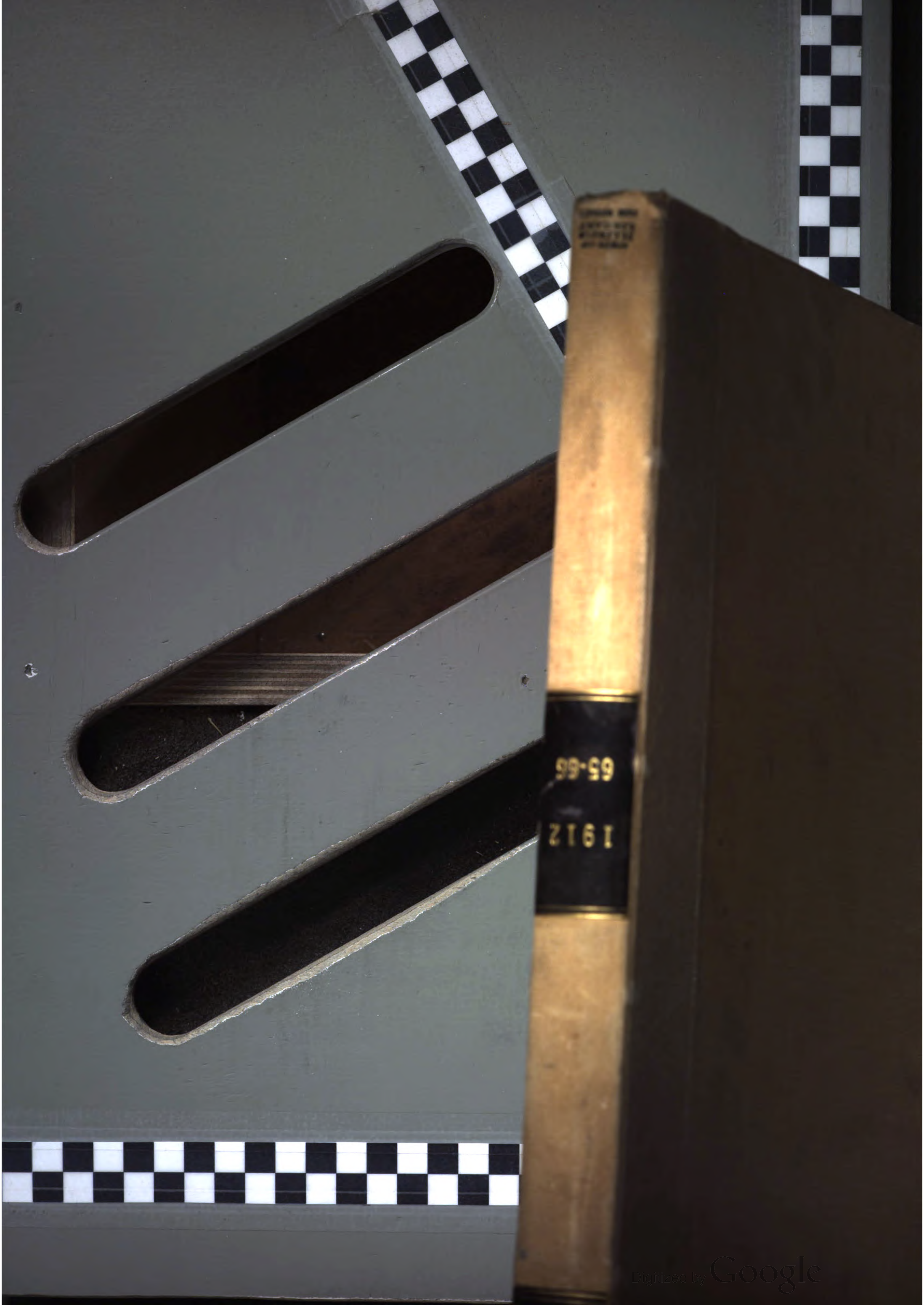

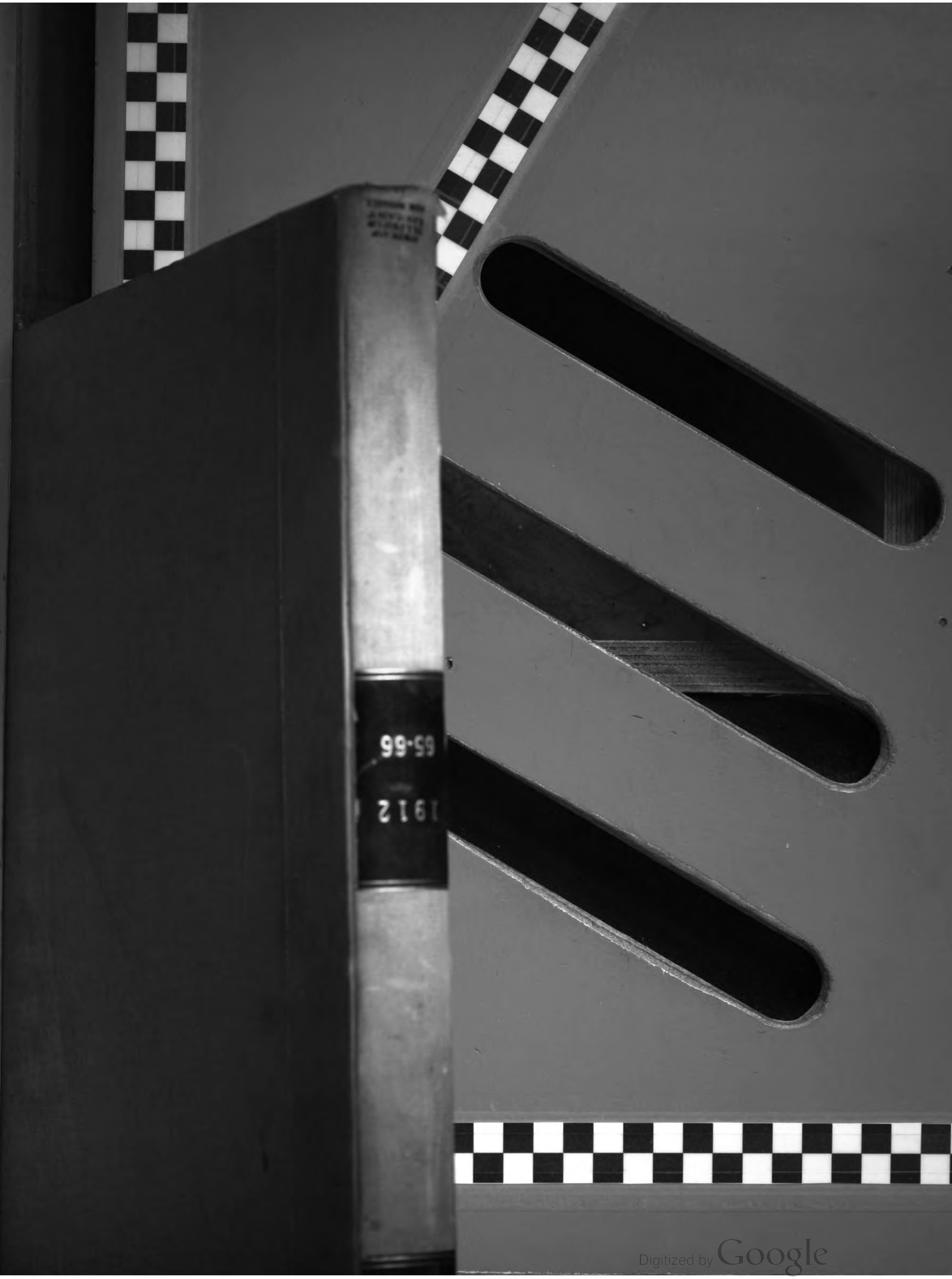

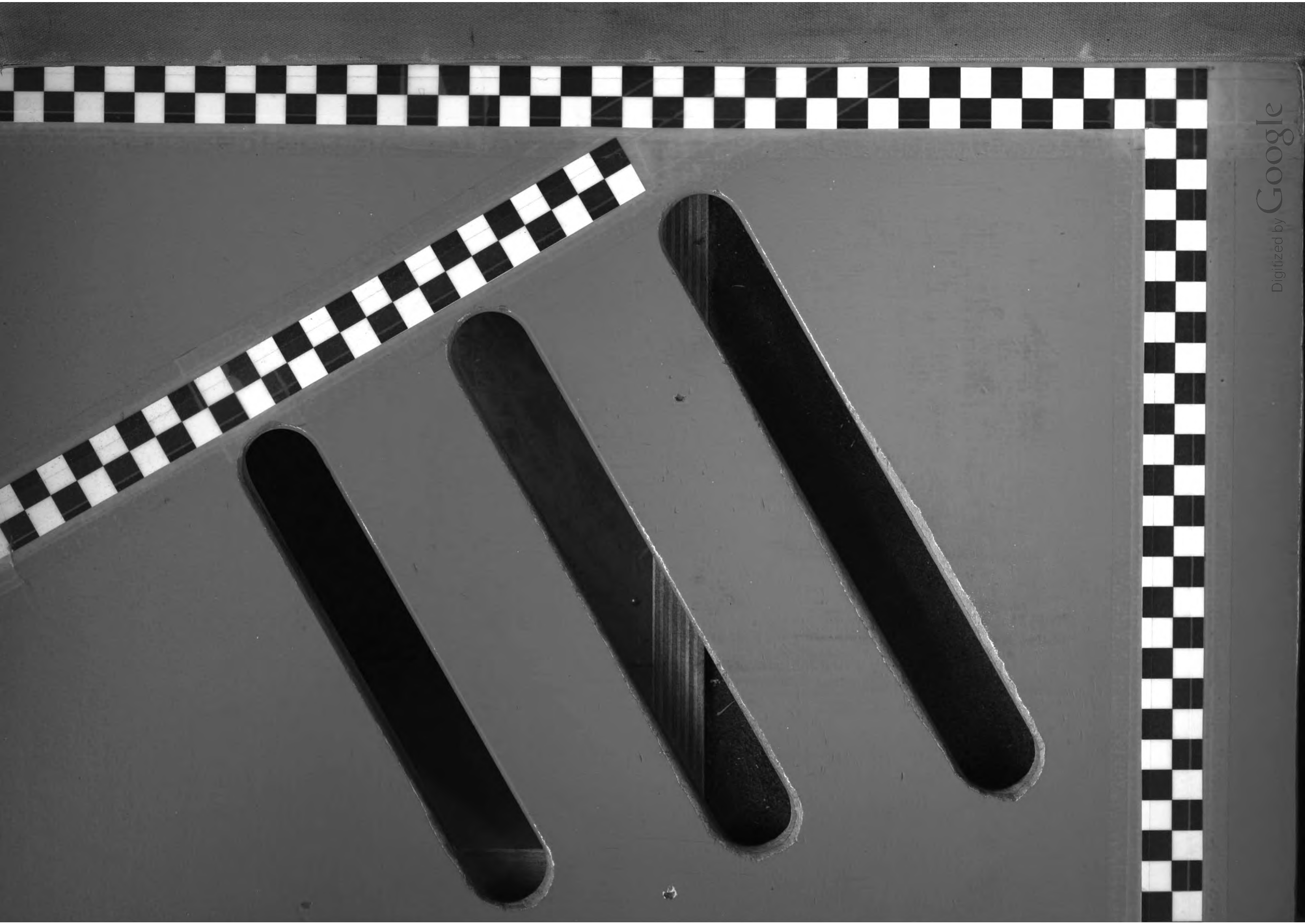

THE

BLACKSMITH AND WHEELWRIGHT

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AUTO BODY FITTING.

How to Make the Necessary Changes for Different Styles.

BY WAGON MAKER.

Changing styles of an automobile is a common occurrence. Sometimes the owner does not like the style and has a new one made, while others change for summer and winter styles. Among the winter styles are the limousines, landaulets and brougham bodies, and the summer styles are generally touring cars, with shifting extension tops, and the runabouts with shifting three bow top, which can be removed or replaced without much trouble. The close top bodies are generally done up during the summer season, while the touring cars and runabouts are repaired in the winter months. The machine often used at all seasons except when it needs repainting and this is generally done during the cold weather.

The wheel base on the frame illustrated is 124 inches, the wheel tread 56 inches, center to center; wood wheels, artillery pattern with steel hubs, and pneumatic tires, 36x4½ inches front and 36x5 inches rear. The frame is pressed steel 1¾x4 inches, 35½ inches wide across and narrowed front 1½ inches each side, giving a small turning radius. It is of seven passenger capacity, divided up as follows: Two for front outside seat, two on auxiliary seats, one on each side, and three on rear seat. The length of such bodies is generally 10 feet 11 inches on top rail, length of body from coupe pillars to rear end on top rail is 6 feet 8 inches, and width across hinge pillars on top rail from 54 to 60 inches.

These dimensions refer to the large limousine body as illustrated in Figure 1. There are two glass frames on the rear side quarters, as one for this space is too heavy to lift.

The body must be designed in proportion with the length of the frame. In such a case the front seat can be lengthened from dash to coupe pillar and three more inches can be added from the dash to seat, but if the body is same size as in Figure 2 or shorter, and to avoid the empty space in the rear, the lower part of the body is extended and, therefore, more space is obtained for storage.

The rear end can be more or less shortened, depending on the length of the frame. The various lengths of this body are as follows: From dash to seat, 24 inches; from seat to coupe pillar, 20½ inches; size of coupe pillar, 2 inches; width of doors 25 inches, and length of rear end 36 inches. This makes in all 107½ inches. The cross widths are as follows: Width of frame 35½ inches; body sills lap over ¼-inch each side of frame. Amount of recess on the sill to the outside of the panel ½-inch each side, which gives a width across 37 inches; width of body on rear recess 41 inches, making the amount of flare 2 inches on each side; width across front, at dash 38½ inches; bottom of seat 46 inches and top of seat 48 inches; amount of turn under 1 inch each side. Across coupe pillar and hinge pillar on top rail, 54 and 54½ inches. Amount of turn-under 5¼ inches each side.

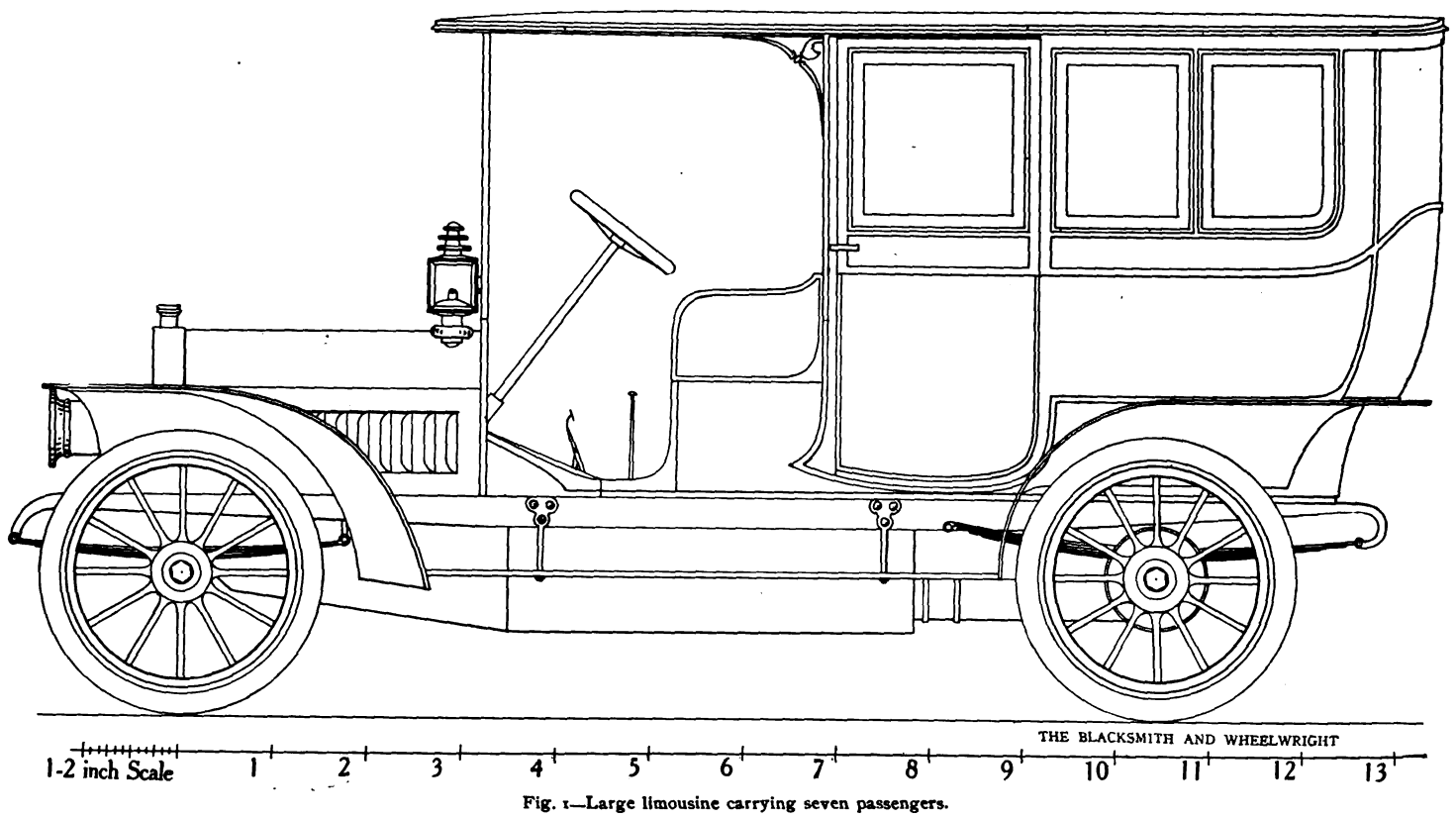


Fig. 1—Large limousine carrying seven passengers.

All these dimensions are shown on the bottom view, and the amount of turn under on the right side of the back view. The bottom view gives also the correct shapes, as created by the shape and amount of turn under, and side curve of body. The bottom view represents only one-half the width of the body, divided by a center line while the back view represents both sides. Considerable practice is necessary to frame such bodies, but if the patterns are made correctly, all the pieces can be dressed from the patterns. The sills are straight but are inclined, therefore, the door rockers must be dressed after the flare, as shown on the back view. If the timber is heavy enough for coupe pillars, they can be dressed square from both sides, which is the easiest way of doing it. Some body builders do away with strainers when covered with aluminum, because the metal will strike against the strainers and produce rattling when the

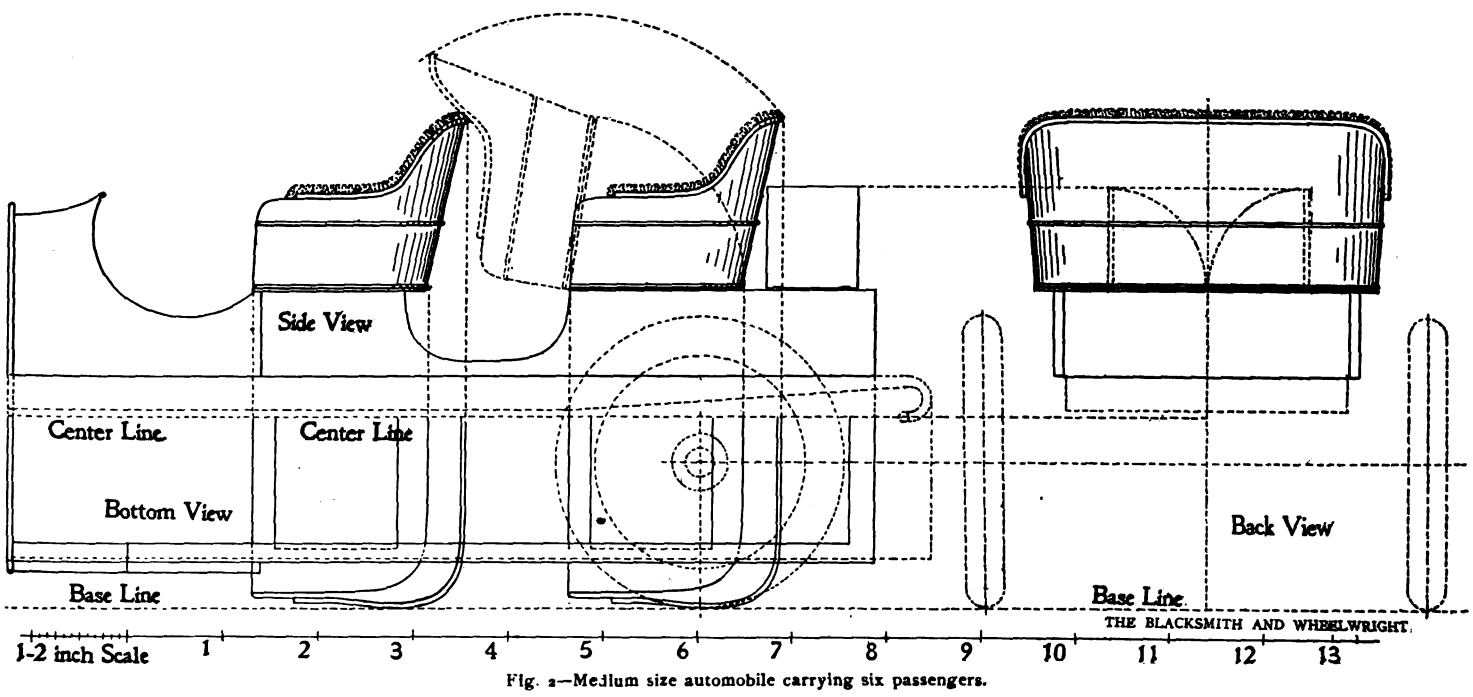


Fig. 2—Medium size automobile carrying six passengers.

car is in motion, but if the metal is well fitted against the strainers the noise will be avoided.

The touring car, Figure 3, has an extension top which can be mounted and demounted by the turning of a few nuts. The front horizontal bow is not stationary to the front bow, and when the top is folded the rear end of the horizontal bow is removed and put in the lower socket; a very simple device and serves the purpose. The rear part of the top is secured to a rail and the rail in turn is fastened to the seat, and the bow prop irons are welded to the rail.

The dimensions of this body are as follows: From dash to seat 24 inches, from seat to coupe pillar 18 inches; width of door including coupe pillar on top of body, 24 inches; length of rear end from hinge door joint to upper molding, 27 inches; whole length of extension top, 8 feet 8 inches.

There is a large space left in the rear for this length of body but this space is utilized for a trunk 12x23 inches, 36 inches long, resting on the frame and strapped to it.

The cross widths are as follows: Across the front at dash, 38½ inches; width of frame, 35½ inches; body sills lap over ¼-inch each side; amount of recess on each side, ½-inch, making the width of the body 37 inches. Across the bottom of the seat, it is 44 inches and across the top 46 inches; amount of flare each side 1 inch. Across coupe pillar on top molding 48½ inches, and across hinge pillars 50 inches. All these widths are represented on the half bottom view and back view.

These bodies are very easily built. The seats have bent rails, bent to the right shape, the metal fitted over the frame work, and moldings rolled to the metal. The size of the rolled molding is generally ⅛x½ or ⅝-inch.

The top is divided as follows: Front length 37 inches; between the two vertical bows 39 inches and rear end 28¼ inches. On account of the large space between the two vertical bows to hold the goods up, band iron ⅛x¾ is fitted over one of the bows and riveted to the leather to hold the top leather in shape. If the top is not lined on inside, this iron must be painted or japanned.

The width across the bows is 52 inches, but the slat-irons are bent inward and have the same width as the body, which can be seen on the back view. On front end the top has 7-inch drop, on front vertical bow ¾-inch and on rear end 4¾ inches.

Figure 4, the touring car, has a seating capacity of four, but the rear seat can be made smaller to seat one passenger only. On top of the rear end are two lids to make it handy for storing away articles; at the same time the seat is hinged to turn up making it still handier for storing large packages.

The lids must be made to keep the water out; generally band iron is screwed on the inside edges of the opening, extending 3-16 inch upward with a recess around the edges of the lids. These lids are locked and locks are specially made for them. The side surfaces of such bodies are generally made straight lengthwise and square up and down, and the space between the seats, which is open on this draft, can be closed with doors. The front part, which is all metal except the sills and toe, must be made to lap over on the frame. To do this, the sills must extend outward so to slip over the toe piece and cover it up.

The seats have a bottom frame with tenons and two bent rails for each seat, the metal put on top of the frame and the molding rolled to the metal. The shape of the round corners for both seats is shown on bottom view, which shows an extra trimming rail. When made as indicated another bent rail is used, and screwed on top of the seat. All parts are drawn to ½ inch scale and any width or length can be taken direct from each of the four drafts.

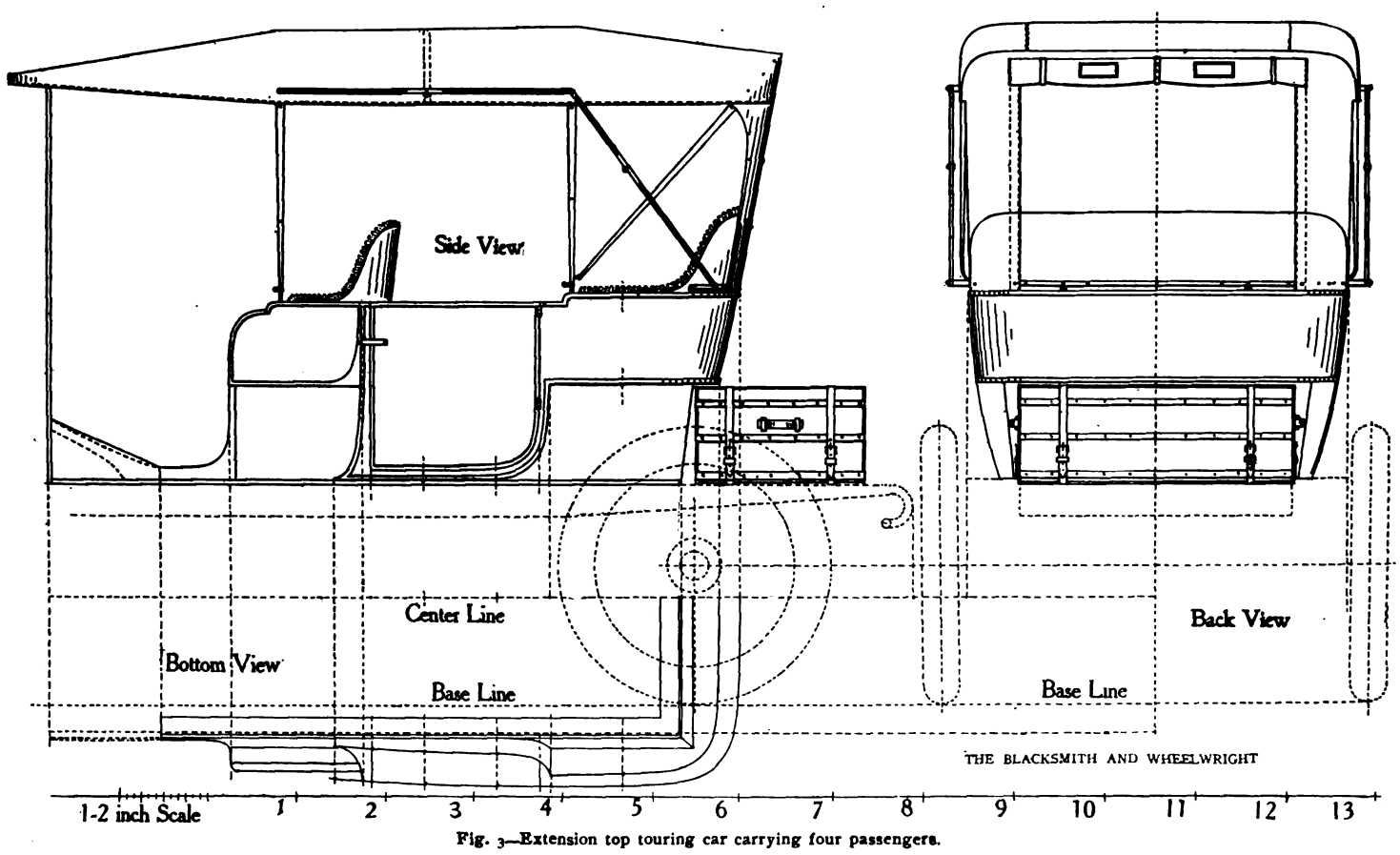


Fig. 3—Extension top touring car carrying four passengers.

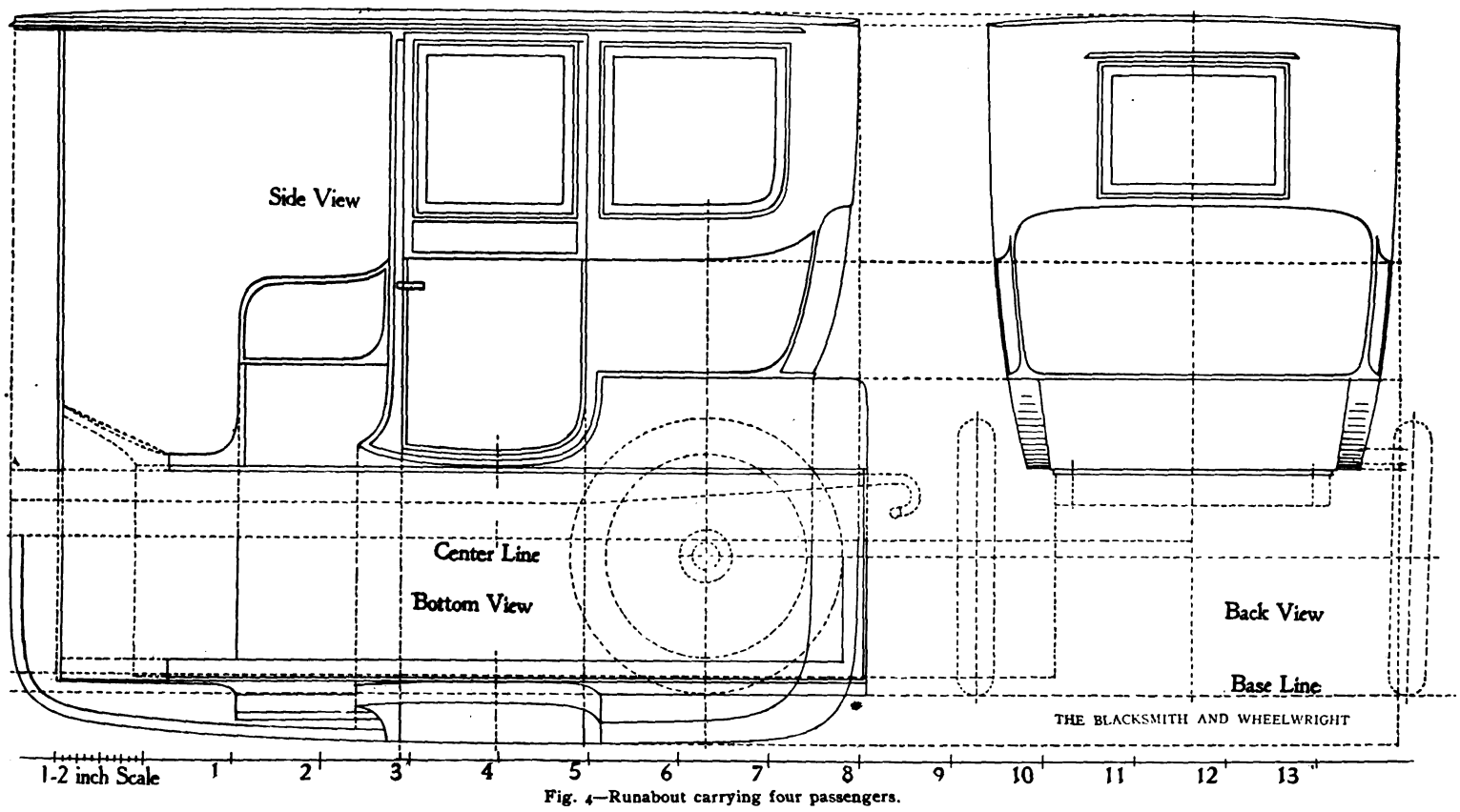


Fig. 4—Runabout carrying four passengers.

THE SUPPLY MAN.

His Importance Among the Various Tools of Salesmanship.

Within the past 25 years a new element in business has been rapidly developing. Possibly it might be more correct to say a new element has already been developed, although it is doubtful if it has even yet reached its full perfection. This element is the science of salesmanship, and it is by far the most important link in the chain of business that connects production with consumption.

Among the more important tools of salesmanship are advertising, travelling solicitors of business, letters, circulars and catalogues. Of these, advertising is undoubtedly the more productive.

Just when advertising first began is uncertain. We know it existed when Adam advertised for a wife and as long ago as David danced before the Lord to give publicity to his joy and loyalty. Quite likely it was practiced a few thousand years before that period. But it was not until the present age, and in fact, not until some 25 years ago, that advertising began to be a real science and by far the most important element to the health and magnitude of business. Pick up any of the old newspapers of 50 years ago—there were really no trade papers of any consequence at that time—and note the crude, incomplete, ill-considered and desultory character of the advertisements.

It is somewhat irrelevant to this subject to inquire why advertising has developed so enormously both in extent and character during this last half century, and the reason for it will thus be dismissed in a single sentence: It is due to the fact that since lightning has been tamed, steam harnessed, iron and steel substituted for sinew and muscle, and the machine—lightning speeded and humanly endowed—has become of universal use, production is all the time keeping just a little ahead of consumption. This subject in itself is one of the most thought-inspiring of the present age, but we will leave it right here hoping our readers may give it the consideration it merits.

This stupendous capacity for production has naturally developed the science of salesmanship, and advertising is by far the most important link in the stream of business that keeps the current moving.

But there is another strong spoke in the great wheel of business which is of decided advantage to the consumer even though it may not be so essential to the producer, or rather to the magnitude of production.

We refer to the retail dealer, or as some have termed him, the middleman. In the blacksmith and wheelwright business, he is usually termed the supply man. In Great Britain he is sometimes called the "factor" or agent. He is the bridge, so to speak, from the consumer to the producer, and in most cases a reliable and essential one. In fact, there is no time when the idea "from producer to consumer" is practicable or advisable except in cases where production and the consumption are right in the same neighborhood or locality.

Where there is a supply man within easy reach of the smith he can visit his place of business, pick out such a keg of horseshoes as he likes, such sizes of iron stock as he needs, look over the general stock to see if there is anything in the way of tools or machines that he could use to advantage, make such inquiry as to the things seen as an inspection is likely to bring out, and go home satisfied.

If there were no supply man, the smith would be obliged to send to perhaps as many as a dozen different firms for his purchases and even then not have the opportunity to make any direct personal comparison of one different tool or machine with another, as he is likely to have made his selection from a catalogue. Buying anything from an illustration is not always satisfactory. It is far better to see the thing itself, and better yet to see it in juxtaposition with another for the same purpose. As for buying anything of much value "sight unseen," it is not popular nor should it be.

But salesmanship can never be developed as it should be and may be in the case of much of the modern machines and tools, until the supply man as well as the manufacturer thoroughly educates the consumer or purchaser as to their mechanism and utility. This is specially true in the case of the gasoline engine. It goes without saying that both the mechanical and thermal principles must be understood and applied by the manufacturer else he could not build a successfully working engine. If in his printed matter every engine maker would go into these matters in an untechnical manner, carefully explaining them by means of diagrams and thoughtfully selected text, he would find an appreciative audience among his agency connections, and among the purchasers of his engines. Furthermore, he would find that the increased knowledge of the construction, limitations and capabilities of his product would make for an increased use and for a wider and more productive reputation.

It is not sufficient that the difference between a two and a four-cycle engine be explained. It is not sufficient that the operation of the carburetor be explained in general terms. Every part of the engine ought to be illustrated and explained. The why and the wherefore of its shape should be gone into, its function prescribed and its possibilities laid down. Especially should its structural and functional limitations be made clear. Engines quite as frequently fail to satisfy because their possibilities are not determined and applied as they do by failing to come up to expectations. Indeed, the cause of failure in both instances is the same—ignorance of the exact nature and ability of the machine in question and a parallel ignorance of how to make it perform to its maximum efficiency under given conditions.

The entering into such explainations would mean a much fuller detail in the advertising matter of most companies, but there would be a gain in business that would more than compensate for the increased attention and expense contingent upon thus filling in the outlines. Taking the advertising matter that is put out by some engine manufacturers, it deals too largely in generalities for the inexperienced operator of an engine to derive much real benefit from it. He cannot get the connection between cause and effect. True, he may learn to run the machine and to get fairly satisfactory results out of it, but there is always the consciousness that he is dealing with an agent concerning which he is not altogether certain. The blacksmith is a man who loves to deal with concrete facts, tangible things, with machines that he thoroughly understands. Of practically all of his other tools it may be said that he has an appreciative understanding, and that he realizes just what every part of them is for and can see why a certain adjustment will meet some conditions he meets in his regular work. But with the gasoline engine he knows what he would like to have it do; he knows how to make it approximate to his needs, but there is always that element of uncertainty due to his lack of confidence in it, that leaves the door open for unexpected troubles to enter. One who follows the inquiry columns of some of the gasoline engine magazines discovers the deficiencies of the gasoline engine user in the knowledge of those simple principles which he ought to find in the printed matter of every manufacturer and be thoroughly understood by every supply man.

Before the gasoline engine business can be developed to its maximum, the user must be educated into a confident reliance upon his engine.

The same thing applies in degree in the case of many other tools and machines, and as long as the manufacturer cannot place himself in touch with the consumer it behooves the supply man to have the required practical knowledge at his fingers' ends so that he can not only demonstrate the uses and advantages of such machines and tools but the ability to set the user right if by lack of knowledge or care they chance to go wrong.

Wrong impressions are often made and sales lost because of improper care of tools or machines. This trouble is all eliminated when goods are marketed through the supply man. When trouble arises in the case of a machine a mail order manufacturer often writes the customer if he will pay an expert's expenses he will send one to him, or if he will ship it back to the factory, he will try to eliminate his troubles. This proves a very expensive experience to the customer. The troubles of a tool or machine in reality are small when a man thoroughly understands it, and all this assistance is rendered free to the purchaser through the supply man.

ENAMELLING.

This May Be a Profitable Side Line In Some Shops.

BY JAMES F. HOBART, M. E.

It seems to me that the blacksmith ought to know a good deal about everything. Not only is he called on to shoe a horse, repair an automobile and fix a gun, but he must be able to do almost any other work which is brought to him. It is not expected that he will be called upon to make new hair springs for watches or to cut diamonds, or fill teeth, still, I have seen a blacksmith do a mighty good job at setting diamonds, and he set them so well and firmly that he used them for sawing marble and other stone. This chap wanted to cut stone faster than was possible with a smooth steel blade, gravel and water, so he made a pattern of a cast iron circular saw, set black diamonds in the mold at the points of the teeth, poured molten iron into the mold and took out a fine diamond-toothed circular saw which cut stone as if it was cheese. These saws were made and sold for years on Third avenue in Brooklyn, N. Y.

I believe there is many a time when the smith might capture a fat job if he knew how to enamel a bit of iron or steel so it would member with fine art-work. There is nothing hard or mysterious about making and applying enamel. The entire operation does not require as much skill as the making of a good weld, but at the same time, it does require a whole lot of "know-how" in order to make and apply an enamel which will not peel off, ruffle or "craze." The first is caused by lack of adhesion between the metal and the glaze which has not been fused properly, for a glaze must be melted right into the metal just as solder or brass is melted in during soldering or brazing operations. The other two troubles are caused by expansion and contraction of the metal and the glaze. If each expands and contracts differently, either the glaze will puff up or pull apart and is said to "ruffle" or to "craze" as the case may be.

There are then, three principal conditions, which being met, the smith may enamel iron (cast and wrought) steel, brass, copper or almost any substance to which enamel is usually applied. The three requirements are: I—The metal surface must be properly prepared. II—The enamel must be properly mixed and prepared. III—The burning must be in a suitable fire and properly controlled.

To prepare wrought or cast iron for enamelling, place the object in a bath containing one part sulphuric or hydrochloric (muriatic) acid and ten parts water and allow the metal to remain therein until all the black scale has become loosened or has fallen away. Sometimes a vigorous scratch-brushing is required, especially where the scale is thick or obstinate. Heating the pickling bath will hasten the operation, which should be followed by thorough washing in clean water. Then the necessary polishing should be done, after which the objects are to be well washed in strong potash water, then carefully rinsed again in clean water, and dried free from dust.

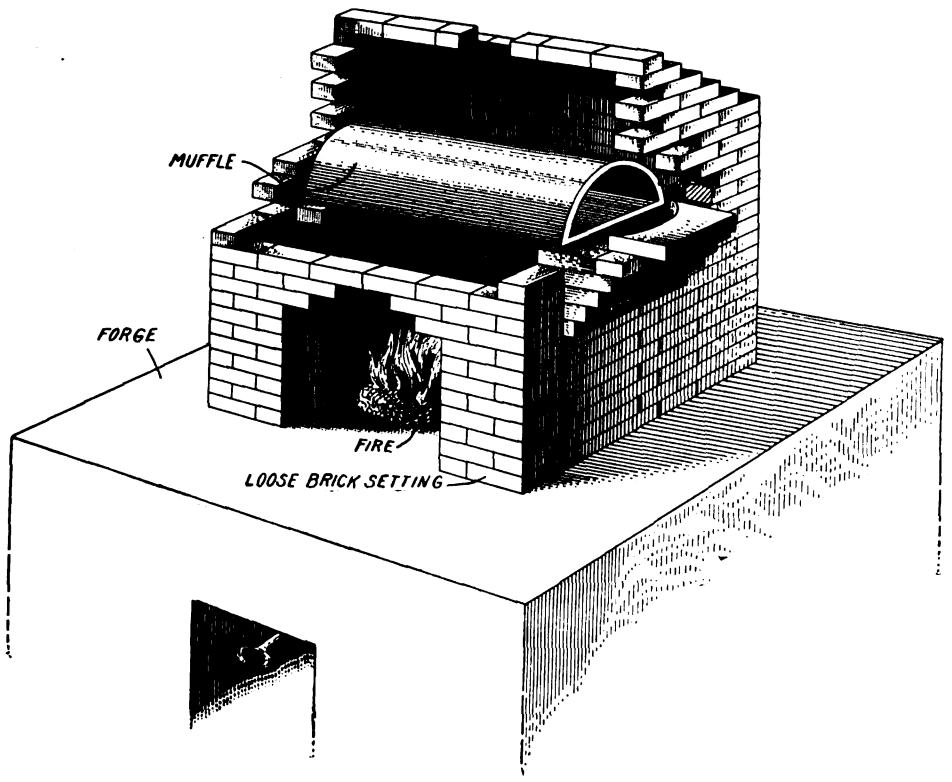
It is necessary that all scale, grease and dust be removed from the surfaces to be enameled. Even finger marks will show plainly after the enameling, and in some cases will cause the enamel to peel off where the marks occur. In fact, the surfaces must be scrupulously, chemically clean and kept so until the enamel paste has been applied.

The next step is the preparation of the

enamel of which at least two coats should be applied, the first being known as the "ground" or "base," the second coat as the "glaze." Ground enamels are composed chiefly of alumina and silica—clay and quartz. Two coats are absolutely necessary in order to take care of the expansion of the metal to which the enamel is to be applied. The "ground" serves as a sort of cushion which gives and takes as expansion and contraction occurs, permitting the glaze to remain smooth and free from cracks under considerable movement of the metal beneath the ground coat or mass.

The base of most enamels is aluminum silicate with which a quantity of silicic acid has been mixed, sometimes to the extent of 75 per cent. Some boric acid is added to lower the melting point of the enamel and a little magnesia will cause it to adhere to the iron much better. When articles are to be enameled which are not to be used for cooking or eating purposes, oxide of lead may be used to reduce the melting point.

The substances selected for making ground or glaze should be carefully selected, clean and



Section of Temporary Enameling Furnace with Muffle in Position.

free from grease, then finely ground until each substance will pass through a sieve with 200 openings to the linear inch. In this powdered condition the articles should be weighed together and carefully and thoroughly mixed. Then the ingredients should be melted together and poured into cold water to break up the resulting mass which should again be finely pulverized and is then ready to be mixed to a cream with water and painted over the surface to be enameled. When exposed to heat, the layer partially melts and unites with the metal surface, forming the ground, or base for the enamel or glaze to be applied later.

There are many good grounds in use. One which will answer most purposes, is composed of the following: White (crystal) glass 13 parts; calcined soda 1½ parts, and boric acid one part. When a good deal of enamel has to be prepared it will pay to put in a little porcelain lined mill—a hollow cylinder with heads like a drum. Inside of this machine, which is lined with porcelain, silica or some very hard non-metallic material, is placed the coarsely powdered glaze material together with some flint pebbles from Newfoundland or France. The cylinder is then closed and started slowly revolving. The tumbling around of the pebbles and material forms one of the best pulverizing machines known to engineers.

But when only a very small quantity of glaze is required as for the purpose of the smith, it may be prepared in a common mortar, pounding it with the pestle screening occasionally to remove the portions fine enough to pass the No. 200 sieve and returning the tailings to the mortar again. Never try to pulverize all of a certain quantity through the fine sieve. Just pound hap-hazard a larger portion of material than you want and stop when a sufficient quantity has passed through the sieve. Where the presence of a small quantity of iron will not harm the glaze, then the porcelain lining may be omitted in the pulverizing machine, but iron, like all other metals, will cause color in the enamel. Bear this well in mind when trying to reach certain shades, and keep out the metals and particularly, their oxides, as these things are used for making color in enamels.

There are many—very many forms of enamel which may be prepared. The mixture noted above may be used for a single coat enamel, without overglaze, but if it cannot be conveniently made, the following will answer and for some work may be even better:—Finely ground felspar 17 parts, borax 14 parts, clay 6 parts. The borax and the felspar are to be coarsely powdered, fused and poured into water and powdered as described elsewhere, after which the clay is to be added, also 3 more parts finely powdered felspar and 1 part of carbonate of magnesia. This mixture is to be made into a cream with water and painted over the metal to be enamelled, then burned.

The over glaze for the above base may be composed of the following ingredients, which have been melted together, pulverized and sifted as described: Quartz meal 10½ parts, borax 5 parts, tannic (tin) oxide 14 parts, soda 4 parts, and saltpeter 3 parts.

The enamel worker must use the utmost judgment in mixing and applying both base and glaze, also in the burning, which will be briefly described. Enamel burning cannot be done in an open fire on account of the chemical action of the fire upon the enamel, also from the danger of impurities becoming attached to the surface of the enamel. Hence a fire-clay box, called a "muffle" is used to contain the articles during the glaze-burning. The potters use a somewhat similar vessel which they call a "sagger."

A muffle in a furnace is represented by the illustration. The smith may make his own muffles if he has the proper kind of fireclay and silica sand, but it usually pays better to purchase them ready for use. The size of the muffle must be according to the size of the work. A fair sized muffle can be heated in the forge by laying some bricks around in the form of a small furnace, with supporting bricks projecting inward to receive the muffle. Room must be left underneath for replenishing the fire which must be maintained for several hours in order to heat the muffle slowly, to melt the glaze, and then to cool the muffle as slowly as it was heated. A forge fire can be used but it is not nearly as convenient as a special furnace made to carry a hot steady fire for a long time.

The muffle proper as shown by the illustration, is just a half round clay affair flat on the bottom, closed at the back end, open in front except that a brick or a slab is placed against the opening while the heat is on. Heat the muffle to a red heat which will just liquify the outer coat of enamel upon the articles within. The time the heat shall be held depends upon the enamel being used, but the time of heating and cooling the muffle and its contents—especially the cooling, should be considerable, for more poor enameling is caused by too quick cooling than by any other means, provided the enamel mixture be fairly good in each case.

It is impossible to tell how to handle the burning of enamel any more than it is possible to tell a green man how to shoe a horse. He must, in both cases, follow general directions and then find out by experience. The muffle shown by the engraving is a large affair, big enough to hold a good deal of work. If the smith wishes to work up a little experience in the enamel business, let him procure for a few cents, from any dealer in assayer's material, a small muffle, say eight inches long. This may be set in loose brick on the forge as shown or it may be set in a little furnace made of silica sand and portland cement. That combination will stand occasional use for a considerable time. Good hard paving bricks will last six months and a few fire bricks may be procured through any dealer in lime and cement.

Set up the little muffle, then work out the enamels, test each one made and keep a careful record of each test, the exact ingredients in the mixture, the time of heating, of firing and of cooling and last but not least, set down the exact results obtained, otherwise the test will be worthless. Any experimenting of any kind whatever, in fields in which the worker is a student, should always be carefully recorded with such exactness that they may be reproduced at any time. Not only that, but without exact recording, the beginner does not know what to avoid trying again, but with results given for the failures as well as the successes, real and quick progress will be made in new work.

A case in point: A certain engineer was required to work out a certain color of enamel, the shade to match exactly some old work. The engineer did this. He made up several mixtures which he thought would be about right, tried them out and found one of them to be exactly what was required. But when he tried to reproduce that shade, he could not do so. He had neglected to record the exact ingredients in each test enamel made and he failed miserably where success would surely have been his had he been careful and exact in his measurements, in the weighing and in the recording of what he actually did!

You can find some dollars in enamel, Mr. Blacksmith, if you will go about that new work intelligently. Will you?

Are Horse-Drawn Vehicles Decreasing?

W. H. McCurdy, president C. B. N. A., in The Carriage Monthly.—We reluctantly admit that in the large cities the gasoline and the electric cars have in some measure temporarily displaced the horse-drawn vehicle. This, however, will prove but temporary, as there is a close affinity between the trained family horse and its owner that is sure to bring back into use the handsome four-in-hand which but three or four years ago was the pride of our city boulevards.

The farmer who is sane (and when you come in contact with him you will find he cannot be designated as otherwise) may buy an automobile when he can afford it, but he does not and will not give up the use of his horses and horse-drawn vehicles. He can afford both and, being aggressive, will keep them both. The farmer and the man who lives in the small town that cannot afford an automobile, or the man who does not want an automobile will continue to keep his buggies, surreys, phaetons and spring wagons.

My contention is (and I feel fully justified in it) that the factory grade of horse-drawn vehicles now in use in the small cities and towns and the country has not been greatly disturbed by the number of automobiles sold; but the falling off of trade, if there be any, may be partially accounted for by the apathy that obtains at present in business generally, but is more directly attributable to a failure of the carriage man to keep his wares before the public.

Many have been dazed by the tremendous

and unwarranted claims of the automobile manufacturers in the number of automobiles being built, and instead of advertising as he did five or eight years ago, it is a difficult matter to find an advertisement covering a full page in any of our carriage journals.

Our lack of business foresight in not keeping before the dealer is causing him to run after strange gods. We must hale him, call him back and set him right. Let us resume our old-time aggressive measure and place our vehicles before the dealers through journals that we know get into their hands monthly, and I predict that a new era for the buggy manufacturer will soon appear.

HORSESHOEING.

Something About the Art, Its Practice and the Construction of the Foot.

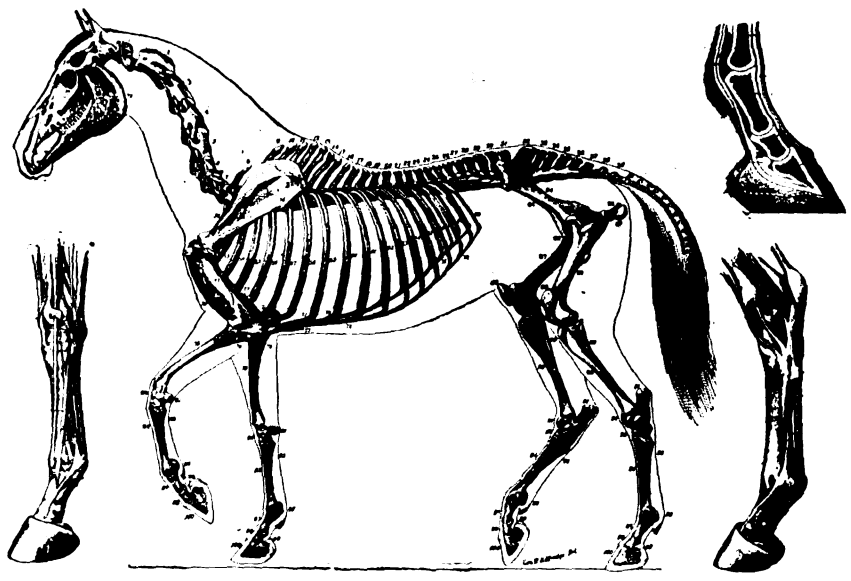
There are probably few things which have been known and practised for so long a period, which have been found of such general utility, and yet have undergone so little modification or real improvement as that of horseshoeing. The earliest model of an iron shoe we can discover differs but little in form from those now in everyday use; and perhaps there are not many arts which have attracted a larger share of attention and experiment by men who had made the subject their profound study, and others who had not, and knew but little of the theoretical principles which should govern its practice. Books have been written by scores, promulgating new methods; patents innumerable have thrown their protection over inventions doomed never to be adopted; expensive machines have been devised for the speedy manufacture of shoes of a particular shape or quality of metal; and individuals have given various designations to eccentric or trivial deviations from the ordinary pattern; yet what is the result? That, with one or two exceptions, little change has been wrought, and shoes resembling in shape those in use ages ago are still in universal use, and are not likely to be supplanted for some time to come; while the mode of fastening them to the hoofs by nails, cannot, it appears, be practically replaced by any other yet proposed. One reason for this is probably that the supposed improvements have been either too extravagant or speculative in their aim, and gave rise to disappointment after a brief trial; or they were so elaborate, or unsuited to the foot and its functions, that they could not be adopted.

The shady aspect of civilization, as regards an artificial existence, is manifested in the horse as palpably almost as in man; and of the many ills entailed upon this creature by domestication and continual employment upon made roads, none are more grievous, more frequent in their occurrence, or more difficult to remedy, than those attributed, directly or indirectly, justly or unjustly, to shoeing. Hence the avidity with which any reasonable proposal for the avoidance of these evils was jumped at, and the inevitable reaction and disappointment which ensued when they failed; until now, so firmly established has the present mode of shoeing become, the announcement of any improvement seldom obtains more notice than a smile of incredulity, or hesitating and often prejudicial trial.

The truth consists in this, that it is not so much new-fangled notions or devices, which have really no practical bearing, and are usually founded on error, that are wanted, but careful attention to the anatomical and physiological teachings which the study of the limb and foot alone can give, and simple adherence to well-established principles which have their foundation in these. A neglect, or want of a just appreciation of the value of the facts which horseshoeing furnish, have been fruitful sources of false doctrine in this respect, and have caused much suffering to the unfortunate horse, and loss to his owner.

For a period extending over very many centuries, it would appear that the horse's foot was regarded and treated pretty much as if it were a block of wood exposed to attrition, and that the sole aim and purpose of shoeing was to defend it from wear. Its anatomy, functions, and maladies, if it had many in primitive times, were little understood; nor, perhaps, were the less noticeable, but no less important advantages to be derived from the scientific application of horseshoeing thought of. At the time of their invention, and during many centuries, horse shoes were simply a narrow iron armature laid flat against the foot, with the exclusive object of protecting it from wear. This primitive idea of shoeing has its analogy in that now employed by the Arabs: an analogy which is further confirmed in the method of attaching the shoe. In both cases the nails have large heads, intended to grasp the ground; they take a short, yet strong hold of the wall of the hoof, and the points, instead of being twisted off, are simply turned round to the side of the foot. The nail-holes are circular, the necks of the nails are also round, and the shoe is light. This analogy gives rise to the conviction that with the Gauls, the Gallo-Romans, the Greeks of the lower Empire, as well as with the Arabs of now-a-days, the horses' feet were scarcely pared; that they were as frequently without shoes as with them, and that the deteriorations of the horny case, and the infirmities of the inferior extremity of the limbs, were unknown to them.

The settlement of certain Germanic races in France and Britain after the departure of the Romans, and the extension of their rule, caused the gradual substitution of the



German for the Celtic method of shoeing. Instead of the narrow shoes, with the flat upper surface and undulated border, heavier plates with a wider surface, and concave towards the sole of the foot, began to be introduced, and reckless paring of the hoofs began. From this time up to the present, this form of shoeing has more or less prevailed.

Caesar Fiaschi, one of the earliest writers on farriery, gives us a long catalogue of foot diseases, directly or indirectly, due to paring, and he and all enlightened men who have succeeded him, and who have written on this subject, have protested against this practise. Whenever the sole began to be pared, the heels opened, and the frog multilated, it became necessary to adopt shoes with the foot surface concave; no pressure could be borne by those parts which had been deprived of their natural protection. Therefore were made like a basin, the inner border only resting on the ground, and the whole strain of the animal's weight and load, as well as that incurred in violent exertion, was thrown entirely upon the outer margin of the foot. This could have but one result for the poor horse—disease and ruin. Routering has accompanied the art from the remotest period; it haunts it now; there are but few workmen who are able or who care to reason as to its application, or its effects on the healthy functions of a most beautiful but a most complicated organ. The art of shoeing is somewhat traditional; and however able a workman may be in the practical detail which he has acquired by imitation from others, yet he will never advance a step beyond unless his intelligence has been quickened by something besides the mere mechanical knowledge he has acquired by unstudied repetition. He is but a laborer or workman pursuing a useful but unscientific occupation, unless he can combine theory with practice and extend his knowledge beyond the hoof shell to the vital structures within, and in this way maintain them in a healthy state. It is no doubt owing to this routine manner of treating the horse's foot little progress has been made in diminishing the defects and diseases of this organ, which are so numerous and prove so destructive.

Previous to the beginning of the 18th Century, it may be said that the shoes were clumsy, and badly contrived. Little thought appears to have been paid to the injurious influence shoes and paring might have on the form of the hoofs, on their texture, on the horse's natural movements.

And in the 19th Century, the mistaken notions prevailing with regard to the elastic properties of the foot did much to perpetuate the mischief. Apparently overlooking the fact that a large portion of the inferior part of the hoof is closely filled with inelastic bone, that the wings of this bone, which is of a crescent shape, extend to the very extremity of the heels, and that the inflections of the wall, termed the bars, are attached to the inner face of these wings, it has yet been stoutly maintained that this portion of the foot was largely capable of dilatation and contraction, and that these movements actually occurred during progression. The sole, too, descended and ascended, and the whole inferior surface of the horse's extremity was a wonderfully contrived resilient apparatus, whose freedom must not only be uninterrupted, but facilitated.

Paring the sole until the blood was nearly or quite oozing through, and sometimes applying extreme pressure to the frog, were the means employed to keep the foot in a natural condition, and to prevent the then extremely sensitive sole from being bruised by coming in contact with the shoe, as well as to permit its easy descent, the upper surface of the shoe was bevelled off so as to leave a wide space in this vulnerable region, and the whole strain of the weight and movement thrown on the crust or wall alone.

The result was, that the hoofs, instead of contracting and expanding, as it was erroneously believed they ought to do, only contracted; the tender horn, ruthlessly exposed by the drawing-knife to rapid desication and other abnormal conditions, rapidly shrank, dried, and lost its healthy properties; from this arose various disorders, such as contracted heels, fissures in the horn, wasting of the frogs, and even more deepseated maladies of the foot. Or if the unfortunate animal was put to severe exertion, the tremendous strain thrown upon the anterior and lateral parts of the foot readily set up congestion or inflammation of the vascular textures uniting the hoof to the bone within, and flat or convex soles, deformed wall, lameness, and partial or total inefficiency was the result.

This most injurious fashion of cutting away the sole and frog, and deeply notching the heels, is still too much in vogue; though in the army it has been for many years abolished, and the result of a rational method of shoeing are most marked in the diminution of footlameness, and the maintenance of the hoofs in a natural and serviceable condition.

Although protecting the horse's foot from exposure to undue wear, and from the injuries

which would befall it if made to undergo hardships with which it was not naturally designed to contend, yet, unless most judiciously employed, much that belongs to shoeing is a serious evil; and the skill of man ought therefore to be directed to the diminution or suppression of those tendencies. For example, the employment of nails to fasten on the shoe, however carefully managed, is to a certain extent a source of injury to the hoof; but when used indiscreetly, is positively ruinous to the animal. No invention yet proposed has succeeded in retaining the shoe so firmly as nails, and the many failures that have resulted when other fastenings have been tried, leads to the belief that no means at once so convenient and so efficacious will readily be substituted for them. Again, different models of shoes have been devised to meet wants, real or imaginery, and to guard against the casualties incidental to the employment of the ordinary shoe, but without success; for one after another they have all been discarded, and the simple shoe, with all its defects, and but slightly modified to suit particular cases, has outlived them all. So that there appears but little chance that anything more simple, useful, or less injurious than the ordinary shoe, when properly applied, will ever stand the same prolonged test, or gain such universal favor.

But knowing the structure and uses of the several parts of the hoof and its contents, as well as the physiology and just proportions of the limbs, the skilful horseshoer, taught by the veterinary surgeon, should be able to obviate many of the disadvantages which usually attend the use of nails and shoes, and reduce others to comparative harmlessness.

The principal object in arming the hoof with a shoe is to protect it from the effects of wear. This was the intention of the inventor, and today it is our chief aim. To prevent the outer margin of the hoof from being broken and worn, by the simplest means in our power, is the problem with regard to the preservation of the horse's foot, and nothing appears to have been easier to accomplish. Before our interference with that organ, its beautiful structures were contrived to meet every demand, and its manifold functions were freely and vigorously maintained. On soft or uneven soil, the entire lower border of the wall, the sole, bars, and frog came into contact with the ground; nature intended them to meet the ground, and there to sustain the animal's weight as well as the force of its impulsive powers. On hard or rocky land with a level surface, only the dense tough crust and bars, the thick portion of sole surrounded by them, and the resilient retentive frog meet the force of the weight and movement; and in both cases, not only with impunity, but with advantage to the interior of the foot, as well as the limb. The horn, in addition to its being a slow conductor of heat, is dense, tough, and elastic to a degree varying with different parts of the foot, while its fibres are not only admirably disposed to support weight, secure a firm grasp of the ground, and aid the movements of the limb, but are also an excellent medium for modifying concussion or jar to the sensitive and vascular structures in their vicinity. Nature has done her best to make these structures, perfect and suitable in every way to the requirements of limb and foot.

In the fore limb, which is chiefly concerned in sustaining weight, the crust or wall of the hoof is formed of fibres running continuously from above, where they are secreted, to below, where they are worn, and following the same direction as the wall itself. As we examine them from within to without—from the surface where they are in contact with the living tissues, we find that they are at first loose and soft in texture, and easily penetrated, while they can be readily dispossessed of their moisture, and then shrivel up into thin, brittle fragments. As we recede from this surface and approach the external fibres, we notice that, like the cells of the human skin, they grow more resisting and dense, are smaller, packed closer and more cohesively together, until near the outer face of the wall, when they become rapidly harder, stronger and more whale-bone like, and though porous, yet appear destitute of moisture. In this respect they are entirely covered with a delicate, translucent, varnish-like secretion, intended to prevent the too rapid evaporation of moisture from the fibres, and to guard against their shrinking and splitting. The bars are similarly formed, and are secreted, like the wall, from the large projecting, elastic mass, the coronary ring, that lies in a wide concavity around the upper and inner aspect of the crust, and has an important share in supporting the weight, and preventing the sole being unduly pressed upon by the bone resting upon it. The crust being always, in an unshod condition exposed to wear, is continually growing downwards from this coronary cushion to meet the demands of attrition; and if hindered from coming into contact with the earth, would increase to an indefinite length. The fibres of the horny sole follow exactly the same direction as those of the wall, and are destined, like them, to come more or less in contact with the ground, and support the weight of the body. They vary in length, being shortest towards the middle of the sole, and longest at their junction with those of the wall. At this part the sole is equal to the wall in thickness. Unlike the wall fibres, however, those of the sole only attain a certain length, when the horny matter of which they are composed dries and fractures like the human hair. By this means the sole seldom, if ever, becomes abnormally thick in a state of nature, and the loose flakes that are continually forming are not only active agents in retaining the moisture necessary for maintaining the elasticity and proper development of horn but also play the part of so many pliant defences to guard the planter surface of the hoof from injury by extraneous substances, with which it is always coming in contact.

The frog is a most important organ. It is analogous to the elastic pads on the foot of the dog, cat, camel, elephant and other creatures. It is designed, like these pads, to meet the ground, diminish the jar to which the limb would otherwise be subjected, especially during violent exertion, and, by its india-rubber-like properties, prevent slipping. In conjunction with the admirably constructed vascular cushion, or "sensitive frog," lying above it, and contained between the wings of the pedal bone, it acts as a protection and support to the large flexor tendon in its passage over the navicular bone.

Spokes In Automobile Wheels.

Up to about two years ago it was the almost universal custom to use twelve spokes in both front and rear wheels. While this practice remains unchanged so far as the rear wheels are concerned, the ten-spoke front wheel has made rapid progress. At present a good many American cars, particularly the lighter ones, are so equipped. We notice that a number of French makers have quite recently adopted the ten-spoke construction for all four wheels. No American maker has to our knowledge yet adopted this fashion.

Experienced wheel makers favor the twelve-spoke wheel, for it permits an economical use of spoke stock and produces an amply strong wheel of sufficiently light weight for the average vehicle. But as their opinions are to quite an extent formed from their previous experience with carriage wheels, it is possible the ten-spoke wheel may have advantages for tyres up to, say, 32in. diameter. It is certain that the wood in the average wheel is not used to the best advantage, for while the oval and sharp-edged spoke sections look well, they are not well adapted to stand skidding stresses. The adoption of rectangular spokes in truck wheels is a step in the right direction.

But whatever may be the merits of wheels with a smaller number of spokes, we must admit that the recent tendency to increase the number of hub bolts is commendable. It is not uncommon at the present time to see as many flange bolts as there are spokes. This gives a much stronger spoke grip, and will result in fewer damaged wheels, for the bolts are so close together that the flanges are not likely to bend.

Col. J. H. Sprague Passes Away.

Thousands of implement and vehicle dealers and manufacturers all over the country will learn with deepest regret of the demise of Col. James H. Sprague, of Norwalk, Ohio, who passed away at his home in that city recently. Colonel Sprague was one of the best known manufacturers in his line, and was very popular as a friend and entertainer. He was at one time employed with D. M. Osborne, Auburn, N. Y. Later he went with the Plano Harvester Company and remained with that company until 1884, when he engaged in manufacturing on his own account, making farm umbrellas, and covers. Colonel Sprague belonged to many fraternal organizations and was one of the highest esteemed citizens of his adopted city.

PRACTICAL FORMULAS.

Under this heading will be published each month a few formulas that have for their purpose the saving of time and money in the blacksmith and wheelwright trade. Although they have not invariably been tested, they come from reliable sources and it would be esteemed a favor if our readers would give their experience with their practical application, whenever possible.

A Sawdust Filler.

The following preparation will be found useful for filling unsightly cracks and holes in furniture and woodwork. Place a quantity of sawdust in an earthenware vessel and pour boiling water over it. Let it soak for about one week, stirring frequently, then place it over the fire and boil until it is of the consistency of thick paste. Pour it on a coarse cloth and squeeze out the excess moisture. When wanted for use, mix a little of it with a thin solution of glue water and fill the cracks or holes with it. When dry and painted over, it will have the appearance of ordinary wood.

How to Draw a Wavy Line.

When it is desired to draw a wavy line with the ruling pen, simply substitute the edge of a coarse-toothed comb for the straightedge. The more rapidly the pen is drawn past the teeth, the less wavy will the line be. Use a coarse comb in which the teeth are not too flexible.

Leather Preservatives.

100 parts sweet oil, 100 parts mutton suet, 2 parts turpentine. Melt together and apply to the leather, which has been sufficiently warmed so that it will liquefy and absorb the fat. Another formula is as follows: 10 oz. linseed oil, 10 oz. mutton fat, 1 oz. Venice turpentine melted together. Apply to the leather when dry and warm and it will preserve it against wet or snow.

Aluminum Polish.

An emulsion of equal parts of rum and olive oil can be used for cleaning aluminum. Potash lye not too strong is also effective in brightening aluminum, benzol is also used.

A good polish for aluminum consists of a paste formed of emery and tallow, the finish lustre being obtained by the use of rouge powder with oil of turpentine.

Aluminum Lacquer.

For aluminum dissolve 100 parts gum lac in 300 parts ammonia, heating for 1 hour over a water bath, paint the thoroughly cleaned aluminum with the varnish and heat it to about 570 degrees Fahrenheit.

Polish for Varnished Wood.

Shake well together 1 pint vinegar, 1 oz. alcohol, 1 pint oil (linseed) 1 oz. butter of antimony.

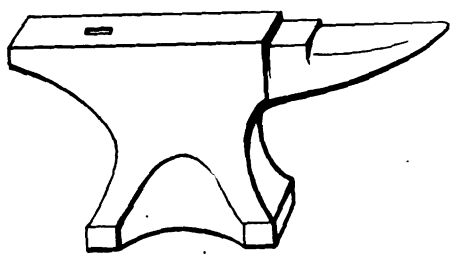
A polish for burnished wood surfaces may be made of the following: Wood pulp 40 parts, hydrochloric acid 44 parts, chloride of lime 15½ parts, turpentine ½ part. Mix in the form of a paste and smear over the surface, allowing it to remain a short time and remove it by quick strokes of a soft brush, or leather, thoroughly cleaning the surface. Rub gently to a polish with a fresh piece of cloth or chamois. This preparation will not affect the varnish. It can also be used on brass and other metals without corrosion.

The Blacksmith's Song

By D. C. NIMMO

All hail to the fire and the bellows strong,
To the anvil face and horn,
The bull-hide apron, tub, hammer and tongs,
And the forgings to be born!
Give, give me the iron! Give, give me the plan!
Stand back and out of my way!
For this hand has fed and old nature bred
The strength and skill of day.

Strike the anvil, give it a ring!
Life loves the oldest lyre.
Around the world the echoes fling
Of man and glowing fire.
As I the mass to heating bring
Life heat and shape me higher!

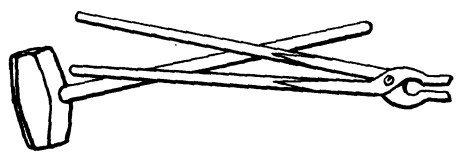


In India old and in Greece and Rome,
All down through the ages past,
And in every land o'er the seas that foam
I have forged and welded fast.
With developing time I have stepped in rhyme
And forged as the thinker planned;
Built another fire and enlarged my tire
Like an all-round first-class hand.

I face all men, a first line man,
Both born and bred on fire.
Black as the coal, fresh as the fan,
An element, strength, desire.
As I the mass forge to the plan
Life beat and shape me higher!

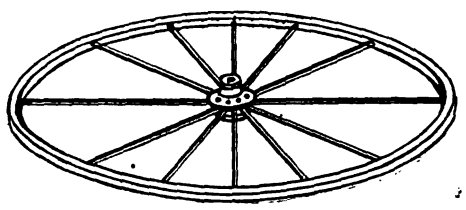
Wagon, horse and plow and all I have dressed
For the agricultural man.
The armor and arms and the swords I blest
For the rare old soldier clan.
I have forged the bones for the vast machines
These moderns bring to birth.
With the strength of storm I have hammered form
Round the old backbone of earth.

Let me live at a welding heat!
Heap up the blast and fire!
The passions white from head to feet,
Feed, thrill me and inspire!
As strength and skill their fullness beat
Life strike and shape me higher!



I have seen all trades, all the crafts and arts,
But would choose again my own.
I have gathered life undreamed by the marts
From life in the forgings thrown.
I am straight and strong and can sing the song
That old Tubal Cain begun.
My old hammer rings and the anvil sings
For my best I've always done.

Lift the hammer! Give her a ring!
Life loves the oldest lyre.
O, beat it out! The echoes sing;
And hope and faith inspire.
As down the mass I finished fling
Life shape me high and higher!



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JANUARY, 1912.

PARTIAL CONTENTS.

A HEARTFELT WISH.

A Merry Christmas and a Happy New Year to all our readers. May we succeed in helping you prosper to the full, and may you contribute to your prosperity by doing collectively that which you cannot do individually.

LITTLE THINGS THAT PAY.

For about a third of a century we have been telling our readers as best we could about things that pay in business. Possibly we may have done this mostly in an imperfect way and fallen short of the responsibility resting upon us, but if so, the short-comings have been due to lack of ability and not to a lack of effort. Helping along our readers in a business way is our principal mission.

But there are little things that pay that do not directly concern the insatiable Moloch of industry. There is, for instance, courtesy. Now we don't mean the namby-pamby, weakly sentimental or affectedly pretty kind, but the courtesy that becomes a man—the civil, gentle and obliging courtesy. This doesn't cost anything and in nine cases out of ten it pays well. It is true that some men do not apparently appreciate it, but right down in the bottom of their hearts, every man has respect for a well spoken and fairly refined man.

Then, although we may not be able to give any material assistance to those in need or in trouble, it costs absolutely nothing to give them a word of encouragement or praise, as the special case may warrant. Those who are successful and who have plenty of friends—and the friends usually go with the success—probably do not need you, but the man who is not successful and who in many cases has few or no friends, does need you. Go out of your way to give him a pleasant greeting or a few words that will let him know that he has your sympathy or best wishes. It will not cost you anything, but it may mean much to him.

We hear a good deal about "opportunity," and how it only comes to a man once in a while, but the word is always used in the sense of self gain or advantage. Why, the greatest opportunity in the world is the opportunity to do something for another, and this comes to us all every day in the round year. You may not have anything to give beyond what has just been stated, but that you may give and that it will pay you to give.

If there are any at this glorious period of "peace on earth, good will to men," who are so beset with misfortune or destitution that they are unable to do even the things mentioned, surely they may at least pat a poor misused horse on the neck or speak a word of cheer to a homeless and hungry dog.

At the beginning of the new year it is a good time to renew and strengthen our feelings of brotherly love and of good will. "Even as ye have done it unto the least of these," etc.

IMPORTANCE OF LABOR.

The term "raw material" is a common one and it is usually expressed with the meaning that no labor has been employed in its production. Coal and wood are commodities that are commonly called raw material. But accurately speaking, there is no such thing as raw material or material where no labor has been employed in its production. Of course it requires labor to mine coal and labor to shear the wool from the sheep. But we may properly go back of even this and point to the labor necessary to raise the sheep that produced the wool. And we may go back still further, and consider the labor that was required to produce the capital that purchased the land on which the sheep was reared or the coal was dug.

In fact, labor is what puts value in everything, and although the price of a thing does not always depend upon the value of the labor expended in its production, for the terms price and value are not of similar meaning, yet if no labor is required to produce a certain thing, it is worth nothing. About the only real raw materials in this world are water and air, for absolutely no labor has been expended in their production. On the contrary, land is not raw material, if we would be accurate, because the money that is paid to acquire it has been made by labor or by the product of labor.

The foregoing may not have been expressed in a strictly scientific manner, but it is near enough to bring out the point which we wish to make, namely: The thing and the only thing that makes value in this world is labor—hand labor or brain labor. Labor can produce capital, but capital cannot produce labor. Capital may be exchanged for labor, but it cannot produce as much labor as the turn of a hand. On the other hand, labor can produce and it has produced everything of value and all value in the entire world. Understand, we are speaking now of value and not of price, for price may be fictitious and may fluctuate, but value is intrinsic or within, and it always depends upon the labor that has been expended upon its production.

It is often assumed that capital can get along without labor but that labor cannot get along without capital. The fact is precisely the reverse. Labor can get along without capital, but capital is absolutely helpless without labor. The capitalists will perish quickly without labor; labor can live and thrive without capital.

By this time, some one is saying, "How can a man labor without capital to pay him for the work?" We reply that labor is cause; capital is effect. Labor came before capital. Labor produces capital; capital cannot produce, it can only make use of labor. Capital is mighty essential in this period of the fullness of time, but capital as represented by money might be all destroyed and the world would go on about the same after the change, producing capital and its representative money or its equivalent, the same old way, until enough had been produced for the convenience of business, and it would not require so very long to do it. But destroy the labor of the earth and the result is quick decadence and death.

MATERIAL FOR HORSESHOES.

A reader asks why horseshoes cannot be made of papier mache, as locomotive wheels have been made. He thinks they would be less likely to slip on the asphalt pavements in the large cities.

The idea, or something like it, was tried in Germany a few years ago, and although reports were favorable, nothing has recently been heard of such shoes. The plan as stated at the time was to take a number of thin sheets of paper saturated with glue and turpentine and subject them to strong hydraulic pressure. The holes for the nails were then bored, and the shoes trimmed for the market. It was said that the shoes wore in such a way that the surface was always rough, thus adapting them particularly to smooth pavements.

That was before the day of so much concrete pavements, and if anything of the kind would work, it would be more advantageous now than at the early period. In England and in some parts of the continent of Europe, we have seen horseshoes made of common cowhide. Three thicknesses were compressed in a steel mold and then subjected to a chemical process. Such shoes were lighter than iron or steel and it was claimed that they adhered firmly to the most polished pavement. They were also said to be quite elastic, thus preventing many sprains. Cowhide is too high priced for such use now, but there is a bare possibility that some sort of a mixture of papier mache and rubber might be combined and make a shoe that would be admirable for smooth pavements and especially for pavements which are liable to ruin a horse after driving a year or two if rubber pads are not used.

THE TRADE ABROAD.

On another page will be found correspondence from London, England, giving a rather comprehensive view of horseshoeing conditions in Great Britain. Summed up, it would seem that the trade there suffers from the same drawback of low prices that prevails in the United States, although compared with the returns in other trades and professions, prices are lower in this country than there.

It is gratifying to note that there exists there what is called a "National Master Farriers' Association," which has done much to

raise the character of the trade and to raise prices as well. As has been stated in this paper before, most of us would prefer to do work and carry on our business as we see fit, without consideration of others in the business, but unfortunately, that independence has now passed except in a few isolated places, and the smith who would be successful today must work in conjunction with others in the trade.

We like to hear of blacksmiths who pull together. It means greater prosperity and better work. It also means better satisfied customers in the long run, and because of these betterments the public welfare is raised.

By the way, have you ever thought that in all questions of this sort that the "greatest good to the greatest number" is what should be sought, and that by setting up this mark as the end to be reached, the final effect is to benefit the individual?

WARS AND RUMORS OF WARS.

Considering that these are "peace on earth, good will to men" days, and that never before have such strong efforts for world peace been made by influential men, the civilized world has just now anything but a peace attitude.

In China the revolutionists seem to be having pretty much their own way, and it looks as if they would be satisfied with nothing short of a constitutional republic with some one at the head entirely satisfactory to the leaders.

Italy is still fighting the Turks and the Arabs. In one recent battle the Turks lost upwards of 1000 killed and several times that number wounded, and the end is by no means in sight.

Persia seems to be standing something like the proverbial lamb, with the Russian bear and the British lion growling and roaring at her head and heels. Four thousand Russian troops have advanced toward the Persian capital. This so frightened the Persian cabinet that after having received Great Britain's advice that Russia's demand for the resignation of the American treasurer general be acceeded to, the cabinet decided to expel him. But the disapproval of the public was so emphatic that the cabinet itself resigned, and a new ministry was formed favorable to the Yankee official. However, the Russian bear stood on its hind legs, so to speak, and showed its fangs to poor Persia, and the Yankee treasurer general was forced out. Quite likely the next move may be the carving of Persia, with the Bear and the Bull as sole attendants at the feast.

Meantime, there is a revolution in Yucatan and there is no knowing what effect it will have upon the present government or lack of government in Mexico.

So much for wars and rumors of wars. We mention them only to show that world peace seems as far away as ever. Those who do most of the fighting have nothing to gain by war. Isn't it ridculous that they should go ahead and kill themselves simply at the behest of a few scheming, plotting officials?

A REAL POEM.

"The Blacksmith's Song," printed on another page of this issue, is a poem of unusual merit. No such faithful and vivid representation of the trade has been recently written. It has the strength and ring of the anvil, the swing of the sledge, the warmth of the forge, and the inspiration of honest toil.

True poetry is one of the fine arts that addresses itself to the feelings and imagination by the use of musical and moving words, and the writer has thus produced a real poem in its best sense. The craft will be glad to read and re-read it, for like everything classical and worthy, it improves by repetition.

A CLOCK IN YOUR SHOP.

Every blacksmith ought to have one of the eight day calendar clocks we offer in our advertising columns with a subscription to the Blacksmith and Wheelwright for a year, for the low price of $3.90. It is the biggest clock for the money we have ever seen. You can see the time clear across even a large shop.

Such a clock would draw trade. It looks enterprising. You can tell to a minute just how long it takes to do a job of work and charge for it what it is worth instead of guessing at it.

READ THE ADVERTISEMENTS.

We have more than once directed the attention of our readers to the importance of the advertising columns of The Blacksmith and Wheelwright. They contain the announcements of large numbers of manufacturers of blacksmith's tools, machines and supplies.

The blacksmith who fails to study the advertising department and to write for catalogues or descriptive circulars of such tools as he may be interested in, is neglecting his own interest. Many blacksmiths are doing work in a crude and laborious way that could be done much easier and far quicker with improved tools and machines.

Time is money to a blacksmith; every minute and every hour counts. He cannot afford to waste time on an old drill or on any other old fashioned tool or machine. Besides it is the advertisements, as we have perhaps pointed out more than once in these columns, that enables us to print such a paper as the Blacksmith and Wheelwright at the low subscription rate of $1.00 a year.

We recommend our readers to look the advertisements over from beginning to end, and if they see anything they are interested in to write for descriptive circular or catalogue, and in each case, kindly mention the Blacksmith and Wheelwright.

Wants Another Knife.

From Ivy Reynolds, Illinois.—About five years ago I got one of your knives and have carried it every day up to last week when I lost it while gathering corn. I want another one just as quick as I can get it; hence the enclosed subscription for a friend of mine.

(Note.—We print the above to convince readers who don't know about it, that the three-bladed pocket knife we are offering to each present subscriber who will secure a new subscriber is really a valuable knife. We have sent out quite a good many of these knives at different times and they have always given satsfaction. Turn to our advertising department and you will see on what terms you can procure one of these knives, which you will find illustrated in the advertisement.—Editor.)

To Remove Rust.

Rust may be removed from iron by immersing the piece for several days, or until the rust has entirely disappeared, in water to which a little sulphuric acid has been added with a piece of zinc firmly attached to the iron so that it makes a good contact. The iron is not attacked as long as the zinc remains in contact with it.

Iron or steel may be cleaned of rust by the use of the following: 100 parts tannic chloride dissolved in 1000 parts water. Add to a solution containing 2 parts tartaric acid dissolved in 1000 parts water. Add to the mixture 20 cubic centimetres indigo solution diluted with 2000 parts of water. Clean the metal parts of all grease, apply the solution to the stained portions for a few seconds, rub clean with a moist cloth then with a dry cloth, and if desired then use any good metal polish. Old rust may be removed in some cases by rubbing with a paste consisting of equal parts of fine Tripoli and flowers of sulphur thoroughly mixed with olive oil.

To Destroy Ants.

The use of carbon disulphide is recommended to destroy ants' nests on lawns. A little of the disulphide is poured into the openings of the hill or disk, stepping on each as it is treated to close it up. The volatile vapors of the disulphide will penetrate the chambers of the nest in every direction, and if sufficient has been used will kill, not only the adult insects, but the larvæ as well. A single treatment is generally sufficient.

Liquid Glue.

A liquid glue possessing great resisting power recommended for wood and iron is made as follows: Clear gelatine, 100 parts; cabinet makers' glue, 100 parts; alcohol, 25 parts; alum, 2 parts; the whole mixed with 200 parts of 20 per cent. acetic acid and heated in a water bath for 6 hours.

HORSESHOEING IN GREAT BRITAIN.

Condition of the Trade There and Other Matters of Interest to American Readers.

From an English Reader, London, England.—Your correspondent has had the pleasure of a talk on general British horse-shoeing questions with Secretary Carson of the National Master Farriers' Association. This society was started in 1905.

One of the principal objects of the association is to defend members in cases of actions for damages to horses by accident or for horses being lamed while being shod. The education of the farrier is also one of its objects, and lectures are given by the president of the association, W. Jones Anstey, who is lecturer on farriery at the Leeds University and the Manchester Technical School, etc. Mr. Anstey gives a lecture each year on shoeing at the Royal Agriculture Show, which is held at the end of June or beginning of July.

Horse shoeing is, on the whole, a declining trade in this country, especially amongst journeymen. Modern conditions have not made very much difference to the number of masters, but of course London has been the hardest hit by the motor traction. The journeymen have been hurt in London because most of the large establishments that previously kept horses, like the bus companies and cab companies, and employed their own journeymen shoeing smiths, have since turned to motors. A great number of the horse shoers are either driving or working in the garages. They cannot find work as shoeing smiths as the horses are not there.

In the country the rise of motor traction has not made so much difference. There are about 20,000 masters in Great Britain each employing at least one man.

So far as Manchester, Liverpool, and Leeds are concerned, the increasing motor traffic makes very little difference. The majority of farriers, except in London, are general smiths as well and do general smith work. Members in the country have gone into the bicycle business and also do automobile repairs. There is no such thing as foreign competition. The average smith makes the horse shoes and London is the only place where the machine-made shoe is used to any extent. Taking the country throughout there are comparatively few machine-made shoes used in England outside London. There is no foreign competition in machine-made shoes because the English manufacturers can compete with the foreigner. We export a tremendous amount of shoes. The leading machine-made shoe makers in England are the British and Colonial Horse Shoe Company, who export their goods all over the world.

There is no apprenticeship system as far as the old-fashioned apprenticeship system is concerned. Horseshoers have apprentices, but they are not indentured apprentices as they used to be. They take on boys and they reckon to serve about three years before they are what is termed "doormen" or "floormen," and are regarded as properly able to nail on shoes. They generally serve about five years to be a finished working farrier.

There is a very large difference in wages in different parts of the country. In London a fully qualified farrier, that is a fireman who works at the fire making shoes and fitting them (higher than a doorman), gets $10.50 a week. In the country districts it would run to from $9 to $9.50; and in the villages from $5 to $6.25. In London the doorman's wage is $9 and in large towns in the country about $7.50 to $8. They work about 52 hours a week. The men get on very well with masters. There is not much trouble between the masters and the men, because the majority of the masters work with the men.

There have been substantial developments and improvements in the trade during recent years because several of the counties and the cities have taken up technical instruction and are giving technical isstruction to the farriers with the result that they know a great deal more about the structure of the foot than they used to and do not practice mutilation as was done at one time.

The shoeing competitions that take place at a lot of the agricultural shows have a great

tendency towards improvement in workmanship.

The Worshipful Company of Farriers, one of the London City Guilds, founded A. D., 1356, have a great deal to do with that because they instituted a scheme of registration some 18 or 20 years ago and it was really they who induced the City and Councils to take up this education of farriers and examine and grant certificates. Horseshoers do not go in for speed records in England as is said to be the case in America. When they have a competition it is for the best work not the quickest—that is the best made shoe and the best fitted and finished job. The one man does everything. He makes two shoes, a front shoe and a hind shoe and he fits the front shoe on himself. He has a man to help him striking. Everything is taken into consideration and judged by points. The hind shoe is made as a model. It is not fitted or put on.

In the rural district the British farrier does wagon, farm machinery and plough repairs. Charges for this class of work have not risen in recent years. That is the great fault in the trade at the present time. Prices have not advanced in comparison with other trades and in proportion to the cost of living. That is what the society, of which Mr. Carson is secretary, is striving for. The men are small masters and are very difficult to organize.

There, of course, always has been the blacksmith who never did any horse-shoeing, the general smith—and he is the class of man who is unemployed in the large engineering shops, railway shops, etc.

The village blacksmith here always is and always was a horseshoer and a general smith as well. He usually does a bit of water fitting and machinery repairs or anything else in the iron line. Even in some of the fairly large towns he does this as well.

One thing that the Farrier's Society would like to have, would be what is already done in Germany, New Zealand and some of the other colonies, and that is compulsory examination and registration of smiths. In Germany farriery apprentices work longer hours and have no Saturday afternoons off, but they must join a school on Sunday mornings and learn the technical part, the structure of the horse's foot, and different methods of shoeing. When they have finished, before they can work as doorman they must pass an examination. If the young hand cannot pass that examination he cannot start even as a journeyman. If he passes and works for a journeyman for a bit and wants to start as a master he has to pass another examination and if he fails in this he can go in for another. If he cannot pass the second time he is not allowed to enter again.

A class of man who keeps prices down here is the man, say for instance, a wagon builder and wheelwright in a small way of business who has a blacksmith. He probably would not have enough work for this blacksmith, so he gets one who can do a bit of shoeing and all kinds of general ironworking, fitting, etc. This wagon building employer takes on local horseshoeing at cut rates just to fill up his man's time during the week and so gets a full return for his weekly wages. If we had compulsory registration and examination this man would be prevented from doing this, because he would not be allowed to start business unless he were registered as a shoeing smith.

The horseshoeing charge here is generally 60 cents to $1.84 per set of four shoes—for making new ones and putting them on. Of course there is a different price for different sizes of shoes. It would greatly depend on whether it was in the country or a town, or in London. The charges are much higher in London than say in a small country market town, the cost of living, rates, rents, and wages all being higher. A farrier would require in London, to pay him, at least $1.84 for a heavy dray horse. Mr. Carson, speaking quite properly for the trade here, does not think any horse should be shod under 84 cents, however small. That would apply to the smallest pony.

It's perfectly proper for the moon to get full occasionally, but the moon has no growing family to pattern after it.

Whenever you feel that you have money to burn, buy some poor widow a ton of coal.

CORRESPONDENCE

This Looks Like Good Business.

From A. E. Lofstrom, Minnesota.—I enjoy reading your paper very much. I am sending you a post card of my shop. Business is very good in this locality, there is plenty to do.

(Note.—The shop of our correspondent is so well designed and apparently so convenient, that we cheerfully reproduce it herewith for the benefit of others who may be intending to build a shop. Mr. Lofstrom's shop is of brick, but in localities where cement blocks are available, we should imagine that a shop built of cement blocks would cost less and be equally as desirable. An improvement to Mr. Lofstrom's shop would be a sign with his name running the whole length of the building on it.

Mr. Lofstrom's Shop.

Heels Too High.

From W. E. Martin, Connecticut.—You often see a horse hobbling around on its toes with stiff front legs. It has always been a soft and elastic, and apparently more easily injured than the harder substance of hoof, but surprise to me that the Humane Society did not take up some of these cases, investigate them and punish the people at fault. There is only one way to shoe a horse, and the men in the business would, of course, prefer doing it that way, properly. A great many horse owners, however, imagine they know all about it, and they insist that the shoe be put on so as to lift the rear of the hoof up high enough to prevent the frog from touching the ground. We may argue the case, but that is about all the good it does. We have to put the shoe on in accordance with the ideas of the owner. The fact is the frog is the mainspring of the animal. It is for all that it is the one part that should be utilized. If it wasn't for use it wouldn't be there. Lift it from the ground and you find your animal walking on his toes. Gradually his legs begin to stiffen, and finally the three bones in his forelegs become one solid bone and there is no more movement of them than if the horse was walking on stilts. It is just about the same as allowing a pair of hinges to remain out in the weather until they become rusted solid, except that with the hinges you can break the rust off, oil them up and work them. But with the horse's leg you can never separate the bones again.

Reads and Learns.

From Waldo Stout, Illinois.—I have saved a good many of your papers. I am sorry I didn't keep it up every year. I have some as far back as 1881. I think they are fine to refer to. Every smith ought to take a blacksmith paper. They are all good but some are better than others, and I think your paper is hard to beat. I have made me a pair of shears, they are very handy and I can cut out off steel 3x⅝ hot either end. I have a Brooks cold tire setter.

Good Business Principles.

From J. F. Sincock, Colorado.—I wish to say to the brothers, that as a usual thing if there are two or three shops in a place, they would do better to get together and come to some understanding about the business. It is a good plan to make out a price list and let each abide by it. Of course you may have some one come to you and tell you that a competitor does work cheaper than you are doing, but if you investigate you will find out that his work is inferior also. If your brother gets the better of you and charges standard prices, the probability is that he is a better blacksmith than you are. Now my idea is that you should do your customer a good job of work and charge him a fair price. Under such conditions he will not usually object but if he does simply say that if he wants good work done he must expect to pay for it, and that you likewise want good pay for the work you do.

A Cleaning Powder.

From Oskar Friedrich, New York.—As every blacksmith has his underwear and overalls always soaked with dirt and grease and his poor wife has trouble in getting them clean enough to please the husband, and as every blacksmith wants to have a clean suit every Monday morning, there is many times a quarrel in the family which could be avoided by using my formula of a cleaning powder. This is dissolved in a certain amount of water and is used for every boiler of wash. This solution dissolves the grease and dirt and cleans the wash without much rubbing on the washboard or with the hands, and prevents the wash from tearing to pieces. By the use of this cleaning powder, a woman does not get tired out or disgusted in doing the wash over and over again. You use this powder in connection with soap, as required in any wash, but I am sure that any woman will know just how to use this preparation in the right proportion after a trial, but she must not mix white and colored clothes together in the same boiler, as that would spoil the entire wash.

The chemicals used are cheap and may be obtained at any drug store, and will last a long time. Buy as follows:

5 cents' worth lump ammonia.
5 cents' worth borax.
5 cent box of lye.
5 cents' worth salt of tartar.

All four chemicals to be dissolved in one gallon of water and use one-half cupful of this solution to every boiler of wash.

I hope that this will be of interest and of great help to every woman and every household, and perhaps it may be the means of solving the dirt problem, and some of the quarrels, in the family.

Foot Power Hammers.

From O. Frederich, New York.—At the present time many of the blacksmiths of Europe are improving their shops with power or foot hammers. The helping labor there is now rather expensive and hard to get, owing no doubt much to the great emigration to this country, where the market for this kind of labor is from the same cause rather dull. In visiting many of these European shops, I observe two styles used for light work as shown by the sketches. They are made of old tire iron and a couple of tension springs, and the method of construction may be easily understood by the illustration. Any blacksmith can make one at very little cost. Both hammers as shown are on the treadle system, but work differently. Fig. 1 works when you press the treadle down with your foot, by lifting the hammer and the springs make the downward blow. Fig. 2 works by pressing down the foot also, but this drops the hammer, the force of the pressure of the foot and the weight of the hammer giving the power of the blow. I find the last-named hammer in most common use around the small shops.

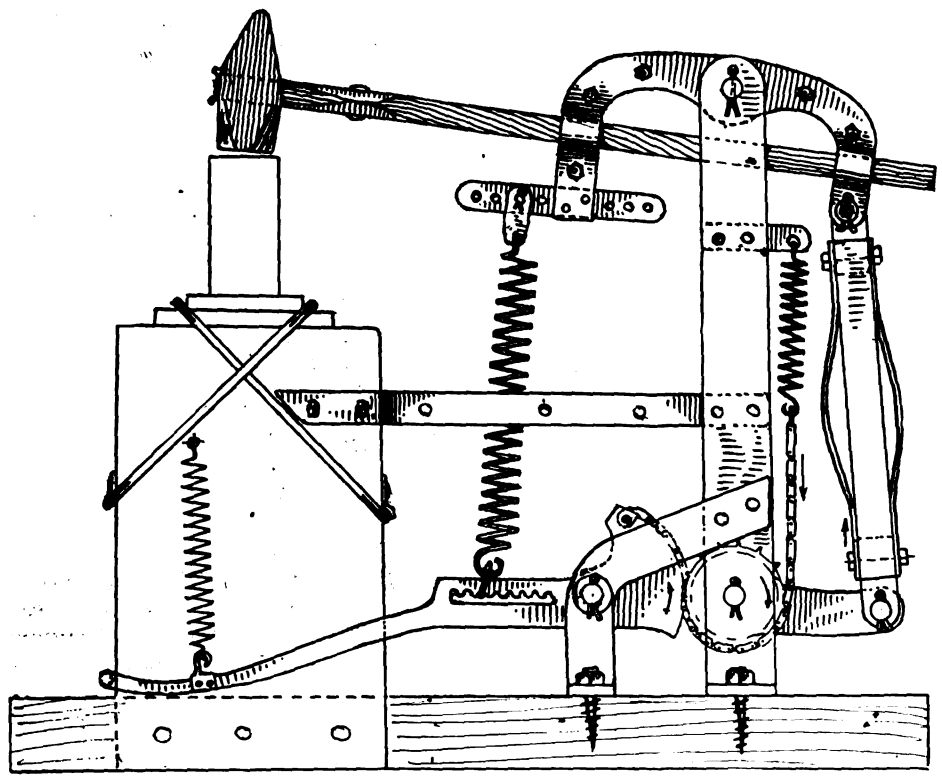


Fig. 1.

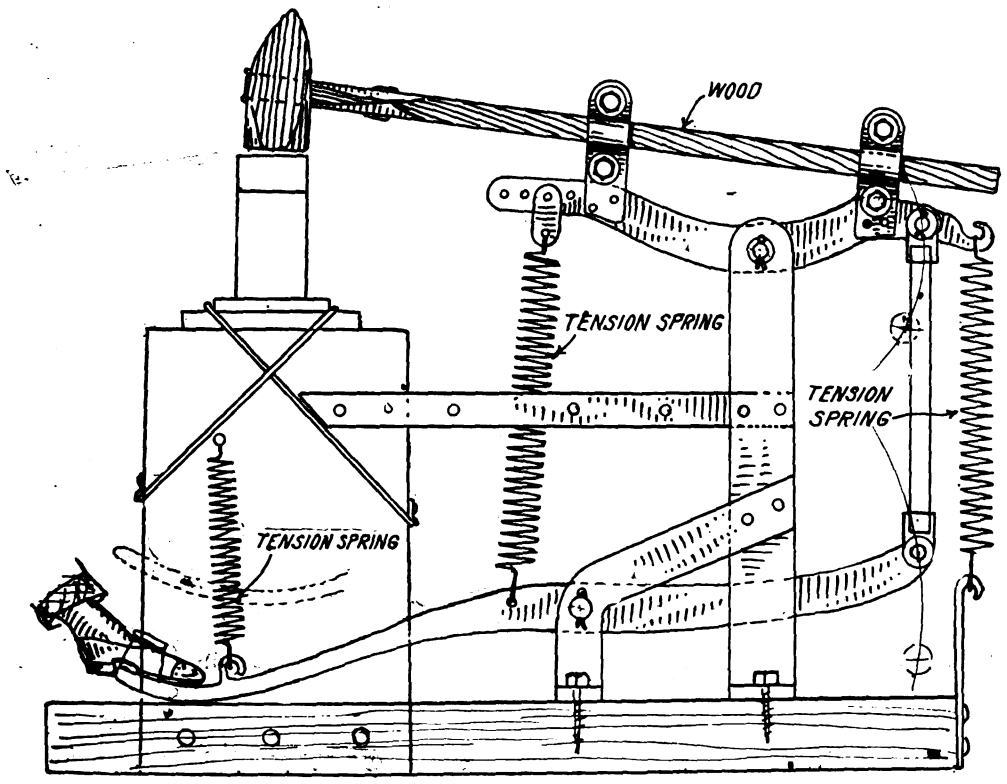


Fig. 2.
Section of Temporary Enameling Furnace with Muffle in Position.

Babbitting Boxes.

From C. L. Presnell, in the Wood Worker.—Instead of cutting the metal out of both bearings at once, cut it out of only one, and shim up the other old bearing with paper or cardboard until the shaft is level and in line, and until the proper thickness of metal is obtained, clamping on the cap so as to hold the shaft firmly in position.

When this is done, cut out two cardboard collars to fit the shaft, and slip them on up to each end of the bearing to be poured. If they cannot be slipped on over the end of the shaft easily, they may be cut apart and spread enough to slip over it anywhere. Cut the metal out of both the cap and bottom of the bearing, as they can be poured at the same time, by proceeding as follows:

Cut the box liners so they will fit out snugly to the shaft the full length of the bearing on both sides. Now cut small V's in one edge of all of them next the shaft, through which the metal can flow to the bottom of the bearing. Clamp on the cap, slip the end collars up, putty or clay them properly, and build up a funnel of putty or clay around the oilhole, through which the metal is to be poured, so as to get sufficient weight of metal to drive it into the bearing, and pour in the metal, which will carry down through the channels in the liners and fill the bottom of the box as well as the top.

When it has cooled, remove the end collars and carefully drive a thin coldchisel under the cap from both ends, which will break the small connections of babbitt holding the top and bottom together, without injury to the bearing, and you will have both the top and bottom of the box babbitted at one operation. Take off the cap of the old bearing and cut the metal out of top and bottom, and do likewise, putting on the cap of the new bearing to hold the shaft in line while pouring the other one. This method will help to get a job done in the least possible time, and, if care is used in the operation, a good job can be done.

Most people have an idea that all bearings ought to be hand-scraped before using, but I have yet to see a man that can scrape a bearing that will bear on the shaft equally all over, unless it is run a while and then re-scraped repeatedly. I advocate leaving off the scraping, but to wrap the shaft with a sheet of paper the thickness of ordinary writing paper, and fasten it on with a string wrapped spirally around the shaft and reaching nearly to each end of the bearing. The paper can be left dry, or moistened with oil, and after the bearing is poured, remove the string, which will leave a nice oil furrow in the bearing; and the thickness of the paper will allow a good fit of the shaft, which will bear evenly all over, and the shaft will run freely without scraping.

After any bearing has run a while it ought to be slightly tightened to a good running fit.

Saw Filing.

From M. J. Lawrence, New York.—The grand secret of putting any saw in the best possible condition, consists in filing the teeth at a given angle to cut rapidly, and of a uniform length, so that the points will all touch a straight-edged rule without showing a variation of a hundredth part of an inch. Besides this, there should be just set enough to cut a kerf as narrow as it can be made, and at the same time allow the blade to work freely without pinching. On the contrary, the kerf must not be so wide as to permit the blade to rattle when in motion. The very points of the teeth do the cutting. If one tooth is a twentieth of an inch longer than two or three on each side of it, the long tooth will be required o do so much more cutting than it should, that the sawing cannot be done well. Hence the saw goes jumping along, working hard and cutting slowly. If one tooth is longer than those on either side of it, the short ones do not cut, although the points may be sharp. When putting a cross-cut saw in order, it will pay well to dress the points with an old file, and afterwards sharpen them with a fine whetstone. Much mechanical skill is requisite to put a saw in prime order. One careless thrust with a file will shorten the point of a tooth so much that it will be useless, so far as cutting is concerned. The teeth should be set with much care, and the filing be done with great accuracy. If the teeth are uneven at the points a large flat file should be secured to a block of wood in such a manner that the very points only be jointed, so that the cutting edge of the same may be in a complete line or circle. Every tooth should cut a little as the saw is worked. The teeth of a handsaw, for all sorts of work, should be filed fleaming, or square across the blade. The best way to file a circular saw for cutting wood across the grain, is to dress every fifth tooth square across and about one-twentieth of an inch shorter than the others, which should be filed fleaming at an angle of about forty degrees.

Lubrication.

From M. J. Lawrence, New York.—In selecting a lubricator for any rubbing surfaces, care must be taken to adapt the character of the lubricating material to the nature of the rubbing surfaces and the weight which they have to sustain. A fine, thin oil is useless for heavy bearings, and a hard, stiff soap which would be excellent for such bearings, would be a poor article for a very light piece of machinery. In the case of heavy bearings, such as railway axles, when they once begin to heat and cut, it will be found impossible to prevent heating by the mere application of oil. The surfaces of the metal must be worked over, either by grinding or the turning tool. Thus, when journals heat at sea, the usual custom is to use sulphur, black lead, or water, but the relief they afford is only temporary. The following is a method that gives permanent relief.

When you find the journals getting hot, slack back the nuts on the cap from one-quarter to one-third of a turn, and supply the journal freely with dust procured by rubbing two bath bricks together mixed in oil to a

consistency a little thinner than cream. After a short time begin cautiously to set up on the nuts; and before finally bringing the nuts to their original position, give a copious supply of oil alone to wash out the journals. Then bring the nuts into position, and you will have no further trouble. This plan has also been tried on railroad journals, and it has been found that a handful of clay or gravel has effected that which gallons of oil and water could not do.

In addition to the usual oils and greases the following lubricators deserve attention: Plumbago.—This material is fast coming into use, and when properly selected and applied it never fails to give satisfactory results. It may be used on the heaviest planers and ocean steamers, or on the lightest machinery. When applied to delicate machinery the surfaces should be very lightly coated with the plumbago by means of a brush. In this way all danger of grit is avoided. Plumbago seems to be specially adapted to diminish the friction between porous surfaces, such as wood and cast-iron. For the cast iron beds of heavy planers, it is a specific.

Anti-Attrition.—Mix four pounds of tallow or soap with one pound finely ground plumbago. This is the best lubricator for wood working on wood and excellent for wooden screws where great power is required.

Fine Lubricating Oil.—Put fine olive oil in a bottle with scrapings of lead and expose it to the sun for a few weeks. Pour off the clear oil for use. Another method is to freeze fine olive oil, strain out the liquid portion and keep for use.

Axle Grease.—Dissolve one-half pound washing soda in one gallon water and add three pounds of tallow and six pounds of palm oil. Heat to 210 degrees Fahrenheit, and keep constantly stirring until cooled to 60 or 70 degrees.

Good Information About Tempering.

From Walter Shriner, Oregon.—Tempering hand drills for very hard and flinty rock requires a little different treatment than for common rock. I use a large vessel to temper in and take the chill off the water. I use plenty of salt and put some heavy oil on the water. I put a 1x6 inch piece one inch under the water to stand the drill while cooling off. I am now ready to proceed. Forge the bit very blunt, let it cool off and heat again till a bright red. Let the end rest on the board till the end is cold. Then I hold the drill until the heat starts towards the point, and keep rubbing the end constantly till it is too hot to do so any more, then cool all of it, and now it is ready for the hard battle.

There has been some inquiry in the past on tempering thin bits. As there hasn't been anything written on the subject I will add a few lines. In the first place, the average blacksmith is not fitted up for such work. The hardest problem is to keep the bit from warping out of shape. Take two pieces of flat iron ¼-inch thick, or near, and as wide as the bit is. Place the bit between the two pieces of iron. Keep the bit a little ways from the end, that keeps the thin part from getting hotter than the rest. Now grip the tongs good to the pieces so they will not move when placed in the fire; heat up slow till all is a cherry red; cool all over in the same solution as for drills. Polish up and heat a large piece of iron to draw the temper with. Don't be in a hurry to do this, as you may have to do it over again. Take a new hand-saw file and when the color comes to a light purple try the file on it till it will just cut, cool off and your bit will be tough and keep a good edge.

I will add a few lines to the beginner on sharpening plane bits: Grind the bit with a long bevel. If you don't, it will ride too much on the heel. Grind the bit square, and round the corner just a little. Now put on the oil stone till you feel a wire edge on the face of the bit, then lay the bit flat down on the face and push the bit gently forward till the wire edge is removed, turn over and whet lightly two or three strokes. Now wet the hair on your wrist and apply the bit. If it will shave the hair it is finished. Now look at the chip brake and see if it is in good condition. If not, true it up to your bit and file sharp.

If you want to do a fine piece of work on a snarley piece of timber, set the chip brake about the width of a hair from the end of the bit. For faster cutting and straight-grained, set the chip brake farther from the end.

Badly Dished Wheels.

From Charles D. Briddell, Maryland.—In some parts of the country where there is much wet weather, and particularly near salt water, there are many wheels which dish up very badly on account of the rust under the tire, thereby running hard, as they will not travel

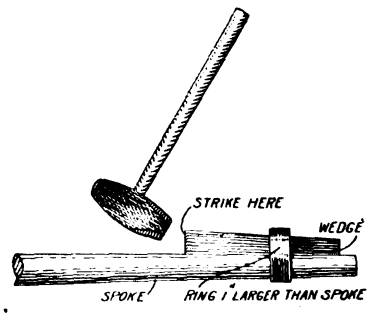


Fig. 1.

with other wheels. It thus becomes necessary to take the dish out of them. This is sometimes done by re-spoking them, but this is rather expensive and so it becomes the wheelwright to devise some other easier and better way. The following method has proven satisfactory: First remove the tire in the usual it is hard to remove them, and it may be done easier by first sawing out an eighth of an inch or less from the rims at one of the joints, and then strike a few blows with the hammer on the face of the tire to break the rust. You will be surprised to see how much easier the tire will come off this way. After removing the rims, being careful to not break any of the tenons, then proceed to draw the spokes. If this cannot be done by working them out with the hand then take an iron ring about one inch larger than the spoke and slip over the spoke tenon in your machine. It will be tween the ring and spoke and drive the spoke out, as shown at Fig. 1. Upon examination you will see that the end of the spoke is at angle as shown at F in Fig. 2, which should be planed or cut as shown at the dotted line and be made like G, Fig. 2. You will also note

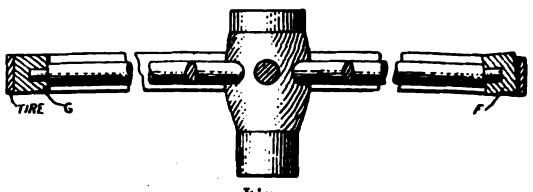


Fig. 2.

that the front shoulder of the spoke as pressed down in the hub should be pared out as shown at the dotted line D, Fig. 3, so the shoulder when driven will fit tight. Before the spokes are re-driven a wedge for each mortice must be prepared and inserted in the bottom of the mortise, as shown at E, Fig. 3. The wedge, H, Fig. 4, is to be just a fraction thicker than the amount which has been removed from the spoke. This wedge is wider at the thin end in order that it will not drive in the hub farther

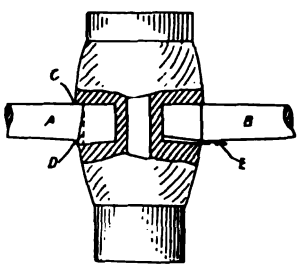


Fig. 3

than wanted when driving the spoke. The spokes seem to drive better if the wedges are sawed out rather than being cut out. There may be some rim tenons that are not strong enough to stand driven spokes. This can be overcome by using an old piece of rim or by boring a hole in a block of wood the size of the tenon, so as to take a bearing on the shoulder of the spoke. After the spokes are all in, put on the rim and tire and while the tire is cooling off, strike a good blow over each spoke. This will make the joints fit tightly and be solid. Then take the chisel and trim

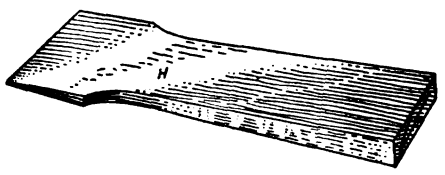


Fig. 4.

off the ends of the wedges. Put on the felloe plate bolts, etc., and the job is done. This method is adapted to farm wagons and to carts, and to plain wooden wheels that have hubs of wood and spokes with shoulders, where the bend is usually found.

There is another class of wheels, such as buggy wheels and light wagon wheels, and Sarven and Warner wheels, where the spokes seem to make the dish by bending in the center of the spokes, as shown at A, Fig. 4. These cannot be treated as the other wheels and the best way to take the dish out of these wheels

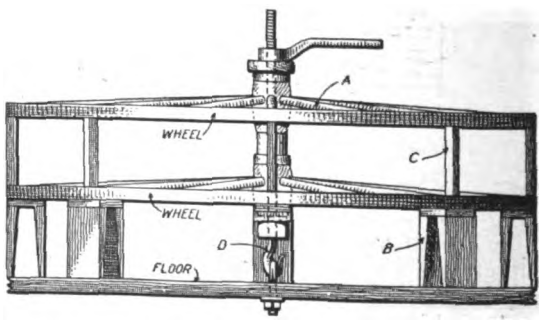
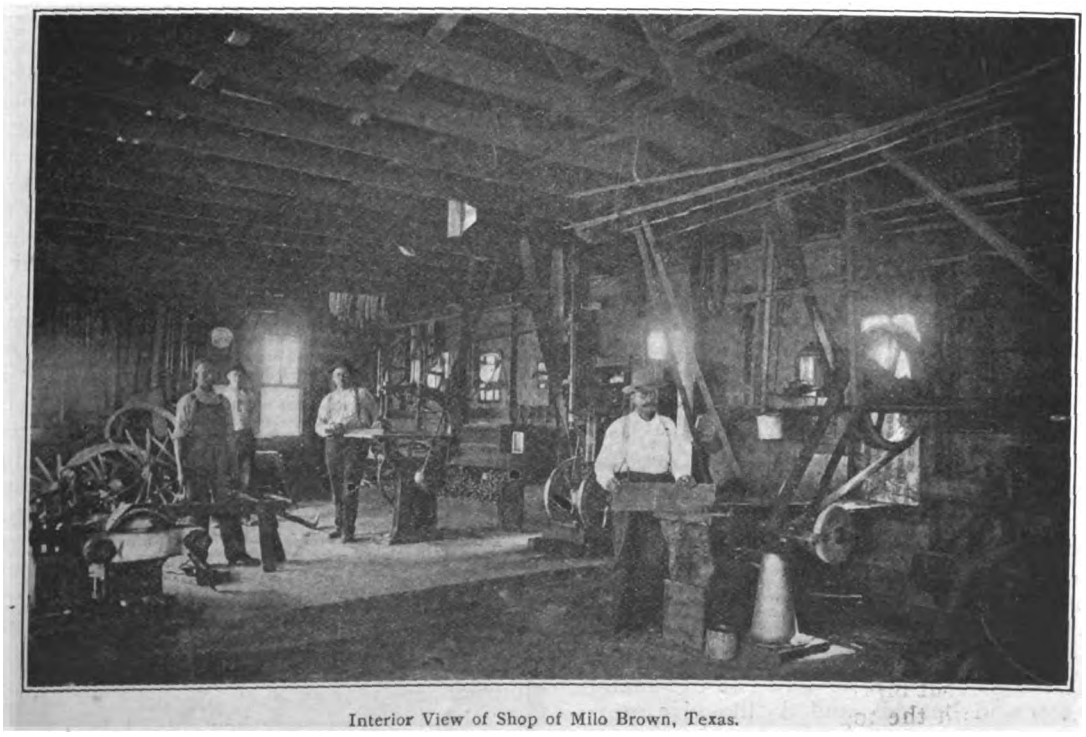


Fig. 5.

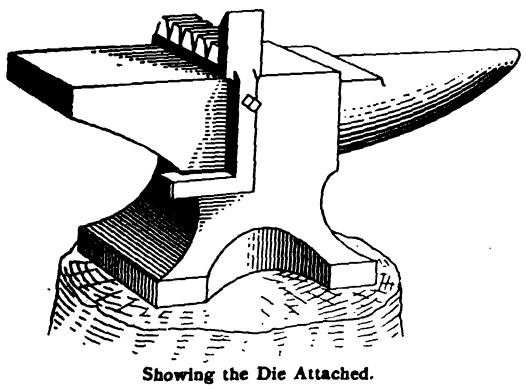
is to remove the tires and put them in a steam box and have the steam turned on them several hours. If this is not convenient, throw them into some convenient water where they will be entirely immersed. Let them soak for 10 to 15 hours. Remove and put into a press as shown at Fig. 5. This is made by the use of two strong legged trestle benches, as shown at B, and a hook into an eyebolt fastened in the floor. It will be noticed that one wheel rests on another in order not to take up too much


Interior View of Shop of Milo Brown, Texas.

room. The dish can thus be pressed out by degrees if they have previously been wet or steamed by the use of the screw as shown. It will be found that after the wheels have been pressed out that the joints at the felloe plates will open up according to the amount they have been over-dished. To obviate this, it will be necessary to insert a face of leather before tiring, otherwise the dish will come back. If, however, it is desired to make a very neat job, you may remove the rims and take a fraction of the shoulder off the spoke with the spoke, and put a hard wood wedge be-necessary to do a little figuring here for you may easily take off too much, and then the rim will be too long instead of too short. It should also be remarked that it will be noticed in badly dished wheels the pressure of the tire on the rims will be more on one side than on the other, and the rim should thus be trimmed down so the tire will take a firm level bearing. Before retiring, paint the face of the rim. Retire carefully and you will have a good job.

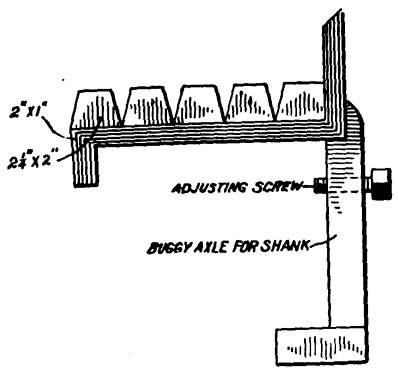
A Handy Anvil Device.

From W. F. Hilsabeck, Illinois.—I am sending a drawing of a tool which I find very handy. It is a hardy and a die for toeing shoes and calking them. After I get the shoe toed I



Showing the Die Attached.

heat the heel and cut just a little of the end off, and I turn the calks in my foot vice and they are sharp when I get them turned, I take a piece of old buggy axle for the shank and of 1x2-inch Norway iron, and 2¼x½-inch tool steel for the block, and hardy after working

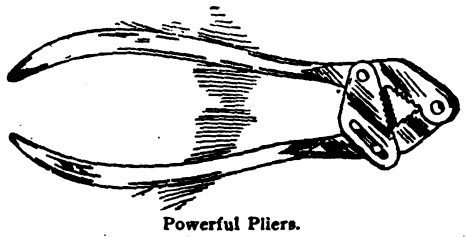


The Die Attachment.

them together, fit to anvil and take a cleaver, cut the notches as many as you want, then take the size toes that you want to use, heat the die, put in the die and drive down until you get the notch as deep as you want it.

For Removing Screw Calks.

The pliers illustrated, says Popular Mechanics, will be found very useful about the shop and especially so for removing screw calks from horses' shoes and for turn-



Powerful Pliers.

ing any metal rod or bolt. It should be made of good tool steel and well tempered.

The handles are forged into the shape shown and teeth filed in them. They are made to hinge at the end with a strong pin. The side plates are cut out and teeth filed in them, and a slot cut diagonally to slide on a pin in one of the handles, the other end being pivoted on the other handle. As the handles are spread or brought together the pin sliding in the slot forces the side plates in or out with great leverage, as the jaws coming together form a triple grip much stronger than afforded by the ordinary pliers.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

Dishing Wheels.

From Charles E. Beach, Oregon.—I notice some inquiries on "how to take the dish out of old wheels," but nothing in regard to putting the dish back again after it has been knocked out. This is the most important matter of the two. A great many smiths have an idea that the dish will not stay unless dished an inch and a half or two inches, when the wheel is soon ruined with dish.

It seems that most of the patent wheels are rim bound, many of which are rock and but few are provided with shelter; consequently, as a wheelwright, I have a great many wheels come to me that are dished the wrong way, and had they been run very long in that condition the spokes in the hub would have loosened, as they did in a number of cases. To hold the wheel in dish properly is one of the most difficult jobs the blacksmith is called upon to perform. I give my method of replacing the dish: I have a pair of trestles with pieces across the ends, which makes a square. I place the wheel on the trestles with the outside of the wheel up, and screw the wheel down until dished about three-quarters of an inch. If the spokes are loose saw a piece out of the rim and then drive the spokes up; if this operation closes the space in the rim, saw out another piece of the rim. When the spokes will drive no farther, saw enough out of the rim to make about an eighth of an inch opening, then put on the tire with about one-eighth of an inch draw. When the tire sets, loose the wheel and drive on the tire over each spoke until the dish comes to about half an inch. Driving over the spokes gives the desired dish, but it also tightens the spokes in the hub. I have set a great many in this way, which always gave satisfaction. If any brother smith has a better plan I would like to know it.

Tire Welding Information.

From J. J. Hardy, Utah.—In the November issue of "The Blacksmith & Wheelwright," I see an inquiry, how to weld wagon tires. I will give my way of welding tires, an idea I got from the "Modern Blacksmith," written by J. G. Holmstrom, and I can do no better than to quote his words. He says: "There are many different ideas practiced in welding tires. One smith will narrow both ends before welding, another will cut off the edges after it is welded. This is done to prevent it from spreading or getting too wide over the weld. I hold that both these ideas are wrong. The first one is wrong, because when the ends are narrowed down it is impossible to make them stay together until the weld is taken, especially if it is a narrow tire. The second idea is wrong, because it cuts off the best part of the weld and weakens it. Some smiths will split the tire, others will rivet them together. This is done to hold the tire in place until it has been welded. There is no need of this trouble, but for a new beginner a rivet is all right." Mr. Holmstrom tells how it is done: "When the tire is ready to weld, draw down the ends and let them swell as much as they want to. Now let the helper take the end, that is to say, on top ad pull it towards the floor, the other end to rest on the anvil. This will give that end a tendency to press itself steadily against the lower end; next, place this end on top of the other end. The ends must now be hot enough to allow them to be shaped. You will now notice that the top end is wider than the tire, so is the lower end. The tire is to be so placed that the swelled parts reach over and inside of each other a little. Now give a couple of blows right over the end of the under tire, next tap the swelled sides down over the tire. This will hold the tire together so that it cannot slip to either side and the swelled end of the under tire will prevent it from pulling out. If the top end has been so bent that it has a tendency to press down and out a little the tire is in good shape to weld. If you have a good big fire high up from the tuyere then you are all right. Place your tire in the fire and proceed as follows: No matter whether it is iron or soft steel tire, sand is the best welding compound and nothing else should be used. When you have the right heat, place the tire on the anvil this way: Let the tire rest against the inside edge of the anvil. If the lower end of the tire is allowed to come down on the anvil it will cool off and can never be welded that way. Now hold the tire this way until you have the hammer ready to give the first blows, then let the tire down and strike the first blows directly on top and over the under end. This is important and if the first blows are not directed to this very place the lower end will be too cool to weld when you get to it. Next weld down the upper end. This done turn the tire on edge and while it is in a welding heat come down on it heavy with the hammer if a buggy tire, and with a sledge and hammer if a heavy wagon tire. Hammer it down until it is considerably narrower over the weld, as it will swell out when dressed down." I think this is enough for me at this time. I would like to hear from someone else on tire welding.

Raising Gates.

From W. D. Mackie, Scotland.—Can you favor with an idea how to make bands or hinges so when a gate is opened the point of

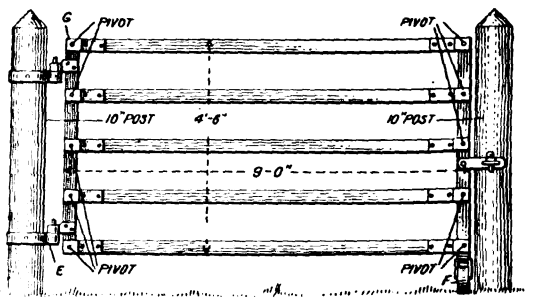


Fig. 1.

the gate will rise at least 12 to 18 inches so that the gate will clear away from the ground, which slopes towards the gate?

(Note.—As Mr. Mackie's query has been overlooked, and he desires necessary informa-

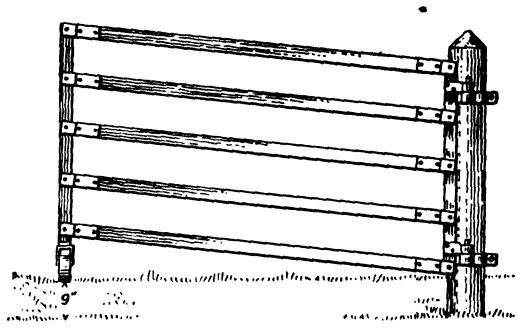


Fig. 2

tion before it can be supplied by our readers, our draftsman has supplied drawings by which this gate may be made, although perhaps some of our readers have ideas of a simpler and better method. Fig. 1 shows the gate closed, Fig. 2 the gate thrown back or open, and Fig. 3,

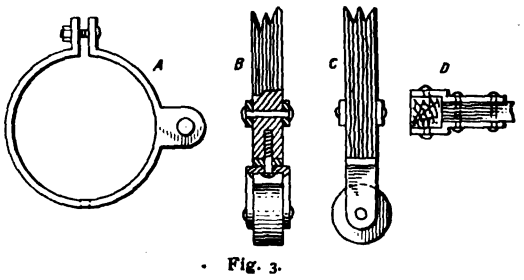


Fig. 3.

the necessary parts. A is a view of the band; this is shown in Fig. 1 at E. B and C, Fig. 3, are details of the wheel on end of the gate providing means for raising the end of the gate at F, Fig. 1. D is a plan view of one end of the gate, showing the construction of the same, and of the pivot pin as shown at G.

HEATING THE CAR.

How Heat Waste May be Utilized to Warm the Automobile Occupants.

As is well known, a large amount of heat goes to waste in running an automobile, and at this season any bright blacksmith may possibly suggest to car users in his locality how it may be utilized to keep the car warm in cold weather and himself do the job, charging any where from $15 to $30 for doing the work, which is not difficult as may at first seem. Several schemes have been worked out whereby a portion of the exhaust has been turned into pipes or coils beneath the autoseats or elsewhere as desired. This method of automobile heating is not always desirable, for when gases, heated to 500 or 600 degrees are turned into coils directly in contact with cloth, leather or wood, there is danger of something being heated far too hot to be comfortable to say the least. True, such coils may be made very thick, or they may be covered with protecting shields of sheet metal, but when that is done, much heat is lost and the entire apparatus responds very slowly to the presence of exhaust heat in its coils.

By means of the arrangement shown by Fig. 1, such portions of the automobile as it is desired to heat are served with straight hot water heating, direct from the water jacket of the engine. As shown by the engraving in question, no change whatever is made with the radiator or its connection with the engine, the entire heating system being a mere addition to the engine cooling apparatus and applied by simply cutting the upper, or hot water pipe between engine and radiator and inserting at that point a three-way cock or valve as hereinafter described and illustrated by Fig. 2.

The hot water pipe, having been fitted with valve A, Fig. 1, is continued at B, being kept in as elevated a position as possible, until it reaches the coils D, and E. The return water pipe which brings the cooled water back from the radiator is simply extended, without valve or cock, direct to the coils D, and E. In placing the coils D and E, it is essential that the inlet side of each coil be kept as high as possible and if the pipe can be located as high or higher than the return pipe from the radiator, then so much the better and the more water will circulate through the coils D and E.

It should be kept in mind that the circulation in any radiator or cooling system where hot water is used—without a pump—that the amount of circulation in radiator or coils must always depend upon the difference in weight of two columns of water, one column hotter than the other. Consequently the taller or higher the columns of water in question the greater will be the circulating power of the heating system.

Usually the distance between the inlet and outlet pipes of the radiator may be taken as the measure of the height of column which gives the circulating power. Likewise, the heating didstance is the height of the column of water in the water jackets of the engines, or from return pipe, vertically to the supply pipe. There is not the least advantage to be derived from having one of these columns of water much higher than the other, but it is desirable that they be both as great as possible and that the heating in the jackets and the cooling in the radiator columns be as great and as even as possible.

And the heating and cooling will be equal. It will be equalized by the action of the engine. If there be greater heating power in the water jackets than there is cooling power in the radiator, then the water will go back to the engine jackets at a temperature which prevents the water from taking up more heat than the radiator can get rid of into the atmosphere. In cases of too small radiator capacity, the heating apparatus described herewith is a considerable and valuable addition to radiator efficiency and exhibits immediate and beneficial results in the operation of the automobile engine to which the heating device has been attached.

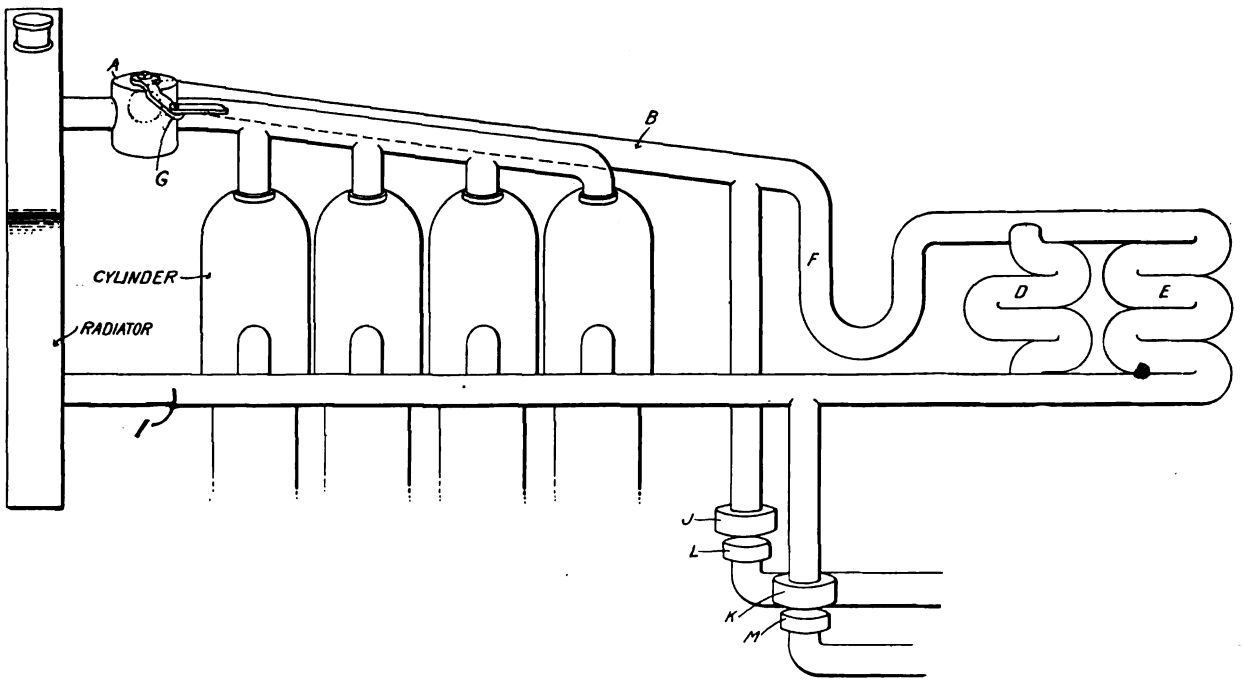


Fig. 1—Automobile Heating Arrangement.

In running the pipe B to the heating-coils, it is important that the vertical distance between them be maintained as far as possible, and that the radiators be placed in a vertical position as far as possible also, for it is the height of the cooler column of water in the radiator coils which overbalances the weight of the hot column of water in the engine jackets and forces a circulation of cooler water into the jackets, where the lighter heated water is displaced by the greater weight of the colder water from the radiators and coils.

It is quite possible, however, to carry the pipe B, either over or under any obstruction, as shown at F, Fig. 1, but it is essential that when such off-sets are made, that the pipes be well covered with heat insulating material, both on the downward and upon the upward legs of the pipe. The reason is: With water standing in the bend F, it is apt to cool and become heavier so that when some hot water come along through pipe B, and flows into bend F, the weight of water which is hot, in the downward leg of F, is unable to overbalance the weight of cooler water (and heavier) in the upward leg of bend F. Therefore, water remains in F, which cannot be driven out by hot water coming through pipe B. Thus the bend F acts as a trap to the flow of water and the circulation cannot be fully established again until the entire bend has become warmed up again. In cold weather, this may never happen and there is an entire or partial stoppage of circulation through the coils D and E, whereas, were the bend F well protected by good heat insulating material against loss of heat, the circulation would not be impaired by the bend except the slight loss which always follows the use of several bends in the piping.

Similar bends in the return pipe I, will also require protection although it would at first sight seem that this pipe, being filled with cold water, or at least colder water than is in the other pipes, would work all right. But, upon looking closely into the matter, it will readily be seen that a bend in pipe I—an inverted syphon, similar to F, in fact—will offer the same obstruction to water flow as is found in pipe B, when an overturned syphon like F is placed therein.

Suppose the bend in pipe B to be filled with colder water and some warmer water comes along from radiator coil D. The drop leg of the bend fills partly full of the warmer and lighter water until the heavier column in the up leg of the bend is balanced or partly balanced by warm water in the upper portion of the drop leg and colder water in the bottom of said leg. It will readily be seen that the lighter warm column cannot drive out the same height of heavier cold water in the up leg of the bend, so there the flow stops, held tight by a very efficient water seal in the drop bend—a water seal which can only be removed by forcing out the colder water, or by providing a pump or other means of circulating the water, whether it be hot or cold, wholly, or in "spots."

There is a way by means of which syphons, either regular or inverted, may be prevented from interfering with the flow of hot and cold water through them. This way is to make one leg of the syphon less in height than the other leg. In drop F, Fig. 1, the upward leg, if made less in length than the downward leg will, therefore, have less height in which to back

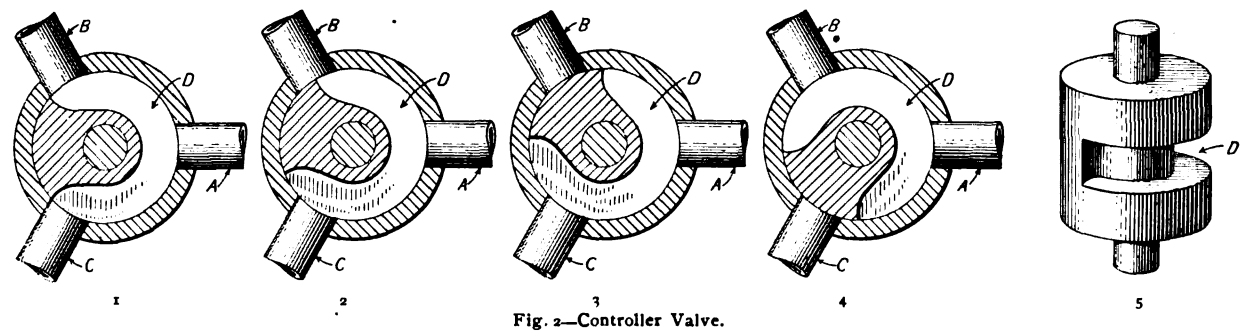
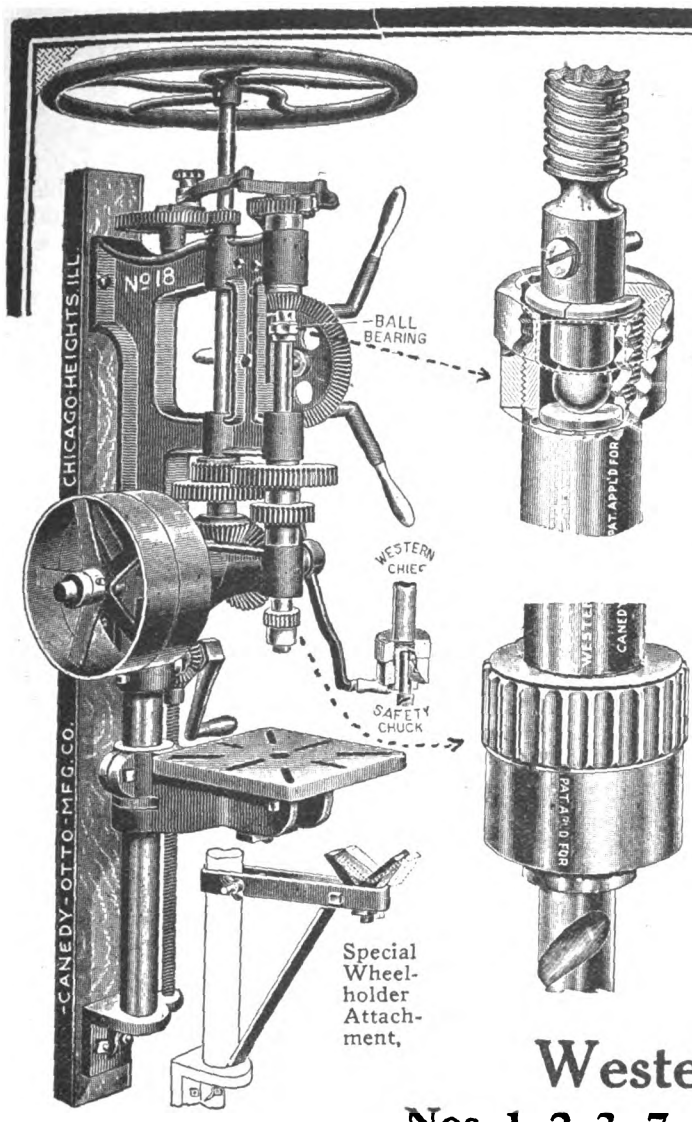


Fig. 2—Controller Valve.



Ball-Bearing and Safety Chuck

Ball-Bearing

A single Steel Ball resting on a hardened Steel Disc. This contact of Ball and Disc forms a bearing in which the friction is too little to estimate.

Safety Chuck

It is opened and closed with the hand.

No more set-screws to mar and bruise the shanks of bits.

No more wrenches to tighten and loosen set-screws.

No more twisting of bits in the chuck.

No more trouble in inserting and removing bits from chuck.

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Nos. 1, 2, 3, 7, 12, 14, 15, 16, 17 and 18

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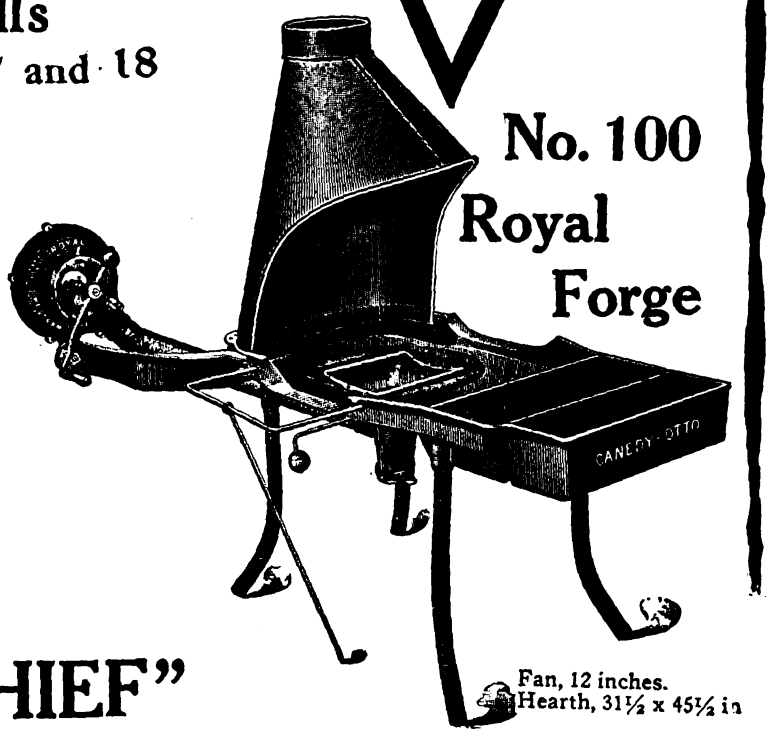
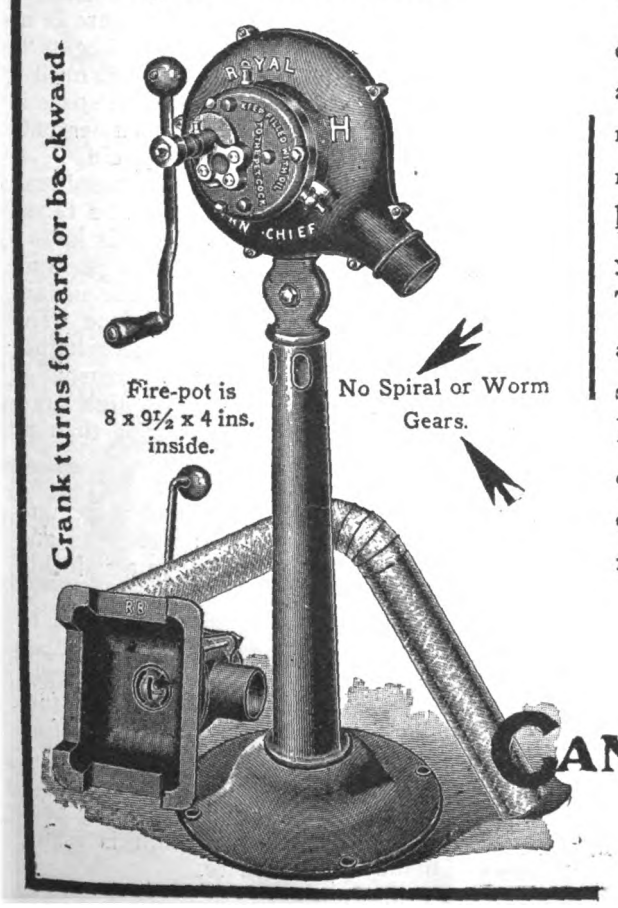
FORGES—BLOWERS—DRILLS



No. 100 Royal Forge

Fan, 12 inches. Hearth, 31½ x 45½ in

Royal Blower



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When found on a Forge Blower, Drill or other Blacksmith Tool—mean that that article is better than the ordinary. They mean that in its construction the best materials and the highest skill obtainable have been employed. They mean that years of experience have served to perfect it. They mean the tool is a success, and quality alone has made it so. Dealers and Blacksmiths in general will procure what they like best. We must deserve before we can obtain trade. There is a reason—Quality

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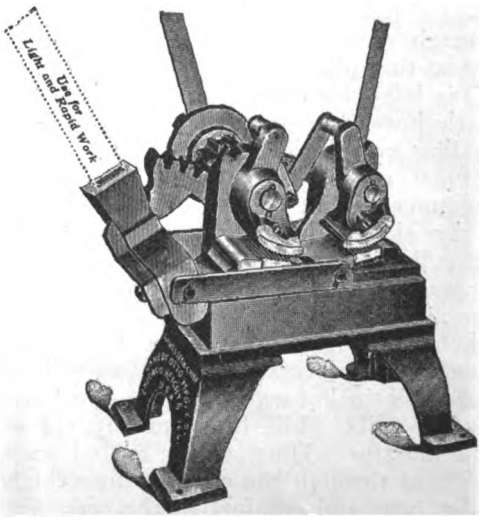


Jaws Adjust Themselves to Uneven Thicknesses

against the action of warmer water in the downward leg. This being the case, it is possible to calculate how much shorter the up leg must be made than the down leg in order that water of a certain number of degrees greater temperature will be able to re-establish and maintain a flow through cold water filled pipes, without danger of a temperature water-seal.

But there is another great and sufficient reason why syphons, both regular and inverted, should be avoided as much as possible in automobile hot water heating. It is evident that when an automobile is exposed to severe cold weather, provision must be made to prevent the freezing of water in the radiator, in the cylinder jackets, or in the connecting pipes. Either the water must be kept hot and maintained in circulation, or the radiator, pipes and jackets must be drained when the automobile is to be left exposed to severe cold.

The above being the case, it is impossible to consider the use of bends like those shown by F, Fig. 1, as there is no provision for draining away the water contained therein when the automobile is to be temporarily abandoned. Such bends would freeze solid in spite of heat insulation coverings, if left full of water in zero weather. Hence, if syphons be used in the connecting pipes, to get over or under passage ways, then such syphons must be well insulated and provided with sure and positive and readily applied means of drainage for cold weather use.

But most of the above objections disappear when a pump is used to circulate the jacket water. Then, the coils D, E, Fig. 1, may be placed in any convenient position and the pump will cause adequate circulation through the coils no matter how they may be placed. Drainage may be easily provided for, when a pump is used, and when hot water heating coils are added to the radiator equipment, much more satisfactory results may be obtained by the use of a forced circulation than when heat and gravity are depended upon to cause the movement of water through jacket, radiator and heating coil.

Having thus briefly described the application and the limitations of the hot water system of automobile heating, it is in order to describe also briefly the manner in which such a system may be controlled and the degree of heat regulated. This matter is made visible by Fig. 2, which illustrates a simple controller valve, by means of which the water may be diverted, wholly or in part from the radiator and sent through the heating coils, or by a movement of the valve lever, all or any portion of the jacket water may be sent through the radiator and the coils left nearly or quite without any heat. The controlling valve, shown at A. Fig. 1, is in turn controlled by means of the lever G, and this lever is connected by a sliding rod with a suitable handle in the driver's portion of the car.

The valve in detail, and in its several working positions, is shown by the several sections, 1 to 5, in Fig. 2, sketch 1 shows the valve in horizontal section, as though cut right through all the pipes entering it. Pipe A, is supposed to be the one through which hot water enters the valve from the cylinder jackets. Pipe B, is the one which supplied the heating coils, and pipe C leads to the radiator. The moving portion of the valve, shown at D, is cut away as shown at D, sketch 5, in such a manner that water entering the valve from pipe A, sketch 1, may flow out through either pipe B, pipe C, or both.

In sketch 2, the valve D, has been rotated slightly so that pipe B, is partly closed, while pipe C, is left wide open. This means that a very little hot water can find its way through the heating coils, while the bulk of the hot water must go through the radiator in the usual manner. With the valve in the position shown by sketch 3, pipe B, leading to the heating coils has been entirely cut off and all the hot water must pass through the radiators, none going through the heating coils.

In sketch 4, Fig. 2, the above distribution has been exactly reversed and the valve is so placed that all the hot water must pass through the heating coils, while it is entirely cut off from the radiator. Thus, all the heated water is being sent through the coils in the vehicle, to furnish heat and comfort to the occupants thereof. It is further evident that pipe C, leading to the radiator, may be partially cut off by properly locating the valve plug, in a manner similar to that shown in sketch 2, except that in this case, pipe C, is to be partially covered, instead of pipe B, as shown by the sketch in question.

The movable portion of the simple controlling valve, as shown by sketch 5, Fig. 2, is merely a piece of metal made to fit the valve shell, and with a narrow portion of its body removed as shown at D. This may be easily done with a hacksaw, after drilling a couple of shallow holes at either end of the proposed groove, D, sketches 1, 2 and 5. The material is chipped out between the drill holes and the hacksaw cuts and the valve is ready to be placed in its case.

The movement of the valve, to cover all the points of adjustment between the extremes of movement in sketches 3 and 4, is less than one-fourth of a revolution, therefore, it is easy for a quadrant lever to be arranged upon the running board—if that locomotive term may be allowed in automobile talk and the lever secured in any required position by means of a simple friction device or by a simple set-screw and thumb nut.

While the device above described will work perfectly in either hot or cold weather, it is evident that an automobile equipped with a hot water heating system needs to be kept warm while not in use as well as when under way. An engine which is warm, will start off much better than will a cold engine, and machines which are kept in heated garages always behave better than do the machines which are frozen stiff when taken out.

When installing the hot water heating system described above, the smith may advise the automobile owner to put in a connection whereby the water in radiator, engine-jackets and coils may at all times be kept at a temperature which will cause the car to work at its best when first taken out of the garage. The connection in question is shown at J, and K, Fig. 1. It is merely a couple of self-closing couplings which are held open when connected, but close when the connection is severed by the starting off of the automobile. The stationary portions of the self-closing couplings are shown at L, and M. By placing these portions against J, and K, connections are made with a water front and water tank located in conjunction with a stove or a boiler in the garage or in the house adjacent to the garage.

When connections are made as above described, the automobile coils, radiator and water jackets become portions of the house or garage circulation, and are kept at all times equal in temperature to the water in the boiler or water front to which they may be attached. When the automobile starts off, the connections are torn apart by movement of the car and each of the four pieces of the connections automatically closes itself and prevents any leakage therefrom.

Thus the car is able to start off well heated, the engines and jacket well warmed and ready for their best work and the engine immediately picks up the explosions without having to be cranked to death in order to become "thawed out." The possibilities of this system of automobile heating are immense and if a small portion of the hot water be piped into the steering wheel, the driver of the car will surely "rise up and call you blessed."

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Cutting Down Wagons.

From H. P. R., Iowa.—In cutting down wagons what effect has it in the running of a wagon, if any, to put the front wheels behind and cut down the hind wheels for the front? Please answer through the Blacksmith and Wheelwright.

Temper for Drill Bits.

From T. S. Everhart, North Carolina.—Will some brother please tell me as to the best solution bath to temper steam drill bits for hard blue granite rock so that they will not break and will cut the run out? I have a job on hard blue granite mixed with flint and have some trouble with my bits. They do not stand if made hard enough to cut the stone but will break or split off.

Forging a Stone Cutter's Chisel Punch.

From L. M. Sidwell, Utah.—I would like some brother smith to tell me through your columns how to forge a stone cutter's cone chisel punch. I have made one but it does not punch the teeth of the chisel satisfactorily.

Once in a while the hot headed man gets cold feet.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

COMPRESSION PRESSURE.

What It Is Based On and Its Value in the Gasoline Engine.

BY E. W. LONGNECKER.

Compression pressure is based upon atmospheric pressure or 14.7 lbs. to the square inch. Compression of the charges by the piston in the gas engine means simply the crowding together of the atoms of the explosive mixture in a much closer relation than they naturally rest at atmospheric pressure. When the inlet valve of the gas engine opens, the piston travels to its extreme point on the outward stroke. At this point the cylinder volume is extended to its utmost and all the air or gas that it can hold at atmospheric pressure is admitted provided no serious obstruction in the inlet passages is allowed.

If the piston were now to remain at this point or at the end of its inlet stroke, the pressure of the explosive mixture within would be equal exactly to the outside or atmospheric pressure, or in other words there would be the same pressure on the cylinder walls from within outward as there is from without inward. But the instant the inlet valve closes and the piston starts on its inward stroke the crowding closer together of the gaseous atoms begins. They are now being compressed. They are crowded into a smaller space than they naturally occupy.

If the entire cylinder volume or space is 80 square inches and the gas is at normal or atmospheric pressure within, then there is no compression. But when the piston begins to and keeps crowding up on the mixture until it is confined in only 16 square inches of space in one end of the cylinder, it then occupies only one-fifth of the space it originally did or, in other words it is compressed to 5 atmospheres.

The pressure outward would then be 14.7x5 =73.5 lbs. to the square inch. This is known as the compression pressure or the pressure the explosive mixture is under at the instant when ignition is supposed to take place. The object of this compression is to give higher explosive pressure to the gas by reason of more rapid combustion under this high pressure. It also causes easier ignition than at normal or atmospheric condition.

By compression to the proper degree we then gain advantage of easier and more uniform or regular ignition of the charges and more rapid combustion resulting in a suddenly increased degree of heat and expansion of gases, which gives greater power impetus to the piston. The ultimate results of proper compression of explosive mixtures in the gas engine then, are, more power from the fuel used, and the minimum quantity of fuel required for the load. Anything below the proper degree of compression is at once wasteful of the power actually convertible and, therefore, calls for more fuel than is really required to make up this waste.

Drop Forgings and Steel Stampings

Only are Used in the Construction of Our

Twentieth Century Shafts

We make this assertion openly and wish to put behind it all the force those simple Anglo-Saxon words can convey!

Let us repeat—***We Use Only Drop Forgings and Steel Stampings!***

Now question the other fellow—see if he can make the same statement. Just put it up to him plainly: Do you use any material other than Drop Forgings and Steel Stampings?

Then ask him to show you where he uses it.

We don't have to tell you what Drop Forgings and Steel Stampings are, or their strength and appearance as compared with **ANY SUBSTITUTE.**

We Do Not Use "Two-Piece" Hickory in Our Poles.

Ask the other fellow if he can say the same—every time you see the "two-piece" business worked you see a weakness—and ten to one, you see where a cheap piece has been used instead of a good one.

Now, what does this mean? For you? Look at it strictly from **YOUR OWN STANDPOINT.** It means that you can depend upon every

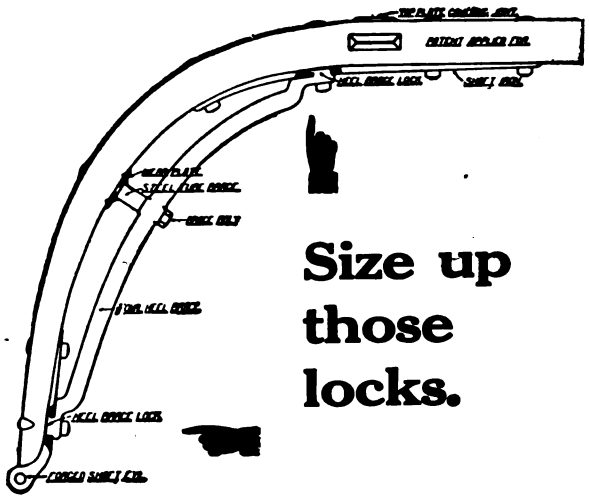
Pioneer Pole and Shaft.

It means that you can send out every pole or pair of shafts without a quiver—you know that every buyer of Pioneer Poles and Shafts is your friend—for you have touched him in his vital spot—you have saved him money—by saving him money you have made him money.

Pioneer Poles and Shafts are trade builders—for us—for the vehicle manufacturer and the vehicle dealer.

Added to this we simply ask you to take one good look at the picture of the Pioneer construction we show opposite. At Cairo, Illinois, we carry the largest stock of Hickory in the world—a year's supply—and we are constantly adding to it. You can understand why we use nothing but seasoned Hickory—and always have Hickory for use.

Let common sense decide the question.



Size up those locks.

THE PIONEER POLE & SHAFT COMPANY

PIQUA, - - - OHIO.

Selle Gears.—No reader should fail to turn to the full page advertisement in this issue of the Akron-Selle Company of Akron, Ohio, wherein will be found described some of the gears manufactured by this company. They make 1000 styles and sizes. You will find these described in their catalogue No. 3 which every reader interested in gears can have by writing for it. Do not fail to mention Catalogue No. 3 or you may get the wrong one.

Helwig Bolt and Rivet Clipper.—The Helwig Mfg. Co. of St. Paul, Minn. has a new advertisement in this issue illustrating and briefly describing their bolt and rivet clipper. This tool has few parts. It is held together by only four bolts and the manufacturers say it is made of best material and that the workmanship is of the best. If your dealer does not carry these tools in stock write to the manufacturers as above or for the particulars in prices.

The Wonder Disc Sharpener.—These sharpeners are made by A. E. Durner, Evansville, Wis. See his advertisement on another page with a list of the leading jobbers who are selling these sharpeners. If your dealer does not keep them write direct to Mr. Durner, for descriptive circular, but consult the advertisement for full particulars and prices.

Brooks Cold Tire Setter.—In this issue the Brooks Tire Machine Company of Wichita, Kansas and Buffalo, N. Y., have a half-page announcement illustrating and describing their cold tire setter which they say is sold by dealers everywhere, but if your dealer does not handle the Brooks write direct to the company, and give the company the name and address of your dealer. This machine has won high awards at various worlds fairs and we understand is giving satisfaction everywhere.

Parks Woodworker.—This is a specially valuable tool for use in the wheelwright department of any blacksmith shop, or for use in wagon and carriage shops. Eight machines are practically combined in one, and the names of the machines thus combined will be found in the advertisement of the Parks Ball Bearing Machine Company, Northside Station, Cincinnati, Ohio, with an illustration and brief description of the machine. Write direct to the company for full particulars and prices.

Laffitte Welding Plates.—These welding plates have been successfully used in the United States since 1879, and they are now regarded by many blacksmiths as an economical necessity. If you have never tried these welding plates send for a free sample and try them out. 400 dealers throughout the country carry Laffitte plates in stock and all dealers ought to carry them. Full particulars will be furnished on application to the Phillips-Laffitte Company, Pennsylvania Building, Philadelphia, Pa. In writing them mention this magazine.

Brass Lacquer.

A good brass lacquer consists of the following: 2 pints alcohol, 2 oz. turmeric, 6 oz. seed lac (coarse powdered), ½ oz. saffron, ½ oz. annatto. The annatto, saffron and turmeric are allowed to dissolve in the alcohol for several days, then strained into a bottle containing the seed lac. Cork and shake the mixture until dissolved.

Axle Setting.

From J. Murray, Pleystowe, Queensland, Australia, in the Coachbuilder.—I have in my time met smiths with different ideas about setting an axle. In my experience an axle should be set according to the dish in the wheels, and also to the taper of the axle arm; that is, when an axle is properly set and the wheels put on, place the wheels with the bottom spokes plumb, then place a straight edge on the felloes from one wheel to the other up against those two bottom spokes that are plumb, then place a square on that straight edge, and a centre line down those spokes should be square with the straight edge. That is to say, if your wheels and axle were standing on a perfectly level floor, your bottom spokes would be plumb every way, and, therefore, the whole weight must come plumb on the spokes. If the wheel is leaning too much under it will turn your wheels inside out; if too much out the weight is inclined to dish the wheels. With staggered spokes you must allow for one spoke being on more angle than another. For the lead of an axle, I could not explain in writing, but you must consider the taper on the axle arm, the height of the wheel, and also (to be accurate) the dish of the wheel, and if an axle is set properly the wheels must slightly run up against the axle collar, not the axle nut, and also if your axle is set right you could drive (that is, if you went in a straight line and turned no corners or curves) with no nuts on your axle until the axle was worn out, and your wheels would not come off.

Apex Horseshoes.—We have received from the Apex Horseshoe Company of Albion, Michigan, a neat pamphlet describing their shoes and giving testimonials from people who have used them. We suggest that our readers who are interested send for this little booklet and read it very carefully. It will be forwarded to any subscriber writing for it who will mention this paper.

The New Motsinger Magneto.—Much has been said of the excellent results obtained with the new Motsinger Magneto, but little or nothing regarding its construction, which is most interesting and novel. The field is constructed on the laminated principle, for which many advantages are claimed, the most important being that the magnets are so shaped that they form their own pole shoes, thus eliminating an additional and undesirable air gap, prevalent when separate pole shoes are used. The Motsinger construction having but one air gap, namely, that intervening between the armature and the magnets, tends to conserve the energy of the magnet and develop high efficiency in the magnetic field, which in turn increases the relative efficiency of the magneto, and reduces the power required for driving the magneto to a minimum. Another decided advantage is gained by building the magneto field up of many individual magnets, each having a complete circuit of its own and not dependent in any way upon its neighbor—thus minimizing any possibility of loss in magnetism, due to faulty material. The Motsinger magneto has 15 magnets, whereas it is not usual for magnetos selling at the same price, to contain more than two magnets. Other features of this magneto are up to the minute in construction, considering the low price at which it is sold; for instance, the 1912 Model is equipped with renewable bearings, and can be furnished with the primary coil contained in the base. This magneto is manufactured by the Motsinger Device Mfg. Co., 542 Cherry Street, Pendleton, Ind.

Kerosene Oil Motors.—The Hatch Oil Engine Company, 8th Avenue and 18th Street, Brooklyn, N. Y., is putting on the market a kerosene oil engine which it is claimed will do good work. These oil engines have no carburetor nor do they have any kerosene attachment to vaporize the oil it being all done in the head. But consult their advertisement on another page and write to them for further particulars and prices.

Hayward Rubber Pads.—These are made by the Hayward Rubber Co. of Detroit, Mich., and are sold direct to horseshoers only. Our readers want to remember this, because they cannot buy these pads of their dealers. The Company pays the freight east of the Mississippi River. Every pad is guaranteed, but write at once for descriptive circular giving full particulars together with special price list to the address given above.

Cray Brothers 1912 Catalogue.—Turn to the advertisement on another page of Cray Brothers, 1113 West 11th Street, Cleveland, Ohio, cut out the coupon, fill in your name and address, and send it to them and they will promptly forward their new Net Price Catalogue of Carriage and Auto supplies, tools, etc., for 1912. They say this catalogue will show every reader how to save "big money."

The Handy Lamp.—A lamp which will give a brilliant light is indispensable in a blacksmith shop if good work is to be done after dark and if the blacksmith has any regard for his eyes. Such a lamp is manufactured by the Brilliant Gas Lamp Co., Dept. 24, 42 State Street, Chicago, Ill. See illustration and brief description in our advertising department and write to them for their B. & W. Catalogue which gives full particulars as to the cost of the lamp and the cost of maintaining it and what it will do.

Aprons of Quality.—These are made by the California Tanning Co. of 712 North 4th street, St. Louis, Mo., whose full-page advertisement will be found in another part of this paper. They have the Dandy Muleskin Apron and also the "Boss" Split Leather Apron, which is made from a cow hide split and is sold by jobbers everywhere. To show the quality and style of the aprons manufactured by this company, they offer to send a miniature apron to every reader of The Blacksmith and Wheelwright who will take the trouble to write for it, mentioning this paper.

Want Advertisements.

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED.

will be inserted under this head at 2 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1. Address

M. T. RICHARDSON CO.,
Publishers of The Blacksmith and Wheelwright
27 Park Place, New York

PATENTS FOR INVENTIONS.

H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.

A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 27 Park Place, New York.

CHANCE TO MAKE SOME MONEY.

We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., Publishers, 27 Park Place, New York City.

BROTHER.

Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. Stokes, Mohawk, Fla.

CASH FOR YOUR BUSINESS OR REAL ESTATE.

If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

WANTED.

WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

PATENTS.

C. L. PARKER, ex-examiner U. S. Patent Office, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G Street, Washington, D. C.

FOR SALE.

At half price "Little John" Trip Hammer, nearly new and in good condition. Address C. C. Stone, Johnson, Nebr.

PATENTS.

Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. DAVIS & DAVIS, 908-914 G St., Washington, D. C., and 220 Broadway, New York City.

MECHANICS.

Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

FOR SALE.

McGovern power tire shrinker, good as new. Have two and only need one. Cost $600, will take $190, or what have you to exchange? Address, 554 Freeman Avenue, Cincinnati, Ohio.

WE BRING BUYER AND SELLER TOGETHER.

If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

BUILD YOUR OWN JOINTER.

We make all Steel Jointer Heads from 6 to 16 in. complete with knives, pulley and cast frame that head runs in ready to bolt to wood table that any wood workman can readily make from the drawings and instructions we furnish. We also make the most practical combination outfits, 6- and 8-in. jointers, saw arbor and boring attachment. Write for illustrated circular and price list. W. L. SHERWOOD, Kirksville, Mo.

BUSINESS WANTED.

I am looking for a good business; will pay cash if price is right. B. W. BUYER, Box 975 Cherry Valley, Illinois.

FOR SALE.

A two fire horseshoeing and repair shop. Furnished with electric motor, etc., in a town of 4,000 population. One other shoeing shop in town. Another town of 6,000 across the creek. Good location. Address C. L. CROGHAN, Dennison, Ohio.

FOR SALE.

A first-class blacksmith and repair shop with modern tools and a good stock in a good Iowa town. Address W. L. JENSEN, Dike, Iowa.

DESIGNS, DRAWINGS AND SKETCHES

Of pleasure and commercial automobile and other bodies for the trade. No order too large or too small to receive prompt attention. Write for information and get aquainted. GEO. J. MERCER, Automobile Body Designer, American Building, Columbus Circle, New York.

FOR SALE.

Two story blacksmith shop and tools. Good sized lot 66x140. Located in Dalton, Ohio. For particulars address J. J. MOOCK, Orrville, Ohio.

FOR SALE.

Blacksmith and wood work shop fully equipped with the latest tools, also a good line of stock. Will be sold right if taken soon. Write MRS. BROWNSON, Viola, Ill.

BLACKSMITHS

"Blacksmiths' Notes;" Good Blacksmiths are few and demand big salaries. Buy Toy's Treatise on Steels; modern methods of doing hard jobs easy; welding compounds that weld solid. Colored tool-tempering charts, all tools tempered to a standard. All for one dollar. Valuable samples free. W. M. TOY, Sidney, O.

FOR SALE OR RENT.

My blacksmith and wheelwright shop. Address A. D. Browne, Dingman's Ferry, Penna.

AUTOMOBILE INSTRUCTION

LEARN TO REPAIR AUTOMOBILES.

I have started blacksmiths in the auto business all over the country—some say they doubled their income. I CAN START YOU, SEND NOW for—for 32 page free book. Let us show you. Don't wait—for your own sake—send for free book. DYKE'S SCHOOL OF MOTORING, Box 10 Roe Bldg., St. Louis.

BLACKSMITH MASTER AND HELPERS WANTED

to know secrets to manufacture their own steel weld and tempering powders, to weld at 250 degrees lower heat than any other known flux. Also I give away secrets on tempering compounds to harden one-sixteenth deep hard like glass and some other secrets which are often desired. Send 30c. in stamps or coin and your address to OSKAR FRIEDRICH, 696 Elton Ave., New York.

POSITION WANTED

By general smith in up-to-date power shop. Address J. M. Hartzell, Cadet, Mo.

FOR SALE.

Blacksmith shop, two fires and modern power tools, including trip hammer. Good prices; best farming country in northern Iowa; a splendid opportunity for good blacksmith; good reason for selling. C. J. HORBERG, Algona, Iowa.

FOR SALE.

Blacksmith shop, lot 50x100, with tools and stock; located in a good town in an Irish settlement. Work for two men; a splendid opportunity for some one, and will give a snap if taken at once. W. JOHANSON, Fonda, Iowa.

FOR SALE.

An up-to-date shop in Southern Oregon's best valley. Power, tools, hammer, emery saw, drill. Nearest shop fifteen miles. Good prices, good climate. Reason for seling, failing eye-sight. Address, FRANK JOHNSTON, Provolt, Oregon.

FOR SALE.

Blacksmith and wagon shop in Southern Minnesota. Large territory. Work for two men. Reason for selling, disabled. W. L. MAUST, Ostrander, Minn.

FOR SALE.

One No. 4 Brooks Tire machine for sale or trade. Will trade for gasoline engine. For particulars address, J. T. NEWBERRY, Del Norte, Colo.

FOR SALE.

General blacksmith shop in good district. Address, F. POLZIN, Bloomfield, Colorado.

FOR SALE.

Power blacksmith shop, tools, feed grinder, paint shop and 5-room house; paying business and will be sold at a bargain. C. W. ROWLAND, La Place, Ill.

SPECIAL NOTICE.

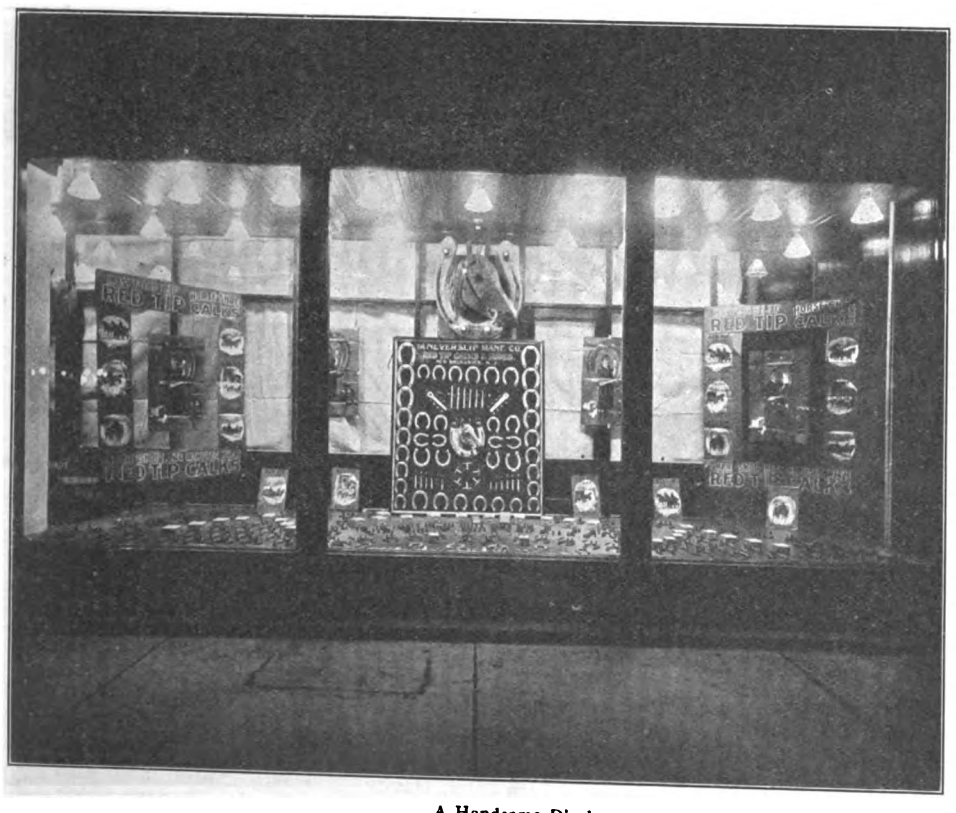
The price of THE SCIENTIFIC STEEL WORKER (2nd edition), has been reduced from $2.50 to $2.00, this is the most practical book ever written on steel working and tool making. It thoroughly explains the art of Forging, Welding, Annealing, Hardening and Tempering all kinds of steel; also contains tables for making rings and much other valuable information which has never before appeared in print. 200 pages well illustrated, cloth bound, stamped in gold. Warranted to be satisfactory or money refunded. Price $2.00.

Address, O. A. WESTOVER, Box 211, Fairmont, W. Va.

A Red Tip Window.

We reproduce the window of the Kalispel Mercantile Company, Kalispel, Mont., composed entirely of Neverslip advertising material, which attracted considerable attention. The Neverslip trade-mark is one which lends itself readily to decorative purposes, and the shoes, tools and calks made a splendid showing on the board in the back ground. The Neverslip Manufacturing Company is annually spending a large amount of money to introduce their goods to the public, all of which is to the advantage of the jobber and shoer who handles this celebrated line.

Any of the material shown in this picture will be furnished cheerfully upon request, also booklet "B" which contains full information and prices of Neverslip Red Tip Calks and Shoes. If you are not thoroughly familiar with this line we should suggest that you write The Neverslip Manufacturing Company, New Brunswick, N. J., for their Booklet "B," and mention the Blacksmith and Wheelwright.



A Handsome Display.

Great Automobile Shows.—Readers in this locality will be interested in the 12th National Automobile Show at Madison Square Garden, New York, from Jan. 6 to Jan. 20. All told there will be more than 600 exhibitors. During the first week there will be 60 exhibitors of complete pleasure vehicles, both gasoline and electric types, the former in the majority. In addition to these there will be 311 accessory manufacturers and dealers exhibiting and 19 motor-cycle concerns. In Part Two, the second week, when commercial vehicles only will be displayed, thirty-one companies will show complete motor-trucks and business wagons of all sorts and sizes, while practically the same number of accessory makers will be represented as at the previous week. Needless to add, everything that is new and up-to-date in the manufacture of automobiles and kindred industries will be shown. Many accessory houses will show new ideas imported from abroad, for the first time this season. Also, many of the new features sprung at the Olympia show in London will be displayed here for the first time.

In addition to this, there will be a show at the Grand Central Palace, New York, beginning Jan. 10 and lasting until Jan. 17. This will also be a splendid exhibition of automobiles and accesories and well worth a visit, it being in a new and imposing building that cost nearly two million dollars.

The Hemphill New Improved Shoeing Stocks.—No reader should fail to consult the advertisement in this issue of the Hemphill Horse Stocks Company of Rensselaer, Indiana. An illustration of this stock will be found in their announcement together with a brief description of it. The company wants every reader however, who may be interested to write for a circular giving detailed description, price, terms and testimony. In writing mention The Blacksmith and Wheelwright.

Cleveland Concord Express Axle.—No reader can fail to notice the attractive and prominent announcement in this issue of the Cleveland Axle Mfg. Co., of Canton, Ohio, giving a brief description of their No. 6½ Express Axle. They say that this axle will out-wear the wagon. Drop this company a postal card and it will send you full particulars, or you can probably obtain this axle of your dealer. He ought to carry them if he does not.

Carriage Gears for the Trade.—Schubert Bros. Gear Company, 44 Cedar Street, Oneida, New York, have a special announcement in this issue regarding carriage and wagon gears, high grade vehicles in the white, tops for carriages and automobiles and automobile bodies and trimmings. An interesting new catalogue will be sent free on application if you mention The Blacksmith and Wheelwright.

Carriage and Wagon Springs.—The Tuthill Spring Company, 770 Polk Street, Chicago, Ill., make a specialty of carriage and wagon springs of the best quality. They emphasize the fact that they are in a position to deliver springs promptly at reasonable prices. This concern was established in 1880, but is doing business on 1912 methods. Write to them for full particulars and prices.

Trip Hammers, Punches and Shears.—The attention of jobbers and blacksmiths is especially called to the excellent line of trip hammers, punches, shears, key-seaters, eye and angle benders, manufactured by the George E. Davis Company, Dubuque, Iowa. An especially successful hammer bears the name "The New Idea" and the manufacturers are anxious to give you full particulars concerning this device, which requires no separate engine, no overhead shafts, hangers, pulleys, etc. Be sure to write for descriptive catalogue and mention this publication.

WAGON BUILDING

"Build me a wagon that will last forever."

"Sorry, Sir, but 'axle troubles' (due to wear—wear on the spindle, or on the box, or both) make it impossible."

You've often received a specification like that and been obliged to give that answer—haven't you?

The Sheldon "TON-DON"—an axle that will not wear, run hot or break—allows your meeting the requirements of the man who wants a wagon to last forever, **and we have told him so.**

The Sheldon "TON-DON" was originally made for buggies and carriages. Its success was so instantaneous and pronounced that we were deluged with requests for an axle embodying the same principles for use on Delivery, on Business, and on Express Wagons.

Hence, the "TON-DON"–CONCORD EXPRESS.
In EFFICIENCY—The HIGHEST.
In CONSTRUCTION—The SIMPLEST.
In SERVICE—The MOST SATISFACTORY.

The Spindle of the Sheldon Ton-Don Axle

Ordinary axles wear flat on the bottom of the spindle because the bottom side is the point of contact and where the wear of the spindle is concentrated. It takes a spindle of unusual hardness to resist this wear—greater hardness than any ordinary axle affords. The spindle of the "TON-DON" is hardened by a special process, producing a wearing surface of such hardness that a fine file makes no impression on it—yet the center remains soft or "natural."

The Phosphor-Bronze Lined Box

The peculiarity of this box lining is that while somewhat softer than the spindle, there is no perceptible wear after thousands of miles of running, but becomes harder and more wear-resisting with use.

Phosphor-Bronze (of a mixture which increases its toughness, smoothness under friction and wear-resisting qualities) is a metal used for making the propellers of ocean steamships, bearings for locomotives, crank-shaft bearings for automobiles and other fine machinery. Imagine what a metal must be to meet such conditions, and you will grasp the advantages of applying such metal to axle purposes.

THESE AXLES CARRIED IN STOCK BY THE FOLLOWING JOBBERS AND CAN BE OBTAINED AT MANUFACTURERS' PRICES.

Baltimore, Md.....E. Scott Payne Co.	Providence, R. I.....Congdon & Carpenter Co.
Boston, Mass.....E. P. Sanderson Co.	Rochester, N. Y.....Burke Iron & Steel Co.
Buffalo, N. Y.....H. D. Taylor Co.	San Francisco, Cal...Waterhouse & Lester Co.
Chicago, Ill.....E. D. Kimball Co.	Scranton, Pa.....Bittenbender & Co.
Cincinnati, O.....G. B. Schulte Sons Co.	Seattle, Wash.....Gray Bros. Co.
Indianapolis, Ind.....W. J. Holliday & Co.	Springfield, Mass.....Chas. C. Lewis Co.
Los Angeles, Cal.....Percival Iron Co.	St. Louis, Mo.....Sligo Iron Store Co.
Milwaukee, Wis.....Shadbolt & Boyd Iron Co.	Washington, D. C.....Louis Hartig
Pittsburg, Pa.....McLean & McGinness	Wilmington, Del.....Delaware Hardware Co.
Portland, Oregon.....J. E. Haseltine & Co.	Bridgeport, Conn.....Chapman & Bangs Co.

The Celebrated Champion Line of Blacksmiths' Tools.—The attention of every reader is directed to the extremely attractive two page announcement which appears in this issue from the Champion Blower and Forge Company of Lancaster, Pa. Readers will note that continual additions are being made to the very complete line of tools and machinery manufactured by this company. One of their very latest productions is the Champion Power Hammer, which has a stroke of 65 pounds. A regular set of dies is furnished with this hammer, also two plain grooves and one tapering groove across one end, for forging round iron, straight and taper. The 1912 catalogue of this company, an illustrated book of several hundred pages, is now ready for distribution and we hope every reader will take pains to send for it, and in doing so, do not fail to mention The Blacksmith and Wheelwright.

The Bokop Tire Setter and Cooler.—This machine is manufactured by Bokop, Webb & Palm of Defiance, Ohio, and the manufacturers say has stood the test for 25 years on all classes of work. But consult their advertisement and write for prices, references and descriptive circular.

Good Place for a Blacksmith.—Mrs. Brownson of Viola, Ill., has an advertisement in our For Sale Department of a blacksmith and wood work shop fully equipped. Owing to the death of her husband Mrs. Brownson is anxious to sell this shop, which we understand is well located and a very favorable place for a good live blacksmith. This business can be bought at a reasonable figure. Write to the address given above, if you are interested.

Lightning and Green River Tools.—Few of our readers will fail to notice the striking advertisement in this issue of the Wiley & Russell Mfg. Company, of Greenfield, Mass. The catalogue referred to is now ready for distribution and this company is anxious to place one in the hands of every reader of this paper. In writing for it be sure and mention that you want New Catalogue No. 35. This catalogue contains a large additional line of screw plates including many new sets in leather rolls and wood cases for automobile repair use and other purposes, also their large line of taps, spiral and straight fluted reamers and other tools and machines. It also contains 20 pages of tables and data particularly valuable for all mechanics. Do not fail to write for it.

CLASSIFIED BUYERS' GUIDE

Index to Advertisers

(Continued on page 39)

Champion Tools.—The Champion Tool Company, Dept., "B," Meadville, Pa., have an announcement in this issue illustrating and describing some of their blacksmith's tools. They make many other tools and would like to send their large descriptive illustrated catalogue of 91 labor saving tools to any reader who may be interested enough to write for it and mention this paper.

L. S. P. Calking Machines.—The L. S. P. Calking Machine Co. of Wyalusing, Pa., would like to have every reader send to them at once for testimonials and prices of their calking machines. Consult their advertisement containing several testimonials as to the value of their machine. The advertisement will tell you also what this machine will do.

Mr. Peterson's Plan.—Consult the advertisement on another page of the Dayton Malleable Iron Company of Dayton, Ohio, mentioning the Dayton Fifth Wheel, and you will find out all about Mr. Peterson's plan, which may be just such a plan as you yourself would like to adopt. Bear in mind the Dayton Fifth Wheel is sold only by carriage hardware dealers. You can get this fifth wheel from your own dealer.

Special Offer.—The Crescent Electric Mfg. Company, 1714 Columbus Road, Cleveland, Ohio, make a special announcement in this issue in connection with their Electric Forge Blower which is sent on trial. If you are interested at all in blowers or situated so that you can use an electric blower, write to the above company immediately for further particulars.

The Improved Falkenhainer Auxiliary Vehicle Springs.—These springs are designed for use on elliptic spring wagons, platform spring wagons, vans and trucks, buggies, surries and automobiles. Dealers generally sell them but if your dealer does not happen to have them, write direct to the manufacturers, Falkenhainer & Co, 313 Carr Street, St. Louis, Mo., and mention The Blacksmith and Wheelwright. This spring prevents the body from swinging sidewise or hanging to one side when the load is unevenly distributed, thus keeping the wheels from scraping the side of the body. Owners of vehicles who have used them would not be without them.

Barbour (Near Rubber) Steel Tires.—Large numbers of our readers ought to be interested in the advertisement in this issue of the Barbour Steel Tire Company of Terre Haute, Ind. They say these tires will increase the business of every blacksmith who adopts them and recommends them to their customers. They are moderate in price and any blacksmith can weld and set them. For further information write at once to the Barbour Steel Tire Company of Terre Haute, Ind., and mention The Blacksmith and Wheelwright.

The Spiral Soft Coal Crusher.—Jno. H. Wiestner, 3556 Frankford Avenue, Philadelphia, Pa. has an announcement in this issue with an illustration of his device for crushing soft coal. Every reader will appreciate we think the importance of making an investigation. Send a postal card or letter to Mr. Wiestner and he will forward promply a circular giving full particulars and prices.

Buffalo Electric Blower.—On another page the Buffalo Forge Company of Buffalo, N. Y., illustrate and describe their Electric Blower. This blower is said to represent the latest discovery in the science of pneumatics. The sides of the fans are formed to fit snugly around the tapering vanes inside, with a wide blast channel beyond the tips of the vanes with blast delivery along the line of least resistance. But write to them for their 104 B Catalogue which will give full particulars also their catalogue 131B describing their 200 Silent Blower. This company also makes drills, forges, tire upsetters, etc.

The New Little Giant Power Hammer.—Mayer Bros. Company of Mankato, Minn., have a half page announcement in this issue of their New Little Giant Power Hammer. These machines are being pushed we understand by the largest and most reliable dealers in all parts of the country. Nearly 4,000 of these hammers are now in successful operation. This company has considerable to say in their advertisement about their hammer which will be likely to interest you. Consult it and write at once for further particulars and price list.

A blemished horse can always be purchased for less than value. Choose the quality of horse you want and remove the blemish with "Absorbine" and he will readily sell at a profit so says W. F. Young, P. D. F., 55 Temple Street, Springfield, Mass., who prepares this remedy. "Absorbine" is good for bog spavin, wind puff, sweeney, curb, splint, rheumatism in the shoulders or muscles, big knee, etc. All druggists sell "Absorbine" or ought to. If they don't write direct to Dr. Young.

I. H. C. Almanac and Encyclopedia.—This annual has recently been brought out by the International Harvester Company of America, Harvester Building, Chicago, Ill. It is a book of nearly 100 pages, and contains the calendar for 1912, and a good deal of general information on many interesting topics. We believe every reader of The Blacksmith and Wheelwright can have a copy of it, if he will write promptly and mention this paper, and the book is well worth having.

The Simonsen Hot Trimming Shear.—This tool is made by N. C. Simonsen, Sioux Rapids, Iowa, and can be made useful in every blacksmith shop in the land. In fact as the manufacturer says it is undoubtedly a necessity. He asks our blacksmith readers to write for prices and particulars and suggests to jobbers that they get in touch with him and carry this machine in stock regularly.

Champion Horse Stocks.—These stocks are made by the Champion Horse Stock Company, of Los Angeles, Cal. See illustration in their advertisement on another page and write to them for full particulars and prices.

Neverslip Calks for Dealers and Horseshoers.—The necessity of using calks on icy roads and pavements cannot be successfully questioned, and the Neverslip line is admitted to be of standard excellence. Dealers who have not received window display and supply of advertising material from the Neverslip Manufacturing Company, should write for same to the main office at New Brunswick, New Jersey, and correspondence is also invited from horseshoers. In writing send for booklet B which contains prices and full particulars.

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

Twentieth Century Shafts.—The Pioneer Pole & Shaft Company of Piqua, Ohio, has a full page announcement in this issue, descriptive of their Twentieth Century Shafts. Drop forgings and steel stampings only are used in the construction of these shafts. Our readers want to bear this little fact carefully in mind because it is important. Shafts made in this way are far superior of course to those ironed by ordinary methods. This company does not use what is called "two-piece" Hickory in their poles, because that would make them weak. But their advertisement is worth reading, every word of it. Insist upon your dealer giving you shafts made by this Company. You will get something that you can guarantee and recommend to your customers.

Scientific and Perfection.—Hydraulic Edge Grip Tire Setters—The Lourie Mfg. Co., of Springfield, Ill., successors to the National Hydraulic Tire Setter Co. of Keokuk, Iowa, has a full page advertisement in this issue, illustrating and briefly describing the different tire setters they manufacture. Every blacksmith should read this advertisement and write for illustrated catalogue and special terms for this winter.

THE L. S. P. CALKING MACHINE.

THIS MACHINE IS IN USE BY THE U. S. GOVERNMENT, AND NEARLY EVERY CIVILIZED COUNTRY IN THE WORLD, AND IN THE BEST SHOPS ALL OVER THE U. S.

Read What a Few of the Many Users Have to Say.

It is a fine machine. "Steel Plugging." I can weld and sharpen the Plugs with one pull of the lever.
(Signed) Geo. F. Laughlin, Malden, Ill.

Your Calking Machine does more than you claim for it.
(Signed) John Reutebuch, Star City, Ind.

I am well pleased with the machine and will always have a good word for it.
(Signed) T. B. Merwin, Woodstock, Ill.

Enclosed find balance for machine. I am well pleased. (Signed) C. L. O'Kelley, Culdesac, Idaho.

Your Calking Machine cannot be praised too highly. (Signed) Theodore Bedell, Freeport, L. I., New York.

Your Calking Machine is perfectly satisfactory in every way.
(Signed) Robert King, Horseshoer for Corby Co. Bakery, Washington, D. C.

I am well pleased with the machine. Horseshoeing isn't half so hard.
(Signed) C. H. Snyder, Rockford, Ohio.

I think your machine is just the thing and so do my customers.
(Signed) E. H. Yonkin, Loyalsock, Pa.

Your Calking Machine is O. K. It makes sharp calks and all other kinds perfectly. I am very much pleased.
(Signed) G. I. Nelson, Roseland, N. J.

My machine is not going out of my shop, if I am not able to get another one.
(Signed) E. R. Schomo, Clearfield, Pa.

You can't improve your machine any. It is a dandy. (Signed) R. M. Hagerty, St. Louisville, Ohio.

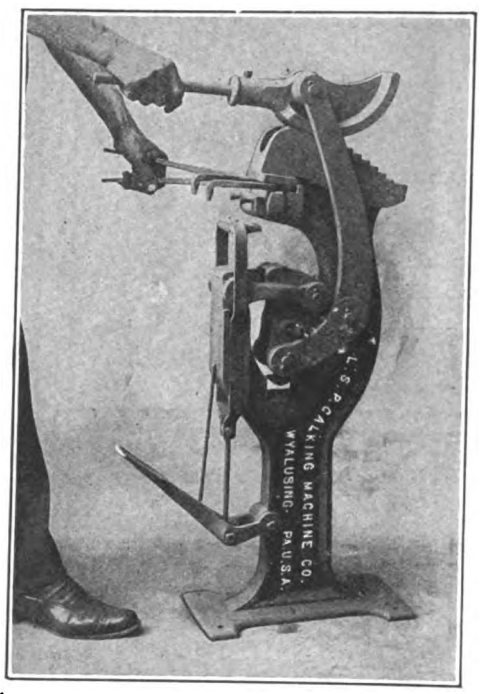
The Calking Machine works fine.
(Signed) John C. Kingsbury, Waitesfield, Vt.

Enclosed find payment on machine. The machine is O. K. and would not think of doing without it.
(Signed) C. M. Douglass, Richfield Springs, N. Y.

The machine is very satisfactory.
(Signed) W. S. Lovejoy, Rangely, Me.

Enclosed find payment. I am well pleased with the machine.
(Signed) A. J Minnich, Liberty Center, Ohio.

I am well satisfied with the machine. It is a great time saver. Heeled 125 shoes, Nos. 2, 3 and 4 in less than two hours and a half.
Signed) Jacob Heinz Olean, N. Y.



WELDING SHARP TOE CALK ON L. S. P.

WHAT THE MACHINE WILL DO.

With one pull of the lever, it will completely make either a sharp or blunt heel calk, of any desired length, on any size shoe, with the stock where it is needed, and no galls or cold shuts, producing a perfect calk. One pull of the lever welds either a sharp or blunt toe calk, and forms clip or not, as you may desire. No weld like the pressure weld, no losing of toe calks.

It has a shear to cut off the end of shoe for shoeing flat or with pads. It works finely on old shoes, and resharpening. It makes the Single or Double Block Heel, or the "Phila. Kink," without the use of hammer, or change of dies. And in Changing Dies, you have no bolts or screws to bother with, all dies pick right out with the fingers.

The machine is made of the very best material and by the best mechanics, and is fully warranted and guaranteed.

WRITE TODAY FOR TESTIMONIALS AND PRICES.

"The extreme of hand labor is the extreme of extravagance."

The L. S. P. Calking Machine Company
WYALUSING, PA.; U. S. A.

National Machine Company
BRIGHTON, ONTARIO, CANADA.

Learn to Repair Automobiles.

Mr. Blacksmith:

Did you ever sit down and pick up some of the different publications that appear for young men, and notice the alluring, promising and glittering opportunities pictured to the young man, concerning the Automobile business?

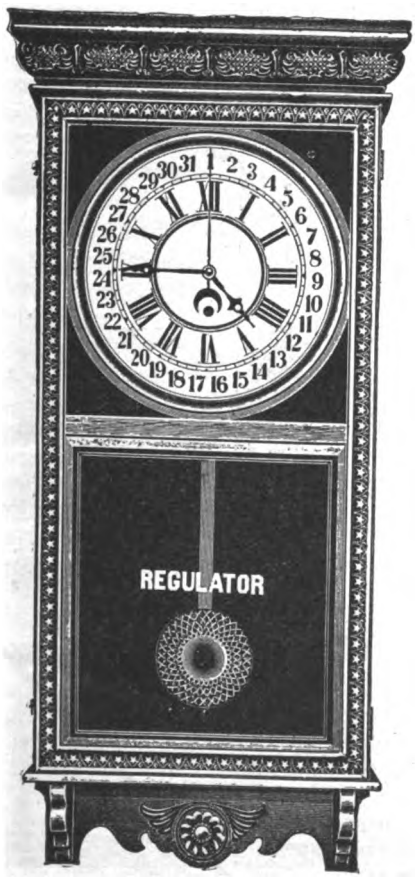
Schools who agree to teach you by correspondence all about an automobile. And did you not murmur to yourself, after reading these glittering, and promising advertisements, one simple word—GRAFT?

Now, I do not claim that I can teach you all about an Automobile through my correspondence course, but I can give you a good insight and help you much more than the cost would be to you, and after you have taken the Home Study Course in my School, if you desire to come to our big School here in Kansas City and finish yourself, all the money that you pay on this Home Study Course will be credited to you.

I know of hundreds of Blacksmiths whom I have educated in this line, who are now competent Automobile men, and we could do as much for you. Write me a personal letter, telling me of your wants and requirements, and I will write to you and tell you how we can fill them, as well as send you our free catalogue.

CLIFF HOGAN, President,
KANSAS CITY AUTOMOBILE SCHOOL
2131 East Fifteenth Street,
KANSAS CITY, MO.

Every Blacksmith Shop Ought to Have a Clock.



Having made a very favorable arrangement with one of the largest clock companies in this country, we now offer to our readers a Regular Eight-Day Calendar Clock, 38½ in. high with a 12-in. dial, with a subscription to THE BLACKSMITH AND WHEELWRIGHT for a year for **$3.90**, or we will send the clock for a club of seven new yearly subscribers at $1.00 each. We cannot fill orders for these clocks to foreign countries.

Every blacksmith shop ought to have a clock of this description, which gives you the time and the day of the month. The engraving shown herewith gives a correct impression of the appearance of the clock.

THIS OFFER IS GOOD FOR EITHER OLD OR NEW SUBSCRIBERS.

ADDRESS

M. T. RICHARDSON CO., Publishers,
27 Park Place, New York.

Do You Want a Knife?

FREE OF COST

Here is a chance to get a three-bladed knife, like the one illustrated below, absolutely FREE OF COST

The blades are made from the best steel, hand forged and oil tempered. Handles of buckhorn, German silver mountings, brass lined and finely finished; strong and well made. All you have got to do to secure this knife is to recommend The Blacksmith and Wheelwright to some acquaintance in the business and secure his subscription for a year. He will pay you a dollar, which you will send to us, with 10 cents extra for mailing the knife, or $1.10 altogether.

If you don't want the knife for your own use, perhaps your son or some friend would like it.

Please remember that the subscriber you obtain does not get the knife. You get it for your trouble in securing his subscription. If your subscriber wants a knife, he can have one by persuading some other blacksmith or wheelwright to subscribe.

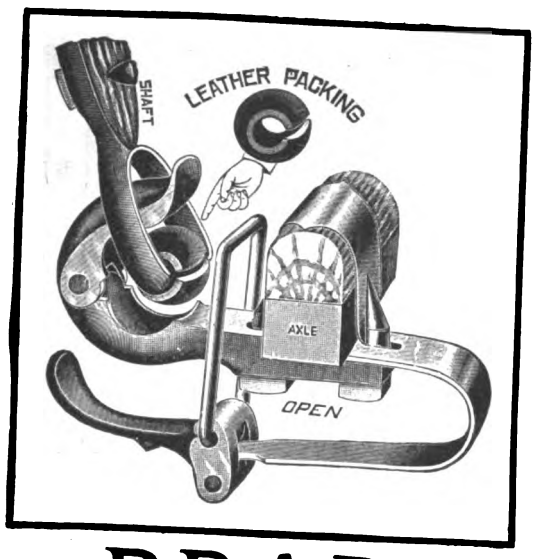
We are willing to give away 5,000 knives, if so many are wanted. We want to double the subscription list of The Blacksmith and Wheelwright, and you can help us do it. Please remember that in each case we must have 10 cents extra for mailing, or $1.10 for each new subscriber secured.

Knife is Wanted or $2.10 altogether (8s. 8d.).
Regular Foreign Subscription, $1.50 or 6s. 2d.
Canadian Subscribers forwarding new Subscriptions must send $1.35 on each New Subscription.

The knives are not given to new subscribers, but only to old or present subscribers who procure for us new subscribers.

Those sending New Foreign Subscriptions must send 6o Cents Extra if Knife is Wanted.

Address M. T. RICHARDSON CO., Publishers, 27 PARK PLACE, NEW YORK.



THE BRADLEY BALL-BEARING Carriage Coupler

All-Steel, Noiseless, Quick Shifting, Ball Bearing

The ONLY Carriage Shaft Coupler that is furnished with a

One-Piece Moulded Leather Packing

A packing that will outwear any other packing ever made. It fits the ball and socket. It is held in place by a spring steel retaining ring. It may be put on and taken off in a jiffy, and it stays where it is put.

MADE IN FIVE SIZES.

Pony—Buggy—Surrey—Delivery—Express

To fit axles 3-4 inch to 2 1-4 inch

Your Jobber Can Supply You.

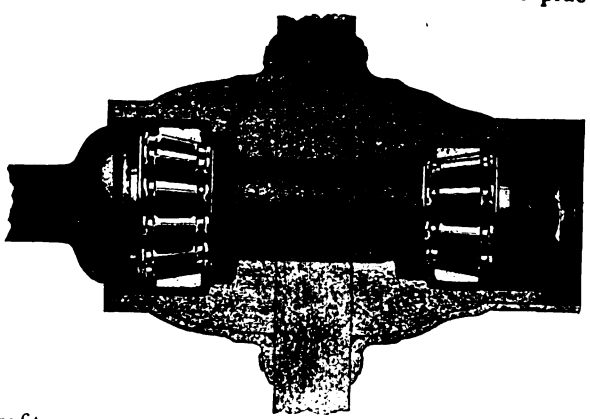
C. C. BRADLEY & SON, Syracuse, N. Y.

WAGONS WITH Timken Roller Bearing Axles

DON'T HAVE AXLE TROUBLES

Axle troubles are due to friction and wear. TIMKEN ROLLER BEARING AXLES cut friction to almost nothing and TIMKEN ROLLER BEARINGS are adjustable for any and all wear.

The TIMKEN ROLLER BEARING AXLE is the most practical and the mostprofitable anti-friction axle to sell. It reduces draft 50%, cuts feed, shoeing, harness and repair bills in two and makes pleased wagon buyers whose trade youhold.



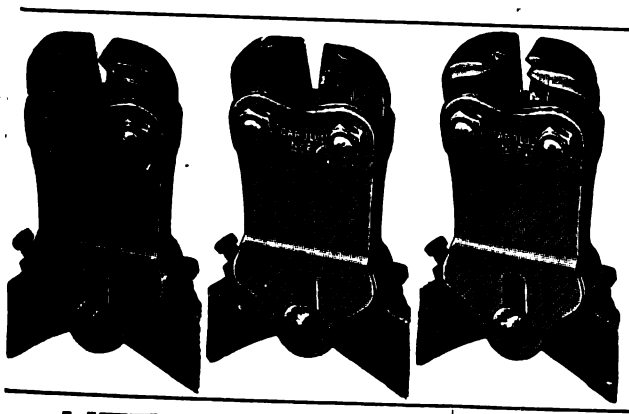
The extra profit on a wagon with TIMKEN ROLLER BEARING AXLES is well worth having—and every such wagon sells another.

GUARANTEED FOR TWO YEARS.
SEND FOR CATALOGUE AND PRICE LIST.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO.

NOTE.—We make Timken Roller Bearings for all automobile applications.
NOTE.—Pleasure and Commercial Car Axles and Jack Shafts with Timken Roller Bearings furnished by The Timken-Detroit Axle Co., Detroit, Mich.

NEW YORK OFFICE: 68th Street and Broadway.
CHICAGO OFFICE: 1347 South Michigan Avenue.

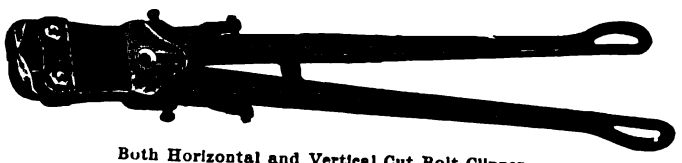


"CAROLUS" BOLT CLIPPERS AND NUT SPLITTERS

Are the simplest, most complete, practical and durable tools of this kind made.

Three different styles as shown in the cuts attached.

Insist on getting these tools. If your jobber cannot supply you, write us and we will take care of your order.

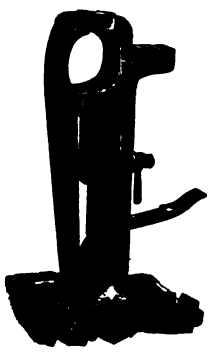


Both Horizontal and Vertical Cut Bolt Clipper.

CIRCULARS AND PRICE SENT FREE.

CAROLUS MANUFACTURING CO., Sterling, Ill.

LITTLE GIANT FOOT VISE AND BOLT HEADER.



For forming, sharpening, and welding calks on horse and ox shoes, for making bolt heads, and takes the place of an ordinary vise for bending and shaping hot iron, thus combining two machines in one.

MADE BY

B. B. NOYES & CO., GREENFIELD, MASS.

Send for Descriptive Circular with Price List of this and other Blacksmiths' Tools and mention The Blacksmith and Wheelwright.

BLACKSMITHS WHO NEED AUTO SUPPLIES
Write For Our
AUTOMOBILE SUPPLEMENT
THE CAMPBELL IRON CO.
817 Cass Ave. St. Louis, Mo.

THE VALLEY CITY BENT KNEES BOB SLEIGHS

PATENTED

For pleasure, delivery, express, grocery, or, in fact, any work where a light, strong sleigh is needed.

The strongest, neatest and best Bobs made in the world, in three sizes, for 1⅛, 1¼ and 1½ shoes. These Bobs are all ironed except draw irons and shoes.

Write for further particulars and Price List.

SUCCESS OSCILLATING SLEIGH KNEES

PATENTED

BEST IN THE WORLD.
TRY SAMPLE SET.

For farm, road, and lumbering Bobs. Made in sizes 1⅛, 1¾, 2, 2½, 3 and 3½ runners.

BROWN'S OSCILLATING SLEIGH KNEES

These knees need no recommendation, having been on the market a number of years. They give perfect satisfaction. Sizes 1¼, 1½, 1¾, 2, 2½, 3, 3½.

SHERWOOD HALL CO., Ltd., Manufacturers, - Grand Rapids, Mich.

No matter how badly they are broken we can repair them in good shape

LOOK AT THIS **THEN AT THIS**

Write for Prices

Columbus Anvil and Forging Co.

West Frankfort Street
COLUMBUS, OHIO

We are experts at repairing Old Wrought Anvils

We manufacture the Celebrated "ARM AND HAMMER" BRAND ANVILS Ask Your Dealer for Them

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

The PERFECTION DISC SHARPENER

The **only** machine that will sharpen discs **on the Harrow** or **Cut-a-way** discs.

FOR SALE BY LEADING JOBBERS IN U. S. AND CANADA

E. E. COMBS, Mfr. - **EVANSVILLE, WIS.**

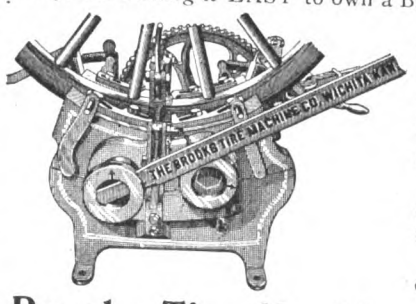
The Brooks Cold Tire Setter

has **earned** the recognition it now enjoys as the World's standard Edge-grip Cold Tire Setter. It's no wonder, when you know the facts, that Governments and large Institutions as well as the majority of individual buyers choose the Brooks. If there is any doubt in **your** mind about its superiority, write us at once and we will **show you.**

NOW IS THE TIME TO INSTALL THIS SPLENDID MACHINE! Ask us why. We will tell you by return mail.

NOW IS THE TIME TO GET IN ON OUR REMARKABLE OFFER, open for a limited time only, and making it EASY to own a Brooks.

Drop us a line **to-day** and ask for our handsome and valuable Booklet "E." It tells the whole story. IT'S FREE. Also ask us about OUR NEW POWER MACHINE.



We will furnish you the greatest accumulation of facts and figures ever compiled on Cold Tire Setting and Cold Tire Setters.

Catch the next mail! We will make it worth your while!

Address our nearest Office.

BUFFALO, NEW YORK **The Brooks Tire Machine Co.** WICHITA, KANSAS

DANDY MULESKIN APRON.

Patented March 15, 1910.

Made in the Following Sizes:

Size R, 32x40 inches.
" S, 30x38 "
" T, 28x36 "
" U, 26x34 "

"BOSS" SPLIT LEATHER APRON.

Made Complete with Eyelets and Strings.
Made in the Following Sizes:

Size X, 30x36 inches.
" A, 26x33 "
" B, 24x30 "
" C, 24x27 "

APRONS OF QUALITY.

THE **DANDY MULESKIN APRON** is a two piece Apron, made upon new lines, has more leather inside of each leg where it is most needed. Made from pure Krom Leather, soft as buckskin and will not burn.

THE **"BOSS"** Blacksmith Apron is made from a Cow Hide Split and has been sold by jobbers everywhere for the past 12 years.

WRITE US TODAY FOR MINIATURE APRON.

ACCEPT NO SUBSTITUTES.

Regular Muleskin Aprons made same as the "BOSS."

Sizes, 32x38 inches. Sizes, 28x35 inches.
" 30x36 " " 25x33 "

We will at all times be pleased to send samples by prepaid express to any jobber for inspection.

MANUFACTURED ONLY BY

THE CALIFORNIA TANNING CO.,

SUCCESSORS TO

EDMUND C. BECKMANN,

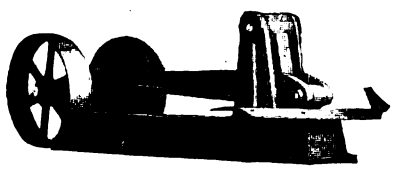
712 North 4th Street. ST. LOUIS, MO., U. S. A.

DANDY MULESKIN APRON.

With Leg Straps and Buckles.
Patented March 15, 1910.
Made in the Following Sizes:
Size 30x36 inches. Size 28x36 inches.
Size 26x34 inches.

"BOSS" SPLIT LEATHER APRON WITH BIB.

Made Complete with Eyelets and Strings.
Made in the Following Sizes:
Size D, 30x42 inches. Size E, 28x38 inches.
Size F, 26x34 inches.



Oh, LOOK HERE, What's This?

Why it's the

"Justrite" Plow Blade and Disc Sharpener,

that every blacksmith ought to have. Does more and better work than power triphammers, leaving the plow lay rolled to a sharp, smooth edge and free from nicks.

IT'S THE BEST YET.

ASK YOUR JOBBER OR WRITE US DIRECT.

What a User has to Say:

Gentlemen: Fairmount, N. D., Aug. 20th, 1911.

I have found the "Justrite" machine just what they claim it to be and I wouldn't be without one. I had a triphammer but I sold it the first chance I had as soon as I owned this machine. I think the Justrite is O. K.

(Signed) G. A. WELGE.

Address **STRITE GOVERNOR PULLEY CO.,** MINNEAPOLIS, MINN., 302 South 3rd Street.

"FAVORITE" CLIPPER GRINDER

The "Favorite" Clipper Grinder grinds the knives of Horse Clipping and Sheep Shearing Machines in a few seconds to cut as good as new.

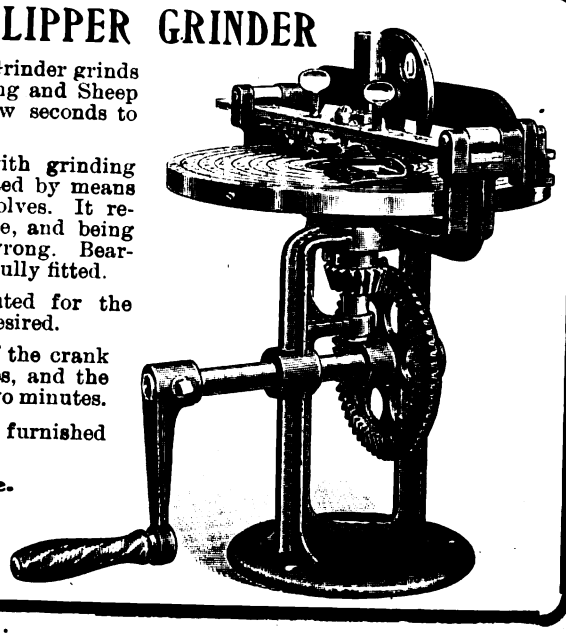
The plate is charged with grinding paste and the blades oscillated by means of a cam, as the plate revolves. It requires no skill or experience, and being automatic, cannot be done wrong. Bearings are extra long and carefully fitted.

A pulley can be substituted for the crank and run by power if desired.

About twenty-five turns of the crank will sharpen a set of Knives, and the Holders can be changed in two minutes.

Tube of Grinding Paste furnished free with each machine.

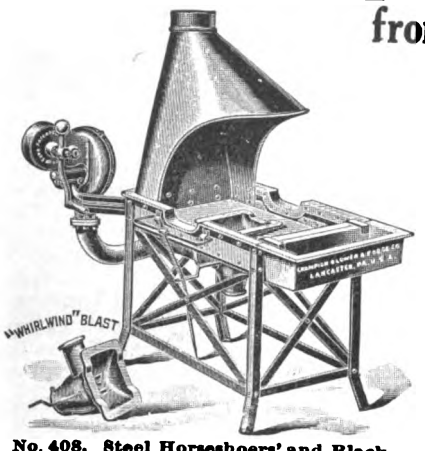
Write for Price.



THE HEATH FDY. & MFG. CO.

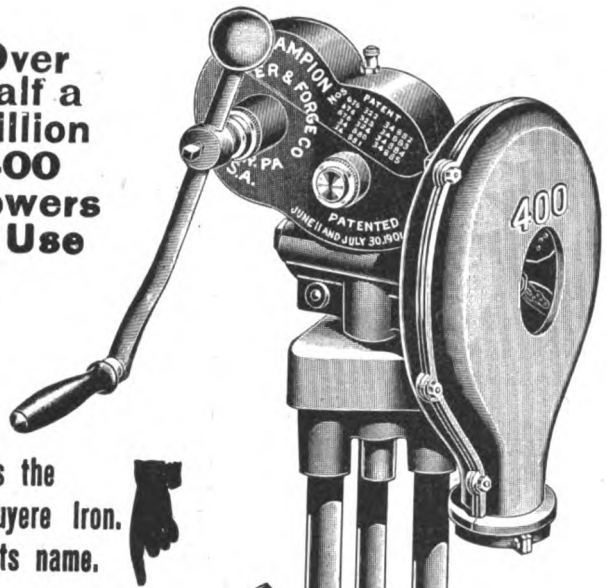
Plymouth, Ohio.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

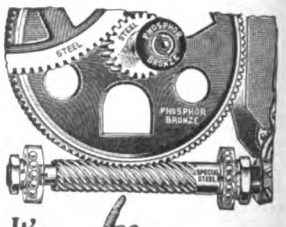
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

Also Great Britain Patent No. 9,662, May 25, 1900.

The Blower for Quality, First, Last and Always

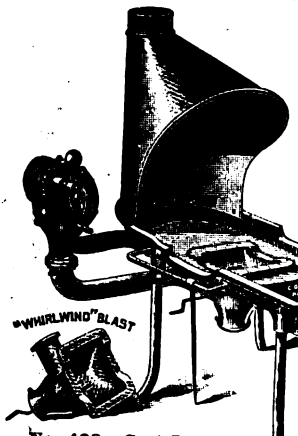
THE FAMOUS 400



It's all in the Spiral

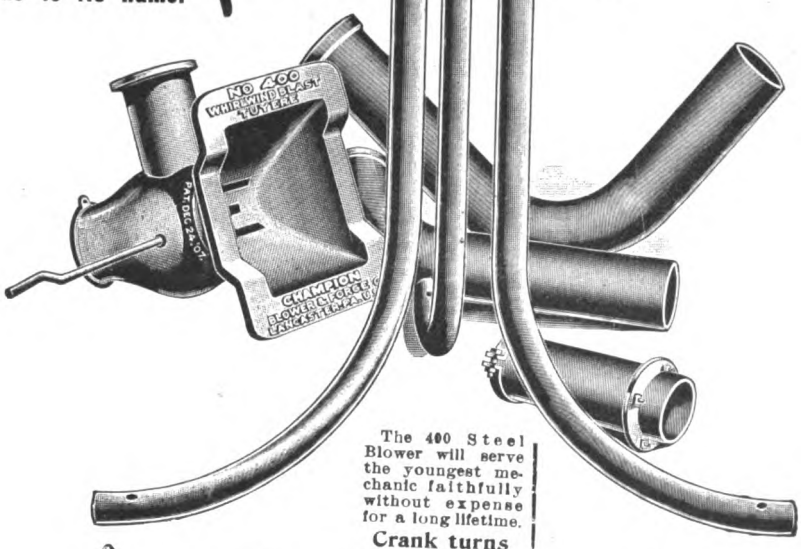
The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

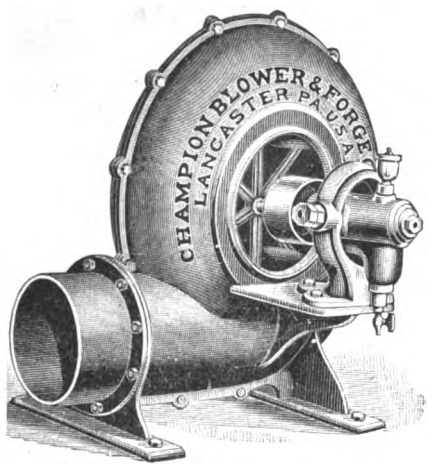


No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.



Champion Power Blowers made in ten sizes up to 64 inches in height.

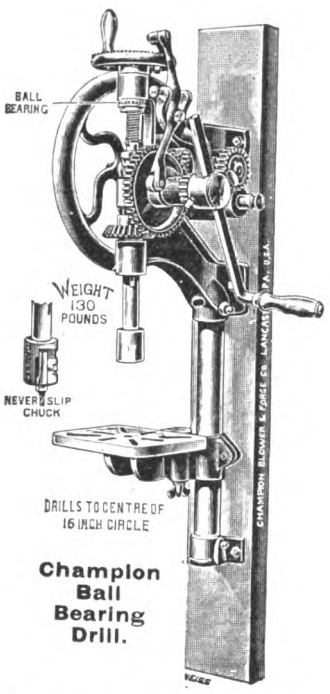
The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

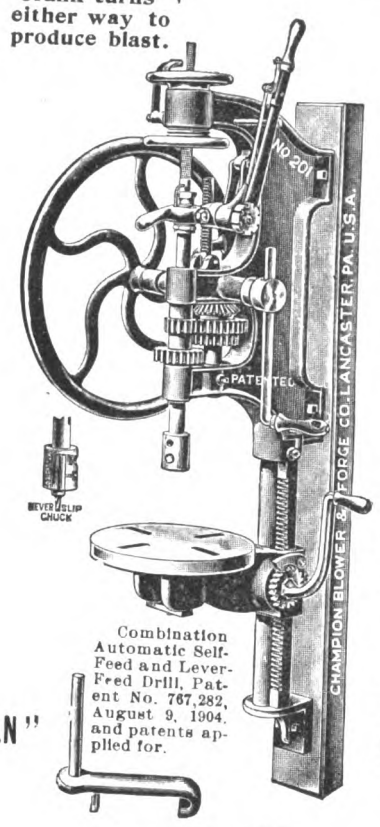
The Champion Latest Invention!

Observe the **Double Compound Lever-Feed**

On the **CHAMPION** "PATENTED" AUTOMATIC **SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT** POST DRILLS. Made with Cut Gears and Ball Bearings.



Champion Ball Bearing Drill.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

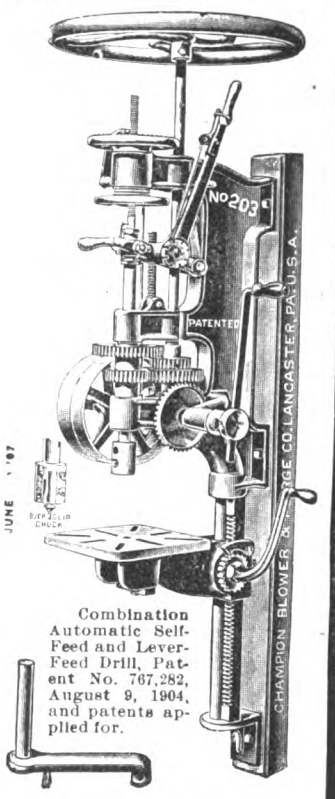
The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill Manufactured.

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

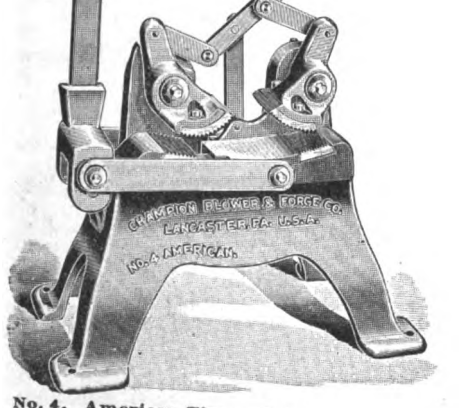
The DOUBLE COMPOUND LEVER-FEED Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.



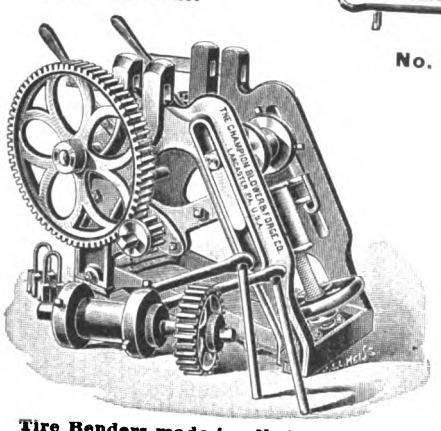
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.



No. 4. American Tire and Axle Shrinker. Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

THE CHAMPION "COLUMBIAN" TIRE BENDER



Tire Benders made in all sizes to bend up to 6x1 inches.

No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

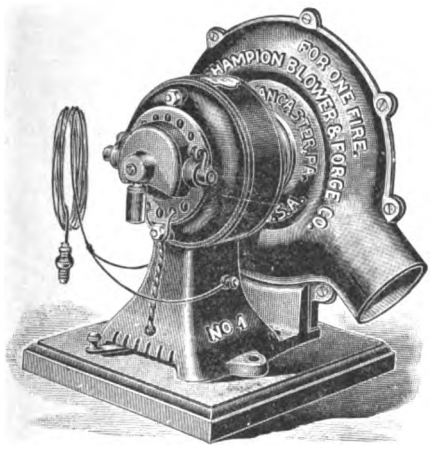
Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

CHAMPION One-Fire Variable Speed Electric Blacksmith Blowers

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements



No. 1 One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for light and medium fires.

THE ELECTRIC SUCCESS.

The four illustrations show a very complete line of Electric Blowers, running up to nine fires, which we recommend in every instance, each fire to be equipped with its own individual Electric Blower so it gives each operator full and complete control of his own individual fire, and a large saving in the consumption of electric current. The material, workmanship, etc., used on these Blowers are of the very best.

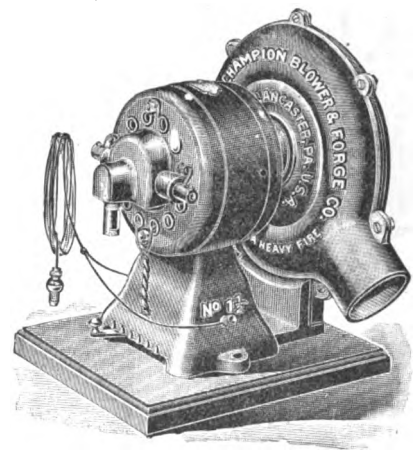
No. 1 and No. 1½ One-fire Variable Speed Electric Blacksmith's Blowers are equipped with attachment cord and plug.

This Variable Speed Electric Blower eventually costs you nothing, because it pays for itself in a very short time.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

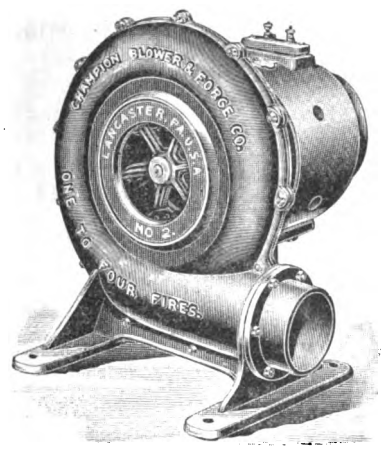
No. 1½ for Extra Heavy Blacksmith Fire

Motor capacity 50% above requirements

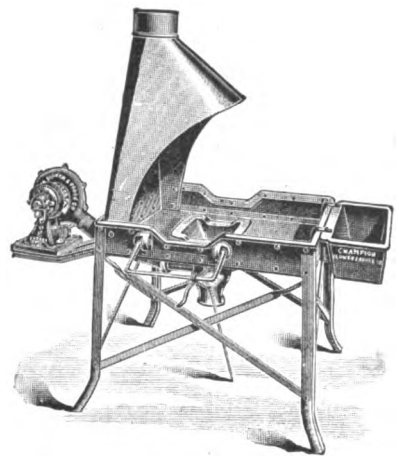


No. 1½ One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for extra heavy fires.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER

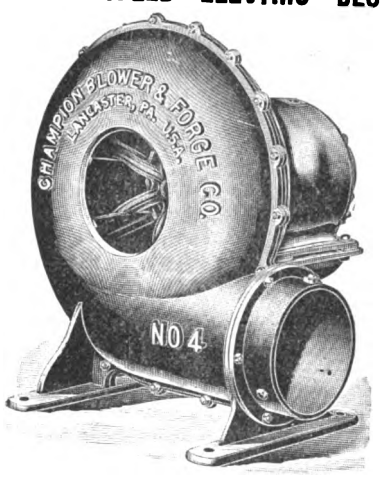


No 2 Electric Blacksmith's Blower. Will blow from one to four fires.



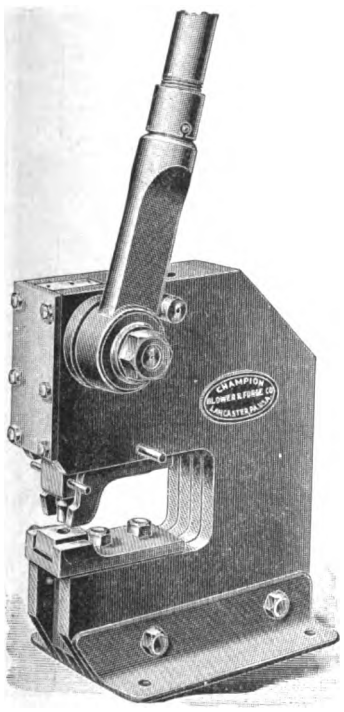
No. 440. Champion Blacksmith's Steel Forge with "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron, equipped with No. 1 One-fire Variable Speed Electric Blacksmith's Blower with five speeds, for light and medium fires. Hearth, 30x36 inches, height 30 inches, with hood complete.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER



No. 4 Electric Blacksmith's Blower. Will blow from one to nine fires.

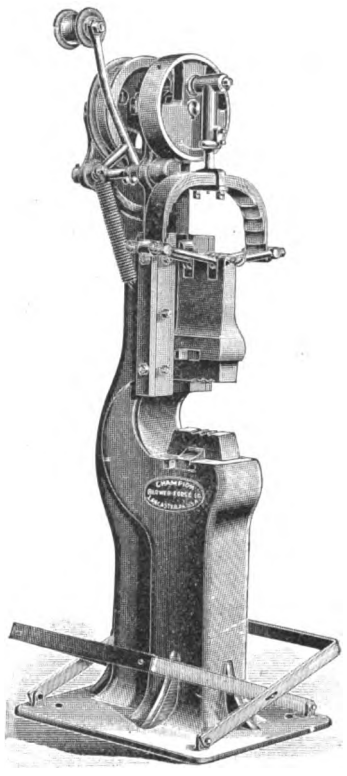
FOUR NEW CHAMPION TOOLS



Champion Steel Punch.

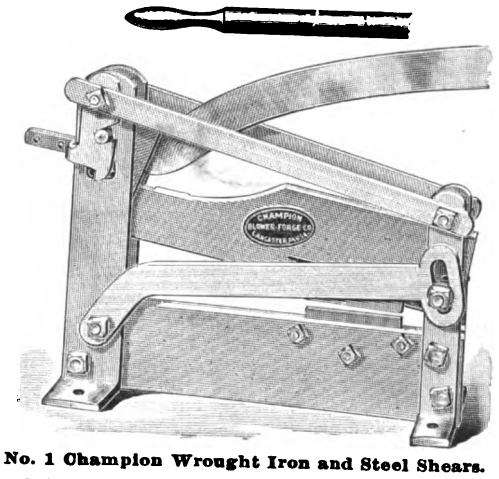
No. 1 punches 5/16 inch hole in ¼ inch material.

No. 2 punches ⅜ inch hole in ⅜ inch material.



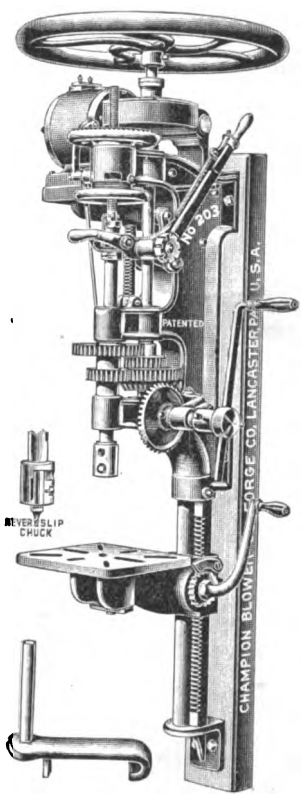
The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



No. 1 Champion Wrought Iron and Steel Shears. Will shear 4x½ inches flat and 1 inch round or square. Weight 255 pounds.

Our 1912 catalogue can be had free upon application, showing the very latest and greatest inventions in the Blacksmith Line in the world on Blowers, Forges, Drilling Machines, Tire Benders, Tire Shrinkers, Screw Plates, Power Blowers, Power Hammers, Punches and Shears, etc. It will pay you to see our new catalogue.



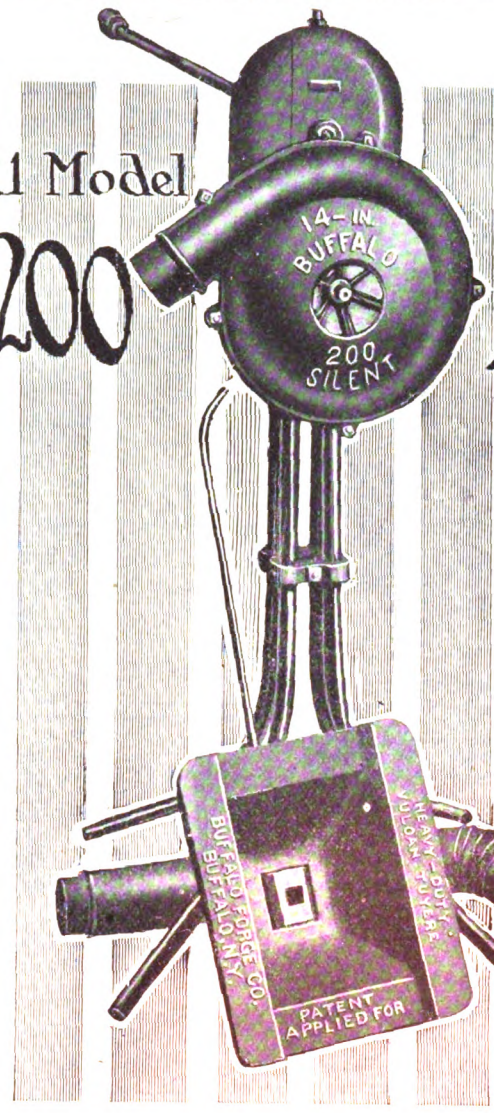
No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.

CHAMPION BLOWER & FORGE CO.

LANCASTER, PA., U. S. A.

1911 Model Buffalo 200 14-inch Fan Silent Blower



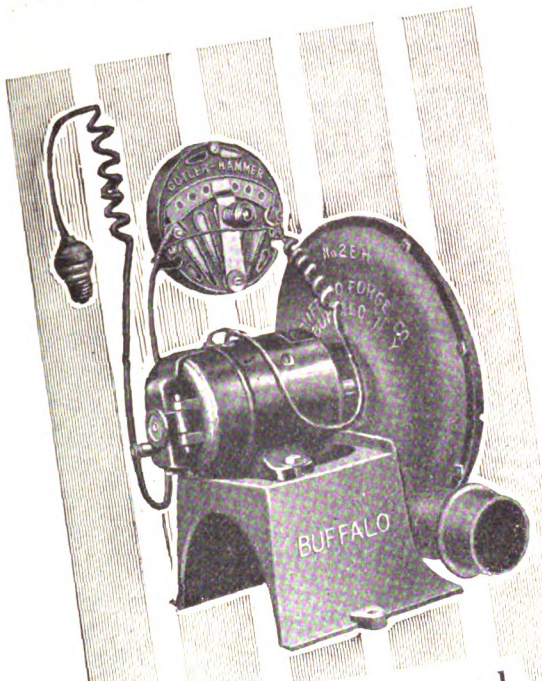
For Sale Cheap 40-Inch Bellows

A master blacksmith near Albany, N. Y., says: "Bought one 14 inch 200 Blower and Tuyere. Had it a week then bought two more. Boys could not use bellows after they had used the "200," and they were 40 inch bellows and good as new."

We have no regrets for this smith who had the bellows left on his hands. His reward lies in the greatly increased amount of work he is getting from "the boys" for the same pay. We feel he will always be a friend of ours through the satisfaction given by the "200." We thank him for his letter. Still we hope he will **not** be able to sell his bellows—simply because we do not wish any other smith so ill as to see him handicapped with them.

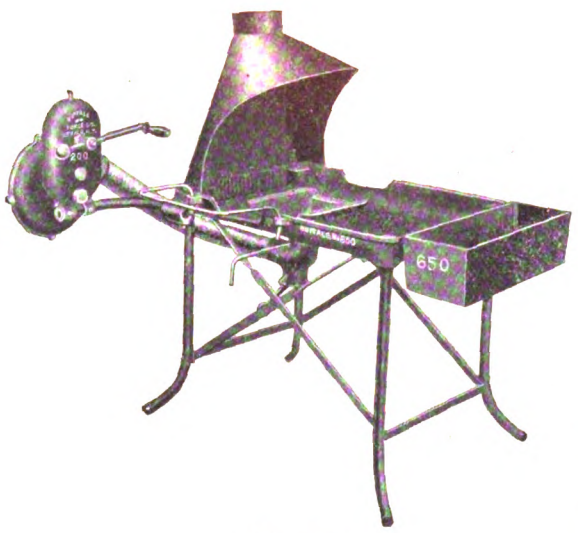
For Fast Work For Heavy Work For Any Work

Get the 14-inch "200." Heretofore it was considered mechanically impossible to make a 14-inch blower run easy enough to be a practical success. The 14-inch "200" astonished the blacksmith world because it runs as easy as any 12-inch blower, and still gives 22% more blast. One might make gears of bronze, silver, or gold, but it would be impossible to make them equal to the high-speed helical steel type used in the "200." With **ball bearing and thrust** and **triple length fan shaft bearing,** these gears are almost entirely responsible for the wonderful performance of the 14-inch "200." In other words, it is impossible without the **helical** gears, in **any blower,** to obtain the same results as in the "200."



Buffalo Variable Speed Electric Blower

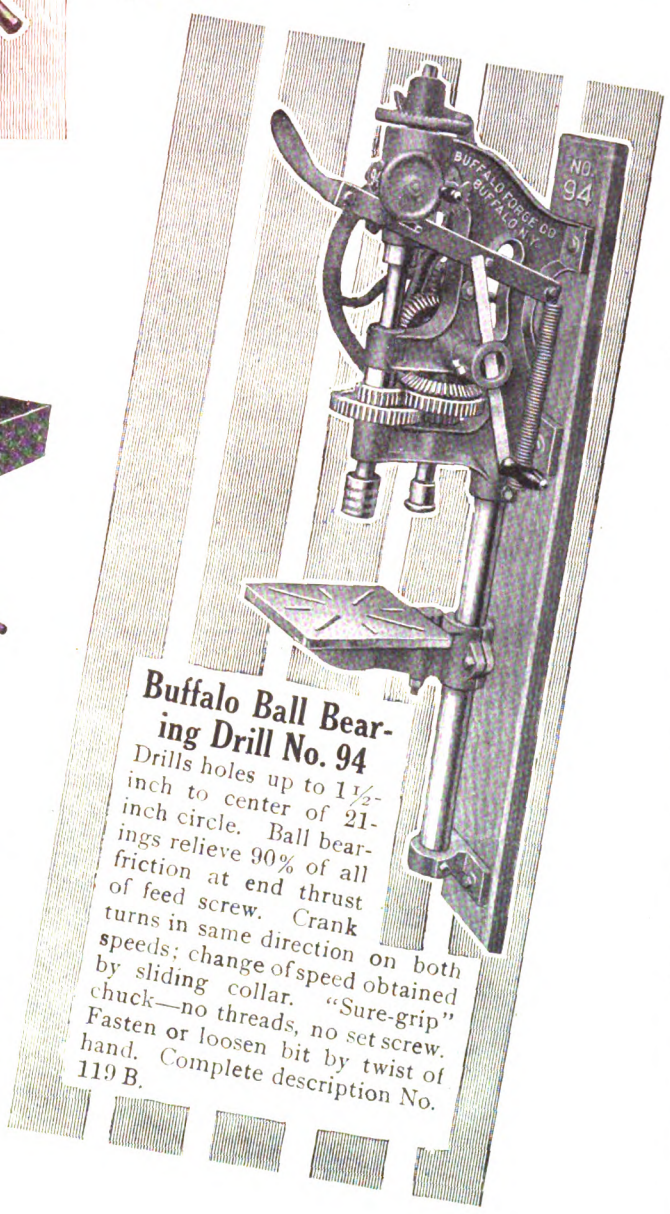
No cost of installation. We furnish it complete with wire and plug. Simply attach to lamp socket. Uses less current than a 16 C. P. electric bulb. Dust proof casing, with hinged doors. Triple size brushes. Automatic oiling. Oil cup cannot be broken. Large fan, giving high pressure at low speed, saves power and lengthens life. Ask for full description No. 154B



No. 650

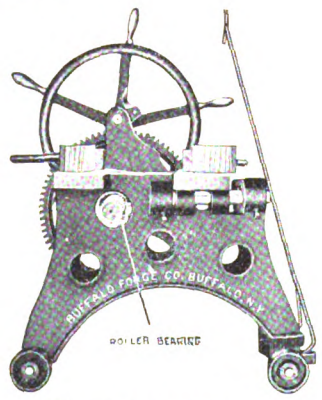
Buffalo Forges

Every size and style carried in stock. Fitted with famous 14-inch "200" Blower, and heavy tuyere with clinker-breaking valve. Note balanced ash gate and the special strong manner of bracing the legs. Ask for Booklet No. 126 B.



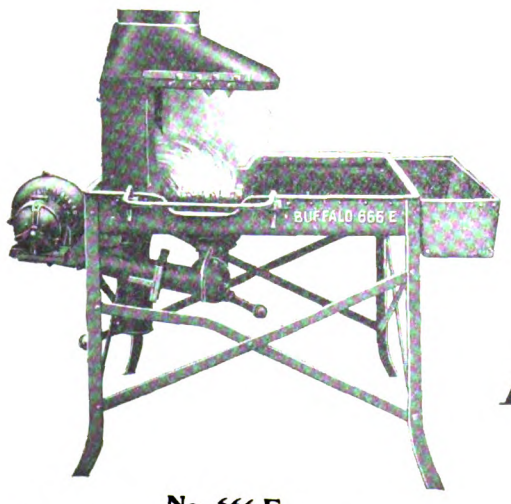
Buffalo Ball Bearing Drill No. 94

Drills holes up to 1½-inch to center of 21-inch circle. Ball bearings relieve 90% of all friction at end thrust of feed screw. Crank turns in same direction on both speeds; change of speed obtained by sliding collar. "Sure-grip" chuck—no threads, no set screw. Fasten or loosen bit by twist of hand. Complete description No. 119 B.



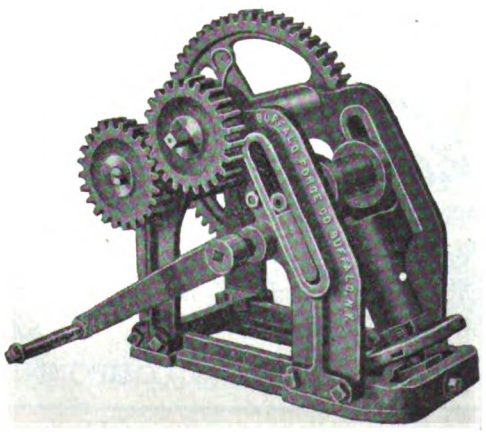
Tire Upsetter

Made in four sizes. Ask for description No. 121 B.



No. 666 E.
Electric "Down Draft" Steel Forge.

Buffalo Forge Company
Buffalo, N.Y.



Buffalo Tire Benders.
Ask for complete description 119 B.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXV. No. 2. NEW YORK, FEBRUARY, 1912. TERMS: ONE DOLLAR A YEAR

INTERCHANGEABLE BODIES.

How to Have Them at the Least Expense and With Little Trouble.

BY WAGON MAKER.

Interchangeable bodies are convenient, and they should, of course, be secured with as little expense and trouble as possible. It is a common thing to have on carriages canopy tops, buggy tops or extension tops interchangeable. When the tops are built with iron posts as is the case with canopies, in case of a necessary change the entire top is lifted from the body, although sometimes the entire body is lifted from the gear and replaced by another.

On the working draft shown we illustrate a carriage which can be changed from a two seated carriage carrying four passengers, with top, to a one seat or two passenger carriage by removing the rear seat and also removing the top, making a light business wagon. Or the entire body can be removed from the platform and replaced by another which is especially made to suit the purpose for which it it needed. On this draft it is a stake rail body that is shown, five stakes and four rails on each side, with stationary driver's seat and heel bracket; the seat and stakes are framed into the sills and the sills are bolted to the platform, thus making a pleasure carriage to carry four passengers. It can also be made into a business delivery wagon, carrying two passengers, with or without top, or a farm wagon, or any other desirable wagon, by building a body to suit any kind of business carrying no more than 1,000 pounds. The convenience derived from these changes is considerable and the cost is very little if the wagon is specially built for them.

How to Build Such a Vehicle.

Make a platform 6 feet and 7 inches long and 37 inches wide, although both the width and the length depend on the needs of the buyer or user. There may be a narrow track or a shorter or longer body needed, but on the draft shown the length and width are as given. The platform has 1⅜ inch or 1½ inch sills. The end cross bars are the same size as the sills, and the five cross bars between the end cross bars are mortised into the sills, and all are covered with ⅝ inch thick ash or oak boards. This platform is best seen on the bottom view, and rests directly on the three springs. The two front spring clips are mortised through the front end cross bar, with a small spring block between the spring and bar, and for the rear springs there are two plates, one top, the other bottom, with upper part of the spring between. In other words, the springs are clipped between the two plates, making it as solid as can be made. The bottom view shows the spring plates, also the step plates and front plates which strengthen the top post. Thus the platform is stationary to the gear and can be used for merchandise, which does not need any body, stakes or rails. On this platform the bodies are built.

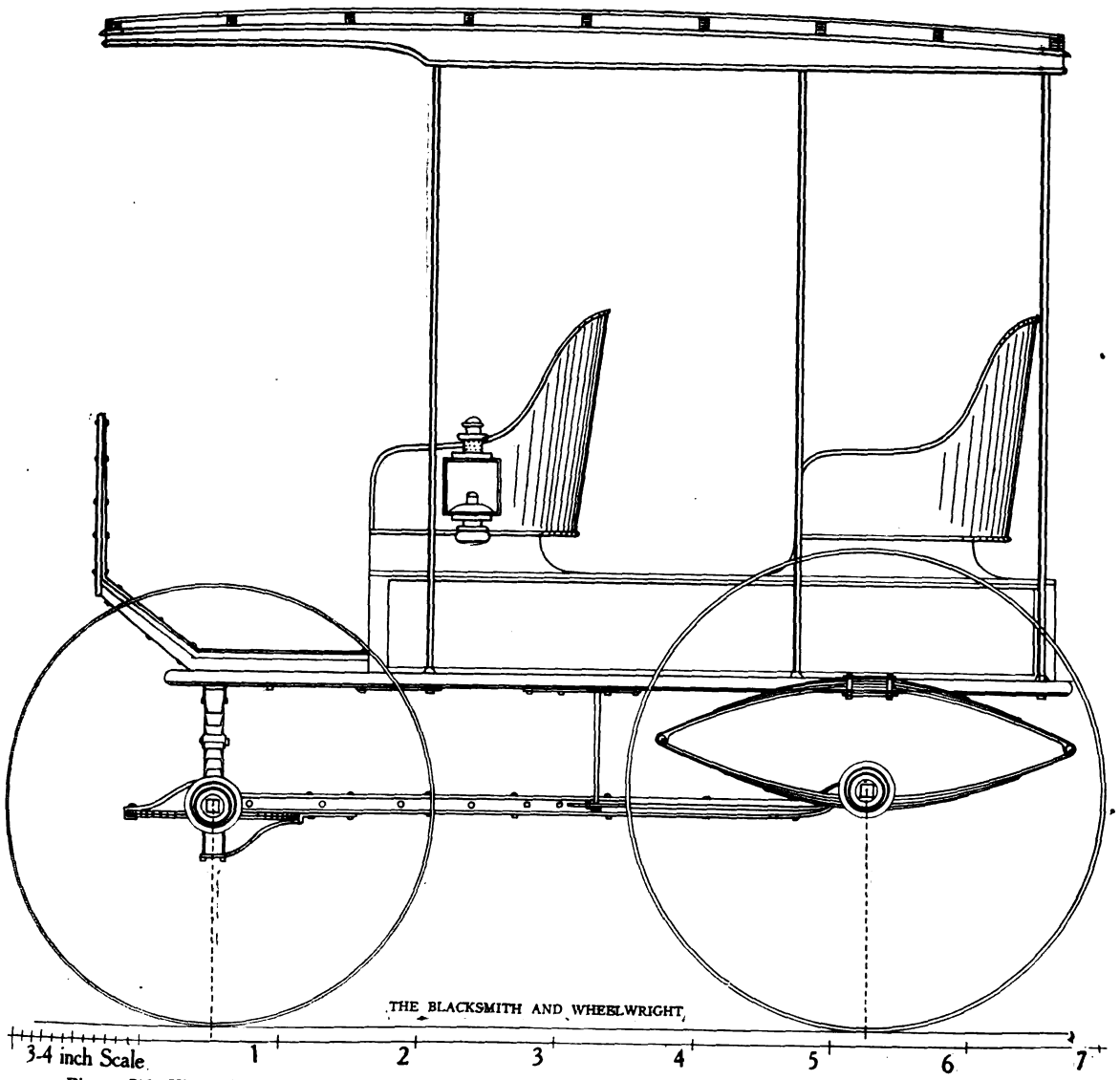


Fig. 1—Side View of a Three Spring Wagon with Wagon Top and Six Iron Shifting Posts, Carrying Four Passengers.

Take, for instance, the two seated body, which has ready made sheet iron seats, which are used a great deal on buggies and phaetons, and are better than wood seats, also, we believe, can be bought cheaper. These seats have a wood frame and are blocked on the inside so that they can be trimmed the same as wood seats. The length of the body from the dash to the front of seat is 23½ inches and the rest of the body is 5 feet. Depth of body 9 inches, and depth of risers 3⅜ inches. The size of the body sills is 1¾ x 1¾ inches square, and the thickness of the sides ¾ inch molded with 3-16 inch x ⅝ inch moldings. These body sides can also be made plain; that is, without any moldings. The body sides in front must be just that much thicker to make them level on the outside. If the bottom sides are 1¾ inches, rear of front seat, and sides of body are ¾ inch thick, the toe bracket must be 2½ inches thick. The entire width of the body, top and bottom, is 34 inches, while the platform is 37 inches, making a recess of 1¼ inches on each side. On this recess the six iron top posts are bolted. The front side is made stationary while the rear seat is made to shift or to be removed. The brace which is shown on the rear view, extends from the risers and bottom of the seat down to the bottom of the body and is bolted to the bottom bar at the center. This brace is to prevent the seat from swaying and from weakening the body. The bolt at the center of the cross bar will prevent this and also braces the seat to the risers. All the six iron top posts rest on iron plates with a large washer on the bottom to prevent the wearing on that part. The space on the platform is 1¼ inches only and a plate to rest on is necessary.

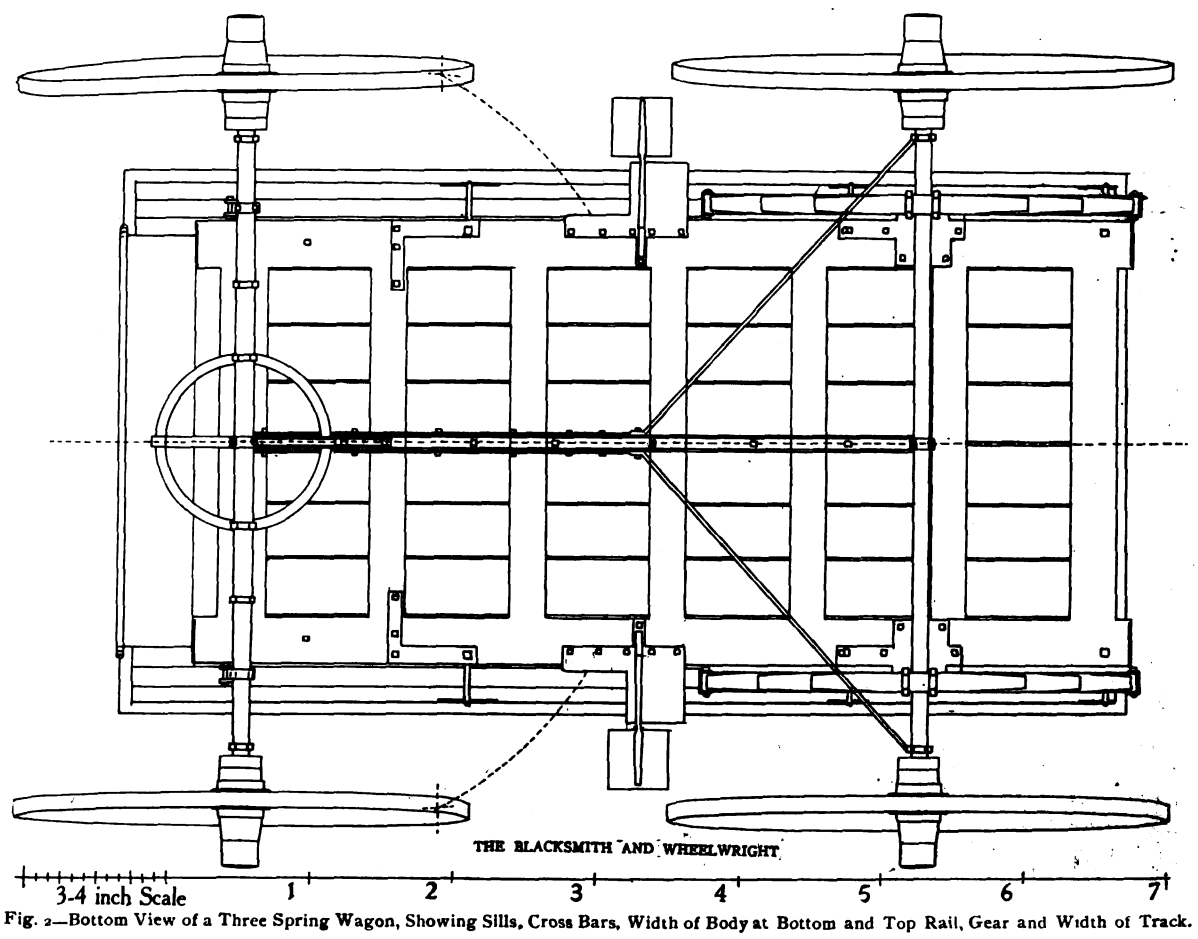


Fig. 2—Bottom View of a Three Spring Wagon, Showing Sills, Cross Bars, Width of Body at Bottom and Top Rail, Gear and Width of Track.

The construction of the top is similar to a

wagon top. The bottom surface from front to rear post is straight; the upper edge is curved and the lower surface from the front post to the front end of the top is scooped out to lighten the front end. All the posts have flanges toward either side, two screw holes on each end, which are screwed to the top rail. Besides the end rails, there are seven curves, as shown on side view, which are covered with 1½ inch strips, beaded on one side on the inside surface. Such tops are covered with imitation leather cloth, the edges of the cloth turned over the cross rails and top rails and tacked. The tacks and edges of the cloth are covered with 3-16 x ⅝ inch rounded moldings. The front and back views will give the body maker and smith the necessary details. The front axle and axle bed has a peculiar shape, but this is done to allow sufficient space for spring, head block and fifth; also to obtain a square surface for the shaft clips. If this could not be done, the body would have to be raised higher which in this case would be a disadvantage. To obtain a level reach it must be bent on the rear end as shown on side view. The rear view gives a great many needed details. Note the rear view which has risers resting on the upper edge of the body, and also additional risers which are stationary to the seats, and lap inside over the body; in fact, both risers are stationary to the seat. The outside risers rest on top edge of the body, both are bolted toegther, and the inside riser rests against the body, but being bolted in the center of bottom cross bar, the seat cannot move to either side. See also shape of step shanks, how they are braced to the step plates. The lamp stays look as if they were drawn to the rear seat because both seats are drawn on a level, but by looking at the side view it will show that they are bolted to the front seat which is stationary and is not removed.

The stake body is the most interesting when the wagon body is considered. This body has no bottom, but sills only, which are bolted to the platform. The sills are 2 inches square and seat posts 1¾ inches square and width across same as the other body, and each fit the same bolt holes. The lower part of seat forms a box, with a lid in front, and the seat is screwed on top of box. The stakes are kept from spreading from two cross rods

Wheel Dimensions, Warner Patent:
Height of wheels, 37 x 44 inches.
Diameter and length of hubs, 3⅜ x 7 inches.
Size of spokes, 1¼ inches.
Thickness and depth of rims, 1 5-16 x 1⅜ inches.
Number of spokes, 14 and 16.
Size of round edge tires, 3-16 x 1 3-16 inches.
Sizes for front springs:

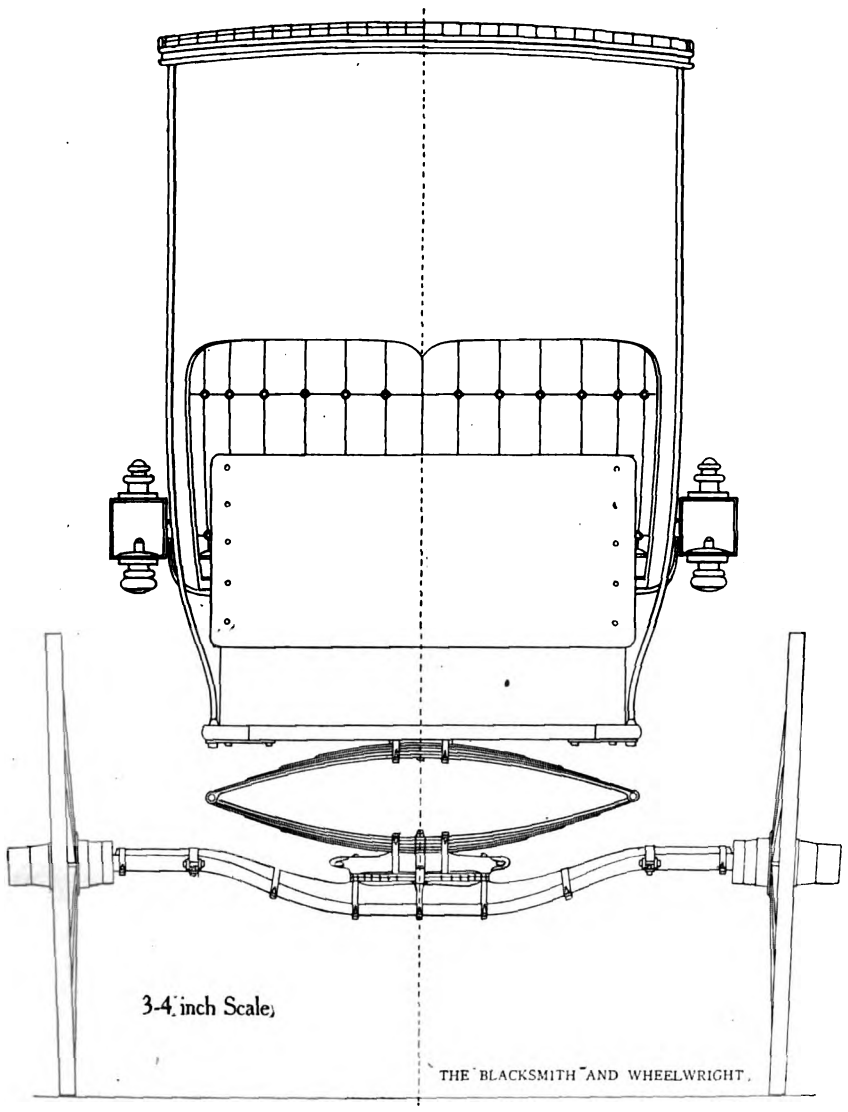


Fig. 3—Front View of Two or Four Passenger Wagon, Showing the Curved Posts, Curved Axle and Axle Bed, Dash and Trimming.

Length from center of bolts, 36 inches.
Open out to out, 9½ inches.
Width of plates, 1⅝ inches.
Number of plates, 5.
Thickness of plates, Nos. 2, 2, 3, 3, 3.
Clipped top and bottom.
Sizes for rear springs:
Length from centers of bolts, 36 inches.
Open out to out, 11½ inches.
Width of plates, 1½ inches.
Number of plates, 5.
Thickness of plates, Nos. 2, 2, 2, 2, 3.
Clipped top and bottom.
Front axles, fantail shape:
Size at square ends and spindles, 1¼ inch.
Size at center, 1 x 1⅝ inches.
Rear axle, coach shape:
Size at square ends and spindles, 1¼ inch.
Size at center, 1⅜ inch.

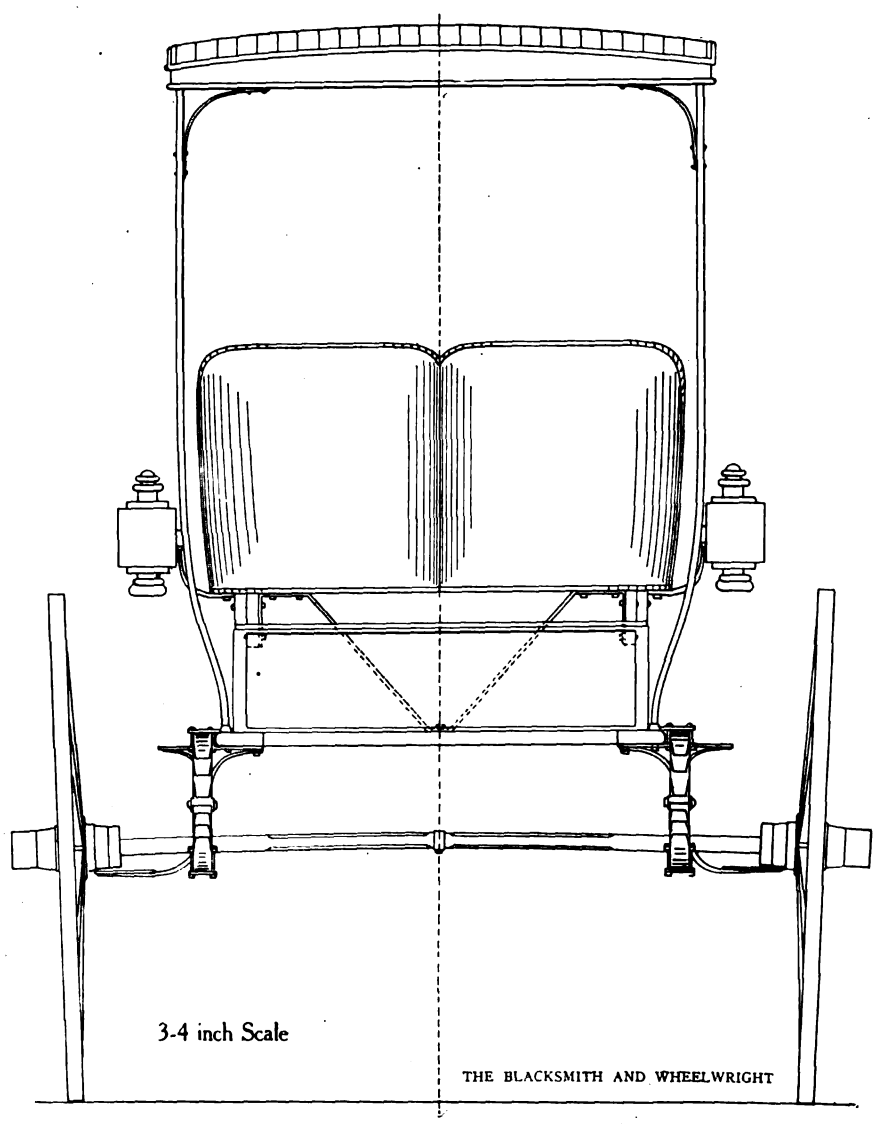


Fig. 4—Rear View of a Four Passenger Wagon, Showing the Sheet Iron Seats From the Rear, Also How the Seats Are Braced.

THE HORSE INCREASE.

Despite the Automobile the Demand Is Still Greater Than the Supply.

All talk and predictions as to the "horseless age," says the Philadelphia Record, that at one time filled much space in papers and periodicals throughout the country have fallen off considerably during the past year. In fact, of late there has seemed to be a decided "switch" in favor of the horse. Amazing facts and figures have been widely published recently, telling of the enormous horse population of the country today, as compared with that of a decade ago.

A Western authority in the semi-annual report sent out from the Chicago market covering the first six months of 1911, states that there were 14,000,000 horses in the United States in 1900, with an average value of $41.61. The number at present is placed at 30,000,000, with an average value of $95.64. The same authority closes his report with the following statement:

"The horses of the country at present represent a valuation of nearly $3,000,000,000. In other words they are worth as much as all the rolling stock of all the railroads, together with all varieties of cars of every description in the United States."

The most remarkable thing about the above statements is perhaps, the fact that all the increase in numbers and valuation occurred during the very decade that the motor car and the motor truck were supposed to have been playing havoc with the horse industry in general. The figures, startling as they may be, will not surprise any one who has to do with horses extensively. Coal dealers, lumber merchants, contractors and all big firms who do

heavy hauling are well aware of how the price of horseflesh has gone up and stayed up during the past ten years. Dealers and shippers declare that it is getting more difficult every day to obtain "top notchers" of the draught type at any price. There is perhaps good and sufficient reason for the lull in the "horseless age" chatter.

Other "Horseless Age" Scares.

There have been other "horseless age" scares. In fact, every time the nation took an important step forward there were always those whose predictions would send the horse backward.

According to Miles M. Baney, of the firm of M. W. Baney & Bro. of Philadephia, many scare periods have occurred since the nation was young. Mr. Baney is well qualified to talk on the subject. He comes of a family, members of which have been stock raisers, breeders and dealers for generations in Pennsylvania. The firm conducts two immense stock farms and a big sales establishment. "Oh, yes," said Mr. Baney, "There were many times during the last century when the 'horseless age' was predicted. Of course," he continued, "I got all my information on the subject from listening to my father and other old

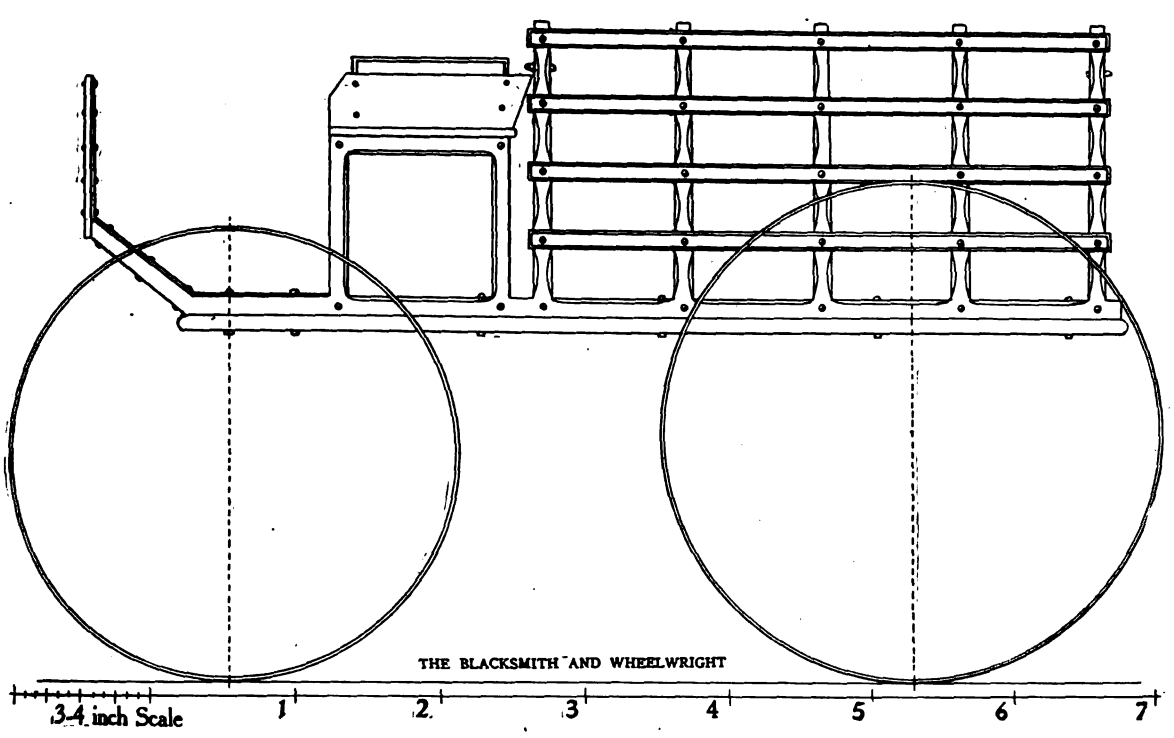


Fig. 5—Side View of Stake Body. The Toe Bracket, Seats, Stakes and Rail Form the Body, Which is Bolted to the Platform.

breeders and drovers in Pennsylvania discussing the good old days. In the early days of the Republic the products of the farms in Ohio, Illinois and Western Pennsylvania were hauled across the country in Conestoga wagons. The drover would put up at one road house tonight and another one tomorrow, and so on until the journey was ended. He returned over the same trail and paid the entire score on the return trip from the money received for his stock. All live stock was driven over the same roads on the hoof.

"Those were the good old days for drovers. Between 1810 and 1830, it seems, there was great activity in canal building. The success of the Erie Canal in York State during that time created a craze for canal construction all over the country. It was at this time that the first 'horseless age' period was predicted. When the farmers stood on the towpath and saw thousands of tons of produce and other freight hauled to Eastern markets by a single team of mules they immediately made up their minds that there was no further money to be made in the breeding of horses. They soon saw the folly of the idea. Terminals grew up here and there along the canals that soon became thriving communities. Horses were in great demand for the transportation of the freight to and from the boats, and the first 'horseless age' died almost a-borning.

"The next time the 'bugaboo' turned up," continued Mr. Baney, "was about 1837, when the country was being 'honeycombed' with railroads and the 'iron horse' was puffing over the hills and valleys of the Middle West—the far West in those days—pulling hundreds of thousands of tons behind it.

"The farmer there and then made up his mind that there could be no mistake about it this time. Surely the limit had been reached. 'Hereafter I shall raise only such horses as I myself shall use.' But the thriving communities that the canals started were soon made into big industrial centers by the railroads. The business of the country was increasing at an almost incredible pace.

Demand for Horses Increased.

Naturally the demand for horses grew apace. It was some time before the supply caught up with the demand, and another "horseless age" scare was a thing of the past.

"When it next turned up," Mr. Baney went on, "it appeared in a much milder form than on the two former occasions. That was some years ago, when the bicycle craze was on. Of course the bicycle did not affect the trade in general, but it certainly decreased the demand for driving horses for the time being. However, it passed in the same manner as did the other scares, and left the trade a more profitable calling that ever before. And now we come to the motor age. There can be no doubt that it has affected the horse business considerably.

"The coach horse industry is almost a thing of the past in comparison to what it formerly was. But just what the ultimate effect of the motor truck will have on the draught horse industry it is a little too soon to predict. Draught horses are in better demand and higher in price today than they ever were, and the indications are that prices may go still higher.

"We should look on the heavy motor truck as a sort of 'godsend.' There is no telling just how high the price of horseflesh might go if there was nothing to curtail the demand to some extent. I really believe that if it were not for the motor trucks in use today a poor man woud be unable to buy a good pair of draught horses. Only big firms and wealthy corporations could afford to pay the price."

The Horse and the Man.

The horse is probably the most valuable animal that man employs in his service. It therefore rests as a moral and economical obligation on man to see that the horse is properly taken care of. The time of the year is at hand when the going is hard and the way is slippery. Don't overload your horse; when you do you lose efficiency just the same as when you overload the electric truck. Keep your horse sharp shod, or fit his feet with some appliance that will enable him to keep upon them. If the horse is left to stand, see that he is well blanketed and by this is not meant throwing the blanket in the general direction of the horse. Put it over him carefully so that the first chance breeze won't blow it off. If there is a brisk wind blowing and the horse must stand some time, don't leave him facing the breeze—he does not enjoy it any more than you do.

POWER IN THE SHOP.

Gasoline, Electricity, Soldering Aluminum, Brazing, Ornamental Table Top.

BY JAMES F. HOBART, M. E.

The smith who has never had power in the shop cannot realize the benefits to be derived from its use and once a man has used the gasoline engine, he wonders how he ever managed to get along without it. And the man who has used the electric motor in the smith shop finds therein a source of power as far ahead of the gasoline engine as that is ahead of foot power. The convenience of the electric motor is so much greater than that of the gasoline or even of the steam engine, that one must be accustomed to the use of all three power units in order to judge the matter correctly.

The writer is a firm believer in the use of a gasoline or electric engine in every blacksmith shop in the world, and so important and valuable is power in the shop, that the smith should get it anyway.

Electrical power, when direct current is supplied, is a very simple matter to handle and to comprehend. The electrician calls it D.C. and thus distinguishes it from A. C., as he terms alternating current. Some smiths have already become accustomed to low tension continuous current (D.C. 110 volts), both for lighting and for power, and these smiths will find something entirely different when they come to handle alternating current machinery and circuits, particularly when operated multiphase.

To begin with, it seems very hard for the average man to understand what a two phase or a three phase system really is. He can readily comprehend a single phase current where the electrical impulse flows first in one direction, then in the opposite, through the conducting circuit at the rate of 60 to 120 times or impulses per second.

To obtain a slight understanding of the matter, assume a circuit with 60 impulses per second. Then, for 1-120 second, current is flowing "clockwise," that is, in the direction taken by the hands of a clock, then for the next 1-120 of a second, the electrical impulse is in the opposite or "counter-clockwise" direction. The electrician always uses these terms to distinguish the direction of rotation of a motor or of a machine, and the method is a good and convenient one.

They call the number of alternations per second, the "frequency" of the alternations. If two generators, or two machines with similar frequencies, be connected to the same circuit, but in such a manner that the alternations in the same directions occur 1-240 of a second apart from each other, then there will be a two-phase current in the circuit. If there were three similar machines connected in such a manner that the clockwise impulses were 1-360 of a second apart, there would be a three-phase current in the circuit.

It is, of course, impossible to so connect up three generators that they will deliver impulses exactly at that small fraction of a second apart, as noted, unless the three machines be rigidly connected together upon the same shaft, or by some other equally positive method.

The usual manner of obtaining a three-phase current is to place three generators upon the same shaft and build the three in one, merely dividing up the winding into three groups, each group being so connected that the impulses are directed into the circuit at the proper fraction of a second apart, as above stated. Thus, the smith learns that a two-phase, or a three-phase alternating current, is merely two or three separate current-impulses, all working in the same direction at slight fractions of a second apart, and then working in the opposite direction during two or three similar small fractions of a second.

Perhaps one of the best illustrations of a three-phase alternating current that can be shown, is a piece of ordinary three-strand rope. The three strands represent the three phases. It will be observed that the strands lead to the right, on the upper side of the rope, but that they lead to the left on the lower side. It is the same with the phases of an alternating current. All the phases work ahead, side by side, in one direction, and then side by side in the opposite direction, almost exactly as do the strands in a rope.

Remove one of the strands, and while the

rope remains, it is not as strong or as smooth as with three strands properly spaced and all of the same size. It is the same with the alternating current. With more phases, properly distributed, it is stronger and more regular in effect than with a phase missing. And the alternating current is by no means limited to two or three phases. Almost any number of phases may be turned into the circuit by properly winding the generator, but the three-phase has been found better adapted commerciallly than a greater number of phases.

Small motors, when connected across only one phase of a three-phase circuit, run well, but not as economically as do the large motors which use all the phases. The above is just a simple step in alternating electrical engineering and it is given to aid the smith in picking up a necessary knowledge of alternating motor work, which certainly gives the best power service in a smith shop that science has yet designed. The alternating current motors don't burn out as readily as do D.C. motors, they need no commutators as do the D.C.'s, and there are several other points of excellence which makes the alternating current motor the best power in the world for the blacksmith shop.

Soldering Aluminum

The reason why it is so difficult to solder aluminum articles, is that the instant a freshly cleaned aluminum surface is exposed to the air, a thin film of aluminum oxide is formed which effectually prevents the solder from uniting with the aluminum surface.

It is the general opinion that aluminum does not rust upon exposure to air, but that is a mistake. Really, so quick is aluminum to unite with oxygen, that it is impossible to cover a cleaned surface with solder before the atmospheric oxygen gets its work in and covers the aluminum surface with a thin film of rust or oxide. But the film, no matter how thin, when once formed, protects the surface from further oxidization, and it is this which gives rise to the general opinion that aluminum is not oxidized by exposure to the air or to water.

The above being the case, it may be proven by immersing the aluminum articles to be soldered in a bath of common "half-and-half" solder, then clean the aluminum surface to be united, by means of a wire scratch brush, used beneath the surface of the molten solder. Keep the aluminum articles below the surface of the solder until they are cleaned, brought together and removed covered with a film of soft solder, and placed aside to cool. By proceeding in this way aluminum may be soldered successfully with common soft solder or any other kind of solder, for that matter.

But there are several kinds of solder on the market with which it is claimed that aluminum can be soldered in the usual way, with an ordinary copper bit, using the special solder in the ordinary manner. One of these solders is described below, but it must be noted that the aluminum surface is to be scratch-brushed under the melted solder, as described.

Phosphor Block Tin (10 per cent. phosphorus)	28.	Pounds
New Lead	3.5	Pounds
Spelter	7.	Pounds

Melt the lead first, then the tin and lastly add the spelter. By proceeding as above, the spelter can be melted much easier than when it is placed first in the ladle. The softer, easier melted metals seem to conduct the heat to the spelter much better than heat can be conducted by the ladle surface as is necessary when the spelter is melted first. The same is true when melting antimony and lead for journal bearings. It is very hard to melt antimony in an iron ladle in a smith's fire, but if the lead (three or four parts to one part of antimony) be melted first, the antimony may be melted without trouble.

Having prepared the tin-lead alloy as stated, stir it well and run into bars of the usual shape, for use with the soldering copper, precisely as ordinary solder is used.

In a book upon Soldering and Brazing, by the writer, not yet out of the printer's hands, the following paragraphs will appear in relation to the soldering of aluminum:

Flux for Aluminum.—An easily handled flux for aluminum is sulphuric acid and tallow. The former is applied to the aluminum and dissolves the thin coating of oxide always found upon the surface of this metal which is then coated with tallow, but sal-ammoniac is used in some soldering operations which should be done with a freshly tinned copper.

Fluxes for Aluminum and Bronze.—A flux which will enable aluminum and bronze to be soldered with ordinary soft solder, consists of a solution of copper sulphate (blue vitriol) in water. Immerse the parts to be soldered in this solution, also put in a soft iron rod which must be made to touch both parts to be joined. This arrangement will cause a copperlike surface to be formed on the aluminum and on the bronze. The articles may then be removed from the bath, rinsed very cean and brightened where the solder is to adhere. When in this condition, the surfaces may be easily tinned by means of the ordinary zinc and muriatic acid solution, using soft solder to unite the parts, in the ordinary manner.

Another method of arriving at practically the same result, is to cover the aluminum articles with copper, in a plating bath at the points where soldering is to be done. Then proceed as in soldering copper. The sulphate of copper solution, when iron is present practically plates the aluminum with pure copper the same as in a bath where the copper is deposited electrically.

Brazing in The Smith's Forge.

Brazing in the smith's forge athough not as convenient as in a specially prepared gas furnace, is still a very practical operation, and is easily done if a little attention be given to details. Like many other things, brazing depends upon having certain small things just right. If the pieces to be joined do not fit well together, there is little use to braze, for the strength of a brazed joint depends not upon the amount of brass that is piled into and around it, but upon the closeness together of the parts, and it is how little, rather than how much brass can be put between two pieces to be joined.

Therefore, hold the pieces so firmly together during the act of brazing, that there can be no motion between them. Also make sure that the parts fit each other as perfectly as possible. If, after fitting as well as can be done, there is still a cavity in the joint, get out a bit of steel or iron which will fill the hole. The very strongest braze that can be made, is where a plug of iron is driven into a hole as hard as possible, and then brazed. Be the plug as good a fit as you can possibly make it, the brass will follow the plug through the hole and show itself on the other side of the plate. This proves that too good a fit cannot be made for brazing.

The surfaces should be cleaned of all rust, but grease and similar substances do not affect brazing. It is best, however, to braze as soon as the fitting has been done, for if left for a time, oxide may show in the joint, to the damage of the brazing operation. For a flux in brazing, borax is commonly used, but procure some granular boracic acid and the work will be done as well as with the dearer material. Almost any soft brass may be used for brazing, but if much work is to be done, it pays to procure some of the finely divided brass used for brazing, known as "spelter."

Brass may be prepared for brazing by melting in a ladle or crucible and then pouring in a very small stream into cold water. The metal cools in a thousand little stringy shreds which may be placed conveniently on the joint together with some of the boracic acid. Indeed, the brass and the acid may be mixed together and kept in the same box. The borax or its substitute should be applied as soon as the work is placed in the fire. Do not wait until a coating of oxide (scale) has formed over the surface exposed to the heat. A little borax on the surfaces will melt over them and protect them perfectly from the oxygen of the atmosphere.

Put the brass on when the borax goes, for the brazing medium might as well be getting hot along with the work. It is not desirable to find the steel or iron hot, and then have to wait for cold bits of brass to heat up and melt. Heat the object so that all parts will get hot together. Look out for the heavy parts and protect the thin ones. Hold the work well up from the fire when the melting takes place, and assist reluctant bits of brass with a hot poker iron. Remove from the fire as soon as the brass runs. Nothing is gained and sometimes a good deal is lost by leaving the work in the fire—either bituminous or charcoal—too long after the brass runs. Wipe off all superfluous flux before the work gets cold.

Top for Ornamental Center Table

I was much interested in the picture and description of the ornamental center table stand sent by Mr. O. J. Hymen, Louisiana, to the December issue of The Blacksmith and Wheelwright (page 942). A table stand of this character requires a more pretentious top than can be made of wood. Marble looks well, but M. H. can make a top for that table which will have marble "skinned a mile" if he will proceed as described in the following paragraphs. The necessary quantity may be calculated by the proportions of the quantities given herewith, the 9¼ ounces of material specified making about 10 cubic inches of solid stone when hardened in the table top.

Ingredients of Table Top:

2 oz. Magnesite (Calcined oxide of magnesia)
3 oz. Calcium-Magnesium Chloride
2½ oz. pearl chips (fragments of mother-of-pearl from a button factory)
¼ oz. asbestos fiber (short)
2 oz. fine sawdust
1½ oz. pearl grit (crushed limestone, 1-16 to 3-16 inch).

Dissolve the Calcium-magnesium chloride in water enough that the solution will float a fresh egg. Mix in the other ingredients dry, stir them thoroughly, then moisten with the Chloride solution the same as concrete or common mortar. Place the table upside down upon a smooth floor or board; place a smooth paper on the floor and carefully place the table on the paper. Place three bits of common matches under the iron ring which forms the top of the table, then proceed to plaster the mixture into the ring, working the plastic material thoroughly to get out all the air bubbles whi, if left in, would cause holes in the table top after it had hardened, which will require but a few hours.

The bits of matches will cause the top of the table to project upward about an eighth of an inch. This is necessary, as the top of the table must be ground after it hardens, in order to bring out the grain and beauty of the table top. The grinding may be effected with common sandpaper but a bit of soft sandstone will do faster work, particularly in the case of the first rought operations, if the sandstone is kept wet and is fed with fine gritty sand frequently.

After the top of the table has been ground enough to show a pleasing grain, it should be treated with wax and polished the same as wood or fine furniture of any kind.

Don't try to use the carbonate of magnesia sold at the drug stores. The oxide of magnesia is what is wanted. That is the carbonate, burned much the same as lime is burned. The table top, if it shows some air holes therein, may be smoothed up by putting some more freshly mixed material in the holes, the coarser stone being omitted from the mixture. It is well to keep a little of the dry material when making the table top and wet it up as required to fill the holes.

Table tops made as described above will be so strong that a hammer can be used on them. The magnesite composition is three or four times as strong as concrete, but it will not stand water or acids as well as concrete. Any desired color may be added, using mineral oxides. So tough is the material, that if a dent develops in the finished table top through anything falling upon it. the dent may be hammered out with a ball-pene hammer as if the dent were in copper or lead.

Death of Henry C. Valentine.

Readers of this publication will learn with regret of the death of Henry C. Valentine, of Valentine & Co., varnishes and colors. Mr. Valentine passed away in this city, Jan. 15, at the ripe old age of 82 years, highly esteemed by all who knew him. He was born in Cambridge, Mass. In the late fifties he entered the varnisn business with his elder brother, the late Lawson Valentine. He was elected president of Valentine & Company in 1882, which position he occupied continuously until Jan. 1, 1900. Resigning the presidency to become chairman of the board of directors, he occupied the latter position until he retired from business in 1909 owing to his failing health.

AUTOMOBILE REPAIR WORK.

Why the Smith Should Fit Himself to Do It and How.

From J. N. Bagley, Nebraska.—In looking about the country we find many smiths who have not made a step toward automobile repair in connection with their regular smithing business. If the smith of today will stop for a moment and give the matter a little serious thought he will realize the importance of the proposition that is open to him. Only a few years back we find the farmers driving the ox and plowing the fields with the wooden plow. If the smith of those days had not taken to the repair of the steel plow and to the shoeing of the horse, where would he be today? Self binding harvesters have taken the place of the cradle, the threshing machine has taken the place of the flail, and there have been a hundred such changes, still the blacksmith has kept in touch and repaired them all. At this day and age when a machine, such as the gasoline automobile, is gaining such favor among the American farmers. I am surprised that so many smiths over the country are idly watching some new man come into the territory and pick up this work that rightfully belongs to him.

All gas engines are constructed along the same lines, and when once the smith gets the inside of the work, it will not be hard for him to make a success of it. Improvements are being made each year and the smith that has taken up the work early will be in a position to handle it all. For a number of years wise heads have been working on a gas tractor to take the place of the horse on the farm. This machine is coming just as sure as fate, and when it does the smith will wish he had familiarized himself with its care and repair while it was in its infancy. To some of the smiths in an out of way district the automobile business may not seem a very profitable business at present, but now is the time to learn while you have a chance. Many are learning and are excused for the mistakes they make. "Get next" just as soon as possible, for as soon as there are machines enough in the community to support a garage you will find some one ready to start one. The time for the smith to get in on the ground floor is while there are not machines enough to pay a garage man. Some time ago I asked a smith why he did not make a business of repairing automobiles. He replied that "It took too many tools I did not have." Now this is a mistaken idea, for there need be but a very few tools that the smith does not already have. A few tire tools, a set of socket wrenches, and a screw plate cutting the standard threads, a small tube vulcanizer, all of which may be purchased for a few dollars, and all that is necessary.

The following will be found very helpful to the smith who is starting new in the business, and finds some of the simple things puzzling him. Among some of the common things that happen to the automobile are: Irregular ignition, overheating of the motor, loss of power, etc.

Irregular Ignition.

The occasional miss in the one or more of the cylinders may be due to a faulty spark plug, or it may be in the magneto contact points. To ascertain if the fault is in the plugs, loosen all the secondary wires from the plugs, leaving them lie over loosely so they may be lifted off while the engine is running. Now start the motor, and beginning at the front cylinder, life the wire from the plug and hold a little distance from the cylinder and note the kind of spark that is delivered from the wire, if it is good do likewise with No. 2. Continue with all the wires in this manner. If a good spark comes from all the wires the fault is probably in the plug. Now speed the motor up a little and remove all the wires from the plugs but the first one, and see if the motor will continue to run. If it does, that plug is all right. Place wire No. 2 on the second plug and remove No. 1 and see if No. 2 will run on one cylinder. If it works all right, place No. 3 wide on the plug and remove No. 2 and see if No. 3 will run by itself. Now try No. 4 in the same manner, and if the engine stops you have found the plug that is giving you trouble. Remove it and put in a new one and try again. Many times the mixture taken to the cylinders through the carburetor is too rich. The motor will misfire and give off a black smoke. In this case cut the needle valve down a trifle thus reducing the flow of gas.

If adjusting the carburetor while the engine is running and it begins to spit back through the carburetor, it indicates that you have shut off the gasoline supply too much and that gas is so weak that it will not ignite. When misfiring occurs, particularly at high speeds, it would be advisable to examine the timer, as the fiber may be worn so that the roller only touches the high spots, or the roller may be sticking at times and wearing out of round, resulting in partial contact when travelling very fast.

If the ignition is irregular when running at slow speeds, and the cylinders have been tested separately, as just described, it is very likely due to thc valves seating irregularly. To test for a weakness in compression, take hold of the starting crank and pull it up very slowly. Repeat this until you have tried the compression on all of the cylinders. When you have located the cylinder that has the weak compression, proceed to discover why the compression is poor. It may be caused by the valves being in bad condition, or it may be caused by a broken ring, or a leaking gasket. One may readily see at a glance how many things might effect the compression of the motor.

Overheating.

When the motor overheats, many operators at once lay the trouble to insufficient water capacity. This, however, is vey seldom the case, for the water capacity is ample and the difficulty is due to some outside influence, such as interrupted circulation, insufficient or poor grade lubrication, carbon deposit on the piston heads, running on an open throttle with a retarded spark, an over rich mixture or a slipping fan belt and a clogged muffler, which will prevent the burned and heated gases from leaving the cylinders. In case the push rods become worn until the valves are not lifted from their seats to permit the burned gas to be expelled from the cylinders, a motor will overheat and have but little power. This may be seen at a glance by noting the space between the valve stem and the push rod, which should be such that a common calling card will just pass between them when the cam is in a neutral position. If such is the case and new push rods can not be obtained, it will be a good plan to take the valves from the cage and braze a small piece on the ends of the stems to bring them down to right length.

Loss of Power

Loss of power may be due to a number of things, but some of the most important we will now mention. Irregular ignition will affect power and is easily found. Too rich a mixture taken into the cylinders will destroy power, and if on the other hand the mixture is too weak the motor will not develop its rated power. In case the cooling system is at fault the motor will gradually get hotter until it stops altogether. A motor that has recently had new bearings put in may heat and stop because the bearings were taken up too tight. Of course, dragging brakes will destroy power, but this will be from the start. If the motor runs fine until it gets hot the trouble must be looked for esewhere. Leaky valves will destroy power and as already stated will cause the motor to overheat. Many times weak valve springs do not force the valves to their seats and a loss of power results, especially, if the motor is running a little fast.

To Test Compression

A very good way to test the compression of the cylinders is to screw a gauge into the spark plug opening and turn the motor over slowly and note the highest point the hand will register on the dial. If the compression of the cylinders varies it will cause the motor to run uneven and seem to have an excessive amount of vibration. In this case the trouble should be located. A small steam gauge will do for this purpose, but it will be much better if a gauge with a stop hand is used as there will be less liability to mistakes. Manyt imes with uneven compression of the cylinders it will be next to impossible to get the motor to slow down to a slow speed. In case the motor will not slow down as it should, it will be well to look for a leak in the intake pipe. Many times with old motors of long use the valve stems are worn to such an extent that a quantity of air is drawn up around the valve stems instead of passing through the carbureter, and this makes the mixture so weak that it will not burn evenly, and when adjusting to run on a low throttle the motor will have entirely too much gas when the throttle is opened.

I would like very much to see every smith make the start and get into the auto repair business while it is young. I have never found a single smith who would give up the auto repair business who has made the start.

Kansas Craftsmen.

The Blacksmiths', Horeshoers' and Wagonmakers' Association of Kansas, held their fifth annual meeting at Lyons recently, the session occupying two days. The delegates were most hospitably entertained, and the attendance was as much as could have been expected. The session was given largely to speechmaking, and President S. L. Walker opened the meeting with an interesting address. The mayor of the town welcomed the delegates and tendered them its freedom. The response on the part of the association was made by George W. Wilson, a veteran craftsman of Fredonia. Other addresses were made by the following gentlemen:

Judge D. A. Banta, of Great Bend; J. I. Saunders, of the Faith Iron Co., Kansas City; Fred W. George, of the Shattuck and George Iron Co., of Wichita; John Massey, of the Massey Iron Co., of Wichita, Mr. Culver and Ed. Bohrer and Sam. Jones, of Lyons.

The following officers were elected:

President, Geo. W. Wilson, of Fredonia.

Vice-President, E. D. Forney, of Cottonwood Falls.

Secretary and Treasurer, Austin English, of Hutchinson.

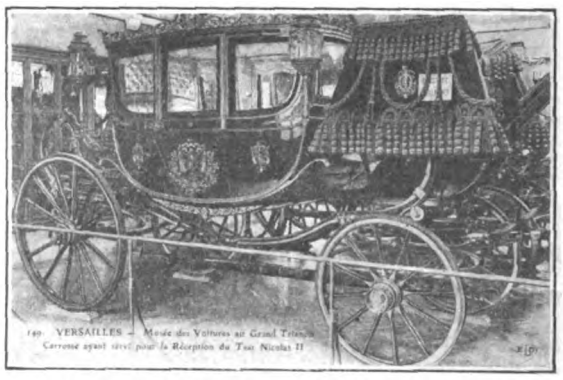
The president appointed the following three men, who with himself and the vice-president, will compose the executive committee: Perry Buckley, of Lyons; G. A. Miller, of Wichita, and W. I. Wolverton, of Holton.

Topeka was selected as the next annual meeting place, on Nov. 20 and 21, 1912.

There were about 200 delegates and wholesale men represented at the meeting and it was the most successful ever held by the association.

Carriage of an Emperor.

The illustration is the state carriage of Emperor Napoleon III, now on exhibition at



Carriage of an Emperor.

Versailles, France. The last time it was used was at the reception of the Czar, Nicholas II.

Aluminum Pulleys.

An American manufacturing company has recently adopted aluminum pulleys for its large planers and for a number of other machines. The aluminum diminishes the weight of the pulleys, which, when made of cast iron, are practically heavy flywheels, retarding the action of reversing the motion. It is also claimed that the lighter aluminum pulleys are more economical, reducing the friction and prolonging the life of the belts.

A writer in Moody's Magazine states that last year over 55,000,000,000 feet of timber were cut in the United States. More than 18,000 acres of timber are cut in the United States every working day.

Still, there are a few legitimate ways of acquiring wealth.

THE BLACKSMITH & WHEELWRIGHT

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FEBRUARY, 1912.

PARTIAL CONTENTS.

PRICE FIXING AND MONOPOLY.

Many able business men and statesmen believe that the trust and monopoly evil may be remedied by the government fixing maximum prices. Andrew Carnegie believes it; President Gary of the steel trust believes it; George Perkins. Mr. Morgan's former partner, seems to believe it, and a whole lot of other able men feel that this is the only solution of the problem.

But let us consider how the governmental fixing of prices is liable to end. Suppose a certain railroad be prohibited from charging more than two cents a mile for passengers, and dividends are thus kept down to a lower point than the officials and stockholders feel that they should be. It costs more than twice as much to run a train 50 miles an hour than it does if the train is run but 25 miles an hour. What is to hinder the railway officials from reducing speed and running less frequent trains to make up for the reduced rate of fare per mile? Must the government likewise control train speed and frequency? Up-to-date and finely fitted cars cost much more than old and antiquated ones. Is the government going to select the quality of the plush for the seats, the finish of the coaches, or the number that may be crowded into them in case of the necessity for economy?

Suppose the government fixes the prices that may be charged for steel rails or billets, or for other products of the raw ore. May not then the steel magnates, being thus between the rock of low dividends and the whirlpool of dissatisfied stockholders, decide to impair the quality of product? If so, must the government hire experts to fix the necessary quality of the drop forgings, the wrought iron, or the machinery steel—the quality of screws, nuts, bolts and the thousand things that the trust produces?

Surely, if such contingencies are not provided for, the public will gain absolutely nothing from price fixing. The quality of the service or of the article is quite as important as the price, but it is far more difficult to control.

Yet even though the government should or could fix both price and quality, shall the government also fix the minimum wage? Having nothing to say as to either price and quality, the trust and the monopoly may conclude that in order to make fair dividends—for fair dividends are largely a matter of individual feeling—wages must be cut. Is the government to pass upon this transaction also? Dwindling profits and itching palms are prone to turn to reduced wages, provided there be no other alternative. Will the public welfare be improved if low prices for products are secured only by low wages?

It is thus plain to be seen that fixing prices is not a solution of the trust problem. It will not accomplish the desired end of protecting the public. It will merely add another "bureau" or "commission" which the public must pay for, and will thus increase rather than lighten their burdens.

"But," some one is now saying, "if this is not a remedy, what is?" Well, we are ready to admit that we are not only unable to suggest a remedy but we have never heard an effective one proposed or suggested. It is fairly easy to state what is not a remedy, and why it is not, but simply impossible to suggest a real remedy.

GET READY FOR IT.

Even at the risk of being charged, in certain localities, with advocating something that will not pay, we feel it is a duty we owe most of our readers to urge them to study up the automobile and become thoroughly familiar with its mechanism and the way it works.

Five years ago even the most sanguine did not foresee the gigantic strides that this vehicle would be making today as a means of travel, much less as a commercial vehicle. This last feature of motoring has developed wonderfully within the past six months and it begins to look as if the motor truck and the delivery goods car would soon be a strong competitor of the horse drawn vehicle.

This will all work to the benefit of the blacksmith if he but prepares himself to attend to the repair work that must and will be done by someone.

Automobile repairing is no work for the jeweler, the electrician, or even the light machinist; it is work for the blacksmith, for the man who is accustomed to handle heavy machinery and who has the shop floor space to take the car in and work around it as he has done in so many cases around the heavy wagon.

Let the car owners know that you are prepared to do their repair work and they will turn it over to you to do.

THE WASTE OF POOR TOOLS.

The most flagrant waste in the blacksmith shop is the use of poor quality or otherwise inferior tools. The difference between the cost of a poor rasp and a good one, between the cost of a poor wrench and a good one, a poor hammer and a good one, a poor hack saw and a good one, or a poor blower or anvil and a good one, is very little, but the saving in the use of the good article, not only in the increased but the better work it will do, often amounts to a good many dollars.

This can be illustrated no better than to cite an actual case of a certain foreman who in the purchase of three dozen shovels sent back those for which he had been charged 90 cents each and substituted some for which he was charged but 75 cents each. He was proud of the saving of $5.40 on the lot and did not hesitate to inform the superintendent of the transaction. On being put to actual work of shoveling loose material it was found that the men handled just as much as with the more expensive shovel. When the material became tough and there was digging to be done they found that the blades had a tendency to kink unless handled carefully. Over on the next street the same number of men was employed digging with a more expensive shovel. The two gangs were carefully compared in the evening; the gang having the strong shovel was found to be digging fifty per cent. more earth than the gang with the cheaper shovels.

The superintendent suspected the shovels were to blame; so he instructed the night watchman to open the tool boxes late at night and change the shovels without the knowledge of the foreman. The next day the men who had been using the poor shovels the day before were watched and their output was considerably improved. The men who had the better shovels the day before bent the cheaper shovels when they tried to do as much work.

The record sheets that evening showed the result of the change and the superintendent placed the figures before the foreman. He saw the point and the low cost shovels were scrapped and good ones purchased in their place.

Economy is a virtue; parsimony is a vice. But where to draw the line between the two is often uncertain. The blacksmith who uses poor tools and machines because he is unable to get good ones, or because he thinks he is unable to get better ones, is likely to remain needy. He will be needy because he fails to get the good tools and machines, and he will not get the good tools and machines because he is needy. Here we have the circle of logic.

LESSON OF A GREAT FIRE.

There was a most destructive conflagration in this city the other day which caused a loss of several lives and millions of dollars. The building destroyed was built of granite and iron, with wood "trimmings," and was supposed to be fireproof. It covered nearly a whole city block, and although the full resources of the fire department were employed, the best that could be done was to keep the fire from spreading to other buildings, and it was subdued only when the fire had nothing more to feed upon, and nothing but the bare and crumbling walls was left.

The fire started from some rubbish carelessly left lying somewhere in the basement, and had the department been summoned at once it could easily have been put out. But some employes, hoping to subdue it themselves, delayed in sending in an alarm until it was too late.

The lessons are obvious. But in view of the fact that in nine cases out of ten, fire losses are due to such carelessness—to the leaving of rubbish about where it is a menace to safety—would it not be advisable in the case of such great structures that the owners be

compelled to have a watchman continually on guard? Not only this; a clause in the lease providing for this and for the proper facility in carrying it out, would be advantageous to both lessee and lessor.

BECOMING WORLD WIDE.

It is interesting to note that despite claims to the contrary, trusts and combinations are being formed in free trade Great Britain. The latest is the amalgamation of Portland cement industry. It is stated that a new company, formed in England, will control an annual output of about 1,500,000 tons of cement. The company, in addition to purchasing the stock of certain local companies, will have a working agreement with the Associated Cement Co., and the combined capital of this company and of the British Portland Cement Manufacturers will be about $58,398,000. It is claimed that the two companies will control five-sixths of the cement production in Great Britain.

The foregoing merely shows that the trust question will soon be quite as pressing in England as it is in this country. It indicates, moreover, that while the absence of protective duties may somewhat delay such combinations, or rather that while protective duties may make such combinations easier to consummate, yet nothing can stop them. When competition becomes destructive—when in fact, it is fatal to business—then combination and co-operation follow as sure as day follows night.

But this must not be forgotten: One combination or trust begets another and another. The tendency is as fertile and as forceful as good or evil. And we frankly confess we don't know whether it will prove good or evil. Only time can demonstrate that.

A CAPITAL OF 25 BILLIONS.

Speaking of solutions of the trust problem, and the troubled times through which possessors of great fortunes seem to be passing, a writer in McClure's magazine has recently suggested about the most astounding remedy for trust evils that has thus far been promulgated. The writer, whose name is William W. Cook, is a prominent New York corporation lawyer and counsel for one of the telegraph companies, which has a capital of one hundred million dollars. He suggests that the only way to cure the trust evils is to create a private corporation with a capital of twenty-five billions of dollars. This startling proposition has excited considerable public interest, although it is generally considered too stupendous to be practical.

His idea is that Congress should create a holding company with the capital named. This holding company should purchase in the open market, or by condemnation proceedings, the railways of the United States. He goes into his plan with considerable detail, but expressed in a few words it contemplates a sort of joint management of all the railways by Government and private capital. Judging by the comments of some of the newspapers, they think Mr. Cook is an acceptable candidate for some lunatic asylum, but his idea is not more amazing than certain economic suggestions were considered twenty-five years ago, which are now received with general approval. The entire matter, however, is interesting as a manifestation of the growth of this movement for curbing the trusts.

PATENT MONOPOLIES.

Individuals and corporations whose business is largely based upon patents, have recently felt a good deal of anxiety concerning the decision of the United States Court as to the protection given to inventors. It appears that the attack by the government is not against monopolies created by patents, but against agreements and combinations based upon patents which are intended to exercise a control over industry beyond that conferred by the patents. In the case of the Electric Lamp Trust, the government contended that after a manufacturer working under a patent had sold the article manufactured, his right to exercise any further control over it ceased, and this contention was accepted notwithstanding the fact that the Circuit Courts had held contrary. In the case of the United States Shoe Machinery Trust, the government took the position that consolidation of patents all relating to a single industry is unlawful, where such consolidation has the effect of producing a restraint of trade.

Having the law now interpreted plainly, a good many manufacturing companies are now applying for patents, not only for the articles manufactured by them, but for the processes and the machinery employed in producing the articles.

The owner of a patent is a monopolist of the thing patented. He is given the exclusive right to make, use or sell his invention, and he may, under the law, almost without limit regulate the making of the article. On the other hand, if the patent is invalid or infringes an existing earlier patent, it is very likely to be worse than useless. If it is invalid, does not infringe, but is narrower than is necessary under the circumstances, it may serve only as a temptation to build up an industry which may later be, in part at least, appropriated by others. In other words, a patent is very much like many other things, it should be bought or gone into with the eyes very widely open.

EACH FOR ALL.

It seems to us that no men in business follow better St. Paul's admonition as expressed in his letter to Timothy, than the blacksmiths. Paul says the way to lay up a good foundation "against the time to come, that they may lay hold on eternal life," is "to be rich in good works, ready to distribute, willing to communicate."

Surely, our readers follow this injunction. They freely communicate and distribute the knowledge they acquire by experience and thus place others of the craft as well as ourselves under deep and lasting obligations to them. When a reader refuses to do this, he often receives a rebuke from some other reader. Thus working together, "each for all and all for each," they raise not only the standard of work but the standard of prices.

PLEASE WRITE PLAINLY.

Frequently we are unable to reply to letters from readers when it is our duty to do so, and when we should like to do so, because of either neglect to supply the correct address or owing to the illegibility of some part of the address. If nothing else be made plain and easily decipherable, we trust our friends will write their names and addresses so that there need be no mistake in trying to read them.

If something in the letter is not clearly written it can usually be deciphered by the aid of the parts which precede or follow. But this is not so in the case of an address or signature. These should be written just as clearly as possible. The foregoing is mutually important. We like to reply to all letters needing a reply, and we do not like to rest under the imputation of neglecting to do so, when to our regret it is impossible.

DO YOUR OWN THINKING.

Concerning the presidential campaign, which will soon be in full force, we may with propriety urge upon our readers the wisdom of forming their own opinions. Do your own thinking. The newspapers will keep you pretty well informed as to what is going on, although you must make allowance for political bias and prejudice. But use your own good sense and judgment.

The time was, and not so very long ago at that, when somebody knew it all and everybody knew little. But since the schoolmaster, or rather the school mistress, has been "so long abroad," everybody knows as much as somebody.

Then we can but urge our readers to keep well posted and "vote as you pray." If this be done, the future is safe and secure.

These should be busy days for the woodworking fraternity up in Canada. The consular reports from up there show that the building records have been broken in various parts of the Dominion the past year, and all indications point toward a continuation of this activity in building operations.

Legal Department

All legal questions answered free of charge. Address Communications to Editor "Legal Department," THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

A Land Contract.

From J. S. P., Oklahoma.—A sold 160 acres of land to B.; the contract was drawn that B was to pay $5,000 to A. for the land, in two payments, one on November 1, 1906, $2,500, and the other on November 1, 1907, but he did not pay anything. Now, the same land can be sold for about $20,000. Can B hold A for the land? which is what he tried to do. The contract is six years old. Is the contract good yet?

Answer: While your question says that A "sold" the land to B, we assume that the deed was not actually delivered, and that the only paper signed by the parties was a contract of sale. Under these circumstances the general rule is that if the purchaser unreasonably delay in performing or tendering performance of his part of the contract, he cannot compel the vendor to perform. Unexplained the default of over four years in making the agreed payments would seem to be fatal to the purchaser's rights. But there may be special circumstances, not stated in your question, which would explain the delay. For example, the vendor may have extended the time of payment, or have waived his right to insist on payment at the time agreed, or have allowed the purchaser to remain in possession of and improve the property, or the delay may have been due to the vendor's inability to remove some defect in the title. In the absence of such special circumstances it has been repeatedly held that the purchaser cannot wait for years until the land has risen in value and then insist that it be conveyed to him. The vendor, if he has not already done so, should notify the purchaser that he considers the contract terminated by reason of the purchaser's default and return or offer to return whatever payment he has received. How far these rules would be deemed to be changed by Sec. 1118 of the Oklahoma Compiled Laws which provides "Time is never considered as of the essence of a contract unless by its terms expressly provided" is still to be decided by the courts of that state.

Wills and Inheritance.

From E. P. R., New York.—In case a man dies in this State leaving a widow and no children, who will inherit the man's real estate and personal property? In case a wife dies under similar conditions, who will inherit the wife's property.

Reply:—If a resident of New York dies intestate, leaving a widow and no descendants, brother, or sister, nephew or niece, the widow is entitled to all his personal property. If he leaves a father and no descendants, the father takes one-half and the widow one-half. If he leaves a mother and no descendants, father, brother, sister or representative of a brother or sister, the mother takes one-half and the widow takes one-half. If he leaves brother or sister, nephew or niece and no descendants or parents, the widow is entitled to one-half, plus $2,000 and the remainder, if any, goes to the brothers and sisters and their representatives. If he leaves a mother and brothers and sisters or representatives of such brothers and sisters, the widow takes one-half and the other one-half is distributed in equal shares to the mother and brothers and sisters, or representatives of such brothers and sisters. As to his real estate, the widow will have a dower right, viz. an interest for life in one-third of the real property. Subject to that dower right, where the decedent leaves no descendants, his real estate will go to his father, unless it came to him on the part of his mother and she shall be living. If she be dead, the inheritance descending on her part shall go to the father for life and then to the brothers and sisters of the intestate and their descendants. If he leaves no father, the inheritance will descend to the mother for life and then to the brothers and sisters of the intestate and their descendants. If there is no father or mother, the collateral relatives take the estate. Of course the

nearest collateral relatives would be the brothers and sisters and their descendants.

If a woman dies intestate without descendants, a resident of New York, her personal property goes to her husband. The same provisions apply in general to her real estate, as to the husband's real estate, except that if there has at any time been issue born of the marriage, the husband will have an estate of curtesy in the wife's real estate, viz. an estate for life in the whole of her real property. But if no issue was ever born of the marriage, the husband will have no curtesy and no interest in the wife's real property.

The foregoing is only an outline of the principal provisions of the New York Decedents Estate Law, which contains many other provisions which the limits of this column will not permit us to give in full. This statute, which will be found in Volume I of Birdseye's Cumming & Gilbert's Consolidated Laws at page 938, should be consulted in each case.

He Has a Lien on the Buggy.

From G. L. DeW., Montana.—Will you tell me through the columns of your paper, what steps to take on receiving payment on repair work done on a buggy, that is still in my possession, but the one that owns it has left the country? If you can give me any information regarding this through your paper, it will be gladly appreciated.

Reply:—The Montana statute provides that every person who while in possession of personal property renders service in making repairing, safe keeping or improving it, "has a special lien thereon dependent on possession for the compensation, if any, which is due to him from the owner for such service." You have therefore the right to keep the buggy till your bill is paid. If the owner goes away without paying it, you can employ an attorney to foreclose your lien. If your bill is paid you have no further right to keep the buggy as against the owner, but you must not deliver it to anybody but the owner or his authorized agent. If anyone offers to pay your bill, before delivering the buggy to him, require him to give you written proof of his authority to receive it. If it is not paid, foreclose your lien. If your bill has already been paid, notify the owner at his last known address to call and get the buggy or you will charge for storage on it. If no one appears to claim it, you can foreclose your lien for the storage charges.

Queer Things About Wheels.

Some queer things about the wheels that turn under a locomotive or car have been collected by a writer in the Railroad Man's Magazine and illustrated by the following experiments:

"Take the end of any spoke near the tire, or any part of the tire, and on a still, windless night fasten a candle to it; then back off till nothing can be seen but that candle flame.

"Let the wheel revolve slowly, free from the ground. The candle flame makes a circle of fire all right, and goes around the axle. Now lower the candle until it rests on the ground and start ahead. The flame suddenly stops going in a circle and begins to make wavy lines, first high and then low. It goes around nothing at all.

"The fact that the bottom of an engine wheel always stands still is more easy to learn than the fact that the top of the wheel moves just twice as fast as the train, but this can be proved easily with a piece of board.

"Take a piece of board, say, ten feet long, and lay one end on top of the wheel. Now move the engine forward two feet, and you will find that the board has gone ahead four feet, just twice as far as the engine. Lay down the board and tie two pieces of string to the wheel, one at the top and the other at the bottom, where it rests on the ground. Now run your engine forward two feet and see what happens. The bottom string has moved forward, too, but not nearly so far as has the top piece of string, although the ends were even at the start.

Occasionally there are fathers who would be glad to have their sons follow in their footsteps.

CORRESPONDENCE

Automobile Work and Farm Work.

From Terry Bros., Kansas.—It has been some time since we wrote anything for our most valuable paper, and it is time to do so. We consider The Blacksmith and Wheelwright as important to the up-to-date blacksmith as his forge and anvil. We get so many good articles of information from it that it does about as much for us as these shop essentials.

Some time ago we saw several inquiries about automobile work. We find that where a smith has all the farm work he can do, that there is far more money in it than the auto work, but during slack times of the year, it makes a very nice line of work to have. Yet a smith has got to know his business or he will not be able to make enough out of it to buy his dinner. The automobile and farm work do not as a rule go very well together, for if one is doing a farm line of work, and a car drives in and you do not stop at once and work for him he generally will get sore about it. On the other hand, the farmer hates to go to a shop and when he gets there find the blacksmith down under a car and thus be obliged to wait for his job. So we consider if a smith has anywhere near enough work to keep him busy he will do far better to let the auto work alone, especially if there is a garage in town, and the same way on the other side. We are not saying this altogether at random as we have been doing both kinds of work for about two years, and we find it about this way.

One reason why we do not favor mixing the work is this: A man to do automobile work must have quite a few tools and wrenches that he does not need on farm work. This calls for a little better price for auto work, as some of them will never be used enough to pay for themselves. We know it is a common idea with some that each car has all the wrenches and tools needed to do any job that will be done, but we have never yet seen the car that had anywhere near enough.

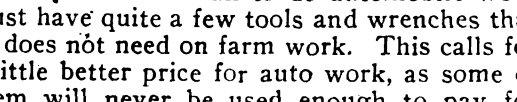
Another reason is if the owner of a car be a farmer he does not stop to consider the unhandiness of some of the places. To show what we mean, will relate one little experience we had some time ago. A farmer drove his car in the shop and had the two bolts out that hold the starting crank in place. Now these two little ⅜ bolts were in such a place that the radiator had to come off to get at them So, taking the radiator off, putting in the bolts, and putting th radiator back took just one and one-half hours. When he asked how much it was, and we told him $1.25 he said "Do you mean it? Just for putting in two bolts?"

He did not stop to consider the time it took to put them in, and after we explained to him he remarked "I'll bet you don't get a chance at me again."

So from our experience we would not advise any one who has not done both kinds of work to begin, and if he has we believe he knows what to do.

A Unique Fish Spear.

From John W. Barber, Pennsylvania.—For fishing through the ice or for spearing in the spring when the fish run up the streams, the fish spear shown will prove useful and can be



shot from an air gun or in any other way most convenient. Put a cord in the hole at D, and hold this cord to draw in the fish. Make the spear as light as possible. It need not be strong.

Does Pretty Much Everything.

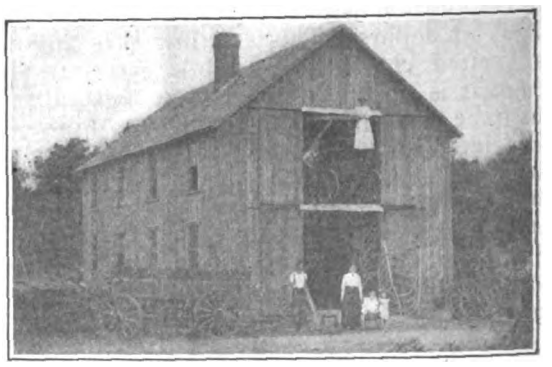
From Mr. H. Johle, Arkansas.—I will make this as plain as possible in order that it may be interesting to the readers of The Blacksmith and Wheelwright. I have followed the trade for the last twenty years, and I have had pretty much all kinds of work to contend with and have even done some automobile repairing. I own a car myself and have had good success in running and caring for it. It has given me many miles of pleasant driving, and mostly over as rough roads as there are in Arkansas. I have never had it overhauled, but have had little things get out of order, and was able to repair the machine myself.

One day, while out driving, I came to a river with another automobile going in the same direction. The banks were pretty soft and slippery, and in attempting to go up the opposite bank, the other car stalled, and went back into the river. It was a 40 horse-power car, and a big and fine one with four inch pneumatic tires. My car is only an 18 horse-power with two inch solid tires and thirty-four inch wheel, but it went right up the embankment without trouble. I think the large wheels and narrow tires are the best for rough roads, or in mud where common wagons are used, and will make much better time. This style of car is also much cheaper to run than the high-priced car, and solid tires are far less expensive and more durable than pneumatic tires. Besides this, they do not puncture or have blow-outs. I am inclined to think also that they ride just about as easy. These low-priced and simple cars are also easier to learn to operate and repair, as they are simple in construction and strong. Also, they have more road clearance and thus are not likely to hit a stone or other object.

I shall be glad to give information at any time to other members of the craft who are thinking of buying automobiles. I make my living, however, mostly by hammering iron and steel, and in this way have accumulated a good home, and good shop equipment. I have a house and lot and 10 horse-power Fairbank's gasoline engine and power hammer, and Brooks' cold tire setter and bandsaw, emery stands, planing, tenoning and bending machines, drill press and two blowers. These are all run by the power of my engine. I also have a grist mill in connection with my shop, and I find it a good paying business to make bread for the farmers.

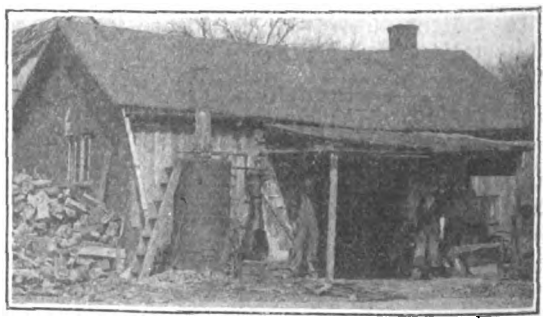
The New and the Old.

From C. Spangler, Ohio.—Find enclosed one dollar to keep that good paper going, also the pictures of our old and new shops. The new



Mr. Spangler's New Shop.

one is 24 x 48 feet. We have two fires, steam and gasoline engines, saws, drill, tire shrinker, punch and shear. We also have a two wheel emery stand, and all the small tools we need



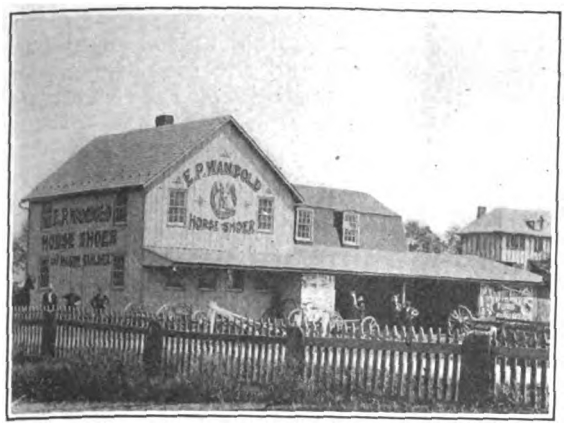
His Old Shop.

to carry on the business. We repair everything from a needle to a traction engine. I made a drill bit for a well driller here the other day.

Some brother asked not long ago, how to prevent smoke in the shop. I have no trouble. My flue is 25 feet high, and big and roomy. It will draw the smoke two feet from the throat of the chimney. In the picture shown myself and family are on the ground, and my partner, Mr. Thorp and his wife are above.

An Up-to-date Shop.

From E. P. Wambold, Pennsylvania.—Enclosed find a photograph of my shop, which is



run by gasoline engine power and is equipped with all the latest power machinery.

A New Zealand Shop.

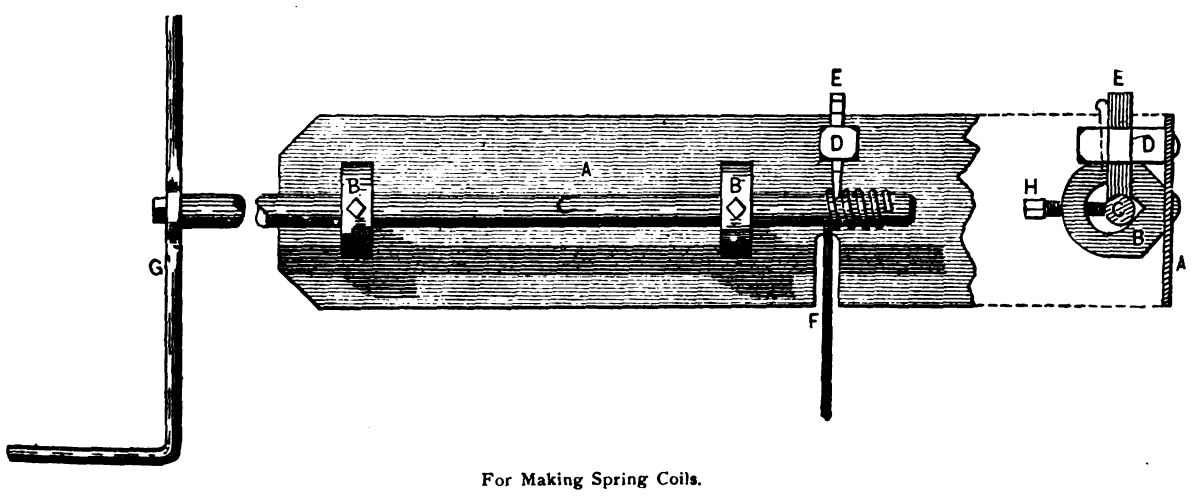
From Wilfred Lawson, New Zealand.—I enclose postcard photograph of my shop which is 75 feet long by 30 feet wide. I have a band

Waiting to be Shod.

saw, circular saw, with two emery wheels, power drilling machine, and a surface planer all driven by a Fairbanks-Morse engine. I run two fires and have a host of hand tools. I do coach building, horseshoeing and agricultural implement work at good prices.

Device for Making Spring Coils.

From Chas. I. Dix, Colorado.—I send a description and sketch of a machine for making



For Making Spring Coils.

spring coils, that may be useful in some shops. It is simple and does not cost very much. In some machine shops a spring is wanted of this kind once in a while, but this machine would not do for manufacturing springs on a large scale. In the illustration, A is a plate of bessemer steel or iron of 8 or 10 inch width, and ¼ inch thick. It should be about 4 feet long. There are riveted to it two lugs marked B. These are V shaped at the bottom, so as to allow any size piece, which is marked C, that you may wish to use. D is a slotted lug, which is also riveted to the plate A. In the slot a guage marked E is used for the purpose of setting the coils any distance apart that may be required. This piece is placed up close to the bar, so as not to bear too tight. It is held to its place by a small key. F is a slot cut in the plate A for the purpose of allowing the wire more heating space, the plate A being placed over the fire at that point. The bar C is kept in place by set screws which are marked H, being let down so as to almost touch the bar. As you will notice, this bar has a small hole on one end for inserting the rod, and on the other end it is made square to suit the double handle, marked G, by which it is turned.

When it is necessary to coil springs closely, the distance piece E must not be used. The lugs should all be put on the plate with square holes, as they cannot turn around should they get loose. After the spring is coiled, the end in the small hole must, of course, be cut off when removing it from the bar. The diameter of the bar C must, of course, be cut according to the size of the springs desired. This device will work in making springs of ¼ inch wire, and the bar on which they are made may be from ¾ to 3 inches in diameter. Anything larger than this, or smaller is not recommended for this machine. I may add that in coiling up the spring it is necessary to hold firmly to the rod while it passes through the fire, so as to make it fit closely, thereby making the coils round and even.

A $750,000 Ozone Plant.

A $750,000 ozone installation, the largest of its kind in the world, has recently been installed at St. Petersburg by a German firm. The plant receives water from the Neva, filters it and throughly sterilizes it for human consumption by the application of ozone made on the spot in large quantities by electrical apparatus.

China is said to have the greatest deposits of iron ore in the world, and one of the factors in the recent revolution was the desire on the part of the revolutionists to inaugurate a nation-wide development of the natural resources of the country.

The United States exported 11,244 automobiles, valued at $11,500,000 during the first nine months of 1911.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

A Brazer But Not a Monopolist.

From Thomas Marks, Oklahoma.—Mr. T. R. Heninger seems to think he knows a lot but don't want to tell it for it will interfere with his business. He is selfish. I believe I can braze anything he can and I haven't got a monopoly on it, either. Brazing is something that is a little tedious sometimes. It can be done one way, and sometimes another. If the pieces are large enough, you can fasten them together by sawing a notch in each broken piece, so the gashes will match. Then slip a piece of hoop iron into the gashes and clamp it down tight, either by pounding the ends of the hoop iron down where they stick out, or by wiring the pieces together, or with a clamp. The hoop iron will hold the pieces from slipping. Sometimes the pieces are so small that you cannot use a hacksaw; then wrap them with wire until they will stay together when heated; put them in the fire and heat them slowly to a dark cherry. Then I have a mixture of 1 pound of borax, and 1 ounce of cyanide of potassium. Sprinkle a little of the mixture where you want the brass. Then I use spelter wire, about No. 9. Let the heat rise until the wire melts freely. Be sure to get enough brass melted. Then take it out of the fire and press the pieces together lightly until the brass is set. Let it cool and dress with a file and you have a good job.

Another way is to use Weldarine, but it is more expensive. Clamp the pieces together as before, but use it according to directions. It is a good plan to use some of the spelter wire with the Weldarine.

To Weld Wagon Tires.

From W. E. Etter, Missouri.—I see in the November number Mr. Arthur Chairson of New Hampshire, wants to know how to weld wagon tires. I will tell how I weld them, and it works successfully. After I bend the tire

Fig. 1.

I measure the wheel it is to go on. Then I measure the tire exactly the same size of the wheel, and scarf it edgewise as shown in Fig. 1. By scarfing this way it raises the material till it is a good deal deeper at the scarf than the tire is thick. When lapped as shown in Fig. 2, it will weld down and broaden out enough so that you will not need to hammer it very much edgewise, and will be the right

Fig 2.

size when hammered down to the thickness of the tire. I use sand and salt in welding, 1-3 salt, 2-3 sand, and like it better than any compound used. I weld corn planter runners, ¼ inch thick and 5 inches wide, at two heats with sand and salt, or any tool steel I want to weld with this mixture.

I have been taking The Blacksmith and Wheelwright for five years, and have every copy. I put the first two volumes together in book form a few evenings ago. It makes such a nice book. I haven't stopped reading it long enough these long evenings to put any more of them together. I certainly enjoy reading books and papers on our grand old craft.

I have a small shop 16 feet x 32 feet, a 2½ horse-power gasoline engine, a Barnes 11 x 40 inch screw cutting lathe, a Canada Otto power drill, emery wheel stand that carries two wheels, a 20 inch rips. I bought the saw and turned the mandrel and made the frame myself; also, I have a boring machine of my

own make. I am building a machine to cut tenons on spokes and bore felloes. I have a 175 pound American wrought anvil, and a very good kit of hand tools. I do all kinds of work except horseshoeing. I enjoy the machine work very much, and like to make my own tools and machines.

I will close by wishing the craft a Merry Christmas and Happy New Year, and a prosperous year for 1912.

A Good Fifth-Wheel.

From C. A. McBride, California.—I send you a sketch of a fifth wheel I make. I have good success with it. This size is intended for wagons with a capacity of 1,400 to 1,600 lbs. I make them for buggies as well. The beauty of this fifth wheel is the king bolt. There is no strain on it. If anything goes wrong with it you need not take the wagon to pieces to get at it. The king bolt can be put in the rear if you want it. I send a diagram of another kind of fifth wheel. It is the top plate; it is for two reaches. It is made the same as the other.

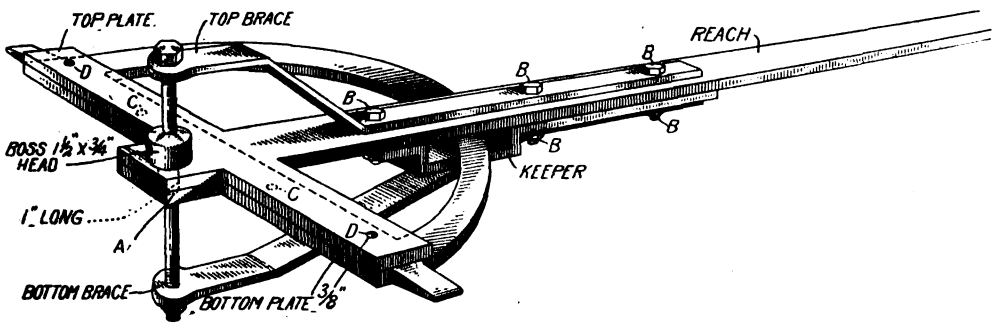


Fig. 1.

As will be seen by the illustration, Fig. 1, it goes under the head block, and along under the center reach. The holes D D go through the head block. They are ⅜ inch and are counter-sunk. The boss fits in the hole in the bottom plate at A, Fig. 2. The holes C C, go through the wood on the axle, and down through the axle. The loop or keeper goes under the circle as shown and on the under side of the reach. It takes bolts, B B. The top

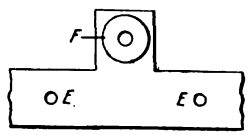


Fig. 2.

brace extends along the top of the reach, and over the front spring, and is bolted as shown. The bottom brace goes under the axle up along on the under side of the center reach, takes the lower end of the king bolt, and the bolts B. The hole in the front axle takes the king bolt. To forge the top plate, take a piece of stock ½ inch thick, 4 inches wide, and 14 inches long. Cut on the dotted lines. The width of the head block governs the width of the plates, 1½ inch and 2 inch are the sizes most used; dress to shape. Weld the boss on at A. Then scarf on the opposite side from the boss and weld on the piece that goes on top of the center reach.

To make the boss, take a piece of 7 inch round iron, stave up a head on one end, put it in a swage block and flatten it out, till you have a head 1½ inches wide, and about ¾ inch thick. Leave it slightly oval in the center. Take a nice soft heat of the plate at F, Fig. 2, and of the boss, and first stick them together on the anvil. Then put the boss in a swage block and finish up with one heat. Dress up and cut off the boss 1 inch in length. Drill a ½ inch hole through the boss. The bottom plate is made the same as the top plate.

The boss in the center of the axle I cut and forge the same as I do the top and bottom plates. The top plates of the fifth wheel for two reaches is made the same as a plate for a single reach.

Cleaning Out Hollow Drills.

From Thomas C. Flickenstein, Colorado.—It often happens in mines, tunnels, quarries and so forth, where there are air drills using hollow steel in operation such as the "Water-Leyner," that owing to carelessness on the part of machine men and their helpers, the hollow drills often become stopped up so badly that it is impossible for the water to flow through them. Of course, such drills are always brought to the blacksmith to be cleaned out and for a long time I used to try and bore and punch the dirt and mud out of them with a piece of good stiff wire, but finally happened to think of a much quicker and easier, as well as surer, way to do the job. I now take a short piece of fuse and attach a blasting cap to one end of it, ram it down the shank end of the drill as far as it will go, which is usually to the lugs. Then I light my fuse and when the cap goes I usually find my drill clean unless the hole in the bit is unusually small. If I find that the obstruction has been driven down to the bit, but not out, I heat the bit and punch the hole out good and large, after which I shoot it again.

Now if any of the brothers are bothered with stopped up drills and have never tried this plan, I think they will find it considerably ahead of trying to poke obstructions out with a wire.

Some time ago I noticed a good bit of discussion in our journal regarding the welding of files. Personally, I have found them as easy to weld as any other kind of cast steel containing the same amount of carbon.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Shop Tools and Their Arrangement.

From G. M. L., Ohio.—I would like to ask the trade in general what power tools are of the most service and pay the best in both the smithing and woodworking branches of the general repair shop, not considering the engine that drives the machinery, and would also like to consider the importance of placing machinery for convenience.

How would it do to have the wood bench placed so that both sides could be used, hand saw at one end, and other tools or machines at the opposite end, say boring machine and spoke tenoning machine? Can any one give up a drawing of a bench constructed in this way with line shaft under bench. I will send a clipped sketch of one.

Resetting Steel Plow Beams.

From V. M., St. John, Washington.—Will some of the readers of The Blacksmith and Wheelwright be kind enough to give some rules and illustrations as to resetting steel plow beams that have been sprung out of true? Especially gang beams when a gang plow jumps upon the point and refuses to go in the ground. What is the matter with it? And how is it to be fixed?

The Team Owners' Review, the official publication of the teaming, transferring and express trade of this country, which has been published in Pittsburgh, Pa., for the past decade, has issued an anniversary number in commemoration of this event. It is handsome and has an artistic front cover. It contains a wealth of information about horses, motor trucks and kindred features of interest to its readers.

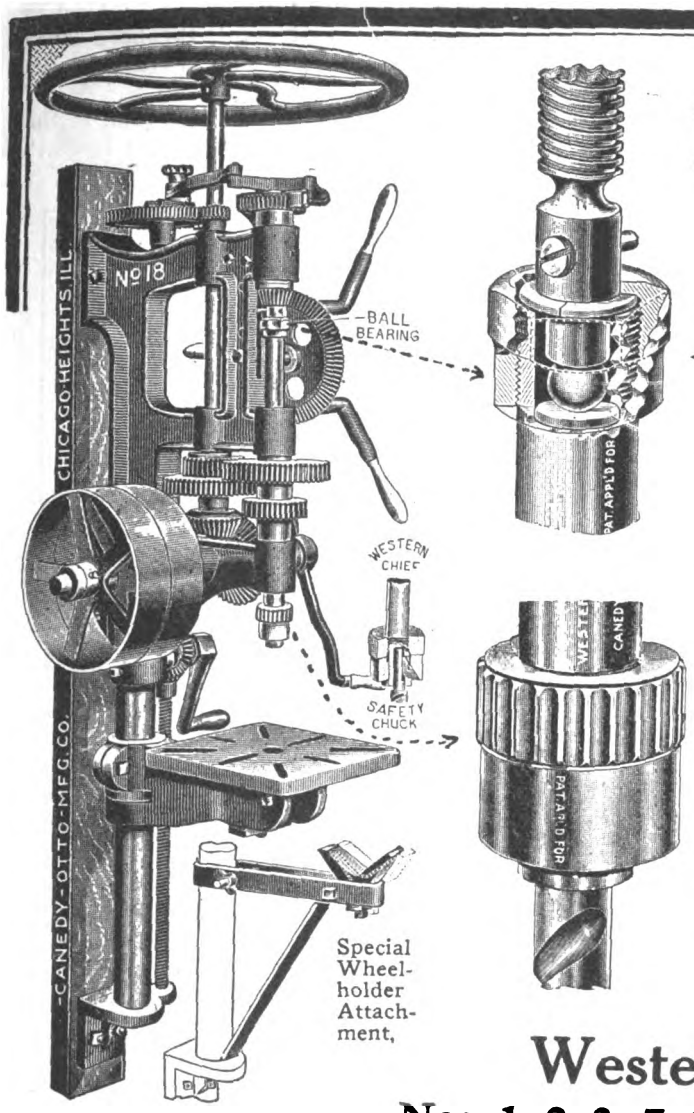
THE COST PRICE.

How to Figure It When Labor and Material Enter Into It.

Very few blacksmiths indeed figure the cost price of work and the real profit—more often no profit—correctly. At the recent State Blacksmiths' convention at Lyons, Kansas, John Massey of the Massey Iron Co., Wichita, Kansas, and W. M. Sasher of the Best & Corbett Iron Co., St. Louis, Mo., gave a "chalk talk" on the blackboard, showing how to figure cost of work, and to this, it will be noted, one-fourth is added for profit. Now in the case of the larger or higher cost jobs, this one-quarter for profit, after the actual cost has been computed, is well enough and quite likely will give the wagon maker a fair remuneration for his capital, taxes and all other items of doing business. But in the case of small jobs like putting in a wagon felloe or spoke this is not enough. However, we give the examples for what they are worth.

In the items given, the prices for wood stock are the cost at St. Louis. Many small items are not included in the figures and should be charged for as extras, such as bolts, nuts, washers, changing the bends of circles and of shafts and poles, handling vicious horses, etc. Labor is figured at 30 cents an hour, which is also low. In blacksmith and wagon work, where a workman does a good many different jobs a day it is almost impossible to foot up at night the number of hours he has been employed during the day. The changing from one job to another in itself consumes a good deal of time, and in such cases the employer usually has to stand for the loss. Forty cents an hour would have been a more just rate. It will be noticed that in the divison, one-fourth is added for the over head cost, and this is about fair. It includes rent, use of machines, wear and investment for tools, etc. But this added to the cost of material, freight, paint, labor, etc., is supposed to give the actual cost to the blacksmith. As he cannot live on air alone, something must be added for profit, and this will be found in the second addition of one-fourth or 25 per cent. which added to the whole as shown, gives the price the shop should charge for the work. Of course, odd cents need not be charged, and when a job figures up to $4.06 it may be scaled down or up to even figures, as either $4 or $4.10, as may be desired. In the table which follows, which was taken from the blackboard illustrations given, it will be seen how the cost and selling price are computed. The same plan may be pursued in the case of any kind of a job.

Buggy Pole	$2.25
Freight	.25
Paint	.20
Labor, 2 Hours	.60
	3.30
One-Fourth	.82
Overhead Cost	4.12
	1.03
One-Fourth	$5.15
Profit	.75
	.30
Buggy Shaft	.25
Labor, 1 Hour	1.30
Paint & Leathers	.32
One-Fourth	1.62
Overhead Cost	.40
One-Fourth	$2.02
Profit	.05½
	.15
Buggy Spoke	.05
Labor, ½ Hour	.25½
Paint	.06½
One-Fourth	.32
Overhead Cost	.08
One-Fourth	.40
Profit	



Ball-Bearing and Safety Chuck

Ball-Bearing

A single Steel Ball resting on a hardened Steel Disc. This contact of Ball and Disc forms a bearing in which the friction is too little to estimate.

Safety Chuck

It is opened and closed with the hand.

No more set-screws to mar and bruise the shanks of bits.

No more wrenches to tighten and loosen set-screws.

No more twisting of bits in the chuck.

No more trouble in inserting and removing bits from chuck.

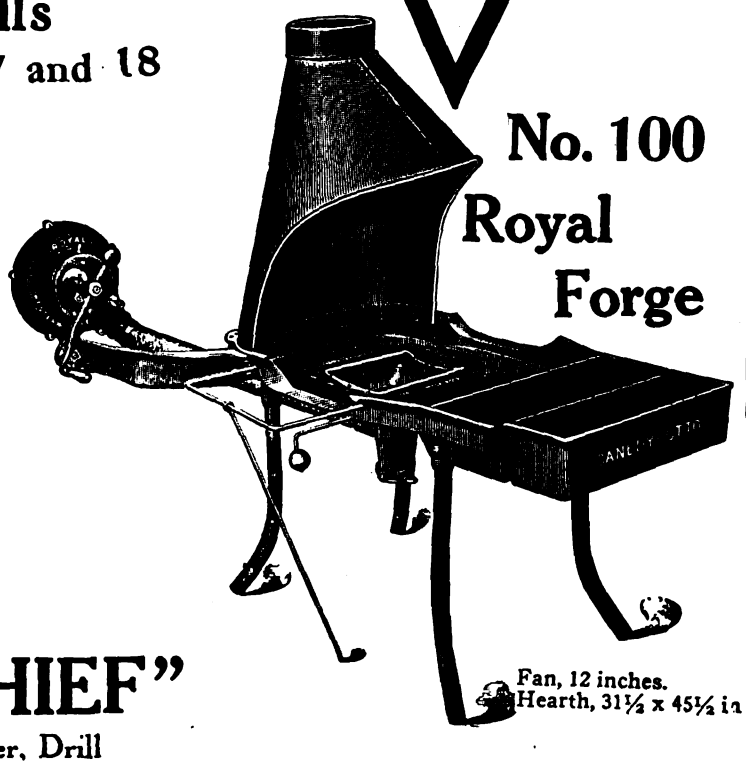
Western Chief Drills

Nos. 1, 2, 3, 7, 12, 14, 15, 16, 17 and 18

A Feature of **TO-DAY**

Wrench? NO!

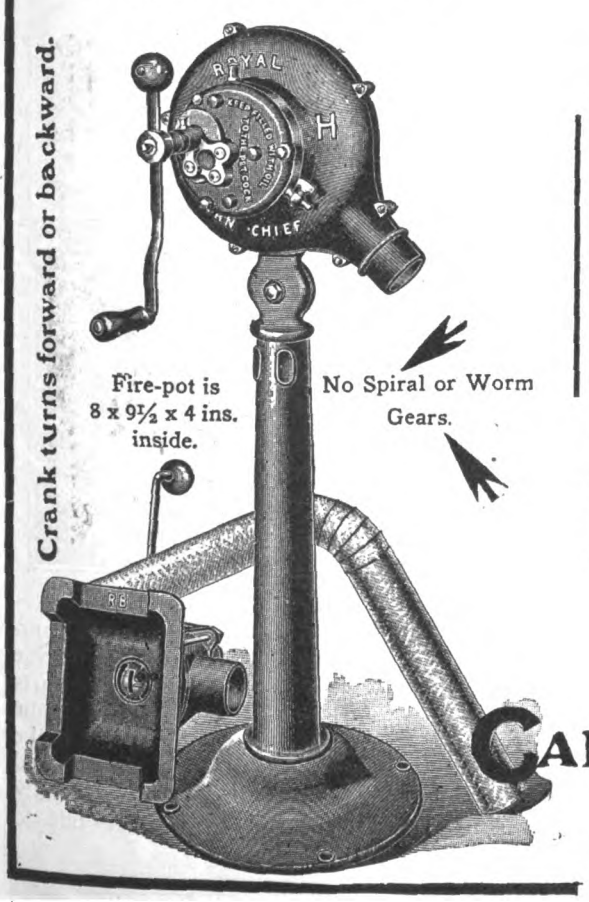
FORGES—BLOWERS—DRILLS



No. 100 Royal Forge

Fan, 12 inches.
Hearth, 31½ x 45½ in

Royal Blower



"WESTERN CHIEF"

When found on a Forge Blower, Drill or other Blacksmith Tool—mean that that article is better than the ordinary. They mean that in its construction the best materials and the highest skill obtainable have been employed. They mean that years of experience have served to perfect it. They mean the tool is a success, and quality alone has made it so. Dealers and Blacksmiths in general will procure what they like best. We must deserve before we can obtain trade. There is no doubt about our deserving, because our production grows rapidly.

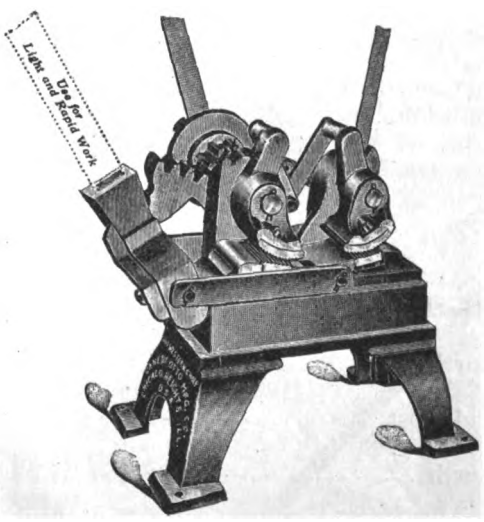
There is a reason—**Quality**

They are all the Best!

THE IMPROVED

No. 1½ Western Chief

(TIRE and AXLE SHRINKER)



Jaws Adjust Themselves to Uneven Thicknesses

MADE BY

CANEDY-OTTO MFG. CO

CHICAGO HEIGHTS, ILL.

I Set No. 4 Shoes & Toes	.40
Nails	.05
Labor, 2 Hrs.	.60
One-Fourth	1.05
Overhead Cost	.25
One-Fourth	1.30
Profit	.32
	$1.62
Pr. Hind Hawns	.50
Freight	.20
Paint	.15
Labor, 2½ Hrs.	.75
One-Fourth	1.60
Overhead Cost	.40
One-Fourth	2.00
Profit	.50
	$2.50
Front Bolster	.70
Freight	.20
Paint	.10
Labor, 2 Hrs.	.60
One-Fourth	1.60
Overhead Cost	.40
One-Fourth	2.00
Profit	.50
	$2.50
Wagon Axle, Fin.	1.35
Freight	.35
Paint	.15
Labor, 5 Hrs.	1.50
One-Fourth	3.35
Overhead Cost	.84
One-Fourth	4.19
Profit	1.04
	$5.23
Oak Wagon Tongue	1.40
Freight	.40
Paint	.20
Labor, 2 Hrs.	.60
One-Fourth	2.60
Overhead Cost	.65
One-Fourth	3.25
Profit	.81
	$4.06
Wagon Spoke	.08
Paint	.05
Labor, ½ Hr.	.15
One-Fourth	.28
Overhead Cost	.07
One-Fourth	.35
Profit	.09
	.44
Wagon Felloe	.12
Paint	.05
Labor ½ Hr.	.15
One-Fourth	.32
Overhead Cost	08
One-Fourth	.40
Profit	.10
	.50

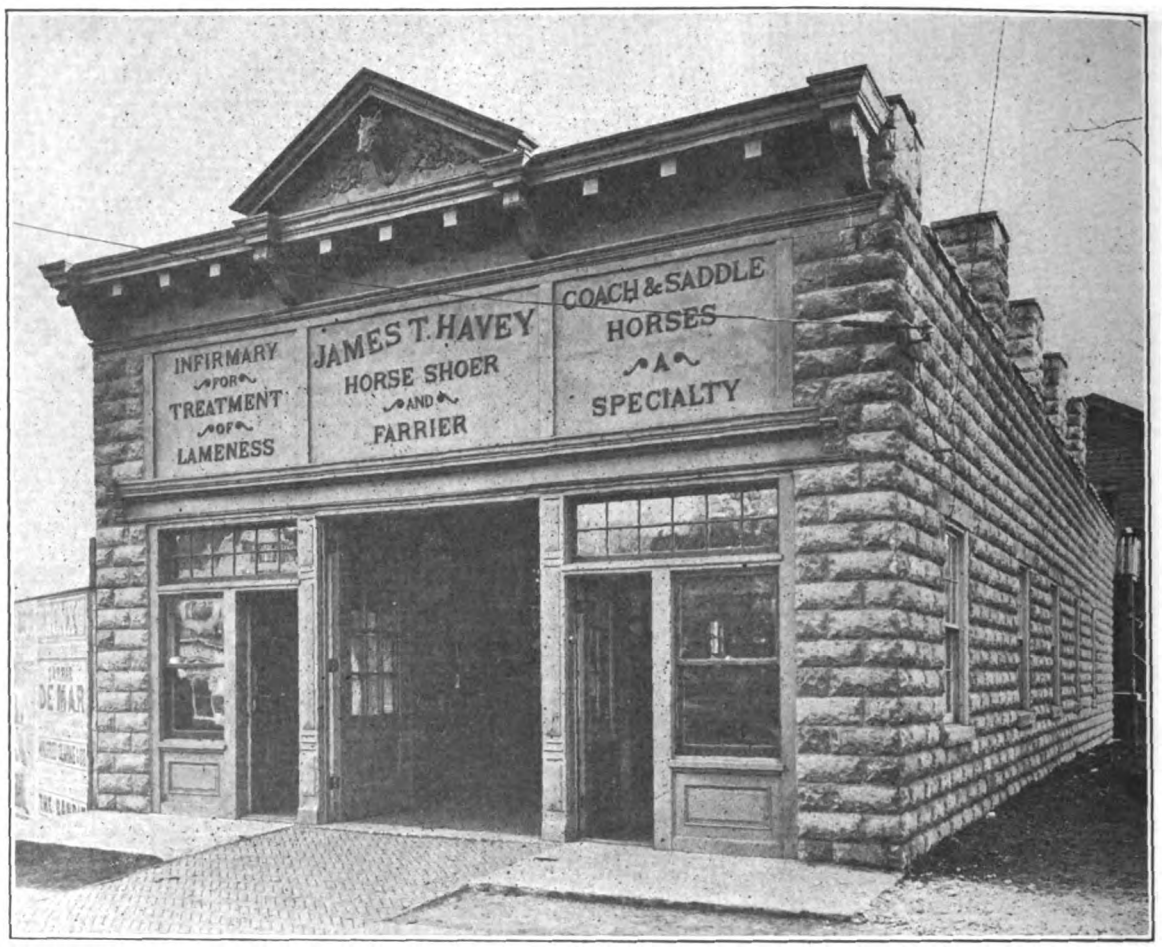
Views of an Up-to-date Shop.

The illustrations were made from photographs of the shop of James T. Havey, Mt. Vernon, N. Y., showing both the interior and exterior. Although it may not be quite fair to say that this is one of the best shops in the country, it is the very best in the locality. In a note describing the shop Mr. Havey says:

"The building is 70 x 28 feet. The ceiling is 14 feet high on which there is a skylight 10 x 36 feet. The proprietor's idea was to have the most comfortable shop for his men, possible. There are 42 windows for light and air. The framework of the ceiling is of dressed yellow pine. There is also a handsome office and furniture complete. I have always held the opinion that the bad conditions of the trade are due largely to the poor buildings.

"There are four fires run by electrical power and built in each forge is a coal pocket which holds a goodly supply of coal. There is also running water at each cooling place, so that each man can have clear water all the time. I have one L. S. P. Calking Machine, which I would not be without, and intend to put in three more, as I think the hard labor of calking shoes, will soon be a thing of the past."

In the view of the interior, the man at the right side at the rear is operating an L. S. P. Calking Machine.



The Handsome Shop of Mr. James T. Havey.

Interior of Mr. Havey's Shop.

To Prevent Screw Threads Rusting.

A mixture of flake graphite and grease applied to screw threads is frequently recommended as tending to prevent the adhesion of the parts due to rust or expansion from heat. Rather a novel recommendation in the same line is to the effect that mercurial ointment similarly applied serves an equally useful purpose. It was formerly employed in marine steam engine practice in cases where the parts of the piston were threaded together. Some such provision should be made on all brake and radius rod connections about the car and any other parts which, though occasionally requiring adjustment, are ordinarily left to themselves in all weathers.

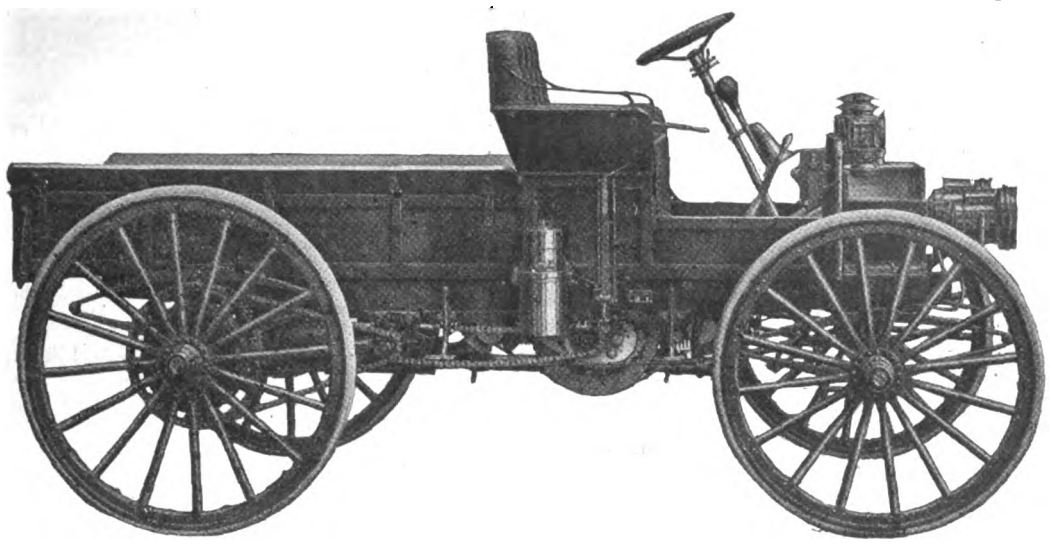
A Simple and Substantial Delivery Car.

The International Commercial Car was designed and is being built by men of ripe experience in the commercial car field. All delivery conditions were carefully considered by the designers, and the result is a car that is giving satisfactory service for light delivery purposes in all lines of business, and under all weather and road conditions. It has a simple type of 2-cylinder 4-cycle motor, which develops sufficient power to carry the car loaded to its capacity up steep hills and over the worst roads. The oiling is positive through a force feed mechanical oiler. There are three speeds —two forward and one reverse. On high speed, the drive is direct from the motor. This transmission is equipped with a device that eliminates the danger of the driver placing two sets of gears in mesh at the same time.

The clutch is of the band type. It can be adjusted with precision and it is very convenient to reach whenever necessary.

The drive is by chains from the jack shaft to the two rear wheels—noiseless roller chains being used. The chain drive transmits more power with less weight than any other form of drive.

The regular body is of a panel type. It is 67 inches long, 35 inches wide, and 9 inches deep—not including the flare boards which may be removed when not needed. The box ironing and bracing is all on the outside, leaving the inside of the box perfectly smooth. An extension sill and brace makes a very strong construction at the rear of the box. Solid rubber tires eliminate all tire troubles and delays caused thereby.



The International Commercial Car.

The car is equipped with brakes that make the control positive—an external band on the jack shaft and an internal experience brake in both rear wheels.

A careful inspection of the International Commercial Car will convince any business man that where quick deliveries are to be made, where there is a large amount of light hauling to do, and where there is a wide extent of territory to cover, its use will prove a decided economy. It is manufactured by the International Harvester Co., and is sold through its agencies. The price is very low for a substantial and dependable commercial delivery car and our readers are advised to get in touch with the manufacturers, with a view of becoming agents or of purchase. Address the International Harvester Co., Chicago, Ill.

Flaws in Castings.

Flaws in castings are common, and very often impossible to detect. The metal near the top of the mould, when making a casting, will often be of a quality which is not nearly so desirable as that at the lower part. For this reason cylinders are cast upside down so that the better material will be found in the combustion chamber and heads. In best practice cylinders are cast in moulds which are too long for the particular piece of work in hand; the upper metal is then removed so that the entire cylinder is composed of the best material possible. This practice is common in the manufacture of all automobile engine cylinders where high-grade workmanship is made an objective point. Drop forgings are as a rule more reliable than castings, not being so subject to flaws and blowholes, and in smaller parts they are used to a large degree. Defects in machined or cast parts cannot be charged to a lack of vigilance on the part of the proprietor of the car, and are mentioned merely to show in what manner breakages may occur which will fall outside of the home care of the car and inside the realm of the maker's guarantee.

PRACTICAL FORMULAS.

Under this heading will be published each month a few formulas that have for their purpose the saving of time and money in the blacksmith and wheelwright trade. Although they have not invariably been tested, they come from reliable sources and it would be esteemed a favor if our readers would give their experience with their practical application, whenever possible.

Condition Powder.

Gentian root, aniseed, caraway seeds, linseed, coriander seeds, rosin, saltpeter, licorice root, fenugreek, of each 1 lb. To the above ingredients, all in fine powder, add oil of cloves 2 drams and mix well in a large mortar; it is not necessary to sieve, if the rosin and saltpeter are finely powdered before mixing.

One or two tablesponnfuls mixed well with the food every night and morning for a week or two, then once a day. For carriage horses, a warm bran, barley or oatmeal mash occasionally, works wonders in conjunction with the condition powders.

Gall Cures.

Galls on horses produced by badly fitting saddles or harness are hard to cure. The sores should be washed two or three times a day with water and a healing ointment or wash applied by means of a soft cloth or a dusting powder. The following are good formulas:

1.—Zinc oxide, 1 oz.; water, 1 oz.; mutton tallow, 2½ oz.; lard, 5 oz.

2.—Tannic acid, 1 oz.; powdered camphor. 2 oz.; zinc oxide, 3 oz. Mix and sift through a fine sieve dust on the raw places.

To Resharpen Old Files.

Wash the files in warm water to remove the grease and dirt, then wash in warm water, and dry by heat. Put 1½ pt. of warm water in a wooden vessel, put in the files, add 3 oz. of blue vitriol, finely powdered, and 3 oz. of borax. Mix well, and turn the files so that every one may come in contact with the mixture. Add 10½ oz. of sulphuric acid and ½ oz. of cider vinegar. Remove the files after a short time, dry, rub with olive oil, wrap in porous paper. Coarse files should be kept in the mixture for a longer time than fine ones.

Aluminum Solder.

The French manufacturers use five kinds of solders for aluminum, all consisting of zinc, copper and aluminum in different proportions. These are given below. Parts by weight.

1.—Zinc, 80; copper, 8; aluminum, 12.
2.—Zinc, 85; copper, 6; aluminum, 9.
3.—Zinc, 88; copper, 5; aluminum, 7.
4.—Zinc, 90; copper, 4; aluminum, 6.
5.—Zinc, 94; copper, 2; aluminum, 4.

For Founder.

Capsicum, 30 gr.; tincture aconite root, 15 drops; cider vinegar, 6 oz.; water 1 pt. Mix. Give as a drench and blanket the animal. After two hours give one pint of raw linseed oil.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

COMPRESSION.

Low, High, Leaks In Compression and What Causes Them.

BY E. W. LONGNECKER.

The degree of compression best adapted to power convertability depends largely on the fuel used and especially so where the fuel mixture is compressed as such. It is generally considered that the higher the compression the more power the engine will develop from the same quantity of fuel. But gasoline vapor ignites at a lower temperature than some of the other fuels, and consequently there is a limit to the compression pressure for gasoline at 70 to 80 lbs. to the square inch. The heat retained in the cylinder from previous charges along with the elevation in temperature caused by compression causes the temperature to reach the igniting point for gasoline at about 80 lbs. where the interior cylinder construction and cooling system are favorable to high compression.

Rough walls of the igniting chamber and heavy iron parts, not well cooled around it, often prevent a 70 or 80 lb. compression, because the heat retained by these parts will bring them to ignition temperature at 60 and even 50 lbs. compression. Consequently to get the best results from compression, construction and design, for the highest advantage in cooling, etc., should be kept in view. This, however, need not be so carefully worked out in engines of the Diesel type where air only is inhaled and compressed to say 500 lbs., and at the point of highest compression the gasoline, or whatever fuel is used, is injected or sprayed into the compressed air.

By this means the combustible is not admitted to the ignition chamber until after the air has reached the highest point of compression and a resulting temperature considerably beyond the ignition point. And since air alone will not ignite the instant that the gasoline is thrown into it by means of a pump and jet, combustion takes place voluntarily by reason of the high compression temperature.

This latter type of engine is not very common and the engines in general use admit both gasoline and air at the same instant and compress the mixture on this combustible so that if the compression is the least bit too high, ignition will occur before the compression stroke is complete, and therefore the engine will be afflicted with auto or self-ignition prematurely.

An engine can be run on alcohol on low compression, as low as 70 or 80 lbs., but it shows more power and much better results if the compression is carried away above the 100 lb. mark. Consequently in considering the proper compression pressure for an engine the fuel to be used must be looked upon, in a sense, as a basis. Low compression is a very common source of trouble in the gasoline motor. Because no matter how nearly correct the compression is when the engine is new the tendency is to rapid reduction, by reason of leaks resulting from worn valves piston rings, piston, cylinder walls, etc.

Low compression, therefore, may result from badly constructed piston rings, worn or broken rings, pitted or corroded exhaust valve or weak exhaust valve springs, blown out gaskets, a scratched or scored cylinder wall, or anything that will result in the leaking away of the gas or explosive mixture or prevent its admission.

The important point then is to keep the compression of an engine as near up to the self-ignition point as practicable, this being done by keeping valves, piston rings, gaskets, etc. in prime condition. An engine running on low compression can not give its best power results because a part of the first mixture leaks away and the quantity is insufficient to give a good power effect. The fuel that leaks away is wasted.

Barbour Steel (Near Rubber) Tires.—These tires are said to give a wheel long life. All hard knocks come on the center instead of the edge and are glancing instead of solid. Jobbers everywhere sell these tires or ought to. If your dealer does not have them write direct to the Barbour Steel Tire Company, Terre Haute, Ind. Our readers will find it to their advantage to investigate these tires.

A Handsome Calendar.—We have received from the Kerrihard Co. of Red Oak, Ia., one of the handsomest calendars that has come to our office this season. It is done in colors and done very nicely. We understand that any blacksmith who will take the trouble to write for one, can have it if he applies promptly before the edition is exhausted.

The Varnish That Defies Soap.—This rather striking headline will be found in the advertisement on another page of Valentine & Company, 257 Broadway, New York. The illustration in the advertisement shows two wheels revolving in soapy water. It is said that spokes finished with Valentine's Vanadium Varnish will stand absolutely unharmed for weeks in soap and water. This varnish of course is just as good for any other vehicle as for an automobile. To show the difference between this varnish and other varnishes, this company has prepared some small pieces of tin varnished on one side with some other make of varnish and on the other side with Valentine's Vanadium Chassis Finishing Varnish. They invite our readers to send for one of these pieces of tin and then let it soak in soap and water and see what the result will be. Consult their announcement on another page, cut out the coupon, fill in your name and address and mail to the Company and one of these samples will be sent to you free of charge.

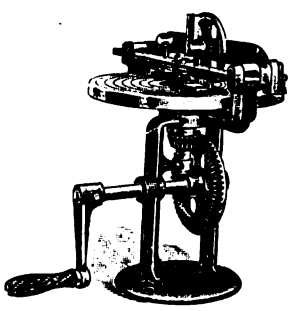
CLASSIFIED BUYERS' GUIDE

Index to Advertisers

(Continued on page 77)

The Clipper Grinder.

The illustration shows well-known Clipper grinder, which grinds the knives of horse-clipping and sheep-shearing machines as good as new, and it does it in a few seconds. The plate is covered with grinding paste, and the blades oscillate by means of a wheel as the blade revolves. It requires no skill or experience to use it; and, in fact, it is impossible to do the work wrong. The bearings are unusuallly long, and are carefully fitted. A pulley can be substituted for the crank and run by power if desired. About twenty-five turns of the crank will sharpen a set of knives, and the holders can be changed in two minutes. The holders are especially adapted to hold Stewart blades, and in ordering be sure to state whether they are wanted



A Low-priced but Useful Grinder.

for horse or sheep blades, or both. Tube of grinding paste furnished free with each machine. This machine is very low priced for one that is every way perfect. For full information address the manufacturers, The Heath Foundry & Manufacturing Co., Plymouth, Ohio, U. S. A.

The New Motsinger (15 magnet) D. C. Magneto we understand has been specified as a standard equipment in a contract just placed by the Lininger Implement Company of Omaha, Neb., with the Field-Brundage Company for 2000 Field engines to be delivered during 1912. This device is manufactured by the Motsinger Device Mfg. Company, Lafayette, Ind.

Concrete Building Blocks.—In this issue W. H. Barten, of Gordon, Neb., has ad advertisement which will be of interest to many of our readers. Consult it on another page and write to him for further particulars, mentioning The Blacksmith and Wheelwright.

An Attractive Calendar.—The Novelty Iron Works of Dubuque, Iowa, manufacturers of the "Boss" Power Hammer, have brought out a very handsome calendar in colors, showing the head of a charming young lady. We understand that one of these calendars will be sent to any reader of The Blacksmith and Wheelwright, who is interested enough to write for it and mention this paper.

Advertising Rates in the Blacksmith and Wheelwright made known on application

Green River Drilling Machine with Quick Return.—This machine is described by the manufacturers as a genuine "quick return." It is provided with an adjustable automatic ratchet feed. It is believed that the simplicity of this machine and its durability will appeal to all blacksmiths. The mechanism is such that the operator has only to raise a collar which fastens the quill to the balance wheel (and spindle) so that the spindle may be raised or lowered readily with the crank. This is a very decided improvement. If our readers will turn to the advertisement of the Wiley & Russell Mfg. Co. on another page, they will see that the Collar "A" is at all times fastened to the threaded quill by a key. When the collar "A" is in the lower position it is held fast so that it cannot revolve with the spindle, by a stud "B" engaging in a seat in the top of the main casting, and the spindle is fed by the automatic ratchet feed. The Collar "A" may be instantly raised to upper position with left hand, the right hand remaining on the crank. When this collar is in the raised position it is secured to the balance wheel by a sliding pin "C" fitting a hole in the balance wheel. In this position the quill and balance wheel are firmly fastened together and the spindle may be rapidly raised or lowered to full range of machine by simply turning the crank forward or backward. These machines are supplied in three sizes. The largest drilling to 1½ inch. Write direct to the manufacturers, Wiley & Russell Mfg. Company, Greenfield, Mass., for further information and their illustrated catalogue of a great variety of blacksmiths tools, and mention The Blacksmith and Wheelwright.

The Apex Horse Shoe Company of Albion, Mich., desire us to say that Hiram Winternitz & Son of Baltimore, Md., are sole distributors for the Apex Horse Shoe in the Eastern States.

"Little Giant" Screw Plates.—Wells Bros. Company of Greenfield, Mass., have an announcement in this issue with an illustration describing their "Little Giant" Screw Plates with adjustable tap wrench. They guarantee all their tools. Write for their catalogue describing a variety of tools for blacksmiths which this company makes.

Crescent Universal Wood Worker.—The Crescent Machine Co., of Leetonia, Ohio, have an announcement in this issue describing their No. 51 Crescent Universal Wood Worker, which they say will save money in any shop and a good deal of it. They want every reader interested to write for their special circular, and at the same time ask for their catalogue describing their band saws, sharpers, jointers, etc.

SULPHUR IN CAST IRON.

And Other Elements that Are Found In Different Grades.

One of the elements of cast iron that has the greatest variation, and one that is admitted will cause a great deal of trouble and annoyance to the founder who wishes to produce first-class castings, is sulphur. Now, the sulphur that cast iron contains is derived chiefly from the fuel used in the process of obtaining the iron from the ore, but a very small proportion of it coming from the fluxes used, or the ore itself; and as charcoal contains less sulphur than coke, it is from that fact that the best and purest forms of cast iron are made where charcoal is the fuel used in the blast furnace.

The effects that sulphur has on cast iron (provided that the other elements, and the rate of cooling, remain constant) are to cause hardness, greater shrinkage, chill and contraction, and it needs less increase or decrease of the amount of sulphur in cast iron to alter the softness or hardness of the metal than of any other element.

A large percentage of sulphur in cast iron causes the metal to be sluggish, shortens the time that the metal can be kept fluid in the ladle, and when it commences to lose its fluidity it congeals so quickly that it encloses the gases generated when a mould is being poured, thereby causing blowholes and dirty castings.

Cast iron can absorb up to 0.3 per cent. of sulphur, but if sulphur is present to the amount of 0.2 per cent. in any ordinary foundry mixture, it will be sufficient to spoil it for any class of work except firebars or sash weights. The percentage of sulphur that cast iron will absorb from the fuel depends mainly upon: (1) The composition of the iron and of the coke; (2) the temperature of the cupola; (3) the quantity and kind of flux used. If the correct amount of flux is used, and the cupola is working hot, then the greater proportion of the sulphur that is liberated by the burning fuel will be carried off in the slag, while with a poorly fluxed furnace, and the cupola "blowing cold," the suphur, instead of being carried away with the slag, will be absorbed by the iron; hence the folly of using too sparingly either fuel or fluxes.

By practical experimenting it has been proved that an iron which before being charged into a cupola contained only 0.03 per cent. of sulphur, was found to have gained 0.055 of sulphur in only one melting. The coke used contained 1.1 per cent. of sulphur.

The above amount of increase may seem at first to be of little consequence, but it is a stern fact that an increase of 0.05 to 0.09 per cent. of sulphur (with the other elements and the rate of cooling remaining constant) can make a casting so hard that only with difficulty can it be chipped or filed, and this fact is more pronounced if the castings are of a light character.

Under all practical conditions the iron that is melted in a cupola absorbs sulphur from the fuel used, and one plan that is sometimes used to drive the sulphur out of the iron is that of placing small pieces of ferro-manganese into the molten metal in the ladle, and then thoroughly stirring the contents.

A far safer plan is to charge into the cupola with the ordinary mixture an iron that contains from 0.9 to 1.5 of manganese, for as manganese has a great affinity for sulphur, they pass off together in the form of manganese sulphide with the slag.

Phosphorus has also been found to be of great use where high sulphur iron is causing trouble, as phosphorus gives greater fluidity to cast iron than any other element. It increases the fusibility of cast iron; but should it be allowed to exceed 0.7 per cent., it has a great tendency to make the castings brittle when cold. If there is no other remedy at hand, the evil of high sulphur iron may be overcome by increasing the phosphorus from 0.2 to 0.45 per cent. The foregoing few facts demonstrate the evil of using high sulphur fuel, and point to the wisdom of analyzing fuels as well as cast iron wherever it is practicable to do so. To obtain the best results the coke that is used shoud not contain above 0.86 per cent. of sulphur.

Cast iron as delivered to the iron founder in the form of pig iron or as scrap iron generally contains from 93 to 96 per cent. of metallic iron. The remaining 4 to 7 per cent. consists chiefly of the following elements: Carbon, silicon, manganese, phosphorus and sulphur; and it is really due to the presence of these elements that cast iron is of such commercial value, as chemically pure iron is useless for the production of castings, while to fuse it would require a great deal higher temperature than is generally obtained in the ordinary cupola.

The various physical properties that the different grades of cast iron possess depend almost entirely on the amount of each of the above elements there is present in the iron.

It is said that S. P. Woods, of Joplin, Mo., has made an inlaid table consisting of a million pieces of wood, some of the pieces being made up of sawdust, some of shavings, and many of foreign woods. It took a year to make the table and it is said that Mr. Woods has refused an offer of $300 for it. He expects to exhibit it at the Panama Exposition in 1915.

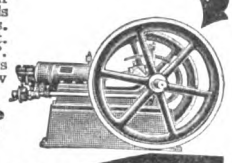
WITTE ENGINES

GAS—GASOLINE—DISTILLATE—NAPHTHA

Do the work at average cost of **One Cent** per horse power hour. Immense saving by our method of "pre-heating" the fuel. Built so perfectly that repairs cost less than **$1** per year average. Every valve is **vertical** and will not wear on the stem or slip inside. Freezing cannot injure bed as **cylinder and base** are **separate.** Hammered steel cranks, cut gears, etc.

GUARANTEED FIVE YEARS

We are experts in engine building; have done nothing else for twenty-six years. Our reference is thousands of satisfied customers. Our prices are right. All sizes, 2 to 40 H. P. Special inducements to introduce in new localities.

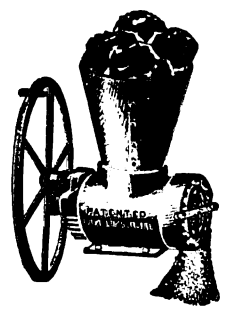


Write for free catalog stating size wanted.

WITTE IRON WORKS CO.
1606 Oakland Avenue, Kansas City, Mo.

Spiral Soft Coal Crusher

Makes a good fire with poor coal by its mixing process; that alone is worth all it costs. In 5 minutes will by hand crush enough lumps to run a fire a day. If your jobber has not got them **send for circular.**



J. H. WIESTNER
3556 Frankford Avenue
Philadelphia, Pa.

Kerosene Oil Engines

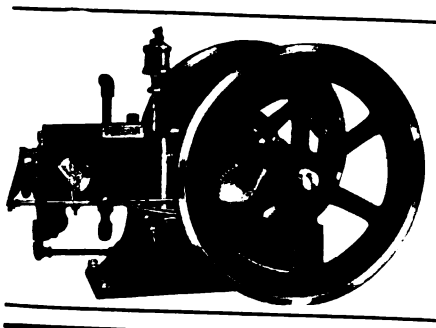
Marine, Stationary, Portable

NO DANGER, Maximum Power, Lightest Weight, Simple, Reliable, Economical. No Batteries, Self Ignition by Compression. Fully Guaranteed.

Write for Catalogue W.

☞ No charge for packing.

HATCH OIL ENGINE CO.
8th Ave. and 18th St., Brooklyn, N.Y.

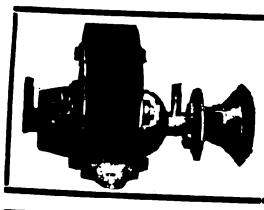


MR. BLACKSMITH—We don't want to fool you, and we are not going to offer you a two horse engine for $27.49 or a five horse for $87.93, **because we know you do not want that kind.** OUR ENGINES ARE BUILT TO DO WORK today, tomorrow, and every day. You cannot afford to pay $1.50 for a helper to swing a sledge, when one of our engines would drive a triphammer ten hours for fifteen cents. The saving in one year pays for the Engine, the Hammer, an Emery grinder, and as much more, besides you do more work and do it easier. Without power you cannot compete, with our engine you can make money easy.

FREE TRIAL.

Write us at once, stating what tools you need.

Address H. L. CHAPMAN, Box B., Marcellus, Mich.



MAGNETS ARE THE LIFE OF ANY MAGNETO

Our new method of magnet construction gives you a magneto of highest power and efficiency.

15 MAGNETS IN EVERY MAGNETO

No batteries required—one-half turn of the fly-wheel and the engine is off.

COSTS YOU NO MORE, BUT DOES BETTER WORK

Motsinger Co., 544 Cherry St., Lafayette, Ind.

Rubber Tired Runabout, $42.00

Top Buggy, 36.75

BUGGY TOPS, $5.50

Write for 100-p. Catalogue—free

BUOB & SCHEU
402-404 East Court Street, Cincinnati, Ohio
COMPARE OUR PRICES. Est. 1883.

Do you want anything? Is your shop for sale, or do you want to buy a shop or hire a man? If so, a "Want" advertisement in THE BLACKSMITH AND WHEELWRIGHT will bring you good results. See terms at head of the "Want" Department on another page.

Fairbanks-Morse Eclipse Pumper

A high grade Pumping Engine at the Low Price of $50.00

Plus the freight from factory, Beloit, Wis. Buy One Now

It is a Four Cycle Water Cooled Gasoline Engine and Pump Jack ready to attach to any pump.

A reliable engine, so simple a child can start it.

Will pump 200 to 2000 gallons per hour depending on size and type of pump and lift.

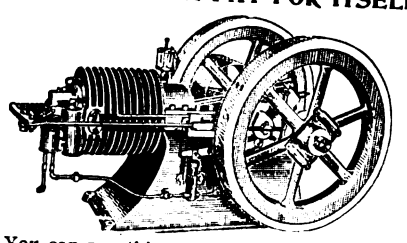
Engine has **two** belt pulleys at different speeds for driving cream separator, churn, grind stone, etc.

Catalog shows how to attach to other pumps and farm machines.

Send for Free Catalog No. MZ655

Fairbanks, Morse & Co.
Wabash Ave. and Eldredge Place, Chicago

LET THIS ENGINE PAY FOR ITSELF.

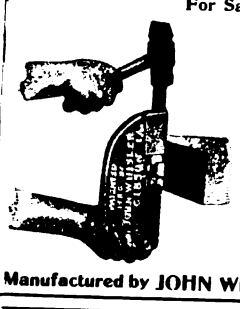


You can run this engine on one-third LESS GASOLINE than other makes. This saving will soon pay for an engine. It is cooled without the use of fans or water. You run no risk of a "freeze up" in cold weather.

Try before you buy. Get our proposition.

GADE BROS. MFG. CO., 200 Main St., Iowa Falls, Iowa.

No Shop Complete Without a WHISLER NUT SPLITTER.



For Sale By

Nicols-Dean & Gregg, St. Paul, Minn.
Shadbolt & Boyd Iron Co., Milwaukee, Wis.
Seig Iron Co., Davenport, Iowa.
Talbot & Hubbard, Phoenix, Arizona
Beard, Campbell & Co., Port Huron, Mich.
Campbell Iron Co., St. Louis, Mo.
Vought & Williams, Iron & Steel, New York City.
Cummings & Emerson, Peoria, Ill.

Manufactured by JOHN WHISLER, Gibson, Iowa

Always Sharp Calks

NONE BETTER

450,000 for sale @ $8.00 per 1,000; or $1.00 per 100 for any size except ½, f. o. b. Harrisburg.

H. A. GABLE, Harrisburg, Pa.

PATENTS

C. L. PARKER,
Late Examiner U. S. Patent Office,
Attorney-at-Law and Solicitor of Patents.

American and Foreign Patents secured promptly and with special regard to the legal protection of the invention. Handbook for inventors sent upon request.

26 McGill Building, Washington, D. C.

SIMONSEN HOT TRIMMING SHEAR.

A shear built especially for HOT CUTTING, and is an every day necessity in every blacksmith shop.

Ask your jobber or write us today for free circular and price list. Please mention your jobber when writing.

N. C. SIMONSEN, Sioux Rapids, Iowa.

A MAN SAID

AT A BLACKSMITHS' CONVENTION:

"I Should Have Bought THE BOSS."

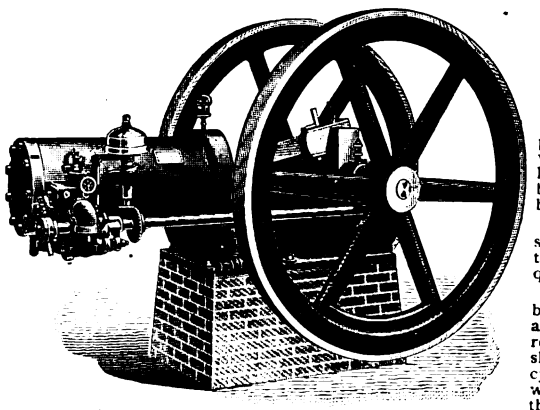
I have one of them d——d things,"—pointing to another make of hammer.

We make the **Boss Hammer,** also the **Helva-Hard-Hitter,** also the **New Idea** with ITS OWN POWER, self-contained—no over-head machinery.

GEO. E. DAVIS CO.,
DUBUQUE, IOWA, U. S. A.

OUR SERMON:

Text:—By the looks and the price ye shall know them.



Would it not be possible to make an anvil to sell for two cents a pound out of cast iron? but show me the blacksmith that would buy one. Any intelligent mechanic will pay from ten to twelve cents per pound for a good steel anvil.

If you see a gasoline engine with the push rod on the side to operate the valves, the valves in the cylinder head, hopper on its back or ribs around the body of the cylinder, you can bet your boots it is of the two cent kind.

Manufacturers who are looking constantly for improvements can't publish the price, as this changes with the quality of the article.

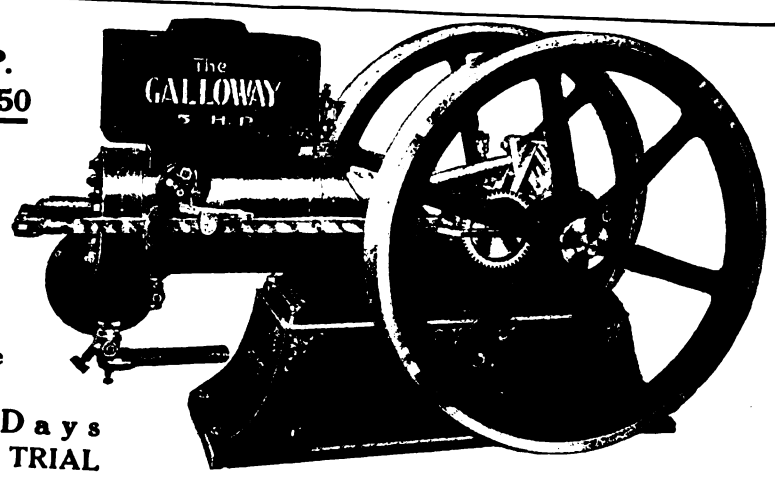
The Capital gasoline engines have been on the market for 18 years. They are made packingless, without the push rod, but with a steel revolving cam shaft and without ribs on the body of cylinder. We have the best in the world. For a short time to introduce this wonderfully built engine

We Have Cut The Price In Half.

GET NEXT TO OUR PROPOSITION.

C. H. A. DISSINGER & BRO. CO., Lancaster, Penna.

5 H. P.
$119.50



Built For Service

30 Days FREE TRIAL

THE GALLOWAY GASOLINE ENGINE

Owned and Made Exclusively by the William Galloway Co., Waterloo, Iowa

will run your shop at several times its present capacity and enable you to take lots of jobs that you have to turn down now because you have not the capacity.

It will enable you to do work you couldn't do without it.

An absolute necessity for all high grade, careful work.

You can reduce your charges on much of your work and still double your profits.

Only Four Things To Do:—Turn on the switch, turn on the oil, turn on the gasoline, give the fly-wheel a start, and the Galloway will go right along all day without further attention. It's the ideal power for a small shop and it's got the capacity to take care of your growing needs.

The Galloway Engine has been a standard engine for fifteen years. Thousands in every day use in every state and territory.

The Galloway Horse Power is rated by actual brake test. If you try the Galloway Engine you will find it is not over-speeded. Remember, the bore and stroke count and you don't have to drive your engine faster than you ought to drive it to get the rated horse power.

We make this engine in seven sizes up to 28 Horse Power. Three or four styles in every size.

Note my SPECIAL PROPOSITION TO BLACKSMITHS.

I have a plan by which every blacksmith can pay for his own machine. It's good, it's out of the ordinary, and you will be overlooking a big chance if you don't write for my proposition. Ask for my free information on Stationary and Portable Gasoline Engines from 2 to 28 Horse Power. We make the best and we price them at reasonable figures.

Beautiful, sensible CATALOG FREE FOR THE ASKING. Write to-day.

WILLIAM GALLOWAY, President,
THE WILLIAM GALLOWAY COMPANY,
1555 Galloway Station, Waterloo, Iowa.

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

The PERFECTION DISC SHARPENER

The **only** machine that will sharpen discs **on the Harrow** or **Cut-a-way** discs.

FOR SALE BY LEADING JOBBERS IN U. S. AND CANADA

E. E. COMBS, Mfr. - **EVANSVILLE, WIS.**

GOVERNMENT INSPECTION

Is recognized, the World over, as the most exhaustive and most expert investigation obtainable!

That article which merits the final indorsement of Government Experts, after their grueling tests, is entitled to the highest praise and strongest indorsement by the public. No article of whatsoever nature obtains this worthy recognition except through **superior virtue and unrivalled quality**; therefore the **continued** indorsement by the United States Government and Foreign Governments, of the Brooks Cold Tire Setters **to the exclusion of all other Edge-grip Cold Tire Setters** is unconditional evidence of their superiority. You can **bank** on such evidence as this! You can **buy without risk on such proof!**

Our Special Winter Terms last only until April first. Write TO-DAY for these terms and for Booklet "B."

THE BROOKS TIRE MACHINE CO.,
Wichita, Kansas.

DANDY MULESKIN APRON.

Patented March 15, 1910.
Made in the Following Sizes:
Size R, 32x40 inches.
" S, 30x38 "
" T, 28x36 "
" U, 26x34 "

"BOSS" SPLIT LEATHER APRON.

Made Complete with Eyelets and Strings.
Made in the Following Sizes:
Size X, 30x36 inches.
" A, 26x33 "
" B, 24x30 "
" C, 24x27 "

APRONS OF QUALITY.

THE **DANDY MULESKIN APRON** is a two piece Apron, made upon new lines, has more leather inside of each leg where it is most needed. Made from pure Krom Leather, soft as buckskin and will not burn.

THE **"BOSS"** Blacksmith Apron is made from a Cow Hide Split and has been sold by jobbers everywhere for the past 12 years.

WRITE US TODAY FOR MINIATURE APRON.

ACCEPT NO SUBSTITUTES.

Regular Muleskin Aprons made same as the "BOSS."

Sizes, 32x38 inches. Sizes, 28x35 inches.
" 30x36 " " 25x33 "

We will at all times be pleased to send samples by prepaid express to any jobber for inspection.

MANUFACTURED ONLY BY

THE CALIFORNIA TANNING CO.,

SUCCESSORS TO

EDMUND C. BECKMANN.

712 North 4th Street, ST. LOUIS, MO., U. S. A.

DANDY MULESKIN APRON.

With Leg Straps and Buckles.
Patented March 15, 1910.
Made in the Following Sizes:
Size 30x36 inches. Size 28x36 inches.
Size 26x34 inches.

"BOSS" SPLIT LEATHER APRON WITH BIB.

Made Complete with Eyelets and Strings.
Made in the Following Sizes:
Size D, 30x42 inches. Size E, 28x38 inches
Size F, 26x34 inches.

ROOTS
New Acme Hand Blowers

WITH RING OILING BEARINGS

Are more durable, efficient—Give more air—operate easier—Give less trouble—than any other Blower on the market.

Ask us for the experience of one who has used The Acme for 25 years.

Write us or your dealer for circular illustrating and describing our Blowers and Tuyeres.

P. H. & F. M. ROOTS CO.
Connersville, Ind.

New York Office,
120-122 Liberty Street.

Chicago Office,
1245-46 Marquette Building.

"FAVORITE" CLIPPER GRINDER

The "Favorite" Clipper Grinder grinds the knives of Horse Clipping and Sheep Shearing Machines in a few seconds to cut as good as new.

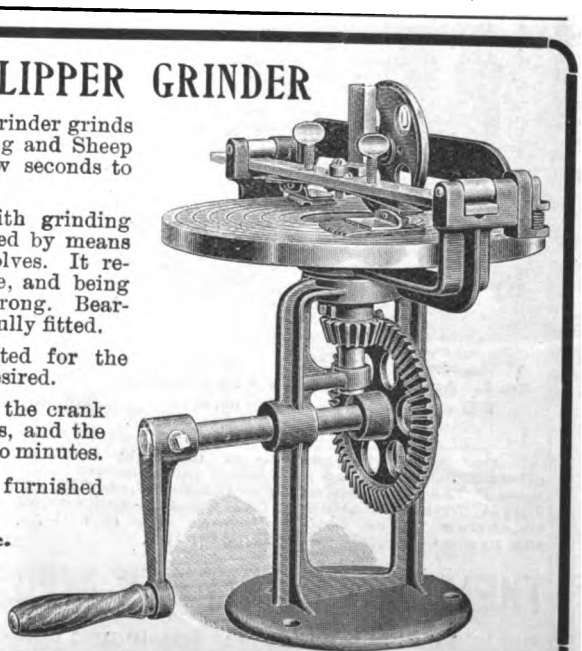
The plate is charged with grinding paste and the blades oscillated by means of a cam, as the plate revolves. It requires no skill or experience, and being automatic, cannot be done wrong. Bearings are extra long and carefully fitted.

A pulley can be substituted for the crank and run by power if desired.

About twenty-five turns of the crank will sharpen a set of Knives, and the Holders can be changed in two minutes.

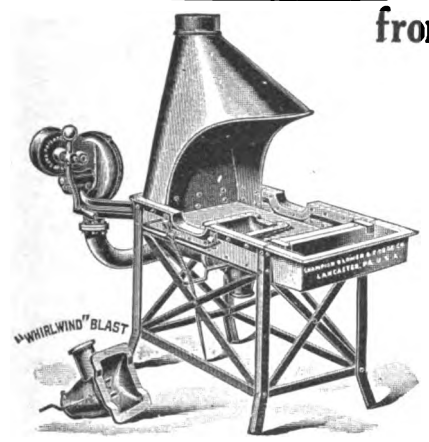
Tube of Grinding Paste furnished free with each machine.

Write for Price.



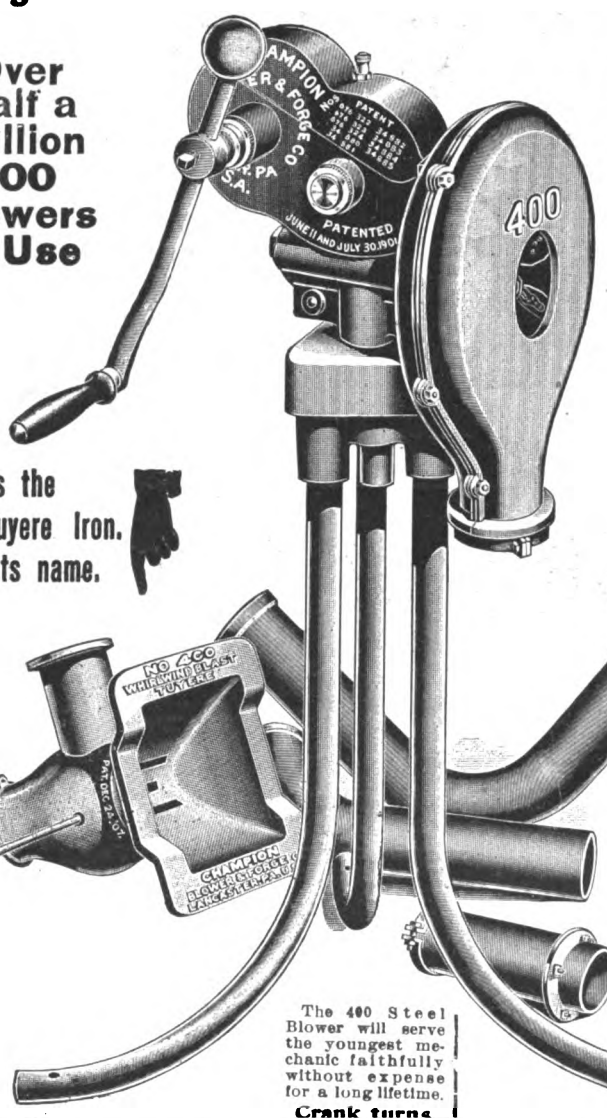
THE HEATH FDY. & MFG. CO.
Plymouth, Ohio.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

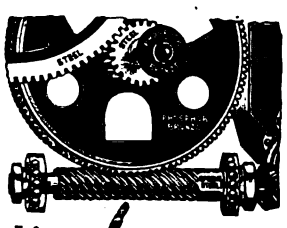
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:	
676,322	34,882
676,323	34,883
676,324	34,884
34,880	34,885
34,881	697,629

Also Great Britain Patent No 9.662, May 25, 1900.

The Blower for Quality, First, Last and Always

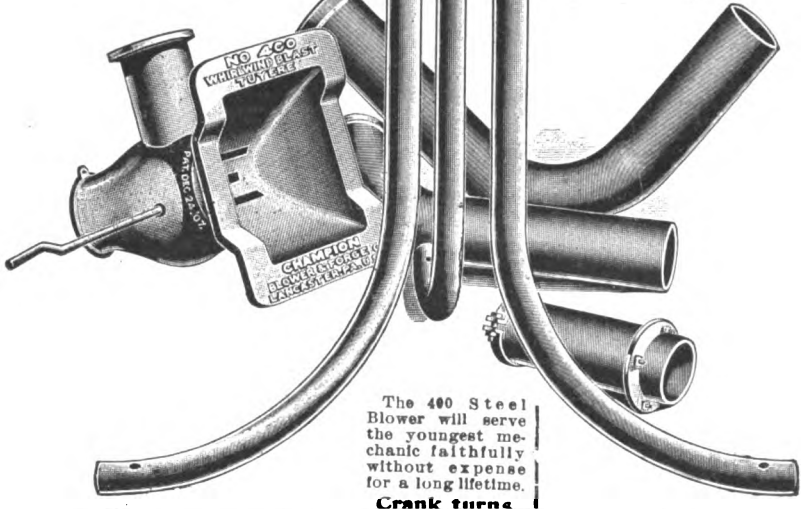
THE FAMOUS 400



The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

The Champion Latest Invention!

Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.

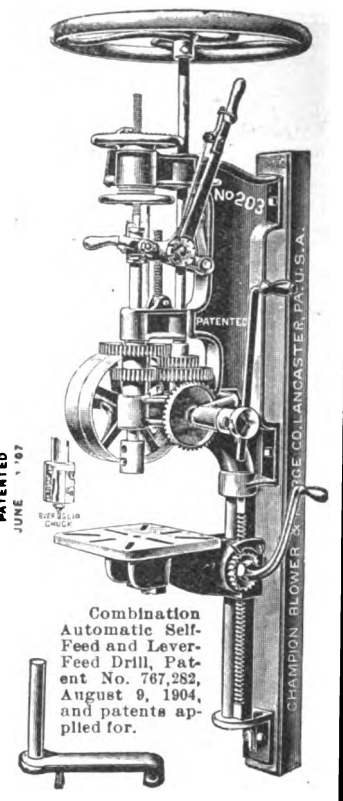
The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill Manufactured.

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

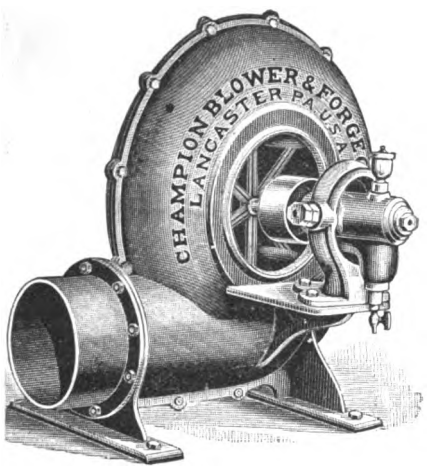
The DOUBLE COMPOUND LEVER-FEED Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

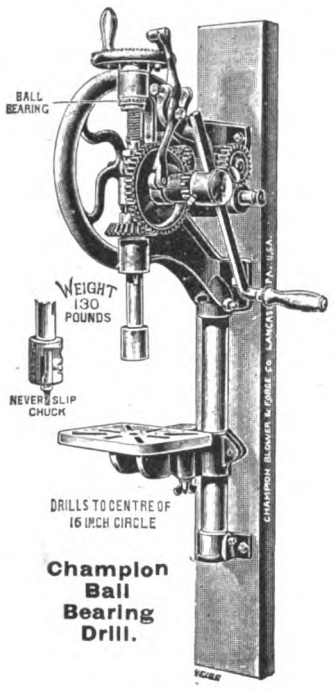


Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

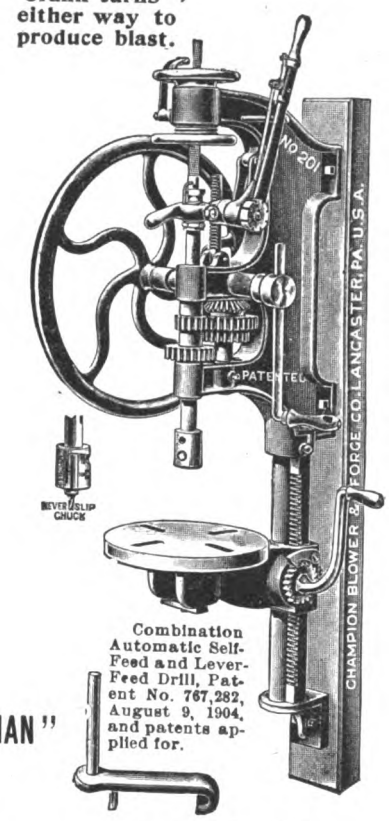
No. 203 DRILL.



Champion Power Blowers made in ten sizes up to 64 inches in height.

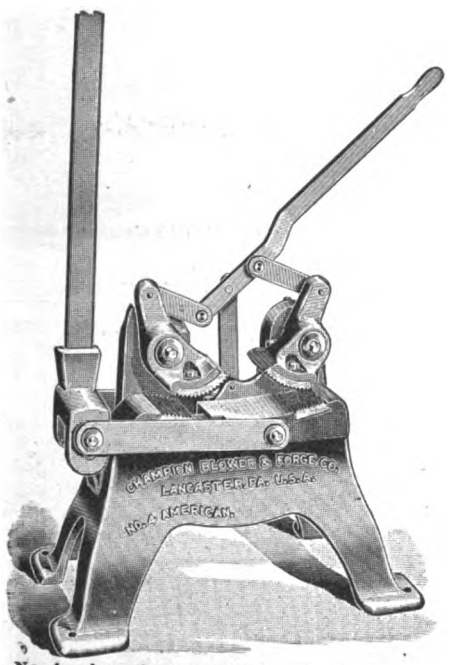


Champion Ball Bearing Drill.



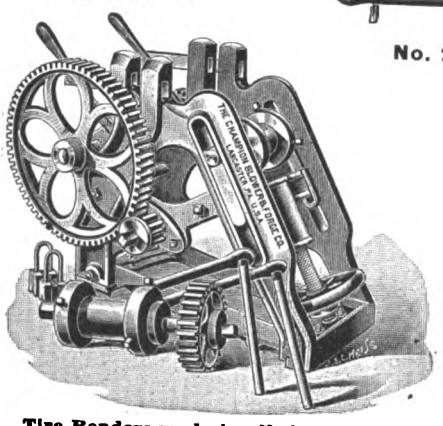
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.



No. 4. American Tire and Axle Shrinker.
Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

THE CHAMPION "COLUMBIAN" TIRE BENDER



Tire Benders made in all sizes to bend up to 6x1 inches.

No. 105. Electric Full Mounted Screw Plate.
Screw Plates in four styles cutting up to 1½ inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

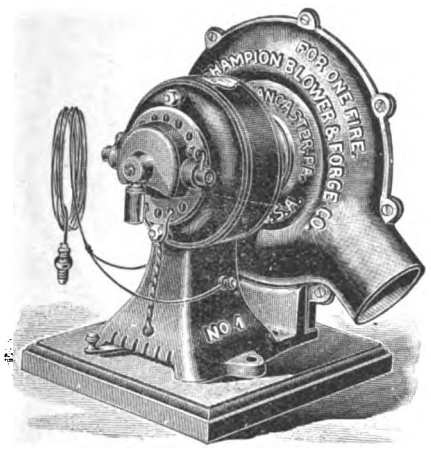
Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

CHAMPION One-Fire Variable Speed Electric Blacksmith Blowers

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements



No. 1 One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for light and medium fires.

THE ELECTRIC SUCCESS.

The four illustrations show a very complete line of Electric Blowers, running up to nine fires, which we recommend in every instance, each fire to be equipped with its own individual Electric Blower so it gives each operator full and complete control of his own individual fire, and a large saving in the consumption of electric current. The material, workmanship, etc., used on these Blowers are of the very best.

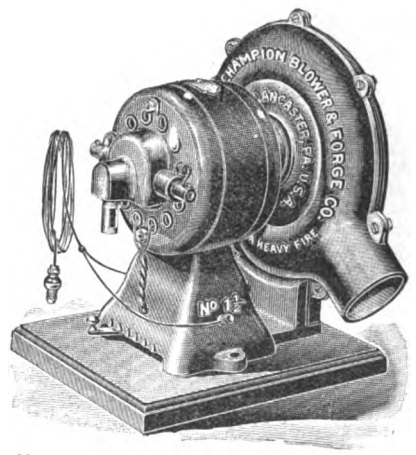
No. 1 and No. 1½ One-fire Variable Speed Electric Blacksmith's Blowers are equipped with attachment cord and plug.

This Variable Speed Electric Blower eventually costs you nothing, because it pays for itself in a very short time.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

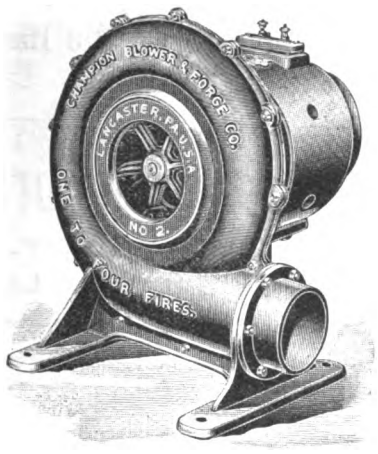
No. 1½ for Extra Heavy Blacksmith Fire

Motor capacity 50% above requirements

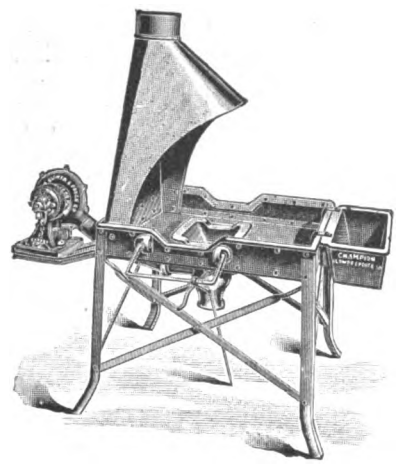


No. 1½ One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for extra heavy fires.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER

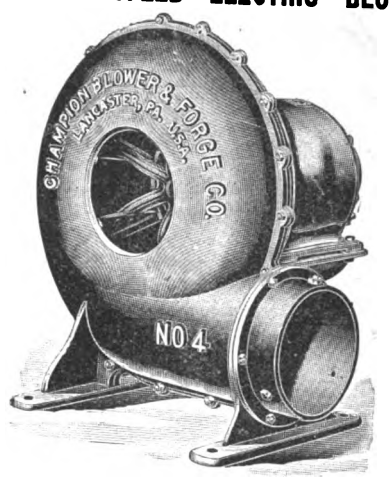


No 2 Electric Blacksmith's Blower. Will blow from one to four fires.



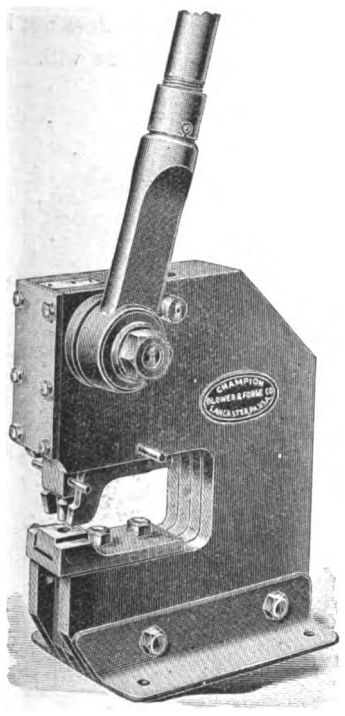
No. 440. Champion Blacksmith's Steel Forge with "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron, equipped with No. 1 One-fire Variable Speed Electric Blacksmith's Blower with five speeds, for light and medium fires. Hearth, 30x36 inches, height 30 inches, with hood complete.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER



No. 4 Electric Blacksmith's Blower. Will blow from one to nine fires.

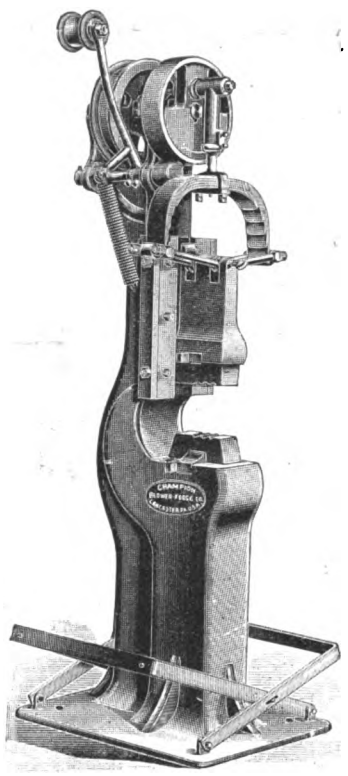
FOUR NEW CHAMPION TOOLS



Champion Steel Punch.

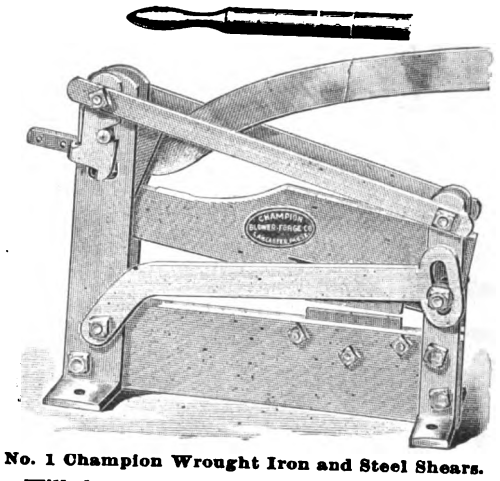
No. 1 punches 5/16 inch hole in ¼ inch material.

No. 2 punches ⅜ inch hole in ⅜ inch material.



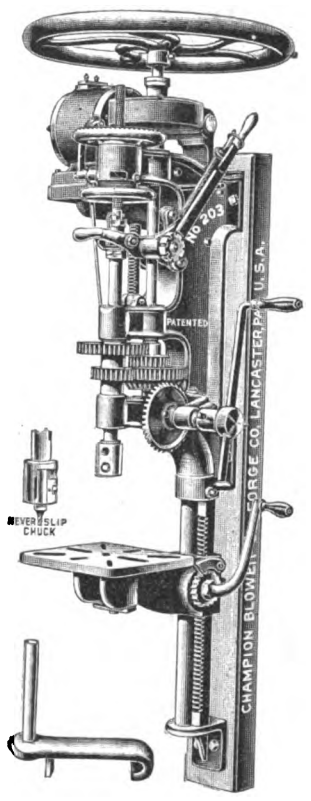
The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



No. 1 Champion Wrought Iron and Steel Shears. Will shear 4x½ inches flat and 1 inch round or square. Weight 255 pounds.

Our 1912 catalogue can be had free upon application, showing the very latest and greatest inventions in the Blacksmith Line in the world on Blowers, Forges, Drilling Machines, Tire Benders, Tire Shrinkers, Screw Plates, Power Blowers, Power Hammers, Punches and Shears, etc. It will pay you to see our new catalogue.



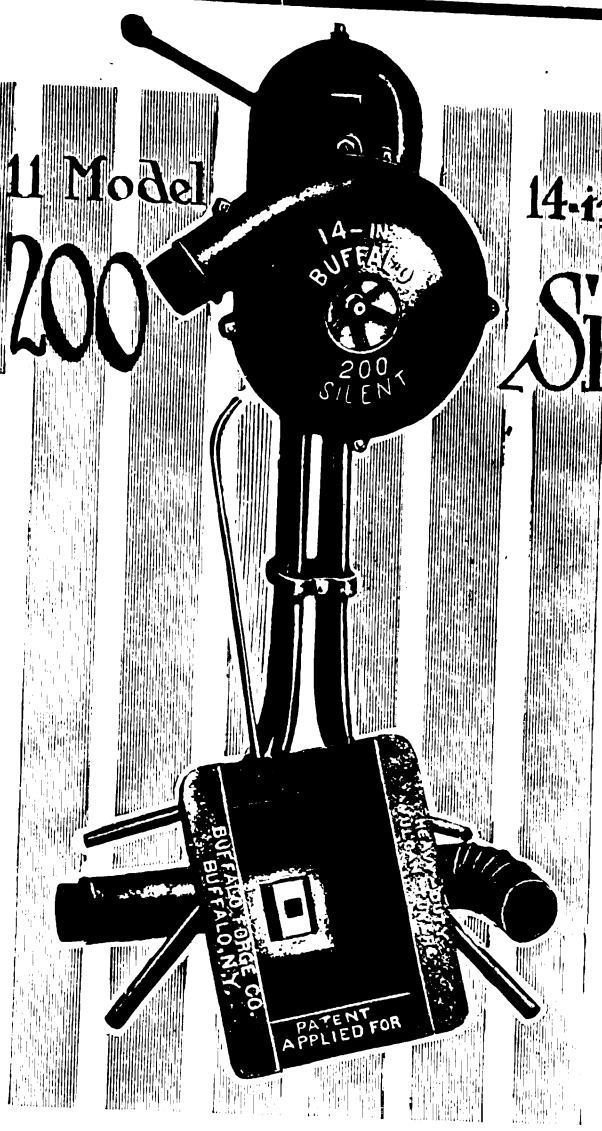
No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.

CHAMPION BLOWER & FORGE CO.

LANCASTER, PA., U. S. A.

1911 Model Buffalo 200 14-inch Fan Silent Blower



151-lb. Rails heated by 14-inch hand blower in Railroad Shops

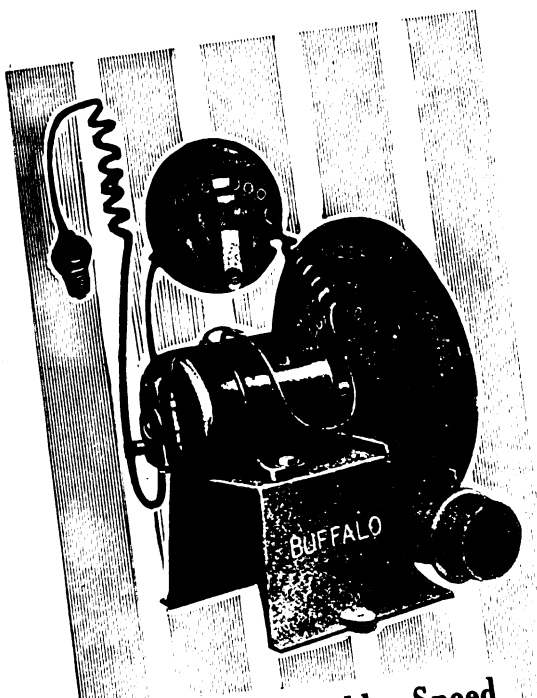
The United Railways and Electric Co. of Baltimore, informs us that they have used the **14-inch** blower for **heating 151-lb. rails for frog spacing,** after they come from the foundry; also that **all their welding** in the shops is done with this 14-inch—No. 200.

The American Pipe and Construction Co., Amsterdam, N. Y., advises us that they handle material **up to 7-inches wide** with this blower without any trouble.

Those are only two cases out of a thousand in which the 14-inch Buffalo 200 is used for work impossible to handle with any other **hand** blower in existence.

Six-year old boy wants to run 14-inch blower all day

You think it must be a wonderful boy who can run a 14-inch blower all day. The fact is, it isn't that the boy is so much stronger than other boys, but rather the **blower that is so much easier running** than other blowers. Mr. Fred Habermehl, of Clarington, Ohio, says it runs so easy he has to make his 6-year old boy leave it alone, because he wants to run it all the time. Now wouldn't you consider yourself in good luck, just like Mr. Habermehl does, to get a blower like that? It costs no more than others. Write us. We have a special proposition for you.



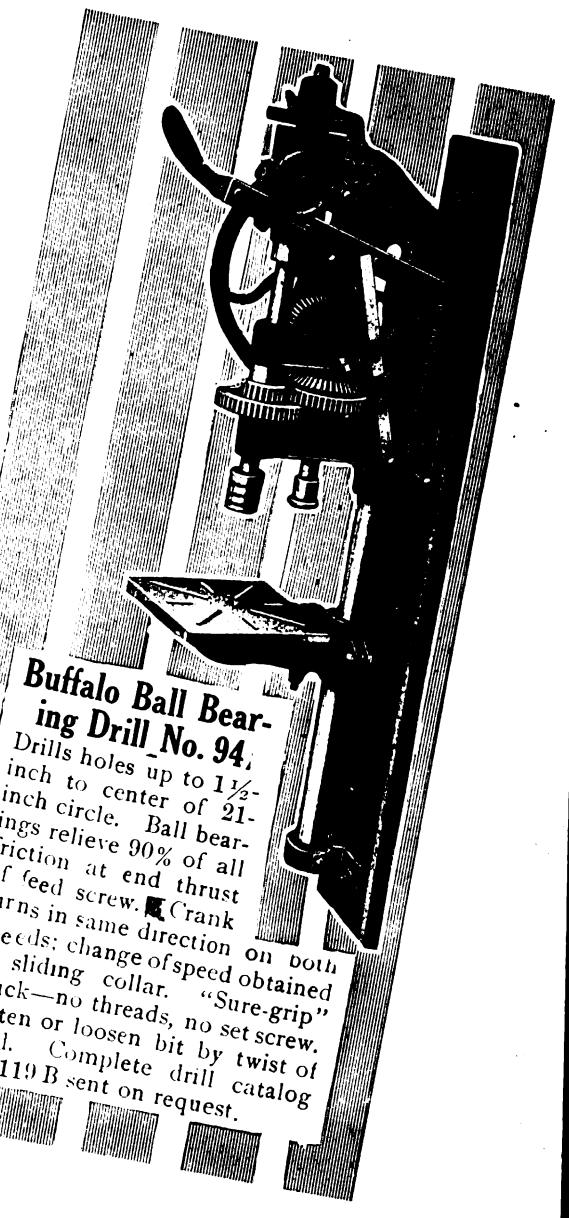
Buffalo Variable Speed Electric Blower

No cost of installation. We furnish it complete with wire and plug. Simply attach to lamp socket. Uses less current than a 16 C. P. electric bulb. Dust proof casing, with hinged doors. Triple size brushes. Automatic oiling. Oil cup cannot be broken. Large fan, giving high pressure at low speed, saves power and lengthens life. Ask for full description No. 154B

No. 650

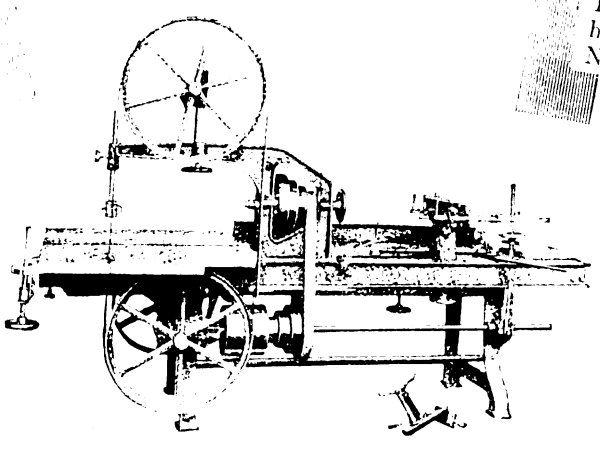
Buffalo Forges

Every size and style carried in stock. Fitted with famous 14-inch "200" Blower, and heavy tuyere with clinker-breaking valve. Note balanced ash gate and the special strong manner of bracing the legs. Ask for Booklet No. 126 B.

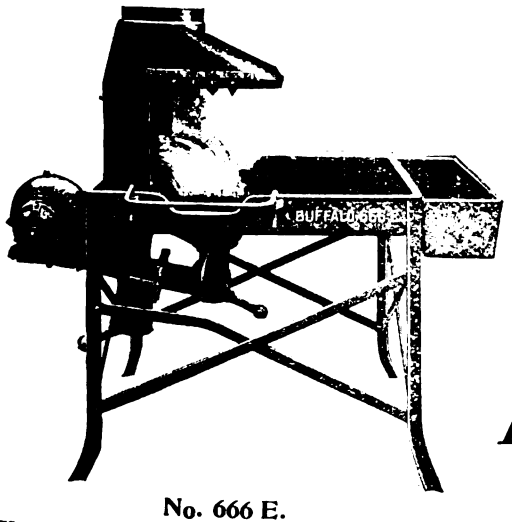


Buffalo Ball Bearing Drill No. 94

Drills holes up to 1½-inch to center of 21-inch circle. Ball bearings relieve 90% of all friction at end thrust of feed screw. Crank turns in same direction on both speeds; change of speed obtained by sliding collar. "Sure-grip" chuck—no threads, no set screw. Fasten or loosen bit by twist of hand. Complete drill catalog No. 119 B sent on request.

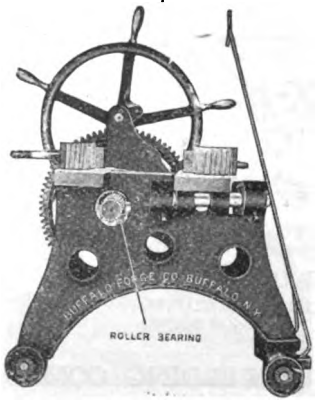


Crain Combination Woodworker.
12 Machines in One.



No. 666 E.
Electric "Down Draft" Steel Forge.

Buffalo Forge Company
Buffalo, N.Y.



No. 4 G. **Buffalo Tire Upsetter.**
Ask for complete description 121 B.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXV. No. 3. NEW YORK, MARCH, 1912. TERMS: ONE DOLLAR A YEAR

FOR FARMERS OR GROCERS.

Five Different Styles Illustrated and Fully Described.

BY WAGON MAKER.

We illustrate and describe herewith five different styles of wagons used by farmers and for country stores, but these styles represent a small part only of those actually in use every day and in all seasons during the year. They are built in different lengths and widths across, but the custom is from 30 to 45 inches, and the width of seat is made to suit the width of the body.

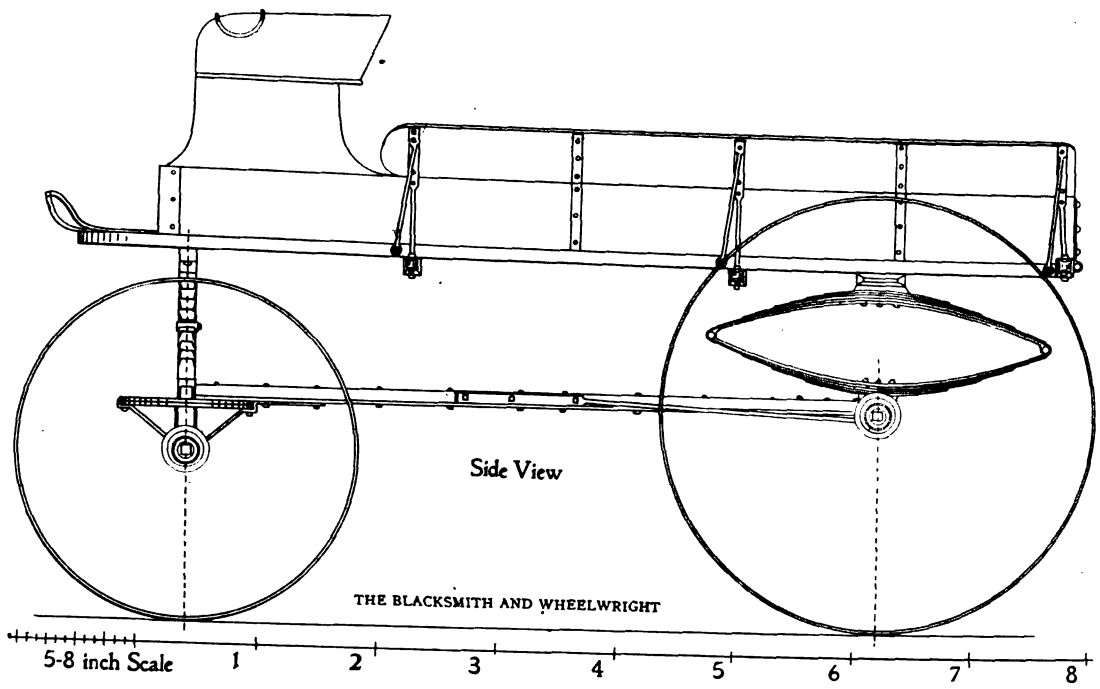


Fig. 1.—Delivery Wagon on Three Elliptic Springs with Three Reaches.

These widths are governed by the width of the track and height of the wheels. On some the width of track is 56 inches and height of wheels 42 inches. When this is the case, the front wheels turn against the rub-iron on the under surface of the sills, and the width of the body must be narrow, otherwise the turnout will be too short. The width of these bodies is 30 or 32 inches for a 56 inch wide track, out to out.

It is different on straight sill wagons. Where the wheels turn under the sills, the diameter of the front wheels is then from 33 to 37 inches. On such wagons the higher the front wheels, the further the body from the ground, as the space between the wheels and body must be at least from three to four inches. The lengths of these bodies are all 7 feet 9 inches, which is medium size, but they are made shorter and longer.

The length of gears, center to center, is 5 feet 10 inches, except the six spring suspension which is shorter, and is 5 feet 3 inches. The thickness of the sills is 1¼, 1⅜, or 1½ inches, and from 3 to 4 inches wide. The cross bars are the same thickness as the sills, and the width is from 2½ to 3 inches. The body sides are ¾, ⅞, or 1 inch thick, grooved 3/16 inch into the sills, and screwed down with strap bolts. The end cross-bars have different sizes and the depth depends on the thickness of the bottom boards. The body sides are braced with four stays, two on each side, to keep them well in position.

Note the bottom view, Fig. 2. These gears, with one straight and two bent reaches, are considered the most practical and most durable gears made. The front ends of the reaches are mortised into the head block, and the straight reach on the rear end is mortised into the axle bed, while the bent reaches are lapped and clipped to the under surface of the axle. Besides the three reaches, the iron side stays and center reach are ironed from front to rear end. The sills, cross bars, and heel board are all indicated in dotted lines. The seat on Fig. 3 is 17 inches high from the top of the sills to the top of the seat. The wing boards are well braced, and at the same time it strengthens the body sides, otherwise the construction of the body is the same as Fig. 1.

Note the bottom view, Fig. 4. Express wagon gears are made the same and are considered the very best gears on hard road driving. The side stays, futchels and straight reach are well braced together, also the combination of all parts with the axle is considered the best wagon practice. The size of the fifth wheel is 14 inches, but most of them are 16 inches, and from 1¼ to 1½ inch spokes.

Fig. 5 is the same kind of body except the side boards are screwed on the outside of the sills. The seat is higher and the seat is raised. The four posts with the two rails on each side are made to lift when not needed. The width of those bodies is made from 42 to 48 inches, and sometimes wider. The body is suspended on six wagon platform springs, and 34 inch diameter, front wheels. The body on Fig. 3 is suspended lower on the rear end, while Fig. 5 is suspended level, but this is not the rule. Many of them are suspended, same as Fig. 3. Note the gears, Figs. 6 and 7. They are light, have a large fifth wheel, and are well braced. In case they settle, they can be raised by turning the two nuts on the rear end, as shown on both ends.

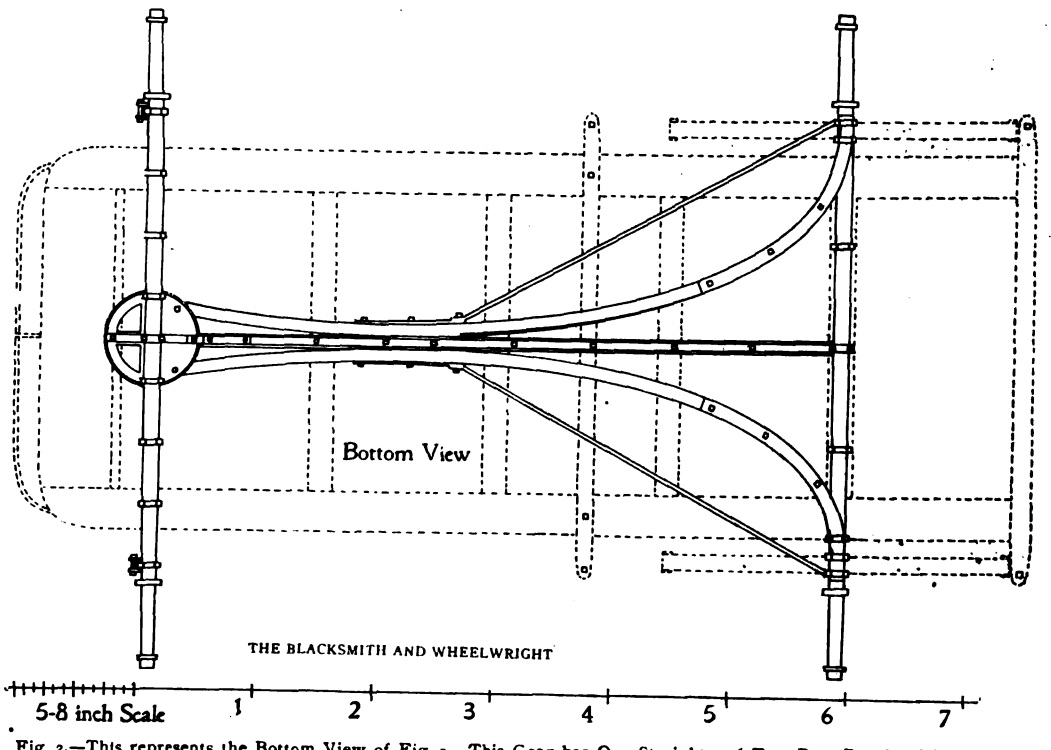


Fig. 2.—This represents the Bottom View of Fig. 1. This Gear has One Straight and Two Bent Reaches Fitted to the Top of the Fifth Wheel Front and Bottom Surface of Axle on the Rear End.

Tops for Farmers' Delivery Wagons.

The tops are made to suit the convenience of the farmers and grocery men. The low tops are made for the protection of the goods carried, but not to sit under, because the entire height from the bottom of the sill to outside of the top is only 39 inches, but all are made to shift. This top has four bent bows. The top or round part is slatted, to keep the canvas from sinking. The front part has side curtains to roll up, and sometimes there is one across the front and across the rear end. The canvas or rubber cloth is put on stationary, is tacked on the top rail, and the edges are covered with moldings. On the lower edge it laps three inches over the body sides, as it cannot be fastened on the body side boards. The dotted lines indicate where the canvas is tacked to. The posts rest in cleats, which are screwed to the inside of boards. Each bow requires four cleats, two on each side.

With Fig. 9 we illustrate a full size roll-up curtain top with five rails on each side, to strengthen it. This top is built similar to a regular wagon top and is also made to shift, same as on Fig. 8. Roll-up curtains are also made across, front, and rear.

Dimensions for Medium Size Farm Delivery Wagons:
- Warner Patent Wheels.
- Diameter of wheels—38, 42 and 44 in.
- Diameter and length of hubs—3⅜ x 7 in.
- Size of spokes—1¼ in.
- Number of spokes—14 and 16.
- Thickness and depth of rims—1 5/16 x 1⅜ in.
- Size of tires—3/16 x 1 3/16 in.

Dimensions for Front Spring:
- Length from centers of bolts—36 in.
- Open out to out—10½ in.
- Width of plates—1⅝ in.
- Number of plates—5.
- Thickness of other plates—Nos. 2, 2, 3, 3.
- Clipped top and bottom.

Dimensions for Rear Springs:
- Length from centers of bolts—36 in.
- Open out to out—10½ in.
- Width of plates—1½ in.
- Number of plates—5.
- Thickness of main plates—No. 2.
- Thickness of other plates—Nos. 2, 3, 3, 3.
- Clipped top and bottom.

CHAIN PULLEY BLOCKS.

Weight, Strength, Simplicity and Something About How to Use Them.

There are many different makes and types of pulley blocks on the market, and the selection of the most suitable should be made with care.

The essentials of a good pulley block are: Minimum weight consistent with strength; simplicity; fewest possible parts, and these so arranged as to secure freedom from liability to derangement in working; high lifting efficiency.

The first of these is attained by the use of the strongest materials only—say cast steel for sheaves and pinions, and the best quality of mild steel for head and snatch blocks, pins, hooks, etc. Another point which makes for minimum weight, and which adds greatly to the convenient handling of the tackle, is the distribution of the lifting chain so as to provide for the full length of lift with a minimum amount of chain.

Simplicity and efficiency both depend on the mechanism employed, and, generally, the best tackle will be that in which the best compromise is effected between the two. Briefly, the best pulley-block mechanism is that which gives the maximum "mechanical advantage" with minimum tendency to "overhaul." The purpose of a pulley block is essentially to raise a weight through the greatest height in the smallest time, and this at first sight makes high hoisting speed the most desirable object to be attained. But high hoisting speed implies a relatively great expenditure of effort, with a high stress on all parts of the tackle; neither of which is desirable, for several reasons. High hoisting speed is also accompanied by increased tendency to "overhaul." So for many reasons it is decidedly better to sacrifice hoisting speed, to some extent, in order to gain other advantages.

All chain blocks, whether in constant or intermittent use, should be thoroughly overhauled at intervals. The whole of the gear should be taken asunder. Head and snatch blocks should be thoroughly cleaned of all dirt, grease, or rust, and should be carefully examined for cracks, signs of straining or distortion, wasting due to rust or corrosion, etc.

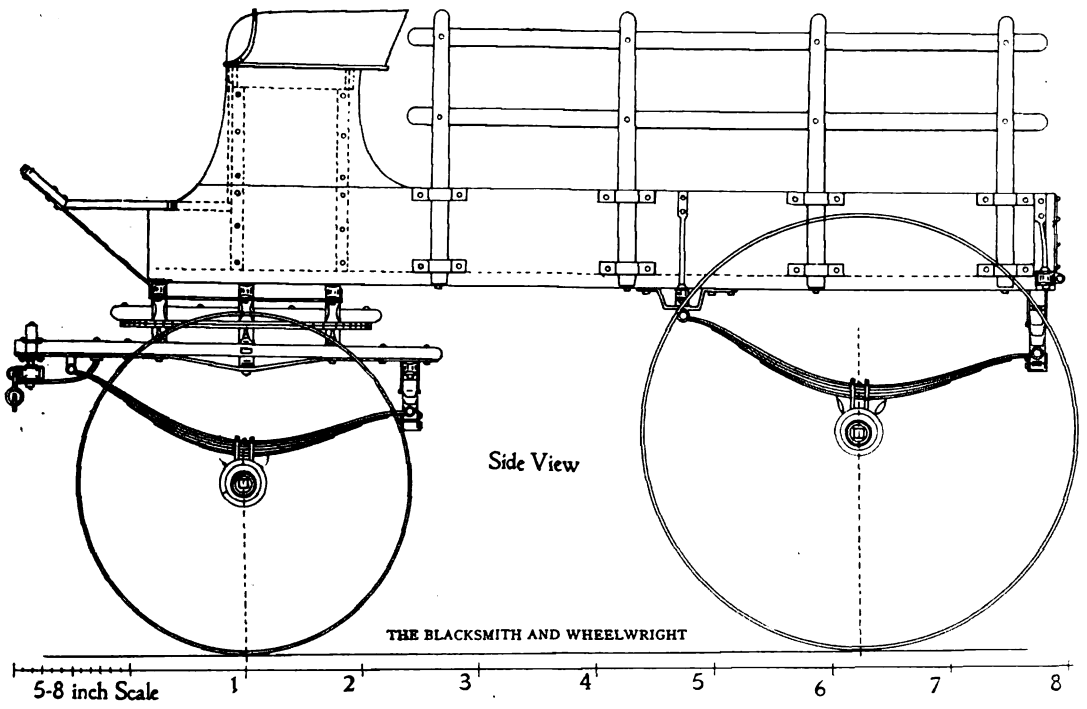


Fig. 3.—Represents a similar body to Fig. 1 except the Seat is Higher, has Wing Boards, and Wheels Turn Under the Sills.

Chains should be annealed in the usual way. Although pulley-block chains are not usually subject to so much shock or impulsive loading as those of cranes, still crystallization of the material will occur, and periodic annealing is necessary. After annealing, the chains should be cleaned, and carefully examined for stretched, twisted, or excessively worn links. If any links are found defective they should be cut out, and a new piece of chain inserted by a good smith.

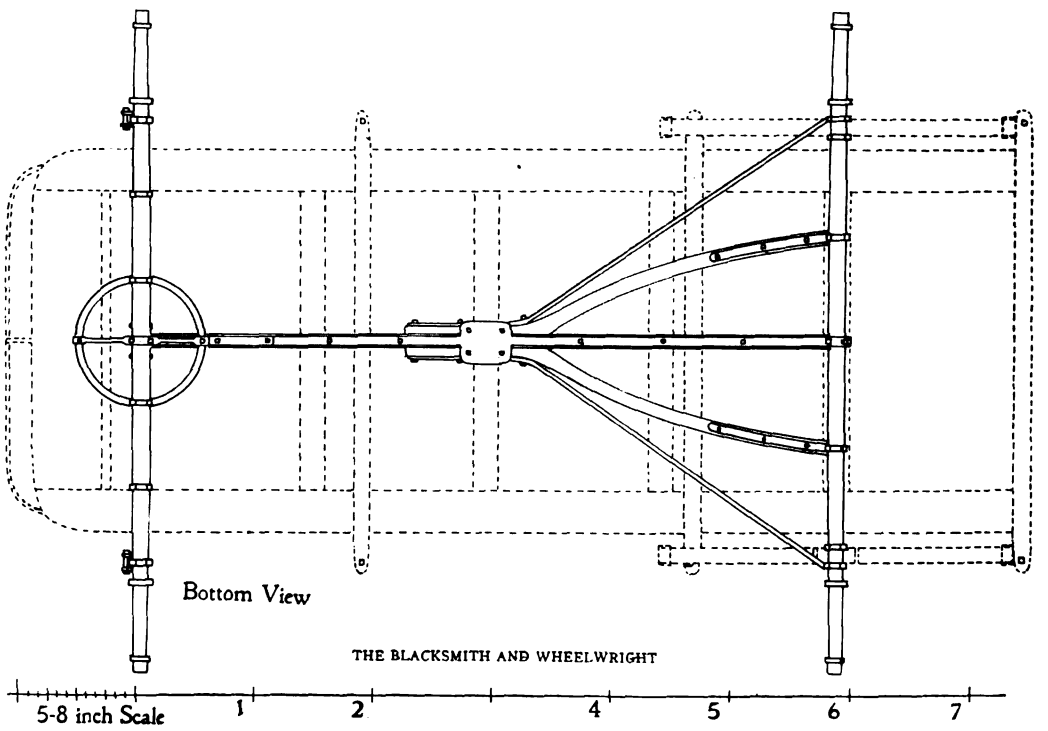


Fig. 4.—Represents the Bottom View of Fig. 3. This Gear has One Reach and Two Side Futchels, also Two Side Stays.

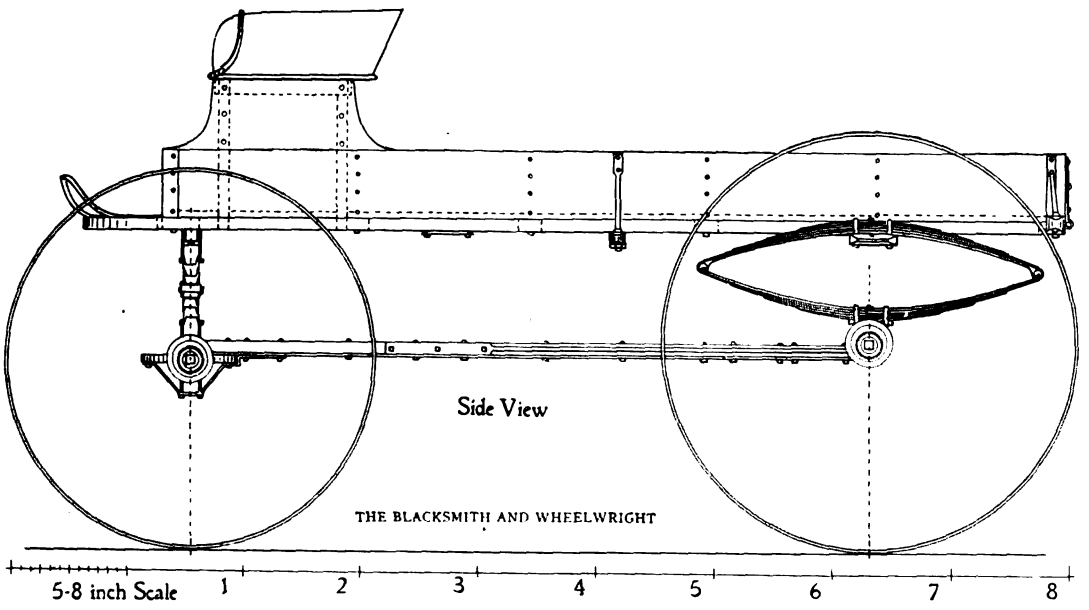


Fig. 5.

All sheaves should have their grooves thoroughly cleaned. This is most important, as an accumulation of dirt in the grooves will cause the chain to rise over the projections and slip, making the blocks practically useless, as well as destroying both chain and sheaves.

Pins should be looked to, and, if much worn or bent, should be discarded and new ones substituted. Worms, brakes, etc., should all be thoroughly cleaned, examined, and, if much worn, renewed.

Head and snatch blocks, sheaves, hooks, etc., should be given a good coat of paint before reassembling the parts. The hoisting chain should receive a good coating of grease. A little grease should also be put on the brake cones of screw-blocks; this will prevent seizing and abrasion of the faces.

In reassembling the parts, care should be taken that the hoisting chain is led over its sheaves free from twist. This is a point which also requires attention when the blocks are in use, as the chain may sometimes become twisted during transit of the blocks from one situation to another, and it is always advisable to look carefully over the chain to make sure it is free from twist before lifting a load. The writer remembers one instance where a serious accident due to neglect of this precaution was averted only by pure good luck. The hoisting chain of a set of two-ton blocks had become twisted. The twist was unnoticed, and the blocks were put to lift a casting, which was well under 30 cwt. When the blocks were hove short the chain gave way, dropping the casting almost on top of men working below. On examination, one link of the chain was found to have sheared clean through both sides, and several neighboring links were found twisted to a large extent.

A twisted chain is extremely dangerous, as the stresses in the chain due to the twisting, particularly when the blocks are hove short, are exceedingly severe, with even a moderate load. This applies to chain blocks of any type in which a snatch block is used.

When the blocks have been completely reassembled they should be slung from a stout beam, and tested, if possible, with their full working load, in both hoisting and lowering, and any necessary adjustments made, before they are returned to service or to the store. In worm-geared blocks the set-screw which takes the thrust of the worm during hoisting will require careful adjustment, as it is chiefly on this that the easy working and good braking in these blocks depend. It should be so adjusted that the brake does not come into action either when lowering without load, or when hoisting, while at the same time the brake should grip sufficiently to hold the blocks when loaded to their full working capacity.

It may be thought by some that pulley blocks are too minor a portion of the plant to merit very serious attention, but when one

considers how much depends, both literally and figuratively, on the pulley block, no amount of attention can be considered too great. The cost of one accident will overbalance the difference between the cost of several poor blocks and several good ones, as well as the cost of many periodic overhauls.

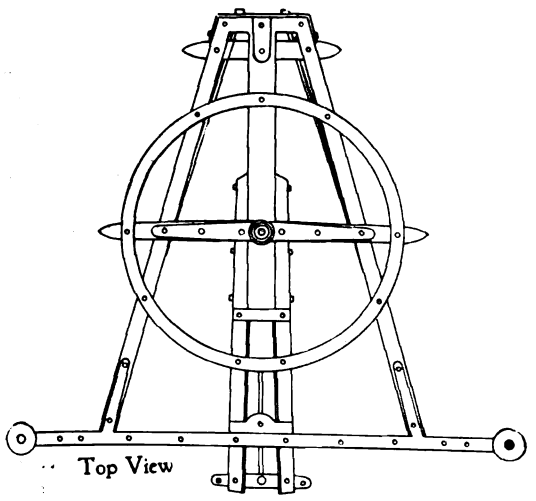


Fig. 6.—This illustrates one of the most practical Gears made, and many are seen on all kinds of Wagons.

In pulley blocks, therefore, it will pay to get the best, and to keep that best in good condition.

IN BEHALF OF THE HORSE.

Good Points That Might Well Be Hung Up In the Shop.

Prepared by the Western Pennsylvania Humane Society:

1. Don't use cold bits in cold weather. Your horse's tongue is tender and his mouth is formed of delicate glands and tissues.

2. Don't clip your horse when the mercury is at the freezing point.

3. Don't fail to blanket your horse when he stands in the cold.

4. Don't forget that nasal catarrh, diphtheria, bronchitis, and other ills often result

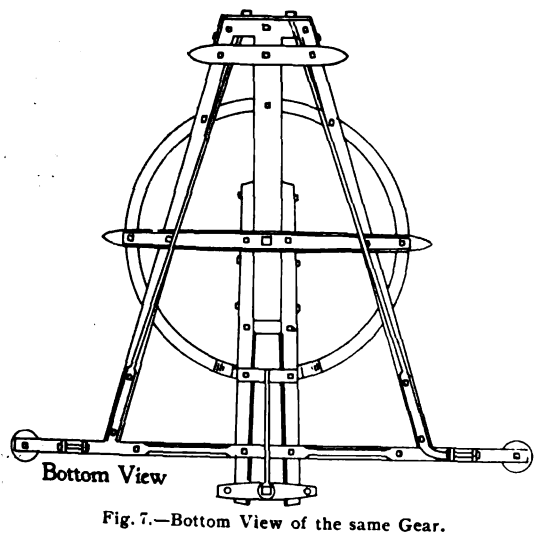


Fig. 7.—Bottom View of the same Gear.

from exposure and the chill which follows suddenly checked perspiration.

5. Don't fail to keep your horse's shoes sharp when the streets are slippery.

6. Don't put your horse's feet in unskilled hands. Good feet are spoiled by bad shoeing.

7. Don't keep your horse in an overheated stable, then stand him for hours in a freezing atmosphere, and wonder why he became paralyzed.

8. Don't fail to water your horse the first thing in the morning, but not with ice water.

9. Don't load your horse too heavily when the streets and roads are blocked with snow.

10. Dont force him to back a heavy load over a snow bank. A shovel, with a little energy, will make it easier for your horse and your conscience.

11. Don't try to convince your horse that he is on skates when his feet strike the slippery asphalt. Go slow, my son.

12. Don't fail to oil your wagon axles. There is a heap of humanity in wagon grease.

13. Don't fail to properly shelter your stock from the cold, and exercise them when the weather is good.

14. Don't fail to have your horse's teeth examined. Of what use is food if your horse can't eat it?

15. Don't dock your horse's tail. He needs it in winter as well as summer, and it was put there by a Master hand.

16. Don't overcheck your horse. Nature's curves are always graceful.

17. Don't forget that there is more profit in coaxing a horse than in kicking him. Try gentleness and see how it grows on you.

18. Don't wait till your horse is dead, or nearly so, before you send for a doctor, or an ambulance.

19. Don't kill your horse trying to get him out of a hole before you send for a derrick.

20. Don't send anonymous complaints. "A Lover of Animals," "Friend to Humanity" and other familiar writers belie their titles when they fail to send their address. Be manly and don't hesitate to appear when you are needed for the successful investigation or prosecution of a case. Don't, by your seeming cowardice, consign your complaint to the waste basket.

The Worn-Out Horse.

A correspondent to a contemporary writes an interesting letter respecting the worn-out horse. The writer says:

Here's a problem that deserves from our humane societies a more serious consideration than is commonly given it. We meet the "old horse" everywhere, on the street, in public and private sale stables, out on the country highway being led or driven to some place where a dollar may be made out of him. The men are legion who traffic in these exhausted and decrepit servants of mankind. With such dealers there is seldom any compassion. They can starve and neglect one of these patient, long-suffering beasts of burden apparently without a sting of conscience.

One way, though not a very good one, is to offer five dollars apiece for them. This is to be imposed upon over and over again unless you are on the spot and have your wits about you. It is even to be fooled sometimes into paying for dead horses—that is, if you are not cleverer than the cunning trader.

A far better way would be to bend every effort toward a law permitting the agents of humane societies to forbid the sale of these worn-out horses at private sale as they now can at public auction. Much of this traffic is carried on in private stables and amid conditions that make it difficult of detection. Many of these old horses are doctored with drugs which temporarily brighten up. The unsuspecting and ignorant buyer finds in a few hours that what he paid fifteen or thirty dollars for isn't worth one.

The best law for meeting this situation about which we know is that in force in Pennsylvania, which makes it "unlawful for any owner to offer for sale, or to sell any horse which, by reason of debility, disease or lameness, or for any other cause, could not be worked in this commonwealth without violating the laws against cruelty to animals." This law has worked splendidly in Pennsylvania, and if every State had one as good a vast deal of this wretched business carried on in these tired-out veterans could be stopped. Meanwhile we plead with all who have some faithful horse whose value has dropped down to less than a hundred dollars, to have him humanely destroyed if they have no longer any use for him. Do not sell him to become the victim of some heartless dealer; that would be to be guilty of an act of treachery and unkindness some day to be answered for before high heaven.

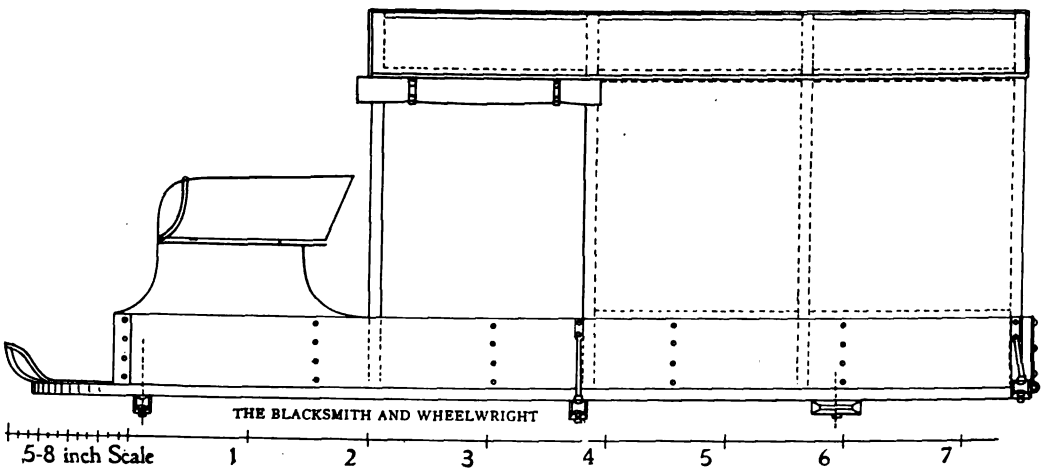


Fig. 8.—Low Top Wagon and Top Made to Shift.

Why She Is a Blacksmith.

Mrs. William Sheffield, of Deshler, O., claims the distinction of being the only practical woman blacksmith and woodworker in the State of Ohio.

Any day in the week passersby can hear the ring of the anvil as the lady at the village smithy smites it with might and main. She works alongside her husband, who is one of the best smiths in the country round, having worked at his trade for years, and she is said to be good as he.

Mrs. Sheffield was married to Mr. Sheffield in 1896, and, being sick and lonely much of the time, she visited her husband in the shop, which adjoined their home.

She helped him at little things just to pass the time away, and her health was so much better that she kept at it and quickly picked up the trade. She seemed to be a natural mechanic, and as well as smithing took up woodworking, turning out wagons and whatever else came into the shop for repair with as much skill as "Bill" Sheffield, known far and wide for his skill.

Being a lover of horses, she took up the branch of horseshoeing, and is now an expert

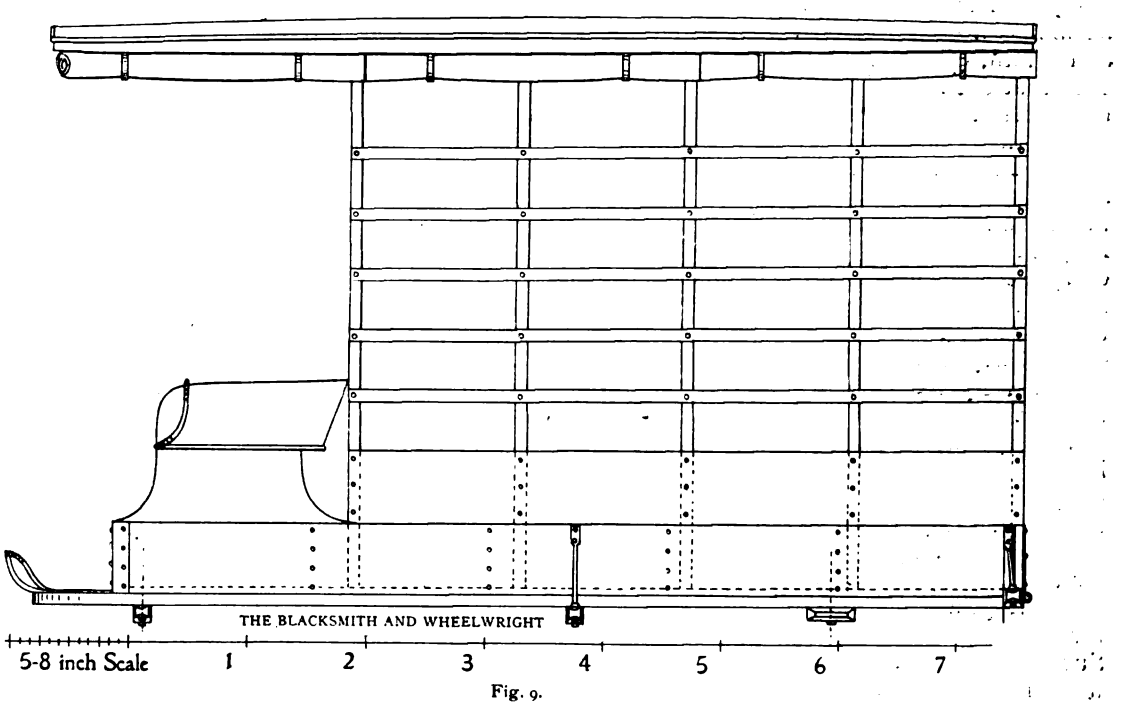


Fig. 9.

at that. She can swing a sledgehammer as well as any man and works daily with her husband at the forge.

When she began work in the shop she was a slight woman, but now, with vigorous exercise, she weighs 175 pounds. Besides working in the shop long hours, she finds time to do her housework.

She is 38 years of age. Mrs. Sheffield believes that 90 per cent. of the ills of woman are due to the lack of healthy exercise. She recommends blacksmithing to those who are weak and suffering from ill health.

STRENGTH OF FORGINGS.

Why They Break and How to Estimate Their Capacity for the Work They Must Do.

BY JAMES F. HOBART, M. E.

The question, "Why do some forgings break, while other forgings do not?" has been asked time after time from the day of Tubal Cain down to the present minute. The answer is always the same: "Because the forgings are not strong enough to carry the load."

A pretty simple question and answer, to be sure; but why are not the forgings strong

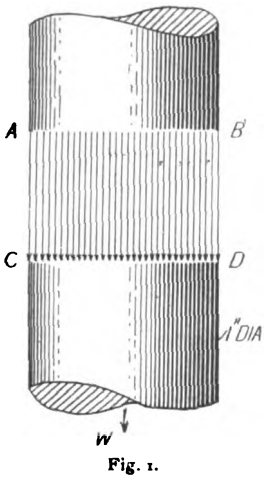


Fig. 1.

enough? In discussing this question, we will drop entirely the matter of occasional poor material, poor or good workmanship, and talk of just one point, viz.: Whether or not there is metal enough in the forging, and if the shape is such as to give the greatest strength that is possible with the amount of metal in the forging.

To come right down to brass tacks, we will try and find out how much a given shape and size of metal is capable of standing up under. In fact, the question comes right down to the design of a forging to stand a certain amount of stress or strain. The smith does a good deal of designing, and he does most of it instinctively and unconsciously. He can't tell why he makes a chain hook of a certain thickness and width, except what he knows by experience that the hook will break or stretch unless he makes it about a certain shape and size.

But these matters will not be guess-work with the smith who will spend a little time in studying the subject. A very little knowledge in this direction will help the smith wonderfully in proportioning forgings which are to carry considerable loads. When there is a straight pull on a forging, it is safe to allow that the metal—if it is soft steel of fair quality—will carry a working stress of 15,000 pounds for each square inch of cross section in the forging.

This means that a square inch rod is safe to handle 15,000 pounds and a rod or bar 1 inch by ½ inch is good for 7,500 pounds, while a rod ½ inch square is good for 3,750 pounds. Consequently, a ½ inch round rod is safe for a load of 2,945 pounds. According to this way of figuring, a rod one inch in diameter is good for 4x2,945=11,780 pounds, nearly six tons. Such a bar of soft steel is shown by Fig. 1, and it will be supposed that the bar is hanging from some support overhead and is loaded at W, with 11,780 pounds. The arrows between AB and CD are supposed to show the direction of the strain, which is vertically downward and is a simple pull along the length of the bar.

The arrows may also be said to represent the fibers of the rod and the load of 11,780 pounds on a one-inch round rod is the same as a fiber stress of 15,000 pounds per square inch. The rod would probably break under a stress of 60,000 pounds to the square inch, which would be 47,120 pounds for the one-inch rod. That load is called the "ultimate" stress which the fibers can carry, and which will probably pull the rod apart. Thus the ultimate stress or load is four times the safe fiber stress, and we say that the rod has a "factor of safety" of four.

Sometimes one factor is used, sometimes another. In certain parts of bridges and machinery, a factor of safety of 10 is used, in other places, four or five may be used, according to whether the steel is to carry an even, dead load or be subjected to heavy shocks and constantly changing loads. The smith must keep this factor of safety in mind when he is calculating how large to make a forging. A forging will not hold unless it has a factor of safety greater than one.

Fig. 1 shows the direction in which tension acts. If the bar were made to act as a post to carry the load, then the fibers would be in compression. A different set of rules are used when calculating the compressive strength of metal articles, but the manner in which the stress affects the metal is exactly the same—straightwise with the bar—except that in a direction opposite to the arrows and tending to force the particles together, instead of pulling them apart.

When a short piece of steel is placed in compression, it will stand more stress without changing shape than it will under tension, but when the length is 10 or more diameters, then the steel will bend under about one-half its tensile breaking or ultimate load. Therefore, all long steel posts must be trussed to prevent their buckling. If not trussed, the round shape must be changed to some other shape, which will carry pressure better than the round bar. This matter may be discussed in some other paper. In this one, it is desired to show how a change of shape will greatly affect the carrying strength of forgings.

Fig. 2 shows a soft steel bar, one inch in diameter, same as shown by Fig. 1, but in Fig. 2 the bar is lying down, resting between two bearings, A and B. In fact, the bar DE is being used as a lever, and the load is applied at W. We know that if sufficient weight is applied to the bar that it will be bent immediately above A. It now is desired to see how the piece goes about bending, and how much stress it requires to do the bending?

When pressure is applied at W, the bar immediately bends or sags downward, no matter how light the load may be. In fact, the bar bends slightly under its own weight. Press down at W with the hand, and the bar is seen to bend slightly downward and return again when the pressure is removed. This movement is called "deflection."

By adding a load and removing it again, the steel will be deflected and return again to its original position. While steel bends and returns, its load is always safe and is said to be "within the elastic limit" of that particular

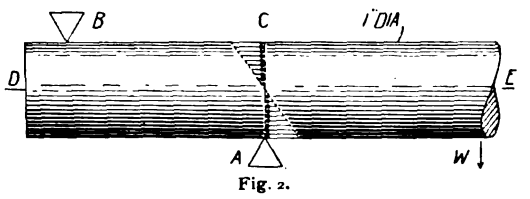


Fig. 2.

grade of steel. But when the load is increased beyond a certain pressure to each square inch of steel section, then the bar will not return quite to its original position, and is said to have "taken a permanent set." The elastic limit has been exceeded, the steel stretched, and this is surely the beginning of its breaking, if the load be increased more and more. Usually the elastic limit of steel is about one-half its ultimate strength, therefore the factor of safety against distortion, or changing shape under stress, is only about one-half what it is against being pulled in two by straight tensile stress.

The bar shown by Fig. 2 is under a much different stress than is the bar in Fig. 1; and Fig. 2 is more like the manner in which forgings fail, therefore we will see what is going on in a piece of soft steel when it is loaded as shown by Fig. 2. The arrows at C show that the steel bar is being stretched on that side while the arrows at A tell that the steel is being compressed or "upset."

The length of the arrows indicates the amount of stress put upon different parts of the bar. It will be seen that the part farthest from the center is under the greatest strain, both tension and compression—the strain decreasing toward the center of the bar where there is neither tension nor compression. The point where there is no stress is called the "neutral axis." In shapes like rods and bars, the axis is in the crosswise center of the bar or rod. Irregular shapes have the neutral axis one side of the center, as will be shown later. A T bar is a good example of the neutral axis being to one side of the center, and by taking advantage of this fact, the smith can oftentimes shape a forging so that it will be stronger than if left round or square.

This matter of shaping forgings to withstand great stress is a hard matter to comprehend, and it is a roundabout road which leads up to it; but have patience and we will get there as soon as possible. Take two bars and place one on top of the other, as in Fig. 3; weld one end together to hold the rods in place, and we have a shape that is stronger than a single bar, but only twice as strong. The rods might be placed side by side and be fully as strong as when placed as in the engraving. Note the arrows? They are no longer than in Fig. 2, just two bars to bend; that's all the difference.

But let two bars be placed one above the other and welded at both ends, as shown by Fig. 4. Here, with the bars one above the other, we have greatly increased strength, and this rule will hold good until the lower bar is about 20 times as long as it is thick. Then it will begin to bend—buckle sidewise and the bars refuse to withstand more load than will buckle the lower bar.

The upper bar never buckles. That bar is in tension and is as straight as a fiddle string. But this very fact tells us where the increase of strength comes from. Instead of one-half the rod being in tension and the other half in compression, we now have a whole rod under tensile stress and another whole rod in compression, and the neutral axis runs right between the rods. Just turn the bars down flatwise, and they will be no stronger than as in Fig. 2.

With the bars as in Fig. 4 it will be noted that the triangle in which the arrows lie is much larger than in either Fig. 2 or Fig. 3. This means that the top and bottom surfaces of the steel are under greater strain than in the other pictures. The bars can stand more stress without bending, just because some of the steel has been placed farther from the neutral axis.

Now we have found the keynote of the whole business of making strong forgings. Place the metal as far from the neutral axis as you can get it, and the forgings will have the greatest possible strength. If we were to weld blocks of steel three or four inches thick between the rods shown in Figs. 3 and 4, then the resulting forging would withstand still greater stress without breaking. It might be necessary to truss the lower rod to make it keep from buckling, but the upper rod would carry a great deal more load than it did when the neutral axis passed through its center.

If we place welded blocks 3 inches thick between the rods and weld them fast, then will the double bar stand 25 times as much as a single bar? It has been made five times as thick, and will its strength—within limits of the tensile strength of the material—be 5x5=25 times as great? But this is not true because the section is not solid, and we must calculate the strength in some other way.

But this is true of a flat bar of steel. Lay it flatwise and it bends quite easily. Place the bar on edge and it will stand much more stress without bending. We determine the strength of a beam or forging by multiplying its breadth by the square of its depth. But if we take a bar ½ in. x 2 in., placed edgewise, then the strength will be ½ x 2 x 2 = 2. And the last noted beam or bar is four times as strong as the ½ in. x 1 in. bar. That is where, as in a previous illustration, the 25 comes from when the block-welded pair of rods, 3 in. apart on centers was found to be stronger than the pair of rods or bars laid side by side.

In designing forgings to have a certain strength by means of their sections—or shapes, it might be called—it is found to be an almost absolute necessity to have some manner of

expressing or considering the strength of the entire section of a forging as being concentrated in one point. Just cut out of cardboard, a circle 1 in. in diameter and balance it on the point of a pin set up vertically. The only place the card circle will balance is when its center is directly over the pin.

Try other shapes. There is always a point where the card will balance. That point is called the "center of gravity" of the section, and no matter which way the bar is laid under strain—that is, which side or corner is uppermost—the neutral axis, shown by D, E, Fig. 2, will always pass through the center of gravity or the balancing point upon the pin, of the paper section.

An easy way of finding the neutral axis will be shown later, and if some way could be found of lumping all the strength of the forging, no matter of what shape, at a certain distance from the part which does not stretch or upset—the neutral axis—then it would be easy

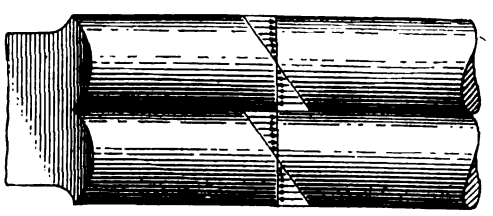


Fig. 3.

indeed to find a section of steel which would give the necessary strength.

It has been found that if we multiply the width of a beam or a forging twice by its depth, or rather by the square of its depth, and multiply the product by the depth of the beam or forging again, that we have a product which corresponds to the entire section of the forging (cut crosswise) condensed to a single point. We can, with this product, consider the entire break surface of the forging as without breadth or width or length, and make all other calculations from this standpoint.

When the breadth of the bar is multiplied by the square of its depth, and then again by its depth and the product divided by 12, the quantity thus found will be what is called "moment of inertia" by engineers. The name doesn't mean very much. Might have called it anything else, as well, but the quantity is very necessary in calculating the strength of forgings.

The divisor, 12, is something which depends upon the shape of the forging and the location of the neutral axis. If the bar be bent as in Fig. 1, then 12 is the correct divisor, but if the bar be strained as in Fig. 3, then the right divisor is 3 for a square bar, but not for a round rod. The manner of finding the proper divisor, as well as for finding the neutral axis, will be described in another paper.

Meanwhile, a brief word as to finding the moment of inertia of a circular forging. The mathematical sharps have boiled down all these rules and the formula of breadth × cube of depth ÷ 12, is a short-cut for finding the moment of inertia of a square or flat bar.

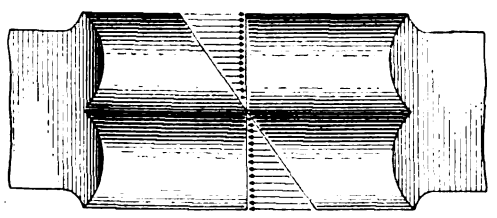


Fig. 4.

For a circular one, they say "multiply the diameter together four times and multiply the product by .0491."

Take the rod shown by Fig 1, for instance. It is 1 in. in diameter and 1. × 1. × 1. × 1. × .0491 = .0491. But were the bar 2 in. in diameter, then its moment of inertia would be 2. × 2. × 2. × 2. × .0491 = .7856. Thus we find that the moment of inertia of a 2 in. bar is 16 times as great as the moment of a 1 in. bar.

Now, let's see how to use the moment of inertia. To find how much stress any forging will stand, take a section crosswise of it and find its moment of inertia as described above for bar and rod shapes. Multiply the moment of inertia by the safe fiber stress which, as stated elsewhere, may be taken as 15,000 pounds per square inch for soft steel. The product thus found is to be divided by the distance of the farthermost fiber from the neutral axis.

But it should be remembered that this is a safe working stress for dead loads—not for live loads—and, while the wagon will stand four times as much when idle, it would not be safe to load as heavily where ruts and hard usage is to be encountered. A 15,000 pound extreme fiber stress has a factor of safety of 4. In fact, it is one-fourth of the breaking load, but, for forgings which must withstand shocks, use a factor of safety of at least 8, and for very heavy work, use a factor of safety of 10.

This would mean that for a wagon axle, a 2 in. bar should only be allowed 1625 ÷ 2 = 812 pounds per wheel, or a load of about a ton a half. But there is another thing to be taken into account. If the rim of the wheel can be brought nearer the collar, the axle will carry more load.

Thus the smith readily sees how much of an advantage it is to use the moment of inertia in calculating the strength of forgings, or any other shapes of wood, brass or steel. The moment of inertia, then, is a number derived from the size and shape of a section under strain, it makes no difference what material the section may be of, and the stresses are all reduced to a certain quantity, figure, or amount, taken at a distance of one inch, or with a leverage of one inch from the breaking point, which is wherever the stress may accumulate.

In the several illustrations, that point is just above the fulcrum over which the rod had a bearing. In practice, it may come in a weak place in the forging, where the section is smaller than anywhere else, or where a hole weakens the forging. It is to determine these points and to take care of them that the smith should make use of the moment of inertia and calculate with exactness the strength of any forging at any particular point. By so doing, he is able to determine the weak points of a forging if there be any, and to correct such weak places by a better distribution of the metal.

The great trouble with the beginner, in calculating breaking strength, is that he cannot comprehend the how and why of "moment of inertia," even after the best possible explanation of it has been made; but, if he will accept the statement of moment of inertia as given above, and use it in his work, then he will gradually comprehend that moment of inertia represents what we may call a certain distance from the neutral axis, and in that distance is condensed the entire size and shape of the section of forging. That description is not technically correct, but it expresses the matter pretty well.

Strength does not count in moment of inertia, which only covers the size and shape of the break in a forging, should it break, or where it would break were the stress great enough. The strength business comes in the 15,000 or some other number of pounds which is multiplied into the moment of inertia. That and the distance of the farthermost fiber is all that is needed with moment of inertia to let the smith calculate the strengh of any piece of material he has to use.

There is a whole lot more to this "breaking strength of material" which it is hoped to place before the smith in another paper, and after that has been done, there is a way of calculating springs of any size and shape which will be worth a whole lot to the smith, sometimes.

SOLDERING METALS.

Some of the Best and the Proper Way to Use Them.

In soft-soldering or tinning metals it is necessary to have the surfaces operated upon free from the metallic oxides that are usually found on them, says a writer in "Machinery." They should be quite bright, or at least chemically clean, for this purpose, and they are usually scraped or polished. When they have been been treated in this way it is found that it is best to apply some sort of flux, which helps the soldering in several ways, and when they are united the adhesion is much better. The bright metal is much more apt to take up fresh oxygen, especially when it is heated in the oxidizing portion of a gas or Bunsen flame, but the flux when applied helps to protect it from fresh oxidation, and some fluxes help to remove oxidation also. Common resin, sal-ammoniac, muriatic or hydrochloric acid, and chloride of zinc, are used for fluxes, as well as others, but the first four are generally used. Zinc chloride—or, as it is sometimes called, muriate of zinc—has many advantages for use in some of the soldering work which machinists and toolmakers have to do, such as soldering pieces of steel, iron, brass, and copper, especially iron and steel. The remarks given herewith do not pretend to deal with the methods used in places where large numbers of pieces and large pieces are tinned, but those adapted for the smaller operations in this line of work.

The most convenient form for using the zinc chloride as a flux for such work is in that of a solution of zinc chloride in alcohol to which a little glycerine is added, which makes it sticky and causes it to adhere more readily to the articles to be soldered. Zinc chloride can be obtained in two forms, one of which is the salt sold by wholesale druggists and chemists, and which comes in bottles in anhydrous crystals and readily dissolves in water and in alcohol, with a caustic solution. The salt is deliquescent, taking up moisture, and should therefore be kept covered up when not in use.

The other form can be prepared by dissolving metallic zinc in hydrochloric or muriatic acid. This form is apt to be corrosive, as it frequently contains free acid, and the salt is therefore preferable. It is obtained by a similar process, but the acid has all been evaporated. The form made direct from acid can be used, however, without any other solvent; but the other form requires a solvent of some sort so that it can be applied to the work. Alcohol possesses two advantages which adapt it to this purpose, as it dissolves the chloride readily, and when applied to the work takes fire if the work is hot enough, thus acting as a temperature indicator and helping to heat the work and keep it hot while the soldering is being done. Various proportions are given for mixing the chloride, alcohol and glycerine, but as alcohol will dissolve the chloride in various proportions, these can be varied to suit individual preferences. One formula gives the proportions as follows:—

Zinc chloride	5 parts.
Alcohol	4 parts.
Glycerine	1 part.

Another formula used successfully is as follows:—

Zinc chloride	2 parts.
Glycerine	3 parts.
Alcohol	5 parts.

These mixtures can be kept for a long time in ordinary bottles with corks, but it is preferable to use glass stoppers when they can be obtained. A brush, cloth, or swab is convenient for applying the solution to the work, but whatever is used should be kept away from the flame on account of the alcohol in the mixture.

Cast-iron pieces can be successfully tinned and soldered with a flux of zinc chloride solution, but great care is necessary in all the work, and the cleaning, fluxing, heating, and soldering must be well and carefully done.

Another "wrinkle" of soldering can be done by the aid of a flux, where the surfaces of the work fit together well, and this is soldering together by means of a piece of tinfoil. The surfaces must be cleaned thoroughly and closely fitted, and then bound together firmly with wire, or held by clamps. The work is then heated by a lamp or a Bunsen burner or in a fire, using plenty of flux as needed, until the foil melts and joins the surfaces of the work together. Care, of course, must be taken to cool it properly and not disturb the parts until the tin has become thoroughly set and crystallized.

In the abuse of the emery wheel, were it the emery wheel alone that suffered it would not be so bad, but generally abuse of the emery wheel carries with it abuse of the work that it is engaged upon.

Whenever you hear a man howling for justice, he usually wants to be the presiding judge.

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MARCH, 1912.

PARTIAL CONTENTS.

TOOL DEVELOPMENT.

The development of tools and machines has always kept pace with the development of man.

For illustration, in early times when primitive man found it necessary to strike a blow harder than he could with his fist he probably picked up a stone, fastened a handle to it in some way, very much as the arm is fastened to the hand, and thus made a rude hammer. It struck a harder blow than he could strike with his fist. A little later, quite likely, he in some way sharpened the stone in the hammer, and then he had the rude hatchet and the axe.

When he wanted to hold something in a stronger grasp than he could do with his fingers, quite likely he split at one end a tough piece of wood and used it for a vise. Thus his hand and arm became the model for almost all of his early tools and as he learned to handle them and control them, the sensitiveness of his hands increased until they could do more delicate things. Then he proceeded to invent the more complicated tools and machines.

There is no better illustration of the enlightenment of a nation than the tools and machines they use. In fact, all the tools and machines in our wonderful system of industry can be traced back to the simple forms suggested by the hand or by the teeth. The saw and file are but adaptations of the teeth as in the early ages they were used for the severing of heavy or tough material.

Poor tools and out of date machines are what keep men poor. There is no higher economy than the purchase of the best tools and the best machines and then keeping them in good order.

DO SOMETHING WORTH WHILE.

Isn't it about time that we had something worth while that is distinctively American? We mean, of course, something outside of the realm of pure commercialism, for in the case of machines and tools, and the things to make money with, we are in the forefront of civilization. But in the things that really make a nation great, we have done little and are doing little.

We go to Italy and Greece for the works of their old master painters and sculptors; to Italy and Germany for our music; to some foreign country for our fashions, for our architecture, for our fine cooking. And, let us be fair about it, there is no reason why we shouldn't; we have nothing purely American that is anywhere near as good.

So we want to suggest to those who have made large fortunes, or to those who have inherited large fortunes, and who are living in idleness with the sole purpose of getting all there is out of life, that they may well make an effort to do something in art, music, or literature that will give them and this country distinction. The time is ripe for it.

There are better things than putting up high buildings, millionaire making, taxing jaded stomachs for something good to eat, or whipping up bored senses for something unique to enjoy. Let the rich who now spend their winters at the Palm beaches and their summers at the Newports, see if they can't do something really worth while.

It is high time we had an American like, say, a Linnæus of plants, a Huber, or better yet, a Materlinck of bees, a Euclid of lines, a Michelangelo of art, a Plato of philosophy, a Swedenborg of mysticism, a Shakespeare of poetry, a Goethe of writing.

This country has now grown to manhood. It is time we did something really worth full manhood.

HAVE A GARDEN.

Speaking about the high cost of living, one way to solve the question is for people to have more vegetable gardens. This is especially applicable to blacksmiths and wheelwrights. Of course they have no time for farming, but there is no reason why they should not have vegetable gardens and have them well cultivated.

The Chief of the Bureau of Chemistry of the Department of Agriculture, Dr. Wiley, maintains that no man or woman should live in a place where it is impossible to possess an individual plot of ground. He says this is the natural and inalienable right of every human being. He is probably right and those who raise their own vegetables in this garden can be pretty independent of the market-man if they choose.

Dr. Wiley goes somewhat further than this, and says he should like to see ordinances passed in all the great cities forbidding the location of manufacturing plants within their borders. He believes that such manufacturing firms should be compelled to move into the country where their working-men and working-women will follow them.

The idea is a good one. If manufacturers only realized it they would themselves profit by such a step. Rents are far lower in the country. Power is cheaper and more plentiful and in the additional space there is both health and comfort, and there should likewise be more content.

FAVOR TO ONE CLASS INJURY TO ANOTHER.

Some of the attempts now being made to "reduce the high cost of living" may be well meant, but they are not judicious. Indeed, we question whether or not they do not do more harm than good.

To confer a special favor upon one class without injuring some other class as much or more, is decidedly difficult. When individuals or classes go into semi-charitable enterprises, they restrict private business and thus create as much want and destitution as they cure.

If benevolent individuals—mayors of cities, as in the case of the mayor of Indianapolis, Ind., or the New York City clergyman—desire to help poor people, let them go to some reputable grocery and buy food products for them. The retailer, who is trying to earn an honest living by hard work, and who pays rent, clerk hire, and taxes, who suffers from bad bills, and who is obliged to undergo the other expenses incident to the retail business, deserves some consideration.

The retail grocery trade is not like most other kinds of business; it does not require a large capital; there is no restriction or bar preventing any one to go into it, as is the case with the professions. So the field is open to all. Yet there are more failures in the retail food product trade than in any other line of business. Competition of a business-like character is usually sharp enough without the competition of individuals who pay no rent and no clerks, and who do not want nor expect to make a living profit.

The moment some individual or association—no matter how good the intention—invades private enterprise and attempts to perform some public service without making any profits, then the public interest or public welfare is injured and more harm than good is done.

When the government puts convicts at work at some trade whereby the product comes in competition with private enterprise, business men and working men make a protest, and one that has been heeded. Prison made goods are not popular because such competition with self-supporting industry is not considered fair. But according to what seems a well-defined feeling, the trade in food products may be subjected to the most unfair kind of competition and no one has a right to make a protest.

There is more than one easily seen reason why the cost of living as it relates to food products is high. First, the increase in the production has not kept pace with the increase in population. Second, consumers require far different treatment than was accorded them a few years ago. Today many kinds of food products are put up in boxes that cost nearly as much as their contents and many require the immediate delivery by wagon of a five-cent cabbage or a peck of potatoes. Milk must be bottled, iced, and in most cases in the large cities delivered at a certain hour by a dumb-waiter to the fifth or sixth floor of a large apartment house. All this is expensive. Not so very long ago the purchaser of sugar took it home in a bucket or a brown paper parcel, and the same simplicity in purchase and sale characterized the entire retail trade. Today everything must be delivered—in the large cities, at all events—and in the shortest possible time, and as for the wrappings and trappings

of much of the food products, verily, "Solomon in all his glory was not arrayed like one of these."

Of course, the matter assumes a somewhat different aspect when the retail merchants of any locality catch the popular co-operation fever and form a combination to keep up prices. But even under such condition there is nothing to hinder any one from going into the retail business, selling at a fair price, reaping the reward of his fair dealing, and incidentally "smashing the local trust."

It is not assumed that the foregoing is all that may be said upon this much mooted "high cost of living" question, but a side of it has been referred to which is important and one which is not often considered.

WHY NOT?

Very frequently some newspaper or magazine mentions the fact with considerable prominence that a mayor of a city or a congressman, or a United States senator, or some other man of distinction, was "formerly a blacksmith."

But why make so much fuss about it? Why should he not have been "formerly a blacksmith?" Or what more natural thing than that he should have changed his vocation to one that pays better or requires less hard work, or that gives him greater public prominence?

If it were a former jeweler, or a dry goods dealer, or a barber, or a tailor, or a man who had followed some other such calling, that had become a statesman and had attained special prominence, the matter might be worth special mention.

The blacksmith business is a substantial one. It does not attract unsubstantial men. It does not attract men who want to get a living or who want to get rich some other way than by working for it honestly. It has no charms for those who are afraid to get their hands soiled or who shun getting a decent living in a decent way.

Now if these qualities of mind and heart do not inspire the respect of the public, and with it a tendency to give the men having them preference when it comes to holding public office, then something is wrong with the public.

The point is that while it may and should be unusual for men to attain public distinction who start out in life with the idea of choosing some calling that does not require much work, it should not be the cause of remark when a blacksmith is chosen to fill some important office or public trust.

If we had a few more blacksmiths in such positions the public service would be improved, and, as far as we know, in every case where a blacksmith has taken office, the public service has been improved.

TWO ABSURDITIES.

Certain things need a little wholesome common sense behind them, and here are one or two such, just as they come to mind:

An exchange uses up two pages of good clean white paper to tell its readers how to invest their money and how not to invest it. But those who have money to invest do not need any special consideration. It is those who have no money to invest and who are unable to get any to invest who most need advice. No one yet ever saw a man with money to invest who did not have chances enough to invest it wisely and safely, and if he was wise enough to get it, he is likely to be wise enough to invest it safely.

It is stated that a bill is before Congress having for its object the investigation of the question of old age pensions. This is a most absurd matter to investigate. A far better one would be, "Why should old age pensions be needed?" If industrial conditions were as they should be, no industrious person would need an old age pension, and no one who has not been industrious should have one.

USE SEPARATE SHEETS, PLEASE.

May we again ask our readers to keep letters relating to their subscriptions or to other business and letters that are for the editor on separate sheets of paper?

We are led to repeat this request owing to the fact that we have come across contributions that were filed with letters relating to subscriptions and consequently were not seen by the editor until too late to be of use.

But our chief regret is that our friends must have thought their articles were not considered fit for publication, when the reverse was true. One of these writers remarked: "If this does not go to the waste basket, I may come again." Now, we want to say that contributions from our readers do not go to the waste basket. They are most readable and instructive.

When we get letters in relation to subscriptions or remittances, they must first go to the subscription clerk. This is necessary in order to secure as prompt attention as possible. But when something follows on the same sheet that properly belongs to the editorial department, it often is filed away, and thus the editor never sees it.

PRICE AND PROFIT.

The blacksmith business does not suffer so much from too much hard work as from too little profit.

Of course the work is not easy, nor is anything else easy that requires close and sustained application. Indeed, some of it is extremely laborious and always will be, no matter how much machinery and mechanical power are employed in doing it. Horseshoeing, for illustration, is about the most tiresome work that can be done.

But we sometimes think that as the work has grown lighter so have the profits. In most cases this is due to competition. In the olden days, when the blacksmith shops were often isolated and when almost everyone fixed a price upon that which he owned and wanted to sell, there was very little cutting prices. But today, the situation is different.

We are inclined to think that about the only way a blacksmith can now secure fair prices and profits is by having an understanding with others in the same locality. This may not be altogether satisfactory, but as a noted statesman once said, "It is a condition and not a theory that confronts us." So we are glad to see these trade organizations spring up and thrive.

Let competition be confined only to superior workmanship. If this be the case, work will go to those who most deserve it.

NEW OFFICES.

The office of The Blacksmith and Wheelwright, which has for many years been located at 27 Park Place, has been moved to 71-73 Murray street. The new offices are more convenient and commodious than the old. Here our friends will now find us when they come to the city, and we can assure them a cordial welcome.

Where the Neverslip Originated.

Within a few hundred yards of Boston's financial centre is located one of the busiest blacksmith shops in all New England. The site is the original home of the Neverslip Shoe, where they were first manufactured. Messrs. Muldoon & O'Brien opened this shop about twenty years ago and have continued successfully ever since.

They employ ten men, have five forges and shoe about forty-five to fifty horses every day. Their high-water mark reached one hundred and sixty-eight jobs in one day. Their equipment is modern, thus facilitating their systematic methods.

A Butter Substitute.

Just now when butter is pretty high priced for ordinary mortals it is well enough to know that vegetable butter of cocoanut oil, eggs and a small percentage of cream is being manufactured in Bohemia where it sells for less than half the price of creamery butter. The claim is made that this butter has an agreeable flavor, that it is not injurious to health, and is excellent for cooking purposes. It is prepared in two forms, soft, and in firm cakes. The principal ingredients are cocoanut oil and the yolks of eggs. It sells at 14 cents a pound.

It never pays to haggle—even if you make a cent by it once in a while. Straight business is the rule nowadays. Don't be a haggling buyer or seller.

If you try to get the best of people, they will try to get the best of you, and what is more, some day they will do it.

CORRESPONDENCE

The Apprentice of Half Century Ago.

From Walter Jack, Ohio.—"Don't waste a single bit of iron," my old master used to thunder at me. "Iron costs money and it is mighty hard to get."

"This was nearly a half century ago when I took my first lessons in the art of Vulcan," says William Cozad, blacksmith, of Pierpont, Ohio. "Then we had to serve three years as apprentices. What would the young man or boy of today think of working as hard as we did, devoting his attention to business as strictly as we did for three years? Before many months he would chafe under the collar, and if he could borrow some money he would equip a shop of his own, or he would throw up the business as a bad job, and look for something easier and more quickly acquired.

"The apprentice today has a snap. When my boss served nearly a century ago in England it was seven years, and the treatment he received was such as to make him a hard taskmaster when it came to dealing with those who sought to learn the trade from him.

"I learned my trade in a little country shop. Horseshoeing was our specialty. I was seventeen years of age when I was well started in my apprenticeship. The masters of the craft all endeavored to keep even the simpler practices of the work secret from learners. Day after day I have spent going over old vehicles, cutting off the burrs, removing all the old iron and carefully sorting it and putting it in boxes as though it were silver plate. It usually took two days to dismantle an old wagon or carriage, and the iron was used in another vehicle after being adapted to the new needs.

"I well remember my first job about the shop. I had looked upon the trade as a very desirable one to enter, and I was a large, strapping youth and had no fear of Taurus or Centaur. My first assignment was to remove the shoes from a stallion. After considerable flourish and entertainment for the hangers on, I came off victor. The shoe-pulling job was mine the larger part of my apprenticeship, and before I had served my three years, I was given over the job of shoeing a horse, I think this same stallion, but not until after he had shelved my boss for a week or so.

"I was kept from the fire until after a year of service. My duties were then to straighten out misshapen shoes, and a little later to make horse shoe nails. We used the backs of scythes for this work. We broke off the sharp edge and after heating, drawing, and pounding, the apprentice would evolve something in the form of a nail. It required considerable practice on the part of the youth, accompanied by liberal cusses and kicks from the boss. After we got so we could strike the hammer twice in about the same place on a hot iron, we were then assigned the shaping of horseshoes from iron bars.

"These bars were from Norway iron and came in square form, about as thick as your little finger, and eight or ten feet long. Heating, pounding, drawing, and twisting was the regular routine of making shoes from these bars. It took a man all day to shoe a team of horses, if he made the shoes and nails. We received $4 for such a job, which was pretty good pay for the work, considering what men received engaged in other lines of trade. A man on a farm was well paid if he received fifty cents a day. We received as high as $35 for ironing a buggy, and I have done as much as iron two in one week. I was pretty popular with the girls then, and spent money on them like the proverbial drunken sailor.

"The third year we were allowed the use of tools, or were allowed space in the shop for tools which we bought. The first year in western Pennsylvania, where I worked, we were given $50, the second $75, and the third $150. A meagre set of tools would cost upward of $100, and for this figure today we can buy twice the amount of equipment. Bellows,

anvil, and drill cost more than twice what they do today, and there was but little left for other necessities. We frequently made such things as hammers, pincers, and such equipment.

"The apprentice had to work some in those days. Jobs were frequently stacked ahead of the shop for weeks and months. We had to work until we would drop down dead tired, sleep a while, then get up and go at it. We were the skilled artisans of those days, and each article that entered into every-day life had to pass through our hands. Bosses were big, burly fellows, just the kind that would fight at the drop of a hat, and I had one that would scrap if he anticipated such thing would happen. My boss led me a merry chase, never less than twelve hours a day, and from that to sixteen or seventeen hours of good hard labor. He was at times overbearing, but I stuck it out, knowing no better instruction could be found elsewhere. At the close of my third year I was looked upon by the community as competent as my boss. I had my equipment, and one day I 'crossed swords' with him, and from that time dates my entrance in business independently, and have worked in a number of States since then.

"Our business was the trade of a half century ago. Almost every cross roads had its shop. About every shop employed two men and an apprentice, and many shops employed more. Business was local then. In those times great factories and nation-wide means of distribution had not been worked out. The interests of the community centered around the blacksmith, the carriage maker, and shoemaker, together with the local storekeeper.

"In those days people were critical about the work done. An inexperienced bumpkin could not collect a kit of tools and open up business. He would have to show that he had the experience and could deliver the goods, or he would be ridden out of town.

"Apparently those were the palmy days for the craft. Today the boys want to shuffle off the word 'blacksmith' and assume the title of machinist. Modern machinery and modern methods of marketing have reduced the duties which devolve on the country smith, but there is just as much room today for good quality work as then. The blacksmith who takes pride in his work, who is glad that he is engaged in the business, and who gives the most for a fair price, is the man who is commanding the business and is outdistancing competitors.

"The business is just as honorable as it was a half century ago. There are great possibilities in it for the man who reads and keeps up-to-date. I read The Blacksmith and Wheelwright when I was young in the business and owe a whole lot to it.

"Take pride in your business, boys, keep up-to-date, deliver the goods, and the business is yours."

Scientific Working of Tool Steel.

From D. Foster Hall, Massachusetts.—Forty or fifty years ago the smith thought that a piece of good tool steel was all right for making a knife or razor blade, or to point a crowbar or pickaxe, but today no one conversant with steel and its uses will use any grade of steel except that which is adapted to the article for which it is intended.

For making tool steel Swedish iron is used, the price of which varies from $32 to $150 per ton. Hence by using the best grades of iron, the finest tool steel can be made, and the best is none too good for tool making. Poor iron contains a large percentage of phosphorus and sulphur. It can be readily detected by analysis of the different grades of steel. Self-hardening steel is a special for deep cuts at high speed. This steel requires no water for hardening. In the steel market is found cast steel containing as high as 1½ per cent. carbon. This steel is used for turning and planer tools, drills, etc. This grade of steel can be used only by skilled workmen, as overheating spoils it.

A high carbon steel containing 1¼ per cent. carbon is used for slotting tools and milling machine cutters. This steel cannot be welded.

A steel for making chisels, containing 1 per cent. carbon, can also be used for granite drills, etc. With care this steel can be welded.

A steel containing ⅞ per cent. of carbon is used for blacksmiths' tools. The smith who would choose 1¼ carbon steel for any tools subject to shock or blow as chisels, granite drills, or any smith's tools, would be up against it in a double sense. The heating of tool steel is of as much importance in forging as well as in hardening. The temperature for forging and hardening carbon steel varies from 1440 degrees F., cherry red, for 1½ per cent. carbon to 1710 degrees F. for ¾ per cent. carbon, which would be a full, bright red.

Tool steel should not be forged at a lower heat than about 1020 degrees F. (brown, red heat), as this produces forging strains, and should always be annealed before hardening. If a furnace is used for heating, a pyrometer should be used, and the heat should never be allowed to rise above a standard point. Tool steel should not be re-heated more than is necessary, as re-heating decarbonizes its surface, causing uneven hardening. Tool steel containing 1 per cent. to 1½ per cent. carbon should be re-heated after forging, and should be allowed to cool slowly. In forging tool steel, always forge square first, then hammer the corners to a round. If these directions are not followed, the steel is liable to crack in hardening, especially with high speed steel. Many a time the steel maker is blamed for unsound steel when the fault is in the forging and hardening. One thing of importance to which the smith does not given even a thought is in taking hold of a piece of steel with tongs that are cold or damp. The tongs should be heated or surface cracks are the result.

Many good jobs of tool making are spoiled by not allowing enough stock in the rough. The outside surface of tool steel is in a decarbonized state and will not harden, so in all cases allow from 1/16 of an inch to 3 inch diameter, ¼ on 3 to 4 inch diameter, and ⅜ on 8 inch diameter. This will insure safety from soft spots in the steel when hardening.

It is a bad practice to cut steel with a chisel, as this causes strains which will show in the forging or hardening. A power hack saw soon pays for itself, but, for accurate cutting, nothing excels the circular saw, which not only cuts true but rapid. A 2 inch bar can be cut through in 8 or 10 minutes.

When tool steel is over-heated, it becomes crystallized and weak, so that it would not resist 250 tons per square inch, as it would in case it had been properly heat treated and had a perfect grain.

Right here is where the scleroscope comes in for its fine work. If tool steel having carbon enough to be suitable for milling cutters were capable of hardening to 105 degrees F., scleroscope test, one would know at once that the steel had been overheated if it showed a hardness of only 90 degrees.

Points on Soldering.

From M. J. L., New York.—Having added a soldering outfit to my shop, I send the following recipes:

Solder for copper: Melt together and thoroughly mix brass, 9 parts; zinc, 1½ parts; tin, 1½ parts.

Coppersmith's solder: Lead, 2½ parts; tin, 5 parts. If the copper is thick, heat by a naked fire; if thin, use a tinned copper tool. The flux is muriate or chloride of zinc or resin. This solder will also do for iron, cast-iron or steel.

All kinds of brass may be soldered with bath metal solder (79 copper, 21 zinc) or soft spelter, using borax as a flux. A good plan is to spread on a little paste of this, then heating till the tin melts and runs and thus coat the surface. Work previously tinned in this way can be joined neatly and easily.

To solder sheet brass: For soldering with a copper, use a solder made of 2 parts tin, 1 part lead, by weight; melt, mix, and pour in small bars. For flux, dissolve zinc in muriatic acid until no more will dissolve; add about one-tenth its bulk of sal ammoniac, and dilute with quarter its bulk of water. Wet the surfaces to be soldered with this solution, using a piece of wood or copper wire for the purpose. Then by rubbing the surface with the tinned point of the copper, a coating of tin will be imparted. Put both surfaces thus prepared together and heat by applying the copper and a little solder to the outside of the seam. The copper should be well tinned on the point, which may be done by heating the copper hot enough to freely melt pure tin. Rub a piece of sal ammoniac on a brick, then rub the copper on the brick with tin or solder in contact with the point. The tinning of the copper is essential for soldering.

Mechanical Farmers.

From M. J. L., New York.—Having read some very interesting articles from blacksmiths who are subscribers to your journal, will tell briefly what some of the farmers in this vicinity are doing. A brother-in-law of mine has an automobile and several hundred dollars in implements and machinery. He uses a portable 6 h.p. gasoline engine, has a buzz saw, ensilage cutters, threshing machine and feed mill. A neighbor has a 6 h.p. Waterloo engine with which he runs a cream separator, churn, drag and buzz saw, feed mill and grindstone. A third neighbor, who is very industrious and ingenious, has a home-made forge and small gasoline engine and runs an open cylinder for threshing, also runs small blacksmith tools, etc. As for myself, I have a small steam engine with which I cut limb wood with a buzz saw, run a bone-cutter feed-mill, grindstone, emery wheels for gumming saws and a sausage cutter. Have also a fairly equipped carpenter and blacksmith shop, and would very much dislike to part with these valuable farm extras.

Tools for Making Eyebolts.

From Reader, Ohio.—I notice in The Blacksmith and Wheelwright an article on making eyebolts. The idea is a good one, and a description of a set of tools for making eyebolts may not be amiss, but may be of benefit to some of your readers.

Fig. 1 of the accompanying sketches has

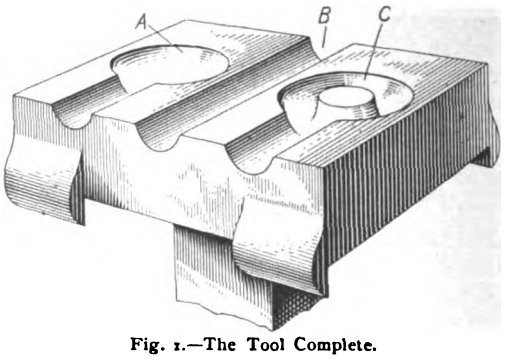


Fig. 1.—The Tool Complete.

three impressions, which makes it a rather long tool for the anvil, but by making the tool wide enough to bend a lip on each side of the anvil the danger of the shank breaking off is greatly lessened.

Impression A in Fig. 1, with the top tool, which is of the style shown in Fig. 2, will form a ball a little less than the outside diam-

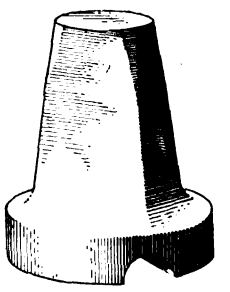


Fig. 2.—The Top Tool.

eter of the eye. To make this impression, forge a ball a little less than the largest diameter of the eye, with a shank a little larger than the finished size of the bolt; sink it half in the bottom and half in the top tool; finish the ball around, and using a little water the tools will finish up nicely and smooth, B is a swage, the size which the bolt must be when

Fig. 3.—The First Step. The Iron Scarfed and Swaged.

finished. Two top swages will be necessary for this, a narrow one, with the edges pretty well rounded, so that it will not cut into the iron when swaging for the eye, and an ordinary swage for finishing the bolt. C can be made by making a good eyebolt a little full of the size that is wanted, and sinking half into the top and half into the bottom, as in A,

the top tool for this impression being about the same as for A. Two pins or mandrels will be needed; one to bend the eye on, and another to finish the eye, being large enough to leave the hole the right size after the eye is cold.

To make an eyebolt take iron a little larger than the bolt is needed to finish, swage enough to form the eye as shown in Fig. 3, scarf as

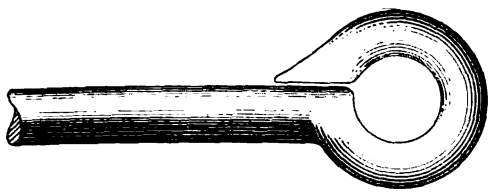


Fig. 4.—The Pin Bent to Form the Eye.

shown by the dotted lines, and bend around the pin, when it will look as shown in Fig. 4. Take a welding heat and weld up in A, Fig. 1. By making the scarf short, there is no need of using a hand hammer to get down the scarf, as the swage part in the top and bottom tools will cover it, and the tendency is to press the extra stock into the eye, thereby helping to fill up and make a good solid eye. Drive a pin

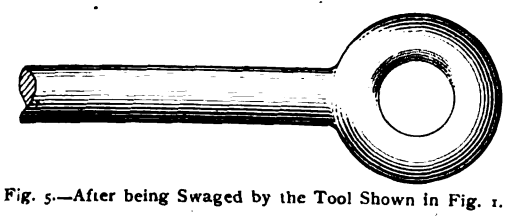


Fig. 5.—After being Swaged by the Tool Shown in Fig. 1.

through the hole and give three or four blows in C, Fig. 1, which will give the eye a nice, finished appearance. Cut the bolt off to length, and swage down to size in B, Fig. 1. Size up the hole and you have an eyebolt as shown in Fig. 5.

Once in a while somebody comes along that wants an eyebolt made to drive. As a general thing, the ordinary eye will open up in the

Fig. 6.—To Make an Eye that will Stand Swaging.

weld, and besides being a poor job, it is an eyesore to the man that made it and to the man that used it. To make an eye that will stand driving, take iron of the size wanted for the bolt. Cut in as shown by the dotted lines in Fig. 6; bend over and weld as shown in Fig. 7.

Bend the eye, keeping the heavy piece inside, as shown in Fig. 8. Weld up in the ordinary eye, using a fuller to get down in the

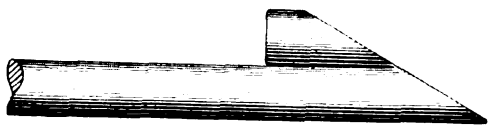


Fig. 7.—The Iron Bent Over and Swaged.

neck and give it a nice shape. Next take a narrow chisel and cut down through the piece inside the eye as shown by the dotted line in Fig. 8. Throw them on each side of the eye, working them thin with a necking fuller. Take a light heat and weld up, using the necking fuller to get inside the eye. Finish up with a necking swage, and you have an eye that will stand almost any amount of driving. The two pieces that have been thrown on

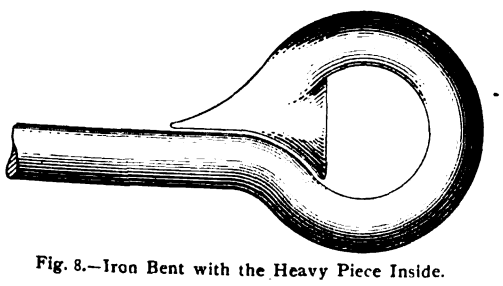


Fig. 8.—Iron Bent with the Heavy Piece Inside.

each side of the eye prevents it from spreading and at the same time fill up the eye good and solid.

The cost of making the tools is quite small, and after once made if you have many bolts to make of the same size, the time and expense saved more than pays for the cost. With a little practice a man can make ten or fifteen eyebolts an hour.

Just Buckeyes!

From James F. Hobart, Ohio.—It was my privilege, recently, to visit a shop which displayed conspicuously over the door, a sign:

"Horseshoeing and Repairing."

As I approached the shop, I saw a man studying the sign, and as I entered, he pushed in ahead and accosted the smith thus:

"Say, when are you going to repair a horse? I want to see you do it."

"What are you trying to give us," asked the smith, staring in astonishment at the man.

"Giving you straight goods. I want to see you 'repair a horse.' Your sign says 'Horseshoeing and Repairing,' and I want to see you do it. Say, how can you repair a horse, anyway?"

"Oh, get out of here," exclaimed the smith, as he shied an old horseshoe at the would-be wit. "Say, don't you know, you chump, that my partner is a veterinary surgeon?"

The shop of Mr. Abbott, in Barberton, contains several little kinks and labor-saving ideas which many other smiths could use to advantage. At the same time of my visit, eight horses were tied to the wall, hitching chains being made fast to the wall every four feet apart, the entire length of the shop. On a pinch, by crowding a little, thirteen or fourteen horses could be accommodated easily as long as no ugly ones are in the bunch. No horses are admitted by the front door which, by the way, is an easy sliding one, parted in the middle and sliding either way.

All the horses are led in by the back door and tied as far to the front of the shop as possible. As fast as a horse is finished, it is led out of the front door and when more horses come in, the entire bunch are moved toward the front of the shop.

Two men run the shop. Mr. Abbott does the fitting, an employee doing the driving. During the last half of January, the streets were covered with very smooth and thin ice, necessitating long and sharp calks and their frequent renewal and sharpening.

"I have shod several horses twice this week," remarked Mr. Abbott, "and I don't see," he continued, "why some people like to work so hard. Just look at these shoes," he continued, as he picked up the foot of a large horse. "The smith who shod this horse last must like to work hard, for he has put on the heaviest shoes that can be bought. Now, selling shoes by the pound is one thing, and of course there's a profit there, but the extra labor of fitting those shoes is more than the profit on the extra shoe-weight."

"What weight of shoe do you recommend," was asked of Mr. Abbott, who replied:

"A shoe should be suitable to the weight of the horse, so the shoe won't spring. Otherwise, all that is needed is a shoe heavy enough to keep the toe and heel calks in place."

The forge in this shop is right in the extreme end of the room, close to the front door. The vise is attached to the corner of the forge, and a calk-welding stand is behind the man as he stands at the fire, and the stand is close beside the anvil. A stock of over 1,000 shoes is carried on short rods driven into the overhead ceiling joists. Above these joists, I noticed an old-fashioned bellows, out of commission, and laid up for good. In place at the forge, was an improved rotary hand blower. It was not in use, however, for in the basement of the shop there was a little electric motor, fed by current from the street railway circuit, 550 volts, and it took care of the blower to beat the Dutch.

The starting rheostat was on the wall, close to the forge, and a turn of the switch was all that was necessary to start the blower in the morning and again at noon. The blower never was stopped except at noon and at night. It was cheap, too. Current cost one dollar a month, flat rate, and while one shoe was heating, another was being shaped up on the anvil. A low fire was carried, and at times I noticed four shoes in it at the same time.

And there was need of three or four irons in the fire, in that shop, for, as stated, Mr. Abbott shod several horses twice during the last week in January, and on two days of that week, the two men in the shop put on 104 shoes one day and 108 shoes another day. Some work that, for two men?

Hoof trimming was done simply and easily. The knife was used to trim around the frog and to level up the soft portion of the hoof inside the outer shell. Then a pair of very sharp pincers was used to trim off the outside of the hoof, after which the fitting was finished with the rasp which brought the hoof to a level surface very quickly.

"No," said one of the men, "I never use the old buttress for paring hoofs. I found one, the other day, upstairs among a lot of junk. I ground it up sharp and tried it once, but the second cut I made, it slipped off the hoof and cut a long slit in my apron and about two inches of my pants. Gee, it just missed my leg. No, that's the first time I ever used one of those things for paring a hoof, and it will be the last time, too. The knife and rasp are good enough for me!"

The shoes are fitted black hot and barely sear the hoof. In fact, the eye is depended upon more than the hot shoe, to obtain a bearing upon the hoof. The rasp is used again a little when needed, but the first paring is so perfect and the shoes are forged so true that little has to be done to the hoof after the first paring.

For Putting on Heavy Wheel Rims.

From Cyrus Everitt, Illinois.—Most all wood workmen have to put on heavy rims on wagon wheels, and it is quite a job to do it successfully. Of course, like anything else, there are a great many ways to do it. Where

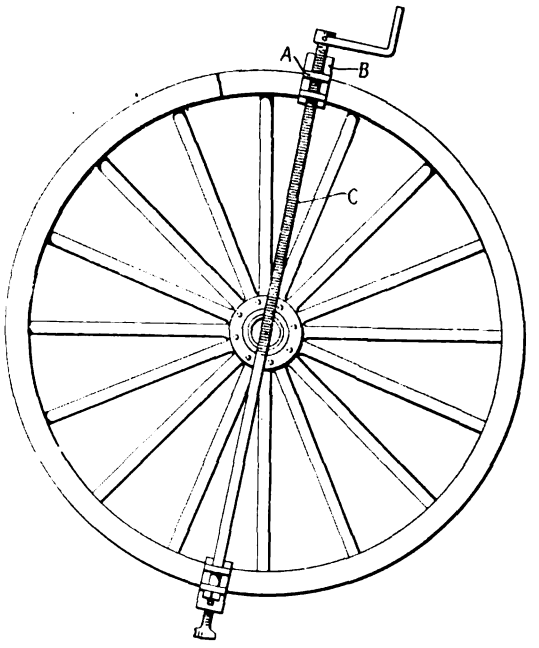


Fig. 1.

I learned my trade I had to do both the iron and wood work, and my boss had never put on many of those heavy rims and consequently we spoiled several spokes. Finally, he inquired of a traveling salesman if there were any machine manufactured that would spread the half rims, and he said there was, and sold the boss one. It did the business, but it had so many joints that it was unhandy. Finally, he wore it so badly that we had to either remake it or make something else, and I got to thinking about it and made up my mind that I could beat it. Consequently, I did, and here it is as best I can give it.

The clamps are attached to the ends of the half rim and then the operator can spread or draw together as he pleases. If one of the pieces of the rim does not come down on the

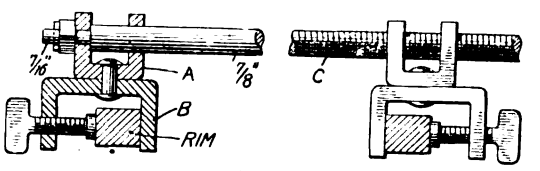


Fig. 2.

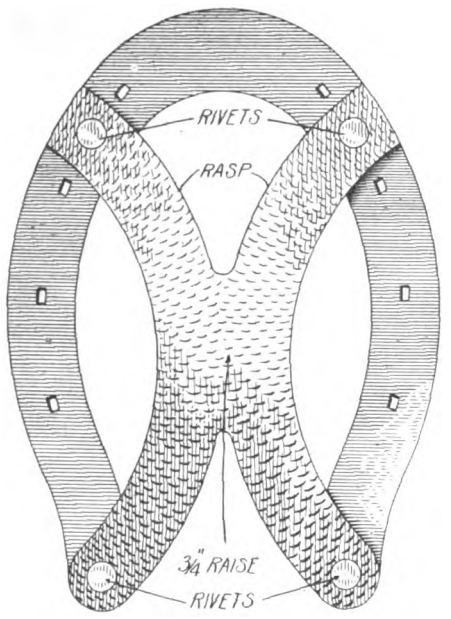
spoke shoulder as it should, the operator can put one clamp on the opposite side and one at the spot that does not fit up and draw it.

A is a U-shaped piece which fits on top of the clamp B. There are two clamps and two U-shaped pieces to each machine. It sits on top of the clamp in Fig. 1. Fig. 2 represents the machine complete, only that I represent the rod as being broken so as to show that the rod has considerable length. A, as you will see, has a hole in the bottom which fits over the upright piece which projects from the clamp, forming a swivel. C shows the rod, which should be 7/8 inch iron, or even larger. This rod is shouldered at one end,

down to 7/16 inch or ½ inch, and a nut and thread are placed on it with a hole for a key so as to prevent the nut from twisting off. As you see in Fig. 2, the rod and U-shaped piece are in position with the U-shaped piece rivetted on to the clamp. The other end of the rod has a thread extending perhaps two feet. The U-shaped piece at this end is threaded to fit the rod. By this method, when the clamps are fastened on the half rim near the ends, it can be spread or narrowed very easily. The woodworkman and blacksmith can get their heads together and proportion this machine to fit their work better than I can tell them. As you know, some rims are large and some small, consequently the machine must be made strong enough to stand the heaviest and with adjustment enough to allow for all sizes.

A Pivot Bar Shoe.

From L. G. Lerch, Ohio.—I am enclosing you a sketch of a horseshoe which I desire you to put before the readers of your paper as a contribution to the trade and a source of benefit and relief to the poor lame and crippled horse. This shoe I do not claim as my original invention, but I do claim to be the originator and promotor of the practical pivotal bar that



A Pivot Bar Shoe.

makes this shoe a decided success over any I have thus far seen used. It is intended for ringbone, spavin, curb, or hip joint lameness. When properly applied, it will give the most wonderful and immediate results for the lameness mentioned. I have tested this shoe for over two years, since I perfected the pivot bar, and it has proven a great addition to my business. It has also been a good source of financial revenue. I receive from $1.50 to $2.50 for putting on this shoe, taking about a half hour to make. It is made from any common machine shoe and the pivot bar is cut from a worn out rasp, one making two shoes.

It is the common knowledge of all horseshoers that, by removing the leverage corresponding to the seat of the trouble, you can partially remove the cause of the trouble. All farriers and veterinarians know that any horse having a curb, ring bone, or a spavin has a depressed outside heel and a corresponding long inside toe. You can readily see that by using this pivot shoe you may place the bearing or pivot at any point, and by so doing relieve the horse, or rather allow him to accommodate himself to the best position to relieve himself. This is a very practical shoe either in winter or in summer. It will outwear two other hind shoes. For dropped sole, punctured foot, or any ailment at the bottom of the foot, where protection and attention are needed, it is specially recommended. You can pack it, and in cleaning it, the pivot bar will keep the packing in place. I have horses come to my shop so lame that they were ordered from the streets and have sent them out to work. I feel that this is something that your readers should know. It is not only remarkably helpful in the points named, but it will be helpful to the smith in advertising his business.

Prices in Oregon.

From Frank Johnston, Oregon.—It might be of interest to the trade to know what prices we get for our work here in Southern Oregon. I herewith submit a copy of part of our schedule as adopted by Josephine and Jackson Counties:

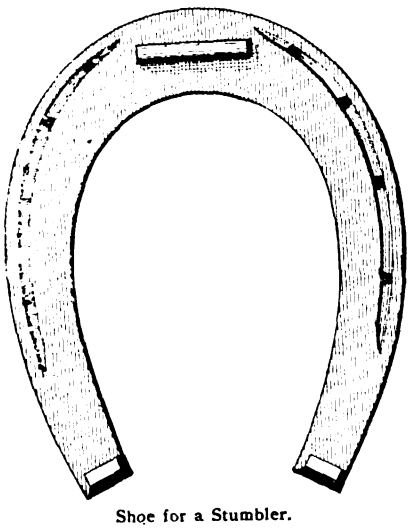
4 new shoes, Nos. 1, 2, 3	$2.00
4 new shoes, Nos. 4, 5, 6	2.50
4 new shoes, Nos. 7, 8	3.00
4 hand turned shoes	4.00
Stallion shoes	4.00 and up
Vicious horses and mules	5.00 and up
4 shoes, reset	1.50
4 shoes, retoed	2.00
Tire setting per wheel	1.00 to 2.00
New tires per set	11.00 to 33.00
New stubs and boxes per set	11.00 and up
Plow shares sharpened, 8, 10, 12 in.	.25
Plow shares sharpened, 14 and 16 in.	.50
Plow shares pointed, 8, 10, 12 in.	1.00
Plow shares pointed, 14 and 16 in.	1.50
New shares	4.00 to 6.00
New link in chain	.15
Grab hook	.50
Round hook	.50
Large choker hooks, per lb	.50
Clevises ½ and ⅝	.50
Clevises ¾	.75
Welding tongue braces	.75
Welding shaft irons	.75
Sledges and wedges, per lb	.30 to .40
Grinding cast shares	.25 to .50
Grinding axes	.25 to .50
Sharpening harrow and spring harrow teeth	.02½ to .15 each

This is only part of our list, but it will give the brothers a fair idea of our prices. We are very solidly organized, and there has been little, if any, price cutting. While work is quiet this winter, we are all doing fairly well considering the present financial depression.

I find The Blacksmith and Wheelwright a splendid medium for the exchanging of ideas and further cementing the good fellowship in our brotherhood. The very honorableness of our craft should cause us to honor and esteem all those who follow it for a livelihood. May the art of Tubal Cain ever live and be respected and dignified by its followers. We must look at all other trades and crafts as being children of our art, and being laid aside to enable the smith to follow his chosen bent, that of forging the white hot iron that Nature has provided him for his own.

For a Stumbling Horse.

From Thomas F. Willis, Iowa.—It is disagreeable and dangerous to have a horse stumble constantly while he is being driven. I believe the only way to overcome this is to shoe him properly I go to work as follows: In the first place I take a look at the horse's feet as he stands upon the floor, to see if he stands square upon all four. If not, I scrape from the hoof that is the highest (thus throwing the other feet out of plumb) as much as can be spared without injury to the foot.


Shoe for a Stumbler.

When the feet are properly dressed they are ready for the shoes. I use common machine-made shoes, but instead of welding the toe calks flush with the shoes at the toe as they are generally calked, I set them back on the middle of the web, as shown in the cut, and then weld them to the shoes. If the horse is a very bad stumbler I make the calks not over three-eighths of an inch high. By welding the toecalks back on the center of the shoes the foot is given a chance to roll over, so to speak, and is thus less likely to catch and stumble.

If the toes are of more than common length, I set the shoes back a little on the feet, nail them on, cut off that part of the toe that projects over the shoes, draw up the nails clinch and finish, and the job is done.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

A Rising Gate.

From E. E. Roberts, Virginia.—I see in the January number that W. D. Mackie wants to know how to make a gate that will rise as it opens. I give you my way:

Take a piece of 3 x 4 inch timber the right length for the height of gate, and mortise the gate bars in. This is for the end that the hinges are on. The other end may be two pieces ⅞ x 3 inches, or it may be mortised. Then take a piece of 1¼ x ⅜ inch iron and

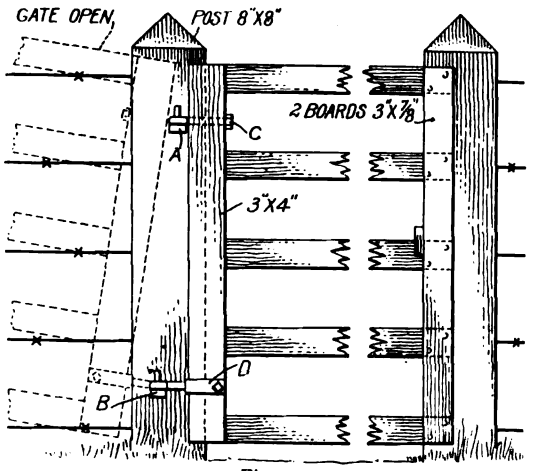


Fig. 1.

make a piece as shown in D, Fig. 1. This is for the botton hinge. Then make piece as shown in Fig. 2. Then make two hooks as shown, one to drive in the gate post for the bottom hinge and one to go through the gate post.

The gate posts had best be square; 8 x 8 inches or 10 x 10 inches are good sizes. Bolt the hinge shown in Fig. 1 to the bottom of the gate and bore a ¾ inch hole through the 3 x 4 inches between the two top bars, and put in the hinge shown in Fig. 2. Bore a hole

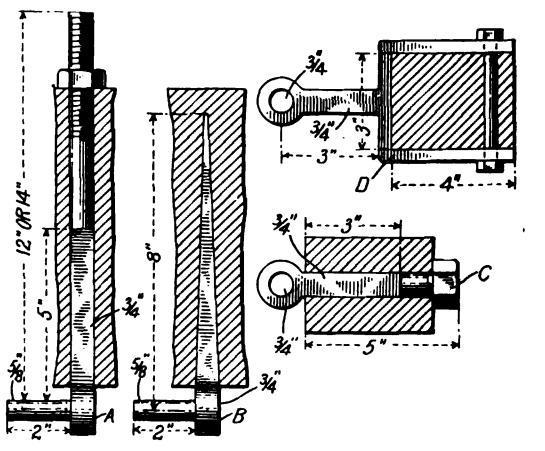


Fig. 2.

in the post near the ground so the gate will clear the ground and drive in a sharp hook, as shown at B, Fig. 2. Bore a hole in the post for the other hook and hang your gate. Screw up the nuts on the top hinge until the front end of the gate clears the ground. When you open the gate the front end of the gate will rise off the ground. This gate is also self-closing. When the gate is closed the hinges on the gate and hooks in the post should be at right angles to each other.

Heels too High.

From Thomas F. Hayes, New York City.—"Heels Too High," from the pen of W. E. Martin, in a recent issue, is a subject all horseshoers should look at in a serious and con-

vincing manner. From my view of the "Heels Too High" subject, Mr. Editor, I think it would be beneficial for all if you reprinted the same article in your next issue, and I can assist Mr. Martin to enlighten all those who do not know how serious it is to allow a horse's heels to be too high, as it positively causes more trouble and lameness to the horse than all others combined. It must be understood that the following ailments cannot be cured by lowering the heels, but they all could have been prevented by keeping the heels low, and allowing frog pressure:

High heels in front, causes corns, quitors, quarter cracks, spring knees, thrush, scratches, stumbling, ossification of the lateral cartilage, side bones, short strides, forging and over reaching, make a pacer out of a trotter, and make a trotter buckle up speeding.

Spade or Shovel Handle.

From A. S. Macmillan, Canada.—I enclose sketches of a handle for a spade or shovel, which I used often to make, and which I find

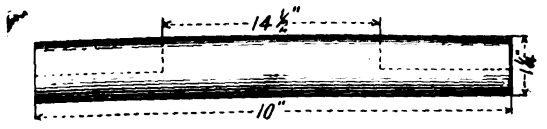


Fig. 1.

gives good satisfaction. I take a piece of 1¼ inch piping about 10 inches long and cut it with a hack saw, as shown at dotted lines in Fig. 1; then I draw out the shape as shown

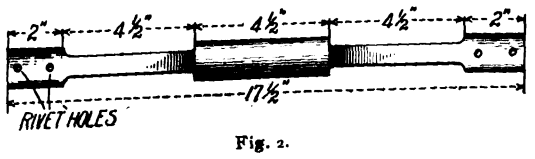


Fig. 2.

at Fig. 2, leaving the parts drawn out about 4½ inches long. Then I bend to shape as shown in Fig. 3, and put it on the end of the

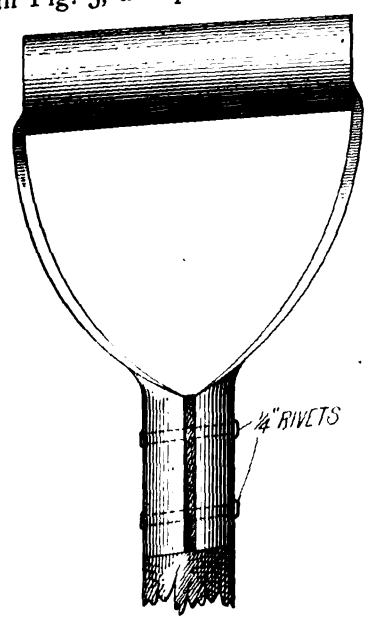


Fig. 3.

handle and put a couple of 1¼ inch rivets through it. I find by this method that I have a handle suitable for any kind of work.

Welding Springs.

From H. N. Albeck, Iowa.—As the business is rather quiet and time is plenty, will try to tell the brothers how I have succeeded in welding springs. I used to think a spring couldn't be welded successfully, but was called on to weld some automobile springs, so tried the following with success: Draw the spring down edgeways to a diamond point (the edge of the point sharp). Have a good, clean fire, and when the spring is red-hot, lay a piece of Lafitte welding plate on the lower piece. Blow on it some more till the spring is good and white (but not as hot as it would require with borax or compound). Take it out and lay the lower piece on the anvil. Put the upper piece on top and press down till the welding plate fuses nicely. Then tap lightly with the hammer till the pieces are stuck solid. Then replace in the fire and put borax on it and blow till the borax runs nicely. Take it out and hammer down to size with quick blows, and not too hard. I have welded a good many and have had fine success, as I never of one of my welded springs or near it, as is usually the Lafitte weld-

ing plate says to put it on after being taken out of the fire, but I found a spring is too thin for that, so I put it on in the fire and let it get warm with the spring. It is great stuff to weld all high grade steel with, as you can weld with considerable lower heat than anything I have ever used. Would say in regard to Brother Etter's way of welding a tire (described in the February issue) I do all welding that way and find it makes a neater and stronger weld than a chisel point scarf weld. I also find that the greatest trouble the young smith has in welding is caused by blowing too hard at the start and not giving the material time to heat through.

With best wishes to the craft and hopes of a prosperous year.

Cold Tire Setting.

From Gus. Wilson, Kansas.—In my forty-seven years of blacksmithing I have often been tempted to take a hand in the discussions in the journals, but never did. However, this matter of cold tire setting, it seems to me, is becoming so important that every progressive blacksmith should be interested, and from all I can find out, the most of them are.

Now I have no radical views on the subject, and don't write this letter with a desire to preach to my brother smiths, but as I have made a very careful study of cold tire setting compared to hot setting since the first cold setters were made, I feel that I may be able to say something that will be of interest to some blacksmith or wheelwright who thinks of buying a cold setter.

First, let me say that I have set tires every way known to the craft and I am talking from experience. After using all the hot methods and then the hot shrinker, I bought one of the first edge-grip setters that came out, and it's my experience with this setter that makes me want to help some other craftsman who may be studying the matter over and not right certain what to do about buying.

Perhaps I had better say further, that I am now out of the smithing business. When I had finished my forty-seventh year to a day, I laid down my hammer and walked out of the old shop that holds so many stories of good luck and bad for me. When I got over to the house I sat down and went to studying about the experiences I had had, and the most unusual and most satisfactory thing that happened to me in all those forty-seven years was the buying of my cold shrinker and the use I made of it.

In reading the many views that have been printed in the journals, I have read once or twice the argument that the cold shrinker did not do as good work as the hot way. I am sure this is a real mistake, for my experience has been quite the reverse, and it covers nine years with the cold shrinker, which is plenty of time to test out the quality of the work which I made my first careful study after getting my machine. I was very careful in the first place to follow every word of instructions which they furnished me, for I knew that a man who can make a good machine ought to know best how to run it to get the most out of it in every way, and in working out and watching the results of the upsetting on my machine, I even put cold set tires and hot set tires on the same vehicle at the same time and did this repeatedly, and every time the cold set tires run the longest and of course the wheels stood up the best. So I know that the cold way is better than the hot and should be in use even if it were as much work and took as long as the hot, which of course everybody knows it does not.

I have also noticed some blacksmiths say there is no use of having a cold shrinker because you have to take most of the tires off any way and repair the wheels. I am glad to hear them talk about their repairing of the wheel for it shows they are careful and conscientious workmen. It is true that a wheel that is out of repair should first be repaired and I have always followed this plan, for, as I said a while ago, it's only a part of a man's duty, and the way to build up a satisfactory trade is to do the work right. But there is still lots of time saved and even actual money saved as well as doing away with lots of the worst part of the work of the hot way. But first of all, as I have said it's a better job after you do it than can possibly be done the hot way, which is the most important point for any blacksmith to consider, for it is good work that makes pleased customers, and it is pleased customers that make good permanent customers, and it is good permanent satisfied customers that build up a blacksmith's business, and I made more money the last ten years of my smithing than I did any twenty before, and I know my cold shrinker was my biggest money-earner, counting all the new business of all kinds which it brought to me one way and another.

Strength of Hooks.

From Alexander Clark, Scotland.—I send you a table showing diameter of hooks and their safe working load in tons.

Diam. of Hooks	Safe Load in Tons.	Diam. of Hooks.	Safe Load in Tons.
⅜	.166	3½	14.497
½	.295	3⅝	15.551
⅝	.462	3¾	16.642
¾	.665	3⅞	17.769
⅞	.906	4	18.934
1	1.183	4⅛	20.136
1⅛	1.497	4¼	21.375
1¼	1.849	4⅜	22.953
1⅜	2.238	4½	23.964
1½	2.662	4⅝	25.314
1⅝	3.124	4¾	26.701
1¾	3.624	4⅞	28.124
1⅞	4.160	5	29.587
2	4 703	5⅛	31.083
2⅛	5.344	5¼	32.619
2¼	5.991	5⅜	34.190
2⅜	6 675	5½	35.798
2½	7.396	5⅝	37.443
2⅝	8.154	5¾	39.126
2¾	8.949	5⅞	40.848
2⅞	9.781	6	42.603
3	10.650	6⅛	44.397
3⅛	11 556	6¼	46.228
3¼	12.500	6⅜	48.095
3⅜	13.480	6½	50

Gate Hanging.

From P. T. Macgowan, Missouri.—A simpler way to arrange for a raising gate than any you have published, may, I think, be

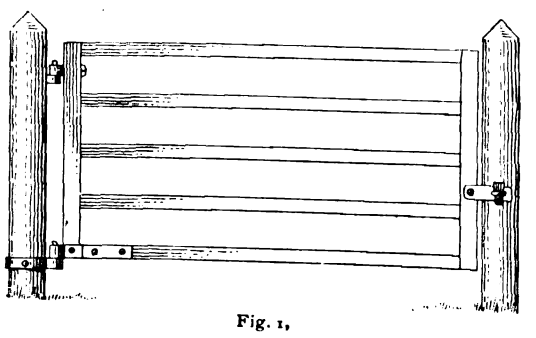


Fig. 1.

understood by the illustrations. Place the lower hanger so that its center is thrown to the rear, which causes the gate, when opened,

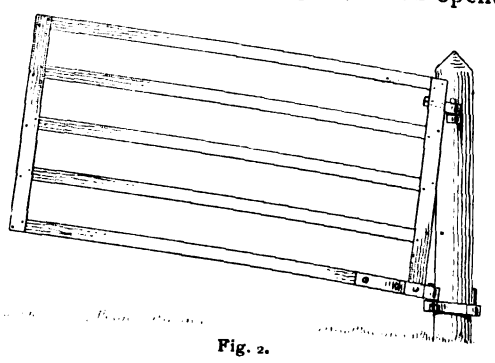


Fig. 2.

to be higher at the other end. When the gate is opened in either direction, the offset against which the lower hanger or strap bears, raises

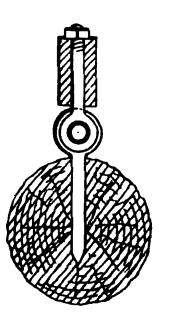


Fig. 4.

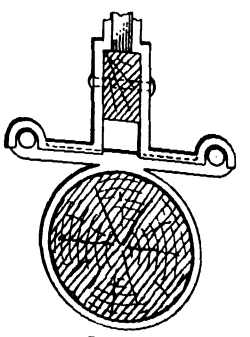


Fig. 3.

the lower corner of the gate next to the post. The upper hanger, which bears the entire weight of the gate, must be strong and loose

enough in the hole of the hinge to admit of the twisting upward lift. Fig. 1 shows the gate closed; Fig. 2, how it raises when being opened; Figs. 3 and 4 are sections of the bottom and top hangers.

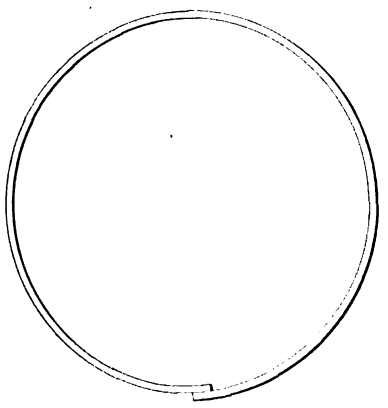
Paring the Foot.

From H. J. Haggerty, Pennsylvania.—The blacksmith today is expected to do more intricate work in repairing machinery than he was 25 years ago. This, at least, appears so in the rural districts. I like James F. Hobart's articles. As an expert mechanic, he does good work, but the boys of the blacksmith craft frequently get ahead of him, for they find he is not as well posted in this business as in the machine shop. I have had some little experience in both branches of the work and thus feel at liberty to criticize. I like the articles you publish on horseshoeing and paring the foot for the shoe. I do not believe in paring too close either on the sole or the frog of the foot. However, the frog should not be hard and dry, but elastic, and it should not pinch at the back of the foot. I do not turn excessive high heel corks, as this tends to keep the foot from the ground. I believe the foot should be kept in contact with the ground every step the animal takes. Under such conditions, he will be surer on his feet and have healthier feet. In this locality, there has been more shoeing needed this winter than for several years and later it will be followed by tender feet, as the foot is injured more or less by paring the hoof too much.

I want to tell you about a clawbar that I found quite useful in my shop. I made it from an inch round steel, 18 inches long, with a claw forge on one end, made so it will take ¼ inch band. This I found convenient in repairing buggy wheels. You can use this claw bar by slipping it over the rivets and drying them out. In place of taking the wheel and drilling or punching the rivet out, the claw is split back 3 inches.

Tire Welding.

From J. E. Cursey, Whitehall, Md.—In reply to the request of Brother Clauson for information as to welding tires, my way is to lay down a bar of iron, run a wheel on it with all joints closed, cut off twice and one-half the thickness of the tire longer than the wheel,



then, bend around without any scarf and lap together about 1¼ inches as shown in the illustration. Bend the tire with a little spring so the lap will press together and it will not slip.

A Veteran's Reminiscences.

From J. P. O'Brien, Pennsylvania.—I have been in the business of working wood and steel for about sixty years. I am now getting old and will soon have to give up work, although I am better at wheelwrighting work than at blacksmithing. I claim to be the inventor of the closed axle nut or box. About 38 years ago I made myself a good buggy, using this device. I selected what was then the best axle with the old style nut, and the screw came threaded. I did not like that, for if anyone were to pass the buggy and touch it, he or she was likely to soil their clothing from the oozing lubricant. I therefore took the nuts off and got a tinsmith to solder a strong tin cap cover each nut. Then I took a piece off the end of the axle sleeve and the nut went on as well as ever. I though then I had a nice device. Several years later axles came from factories with soldered ends the same as they are now. I am of the opinion that some traveling man in the axle business saw my buggy with the closed nut, and it gave him the idea to have them made similar. As far as I know, a patent has never been taken out on it. If I had secured a patent at that time, it would have made me pretty wealthy by this time, I fancy.

Drill Tempering and Corns.

From F. J. Kendall, Colorado.—I see an inquiry is made for a method of tempering stone drills. Here is the plan I have adopted with success: Heat the drills to a dark cherry red and cool; do not draw the temper. Of course the result depends something upon the grade of steel used, but I have used it for plows, axes, edge tools of all kinds, drills and mill picks, and in fact, for every kind of work around the shop. Try it.

In answer to an inquiry, I send you a receipt for corns on horses. I have used it for years, and it has never failed to cure. I have used it where the corns were so bad when they were cut open that the blood and pus would run from them. My method of treatment is this: Pare or cut the corns out as deep as possible and pour in oil of cedar. Continue to apply morning and night until a cure is effected. I have never used over four ounces in the worst cases.

Sharpening and Tempering Paving Cutting Tools.

From M. H. Knuckey, Massachusetts.—Perhaps some time some of the readers of The Blacksmith and Wheelwright have had a request for sharpening tools for men that cut blocks for paving streets. I might say that I have done quite a lot of that kind of work myself, sharpening for paving cutters, so I will give my way of doing it. I am also sending a few rough drawings of the kind of tools they use which I hope the readers will understand, although I am a bad artist. To begin with, we will take the drill, Fig. 1. It is what is called the hand drill. They are made out of ¾ or ⅞ steel. Some are square and some are

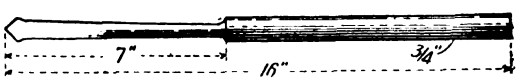


Fig. 1.

round steel. They are drawn down at one end about 7 inches. They are about 16 to 17 inches long altogether, and sharpened with a diamond bit. In sharpening, always be careful about the heat. Do not get them too hot, and do not be afraid to give them a plenty of hammering, as I think the more steel is hammered for cutting stone the better it is. After it is sharpened to a diamond bit, the next is the tempering. Now about the bath. Take a big barrel and fill it with brine and you will have a good bath. Get the brine strong enough so that when you put the steel in it will jump just a little. Now, heat your drill for tempering, but be careful about the heat you give it. Do not get it above a cherry heat. Then dip it in the brine, but do not cool it

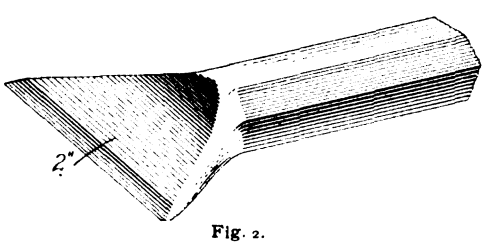


Fig. 2.

right off. Let heat enough remain in it to run the temper. Keep a board near the brine with sand on it. Then rub the drill and watch for the temper. Run it down to a dark straw color. Then cool it off, but always remember the heat. If it is overheated, it is not any good. Next comes what is called the bracer, Fig. 2. It is like a chisel, but the end that is sharpened is about 1½ or 2 inches wide. They mark the stone where they want to break it with the brace. They are sharpened to shape and tempered just like the drill. Then there is what is called the big "mall," Fig. 3. It is a big hammer about 28 lbs., that they use in breaking the stone after it is drilled up in pieces. They are sharpened to a pean at one end. There is also the opening hammer, Fig. 4. They are not quite so heavy, about 14 or 16 pounds. They use them when they have a piece of stone that will make two blocks. They are sharpened square one end and a peen at the other. To sharpen the mall, do not get it too hot; if you do, they are spoiled. Then, in hardening the mall, get a good, even cherry heat and cool in the brine. Do not draw the temper and, above all, do not take it out of the brine until cold. The opening hammer, after it is sharpened, is hardened just the same as the mall. Now, there is the reel, Fig. 5, also

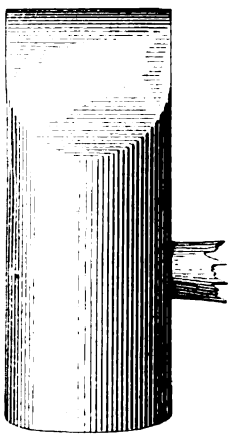


Fig. 3.

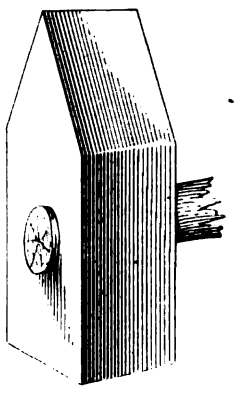


Fig. 4.

the side hammer, Fig. 6. Some men use the reel and some the side hammer. They are both for the same purpose, for dressing the blocks. The reel is sharpened at both ends, but as a rule the side hammer is only sharpened at one end, although on some job both ends are sharpened, but when I was sharpening I only sharpened one end. Then, when they are sharpened, next comes the hardening. They are heated to a cherry heat and cooled in the brine. Do not take them from the brine until cold. Do not draw the temper.

I have been sharpening tools for paving cutters, also granite cutters, for about 14 years.

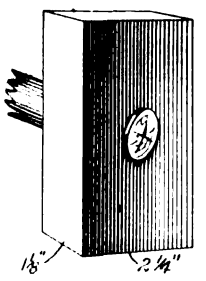


Fig. 5.

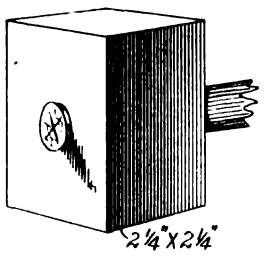
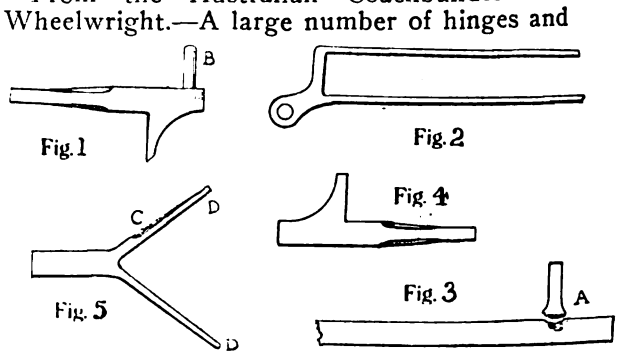


Fig. 6.

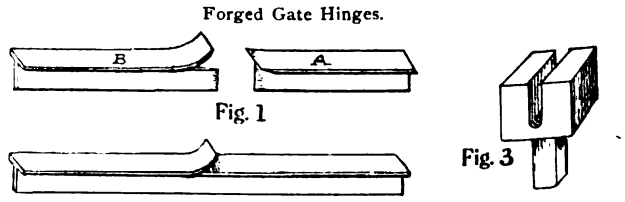
I am still working at tool sharpening for granite cutters. In sharpening tools for cutting stone, you will come across different grades of steel, but the thing to be most careful about is the heating of the steel, as anyone that has anything to do about steel knows if it is overheated it is not any good, so my advice is, do not use very high heat on steel, and in sharpening tools for cutting stone, always give it a good hammering, as steel will do more work when well hammered, and in tempering, never heat above a cherry heat.

Heavy Gate Hinges.

From the Australian Coachbuilder and Wheelwright.—A large number of hinges and



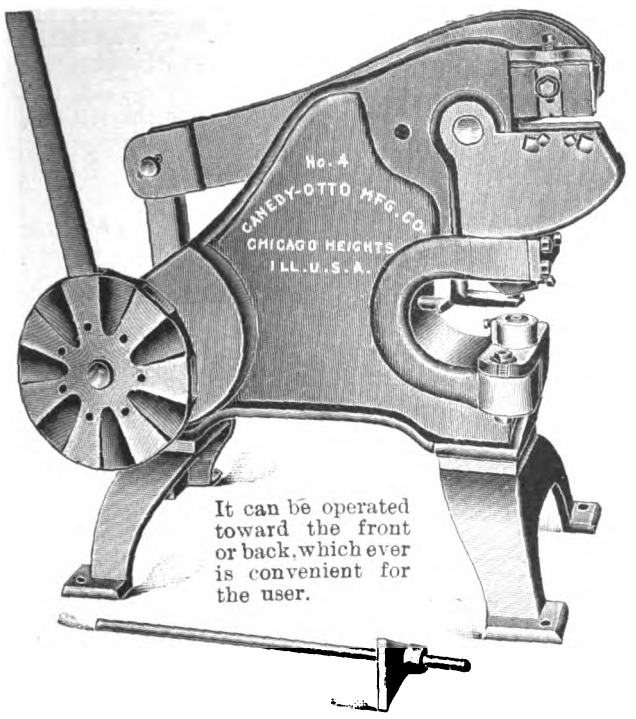
Forged Gate Hinges.



For Tee Bars.

gudgeons had recently to be forged. They had to be strong and cleanly finished, and

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.

This machine is furnished with ½-in., ⅝-in. and ¾-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

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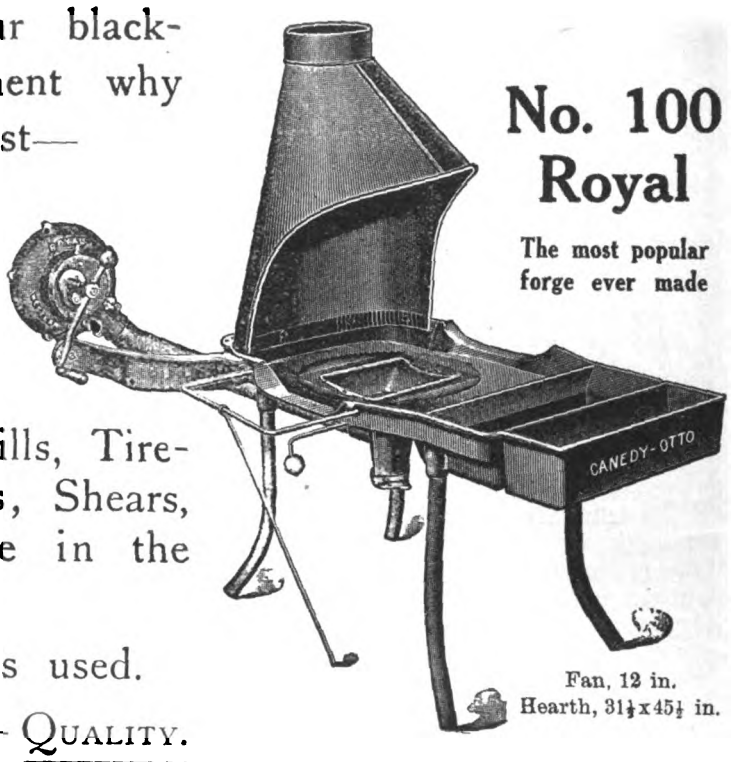
It costs no more.

Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.



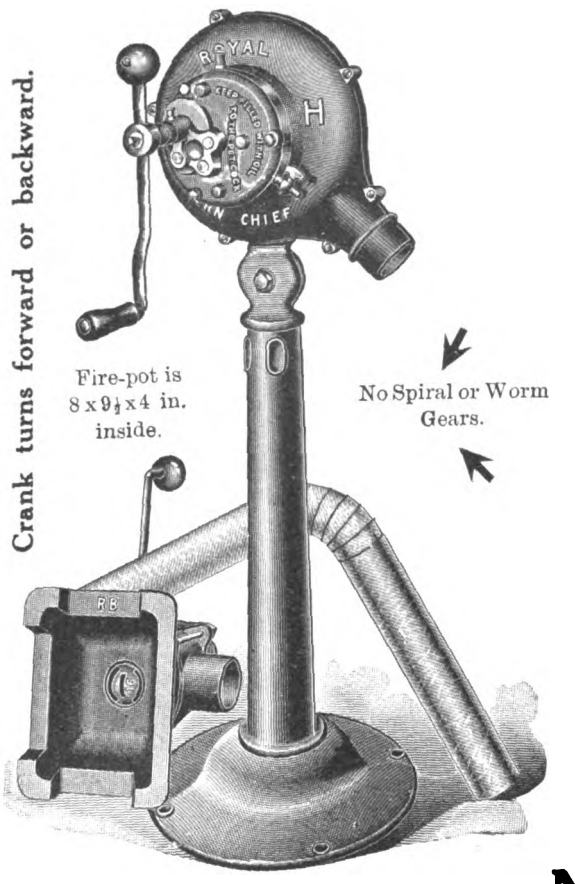
No. 100 Royal

The most popular forge ever made

Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

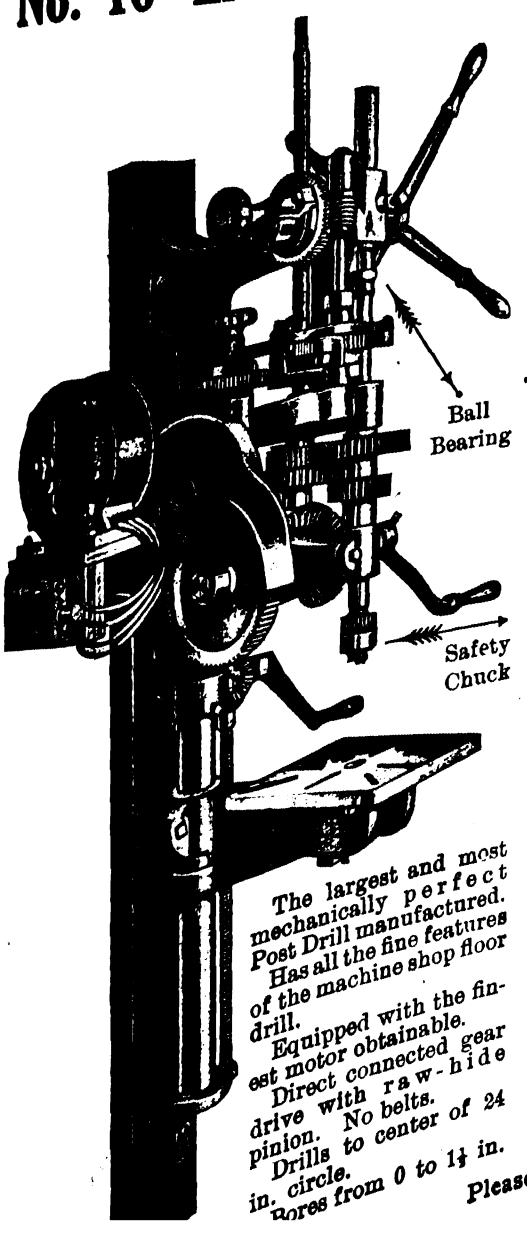
(Ask the man who owns one)



FORGES
BLOWERS

PUNCHES
SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1¼ in.

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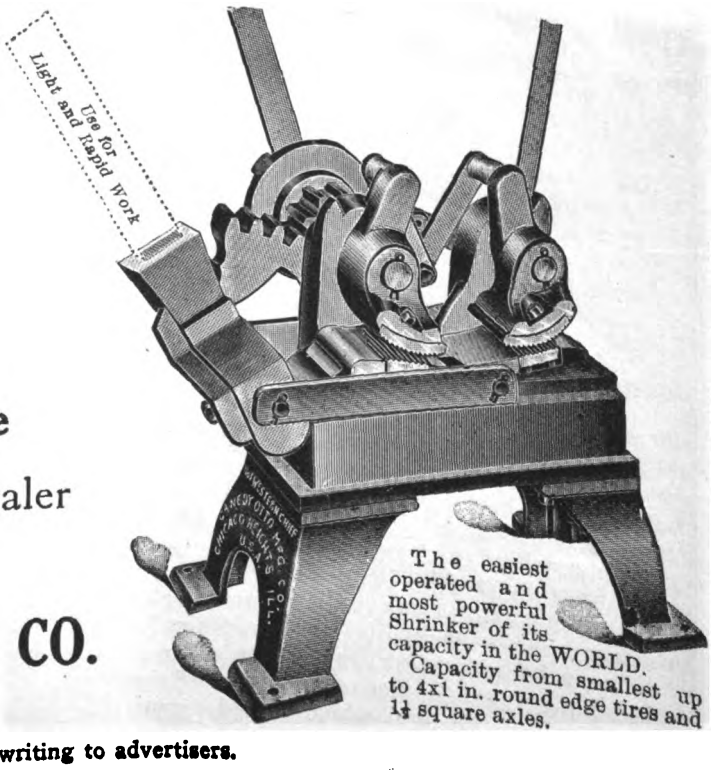

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Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

made to the shape shown in Figs. 1 and 2. To make the gudgeons, 2 inches square, cut into convenient lengths, was used, and a piece of 1½ x 1 inch was jumped on a A, Fig. 3. This piece formed the stop or shoulder, and the end was then drawn down as in Fig. 4 to the required screwing size. The pintell, B, was then jumped on, and was sunk well in with a good clean heat, as there was a very heavy gate to swing on it. The outside was then rounded off and the stop drawn out and finished off, which completed the gudgeon. The hinge, Fig. 2, is also made of 2 inch square, split and drawn down as in Fig. 5, with a shoulder at C, and ends welded on at DD. It is now bent at C, which brings the two tails parallel. The eye is then rounded off and shaped up with the fuller, and the hole drilled.

The Development of the Caliper.

To definitely ascertain when the first piece of mechanical work requiring accurate gauging or measurement was executed, is as difficult as is the task of settling the date of the deposit of the metals and their ores among the rocks. It is certain that the working of metals is a very ancient art. Some of the ancient work proves the early existence of tools which

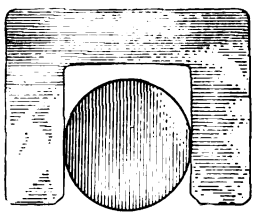


Fig. 1.—The First Measuring Tool.

were at least as effective if not equal in all respects to such as the modern mechanic requires.

Tubal Cain is the first name mentioned in connection with this subject. He is reputed as a skillful workman, and while he may have made many measurements by touch and sight, he must have had certain tools to aid him in securing accurate results.

Without doubt, the first tool that suggested itself to the mind of this early workman, for the measurement of diameters or thicknesses,

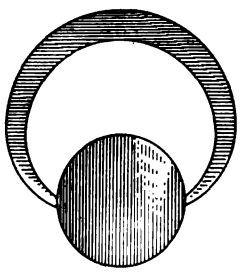


Fig. 2.—The Early Adjustable Caliper.

was a gauge something like that shown in Fig. 1, which is simply a notched plate of iron, the width of the notch being the measurement of the diameter or thickness required, and by repeated applications of this gauge to the work as it neared completion, accurate results were secured; but this tool was what would now be called a special tool or gauge designed for measuring fixed diameters. It lacked the adjustable feature which was necessary to adapt it to work of different sizes. Of course the tool could have been heated and altered, but this would have occasioned con-

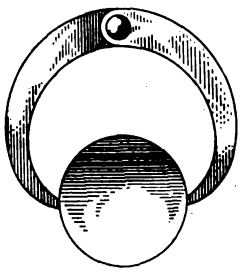


Fig. 3.—Showing the First Improvement on Fig. 2.

siderable labor, as well as the loss of the original gauge. It is therefore probable that for an adjustable gauge or caliper, something like that shown in Fig. 2 was employed. This tool consisted of a curved bar of metal with the ends approaching each other, and the adjustments were effected by bending the bar.

An obvious and early improvement upon this caliper is shown in Fig. 3. The difficulty of being a bar whenever an adjustment was required suggested the use of a frictional joint at the center of the bar, which would permit of swinging the arm of the caliper to adapt it to the measurement of different diameters. From this crude mechanical device have been developed all the modern improved forms of caliper.

The climax of perfection in this line is seen in the caliper, represented in Fig. 4. In this caliper the jaws are connected together by a

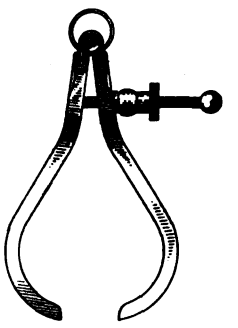


Fig. 4.—The Improved Stevens' Caliper.

fine joint, and a G-shaped spring is applied, which tends to separate the free ends of the jaws. The adjustment is instantly effected by a simple and durable slip nut, which together with the joint and spring, forms an ideal arrangement appreciated by every mechanic.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Resilvering Mirrors.

From G. L. D., Montana.—Will you tell me through your journal how to resilver looking glasses where the silver has come off. Any information regarding this will be appreciated.

Reply.—The silvering of mirrors is quite a difficult job and one that requires patience, several different kinds of ingredients, and tables and tools. We would not advise any one to attempt it for one mirror or for a dozen. But if the silvering has become scraped off, the following method may be adopted with success: Place the mirror face downward on a table and with a bit of cotton clean off the spot to be silvered by rubbing it with the cotton. Now spread over the spot a piece of tin foil a little larger than the area to be repaired, and after spreading out smoothly, let fall on the center of it a drop of metallic mercury, and with a bit of chamois rub the foil until it becomes brilliant. Then place over it a sheet of writing paper and put on this a pile of books or a weight of any sort, and leave it over night. The weight need not be heavy—just sufficient to keep the new amalgam in close contact with the glass. While this method seems easy, it must be done carefully to be successful. The original silvering is done in various ways, but it usually requires nitrate of silver, distilled water, alcohol, ammonia, sugar or glucose, and careful mixing.

Will Some One Tell Him?

From Otto Acord, Illinois.—Will O. Frederich, of New York, give measurements of how to make the foot power hammer, like Fig. 2 in January number of The Blacksmith and Wheelwright; what weight of sledge and anvil should be used?

Will some of the local blacksmiths tell how they shape ends of axles and fit skeins; also boring of hubs, and fitting thimbles for the common farm wagon.

Will G. W. Black, or some others, give their views on this question: In my daily paper I notice this advertisement: "For Sale—Bay mare 7 years old, good driver; sound; trial given. $75." Now what is wrong with this animal in your judgment? Would these city animals be all right if taken to the country for farm and road use?

I would be thankful for any answers on these questions.

Shop Equipment.

From Foster T. Hanson, Wisconsin.—I would like to ask the brother blacksmiths if anyone has a Fisher double screw vise. Is it good? Does it stand up to the work? Would you buy another if you were going to buy again?

Is any brother using a combined woodworker, rip and cross-cut saw, band saw, planer, dado, boring, and wood turning lathe, all in one machine? Is this combination a good one? Which make would you advise me to buy both as to price and durability?

Building a Chimney.

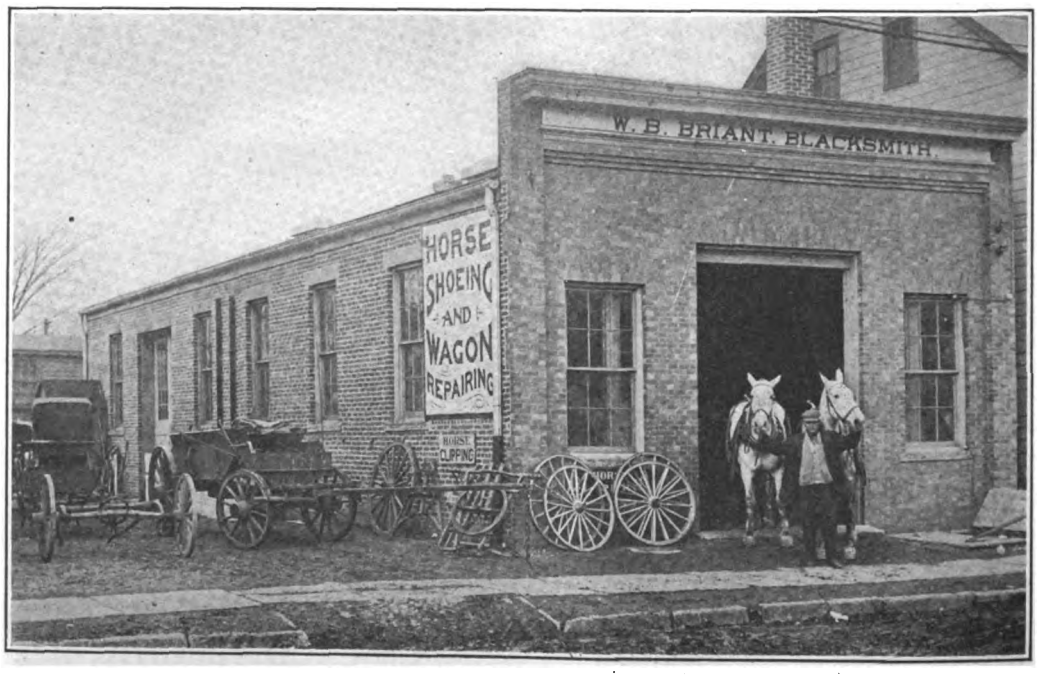
From T. W. Ridgway, New Jersey.—I wish to ask through your paper how to build a blacksmith chimney so it won't smoke or cause gas in the shop. I want to know the size of the opening and full particulars. I would like a diagram of the whole chimney and the height which it should run above the roof in order to draw well. Mine smokes in winter weather and gas comes out in the shop.

Sled Bolsters.

From H. P. R., Iowa.—Will some brother of experience tell me just where to hang the bolster on an oscillator bob sled, and just how high the draw bolt or roller bolt should be?

A Handsome Jointer.

From Walter L. Shriner, Oregon.—In a back number a brother contributed a drawing of a device to joint hand saws, by using a hand saw file, but I don't like its use very well, as it takes too long to get the file square with your work. The least variation of the file will make more work to keep the teeth square. I have used a jointer of my own make for years that gives perfect satisfaction. I take a piece of wood 1 inch by 2 inches by 8 inches. I plane up nicely, and square the top side of the block. Then I take a 6-inch flat file and lay lengthwise and let the file project over the edge one-eighth inch. I make the file solid by driving four upholster tacks on the back and side of the file. This makes a cheap and handy tool.



Shop of W. B. Briant, New Jersey.

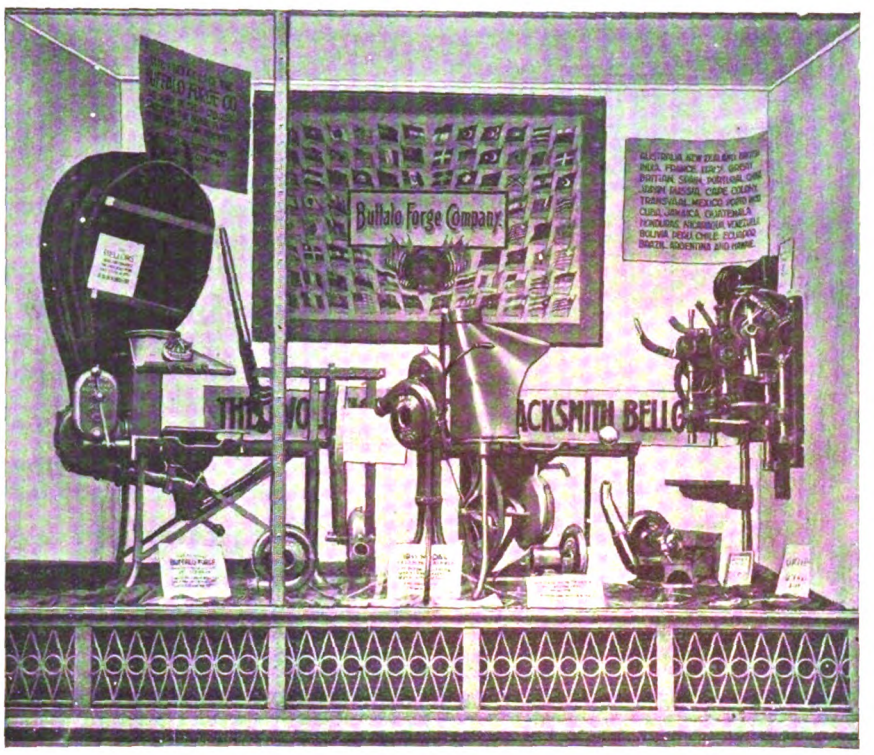
A Remarkable Display.

Attached is a photograph of quite unusual interest. It was taken during the Buffalo "Industrial" Week, which was held a short time ago. The retail merchants during that week had agreed to place their display windows at the disposal of the local manufacturers. The arrangements were made by the Chamber of Commerce, the object being to promote the sale of Buffalo-made goods locally. One of the most interesting exhibits was that of the Buffalo Forge Company. A solid wall of people blocked the sidewalk in front of Weed & Company's window almost continuously.

The keynote of the display was struck by the large sign stretching across the background which reads: "The Evolution of the Blacksmith Bellows." The bellows are seen in the corner on the left. A little farther to the right is seen the first blower which took the place of the bellows. This blower operated by the long lever has the fan mounted near the floor on a wooden frame; a little above it is the large wheel belted to the fan, and to the top of it the lever is attached. This blower was originated nearly 30 years ago by the Buffalo Forge Company and is still, occasionally, seen in blacksmith shops—a pretty good evidence of strength. Directly to the right of this blower can be seen the familiar outlines of the Buffalo 200 Silent Blower, of the 1911 design, with the snail shell 14-inch fan, which is the latest development in fan blower construction. Seen so close beside the old bellows, it furnishes a striking example of the contrast between old methods and new. It represents the bellows reduced by modern ingenuity to only one-sixth its original size, yet producing a welding heat in much less time and with only a small fraction of the effort. Modern practice is still better exemplified by the several variable speed electric blowers scattered around on the floor. One of these was mounted on a revolving disc and tilted up so that the discharge pointed upwards. This blower was the center of much curiosity and kept crowds standing in front of the window at every hour of the day and up till midnight.

Our readers will notice a small white ball directly above the spout or discharge of the blower. The electric current was kept turned on from 8 a.m. till late at night without interruption, and the blast from the blower was so strong that it would not only keep the ball suspended in the air, but would make it travel in a circle following the spout on the discharge of the blower, at a distance of about one foot above it as the blower turned on its revolving table. All kinds of guesses were made by the onlookers as to what held the ball up, but none, as far as could be ascertained, could make head or tail out of it.

Even to those who know that the fan produces a strong blast, it might appear that this would simply have the effect of throwing the ball away instead of holding it suspended in the air. In reality, the blast, when striking the ball, glances off, hugging the sides of the ball closely, thereby holding it as though within the grip of a man's hand. As an example of the strength of the blast may be mentioned the ball had to be loaded down by stuffing nails into it to prevent it from being blown too far. It is a noteworthy fact that even after 14 to 16 hours continuous run the motor would show absolutely no tendency to overheating, a point which counts for a great deal in any motor. Two forges were also exhibited. The one was the original Buffalo No. O, which was the first forge to be used in a blacksmith shop instead of a brick forge. It was first introduced by the Buffalo Forge Company, about 30 years ago. The portable forges then made were small, intended exclusively for outdoor use and for those trades, manufacturing shops and shops which only occasionally have any use for a forge.



An Interesting Window.

Mr. William F. Wendt, now the president of the Buffalo Forge Company, and then a young man of some twenty odd years, struggling with the introduction of the new forge, a little later got the idea of separating the hand blower from the iron forge and to use it instead of the bellows on brick forges.

Next to this forge on the left, was exhibited, as an example of the progress made during the last 20 years, the latest model of the same forge, known as the No. 669 Down Draft, with patented smoke-removing "Down Draft" hood. Vulcan heavy-duty, Vulcan tuyere iron, and both hand and electric blowers. Three modern blacksmith drills are shown on the right, one of these equipped with an electric motor. The large picture in the background is an oil painting representing the World's flags in original colors; it is symbolical of the world-wide use of Buffalo blacksmith tools. In a window adjoining a line of their armor plate steel, punches and shears and other machines were exhibited.

Novelty Disc Sharpener.—The Walker Mfg. Company of Council Bluffs, Iowa, manufactures the Novelty Disc Sharpener, which will be found illustrated and briefly described in our advertising department. They say it is a complete sharpener within itself for all kinds of disc work. They invite our readers to ask their dealers for it, or write direct to them for further particulars.

Common Sense Tire Remover.—In spite of the fact that large numbers of cold tire setters are in use all over the country, there are a good many blacksmiths who still believe that hot tire setting is the best. All such should turn to our advertising department and consult the advertisement of the Common Sense Tire Remover Company of Dowagiac, Mich. Every man who has heavy tires to remove knows the difficulty of doing it and that it is hard work. He also knows that it is almost impossible to remove heavy tires without injury to the felly. The Common Sense Tire Remover is a machine which has been devised especially to remove heavy tires and to do it without injury to the wheel in any way. We understand that wherever this machine has been used, it would not be dispensed with for twice its cost.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

ENGINE OPERATION.

Information as to the Mixture, Velocity, Heat and Power Per Cent.

BY E. W. LONGNECKER.

Some of the conditions prevailing during the running or operation of the gas or gasoline engine are not generally understood. In fact, many of these conditions, while absolutely essential to the success of the engine, are not manifestly present to every operator, and many a successful operator seldom thinks of them or has occasion to look closely into their existence.

For instance, many an operator is not aware of the fact that the velocity of the mixture as it passes through the valves into the cylinder is something like 4,000 to 5,000 or more feet per minute. And that the pressure during the inhalation stroke of the piston is a pound or more less within the cylinder than atmospheric pressure on the outside of the cylinder.

This fact accounts for the inrush of the air mixture so as to equalize the pressure within and without. At sea level the atmospheric pressure is 14.7 pounds to the square inch. This pressure is simply the weight of the atmosphere. And this weight or pressure is utilized or taken advantage of in the process of feeding and mixing the fuel of the gasoline engine. The fact that there is a pound or more less pressure within the cylinder while the piston is moving out on its inhalation stroke is evidence that when the stroke is ended the pressure within has not yet come up to the atmospheric point, and for this reason the inlet valve should be held open until the crank has passed the outer center by several degrees. This will give time to fill the cylinder completely by a full inhalation, and compression will begin at once the valve closes.

Beginners often wonder why it is necessary to cause the spark to be made so far in advance of the end of the compression stroke. This is necessary because it takes time even for a high explosive mixture to build up its inflammation and combustion, and since the piston of the gas engine travels at a high rate of speed, it will complete its compression stroke and start on its power stroke in a very short period or space of time. And by giving the ignition the advantage of sufficient lead, it will be ready with its highest degree of heat and greatest expansion by the time the piston is ready to start on its power stroke.

This insures the conversion of a liberal percentage of the heat energy into power. It also permits of complete combustion before the end of the power stroke and a consequent rapid heat reduction so that by the time the exhaust valve opens, the temperature is sufficiently low to prevent heat injury to the valve.

The degree of temperature in the beginning of the power stroke is excessive, something like 2,000 degrees Fahr. or more, but as the piston recedes, the gases expand and both pressure and temperature diminish rapidly.

Because of this excessive temperature, provisions are made through the means of radiating and cooling devices to prevent the high temperature from burning the lubricating elements, injurying the valves, etc., by the absorption of much of the heat. It is known that about 50 per cent. of the heat generated by the explosions is lost through absorption by the water radiating system. If it were possible to lubricate and otherwise avoid injury to the engine without this absorption, all this energy might be converted into power and the power output be more than doubled from the same quantity of fuel.

The maximum temperature of the gasoline engine cycle is about four times that of the steam engine.

Recipe for Scratches.

Wash the affected parts thoroughly with warm water, into which place, say, 2 ounces pure carbolic acid to 2 quarts of water. Then cover the cracks with cotton, containing some of the following, and wrap well with roller bandage:

1 ounce of alum, powdered.
4 ounces of acetate of lead.
8 ounces of glycerine.

Dissolve in one pint of warm water.

Rub the sores and then put the cotton on and bandage as above mentioned. Keep bowels open with glauber salts, reduce grain food, and in very bad cases feed bran mash or other non-stimulating food.

"Easy Money For a Blacksmith."—This sentence heads in large type the attractive advertisement in this issue of the Chicago Flexible Shaft Company, 630 LaSalle Avenue, Chicago, and 16 and 18 Reade Street, New York City. Every reader of this paper who has much horseshoeing to do, who has not already bought a horse clipping machine will probably find it to his advantage to do so. The custom of clipping horses in the Spring is growing all over the country. But consult the advertisement referred to, and either send your order in direct or write to the company as above for further particulars, and mention this publication.

Crescent Universal Wood Worker.—This machine will be found illustrated and described in the advertisement of the Crescent Machine company of Leetonia, Ohio, on another page. It is said that four men can work on this machine at the same time. It consists of a 26-inch band saw, eight-inch jointer, reversible single spindle shaper, saw table, and borer. Write for 112 page catalogue at once. This catalogue of course contains a more complete description of the No. 51 Universal Wood Worker than is to be found in the advertisement referred to.

Skow Rotary Disc Sharpener.—This machine is made by Skow Bros. Mfg. Company of Newton, Iowa, and is said to be a money maker for up-to-date blacksmiths. They claim it will make more money than any other machine that the blacksmith puts in his shop. It is for sale by dealers everywhere. Write for catalogue giving full particulars, and mention The Blacksmith and Wheelwright.

The Little Giant Power Hammer.—Mayer Brothers Company of Mankato, Minn., manufacture the "Little Giant" Power Hammer which can be furnished in three different sizes. These hammers, it is said, are made of the best material and by the most skilled workmen and are in every way up to date. The manufacturers want to send a descriptive circular to every reader of this paper, who may be interested.

Rubber vs. Steel Tires.—A series of tests has been proposed among carriage manufacturers and manufacturers of rubber tires to determine just how much longer running life is possessed by a carriage equipped with rubber tires than one having the old-fashioned steel tires. There is a general agreement that rubber tires absorb shocks, save carriages from racks and jars of the road, and thus prolong their lives, but no exact percentages have ever been figured out. The Goodyear Tire and Rubber Company, of Akron, Ohio, large producers of carriage tires, is deeply interested in the proposed tests. Rubber carriage tires make easier work for the horse. The life and bounce of the rubber cushion makes carriage loads easier to move than with the steel tire, and incidentally make for much greater comfort for the occupants of the carriage. Noise is absolutely eliminated. Rubber tires make a carriage run softly.

The work of changing over a carriage from steel to rubber tires occupies only a few hours. Nearly every carriage dealer in the country, and many carriage blacksmiths as well, are now equipped with tire applying machines. The carriage tire business of The Goodyear Tire & Rubber Company, is steadily growing larger year after year. All Goodyear carriage tire rubber is guaranteed for one year.

The Justrite Plow-Blade and Disc-Sharpener.—This tool is designed for rolling out plow blades, and the manufacturers say it is just right for that purpose. In their descriptive circular, they state that from 75 to 100 plow blades can be sharpened on this machine in one day. In a letter just received from them, they say that when handled by a skilled operator, one plow blade per minute has been turned out. This is certainly remarkable work for any machine to do. This machine is made by the Strite Governor Pulley Company, 302 So. 3rd Street, Minneapolis, Minn. Write at once for descriptive circular and price, and mention the Blacksmith and Wheelwright.

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Burlington Rubber Tire Machine.—A great many of our readers no doubt, as Spring opens, will want a rubber tire machne, and they are invited to investigate the merits of the Burlington Rubber Tire Machine manufactured by the Enterprise Foundry, of Harvey, Ill. See illustrated advertisement on another page and write at once for descriptive circular and prices.

Cast Iron Brazing.—As Spring opens our readers, many of them, will have a chance, if they want to, to mend a good many broken castings and this can be done by "Braziron" manufactured by the A. & J. Mfg. Company, 557 W. Lake St., Chicago, Ill. This company supplies special outfits. It wants to send full information concerning the brazing of cast iron and the money that can be made in doing so to any reader of the Blacksmith and Wheelwright who is interested. In writing kindly mention this paper.

Improved Power Hammers.—In this issue will be found the announcement of the Star Foundry Company of Waterloo, Iowa, with an illustration of their Improved Power Hammer and an illustration of their Improved Star Disc Rollers. They would like to send a descriptive circular giving full particulars to every reader who may be interested. In writing please mention this paper.

The Goodyear "Wing" Tires.—Lots of our readers are already putting on solid rubber tires of somebody's make, and many others are no doubt contemplating the addition of a tire department, which always proves profitable. In this connection we would direct attention to the prominent advertisement in this issue of the Goodyear Tire and Rubber Company of Akron, Ohio, manufacturers of the Goodyear "Wing" Tires for carriages of all kinds. Read this advertisement carefully and then write at once for descriptive circular and special prices to agents.

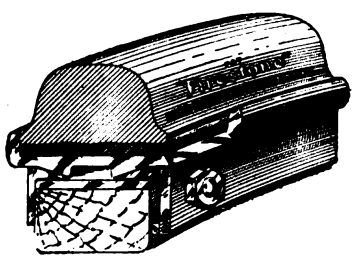
Make Your Own Jointer.—In this issue will be found the advertisement of W. L. Sherwood of Kirksville, Mo. in which he says he will furnish all steel jointer heads 6 to 16 inches long complete with knives, pulley and cast iron frame that heads run in, all ready to bolt to wood table which any wood workman can readily make from the drawings and instructions which he will furnish. Write for descriptive circular giving full particulars to the address given above and mention this paper.

Free to Horse Trainers.—No reader of course will be likely to skip the animated advertisement in this issue of Prof. Jesse Beery, Box 360 Pleasant Hill, Ohio. It contains several illustrations showing what refractory and balky horses can do when they want to. His book entitled "King of Horse Trainers and Horse Tamers" is a very interesting work. But consult this advertisement and read it through carefully and then cut out the coupon at the bottom, fill in your name and address and mail it to him and he will send you the book without charge.

Firestone's New Tires for Heavy Service.

Firestone has added three new heavy service truck tires, thereby increasing the line to six distinct types. They provide a wide range of designs to exactly meet every type of car, size of load, and condition of service. The new tires are known as the block, the hard base, channel type, and the hard base European type.

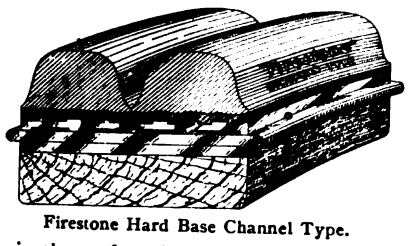
The Firestone block tire has a continuous base from which one or more



Firestone Block Tire.

sections may be cut and new ones substituted, without in any way impairing the solidity of the fastening. The blocks allow more escape for the rubber than a regular tread and quicker radiation of heat also better traction and greater resiliency.

The hard base channel type is composed entirely of rubber, having no cross bars, side wires or other metal in its construction. Its hard rubber base is cured in an endless rim with saw-tooth



Firestone Hard Base Channel Type.

projections, forming a positive union of rubber on steel. The tough rubber tread is vulcanized to this hard rubber base. Ample protection against side abrasion is afforded by the upturned sides of the channel.

Both the above block and hard base types are made in single and dual forms. They may be used on removable rims, permitting quick tire changes with no other tools than a wrench. Special attention is called to the fact that these rims allow both dual tires to be taken off without removing the wheel.

The "Economizer" Hopper-Cooled Engine.—H. L. Chapman of Marcellus, Mich., manufacturer of the "Economizer" Hopper-Cooled Engines, would like to send a descriptive pamphlet with full particulars to every reader who is thinking of putting in power. The "Economizer" engine possesses some points of advantage which Mr. Chapman desires to bring to the attention of our readers.

Cyclone Disc Sharpener.—This is manufactured by Mayer Brothers Company of Mankato, Minn., and has some points of advantage which the manufactureres would like to explain to every reader interested in disc sharpeners who will write to them for further particulars. This tool is a money maker and a time saver, as well as a labor saver.

Varnish and Soap.—The automobile handed difficult problems to the varnish maker. Mud and dirt could be coped with, but mud, oil, and grease were an equation hard to solve when the chassis was covered with the three. No varnish has been compounded that could itself stand the soap-suds that were needed to clean the chassis of the grease, so nothing would "stand up." You must have soap with a good mordant if you want to cut away the grease, but it likes the oil in the varnish just as well, as all oils look alike to such soap.

To compound a chassis varnish that would surmount these "troubles" was an achievement, and Valentine & Company have done it and tell all about it in a booklet. The whole Vanadium family of varnishes made by the company are very remarkable as a step in advance in the art of varnish-making, but this Vanadium chassis varnish is an epoch-maker, and is the something new the painter will prick up his ears about, hence, we are doing all the fraternity a service by calling attention to the series of freely-given away booklets the company sends on application. These can hardly come under the head of advertising effort, as the issue is more educational and informing. The reader is asked to think about it, experiment with it, and try out the claims made.

For this very instructive book, address Valentine & Company, 257 Broadway, New York, and mention this journal.

Want Advertisements.

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED.

will be inserted under this head at 2 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1. Address

M. T. RICHARDSON CO.,
Publishers of The Blacksmith and Wheelwright
71-73 Murray St., New York

PATENTS FOR INVENTIONS.
H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.
We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., Publishers, 71-73 Murray Street, New York City.

BROTHER.
Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

CASH FOR YOUR BUSINESS OR REAL ESTATE.
If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

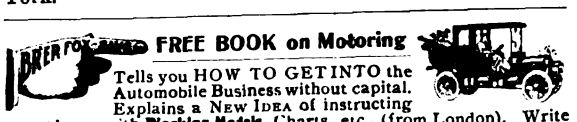
WANTED.
WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

MECHANICS.
Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

WE BRING BUYER AND SELLER TOGETHER.
If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

BUSINESS WANTED.
I am looking for a good business; will pay cash if price is right. B. W. BUYER, Box 975 Cherry Valley, Illinois.

DESIGNS, DRAWINGS AND SKETCHES
Of pleasure and commercial automobile and other bodies for the trade. No order too large or too small to receive prompt attention. Write for information and get aquainted. GEO. J. MERCER, Automobile Body Designer, American Building, Columbus Circle, New York.



PATENTS.
C. L. PARKER, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

PATENTS.
Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. DAVIS & DAVIS, 908-914 G St., Washington, D. C., and 220 Broadway, New York City.

FOR SALE.
On account of sickness in family will sell good general repair business. New shop with modern flat above, worth $2,500 for $1,600. Can be handled for $800 cash. For particulars address Lock Box 524, Sheldon, Ill.

FOR SALE.
Two-story brick building, 30x50 feet, 3 lots on main street in good Wisconsin town, having three railroads. Good machinery and tools. Easy payments. Six per cent. on deferred payments. Address A. J. Sinkula, Taylor, N. D.

BLACKSMITHS.
Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

FOR SALE.
Blacksmith and wagon shop, stock, tools and machinery including 8 H. P. engine, trip hammer, emery stand, two fires, power blower and plenty of hand tools. Work for two to three men year around. Only shop in town in South Minnesota, big territory. A snap if taken at once. Must sell on account of health of family. Size of shop 24 x 54 on main street. Address C. H. WHISSEMORE, Alpha, Minn.

FOR SALE.
Good six room house, power shop. Asthma reason for selling. Will send photographs of buildings and other parts of town on request. Address R. E. KEENE, Wilsey, Kansas.

WANTED.
To trade a 10-room house and one-half acre of ground 23 miles from Scranton, Penna. for shop and tools in Pennsylvania, South New York or North New Jersey. Address A. L. MERITHEW, Worland, Bates Co., Mo.

FOR SALE.
Blacksmith shop, wagon shop, implement business, house and barn. Good trade for two men, all buildings new. All inquiries will be answered. Address LYNN MASTENBROOK, Bowens Mills, Mich.

WANTED.
All around blacksmith and shoer. Steady job. Or to rent shop on percentage. Write at once to F. J. PAVELAC, Lyle, Minn.

FOR SALE.
McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

FOR SALE.
Blacksmith tools and stock. Two fires, good location, will sell cheap if taken soon. Address J. H. BRIGHT, Blackfoot, Idaho.

FOR SALE.
General blacksmith shop, with lot, tools and stock; also residence. Splendid opportunity for auto garage; only shop in town, good trade; reason for selling, going to Norway. L. J. BROMSTAD, Shelly, Minn.

BARGAINS FOR SALE BY FRANK P. CLEVELAND.
THRESHING RIG consisting of 16 horse-power engine, Colorado Special separator; Birdsell clover huller; Stevens separator; also Buckley traction ditcher. Will sell separately; price of entire outfit $2,600 F. O. B. Shipman.

THRESHING RIG Rumlet separator; also 20 horse-power Rumley traction engine and six hole cord sheller; will exchange for land; price $1,600 Grafton, Neb.

THRESHING RIG; 18 horse power Buffalo Pitts engine. Red River separator; Birdsell clover huller; six roll McCormick corn sheller, belts, etc.; price $1,600 F. O. B. Monroeville.

PLOW OUTFIT—20 horse-power International gas tractor; also six bottom case gang plow, and 45 gallon gasoline tank; price $1,500 F. O. B. Wahpeton, North Dakota.

BLACKSMITH SHOP AND BUSINESS in Pike Co. Pa. 2-story building 20 x 30 feet in size; lot 84 x 100 feet; fine opening for a practical workman; price, $1,300.

WISCONSIN—BLACKSMITH SHOP, HOUSE AND LOT in Sauk Co. Shop 2 stories high, 24 x 40; 8-room house and large lot; price $3,500.

WISCONSIN—Blacksmith and wagon shop at a good point in Fond du Lac Co., fully equipped power shop; will sell shop, tools and residence for $5,000.

KANSAS—BLACKSMITH SHOP AND IMPLEMENT BUSINESS at a good point in Washington Co. This is a power shop with a full set of tools and machinery. Price $1,000.

No matter where located if you want to buy, sell or exchange any kind of business or property anywhere, write me. Established 1881. FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

FOR SALE OR LEASE.
Blacksmith, Repair and Paint Shop, doing a good business, employing five or six men. Lot 50 x 150 feet, location in thriving city. Call and see FRED A. CROVE, Englewood, N. J.

THE BEST BLACKSMITH TONGS IN THE WORLD.
They will hold any shaped iron tight without any grip of the hand. Good testimonials. Write the EUREKA TONG COMPANY, Tupelo, Miss.

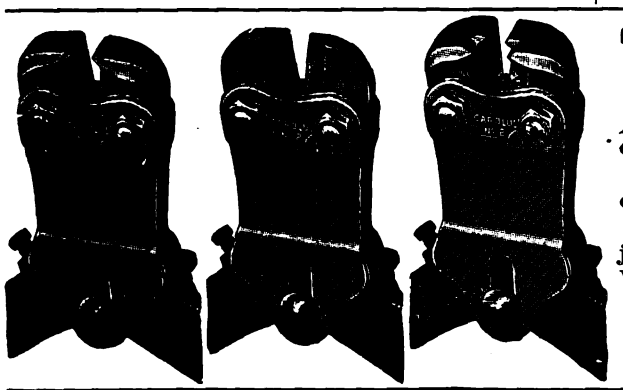
BLACKSMITH WANTED.
A good shorseshoer and general jobber. Steady work for reliable man. Address C. E. HODGE, Wingdale, R. F. D., Webatuck, N. Y.

FOR SALE.
Good property with house barn and shop in country village, Jefferson County, Iowa. Fine location for blacksmith. Terms reasonable. For further particulars address D. J. LAWRENCE, West Wellington, Iowa.

FOR SALE.
Blacksmith and horseshoeing business shop and lot cheap in county seat, 4,000. Reason health, going south. Cash price, $700. Business amounts to from $1,900 to $2,100 a year. Address F. W. MEIER, 219½ So. Main Street, Upper Sandusky, Ohio.

FOR SALE.
General Blacksmithing and Wagon Repairing Shop, horseshoeing, also tools, stock and shop and lot all for sale. For particulars address NELS H. NELSON, Box 113, Canova, So. Dak.

WANTED.
A Blacksmith and horseshoer, steady job the year around for a good sober man. State wages wanted. Address Geo. C. SCHRECK, Paw Paw, Lee County, Ill.

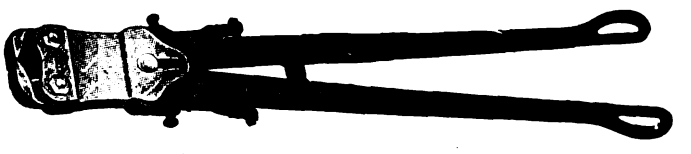


"CAROLUS" BOLT CLIPPERS AND NUT SPLITTERS

Are the simplest, most complete, practical and durable tools of this kind made.

Three different styles as shown in the cuts attached.

Insist on getting these tools. If your jobber cannot supply you, write us and we will take care of your order.



Both Horizontal and Vertical Cut Bolt Clipper.

CIRCULARS AND PRICE SENT FREE.

CAROLUS MANUFACTURING CO., Sterling, Ill.

A Table or Desk Lamp.

This is a 300 candle power inverted portable gasoline lamp for home or business use, table, desk, pulpit, work-bench, office, library, store, shop, or wherever a stand lamp can be used. Can be carried around with more safety than a

The Triumph Table or Desk Lamp.

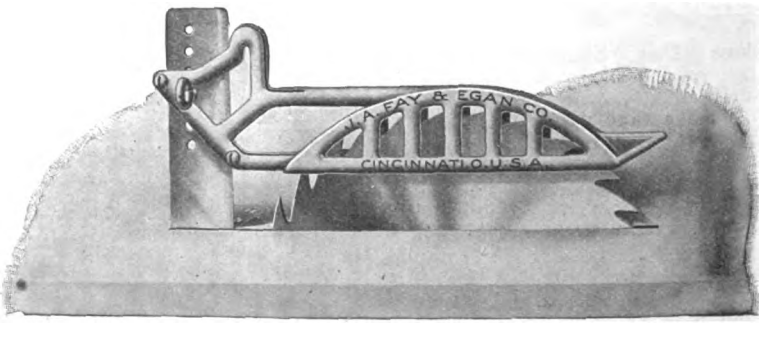
kerosene lamp, gives far more light, and does not cost nearly as much to operate, which almost any child can do. Better than any gas or electric lamp, because it has no drop wire or hose to interfere with its being moved, or used, anywhere. Mechanically perfect, and built on such graceful lines, it will harmonize with the most select and fastidious surroundings. It cannot be turned high enough to smoke, or low enough to extinguish it, can be kept burning at a mere glimmer, and turned up instantly when more light is desired. It holds about two quarts, and, being an overhead generating lamp, the gasoline remains ice cool at all times up to the generator or valve, a factor of safety exclusive in this lamp.

One gallon of gasoline and a few strokes of the little pump that goes with each lamp will run one of these lamps 30 to 40 hours at 300 candle power on an average cost of about ¼ cents per hour. The demand and success is phenomenal. For further particulars and prices, address the Brilliant Gas Lamp Company, 182 N. State Street, Chicago, Ill., and mention this publication.

"Minor Repairs and the Care of Tires."—This is the title of a little booklet just brought out by the Firestone Tire and Rubber Company, Akron, Ohio. It tells how to make repairs on tires and inner tubes, and contains many suggestions on the care and preservation of tires, in order to get the utmost service out of them. We understand that a copy of this booklet will be sent free of charge to any reader of this paper who will take the trouble to write for it.

An Aluminum Saw Guard.

Herewith is shown an illustration of a new idea from the J. A. Fay & Egan Co. It is a new guard made of aluminum. This guard is a most efficient safety device made for circular saws. The hood, being made of aluminum, is very light and does not interfere with the operation of the saw, nor mar the work in any way. Neither will it damage the blade should the hood by some accident be forced against it. The guard complies with all safety appliance laws in every respect.



New Saw Guard.

The guard is mounted on a steel standard which is easily removed, while the hood is quickly set for various thicknesses of stock or can be thrown when not required. The laws of practically every State now make it obligatory to use saw guards, and where none are provided there is no defense against an action for damages for injuries sustained by the operator. Now that there is a guard which affords the needed protection without decreasing the efficiency of the operator, there is no excuse for not applying it to every circular saw. For further information, application should be made to J. A. Fay & Egan Co., No. 175-195 W. Front Street, Cincinnati, Ohio.

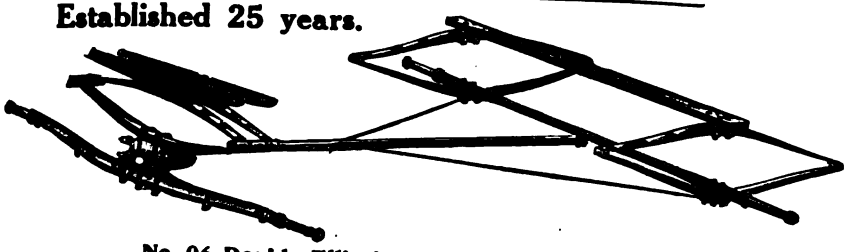
Schubert Bros. Gear Co.

44 Cedar Street, Oneida, N. Y.

DESIGNERS and manufacturers of high grade vehicles and gears in the white, tops for carriages and automobiles, automobile bodies, also trimmings.

Our new catalogue sent free on application.

Established 25 years.



No. 06 Double Elliptic Front and Platform Gear.

The Perfect Power Hammer.

Note the difference in construction over other makes:

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other Hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented **Friction Clutch** fitted with **Ball Bearings,** absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the Hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

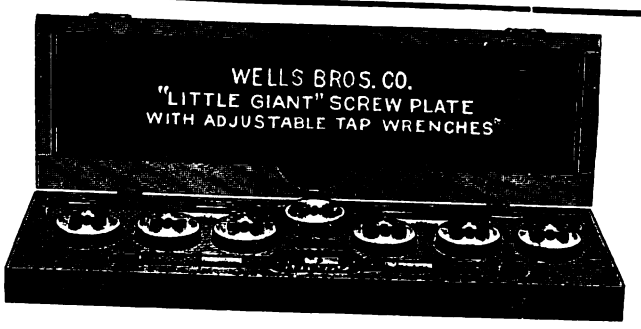
Will ship to any responsible party on approval. If not as represented, no sale.

Made in two sizes:

8 inch square, 40 lb. ram—shipping weight, 1,150 lbs.
4 " " 80 " " " " 1,800 "

Write any jobber for prices, or

Macgowan & Finigan Foundry and Machine Co.,
204 North Third St., ST. LOUIS, MO.

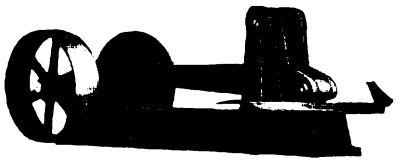


A Good Roadster.

A LITTLE GIANT Screw Plate will cut more miles of thread than any other plate.
Look it over. It's sound. It's built on sound principles.
You get an adjustable die, yet it is as rigid as a solid one.
We guarantee our tools.

DO YOU WANT OUR CATALOG?

Wells Brothers Company, Greenfield, Mass., U. S. A.



Oh, LOOK HERE, What's This?

Why it's the

"Justrite" Plow Blade and Disc Sharpener,

that every blacksmith ought to have. Does more and better work than power triphammers, leaving the plow lay rolled to a sharp, smooth edge and free from nicks.

IT'S THE BEST YET.
ASK YOUR JOBBER OR WRITE US DIRECT.

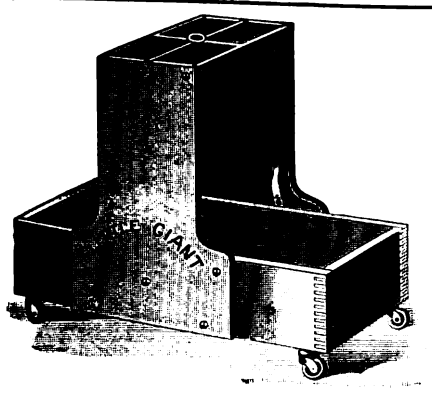
What a User has to Say:

Gentlemen: Fairmount, N. D., Aug. 20th, 1911.

I have found the "Justrite" machine just what they claim it to be and I wouldn't be without one. I had a triphammer but I sold it the first chance I had as soon as I owned this machine. I think the Justrite is O. K.

(Signed) G. A. WELGE.

Address STRITE GOVERNOR PULLEY CO., MINNEAPOLIS, MINN., 302 South 3rd Street.



ATTENTION, BLACKSMITHS!

The New

Little Giant Farriers' Tool Box No. 2

16 Inches High

To meet the demand of tall farriers.

MADE BY

B. B. NOYES & CO.,
Greenfield, Mass.

ASK YOUR DEALER FOR THEM.

No matter how badly they are broken we can repair them in good shape

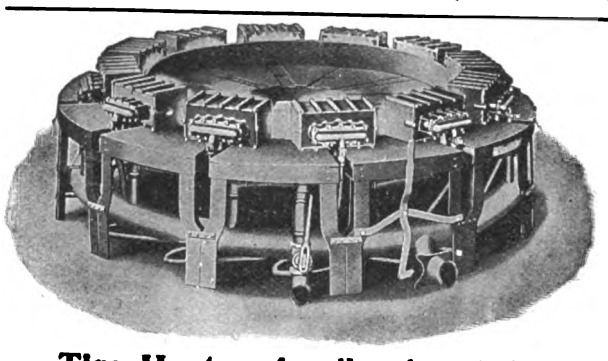
LOOK AT THIS **THEN AT THIS**

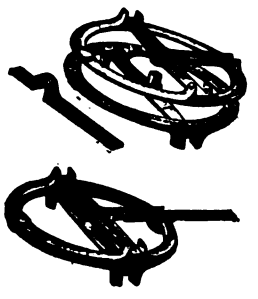
Write for Prices

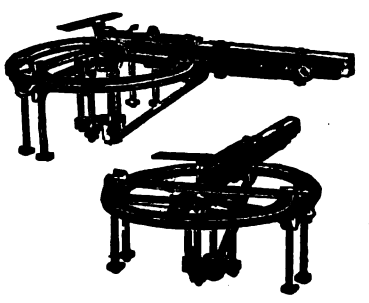
Columbus Anvil and Forging Co.
West Frankfort Street
COLUMBUS, OHIO

We are experts at repairing Old Wrought Anvils

We manufacture the Celebrated "ARM AND HAMMER" BRAND ANVILS **Ask Your Dealer for Them**







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A 300 Candle Power Shadowless Light that can be turned up and down like gas and left burning at a mere glimmer and instantly turned up when more light is needed.

Equal for any purpose to a private gas plant entirely under your own control, so simple anyone can operate. Better than gas, kerosene or electricity at half the cost. We have five other distinct lines of gasoline lamps and hollow wire systems. **Catalog B. & W. tells why. Write for it now** and be our agent.

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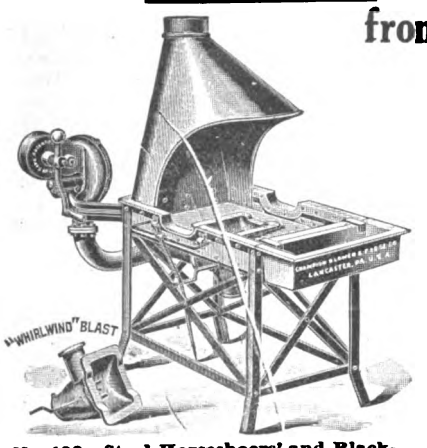
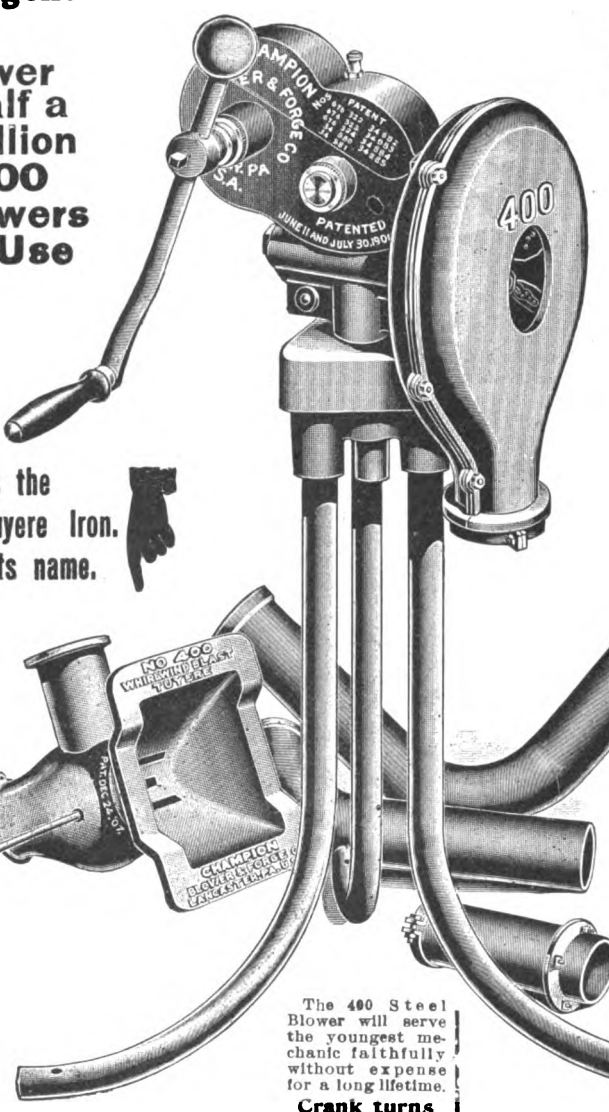


No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

Also Great Britain Patent No. 9,662, May 25 1900.

The Blower for Quality, First, Last and Always

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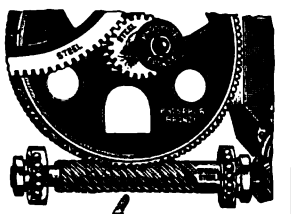
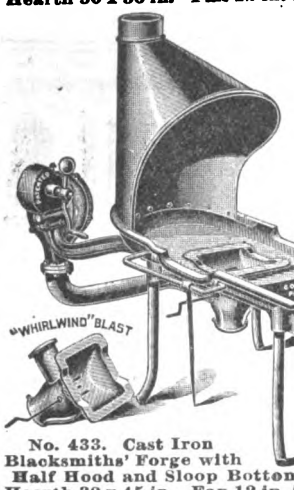


It's the all in Spiral

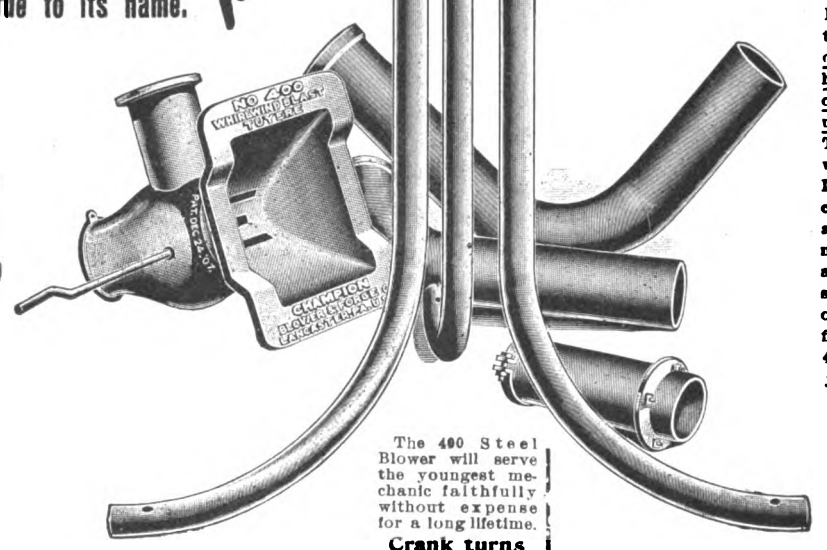
The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost



No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

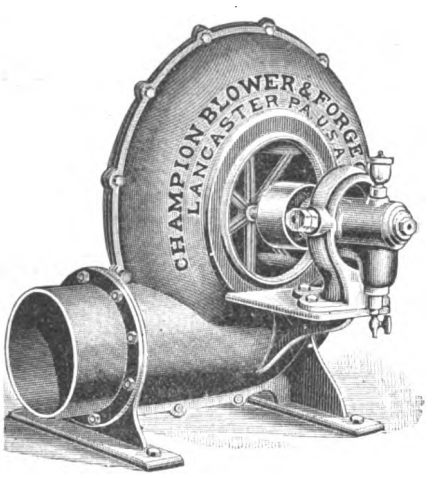
Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

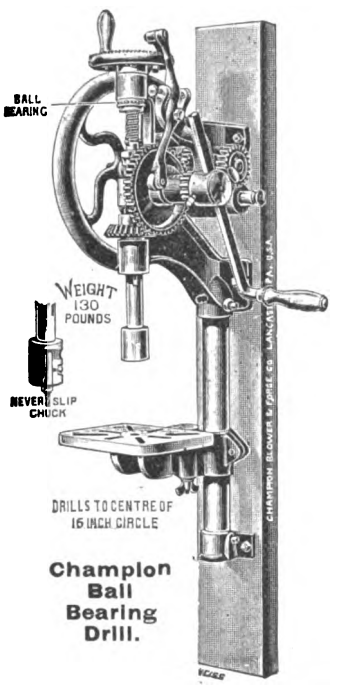


Champion Power Blowers made in ten sizes up to 64 inches in height.

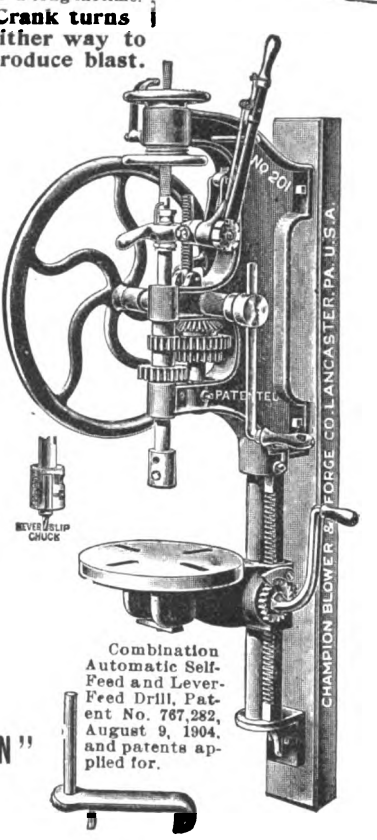
The Champion Latest Invention!

Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



Champion Ball Bearing Drill.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill Manufactured.

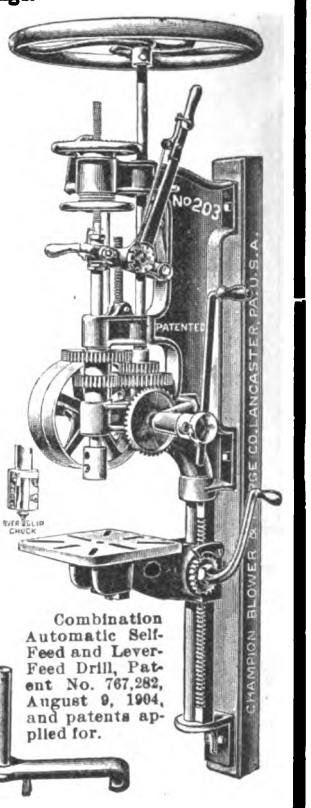
Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

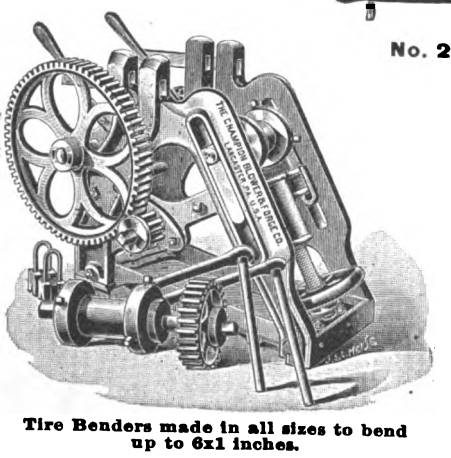


Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.

THE CHAMPION "COLUMBIAN" TIRE BENDER

No. 4. American Tire and Axle Shrinker.
Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.



Tire Benders made in all sizes to bend up to 6x1 inches.

No. 105. Electric Full Mounted Screw Plate.
Screw Plates in four styles cutting up to 1½ inches.

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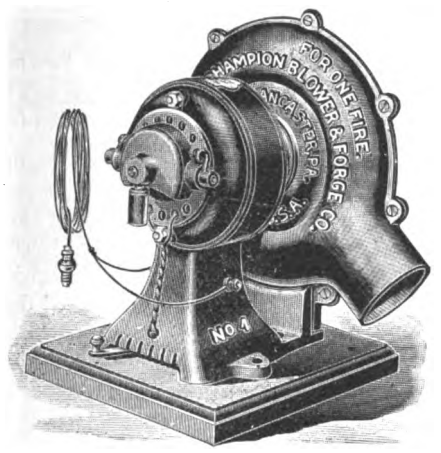
CHAMPION One-Fire Variable Speed Electric Blacksmith Blowers

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements



No. 1 One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for light and medium fires.

THE ELECTRIC SUCCESS.

The four illustrations show a very complete line of Electric Blowers, running up to nine fires, which we recommend in every instance, each fire to be equipped with its own individual Electric Blower so it gives each operator full and complete control of his own individual fire, and a large saving in the consumption of electric current. The material, workmanship, etc., used on these Blowers are of the very best.

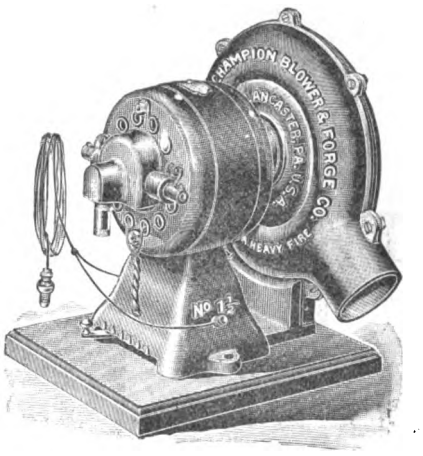
No. 1 and No. 1½ One-fire Variable Speed Electric Blacksmith's Blowers are equipped with attachment cord and plug.

This Variable Speed Electric Blower eventually costs you nothing, because it pays for itself in a very short time.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

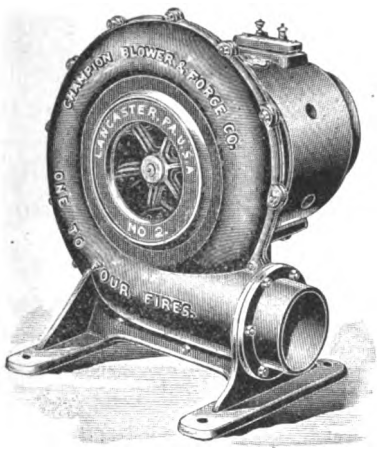
No. 1½ for Extra Heavy Blacksmith Fire

Motor capacity 50% above requirements

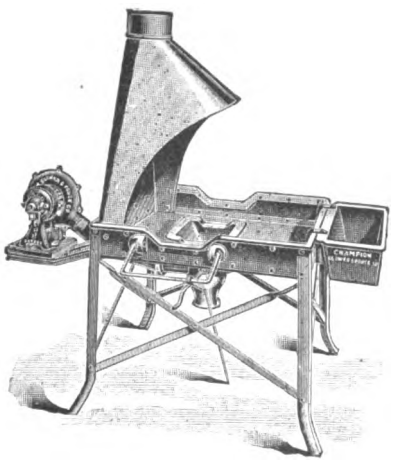


No. 1½ One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for extra heavy fires.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER

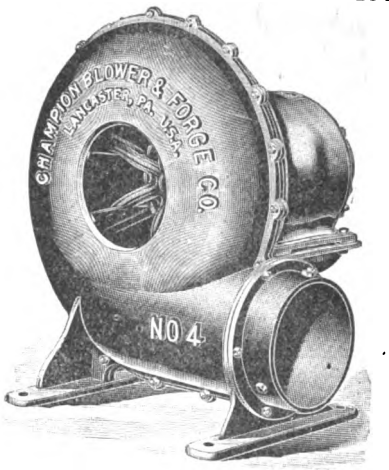


No. 2 Electric Blacksmith's Blower. Will blow from one to four fires.



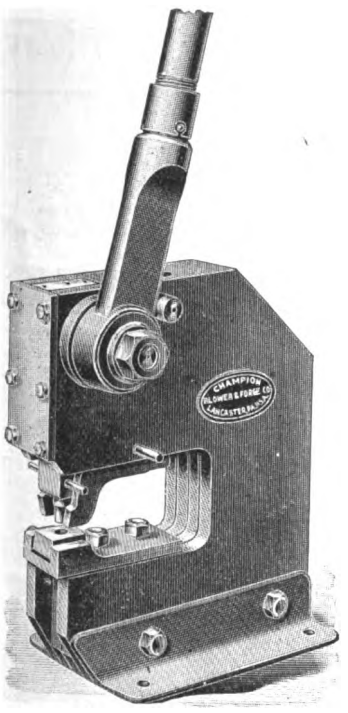
No. 440. Champion Blacksmith's Steel Forge with "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron, equipped with No. 1 One-fire Variable Speed Electric Blacksmith's Blower with five speeds, for light and medium fires. Hearth, 30x36 inches, height 30 inches, with hood complete.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER



No. 4 Electric Blacksmith's Blower. Will blow from one to nine fires.

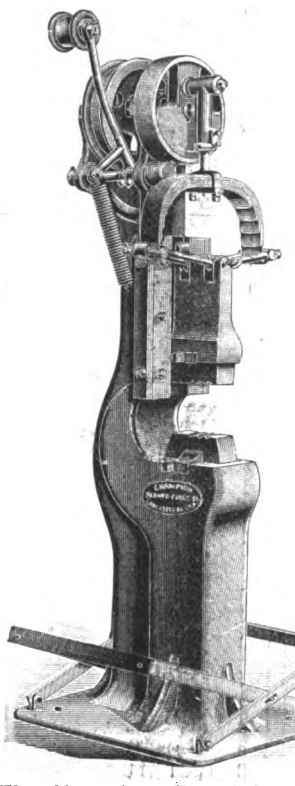
FOUR NEW CHAMPION TOOLS



Champion Steel Punch.

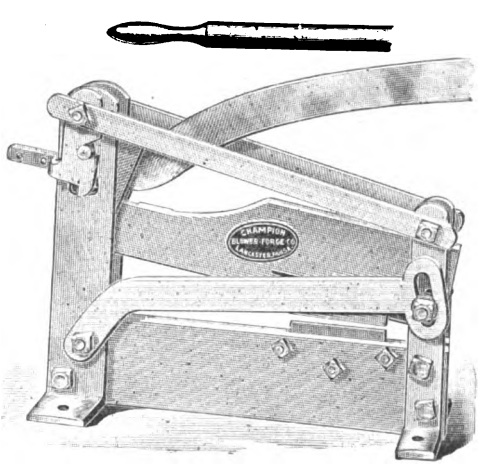
No. 1 punches 5/16 inch hole in ¼ inch material.

No. 2 punches ⅜ inch hole in ⅜ inch material.



The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



No. 1 Champion Wrought Iron and Steel Shears. Will shear 4x½ inches flat and 1 inch round or square. Weight 255 pounds.

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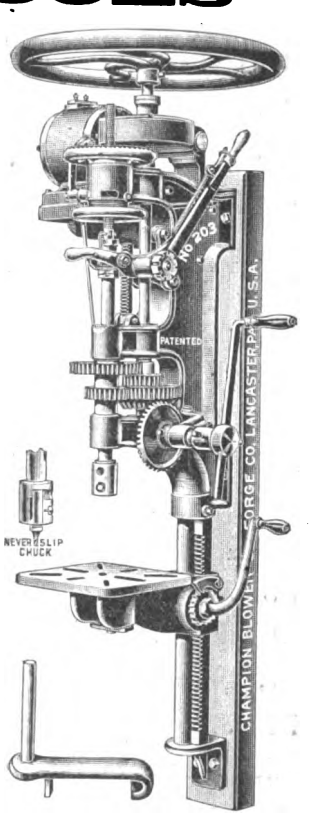


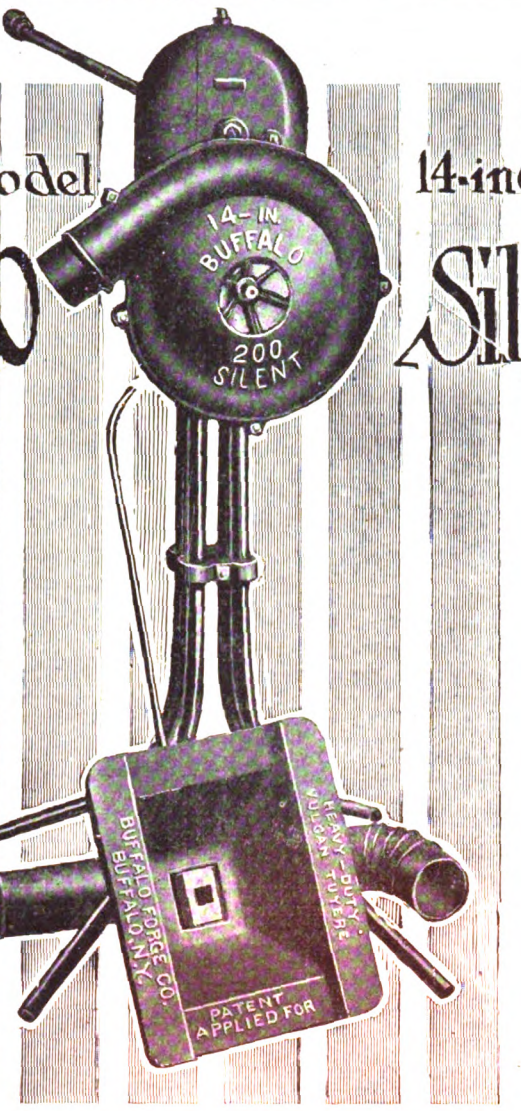
No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.

CHAMPION BLOWER & FORGE CO.

LANCASTER, PA., U. S. A.

1911 Model Buffalo 200 14-inch Fan Silent Blower



151-lb. Rails heated by 14-inch hand blower in Railroad Shops

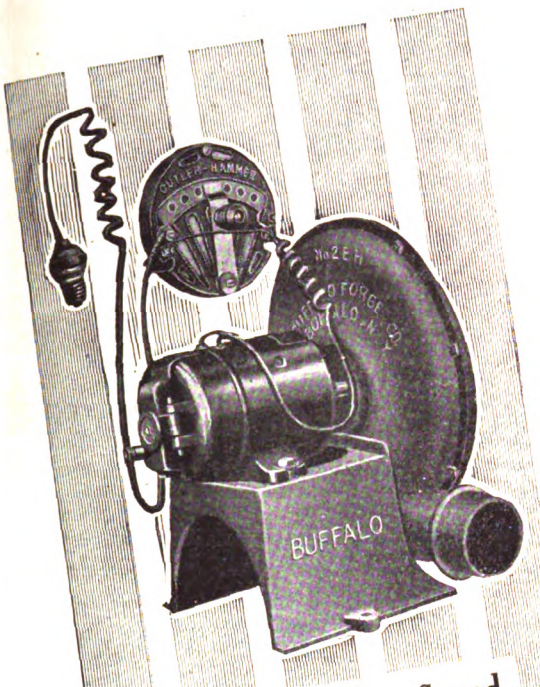
The United Railways and Electric Co. of Baltimore, informs us that they have used the **14-inch** blower for **heating 151-lb. rails for frog spacing,** after they come from the foundry; also that **all their welding** in the shops is done with this 14-inch—No. 200.

The American Pipe and Construction Co., Amsterdam, N. Y., advises us that they handle material **up to 7-inches wide** with this blower without any trouble.

Those are only two cases out of a thousand in which the 14-inch Buffalo 200 is used for work impossible to handle with any other **hand** blower in existence.

Six-year old boy wants to run 14-inch blower all day

You think it must be a wonderful boy who can run a 14-inch blower all day. The fact is, it isn't that the boy is so much stronger than other boys, but rather the **blower that is so much easier running** than other blowers. Mr. Fred Habermehl, of Clarington, Ohio, says it runs so easy he has to make his 6-year old boy leave it alone, because he wants to run it all the time. Now wouldn't you consider yourself in good luck, just like Mr. Habermehl does, to get a blower like that? It costs no more than others. Write us. We have a special proposition for you.



Buffalo Variable Speed Electric Blower

No cost of installation. We furnish it complete with wire and plug. Simply attach to lamp socket. Uses less current than a 16 C. P. electric bulb. Dust proof casing, with hinged doors. Triple size brushes. Automatic oiling. Oil cup cannot be broken. Large fan, giving high pressure at low speed, saves power and lengthens life. Ask for full description No. 154B

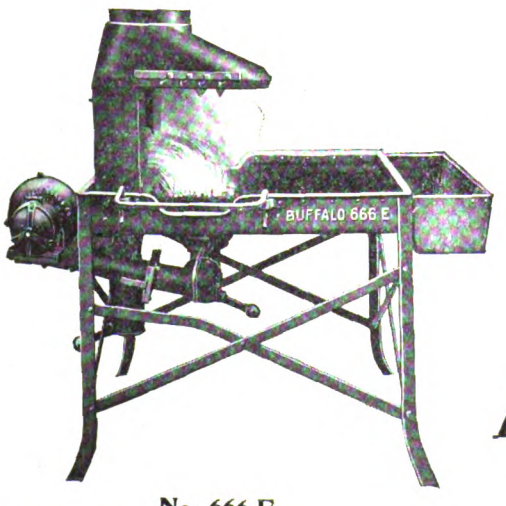
No. 650

Buffalo Forges

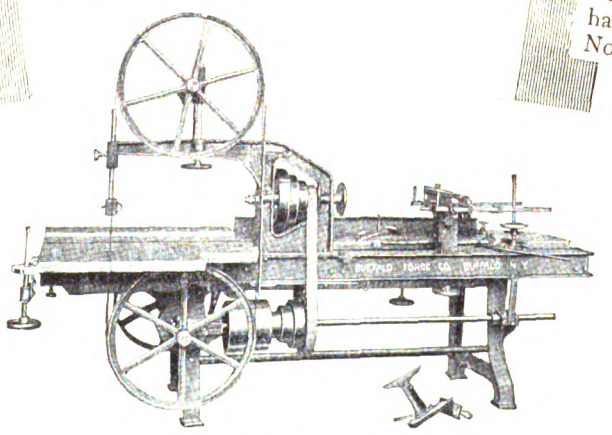
Every size and style carried in stock. Fitted with famous 14-inch "200" Blower, and heavy tuyere with clinker-breaking valve. Note balanced ash gate and the special strong manner of bracing the legs. Ask for Booklet No. 126 B.

Buffalo Ball Bearing Drill No. 94

Drills holes up to 1½-inch to center of 21-inch circle. Ball bearings relieve 90% of all friction at end thrust of feed screw. Crank turns in same direction on both speeds; change of speed obtained by sliding collar. "Sure-grip" chuck—no threads, no set screw. Fasten or loosen bit by twist of hand. Complete drill catalog No. 119 B sent on request.

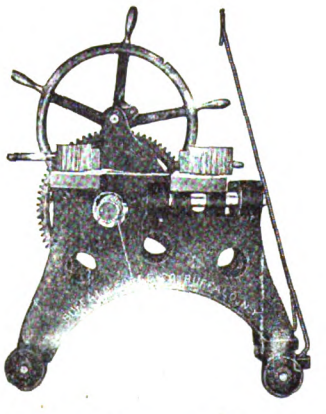


No. 666 E.
Electric "Down Draft" Steel Forge.



Crain Combination Woodworker.
12 Machines in One.

Buffalo Forge Company
Buffalo, N.Y.



No. 4 G. Buffalo Tire Upsetter.
Ask for complete description 121 B.

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BLACKSMITH AND WHEELWRIGHT

Vol. LXV. No. 4. NEW YORK, APRIL, 1912. TERMS: ONE DOLLAR A YEAR

MOTOR TRUCK BODIES.

Directions Given for Construction of Some of the More Common and Convenient.

BY WAGON MAKER.

The great variety of trucks and the different ways employed in their consturction by the best builders making a specialty of custom work is not only interesting but also very instructive to the majority of mechanics. They are built with and without tops and the style of tops differs considerably. The sides of trucks have stakes removable or stationary; rails the whole length or partly open; paneled partly or entirely; hinges, doors and traps or made to shift. A great many are of special style and construction.

We illustrate four drafts which are totally different and the explanation will show the manner of construction. We give each body a certain length, width across, height from bottom to top, and width of frame across, but all these dimensions vary in practice because for custom work they must not only be built to carry a certain load of merchandise but must also fit the frame, which is in both cases of the most importance to the wagon builder and the party it is built for.

The engine may be above or below the frame. The wheels must have a certain amount of clearance and to be driven by gasoline or electricity. Therefore, we can only illustrate the styles and the manner of the different constructions.

Fig. 1 is an eight post top truck, best suited for an electric frame. In some of the electric built trucks the front wheels turn under the frame, therefore the body rests on 2-inch thick cross bars only, but the majority turn against the frame and the body is raised 4 to 6 inches above the tires and the frame can be built narrower to give enough room for the wheels to turn under and the body raised by either lengthwise or cross bars, which, in the best practice, and especially for those wide bodies are from 5 to 6 inches across.

On this draft there are cross bars only, which are 4½ inches deep, but they may be needed higher or lower, depending on the height of the frame from the floor and diameter of tires. The position of cross bars is also important, because on a wide body they may interfere with the front or rear tires. In all wide cars the cross bars must be shifted, and the number decreased or increased to suit the construction of the frame. The above also holds good on the position of the posts, movable stakes, side drop gates and battery boxes which generally are placed between cross bars. Therefore, the way the cross bars are placed on the draft may not suit on many frames without different lengths, and consequently must be shifted to suit, and the same with the position of posts.

The length of this truck outside of the end posts is 11 feet 3 inches; 4 feet 8 inches across outside of rails and entire height 7 feet. The head room for the driver is 3 feet 5 inches. The stakes and rails, front and rear end of body, are stationery, but the two stakes on each side at the center are removable so that the loading can be done from the side or rear end. There are no sills on this body and no bottom boards, but 1½-inch planks, six in all. The two side planks are 7 inches wide and the other four 10 inches wide and all bolted to the cross bars. Some builders discard the wooden cross bars and use iron ones and place them under the body 12 inches apart, and no doubt they are far superior to the wooden ones. Bottom boards can be bolted direct to the flanges alternately on either side. The stakes and posts are mortised through the planks and all are ironed from the inside with corners running from the narrow side boards over to the wider ones, and are bolted to the planks with counter sunk heads. The removable stakes pass through a 3-16 to 3 inch wide plate, and under the plank are sockets as shown on side, back and bottom view. All rails are bolted to the stakes and posts and the body can be taken to pieces if needed, as very piece is bolted including the cross bars. Note the hooks and rings on the stakes and posts, also the hook rods on the side and rear end, as every well finished wagon should have them.

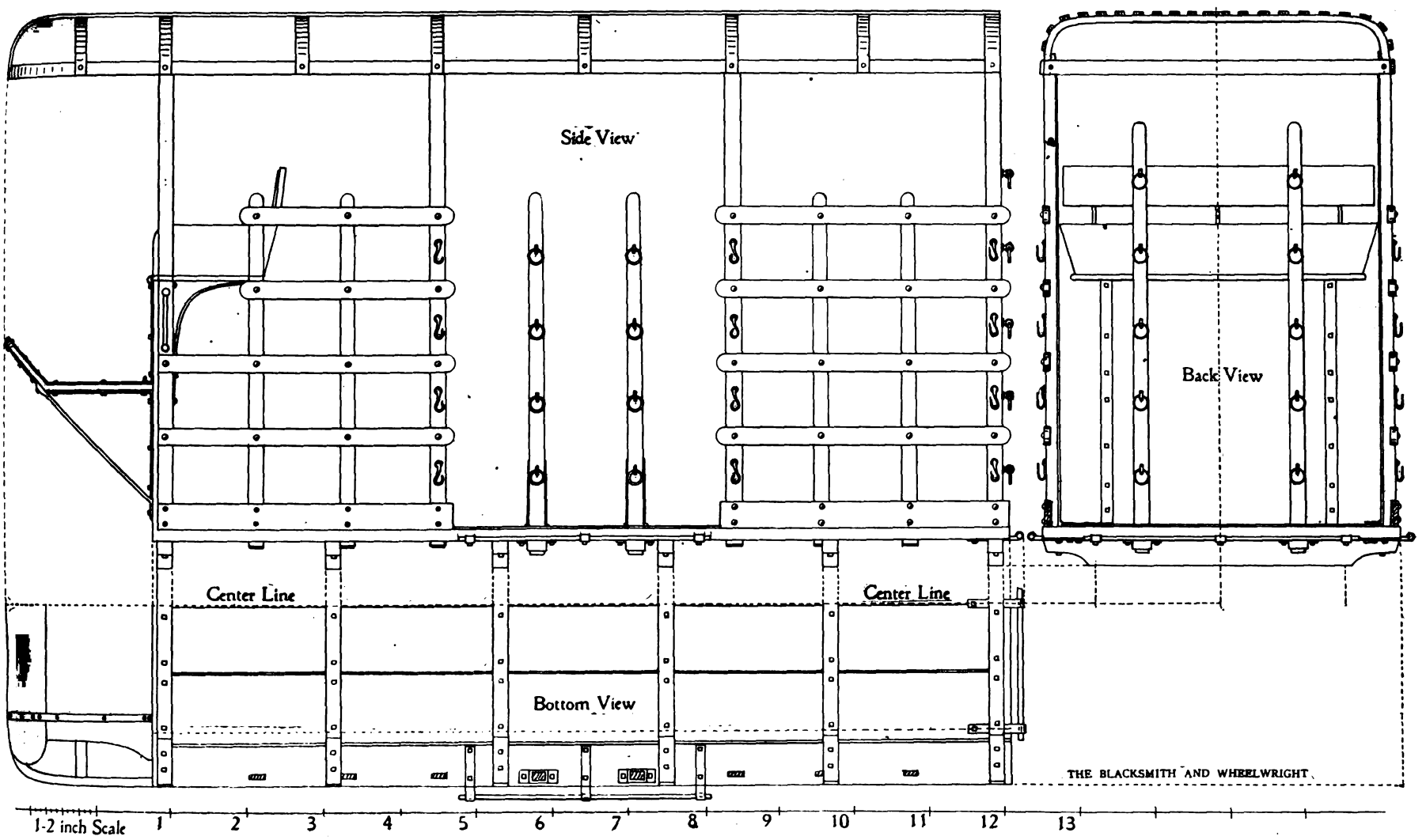

Fig. 1.—Sills and bottom boards are discarded on this body and replaced with 1½ inch thick planks over the entire surface. The eight posts and stakes are mortised into the side planks, and all strengthened with corner irons running up to top rails on the posts.

The top is finished with bent bows and covered with ½x1½ inch strips 1 inch apart. The bent bows are fitted to the straight posts and side rails, making the least expensive top, and as durable and light as can be made.

Fig. 2 is built without a top, with eight stakes on each side and 10 feet long on single irons. This body is built without sills but has bottom boards, and instead of sills, angle irons take their place. This construction is most practical, durable and less labor than those with wood sills. When built with angle iron the whole structure rests on the cross bars and should be not less apart than 15 inches, but 12 inches would strengthen the structure. The angle irons are 4 x 4 inches and bolted with two bolts, one for each end of each side bar. All stake sockets are bolted with four bolts on the angle iron, which should not be less than ¼ inch thick. The angle irons have a great carrying capacity and are far superior to wood sills, making each side of the body very stiff. The sockets, bolted 4 inches deep, bolted with four bolts, will give a far better hold to the removable stakes and will not wear as easily as those fitted in 1½ inch thick wood sills.

The angle irons are notched into the cross bars ¼ inch and bottom boards rest on top of it. The bottom boards are ¾ inch thick and the end wood of boards extends ½ inch outside of the cross bar. A better way is to make the back cross bar ¾ inch deeper, rabbet in the bottom boards, and put ⅛ x 3 inch iron over the joint and level with rear edge of the cross bar, thus making a good support for loading and unloading without splitting the bottom boards or cross bars. On this body all the stakes are on the outside and boards are on the inside. All bolts and inside boards are riveted with flat bolt heads for the bottom boards, making a smooth surface over all, which is appreciated by drivers.

This body is 64 inches wide, outside of stakes, and therefore has considerable overhang on each side, and as the cross bars are close together and must be equally divided the body must be raised at least six inches above the tires. The cross bars at the ends where

the wheel is situated is 2 inches deep leaving 4 inches for the body to settle before it will strike the cross bars when the body is fully loaded.

The three rear stakes are made to shift and

To increase the strength on the joint the side boards are rabbeted down ¼ inch, making a shoulder which rests on the sill, the boards being screwed to the sills with 1¾ inch No. 14 screws 6 inches apart. There are no strap

end cross bars 2¼ inches, bottom boards rabbeted into it. This gives more carrying capacity to the sills and the water and dampness will not accumulate between the bottom boards and sills. The top rails are lapped to

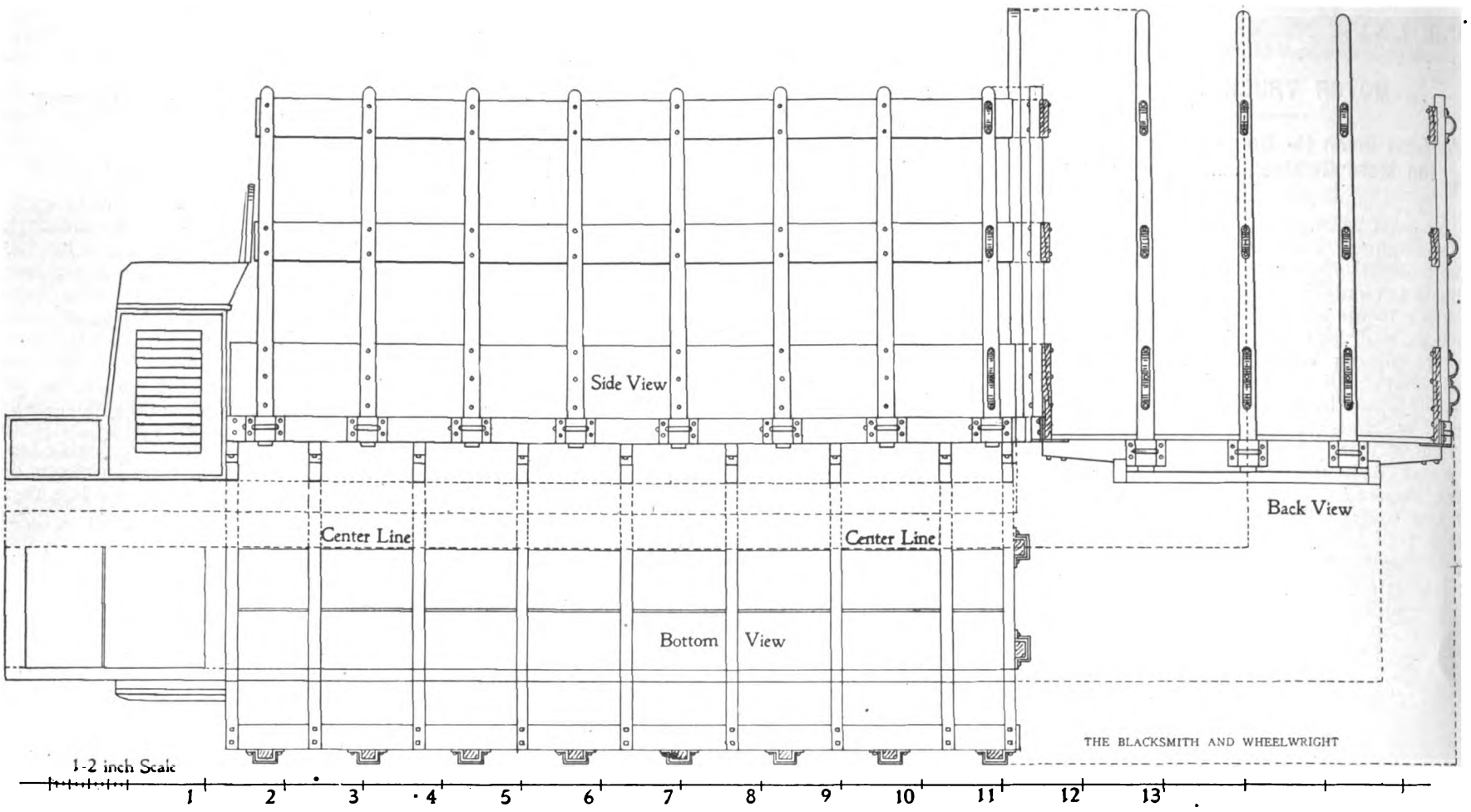

Fig. 2.—Built without sills and replaced with angle irons, but has ¾ inch thick bottom boards. All stakes are stationary but can be made to shift, as they are not bolted. The three rear end stakes are made to shift.

provision is made to close the rest of the spaces in with drains. The seat is above the engine as wide as the frame is apart, is made to shift and is bolted to the frame with four bolts. The body is bolted to the frame with six bolts.

Fig. 3 body is 8 feet 6 inches long; 4 feet 6

bolts, but angle irons to which the entire depth of the side boards is bolted and the angle on the top of the bottom boards and sills is 8 inches long. On the three posts the inside irons run up to the top rail and the angle on the bottom boards is 12 inches long. The six

the posts and top covered with two or three ply built up wood, filled in and varnished on the inside, canvassed with muslin and the outside painted same as usual.

The seat is separate from the body and both are bolted independently to the frame. The

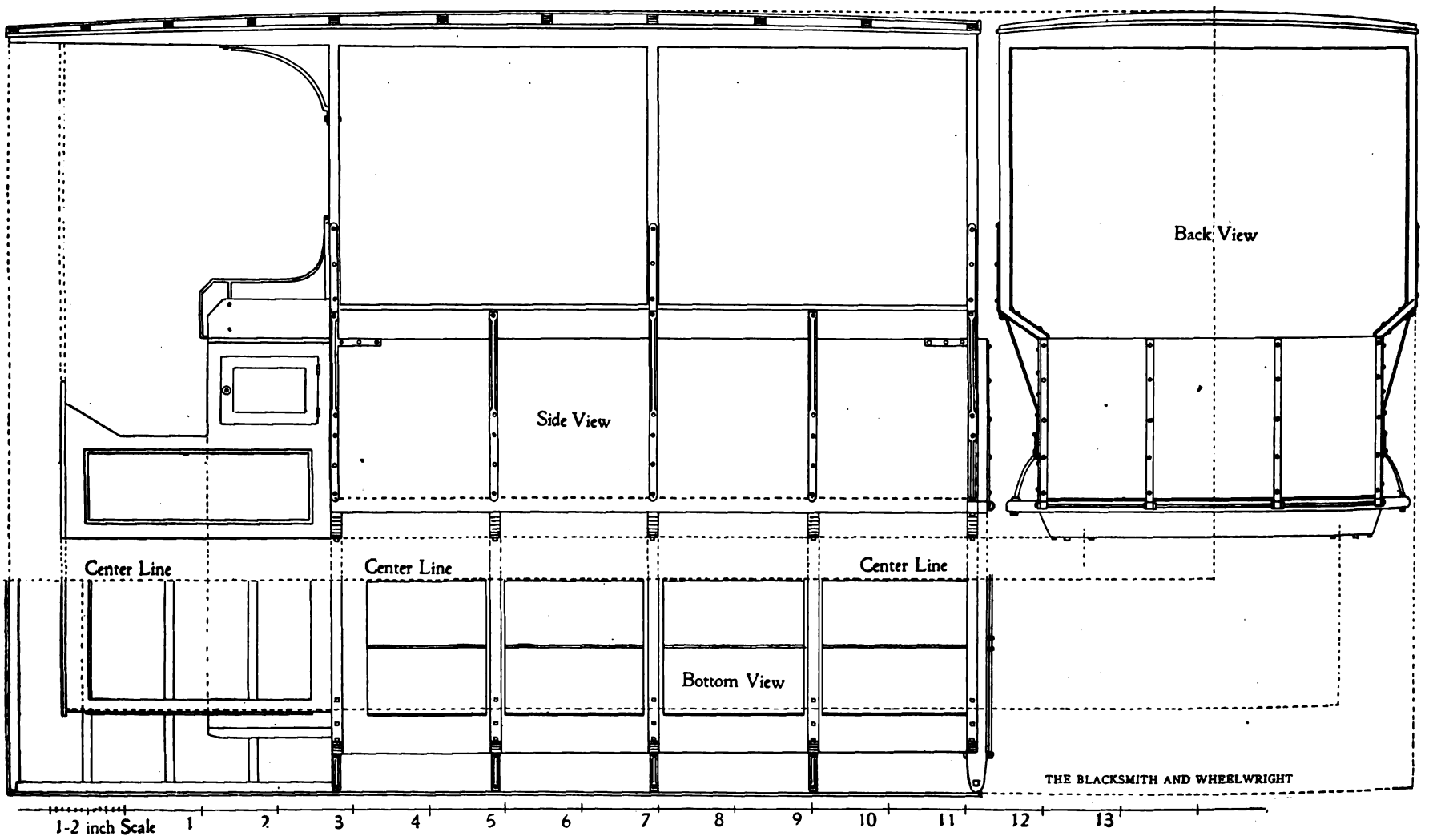

Fig. 3.—This has wing boards, being narrowed across the sills and wide above the wing boards and top rails. The base of the body has sills and a side board cap over it.

inches wide across the sills, and 5 feet 7 inches across the top rail, making a very convenient conveyance for a furniture house or other light merchandise.

This body has 1½ x 5¼ inch sills; 1 inch by 27 inch side boards which lap over the sill.

posts are fitted to wing boards and the wing boards are braced with five stays on each side. The bottom boards on this body are ¾ inch thick nd rest on cross bars and sills.

A better way is to make the sills 2¼ inches thick, the three cross bars 1½ inches and the

engine is above the frame and the front is closed in with a wind shield.

Fig. 4 body is 9 feet 12 inches long; 5 feet 2 inches wide and 6 feet high over all. The body is built on 2¼ x 4¼ inch sills rabbeted into the sills and joints covered with moldings.

The side boards are ¾ x 23 inches and are lapped into the end posts, the four inside parts lap over it and on the upper edge of the side boards is a rail which is made level with the inside surface of the posts. The five bottom cross bars are 1½ x 3¾ inches and the end cross bar front is 2¼ x 3¾ inches the rear end being 2¼ x 4¼ inches. All posts have strap bolts from top to bottom going through sills and cross bars. Besides the eight strap bolts and the main posts there are six between the posts screened or bolted to the side boards and also going through the sills and cross bars. The rear end is closed with two doors, which have

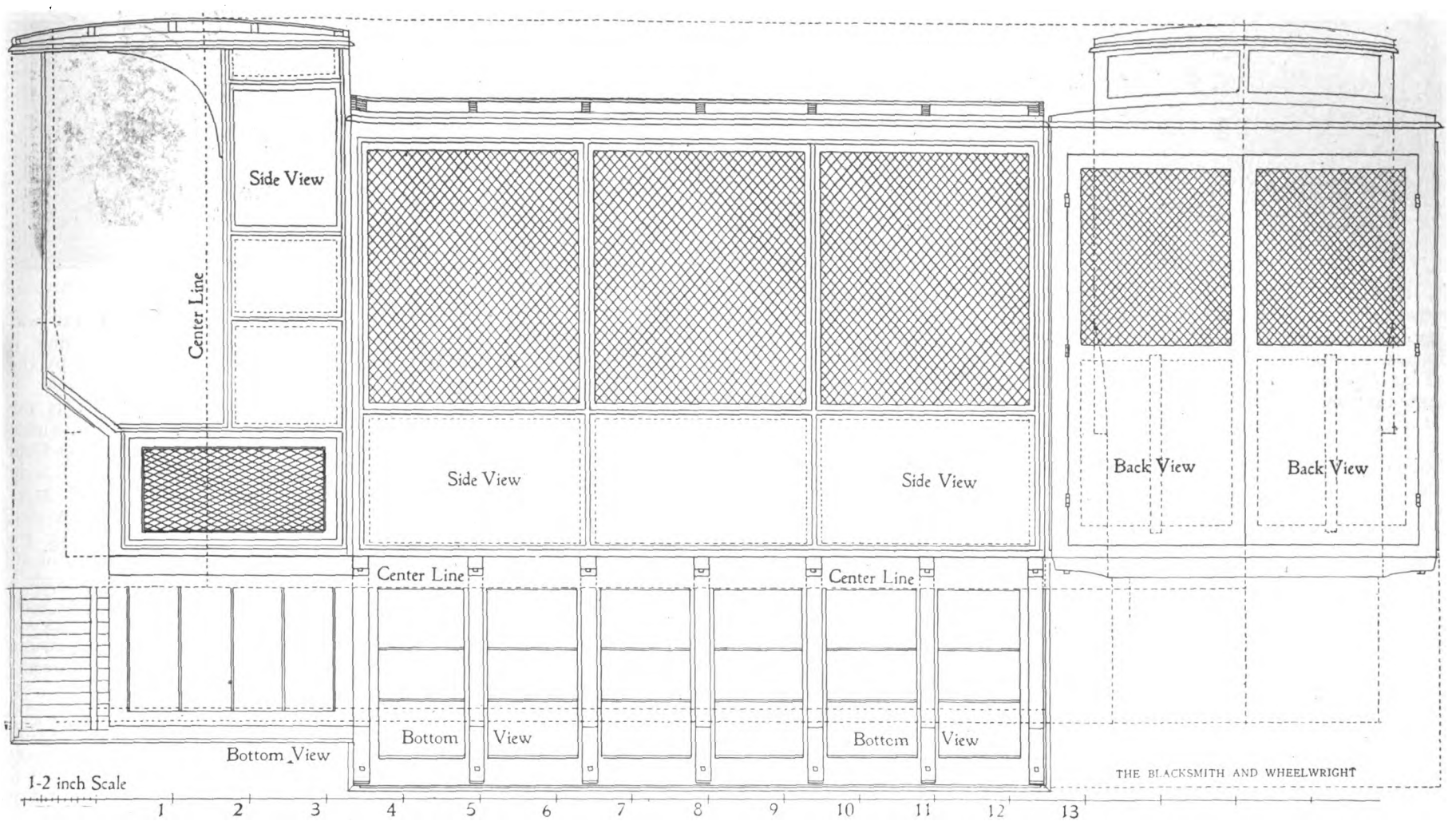

Fig. 4.—This is an eight post body with removal screens, closed in cab, with engine above the frame, wind shield, and hinged doors on the rear end.

screen frames. The front ends on each side are paneled and the rest is closed with the rear of the paneled cab. This cab can be made with five stationary glass frames or made to drop. The width of the cab is the same as the width of the frame.

REPAIR OF WHEELS.

Some of the Adjustments Often Required on Automobile Wheels and How to Make Them.

There are certain operations more or less ordinary, about the overhauling of an automobile, which nevertheless if not attended to, will cause a lot of trouble. Among this class of operations may be included the care which it is necessary to take of the wheels and their parts and attachments, and one or two notes of a practical nature concerning these may be permitted.

Very often there will develop, in the front road wheels of a car, a certain amount of play due to wear which manifests itself in a slight "wobbling" of the wheels while they are running. If the wheels were jacked up, and then taken hold of by the spokes and worked backwards and forwards the play will be distinctly felt. In cases where the wheels are provided with a plain brass bearing the most probable cause of the play is due to wear on the washers which takes the bearing, as will be seen from the polished surface of the rim, round the bearing. The trouble can therefore be cured by taking off the wheel and turning out the washers. These are in most cases about one-eighth inch thick on the bearing part, and about one-quarter inch on the inside part, this is where the play can be taken up.

In order to carry out this piece of work, the washer should be put in a lathe and turned out sufficiently on the inside part to take up the play. Care, however, must be taken not to take off so much metal from the washer as to make the wheels run tight. It will generally be found that this simple operation will make the wheels run without play; but should it not do so the trouble must then be sought for in the brass bearing itself. If this is worn the only satisfactory way of getting rid of the play is to renew the brass. It should be remembered in getting the wheel on again to use plenty of grease.

Some of these front wheels, however, have in place of the brass bush and washers, a method of fitting consisting of ball bearings and cones. Should the play occur on such wheels the method of procedure is slightly different. The first thing to do is to take off the wheel cap and clean off the grease, and then take out the split pin which secures the nut and cones. The castle nut should be removed and it should then be found that the cone will come out and the wheel should slide off the axle, and the bearings with it. These bearings should then be carefully cleaned, and examined to see if any of them are broken. If they are all right they should be fitted into the wheel again and the latter fixed into position. The adjustable cone should then be screwed up, care being taken to see that the cone is not brought up so tight as to prevent the wheel from revolving. It may possibly be found that when the cone and the castle nut have been screwed up, there is room for a thin washer between the cone and nut. This should be inserted; for if this is not done it will be found that the slot in the nut and the split pin hole in the axle will not come into proper position. When the adjustment has been made satisfactorily the wheel cap should be filled up with grease and screwed on, and this operation should be repeated until the lubricant can be seen oozing out of the other side of the wheel.

It will probably be found that this treatment will be found effective in taking up the play of the wheels, but should it still be found that play is evident the deduction is that either the bearing or the axle of the wheel is considerably worn and may require to be renewed.

In attending to the back wheels of a motor car it will often be found, on attempting to extract them, that it is a most difficult undertaking to get them off the back axle. A good deal of energy can be wasted in trying to drive them off with a block of wood and a hammer, especially if they are keyed on. It is a very wise investment to buy a wheel extractor for this purpose, as these can be obtained from any accessory firm on application. When ordering it is advisable to state the make of the car for which it is intended, and if possible to send one of the wheel caps. It sometimes happens, however, that it is impossible to order in this way, without incurring a loss of time, and therefore, a method of making an article of home manufacture which will answer the purpose may be useful, although the making of a wheel extractor is rather an expensive job. A spare wheel cap should be taken and a hole drilled in the center of it one-half inch tapping size, the hole being then tapped. A piece of round steel bar (preferably cast, because of its hardness) should then be taken, tapered slightly at one end, and a square filed upon it at the other. On the main length of the bar a one-half inch screw thread should be cut, and the bar screwed a little way into the cap, the squared end projecting outwards. The wheel cap should then be fixed on to the wheel in the usual way and a spanner used on the squared end of the bar. When this is screwed up tight it will be found that the wheel will slide off easily.

In conclusion, a word may be said with regard to taking the tube out of a tire. A good many people when taking out a tube or taking a tire off a wheel manage to damage the valve in the tube, and this as often as not makes it necessary to have a new valve fitted. There is a right and wrong way of doing even the simplest operation, and it may be of use to mention that the above trouble can be avoided by taking the whole center piece out of the valve, then screwing off the cap and taking the small center piece off the valve parts. This when fitted to the valve of the tube can be knocked without sustaining damage to the valve in any way. Although this takes a few seconds longer at the time of repairing, it will surely save time and expense in the long run.

A Rasp-Cutting Machine.

A new machine of German make is now available for cutting rasps. It cuts every kind of rasp, including those which have hitherto been cut only by hand because of the difficulties in designing a practical machine to do this work. Among the automatic properties of the new machine is an arrangement whereby it reduces the number of teeth cut on the tapered part of the tool without the necessity of being stopped or otherwise interfered with. The output is consequently rapid, and little attention is required.

When you tell a joke, be prepared to listen to one of the other fellow's.

QUEER VEHICLES.

Some Ancient Ones and a Few Strange Ones That are Used Today.

BY JAMES F. HOBART, M. E.

It is extremely probable that the very first vehicle ever used by mankind consisted of a pole upon which the burden to be carried was placed and the shoulders of primitive man or monkey did the rest. Next, two poles were used and a type of vehicle

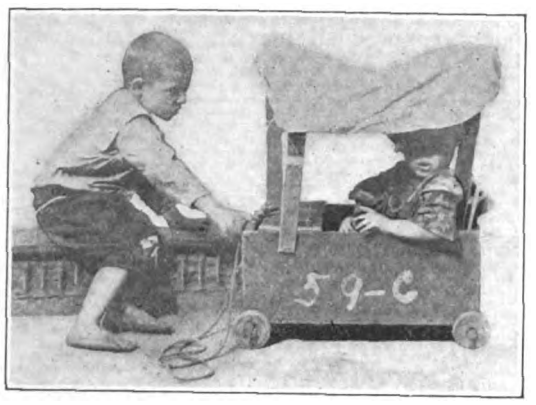

Fig. 1—His First Wagon and First Sweetheart.

was originated which is in use today by savages and by advanced military engineers in almost similar form. This vehicle consists of two poles or saplings, one of which is fastened to either side of a horse and the "duffle" to be transported, whether camp material or wounded soldiers, is placed upon the two poles and conveyed to destination with one end of the poles or saplings dragging upon the ground.

The Florida cracker uses almost the same vehicle today. He cuts a pair of rough saplings in the forest, attaches the front ends thereof to a horse, a cow or an ox, and loads the plunder upon the saplings. But there is this difference: Instead of letting the small ends of the poles drag on the ground, the Floridian cuts the poles a bit short and places underneath the rear ends a pair of rough wheels as may be seen in Fig. 3.

Primitive man early felt the need of a vehicle by means of which he could easily transport more plunder than he could carry on his shoulder or on the two poles placed thereupon, and ere long some early genius arranged the

Fig. 2—Lunch Cart, Washington, D. C.

poles crosswise and placed sections of tree trunk upon the ends of the poles, thereby forming a rudimentary wagon, the predecessor of the most elaborate vehicle of the present day.

The child probably imitates primitive man very closely in many things, and the little wagon, shown by Fig. 1, may be taken as a pretty close approximation of the first wagon constructed by the savage who had progressed sufficiently to evolve rolling instead of sliding friction. In Fig. 1, the solid wheels typify the sections of tree-trunks which evidently formed the first wagon wheels, and which are also pretty closely exemplified, although in greatly improved form, by the all wood wheels shown by Fig. 5.

But the boy shown by Fig. 1 shows one great result of civilization which was lacking in the early savage, and, I am sorry to say, in the Florida cracker as well. The boy—the product of civilization—places his first sweetheart in the little wagon and gives her the pleasure of a ride. The savage who created the first wagon made his wives load and unload the vehicle, and also made them drag or help drag the load when horses were scarce or absent. The native Floridian is surely a descendant, perhaps not so far removed, of the savage, for he places the load upon the rude cart shown by Fig. 3. He mounts astride of mule or ox, and—if there is not too much load—the woman mounts the cart and perches herself upon the load. But if the load be too great, the man remains astride the animal and the woman—well, she walks behind the cart!

In tracing the progressive improvement of the vehicle, and of the savage as well, the lunch cart as seen in the streets of Washington, D. C., and elsewhere, typifies very forcibly the slow but sure progress from crudity to almost perfection in vehicles. Fig. 2 shows not only the advance of the vehicle from the savage to

Fig. 3—Florida Cracker Rig.

the barbarous stage, but it also shows a like evolution in the owner and maker of the vehicle. Note the progress; bicycle wheels but no tires! A shoebox for the body and bits of boards nailed on in front for a third support to the vehicle while it is at rest. Guiltless of paint, but covered with layer upon layer of grease, the vender of lunches heated them upon a little oil stove inside the soap box. Surely, he caters to those of strong but not very fastidious appetite. His little cart is well placed as a link in the chain of progression between the solid wheeled cart of the savage as typified by the Fig. 1 and the cracker rig, illustrated by Fig. 3.

The axle of the Floridian's cart is made of wood, with a most generous linchpin and when one of these wobbling vehicles comes meandering along the sandy trail, it is claimed upon good authority that the wheels have been known to run over and badly damage a snake fully thirteen inches from the trail, and then the wheel would wander back into the track again as if nothing had happened, showing that "13" is a bad number even for snakes!

The patient mule shown in Fig. 3 needs no introduction to readers of The Blacksmith and Wheelwright. They have, one and all, often seen his kind, but one word of explanation is necessary. The hair of the mule, as seen upon rump and flank, is not done up in curl papers, or tied in bunches like the wool of a pickaninny. The mule-hair is just natural, that's

Fig. 4—A Pole Road Truck and Team.

all. The hair of that little mule never was curried, carded or brushed from the time it was foaled until the day it was caught by the camera, as shown in the engraving.

An elaboration of the Florida cart is the pole-road truck shown by Fig. 4. This vehicle consists of a pair of heavy timber sills from eight to twelve feet long with a pair of plain cold-rolled axles bolted thereto. The axles are from 1 15-16 to 2 15-16 inches in diameter, according to the service for which they are intended. The wheels are plain cast-iron affairs, immense rope sheaves in fact, with a grooved face which will go upon a timber eight or nine inches in diameter. The wheels are given about ten inches play upon the axles, and a linchpin in either end of each axle, prevents the wheels from coming off.

The excessive movement of the wheels, endwise upon the axles, is for the purpose of allowing the wheels to run over pole-rails very roughly aligned indeed. As the pole-road is usually made by lapping into the large end of a pole and placing the small end of the adjacent pole in said lap, level with the top side of the large pole, it may be readily seen that the levelling and surfacing of a pole-road is something exceedingly flexible, and that it is necessary to permit great end-motion to the wheels, especially upon curves.

The writer has had occasion to lay out one or two of these pole-roads, and the manner in which the curves were projected and run in would have driven to despair the railroad engineer who works with transit and rod to locate the track centers within 1-100 of an inch on rough work and much closer on accurate track work. All the engineering tools necessary in laying out a pole-road are a tape line,

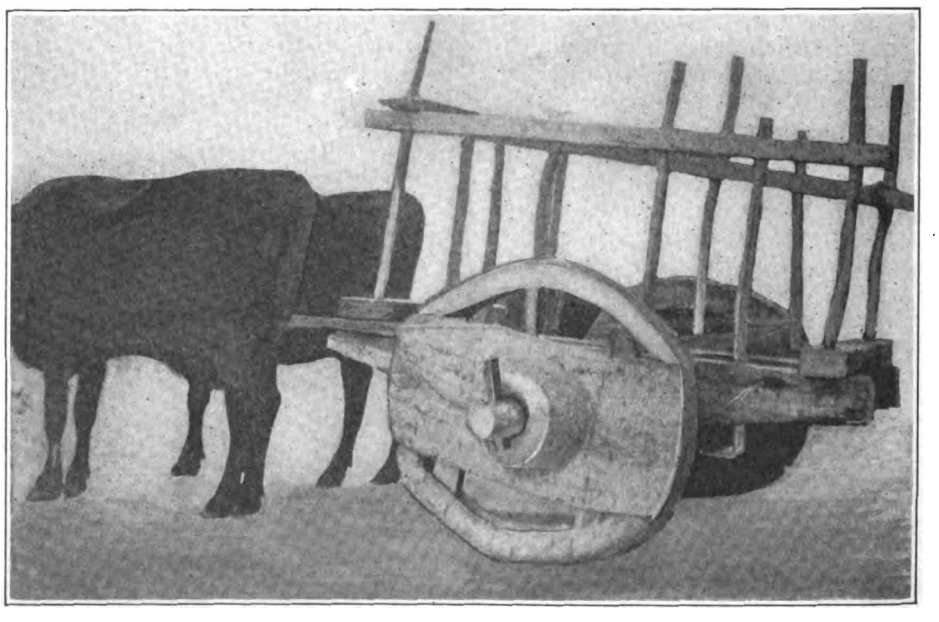

Fig. 5—Cart Made Without Metal.

an axe and a few stakes. The radius of the curve is found—usually 100 feet or less—a stake is driven at the center, and, with the 100 foot tape as a radius, a curved row of stakes is located along the center of the proposed curve

and the poles are afterwards placed on either side of the line of stakes and bent to fit the curve as closely as possible. And if any smith thinks 10 inches of "rambling space" is more than is necessary for a pole-road truck wheel upon its axle, then just let him once try making a truck run upon a pole-road with less lost motion than ten inches!

There are no brakes fitted to pole-road trucks. When the train of one or two trucks is started, the mules pull hard until the load is under way. When the train is to be stopped, the mules are swung off the track to one side and the load pulls the mules until their resistance brings the load to a stop! Luckily there are no grades of any consequence in the Florida pole-road lines, or there would be as much excitement along the line as there was near Cleveland, the other day, when a flying machine at the Bell Vernon farm was badly wrecked by running into a calf!

Certain points of resemblance are to be found in all vehicles of the same or similar classes, and the clumsy wooden construction of the Florida cart seems to have reached its limit in the vehicle made in one of the Asiatic countries where a serviceable cart is made, which stands up under severe usage on long journeys, without a particle of metal of any kind being used in the manufacture of the vehicle. Not in the making, for these vehicles are made, not manufactured.

The hubs of the cart depicted by Fig. 4 are certainly marvels of massive construction. Had the tree from which they were made been a

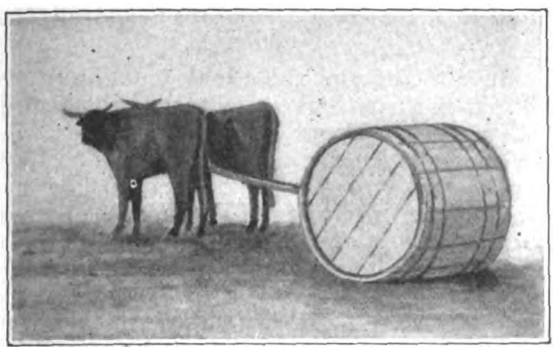

Fig. 6—Barrel Transportation in East India.

little bigger, there would have been no need of the two auxiliary felloes used with each wheel. The designer of this vehicle surely showed a good deal of engineering ability in elongating the hubs of the vehicle along the grain of the material, and then further strengthening the construction by heavy square girths or beams which are let into the inside of each wheel and serve to strengthen the hub arrangement as above described, also to receive the short felloe segments of which two are attached to each wheel.

The appearance of the cart without metal is evidently much like that of the ox-sled which a backwoods genius in the wilds of Maine claimed to be able to construct with the use of no tools whatever, other than a small saw, a narrow axe, and an auger. "You can probably construct a sled with those tools," said a gentleman who had heard the statement, "but I'll wager a dollar that it will look so rough that you can't get the oxen on that sled unless you back them on!" But evidently rough workmanship and lack of finish were not considered in the least by the makers of carts without metal in their construction!

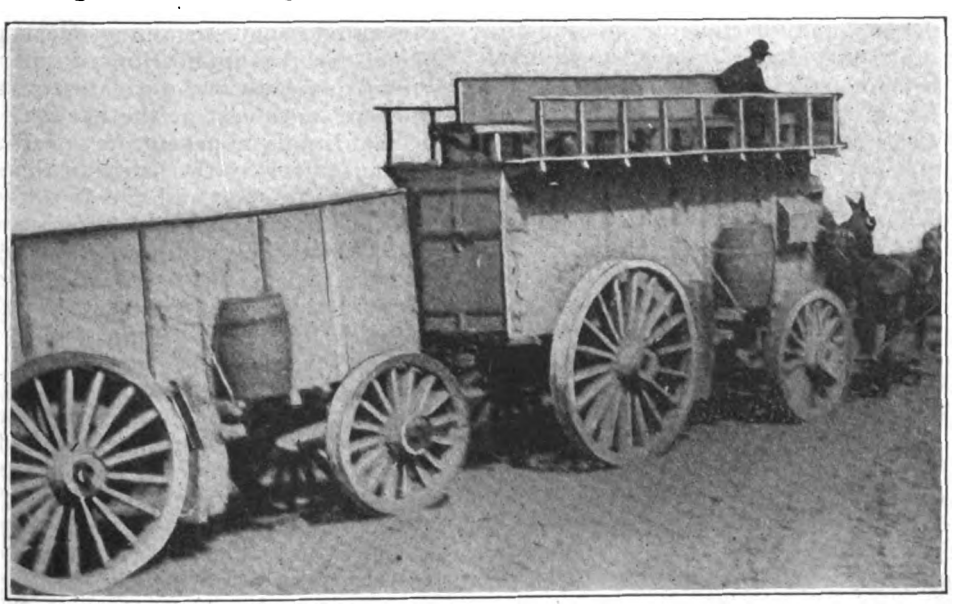

Fig. 7—Original 20-Mule-Team Borax Wagon.

The "No Metal" vehicle seems to have been carried to the very limit by people of the East, and the East Indian barrel cart, exhibited together with the vehicle without metal, Figs. 6 and 5, at the Louisiana Purchase Exposition in St. Louis, a few years ago, seems to have reached the limit of economical use of material in the barrel vehicle shown by Fig. 6, herewith. This vehicle is nothing more or less than a cask or hogshead, probably packed full of merchandise, and with a pole attached by means of which one or more pairs of oxen were hitched to the vehicle as shown by the engraving.

There are some things about this method of transportation which would seem to commend itself greatly to the attention of some transportation lines in New York and elsewhere where the chief aim of the management seems to be the carrying as many passengers as possible with an extreme limit of equipment. Should the officials of said transportation companies once become aware of the great carrying capacity of the barrel vehicle, they would immediately arrange for a line of barrel cars which could be packed so full of hapless commuters and suburbanites that even the money-making straps in cars could be dispensed with at once and forever, to the still greater profit of the transportation company in question.

Compare with the more or less crude vehicles the perfected vehicles illustrated by Figs. 7 and 8, which may be taken as typical examples of their kind. Note the extremely substantial and solid form of construction exhibited by Fig. 7. Note the two vehicles, connected one behind the other, thus enabling the driver to "double up" whenever a particularly bad bit of road must be negotiated. And note well the massive brake-shoes in place upon the rear wheels of both parts of this wagon! Well may the construction be solid, massive and honest throughout, for probably no vehicle ever constructed has more to withstand than the one shown by Fig. 7, which reveals the original 20-Mule Team Borax Wagon, used regularly across Death Valley, West of the Rockies.

This vehicle is exactly as it was used to haul borax across the valley, and nothing has been changed. It shows the water barrels in place, just as they were used when crossing the desert, but the overhanging seats upon the larger wagon were added to accommodate curious sightseers who desired to imagine themselves crossing the desert while riding a few feet in the historic vehicles—for a consideration.

Even more massive and durable than the Death Valley Borax Wagon is the vehicle shown by Fig. 8. This, with the exception of the spokes

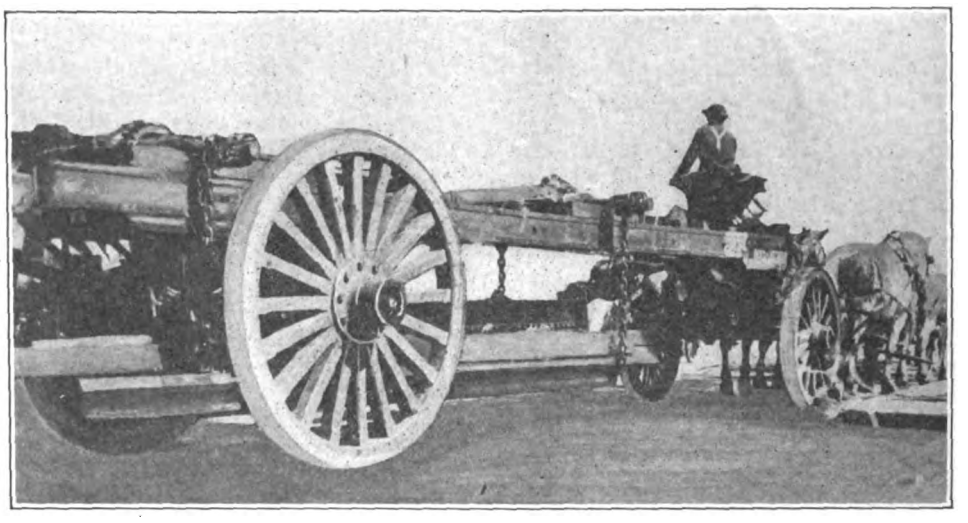

Fig. 8—Steel Truck for Structural Steel Transportation.

and felloes in the wheels, is of steel construction, and intended for steel transportation.

Note the massive wheels with 20 spokes in each of the larger ones (the borax wagon only has 18), and see the double riveting, four rivets in a group, between each pair of spokes. Surely these felloes are as near being split-proof as it is possible to make them. The steel sills of this vehicle are surmounted by a pair of movable carriages in each of which is mounted a ratchet shaft and winding drum upon which is wound up the chains which hold the load to be carried. By means of the winding drums and ratchets, this truck may be loaded to its carrying limit by simply driving over the beams to be loaded, passing the chains under them and then swinging up the beams by means of the ratchets and winding drums.

The sliding carriages upon the steel sills make it easy to adjust the winding drums to fit any

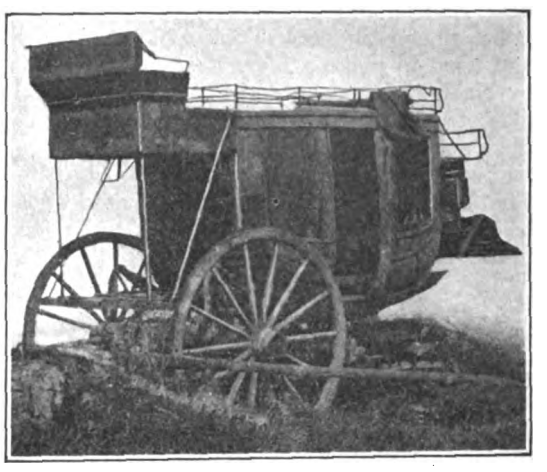

Fig. 9—Abandoned Lake George Stage.

length of beam which it is desired to carry. There are about two things which could be added to the truck depicted by Fig. 8, in order to make it ahead of anything yet designed in its line. These things are: A rear steering wheel and device whereby the truck may be made to handle easily in confined quarters. The second is the addition of a gasoline auto-truck engine to make the vehicle self-propelling. With these two great improvements added, the Steel Structural Truck would be far, indeed, in advance of the vehicle shown by Fig. 1!

Almost as great a contrast is presented by Fig. 9 as by Fig. 1. The former illustrates one of the old-time stage coaches, which was abandoned by its owner a very few years since, between Saratoga, N. Y., and Lake George. This old-timer is of the regulation, thoroughbrace type, one of the easiest methods of body suspension ever devised. It would be hard, indeed, to improve upon the design of this vehicle for the service it was intended to give. There is the ample baggage space, outside and inside seats, a powerful brake for the mountain roads upon which it was designed to travel; lastly, there does not seem to be a pound of superfluous material in the vehicle. Weight has evidently been reduced to the lowest terms by placing each and every ounce of material just where it would do the most good. Indeed, in its class, the old stage-coach shown by Fig. 9 is as perfect an

example of design and progression as is the Pullman railway coach attached to the Twentieth Century Limited!

This old coach, when last seen by the writer, was apparently as strong and as fit for service as when it was put in commission. The coach did not wear out, it bids fair to rust out, as has thousands of its kind. Its business was killed electrically. The trolley did it. The electric road took away the business upon which its owner depended for a living, and, alas! the old stage coach was quickly no more!

Fig. 10 shows another old stage coach. Apparently this one became puffed up with vanity until it got too large for itself or anything else, and there it lies, abandoned and neglected —"Busted by Politics," as many another thing has been ruined before it. The queer-looking vehicle presented by Fig. 10 was once a stage—a Fifth Avenue stage, if you please, and meandered up and down exclusive Fifth Avenue in

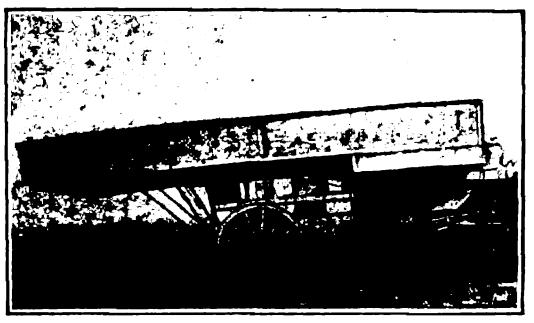

Fig. 10—Platform Wagon for Public Speaking.

New York—that avenue which would not listen to street car service but which maintained an old-time stage service for years after the trolley ran away with all other street traffic. Even now, Fifth Avenue in its exclusiveness, maintains a stage service, but, alas! the horse-drawn stage has been relegated to politics and then to disuse, as depicted by Fig. 10, and honking auto-stages range up and down Fifth Avenue for the convenience (?) of its residents.

The vehicle illustrated by Fig. 10 was, as stated, once a Fifth Avenue stage, but, upon becoming old and rickety, it was replaced by a new vehicle and chanced to be acquired by a political club in New York which a few years ago tried to make a big noise for its candidates by placing almost an entire convention upon the platform of the vehicle and sending them with their speeches to the point in the enemy's country where speaking should do the most good. The little house seen above the wagon does not belong to it. The house happens to be located in the distance, not in the vehicle.

THE READING HABIT.

A Short Sermon Concerning Man's Greatest and Finest Asset.

Written or spoken words are conveyances for passing along an idea to the other man. If you spend time in talking riffle or in carrying idle gossip, you are wasting words, killing time—and it is you for a small job, a small salary and a lay-off during the dull season. The man who attempts to monopolize an idea and keep it under cover loses it, because we understand a thing best only when we have written it or when we have given it away. That is to say—we never understand a thing quite as when we have just explained it to someone else.

Coming down to the work-a-day phase of this problem—no man can afford to get along or try to do business without the reading habit, and no man can afford to surround himself with employees who do not read. The man who does not read does not care, and he is not concerned to know and understand the best in his field or in his line. If a business concern employs enough men who do not read, who do not keep in touch with the ideas which concern the things they are supposed to do, it is only a matter of time until the rats will gnaw such a business down on their shoulders.

In the acquisition of good habits there are the Health Habit and the Reading Habit. The man who has the Health Habit usually acquires the Reading Habit. Oswold tells us "the mind is a flower that requires a strong physical stem." The trouble is, too many men try to succeed without the ideas of other men and without the assistance of a strong physical body to support a growing and expanding mind. The man who reads, investigates, thinks and looks ahead is always loyal and dependable. He is dependable because his mind is open to new ideas, and these ideas are new methods he intends to use in connection with his business, and when put to the test "an ounce of loyalty is worth a pound of cleverness."

The man who has not cultivated the reading habit is dangerous to the interest of good business, because he does not keep in touch with the newest and best—with ideas that make for economy—his methods are slow and old-fashioned, his ideas are crude, uncertain, unreliable and expensive. Any business concern is largely a composite of the ideas of other business concerns. Any successful man is in a very great degree a composite of the ideas of other men. There is no such thing as knowing it all. There is no such thing as success without the ideas of others, and no man can know the efficient, practical way of doing things without having first cultivated the reading habit.

Through the reading habit, through the exchange of ideas, we have evolved more economic methods in everything from laying brick to weaving fabrics of the finest silk. Through the reading habit men are growing rapidly to independence and are reaching a degree of intelligence which the world has never known until the last few years.

Then, the point is, if you employ men and women—in the name of all that is right and just—in the name of all that is worth while—cultivate among these people the habit of reading, regardless of how it must be done. Place something of value in their hands, teach them by suggestion or by example. If necessary, subscribe and pay for their literature. It will mean a more loyal force of employees, a better managed business, and will pay you dividends as long as you live, not only in profits from your business, but in the happiness you derive from the thought that you have done these people a positive and lasting good.—Iron Age-Hardware.

CITY SHOEING

Pittsburg Councilmen Think Horses Should Be Shod for $34 a Year.

The latest city to get a spasm of horse-shoeing economy is that city of millionaire magnates, Pittsburg, Pa. It is a little singular that when municipal or town economy strikes its officials it always begins with something of this sort. Little wonder that one of Pittsburg's councilmen is a little exasperated at the idea that the city horses should be shod for $34 a year. He is himself a horseshoer and he says:

"I could make contracts right now to shoe hundreds of horses for $34 a year each, if I would. The average horse belonging to business firms costs its owner from $50 to $60 a year for shoeing and refitting of shoes. The statement that the city is compelled to send horses to be shod, whether they need attention or not, I know to be incorrect. It is possible that a horseshoer who does the city work, finding himself with slack time on hand, might telephone to the city stables and ask that horses needing attention be sent. A horseshoer who is the right kind of a man thinks not only of the money he can make but of the animal's comfort. Any horse used in city work ought to have a new pair of shoes every other month, and have the shoes refitted the next month, if its feet are to be kept in condition. It is very probable that the horseshoer keeps track of the last time when his regular customer's horses were attended to and, if he thinks it time to refit or to reshoe, that he telepones and inquires why the horses are not sent.

"Horseshoers now charge $2.50 for shoeing a horse and $1.50 for refitting shoes. Thirty years ago, when I learned the trade, they got $2 for shoeing. In those days the men got $2 a day; now they get $4. Material is much higher now than it was then. If you, for example, are a regular customer of mine, and you bring a horse that has something the matter with its feet, I may spend an hour examining and treating it with no extra charge, so that it is not only the work of putting on a shoe that the horseshoer must do. Two $4 men can shoe an average of six horses a day. The city has 820 horses. Counting three horses to a man, 12 men would have to be steadily employed to shoe these horses, an average of 36 animals a day. That would take $16,000 in wages alone for a year."

It appears that a proposition has been made to have some automobiles supplied with forges and have them sent around to the stables whenever a horse is to be shod. Concerning this idea the same councilman says:

"It would cost something to keep up the cars, which ought to be added to the cost of wages for the men, besides material and interest on the city's investment. The men would not be allowed to take the portable forge into the city stable, hence the work would have to be done outside, in the street or alley. Where can the city find the horseshoers, real mechanics, who will shoe a horse out in the rain or in freezing weather? A certain kind of horseshoer might consent to work under those conditions, but the kind that the average master horseshoer employs would not take the job.

"No, the city is getting off lucky if it pays $34 a year to shoe each of its horses. Several persons have told me they would gladly contract with me to attend to their horses for that price; not seriously, of course, for they know it costs them $50 to $60 a horse, if they want the animal kept in good condition."

SHOEING ERRORS.

And How the Hoof Should Be Prepared for the Work.

In noticing the rules which ought to guide in shoeing the horse's foot, we will glance at the most prominent and common errors which occasion and perpetuate grave evils.

The limb and hoof of the unshod horse should be attentively studied, as both are beautifully adapted for their functions, and our care should be to interfere as little as possible with these; in fact, we ought, in shoeing, to adapt to the feet shoes which will preserve the regularity and just direction of the limbs, maintain the integrity of the hoof in form and texture, allow freedom to those movements of which it is capable, while shielding the horn from the effects of undue wear. They should also aid the animal in retaining a firm and solid grasp of the ground or pavement.

In a normal state of the foot, the crust or wall grown from the coronet at an equal rate at all points, and in a degree generally sufficient to compensate for the wear sustained at its lower or ground margin. When this wear is regular, and the foot may be said to stand in harmonious relations with the other parts of the member, the angle of inclination of the front of the hoof depends on the formation of the limb to a certain extent, but may be set down at from 50 to 60 degrees. This part of the hoof is larger than the heels by one-third. The crust grows to an indefinite length when prevented from sustaining wear through accident, or the application of the shoe. This growth appears to be greatest at the front of the foot, and least at the heels.

This is only apparent, however, and may be accounted for by the attrition that takes place between the shoe and the foot, from the last nails to the heel, where there is an amount of play which wears down the horn almost as quickly as it grows, and is evidenced by the deep furrows observed towards the heels of the shoe. This is an important fact to remember, as the continual increase in length of the toe is one of the unavoidable evils of shoeing. Every hour the balance of the limb is being altered as the foot grows forward, and more strain is thrown on the back parts of it. In a state of nature, growth and wear would be continually balancing each other. At each shoeing, the abnormal length of the foot is certainly remedied by the skillful horseshoer, who reduces it to its natural proportions; but he has no sooner applied his shoe than the same process of growth again slowly, but surely, alters the proportion. That is, to a certain extent, irremediable. But it is not a very great evil; and it is in reducing the wall of the hoof to its proper length that a workman is known. The amount of growth varies in different animals, according to circumstances. If it is active in the shod horse then the shoes must be more frequently removed to reduce the re-

dundancy, and restore the lower part of the limb to its natural position.

The second rule—to maintain the integrity of the hoof in form and texture, and allow freedom to those movements of which it is capable, is one of vital importance to the well-being of the animal. What we may term hygienic shoeing is reduced to a few simple lessons, which any one may learn and readily practice, or see carried out on their own horses; and that it has nothing of the painfully elaborate carving, rasping, nailing and filing attending the usual method of shoeing, and which demands much skill, much labor, and after all entails grave injury on the horse.

Shoeing, as it is termed, is required either when the shoes have been worn out, the hoofs have grown too long, or the wear and growth have both reached a stage when the intervention of the shoer is needed. The length of wear of the shoe will depend upon the material of which it is made, its weight, and the attrition to which it has been subjected. It is generally better that it should wear for a long than a short period; frequent shoeing, requiring frequent nailing, damages the crust by piercing its fibres and spitting them.

The shoe is said to be "worn out" when it has lost a portion of its substance at the toe—where the greatest amount of wear usually occurs, or when it has become very thin either over the whole surface or in one of its branches. When the shoe lasts for a long period—six weeks or two months—without being removed, the hoof usually becomes unnaturally long, widens at its under surface, and the iron being carried forward with the growth becomes buried within the crust. The horse moves awkwardly, stumbles, goes on his heels, and an undue strain is thrown on the flexor tendons and the posterior regions of the limb.

The period during which a shoe ought to wear, or be allowed to remain on the foot, depends upon circumstances. Unless in very exceptional cases, it should not be suffered to remain longer than four or five weeks, and neither should a horse be shod more frequently than once in three weeks or a month. It must be always remembered, that an excess of growth is far less injurious than too frequent shoeing.

It is easy to distinguish when the shoe is worn out; though some people, whenever the outer margin of the iron at the toe is worn away—and though the horse may not have been shod the full period—become alarmed, and have the animal re-shod.

So long as the shoe remains firmly attached, this wear is of little importance. If the horse has not been shod a month, allow him to go until the plate nearly or quite breaks through at the point of wear, as he only removes that horn from the front of the hoof which must be taken away by the rasp in the operation of shoeing. This enables me to order lighter shoes to be worn.

Some horses have naturally long feet, and when they rest on the ground they appear to require "shortening." If a foot is raised, it will be at once seen whether this is the case—that is, if the sole has not been mutilated by the drawing-knife in the previous shoeing. If it is in its natural condition, this will be some distance from the shoe, and the latter will have lost its proper seat on the foot. This is because the crust grows indefinitely, while the sole always maintains a regular thickness.

Before the shoes are taken off, the direction of the limb and foot should be studied, both while the horse is standing and when it is moving. This is seldom, if ever, done by the farrier; and yet it ought to be an important object to maintain or regulate the direction of the leg and hoof, which can be done by ascertaining whether in front or in profile they are in line—whether the toe, the side of the hoof, or heel, incline too much inwards or outwards—whether the heels of the hoof are too low or too high—the toe too long or too short—and if there are any traces of interfering or "cutting" on the inner sides of the hoofs, fetlocks, or knees. Seeing the horse walk or trot indicates the nature of his action—whether high or low—or if the movement of the limb is false or irregular—and whether any fault which may exist can be rectified by shoeing.

These are very essential points to observe, as they all come within the domain of the art; and the intelligent workman can do much to modify or rectify natural or acquired defects, as well as preserve perfect form and action, and in this way carry out our first rule.

Then the shoe is removed. This is a very simple operation, and yet it requires tact and care: tact, that the horse's limb and foot be not twisted by violently wrenching off the shoe; and care, that no nails or clenches are allowed to remain in the crust, and that the latter be not broken. It is better, after cutting the clenches clean off, to spring the shoe gently at the inner or outer heel by means of the pincers, prying them softly forward, and then across the foot—never outward—and withdrawing the nails one by one. A glance is sufficient to show the state of the sole and frog. The next step is to reduce the hoof to its proper dimensions—and this is no trifling matter. On this operation depends the true or false direction of the limb, and it is in this respect that grave errors are often committed. It may be accepted as a truth, that the ground surface of the foot ought to be directly transverse to the direction of the pastern, no matter how defective the limb may be; and it is in maintaining or restoring this relation, and keeping the length of the toe in harmony with that of the heels, that care and skill are required.

This is accomplished by reducing the crust. If the pastern is perpendicular to the shank-bone, and the two sides of the lower margin of the foot are directly transverse to the line passing down from these, the crust has only to be lowered equally on each side; but if the pastern deviates to the outside or inside, then more horn must be taken away from one margin than the other, to regulate this deviation. This operation ought to be accomplished with mathematical exactitude, as a difference in height between the sides of the foot of some fractions of an inch determines considerable oscillations of the weight.

A just relation may be said to exist between the height of the toe and that of the heels, when the latter is about two-thirds that of the former. This is the natural form; though, through improper shoeing, and perhaps defective organization, it may vary. To lower the heels more than the toe, and leave the heels untouched, is to raise the latter.

The amount of horn to be removed from the crust, as well as the manner of removing it, is another important consideration. As before mentioned, the heels usually wear themselves tolerably low against the extremities of the branches of the shoe; but where the latter has been firmly fixed to the crust, this up-and-down friction does not take place, and the posterior parts of the foot are proportionally long. As a general rule, however, the heels require little or no alteration, and the toe needs shortening. With the hoofs of saddle or carriage horses, this shortening is best and most safely accomplished with the rasp. Heavy draught horses, whose hoofs may have grown excessively long, and which have more horn to spare, are oftener trimmed with the toe-knife.

If the horse to be shod with a shoe reaching to the points of the heels, the horn of the wall at this region, if necessary, is to be removed to the degree prescribed above. Under all circumstances, every fragment of loose horn incapable of supporting the shoe, ought to be taken away, so as to reach sound material. This may be done by passing the rasp evenly along the ground-surface of the crust, gradually removing a larger amount as the toe is reached, and inclining the instrument in a sloping manner on the outer edge, so as to cut off the external fibres shorter than the internal ones. At the toe, the crust should be cut down to the level of the sole. Here the knife may be used, and the remainder of this part removed until the white or yellow line marking the junction of sole and wall is reached. This is only to take place around the toe, and no more of the sole must be taken away than is absolutely necessary to give a level bed to the shoe. In the majority of cases never allow the knife to be used for this purpose; let all the work be done by the rasp. The object in cutting off the external fibres at an angle from the quarters to the toe, is to give the edge of the hoof a rounded appearance, while it equalizes its thickness, and prevents it from splitting and breaking. The sole, frog and bars must on no account, or under any conditions—unless those of a pathological nature—be interfered with in any way by knife or rasp. I have already shown the urgent necessity there exists for preserving these important parts of the plantar surface in their full natural strength. As certainly as they are interfered with, and their substance reduced, so surely will the hoof be injured. Nature has made every provision for their defence. They will support the contact of hard, soft, rugged, or even sharp bodies, if allowed to escape the terrible drawing-knife; while hot, cold, wet, or dry weather has little or no influence on the interior of the foot, or on the tender horn, if man does not step in to beautify them, by robbing them of their protection—perhaps to please the fancy of an ignorant groom or coachman.

(To be continued)

A New Canadian Metal.

Canadium is the name that has been applied to a new metal discovered by A. Gordon French, metallurgist, of Nelson, B. C. For some time past Mr. French has been experimenting with the platinum group metals found in the hills surrounding the Nelson district, and after careful investigation has come to the conclusion that there is another metal in this group, hitherto unknown. He describes the metal as being a beautiful silvery white, far outshining silver in lustre. It melts at a lower temperature than that metal, but has some characteristics of silver, though differing from it in many respects. The confirmatory tests given by the discoverer are chiefly as follows: It dissolves readily in nitric and hydrochloric acid, also in aqua regia, leaving no residue. The nitrate solution does not give any precipitate with sodium chloride, nor with potassium iodide. It is not blackened with sulphuretted hydrogen nor the alkaline sulphides, nor is it blackened with tincture of iodine.

It is found native in lamprophyre rock in the Nelson district, and has also been found in a serpentine dike in the Granite mine. Its native form in a semi-crystalline grain, or short rods varying slightly, but usually about half a millimetre, in length, and about one-tenth of a millimetre in thickness. It has a bluish, silvery-white color, and when burnished is more lustrous than silver. Upon long exposure to dampness it does not tarnish, and does not oxidize when heated before the oxidizing flame of a blowpipe. Mr. French, says the Mining Journal, thinks that in its native form it is in combination with osmium or some such volatile metal.

Wood or Wire Wheels.

An interesting demonstration to show the relative strengths of wire and wood automobile wheels under heavy lateral stresses, such as would be sustained under severe side slip, was carried out at an automobile plant in England for the benefit of members of the American Society of Automobile Engineers, during their recent visit to Europe. Under pressure of 500 ft.-lb. the permanent lateral deflection of the wire wheel was .164 in., and of the wood wheel .250 in.; under 615 ft.-lb. the wire wheel .331 in. and the wood wheel .574 in.; under 730 ft.-lb., the wire wheel .574 in. and the wood wheel 2.875 in., and under 850 ft.-lb., the wire wheel 1.125 in. and the wood wheel approximately 6 in. At the conclusion of the test the wood wheel was found to be shattered, having 90 per cent of its spokes broken, while the wire wheel had only 11 per cent. broken.

Bronzing Cast Iron.

A German paper gives the following process of bronzing cast iron without covering it with a metal. Thoroughly cleanse the metal and rub it smooth. Apply evenly a coat of sweet or olive oil and heat the iron, being careful that the temperature does not rise high enough to burn the oil. Just as the oil is about to decompose, the cast iron will absorb oxygen, and this forms upon the surface a brown oxide skin, which holds securely, and is so hard that it will admit of a hard polish, thus giving it the appearance of bronze.

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Subscribers who desire the address of their paper changed will please send the old as well as the new address.
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APRIL, 1912.

PARTIAL CONTENTS.

OF INTEREST TO EVERY READER

This is the season of the year when many of our readers will be considering the advisability of substituting new and better tools for old ones that are out of date, and will also be investigating the merits of various machines which can be used to advantage in both the wood shop and the blacksmith shop.

The era of all-muscle power has passed away. The tendency now in every line of mechanical work is to employ steam, gasoline, water or electric power, as the case may be, to do a considerable share of the work that used to be done purely by muscle, in all blacksmith and wheelwright shops. Some of our readers will say they cannot afford to put in new tools or machines, but they have been saying that all their lives and they will continue to say it the remainder of their lives, if that is the way they feel about it.

The thing to do is to see what you need in the way of improved tools and machines and then try to make arrangements to get them. Your regular dealer, if you explain your case to him, is likely to be willing to help you out, probably not only on new tools but on the new machines that you may need.

The blacksmith who has been plodding along in the same old rut for years will be surprised at the impression this will make upon his customers, if he adopts our suggestion to improve his equipment. They will talk about it to their neighbors and others, and these neighbors, perhaps who have not been his customers, will call upon him, and especially if he has power in his shop in the way of a gasoline engine or any other form of power. Everybody likes to see the "wheels go round" and listen to the hum of machinery.

We have, perhaps, told the story more than once in these columns of the man in Nebraska, who did not have work enough to keep himself busy, but who stumbled upon a good steam engine that the owner did not want and bought it at a sacrifice. He did not know what to do with the engine after he got it, but finally decided to set it up and run a grindstone, an emery wheel, and one or two other little things that he could hitch on. One of his customers, a farmer, persuaded him to put in a feed mill and grind feed. This proved to be a profitable arrangement. Later on another customer persuaded him to put in a shingle mill and cut shingles on shares. This also proved profitable.

When we last heard from him, this blacksmith, who formerly had not enough work to keep himself busy, was employing five men besides himself and his business had all been built up around this steam engine.

If our readers will look over the advertising columns of The Blacksmith and Wheelwright, they will see a good many tools described that they would like to own, and probably can own, by an arrangement with their dealers, and a good many machines that would be of use to them. Triphammers are cheap now, and there are a good many styles to select from in our advertising columns. There are also a good many kinds of cold tire setters advertised, and the man who owns a good tire setter will find it profitable. Many a farmer finds a loose tire, but does not want to take the time to have the tire set in the old-fashioned way, and keeps on with his work until the wagon practically goes to pieces. If he could take the wagon to a shop and have his tires set in a short time with a cold tire setting machine, he would do it.

Gasoline engines have been improved up to a point where it would be difficult to find one that would not work. Some, of course, may be better than others. The reader who is thinking of putting in power should consult the advertisements on another page and write for circulars and catalogues.

Almost every reader of this paper can make the advertising department much more valuable to him than it has been in the past, if he will take pains every month to look over the advertisements for new things that are coming out.

THE ELECTRIC ERA.

Although the need for it is not now apparent, the time is quickly coming when the blacksmith will find it profitable to have some knowledge of electricity and of electric devices and machines.

We have it on the best authority that at present more than 2000 villages and towns in the country are now operating electric plants and quite a number of them are sending current as much as ten miles into the country to be used in lighting and running feed cutters, corn shellers, threshing machines and the like.

No doubt the use of electric plants in the towns and villages and the development of hitherto neglected water powers will do a great deal towards advancing American farming. A "neighborhood" electrical plant may be set up at any mill pond, or wherever there is a waterfall or rapids, and the expense of the transmission plant is hardly more than the cost of the wire.

A few years back electric apparatus was so intricate and so dangerous—at least it was so regarded—that only experts dared to handle them. Now, however, motors are made that may be carried around under the arm, as it were, and that anybody can operate.

The time is fast approaching when a majority of farm houses within a radius of ten miles of a town or elsewhere where there is an electric plant will be lighted by electricity and electricity will furnish the power for all house and barn work like drawing water, churning, cutting fodder, etc.

When anything breaks, the blacksmith should be the man called upon to do the mending or repairing. He will be the one called upon if he can do the work. A little study and attention is about all the smith needs. He may not be the one to install such machines or devices, but if they ever break or need replacement, no one else should be called in to put them right.

LICENSE FOR HORSESHOERS.

There is much more reason why a man should pass an examination in order to become a horseshoer than that he should pass one to become either a doctor, a dentist, a lawyer or a preacher.

Why? Because human beings can speak for themselves; horses can't. If a human being suffers from medical malpractice, he can complain; he can tell others about it; he can give so much publicity to the injury that the quack may be deprived of the greater part of his business; if he is being badly hurt he can yell, and if he has a strong body and a proper brain, he can punish the rascal doctor of dentistry or of medicine within an inch of his life. And the quack lawyer—well, a man is to be pitied if he has to employ a lawyer at all, but being obliged to do it, he has a remedy something like that of the victim of the doctor.

But the victim of the quack horseshoer cannot speak; he can make no protest; he can only suffer in silence and agony, while the shoeing butcher is performing his fell work, and when his unfeeling master is prolonging his agony thereafter.

By all means let us have a license board for horseshoers. If there is any reason under the sun why human beings need protection from quacks, the reason is far more intense in the case of the most patient and noble servant of man—a servant which cannot speak for himself.

Such a law providing for the license of horseshoers would have been on the statute books of every State in the Union long ago were it not for the fact that a horse cannot speak while inhuman man can, and for the additional fact that dollars are often considered of more importance than animal flesh and blood—or human flesh and blood also, for that matter.

A MISDIRECTED MOVEMENT.

For some unaccountable reason a good deal of misdirected energy is being expended in trying to secure a large increase in second-class postage rates with the mistaken notion that the government is carrying periodicals at a loss.

When Congress, 25 years ago, or such a matter, reduced second-class postage, (which means, of course, the postage on all monthly publications, magazines, trade journals, religious, agricultural journals, etc.) from two cents to one cent a pound, it was done with a viem of enabling the people of the country to have cheap literature of all kinds.

The subscription price of every class of periodicals is thus very low. In some cases the rate is barely enough to pay the publishers for the white paper and printing of the same. The

only way any profit can be made is through the advertisements, and the advertisements also enable the publishers to make low subscription rates. But advertisements promote business, and the business of the country has been developed immensely by the advertisements in the various publications.

Any attempt to hamper or oppress periodical literature for the purpose of making the Post Office Department self-sustaining, whether it results in curtailing advertising, increasing subscription price, or causing the suspension of the weaker but none the less useful periodicals, will greatly curtail the business of the country. The country needs all the business it can get.

Just why the Post Office Department should be self-sustaining any more than any other department, nobody knows. The Agricultural Department properly issues millions of bulletins connected with farming, which are sent out at the expense of the Post Office Department. The Agricultural Department sends tons of seeds throughout the entire country by mail, at the expense of the Post Office Department. Nobody expects the Agricultural Department to be self-sustaining.

If the farmers of the country are entitled to such vast quantities of printed matter every year at no cost whatever, why shouldn't the general public be entitled to gets its periodical literature at a reasonable rate?

As we have pointed out more than once, perhaps, our Northern neighbor, Canada, reduced its second-class rate from a half cent a pound to a quarter of a cent a pound about a year go.

Now if Canada can afford to carry second-class publications at a quarter of a cent a pound, it seems ridiculous that the United States is losing money at one cent a pound.

One important feature of the matter is ignored or only partially recognized by the Post Office Department, and that is the immense amount of first-class mail (letters) produced by the advertisements. It is contended by some publishers that the government could better afford to carry the second class publications free, than lose the income which it derives from the letters written in consequence of the advertisements carried by the thousands of publications of the country.

We are explaining this matter now to our readers who may not have thought much about it, so that when the question comes up in Congress, they may write to their congressmen and senators and protest against any increase in second-class postage rates.

Of course, if the postage is increased on second-class publictions, the subscription rates will also have to be raised. There will be no escape from this.

The result of the plan proposed by the Post Office Department will also be to create a gigantic monopoly in the publishing business. The Government is all the time fighting monopoly in other lines, but it is adopting the very course to produce a monopoly in publishing.

The subscribers to the thousands of publications which will be affected, have it in their hands to prevent any raise in postage, and they can do it by writing to their congressmen and senators, urging them not to vote for any such increase.

MONEY WELL SPENT.

We may say as much as we like about Massachusetts and her rather conservative spirit, yet in many respects she may rightly be named the nation's schoolmaster, blazing the way into the new fields of the right sort of progress, for other States to follow. Take, for illustration, the work of that State for better roads. A few years ago it may have been just a little behind New Jersey in enterprise of this sort, but today it probably leads that State in work done and in liberal expenditure. During the past 20 years Massachusetts has built 879.60 miles of State highways at a cost of $8,013,359.65. In addition it has aided the small towns, so that 272 miles of road that are within the limits of these towns, but are connecting links in the State highways, have been improved at a cost of $481,583.05. This does not include the thousands spent by cities and towns for park roads and improving roads within their borders.

During the last five years the maintenance of State roads has become a big problem, and experiments have been made in treating and resurfacing them. Up to December 1, 1911, 308 miles received one or more coats of oil or tar. It is not stretching the figures to say that there has been expended within a generation something like $20,000,000 for Bay State roads. So valued are the highways in the estimation of the people in Massachusetts that the legislature is ready to make generous appropriations every year; and the fees from the automobiles are now transferred to the highway maintenance fund without objection, and even the fines throughout the State go into the same fund.

In addition to this, thousands of trees have been planted beside the roads to keep the rays of the sun from drying them up and to retain the moisture. Maple, elm, oak and pine are used in about the order given, maple being the most common.

What is the result of this intelligent work? Why, real estate has increased in value, the farmers are able to get to the market quicker and with less expense, automobiles are being used far more commonly than they otherwise would be, and in short, the State has never undertaken an enterprise that has proved so remunerative.

HORSESHOEING BY THE YEAR.

Something will be found elsewhere in this issue, concerning the action of the municipal authorities of Pittsburgh, Pa., who have decided that $34 a year is enough to pay for shoeing the horses owned by the city. To accomplish this, however, the plan is to have portable forges taken around in automobiles. Seems to us, this would be "saving at the spigot and losing at the bung hole," so to speak.

The idea of fixing a stated price a year for shoeing a horse is in itself impractical. The cost of keeping a horse well shod depends upon how the animal is used, where he is used, how much he is used, and how he is shod. In some cases quite likely, the expense need not even amount to $34 a year, and in others the cost should be greater than that sum.

But the significant fact is that although there seems to be a horseshoer on the board of councilmen of Pittsburgh, yet other members who probably were never in a blacksmith shop, who never owned a horse, and who probably never will own one, will feel that they "know it all," and their own ignorance will prevail against the horseshoer's knowledge. This is the way many things are done in this world.

GET TOGETHER.

Every letter we get from our readers favoring the idea of blacksmiths working together for good work and for good prices, rather than suffer senseless unscrupulous competition and its consequent poor prices and poor work, encourages smiths in other localities to favor such working together. It means the raising of the business to a plane of living profits and prosperity where it rightly belongs.

There is no reason whatever why the blacksmith should not receive the same returns for his work, his invested capital and his knowledge, as other business men in the community receive for similar business assets, as for instance, the lawyer, the doctor, the merchant, and the manufacturer.

It will not be long before there will be a hegira to the fashionable summer resorts, for the season of so-called rest and recreation is increasing every year. But how many blacksmiths and wheelrights can afford such a rest and recuperation? We don't say they would want to go to such places if they could, or that they would show good taste in going to them if they would. But don't they need this rest and recreation as much as any other workers—physical or mental—who live? Should they not be as well able to have this rest and recreation as any class of workers?

Be this as it may, none will be found at such resorts. On the contrary, they will be at the same old places all summer long. The anvil will be ringing, the sparks will be flying upward, the bent backs will be seen under the running gears of vehicles and the perspiration will be dripping, no matter how hot the weather.

Gentlemen, your prosperity is in your own hands. If you will but establish fair prices for your work, you can be fairly prosperous. No man should ask for more; none should be satisfied with less.

The Arkansas Lien Law.

The following is the amended lien law for blacksmiths, wheelwrights and horseshoers in Arkansas:

Section 1. That section 5013 of Kirby's Digest of the Statutes of Arkansas, be amended so as to read as follows: Blacksmiths, wheelwrights and horseshoers, who perform work or labor for any person, if unpaid for same, shall have an absolute lien on the product of their labor and upon all wages, carriages, implements and other articles repaired or horses or other animals shod by them, for all sums of money due for such work or labor and for any material furnished by them and used in such product, repairs or shoeing.

Section 2. That Section 5014 be amended so as to read as follows: Any person having a lien under this Act and desiring to avail himself of its provisions, shall within ninety days after such work or labor is done or performed, or materials furnished, file with the Clerk of the Circuit Court of the County in which the debtor resides, a just and true account of the demand due, or becoming due, allowing all credits, and containing a description of the property to be charged with said lien, verified by affidavit.

Section 3. That all laws and parts of laws in conflict with this Act are hereby repealed, and this Act shall take effect and be in force from and after its passage.

A creditor must now file a lien within 90 days after work has been done on which a lien is to be placed.

One Way to Live.

If the common people of this country want to live as some do in Germany or other foreign countries, why, no doubt they can afford to work for as low wages and that we can thus compete with them in manufactured products without the advantages of a tariff duty.

In Berlin, Germany, there are many places where you may secure a meal of horse flesh, bread and coffee for twenty-five pfennig, which is about six cents. In the poorer parts of the city, there are many little restaurants where you can buy a meal for twelve pfennig, which would be about three cents. In some of these cheap restaurants, there is a long table, and no chairs are to be seen, but there are long benches. Tin spoons are chained to the table, soup plates are sunk into the table, and the one who wants to eat a meal comes in and sits down in front of one of these plates, and lays his three cents beside it. Usually a woman is in the kitchen, and in many of these places the kitchen is a part of the restaurant itself. As soon as you have laid your money on the table, she trots forward with a steaming hot kettle of thick soup, although thin soup is sometimes served. She fills your soup plate with this hot soup, and lays a thick slice of black bread beside the plate, and your dinner is complete.

Chicago's Manufactures.

The total value of the manufactured products of the city of Chicago in 1909 is calculated by the U. S. Census Bureau to have reached the enormous sum of $1,281,313,000, from materials valued at $793,571,000 and on an invested capital of $971,990,000. Some idea of the immensity of these figures can be gained from the fact that the total exports of the entire British Empire for the same year was but $1,840,414,658.

Cleaning Brick Walls.

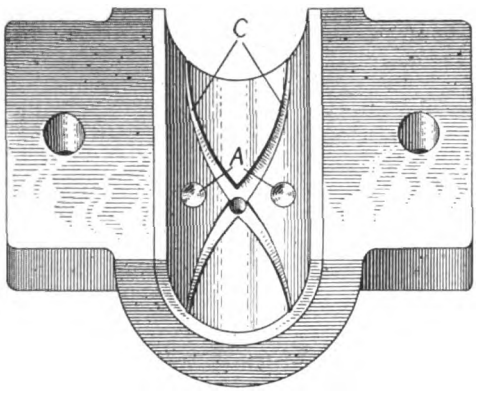
A solution of about 2 oz. of muriatic acid to 5 gal. of water makes a good wash for cleaning brick walls. This wash should be applied and the wall scrubbed down with a wire brush made for this purpose. Care should be taken to keep the solution from touching the hands or clothes.

CORRESPONDENCE

BABBITTING.

The Full Process Explained and How to Make the Box.

From L. S. Ferree, Nebraska.—Here is a little "dope" on babbiting that may be of interest to some of the craft. In babbitting the cast iron box, such as where they are in halves. as in the illustration, they may be filled in this way, which will result in a good job. After the old worn babbitt has been removed by driving a chisel between the babbitt and box with some gasoline and waste, clean the box of all grease and moisture. If this is not done the metal will broil or blow clear out of the box into the operator's face and eyes. Also see that the holes are clean that holds the bearing in. If there should be no holes already in the box for that purpose it may be best to drill two in each half, as indicated at A in the illustration. They need not be deep ones, only countersunk a little. When the box and shaft are both cleaned, block the shaft up so it is in the center and in line. In some cases where there is gearing, it may be that the shaft will have to be placed a little to one side, low or high, in order to have the gearing properly mesh. If



For Babbitting. From L. S. Ferree.

the gearing is too far apart it will be noisy, besides wearing faster; if too close, it will run hard and cut the bearing out until it has cut enough so it can mesh easy. Now take a piece of asbestoes, thin paste-board or two thicknesses of visiting or business cards, and fit on top of the lower half of the box and each side of the shaft. Cut holes in them for the bolts to go through, and one hole in each piece, one for the pouring hole and the other for a vent hole, overflow or air escape. If the vent hole is not there the metal will bubble and not fill good.

Next fit a piece of asbestos or card-board to the ends of the box. It can be held in place by mud or clay, but don't mix it moist enough so it will soak through the card-board if you have used that instead of the asbestos or it may bubble and blow when pouring.

Now if we are ready to pour the metal, be sure and have plenty in the ladle, as a little extra will help to hold the heat longer while pouring. If in winter time, the box and shaft should be warmed a little to take the chill off so as not to cool the metal before it has run clear around. Heat the babbitt just hot enough to scorch a splinter of soft pine wood when dipped into it. Babbitt should not be heated to a red heat, as it will in a few heats spoil it, making it brittle and flinty when cool, and spongy while pouring. When it is heated enough, it should be skimmed before pouring. Then pour the lower half that is ready. Pour just fast enough not to choke the pouring hole. Pour until it runs out of the vent hole. The sooner you stop after it is full, the better and smoother the bearing will be.

When cool, remove the asbestos and cut off the knobs left from the pouring and vent holes. Or maybe better, file them off as there won't be so much danger of injuring the bearing. Now fit in another set of asbestos on top of the lower half, but don't cut any pouring or vent holes in these—only the holes for the bolts. Now place the top half of the box in place and screw it up snug. Plug the ends with asbestos and clay, the same as was done on the bottom half. This can be poured through the oil hole in the box, but pour slow, so the air can escape through the same hole. When cool remove the top half and drill out the oil hole. In drilling out the oil hole, give the bit light pressure so as not to push out the bearings. After it is drilled, cut two oil creases in it as at C. These are important in getting the oil evenly distributed throughout the bearing, which permits the box having a tighter fit without it heating. These need not be deep, only about 1-16 of an inch deep, and a little deeper and wider near the oil hole than at the outer edge. In putting back in place, the shaft should turn easy without binding, but should not show any slack when lifted up and down. If too loose or too tight, it can be adjusted with leather, asbestos, card-board or paste-board, fitted in between the two halves of the boxing. Adjust it so the box may be screwed up good and tight. This will, if properly followed, insure a good job of babbitting. Next month will write of babbitting the closed box, such as in windmills, mowing machines, etc., also of filling corn planted and lister plates and bar shoes.

Grinding the Lawn Mower.

From A. E. Bachman, Pennsylvania.—The season in which the hum of the lawn mower can be heard in almost every home is close at hand. A well-kept lawn, like clean teeth and neatly trimmed finger nails, is the indicator of a pride which manifests itself in various ways in our respective homes. In keeping with this sentiment, it follows that proper care and attention needs to be given at every point. I wish to direct your attention to only one of these, viz. Proper grinding and care of the mower. In the first place, some good lubricating oil, not too heavy, needs to be used. When this can not be had and heavy oil must be used, good results for the free and easy running can be had by using kerosene alternately with a heavier oil. Care should be taken that the reel shaft bearings are not so loose as to cause it to make a rattling sound when in motion. The reel bearings should fit so close as to allow freedom of movement in revolving only. The next thing to adjust properly is the cutting blade. This should be brought in contact with the reel blades only very lightly. Last but not least is grinding. Different means have been employed in this work to attain satisfactory results, some by revolving the reel backward and putting emery with oil on the blade. This, while it makes a smooth-gliding point of contact, wears a bevel on the blade, increasing friction at this point and robbing the reel of its keen cutting edge. Another manner of sharpening is to put the reel into a lathe and have an emery running against it while the reel itself is revolving. This grinds the reel perfectly round but gives the reel blade no clearance, making the back of the blade of the same diameter as the front cutting edge; because of this, the machine must run cloggy, cut poorly, and go hard.

The best and most satisfactory manner of sharpening is to have a machine which is designed for this work which has the shaft of the reel in a firm position on a moveable carriage passing a point of a highly speeded emery wheel. The curvature of the reel blade serves to turn the reel, as each blade passes a firmly fixed rest in front of the wheel. This point can be raised or lowered and thereby regulate the amount of clearance the reel blade shall have, grinding the blade uniformly and of equal diameter, bringing the cutting edges only in contact, reducing the amount of friction to a minimum, and allowing your machine to run free and easy and to cut keenly. I have made many to cut rags, even threads.

Another method is to grind the reel while in the mower. "Grind it as you find it." This method is little better than filing because of the construction, the mower blades cannot be ground their entire length and filing must be resorted to at the ends, making it next to impossible to make reels uniform.

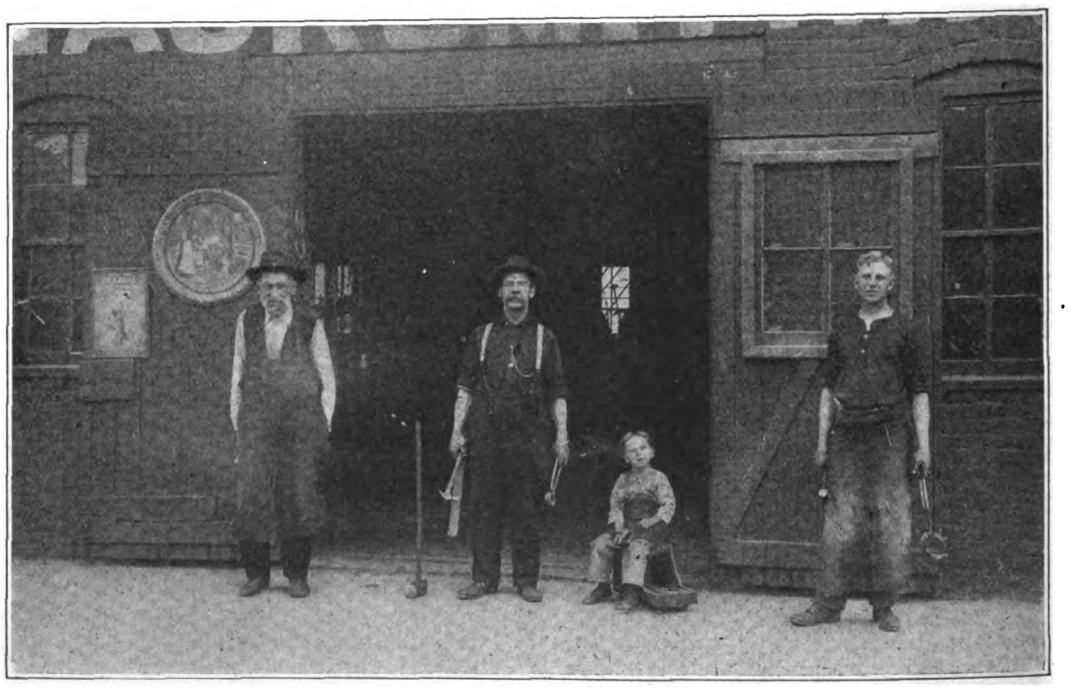
Sleigh Shoes.

From John P. Maw, New York.—During the winter months over an extensive territory the sleighs in one form or another are a most useful and necessary conveyance. The large bearing surfaces of the runners enable them to carry loads where wheeled vehicles would sink in and get stalled. On smooth ice or packed snow almost any kind of shoe for the runners will answer, but when there are spots of bare ground, railroad tracks, etc., to cross, the quality of the shoes becomes important. Strange as the statement may seem to some, the writer has no hesitation in saying that the best material for sleigh shoes is unknown in most parts of the country.

The shoes most commonly used are mild steel for light cutters and bobs, and cast-iron for heavier sleighs. Wrought iron or the mild steel commonly used, draws hard on bare ground, because the stones and grit cut into it, and the tough metal does not readily let go. This, as all drivers know, is very hard on horses and harness, and also on light sleighs. It causes the shoes to wear out quickly and bends and racks the braces and knees more or less. Spring steel is better than the foregoing for light work, but it is harder to drill. The writer had heard of welding tool steel to iron and then hardening, but this is a difficult and expensive job and is seldom resorted to. The cast-iron shoes generally used are of that grade known as gray iron. They wear very smooth on ice or snow, but cut away very fast on bare ground and are easily broken. On account of the weakness and friability of the metal, they do not "hang" like steel or wrought iron, consequently they draw easier on bare places. But in very cold weather they will freeze down tight when a loaded sleigh stops for a few minutes, owing to their becoming slightly heated by the friction when running.

Four Generations.

From G. T. & F. D. Granger, Colorado.—In response to your inquiry we do general blacksmithing, horseshoeing, sell oil, separators, blacksmith's coal, buggies and wagons. Our shop is fitted up with band saws, drills, emery



Four Sturdy Blacksmiths.

wheels, blowers driven by electric motor, and 5 H.P. motor being used on all machinery except the blower which has its own motor attachment. We are well equipped to do all kinds of repairing, although horseshoeing is our specialty. R. R. Granger is our expert horseshoer and he enjoys the distinction of being called the neatest and best one for many miles around. As will be seen, however, all four generations are or have been or will be experts in all branches of the trade. G. T. Granger, the senior member of the firm was born in Wyalusing, Pa., Aug. 29, 1837. After living in different places he went to Wysox, Pa., when about 15 years of age and apprenticed himself to J. B Ridgeway After reaching his majority he worked in different places in that State and in 1873 moved to Fremont, Neb., and from there to Stockton, Kans., where F. D. Granger had moved the year preceding. G. T. and F. D. Granger have been in business in Salida, Col., 18 years. F. G. Granger, the fourth addition to the generations came on deck a little more than four years ago and bids fair to follow in the footsteps of his progenitors, as he is already developing quite a liking for hammer and nails.

Handy for Cutting Cold Iron.

From Frank Johnson, Oregon.—I would like to submit a sketch of a tool I find very handy for cutting cold iron where one is working alone. It enables one to use the sledge and do more cutting in one minute than in three with a hand hammer. I have never seen a tool like

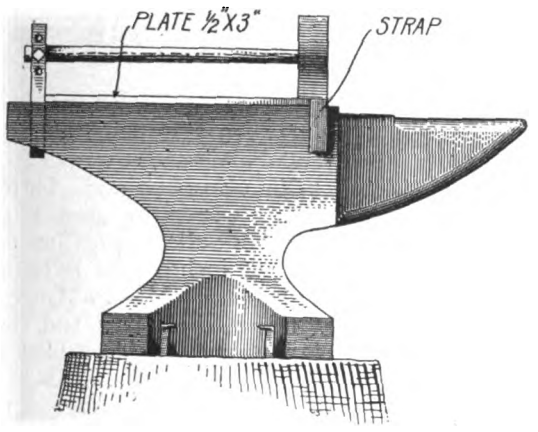


Fig. 1.—The Cutter Attached.

this and believe it to be original. It is best for cutting lengths from a long bar, when one end of the bar can rest on the helper's stand. The cutter and its handle should be forged in one solid piece. This tool will not bound from the anvil if made straight and smooth on the bottom. It can be fitted with a hot cutter,

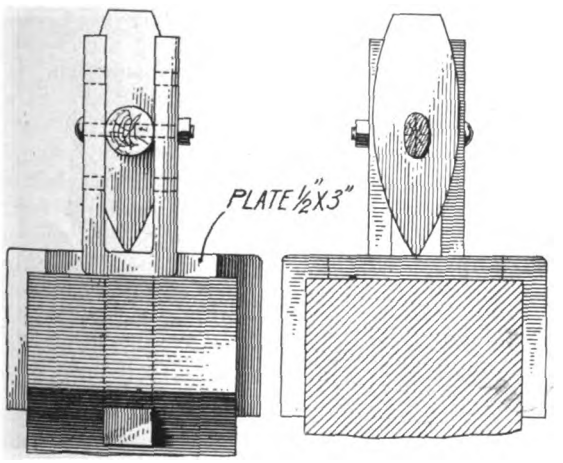


Fig. 2.- End Views.

fuller, or set on a flatter. As a cold cutter, it is fine for cutting new tire, harrow teeth, plow steel, etc. The plate on the anvil should be ½ x 3 inches, of soft steel, with strap welded to the front end to drop down on each side of the anvil, Fig. 1. The rear fork should fit in the hardy hole and be welded to the main plate. Fig. 2 shows end views.

Tool Steel Working.

From D. Foster Hall, Massachusetts.—It is desirable that all tools should be heated in a furnace with pyrometer attached and the temperature for the different grades of steel should not exceed 1450 degrees F. If a gas or oil furnace is not available the old method of heating must be resorted to. Do not leave the tool to soak in the fire, as this decarbonizes the steel on the surface which will cause uneven hardness in hardening, but apply the heat slowly until the tool is heated through, and then bring the heat up quickly as possible without too great heat on the sharp corners.

Experience shows us that carbon steel tools when hardened at from 700 degrees to 780 degrees Centigrade expand. They neither expand nor contract, except when over 800 degrees they contract. See that the tongs are neither cold nor damp in handling tool steel, as this is liable to cause cracks through contraction. If a tool has a hole through it, a rod is better than tongs to handle it with. See that the hardening fluid is ample for the size of the tool being hardened. Want of attention to this fact is one cause for defects in hardening tools.

When cracks of a circular form occur, it is an indication of uneven heating. When cracks of a vertical nature are found, they show that the steel has been burned. Soft and hard places show unevenly cooled or soaked. If a tool is not moved about in the hardening fluid, it will show these hard and soft places and is liable to crack. Tools will show hard and soft spots if allowed to drop to the bottom of the tank before cooling. They should be thoroughly cooled before letting sink to the bottom.

Overheated Steel.—If a tool in heating comes in direct contact with the blast of the smith's fire it will become surface burnt and will show hard and soft places in hardening.

Heating in Gas Furnaces.—Great care should be used in heating with the gas furnace. If more gas is used than the right proportion, bad results will follow in hardening; or if more air than gas is used, the oxygen in the air attacks the steel forming oxide of iron on the surface. The result is a soft tool.

Tempering.—After a tool is hardened, it is ready for tempering. The temper is determined by colors on the surface of the steel. The only correct way of demonstrating this is by the use of the scleroscope which will give the hardness degrees as they actually exist. One cannot depend altogether on the color, for a piece of soft steel would show colors as well as tool steel.

To reduce strains in tools, it is a good plan to dip into the hardening bath, and as soon as the cutting parts are black, remove quickly and plunge into an oil bath. This will relieve the hardening strains.

Cold Shoe Fitting.

From Mr. A. E. Bachman, Pennsylvania.—The subject of setting shoes hot or cold has been discussed pro and con for a few years, but of late I have not seen much of it. It seems to have died a natural death, but, be that as it may, there are still suggestions to be thrown out for those who have not yet attained satisfactory results.

For my part, I am satisfied that the way I have learned from instructions from other good shoers, and my own experience, that my shoes stick very well, and the hoofs stay as straight as can be expected. I am a firm believer in cold setting and no tips. My shoes stick invariably until the feet are too long. No matter whether the horse is used on the city streets, on the farm, or on the open pike. The tip is put on to help hold the shoe, which if other work is done well is not necessary. In the first place, dress the right foot level, and let all of the horn or crust, all of the quick, and a small part of the sole, come up as a level on a perfect plane. Then fit and level your shoes perfectly, letting the two plane surfaces rest firmly on each other. When nails are set, drive them firmly into the

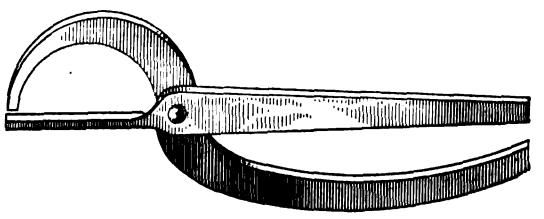


Fig. 1.—A Puller.

crease of the shoe with your shoeing hammer, striking each nail several hard blows until the head is firmly set.

For making a clinch I use a puller like Fig. 1. When all nails are firmly driven, I drop the foot, take it forward, cut nails off with a sharp pair of nippers, and with a file remove the loose hoof under the nails, and pull the nail end out with the puller as much as I see fit, then trim these ends down with a rasp, just long enough to double them round like Fig. 2, then your shoe is on as tight as possible. The heel ends of the shoe need not project more than half an inch; less is better. I began shoeing in 1859, and

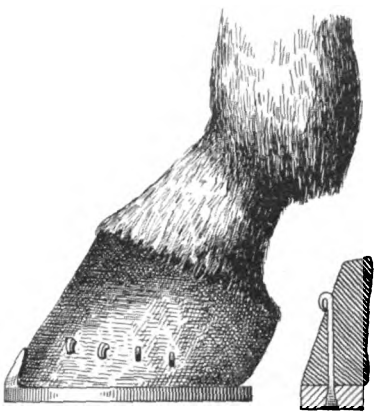


Fig. 2.—Showing the Clinch.

served my time as an apprentice, before the war. I enlisted July 31, 1861, into the cavalry service, where I learned fancy shoeing from a former race horse shoer.

A Bench Hook.

From J. P. O'Brien, Iowa.—I send you sketches of a wheelwright's bench hook. It is simple in construction, easily and quickly adjusted, and better than any which I have seen

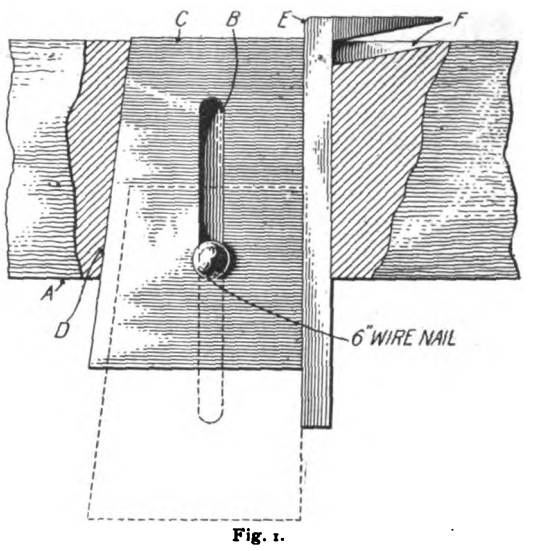


Fig. 1.

on the market. I can recommend this device in every way. I have used it for fifteen or twenty years and think it will be of some interest to our brother workmen. By inserting a 6-inch wire nail through the edge of the bench A, Fig. 1, then through the slot B in the wedge

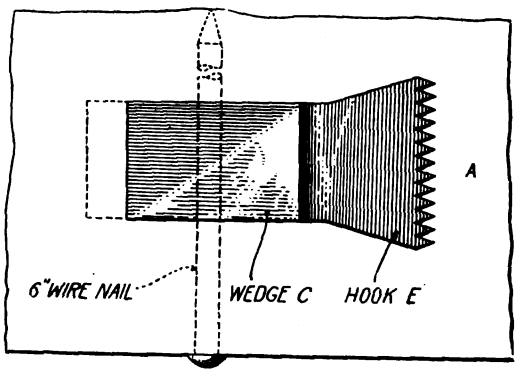


Fig. 2.—Plan View.

C, the adjustment of the hook E may be easily made when necessary. D shows the opening in the bench. The hook can be lowered flush with the surface of the bench by making a cutout as shown at F. Figure 2 shows a plan view of the device and also the teeth on the hook E.

An Ice Chisel.

From C. R. Keeney, Connecticut.—I will explain about an ice chisel I have made which is very useful when fishing through the ice or otherwise.

The first operation is to take a piece of tool steel 18 x 2¼ x ¾ inches. Shoulder the end in

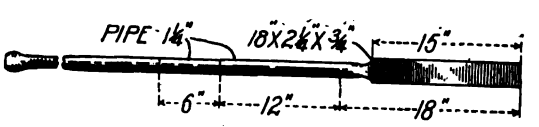


Fig 1.—The Material.

shape to fit 1¼ pipe about 12 inches long. Insert the shouldered end of the tool steel in the pipe and weld in place. Draw down from the shoulder of the tool steel a true taper, which

will make the blade 15 inches long. Then finish and temper the blade. For the handle part, take a piece of 1¼ pipe about 6 inches long. Plug up one end with a shouldered plug.

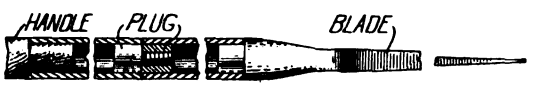


Fig. 2.—Showing the Fitting.

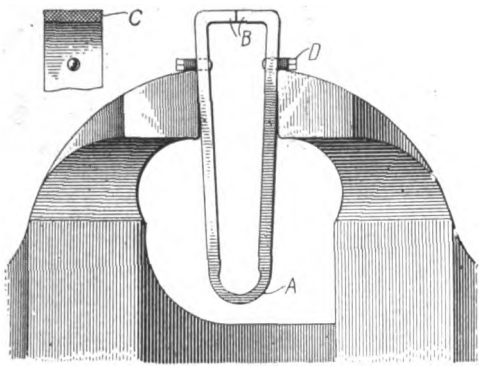
Thread to fit the other plug which is inserted into the other end of the pipe which is welded on to the blade. Then turn up to fit into the 6-inch piece of pipe and rivet through, making a take down ice chisel.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

A Spring for a Vise.

From J. P. O'Brien, Iowa.—The accompanying sketch shows a spring vise in a vise for the purpose of holding very short centre shank head bolts, machine screws, etc. It is constructed from a buggy or wagon spring of from 1¼ to 2 inches wide and about 12 inches in length.



A Vise in a Vise.

When made from 2-inch steel it should be drawn wider at A in order to give it enough spring motion. The face of the jaws B should be made as shown at C, so as to have a firm hold on the bolts. The pins D are supports to prevent the vise from falling down from the larger vise. The spring is strong and large enough for small work.

Weed Out the Bad Shoers.

From C. A. McBride, California.—I saw in the January number of our journal Brother W. C. Martin's high heel article. I have been reading The Blacksmith and Wheelwright quite a while and I have refrained from writing anything pertaining to shoeing horses, but I can't keep still any longer. Now, I want it understood that I am not raking Brother Martin, but I am getting a good dig over his shoulder at a lot of quack shoers, that put themselves up for first-class shoers, yet can't sweep the droppings from the floor. I don't pretend that I know everything about shoeing, but I always think that I am right till I am shown where I am wrong.

In the first place, I have had the good fortune to work with Ed. McGlade for over seven years. You cannot name a track shoe but what he can make—running or trotting shoes. He was the shoer that drove the first nail that was driven in Sunol's foot. Sunol held the world's record. I am using Mr. McGlade's name to illustrate where I got my ideas of shoeing. I would like to ask Mr. Martin one question, and I want him, or any other shoer, to answer it:

Did you ever see a horse that was lame in the tendons that had a good high frog? If such a case exists, it ought to be put on exhibition and on record. Brother Martin strikes the right key when he says the Humane Society should take up some of the cases. But they surely ought to weed out all bum shoers. Grant licenses only to those that can pass a rigid examination. Send them over the road if they drove a nail without a certificate.

High heels and short toes are what is needed for lame tendons. What I mean by shortening the toe of the foot is to take the rasp and dress the toe back within half an inch of the sole of the foot.

Why is it that I never have seen one of the important items of shoeing discussed, that is getting the feet ready for the shoes? I will start it myself. I dress the foot to shape with rasp and nippers. If there are any "wings" grown out of line with the shape of the foot, they should be rasped in shape. Shorten the toe back within half an inch of the sole. When this is done, take the foot forward and finish it off, just as you would after you have turned down the clinchers. By following this method, you will find it easier to drive the nails and you can fit a shoe easier and a foot will take a better finish; and it will be easier all around. You have got to fit the shoe to the foot, not the foot to the shoe.

The reader of this will bear in mind that it is only for lame tendons and flat footed horses.

A Blacksmith's Chimney.

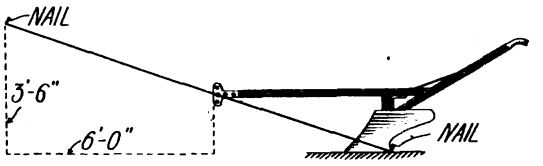
From A. E. Bachman, Pennsylvania.—Brother T. W. Rigway wants to know how to build a blacksmith's chimney. I am sure he can make one of brick, say 20 or more feet high, 8 or 12 inches wide, inside. It is not so much how the chimney itself is made as to how the draw-hole is made. A chimney will draw well if the draw-hole is about 4 inches wide and about 15 inches high. Build the chimney straight up, then put your fire box about 6 or 8 inches away from the chimney. If you make a bonnet to fit over the fire, make that to be movable, so that it may be taken away if desired. I'm sure a chimney built this way will draw well.

Plow Information.

From H. P. R., Iowa.—If a gang or sulky plow runs on its nose and shoves itself through the dirt, the fault is with the share or beam. In most cases this fault is a set back beam, but it might also be the result of a badly bent down and out of shape landside point. If it is in the beam, take it out and heat it in the arch, then bend it forward until the plow has the right shape, and it will run right. The landsides on boths plows should be the same distance apart at point and heel, if a gang. The measurement should also be the same from bottom of points to bottom of beams.

Straightening Plow Beams.

From G. W. Lancaster, Kansas.—I see that a brother wants to know how to straighten an iron beam plow. I send you one that I got out of your paper several years ago and have used on at least twelve plows and have found it absolutely right. This rule is: Set your plow on a level floor. Six feet from the end of the beam, forward 3 feet 6 inches, straight up,



For Straightening the Beam.

take a string and drive a nail in the floor at the back bolt where the stick is bolted to the bar, and when your string will center the end of the beam at the top of the stick 3 feet 6 inches to the nail, your plow will run right for depth. As to land, I have seen no rule that will work, for different sizes or the "set" is different. I have found the eye best. This will work on a wooden beam as well as on iron. This alone is worth all the paper ever cost me.

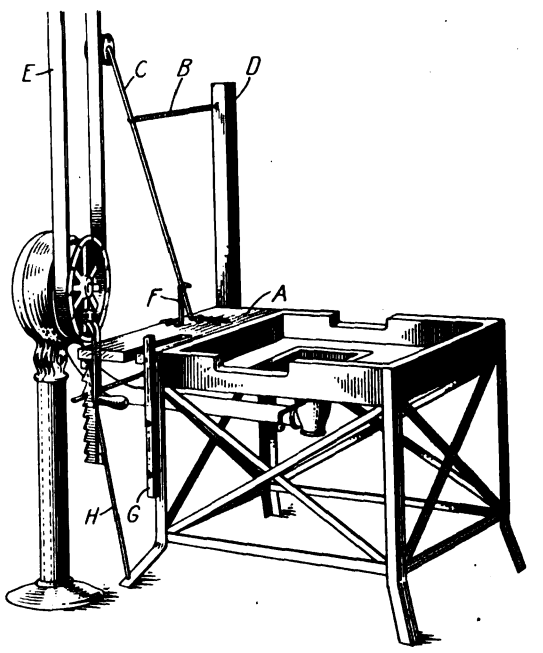
Likes Fisher Vises.

From A. E. Bachman, Pennsylvania.—Brother Foster T. Hanson, of Wisconsin, wants to know about a Fisher's vise. I have had one of these double screw vises one year and have used it very hard and can say that it is made to stand the racket. It holds well, and I think you could not break it if you wanted to. It is built very strong, of the best material, for there is no give in it. It is the best vise I ever had, or used in other shops. It is a much better vise than the single screw. It opens parallel at any distance. If I wanted a dozen vises, I would buy Fisher vises. This is my opinion on this vise.

A Home Made Fire Blower.

From Terry Brothers, Kansas.—Complying with the request of several of our brother craftsmen who have seen our arrangement for blowing our fires by power and the manner we have of controlling the blast, we are enclosing a rough sketch of our plan from which we trust you can understand enough to help your draftsman to make a good sketch.

First, one should arrange a jack shaft directly over the blower or as nearly so as possible. If more than one forge is used and these are



No 1.—The Forge Blower.

placed in a row, this shaft may be long enough to work all the forges. We use two on the same shaft. This shaft should run about 100 R. P. M., and use about a 5- or 6-inch pulley. Then on the shaft of the blower, where the crank is, take off crank and place on a pulley to fit the shaft, having a face about 1¾ inches or 2 inches and about 12 inches in diameter. Make a flange for this pulley out of heavy sheet iron and clamp on to pulley one flange on each side. Then bolt the crank on to the spokes of this wheel so the blower can be used when the engine is not running. Then use a piece of 2x12 inches, the width of the forge, placing as shown at A, Fig. 1. The shank should be made as in Fig. 2. The slot is for the handle controlling the blast gate. Then take a piece of 7-16 or ½ inch round rod and make the piece C. One end should be bent about 8 inches and enough of a bend on the upper end to hold a small flange pulley to tighten the belt. This small pulley should be about 30 inches above a pulley on the blower. C is fastened to A with 2 U bolts. B is a coil spring something like a screen door spring, and is to hold C away from the belt when not in use. D is a studding used in building, put on the should be very pliable. H is a supporting leg corner of forge. E is a 1½ leather belt and for A, to which is fastened a quadrant for the lever F. It should be about 14 inches long. F is made of ½-inch round iron. Care should be used in making this part, as upon it depends a great share of the good service derived. In Fig. 1 G is a ¾x¾ hickory stick about 24 inches long bolted at the lower end to the leg of the forge. Now this blast gate can be made by

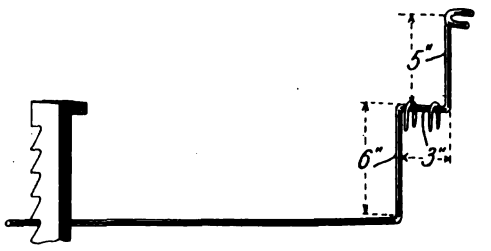
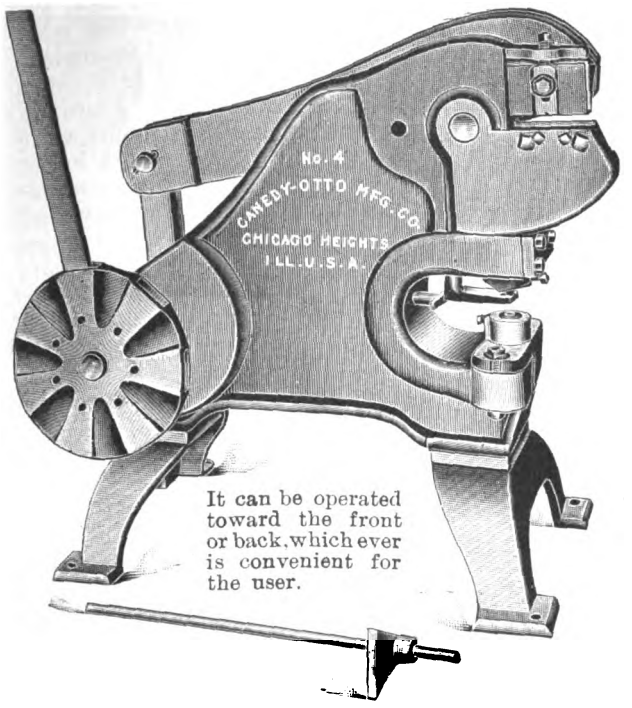


Fig. 2.—The Shank.

cutting a blast pipe and connecting it with strips of sheet iron riveted to each piece of pipe and then riveting on to a small piece of wood a piece of sheet iron just large enough to slide back and forth through the blast pipe where cut into, and bolting the other end on to piece G just far enough from the bottom so as to pull out of the blast pipe perfectly straight. Or you can use a cut such as is used on water conductors around the eves of a house. This we like the best of anything we tried. These gates are cheap and can be bought of most any tinner, and you can

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ⅝-in. and ¾-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

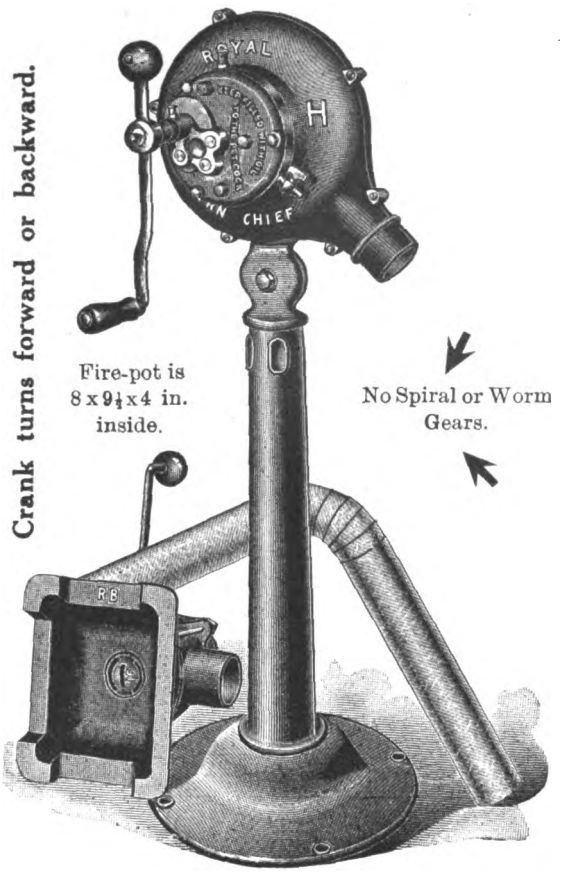
No. 100 Royal

The most popular forge ever made

Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

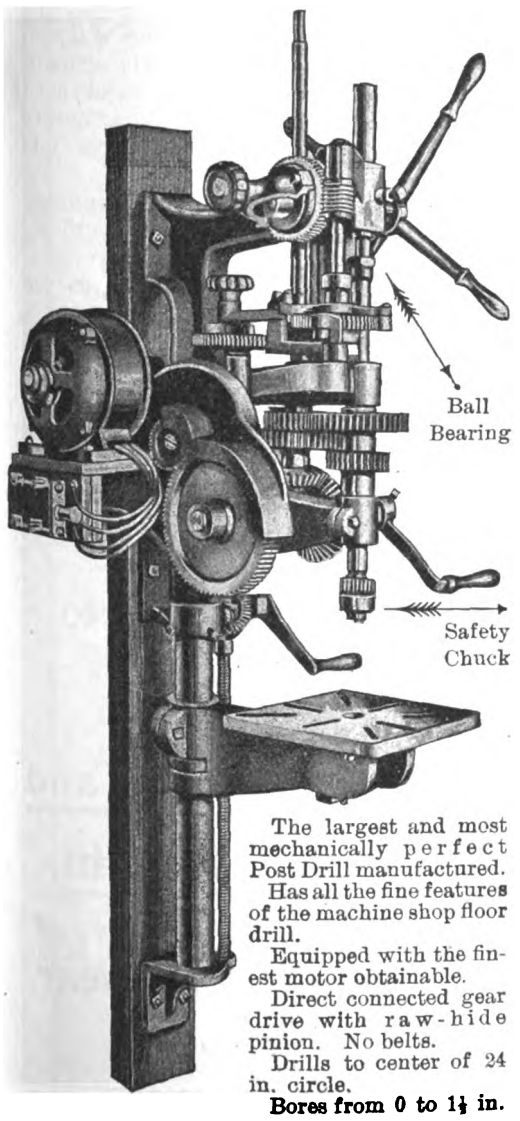
(Ask the man who owns one)



FORGES
BLOWERS

PUNCHES
SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1¼ in.

DRILLS
TIRE-SHRINKERS

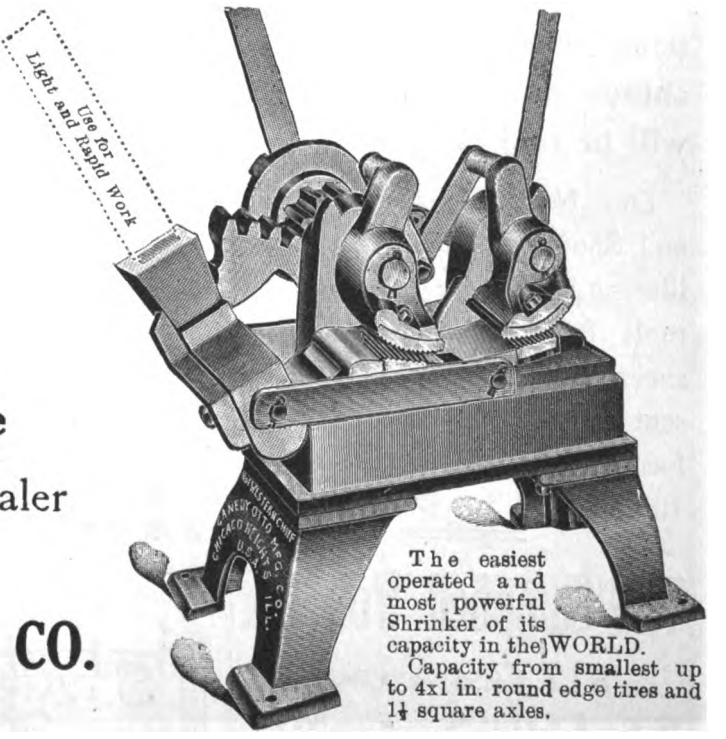
Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

Give name of supply dealer or jobber.

No. 1½ Western Chief

(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1 in. round edge tires and 1¼ square axles.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

get them the same size of any ordinary blast pipe. Fig. 2 gives further details of the construction.

We can say we have used this arrangement for over two years now and find it far superior to the tight and loose pulley business (or an extra man to turn). With this you are able to work two plowshares at once, and for welding or brazing we never found anything to equal it. With it one can handle about twice as much work as without it, and if you do have to wait for a heat you get a chance to get a rest and not have to be turning the fire. Ours we made out of the scrap pile, and about all the new stuff we bought was our blast gates and leather for belts. They are fine. Make yourself one and try it. It won't take over six hours to make it.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Information Wanted.

From J. W. Donovan, Alta., Canada.—I would like to ask some of the brother blacksmiths how to harden a plow lay so it will clean in sticky soil. I am just beginning and would like this information very much.

An Axle Straightener.

From Anton Westerberg, Kansas.—Can you or some of your readers tell me how I can make an axle straightener to straighten them out without taking the axle out of the buggy?

Never try to be funny with a customer unless it is someone of whose sense of humor you have no sort of doubt. There are people, you know, who cannot take a joke.

Hanging Hand Saws.

Hand saws are usually hung up by the handle, involving a very awkward operation every time they are taken for use or replaced on the pin. It usually requires both hands to go through this performance, so common to every woodworker that its awkwardness is not appreciated, and will not be until he has his saws intelligently hung up by the point, with the handle within reach. Then he will wonder why he didn't have that hole drilled in the point long ago. By the way, drilling that hole is the only difficulty in the matter, but any machinist knows how to drill a saw of ordinary temper. Don't be contented with a small hole, but make it five-eighths of an inch or three-quarters of an inch, although the machinist will doubtless drill a small hole first. When you have your saws thus properly suspended, you will hang them up a dozen times a day where you now lay them down for a few minutes until you want them again. Besides, this method has decided advantages to the saw itself. Its handle is not scratched and marred by being constantly placed and replaced on a rough nail or screw, and its blade is not corroded by the sweaty hands of the workman, as is necessarily the case in the old way. It would be a decided boon to wood workmen if sawmakers could be induced to put this hole in the saws when they are made.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

TRIVIAL CAUSES.

But They Are Likely to Give Much Trouble to the Engine Operator.

BY E. W. LONGNECKER.

The average man's life is made up of about 80 per cent. of good health, from 15 to 18 per cent. of slight ailments amounting to various degrees of indisposition, and from 1 to 2 per cent. of real down sickness that may be considered serious. In other words, the average man has no more than from one to four serious maladies to contend with during a lifetime.

The 15 to 18 per cent. of indisposition consists of anything from Sunday morning "church time" excuses and fleas to rheumatic pains and sick headaches, either of which may be relieved with such trivial means as the funny sheet of a Sunday newspaper, insect powder and pain killer.

The troubles with a gasoline engine on the average may be likened, both in proportion and seriousness, to those in the life of the average man. There are only a few times in the life of the gasoline engine that there is really any serious break or cause of trouble. All the other difficulties met with may be traced to some trivial matter, something that may be adjusted readily and almost anywhere by a competent operator. If we would do our duty therefore as operators or repair men, we will consider well the little things that may loom up in the running of a gasoline engine, to momentous proportions to harass and ruffle our feelings, if we are not on our guard. It makes us feel something like thirty cents when our engine has stopped and we cannot locate the cause of the trouble, but, fearing something awful we "yank" out the piston and work possibly for two solid hours under heavy perspiration to get it back when some one points out to us a loose or broken battery wire. We are so liable to be hunting around the carburetor for improper mixture when possibly the compression is poor on account of bad piston rings or a leak at the valves or somewhere else.

When the engine misses fire we may get our heads set that it is in the spark plug and we will spend in time and money at least $5, before we can even be convinced that it might be a short circuit somewhere else or that the carburetor may have gotten partially clogged preventing the free admission of the fuel.

And when we hear a knock about the engine we will turn on more water if possible to keep it cooler, but the knock keeps up. Then we delay the spark and give less fuel because we want to stop that pre-ignition, when we never suspect a loose fly wheel that is trying to twist off the shaft or brush or shear off the key in the keyway at every impulse of the power stroke.

Sometimes when there is backfiring we conclude that the spark is advanced too far or that there is carbon in the cylinder and forget that overheating of the engine for want of sufficient cooling circulation or a weak slow-burning mixture may cause the same symptoms, and if due to overheating it may also be due to air lock, or choked radiator or the circulating pump may be out of order.

If the engine stops we should look for some one or more of these causes: Exhausted supply of gasoline; water in gasoline; gasoline jet choked; filter of carburetor choked with dirt or ice; gasoline not turned on; valves or valve springs broken; piston seizes; battery exhausted; coil defective; spark plugs dirty; or insulation broken; loose wires; dirty contacts; bad insulation; corroded battery terminals; wrong adjustment; dirt in contact breaker or commutator; points on plug too far apart; moisture on porcelain of plug, wires, terminals of contact breaker or terminals of coil; wet cloth or iron across poles of battery; loose platinum on vibrator on coil; oil on contacts where magneto is used; commutator brushes stuck, or are dirty and need cleaning; oil soaked commutator; armature spindle run dry and heated; magnets lost magnetism.

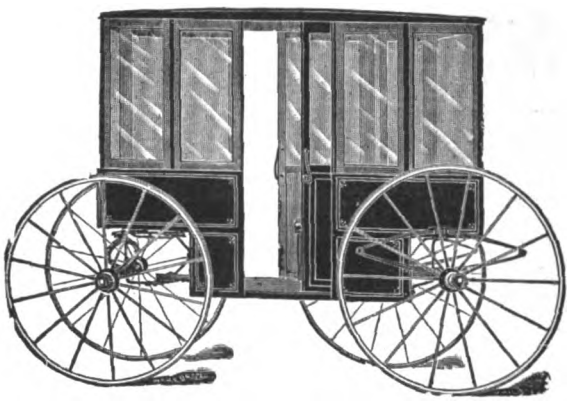
Smell and listen while the engine is running and you may smell bad carburetion, overheating and overlubrication, as well as overfeeding of fuel. You may hear a pound in the cylinder due to pre-ignition, a misfire, a a knock of a loose fly wheel, a hiss of a valve or other leak, or the purr or grating noise of a broken fly wheel spoke.

The Champion Line of Blowers, Forges and Blacksmiths' Tools.—If any of the readers of The Blacksmith and Wheelwright have not yet sent for the new catalogue issued by the Champion Blower and Forge Company of Lancaster, Pa., they should certainly do so at once. This company manufactures a justly famous line of tools and machines for the blacksmith shop which includes blowers, forges, drilling machines, tire benders, tire shrinkers, screw plates, power hammers, punches and shears, etc. Even if it is not your intention to purchase anything in their line just now, you will find that the large illustrated catalogue for 1912 which is issued by this company is a valuable reference book for your shop, and it will be sent entirely free of charge if you will simply send your name and address o na postal card and mention. The Blacksmith and Wheelwright. Readers are requested to turn to the double page announcement in this issue and they will get some idea of the variety of tools manufactured by this company, who will be pleased to correspond with any of our readers.

"Corona Wool Fat for the Hoof."—F. W. Collins of South Dakota recently wrote the Corona Mfg. Company of Ashland, Ohio, with respect to their preparation called "Corona Wool Fat" as follows: "For horses that have brittle and shell feet I find nothing better than Corona Wool Fat applied two or three times per week. This is a newly discovered preparation which is extracted from the wool of the sheep. It is the greatest hoof-softener I have ever used. I can also highly recommend this product for use on the frog of the foot, for nail punches, shoeboils, quarter crack, grease heel, sore shoulders, etc." See ad. on back cover page of this issue.

Wagons in the White.

We illustrate herewith a very popular type of low down milk delivery wagon, which is manufactured "in the white" by Shubert Bros. Gear Company, 44 Cedar St., Oneida, N. Y. Many of our readers can undoubtedly make considerable money by buying these wagons in the white, painting them up and selling them to the farm trade in their vicinity. The same company manufactures gears, tops, trimmings, seats, automobile bodies, etc., and they will be pleased to send their new 1912 catalogue on application. In writing kindly mention The Blacksmith and Wheelwright.



No. 600 Low Down Milk Delivery Wagon. Manufactured by the Schubert Bros. Gear Co., Oneida, N. Y.

It is a well known fact that foreigners are usually slow to take hold of American Goods of any kind. We understand, however, that the Common Sense Tire Remover, manufactured by The Common Sense Tire Remover Company of Dowagiac, Mich., is being called for in several foreign countries. The company is getting orders from foreign countries constantly. Our readers are requested to turn to the advertisement of this company on another page and write to them for further particulars and prices.

Studebaker Delivery Wagons.—Many of our readers can easily sell such delivery wagons as are manufactured by the Studebaker Corporation of South Bend, Ind., whose announcement will be found on another page. It is claimed these wagons sell easier than others, because they are made right and have a reputation behind them. This company has a liberal proposition to make to blacksmiths and wagon makers all over the country. Write to them at once for their catalogue No. 601 and price list, together with special proposition referred to. It is easier some times to make a little money selling a wagon which has already been built by somebody else, than to hammer out the same amount of money on an anvil.

Victor Horse Shoe Pads.—These pads are dsecribed as the most satisfactory to the blacksmith and the most satisfactory to the horse. The reason being that they are made of good live long wearing rubber and the best oak tanned leather, coupled with perfect workmanship. Blacksmiths who are not now using the Victory pads should see their dealers or write direct to the Victor Rubber Company, Springfield, Ohio. In doing so kindly mention The Blacksmith and Wheelwright.

Tools.—The Campbell Iron Company 817 Cass Avenue, St. Louis, Mo., wants to send its No. 5 Tool, Machinery and Shop Equipment Catalogue to every reader of this paper who is thinking of purchasing new tools of any kind. This catalogue illustrates and gives particulars of a great variety of tools for blacksmtihs, horseshoers, auto repair shops, etc., and is sent promptly on request. Write for it today and you won't forget about it.

A Valuable Book.

Practical Problems for Vehicle Draftsmen and Mechanics. Published by Ware Brothers Company, Philadelphia, Pa. Price, $2.00, postpaid.

This book is by R. B. Birge and Hugh M. Sargent and as far as we know nothing thus far has been published of more practical value and interest. The authors have been intimately connected with the vehicle industry, and because of their wide knowledge of carriage and automobile design and their skill in executing vehicle drawings, were selected as instructors of a class of pupils in the art of vehicle drafting. As this course of instruction proceeded many practical problems came up for solution in relation to the highly technical work of the draftsman and body builder, and notes were made of all these points, these notes forming the basis for the book. The subject matter thus afforded covers a thorough explanation of geometry so far as it relates to the drafting of carriage and automobile bodies.

There are plain directions as to how to lay out sweeps or curves, ovals, and the application of the proportional triangle for laying out twisted or winding surfaces. The construction of joints is taken up, the laying out of proportional corners, finding the dihedral angle, etc. Coupé pillars, door framing, glass frames, wheel houses, mud guards, seat panels, and many other features of vehicle design are explained and illustrated. Chapters are devoted to "Perspective Drawing of Vehicles," "Coloring Carriage and Automobile Drawings," and the book closes with a series of drafts for up-to-date automobile bodies.

The book is well bound in cloth. The paper used is of the highest grade, and of the most suitable kind for printing line drawings.

Any one wishing a copy can have it sent postpaid by remitting $2 to M. T. Richardson Co., 73 Murray st., New York.

An Hour's Work for One Cent.—The average cost per horse power hour for running a Witte gas, gasoline, distillate or naphtha engine in a blacksmith shop is said to be one cent, which is certainly a very economical basis for obtaining power. The Witte engines are sent out with a five years' guarantee, and the Witte, Jr., which is especially adapted for the blacksmith shop, is built in four sizes, 2, 4, 6 and 8 H. P. Larger Witte engines are made up to 40 H. P. Readers are requseted to spend one cent for a postal card which will bring the new catalogue, issued by the Witte Iron Works Company, 1606 Oakland Avenue, Kansas City, Mo. Many of our readers might like to act as agents and special inducements are offered to introduce the engine in your locality. In writing do not forget to mention The Blacksmith and Wheelwright.

A New Punch.—The Tomlinson Mfg. Company have recently brought out a new machine which they characterize as the latest and cheapest punch. It is said that the work on this machine can be done five times faster than drilling and it punches one-half inch iron. A twist of the wrist firmly locks the machine to your anvil. It is easy to place and as easy to remove from the anvil as a hardy. Hundreds of these machines are already in use and they invariably give satisfaction. A descriptive circular will be sent free if you will take the trouble to write for it. Address all correspondence to the Tomlinson Mfg. Company, Severy, Kansas.

Death of William G. Sawyer.—The readers of this journal will learn with regret of the death of William G. Sawyer, one of the founders of the well known Star Manufacturing Company, of Carpentersville, Ill. He was born in 1841, and with his brother formed the nucleus of the Star Manufacturing Company many years ago. One of the local papers says that Mr. Sawyer was a big business man but he always had time to tell a story and radiate sunshine and encourage young men. Naturally his friends are numbered by the thousands in his own town and all over the country.

Spliced Joint Shaft Ends.—The Steel Socket Shaft End Company of Cleveland, Ohio, have an announcement on another page concerning their spliced joint shaft ends which they say give perfect satisfaction in all cases. The splice joint where the wood meets adds great strength and guarantees them against breaking. These goods are handled by the leading supply houses throughout the country. If your dealer does not carry them write direct to the manufacturers as above.

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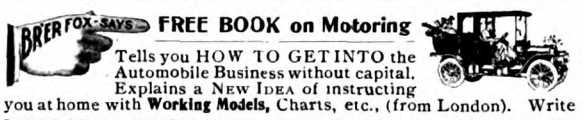

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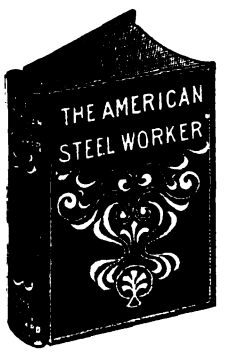

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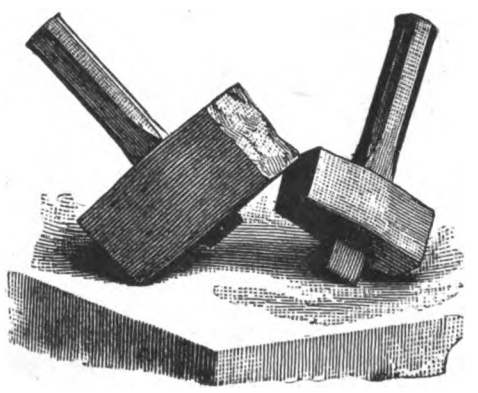

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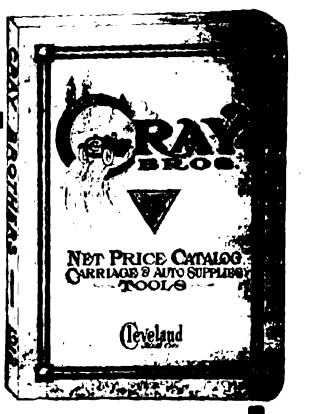

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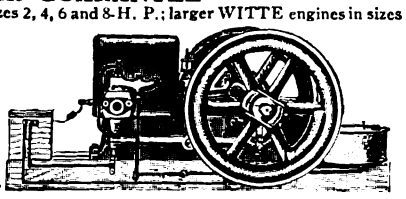

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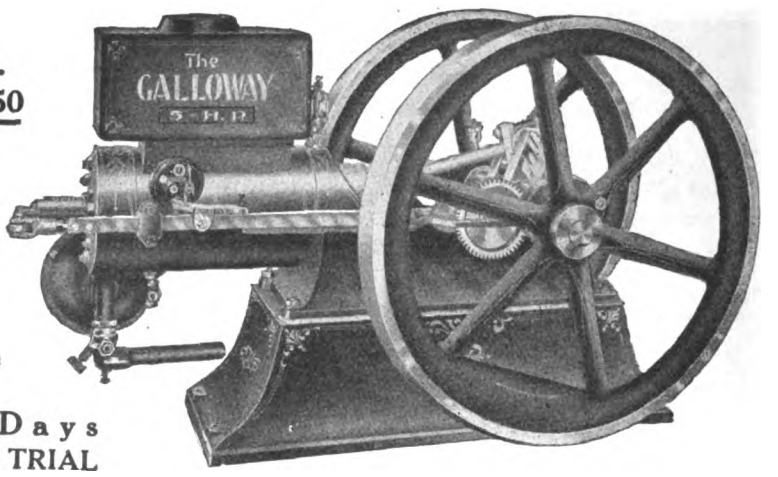

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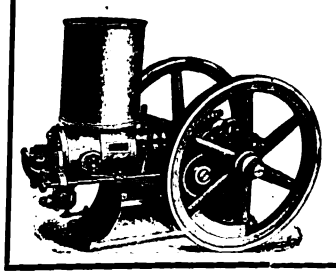
WILLIAM GALLOWAY, President,
THE WILLIAM GALLOWAY COMPANY,
1555 Galloway Station, Waterloo, Iowa.

THE CHAPMAN ENGINES



Are built to give the longest life in the most reliable always-ready manner. **THEY HAVE GOT THE STUFF IN THEM** to do hard work and keep at it year after year. **THEY ARE DESIGNED** to do more work with a gallon of gasoline than any other engine you can find at any price. **LET US PROVE IT.** Two and five horse hopper cooled or with large tank they will save money for you every day they run.

Address **H. L. CHAPMAN, Box B, Marcellus, Mich.**

Subscribe to THE BLACKSMITH AND WHEELWRIGHT. $1.00 per year.

MOTSINGER
Guaranteed Auto-Sparker

Write To-Day

Catalog Free, with full information.

(Better than an everlasting battery.) Will generate current for ignition, and electric lights, charging storage batteries, etc. Suitable for all types and sizes of gas and gasoline engines. **Let us tell you how to make your own electricity.**

MOTSINGER DEVICE MFG. CO.
578 Cherry St., La Fayette, Ind.

ABSORBINE

Before. After.

Cures Strained, Puffy Ankles, Lymphangitis, Poll Evil, Fistula, Boils, Sores, Wire Cuts, Bruises, Swellings, Lameness, and Allays Pain Quickly without Blistering, removing the hair, or laying the horse up. Pleasant to use. $2.00 per bottle at dealers or delivered. Describe your case for special instructions and **Book 5 E free.**

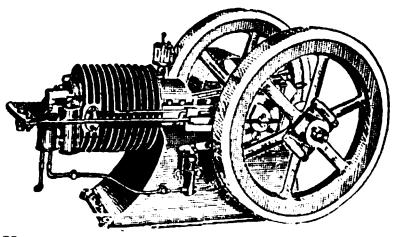
Tionesta, Pa., June 12, 1911.

"I have used your ABSORBINE for years and find it an excellent liniment. Used it on a horse with a weak ankle and got fine results, and am never without it." (Signed) Robert A. Fulton.

ABSORBINE, JR., liniment for mankind. For Strains, Painful, Knotted, Swollen Veins, Milk Leg, Gout. Price $1.00 per bottle at dealers or delivered

W. F. YOUNG, P. D. F., 55 Temple St., Springfield, Mass.

LET THIS ENGINE PAY FOR ITSELF.



You can run this engine on one-third LESS GASOLINE than other makes. This saving will soon pay for an engine. It is cooled without the use of fans or water. You run no risk of a "freeze up" in cold weather.

Try before you buy. Get our proposition.

GADE BROS. MFG. CO., 200 Main St., Iowa Falls, Iowa.

Kerosene Oil Engines

Marine, Stationary, Portable

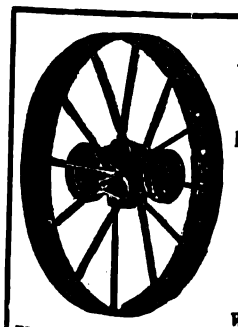
NO DANGER, Maximum Power, Lightest Weight, Simple, Reliable, Economical. No Batteries, Self Ignition by Compression. Fully Guaranteed.

Write for Catalogue W.

☞ No charge for packing.

HATCH OIL ENGINE CO.
8th Ave. and 18th St., Brooklyn, N.Y.

STEEL WHEELS



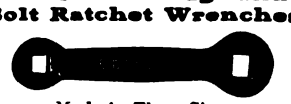
To Fit Any Wagon
Plain or Grooved Tire
Farmer's Handy Wagons
All Standard Types
Special Inducements to Blacksmiths

Write To-day for Agency

EMPIRE MFG. CO., P. O. Box 203, **Quincy, Ill.**

"BAY STATE"

Double-End Carriage and Tire Bolt Ratchet Wrenches.



Made in Three Sizes.

No. 1, 6 inches long, has ⅜" and 15/32" openings.
No. 2, 7 " " " ½" " 5/8" "
No. 3, 8 " " " 13/16" " ⅞" "

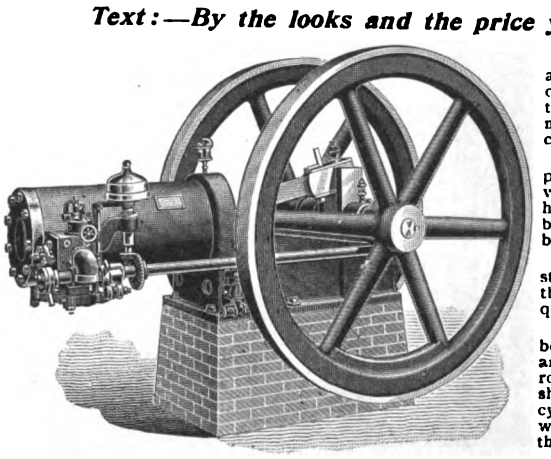
Nos. 2 and 3 take hex. and square nuts.

Send for Circulars.

G. A. CUTTER, Sales Agent, Taunton, Mass.

OUR SERMON:

Text:—By the looks and the price ye shall know them.



Would it not be possible to make an anvil to sell for two cents a pound out of cast iron? but show me the blacksmith that would buy one. Any intelligent mechanic will pay from ten to twelve cents per pound for a good steel anvil.

If you see a gasoline engine with the push rod on the side to operate the valves, the valves in the cylinder head, hopper on its back or ribs around the body of the cylinder, you can bet your boots it is of the two cent kind.

Manufacturers who are looking constantly for improvements can't publish the price, as this changes with the quality of the article.

The Capital gasoline engines have been on the market for 18 years. They are made packingless, without the push rod, but with a steel revolving cam shaft and without ribs on the body of cylinder. We have the best in the world. For a short time to introduce this wonderfully built engine

We Have Cut The Price In Half.

GET NEXT TO OUR PROPOSITION.

C. H. A. DISSINGER & BRO. CO., Lancaster, Penna.

BOOKS FOR BLACKSMITHS

Send for Free Catalogue

M. T. RICHARDSON CO., Publishers, 71-73 Murray St., N. Y.

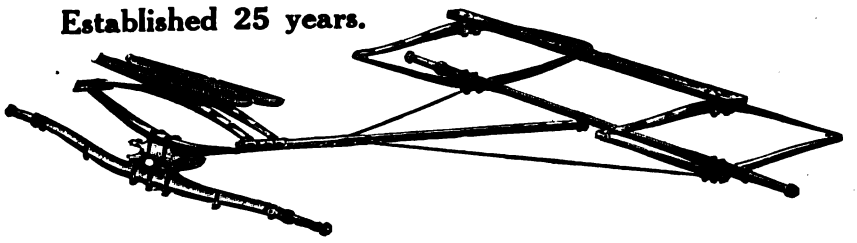
Schubert Bros. Gear Co.

44 Cedar Street, Oneida, N. Y.

DESIGNERS and manufacturers of high grade vehicles and gears in the white, tops for carriages and automobiles, automobile bodies, also trimmings.

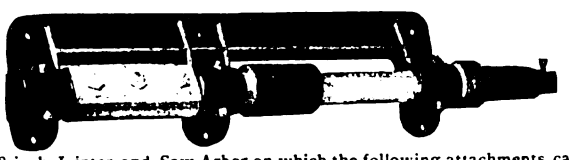
Our new catalogue sent free on application.

Established 25 years.



No. 06 Double Elliptic Front and Platform Gear.

MAKE YOUR OWN JOINTER



Combined 8 inch Jointer and Saw Arbor on which the following attachments can be used: Rounding Knives, Boring Bits, Spoke Augers, Disk Sander, Extra Rounding Head, Rip and Cut Off Saws, and Dado Heads.

We furnish All Steel Jointer Heads 6 to 16 inches long, complete with knives, pulley and cast iron frame that head runs in, all ready to bolt to wood table which any wood workman can readily make from the drawings and instructions we furnish.

We also make the most practical

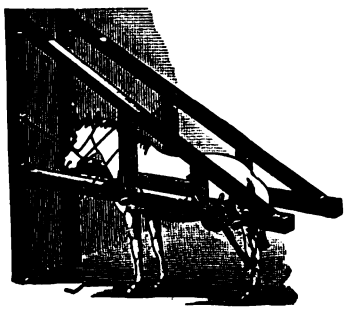
COMBINATION OUTFITS, JOINTER, SAW ARBOR, BORING
and a number of other attachments.

Send for **Illustrated Circular and Price List** of our full line of specialties.

W. L. SHERWOOD, Kirksville, Missouri.

Every Shop Should Have a Barcus Horse Stock

The most easily operated; the simplest and most perfect in every detail. Safe for both horse and man.



A perfect Automatic Device to hold the foot in any position perfectly solid.

Write at once for circular which describes the advantages of our stock in detail.

ADDRESS

BARCUS MANUFACTURING CO., Wabash, Indiana

The PERFECTION DISC SHARPENER

The **only** machine that will sharpen discs **on the Harrow** or **Cut-a-way** discs.

Pat'd in the U. S., 1908 & '11. Pat. applied for, Canada, 1911.

FOR SALE BY LEADING JOBBERS IN U. S. AND CANADA

E. E. COMBS, Mfr. - EVANSVILLE, WIS.

The Perfect Power Hammer.

Note the difference in construction over other makes:

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other Hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented **Friction Clutch** fitted with **Ball Bearings,** absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the Hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

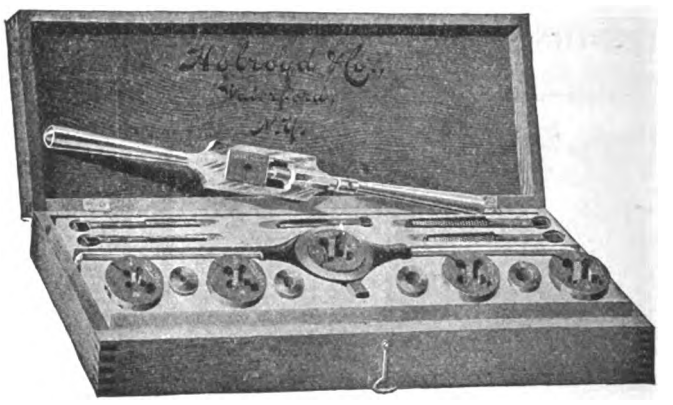
Will ship to any responsible party on approval. If not as represented, no sale.

Made in two sizes:

3 inch square, 40 lb. ram—shipping weight, 1,150 lbs.
4 " " 80 " " — " " 1,800 "

Write any jobber for prices, or

Macgowan & Finigan Foundry and Machine Co.,
204 North Third St., ST. LOUIS, MO.



SEND AT ONCE FOR
ILLUSTRATED CATALOGUE OF SCREW PLATES
ESPECIALLY BUILT FOR BLACKSMITHS
Address HOLROYD & CO., Waterford, N. Y.

PARKS WOODWORKER

The First and Original Combination of Circular Saw, Jointer and Band Saw ever placed on the market.

Reversible Spindle Shaper, Boring and a dozen other valuable attachments can be added.

Each machine is sold separate or can take a Circular Saw and add to it all desired.

BUY from the ORIGINATORS and LEADERS in improvements and you will be sure to get the best.

Our Ball Bearing Machines are the greatest improvements ever made in Foot and Hand Power Circular and Band Saws.

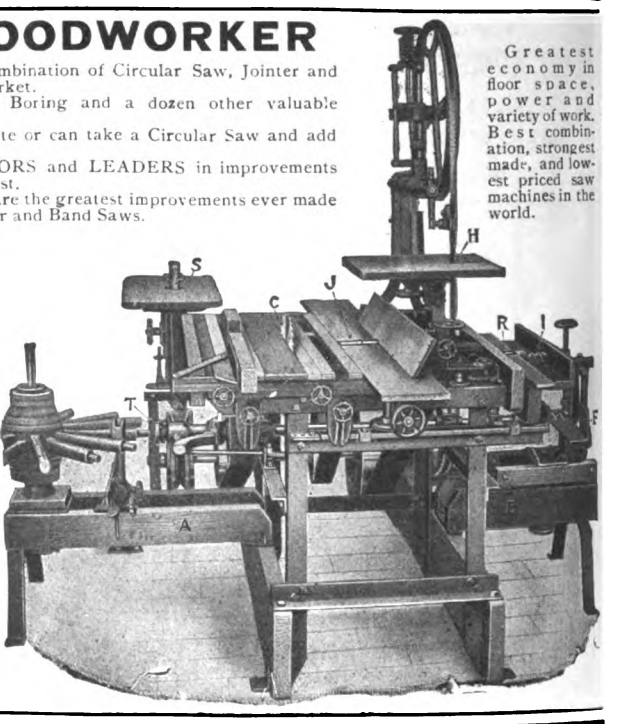
Greatest economy in floor space, power and variety of work. Best combination, strongest made, and lowest priced saw machines in the world.

Here is a Combination of Eight (8) Machines in One.

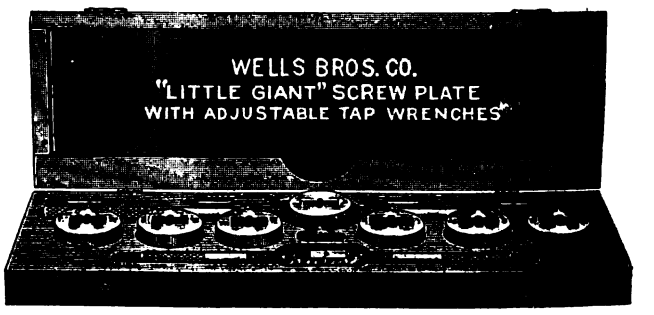
C Circular Saw.
J 6 Inch Jointer.
H Band Saw.
R Rabbeting Attachment.
S Reversible Spindle Shaper.
I Light High Speed Boring.
F Heavy Boring.
T Spoke Tenoning Attachments.

All ready for instant use with friction clutch to start and stop either or all machines desired. Simple strong and ready to go with little power.

WRITE FOR CATALOGUE.



PARKS BALL BEARING MACHINE CO.
NORTHSIDE STATION,
Cincinnati, Ohio.



A Good Roadster.

A LITTLE GIANT Screw Plate will cut more miles of thread than any other plate.

Look it over. It's sound. It's built on sound principles.

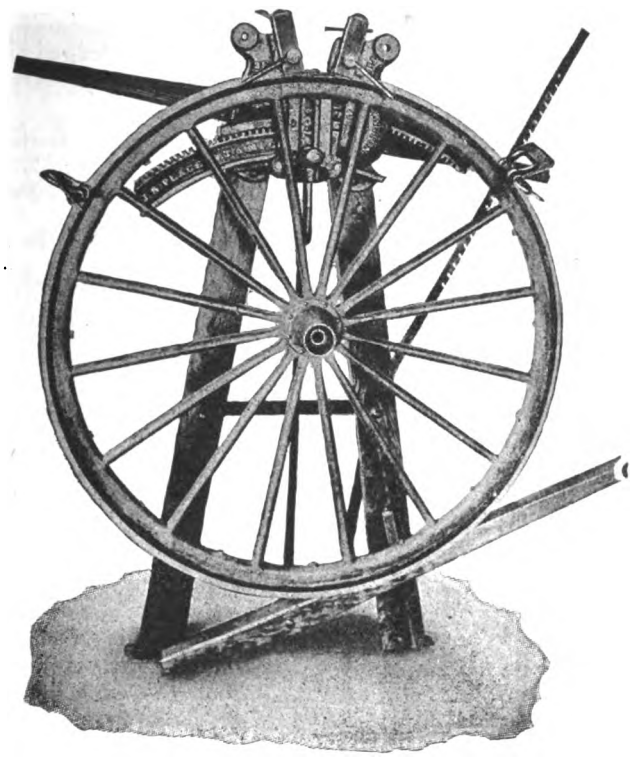
You get an adjustable die, yet it is as rigid as a solid one.

We guarantee our tools.

DO YOU WANT OUR CATALOG?

Wells Brothers Company, Greenfield, Mass., U. S. A.

Burlington Rubber Tire Machine

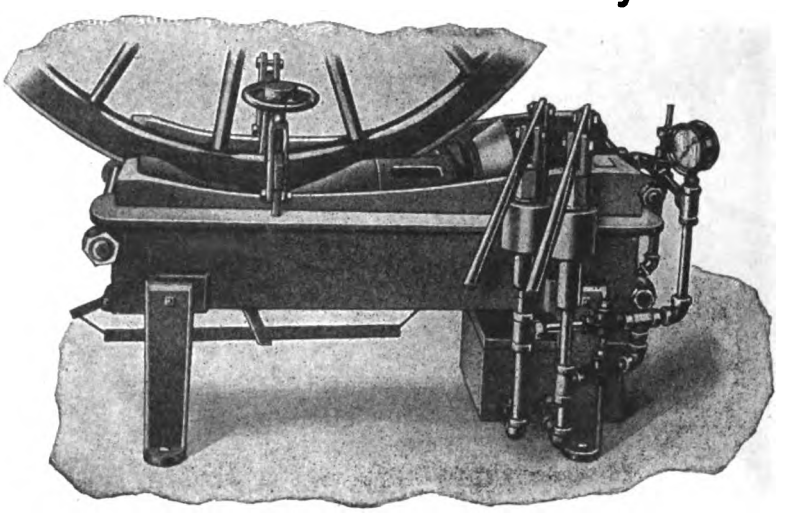


Our big No. 4 is the only machine made that will apply all kinds of solid and cushion rubber tires both internal and outside wires and close the joint on the same machine. One man can operate the machine easily without help. Put an end to your troubles in applying tires by investing in this machine. **Write for descriptive circulars and price.**

ENTERPRISE FOUNDRY,
HARVEY, COOK CO., ILL., U. S. A.

THE LITTLE GIANT TIRE SETTER

Makes Hard Work Easy.



The most powerful. **The most durable.**
Simplest in construction. **Easiest to operate**
No long LEVERS. **No WEDGES.**

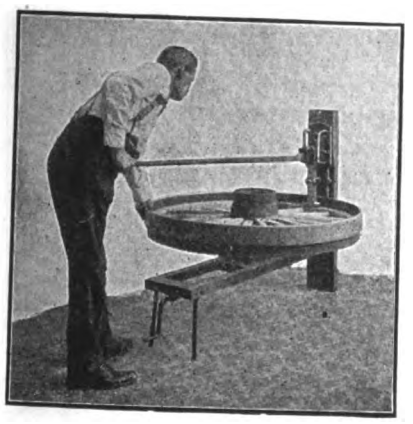
THE MACHINE YOU WANT.

Write NOW for prices and description.

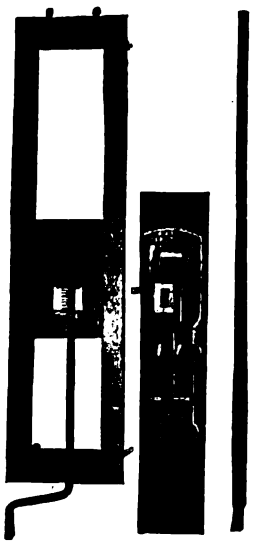
Keokuk Hydraulic Tire Setter Company,
1301 MAIN STREET, KEOKUK, IOWA.

COMMON SENSE TIRE REMOVER

The Best Machine on Earth for Removing Tires.



In Use



When not in Use

It will remove any tire, large or small. Does it without injury to the wheel. It does its work quicker than it can be done in any other way. It is the easiest worked. The sweep of the lever is always from the hip to the knee. It is strictly a one-man machine. No helper needed. Takes up but little space, and can be placed on shoeing floor, and when not in use platform can be detached and hung on the wall and the lever stood in a corner and the upright used to hitch to.

For sale by the trade. If your dealer does not handle them, send us draft or money order for $20.00 and one will be shipped to you.

People who set tires, write us for circular and give us name of your jobber. Farmers and Teamsters, once they have seen this machine, will not go to a shop that does not use it, as it saves the wheel and they know it.

Jobbers, this is the greatest selling article you have ever seen. Send for sample machine, test it and show it. Every person that sets tires will buy them.

COMMON SENSE TIRE REMOVER CO.
DOWAGIAC, MICH.

Champion of the World

For Wagon and Jobbing Shop

No. 1 punches ½ through ½, cuts 4 inch wide ½—this work done with a 3 foot lever.

No. 3 punches ⅝ through ⅝, cuts ¾—3 inches wide—this work done with a four foot lever.

Sets cold tire from ⅞ up to 1⅜ and welds on plow lays.

I guarantee my machine to be the best in the world and will back it up by giving two hundred dollars and the machine if any one can show me a machine that will come within 35 per cent. of being as good as mine. If other machines will do as they claim, why don't they guarantee it same as I do, also give length of lever and weight of man it requires to do the work, and put a guarantee behind it the same as I do? I will pay all expenses and give the machine and two hundred dollars for a test here against any machine in case you show me a machine that will come within 35 per cent. of mine. I ship under this guarantee to any country.

WYOMING, IA., Dec. 5, 1910.

MR. GEO. SEARS & CO., Onslow, Iowa.

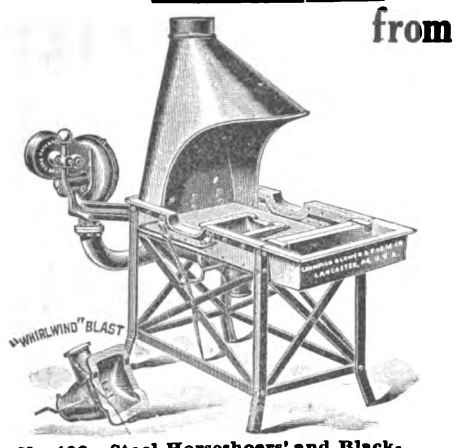
I have one of your machines which I bought of you four years ago. It has been used every day since I got it and if I could not get another I would not sell it for twice the money I paid for it. It is perfect, will do all and more than you advertise. No one could make a mistake in buying one of these machines. The improved machine which you are making now you advertise as 35 per cent. better than any other make for wagon and jobbing shops. You would be safe in saying 100 per cent. I have used several other makes but none come anywhere near the Sears' Blacksmithing Device.

(Signed) J. B. JENKINS.

Write for Catalogues and Prices.

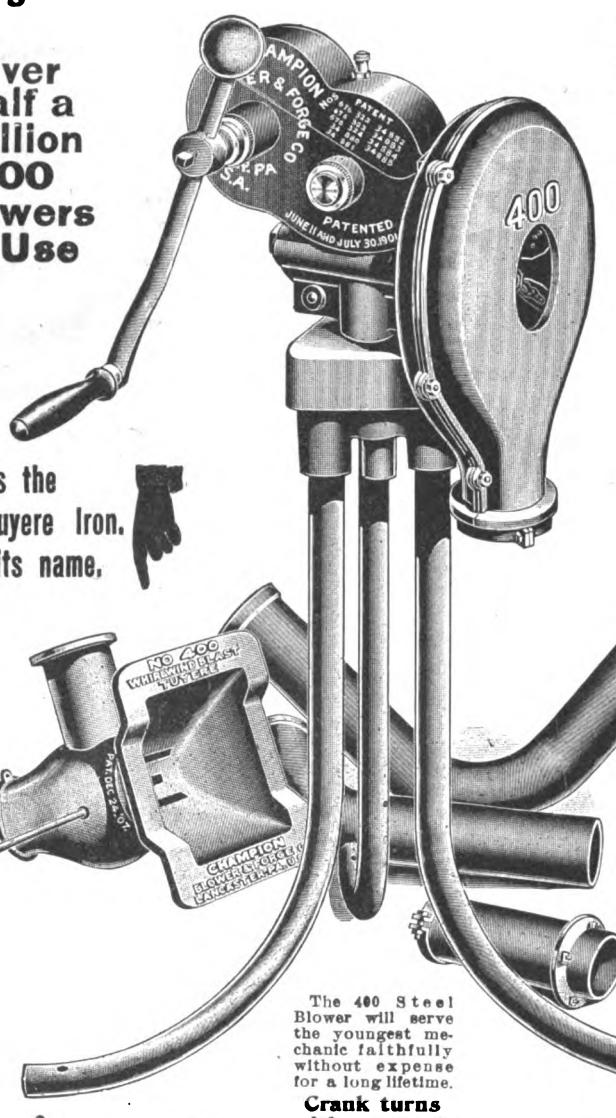
GEO. SEARS & CO., Onslow, Iowa.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

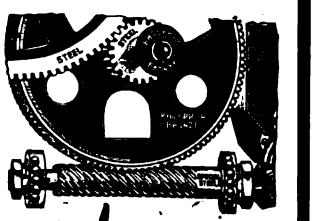
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

Also Great Britain Patent No. 9,462, May 25, 1900.

The Blower for Quality, First, Last and Always

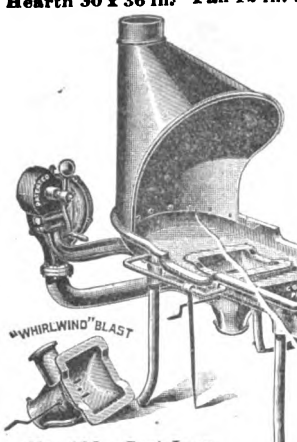
THE FAMOUS 400



It's the all in Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost



No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.

The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

The Champion Latest Invention!

Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill Manufactured.

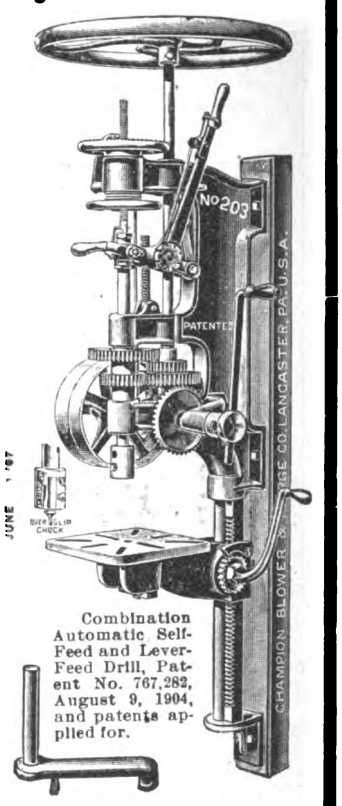
Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

The DOUBLE COMPOUND LEVER-FEED

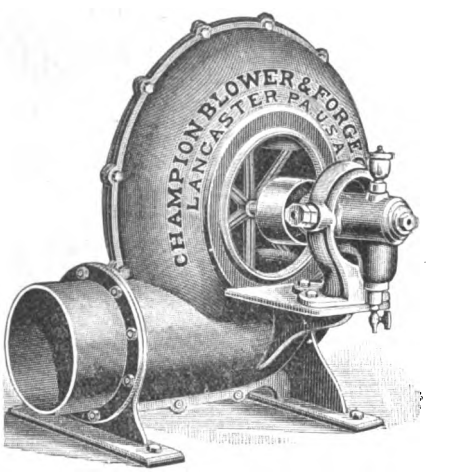
Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

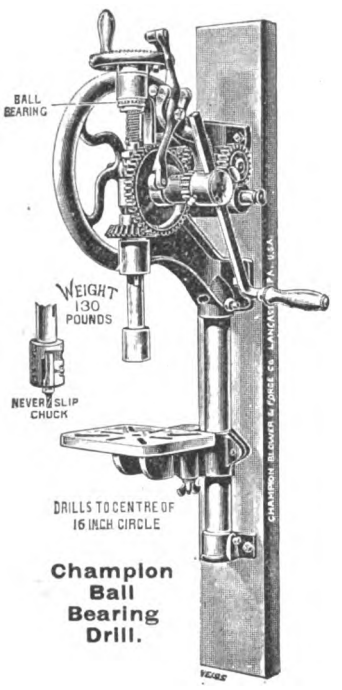


Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

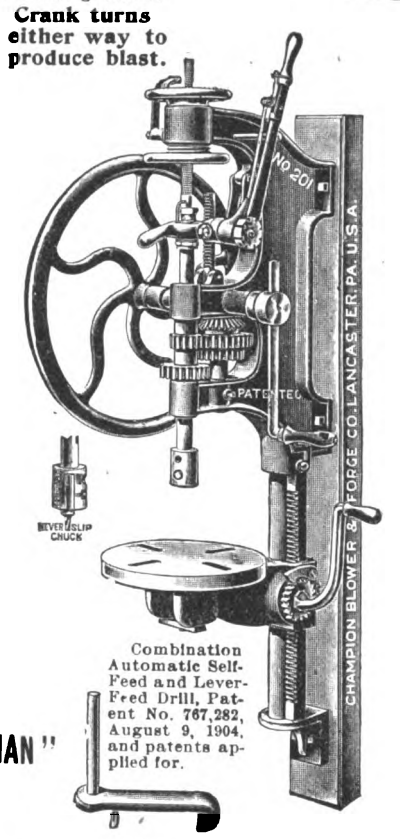
No. 203 DRILL.



Champion Power Blowers made in ten sizes up to 64 inches in height.



Champion Ball Bearing Drill.

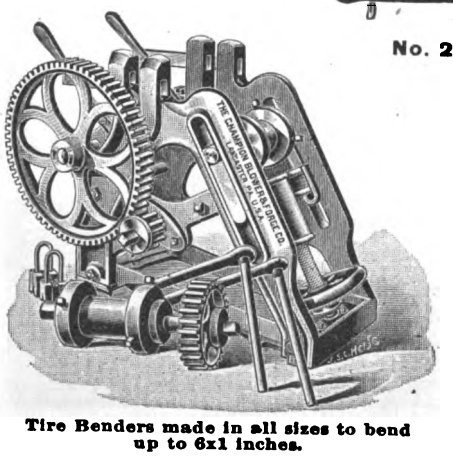


Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

THE CHAMPION "COLUMBIAN" TIRE BENDER

No. 4. American Tire and Axle Shrinker.
Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.



Tire Benders made in all sizes to bend up to 6x1 inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

No. 105. Electric Full Mounted Screw Plate.
Screw Plates in four styles cutting up to 1½ inches.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

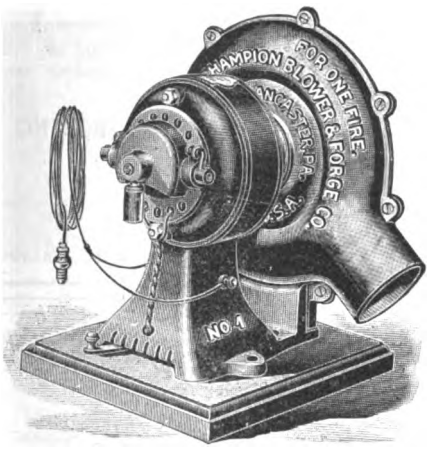
Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

CHAMPION One-Fire Variable Speed Electric Blacksmith Blowers

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements



No. 1 One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for light and medium fires.

THE ELECTRIC SUCCESS.

The four illustrations show a very complete line of Electric Blowers, running up to nine fires, which we recommend in every instance, each fire to be equipped with its own individual Electric Blower so it gives each operator full and complete control of his own individual fire, and a large saving in the consumption of electric current. The material, workmanship, etc., used on these Blowers are of the very best.

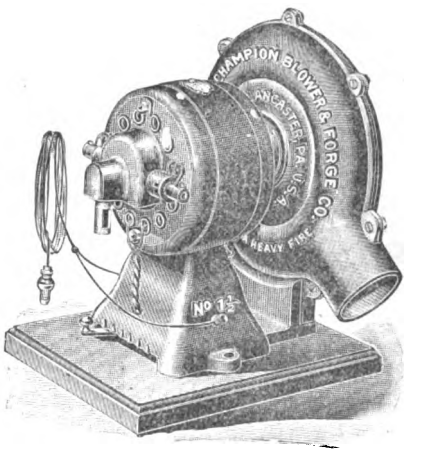
No. 1 and No. 1½ One-fire Variable Speed Electric Blacksmith's Blowers are equipped with attachment cord and plug.

This Variable Speed Electric Blower eventually costs you nothing, because it pays for itself in a very short time.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

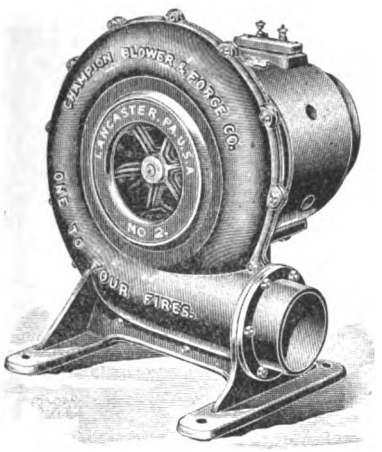
No. 1½ for Extra Heavy Blacksmith Fire

Motor capacity 50% above requirements

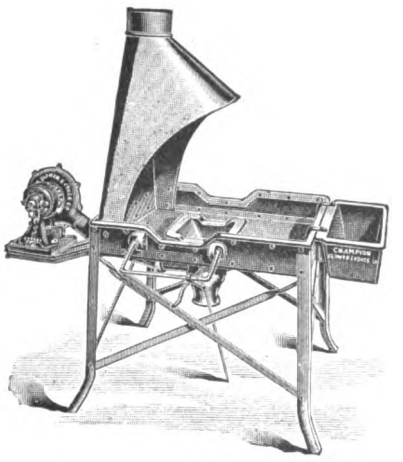


No. 1½ One-fire Variable Speed Electric Blacksmith's Blower, with five speeds, for extra heavy fires.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER

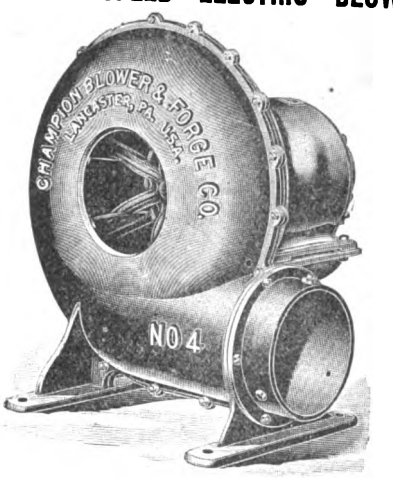


No 2 Electric Blacksmith's Blower. Will blow from one to four fires.



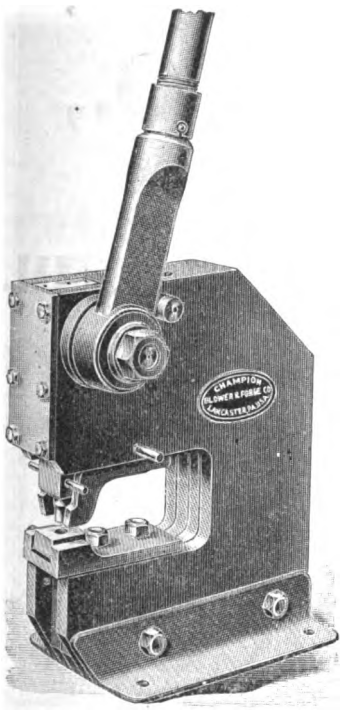
No. 440. Champion Blacksmith's Steel Forge with "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron, equipped with No. 1 One-fire Variable Speed Electric Blacksmith's Blower with five speeds, for light and medium fires. Hearth, 30x36 inches, height 30 inches, with hood complete.

THE CHAMPION DIRECT CONNECTED CONSTANT SPEED ELECTRIC BLOWER



No. 4 Electric Blacksmith's Blower. Will blow from one to nine fires.

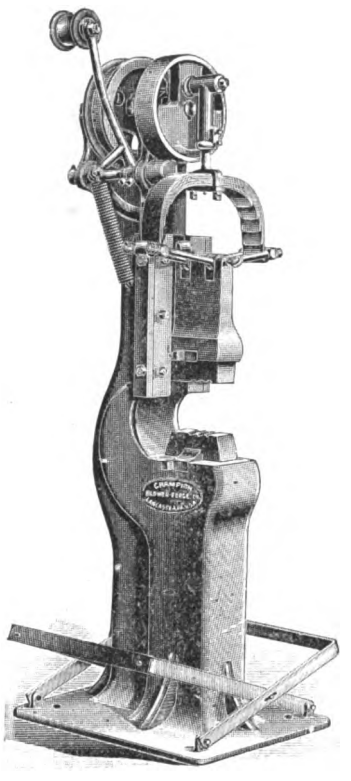
FOUR NEW CHAMPION TOOLS



Champion Steel Punch.

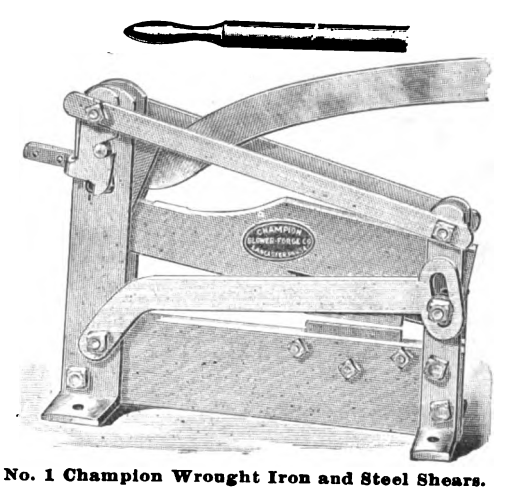
No. 1 punches 5/16 inch hole in ¼ inch material.

No. 2 punches ⅝ inch hole in ⅜ inch material.



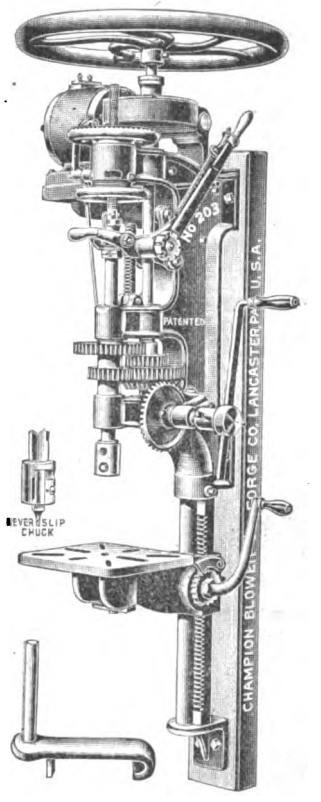
The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x8 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



No. 1 Champion Wrought Iron and Steel Shears. Will shear 4x½ inches flat and 1 inch round or square. Weight 255 pounds.

Our 1912 catalogue can be had free upon application, showing the very latest and greatest inventions in the Blacksmith Line in the world on Blowers, Forges, Drilling Machines, Tire Benders, Tire Shrinkers, Screw Plates, Power Blowers, Power Hammers, Punches and Shears, etc. It will pay you to see our new catalogue.



No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.

CHAMPION BLOWER & FORGE CO.

LANCASTER, PA., U. S. A.

Have you Power in your Shop?

If so, problems of speeds, sizes of pulleys, manner of installing, etc., have undoubtedly often puzzled you. To better serve users of power equipment, we maintain a corps of expert engineers whose duty it is to give competent advice to our thousands of customers.

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It is significant that in 95% of all the splendid schools, colleges, and universities in the country in which practical blacksmithing is taught, "Buffalo" Power Blowers, Forges and Exhausters are used. We are the inventors and sole patentees of the famous "Down Draft" forge system, which is regularly specified by large carriage and auto shops, plow, stove, implement works, and the various governments of both the Old and the New World.

Besides, we make a splendid line of power drills; punches and shears; tire benders and tire setters.

We lay out and install complete **EXHAUST SYSTEMS** for wood-working shops, and have developed for this purpose a slow speed fan which during the last year showed power savings running up to $1,800.00 for a single customer.

Our Crain Combination Woodworker is made especially for the wagonmaker, and performs 12 different operations.

Write us for practical advice and catalogs on the installation of

1. Power Equipment of any kind for the forge shop.
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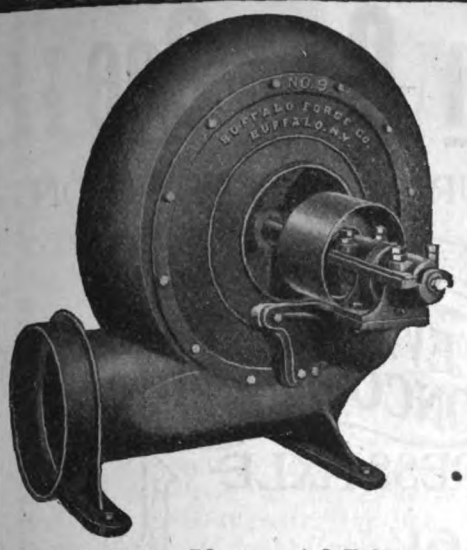
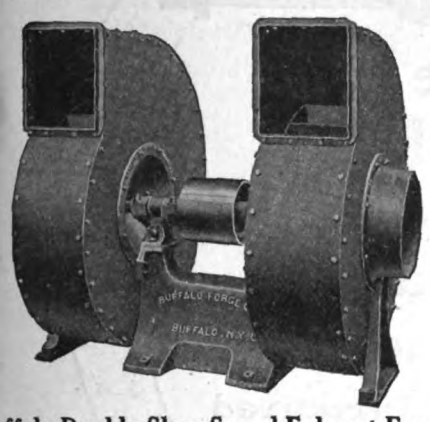
Buffalo Forge Company

BUFFALO, N. Y.



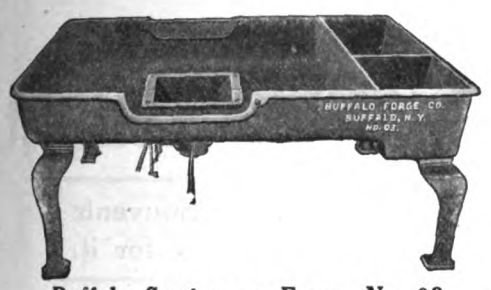
Buffalo Power Blowers and Exhausters.

Made with leak-proof one-piece peripheral shell, and extra long oil-ring bearings. The fan wheel can be removed by simply unbolting the side plate. All sizes.



Buffalo Double Slow Speed Exhaust Fans.

Also made single; guaranteed to effect power savings from 15 to 50% below any other slow speed fans. Plans and estimates on complete systems free.

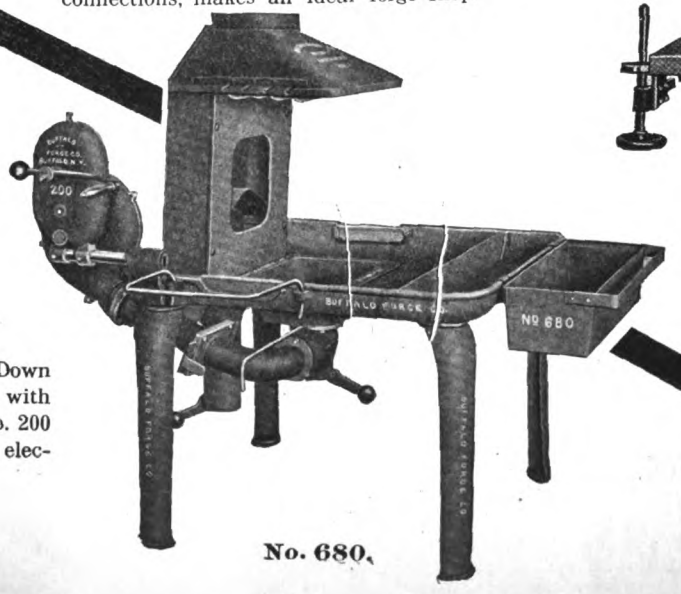


Buffalo Stationary Forge, No. 03.

Has every advantage over a brick forge; lasts longer; more spacious and convenient. Overhead hood also furnished.

"Down Draft" Forge, No. 02.

Designed for large shops. A battery of such forges, with *underground* blast and exhaust connections, makes an ideal forge shop.

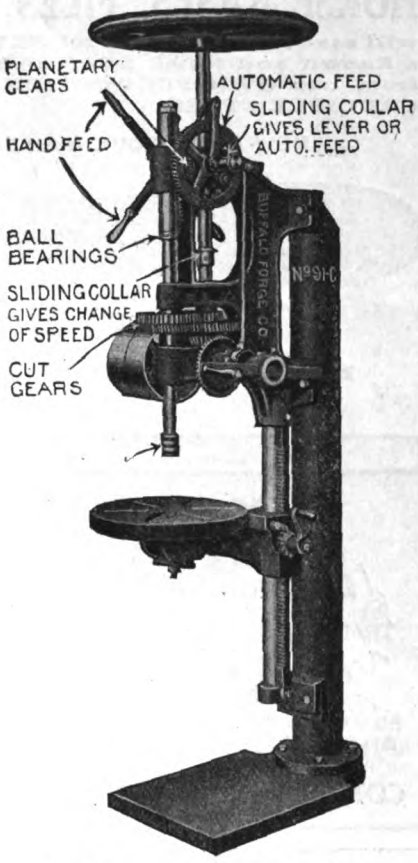


No. 680.

No. 680 is a heavy "Down Draft" portable forge fitted with hand blower—the Famous No. 200 Silent. Also furnished with electric or power blower.

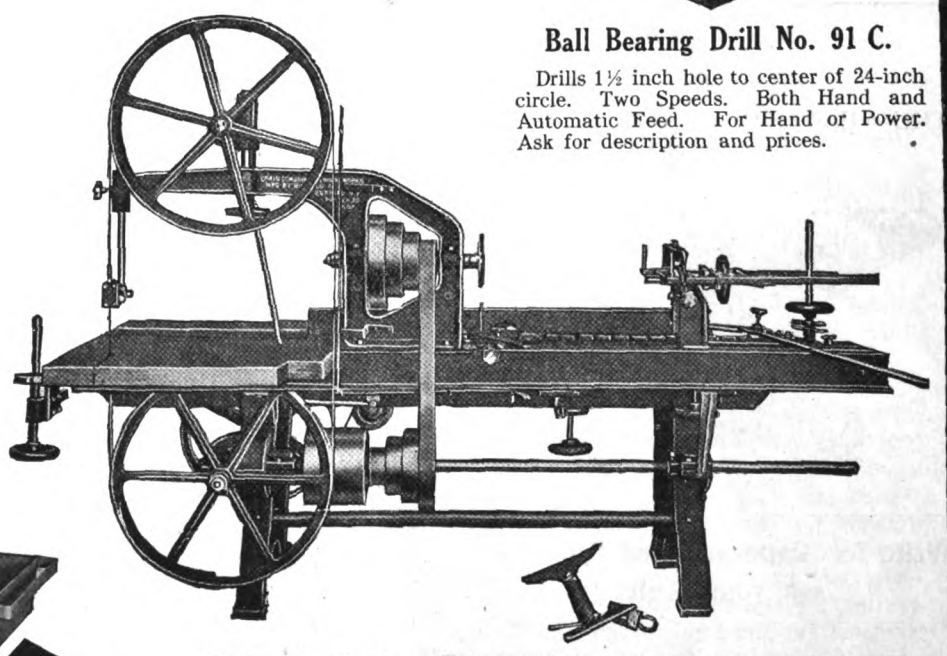
Buffalo 200 Silent Blower.

Made with 14-inch fan for hand or power. Gives 22% higher pressure and runs easier than any 12-inch blower.



Ball Bearing Drill No. 91 C.

Drills 1½ inch hole to center of 24-inch circle. Two Speeds. Both Hand and Automatic Feed. For Hand or Power. Ask for description and prices.



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We will send you free, on request, illustrations of all the operations you can do on this machine; cross cutting, wood turning, sizing boards, joining lumber, drilling tire on wheel, equalizing spokes, tenoning spokes, rounding rim, boring rim, etc.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXV. No. 5. NEW YORK, MAY, 1912. TERMS: ONE DOLLAR A YEAR

SUBSTANTIAL TRUCKS.

How to Build Them for One, Two, Three or Four Horses.

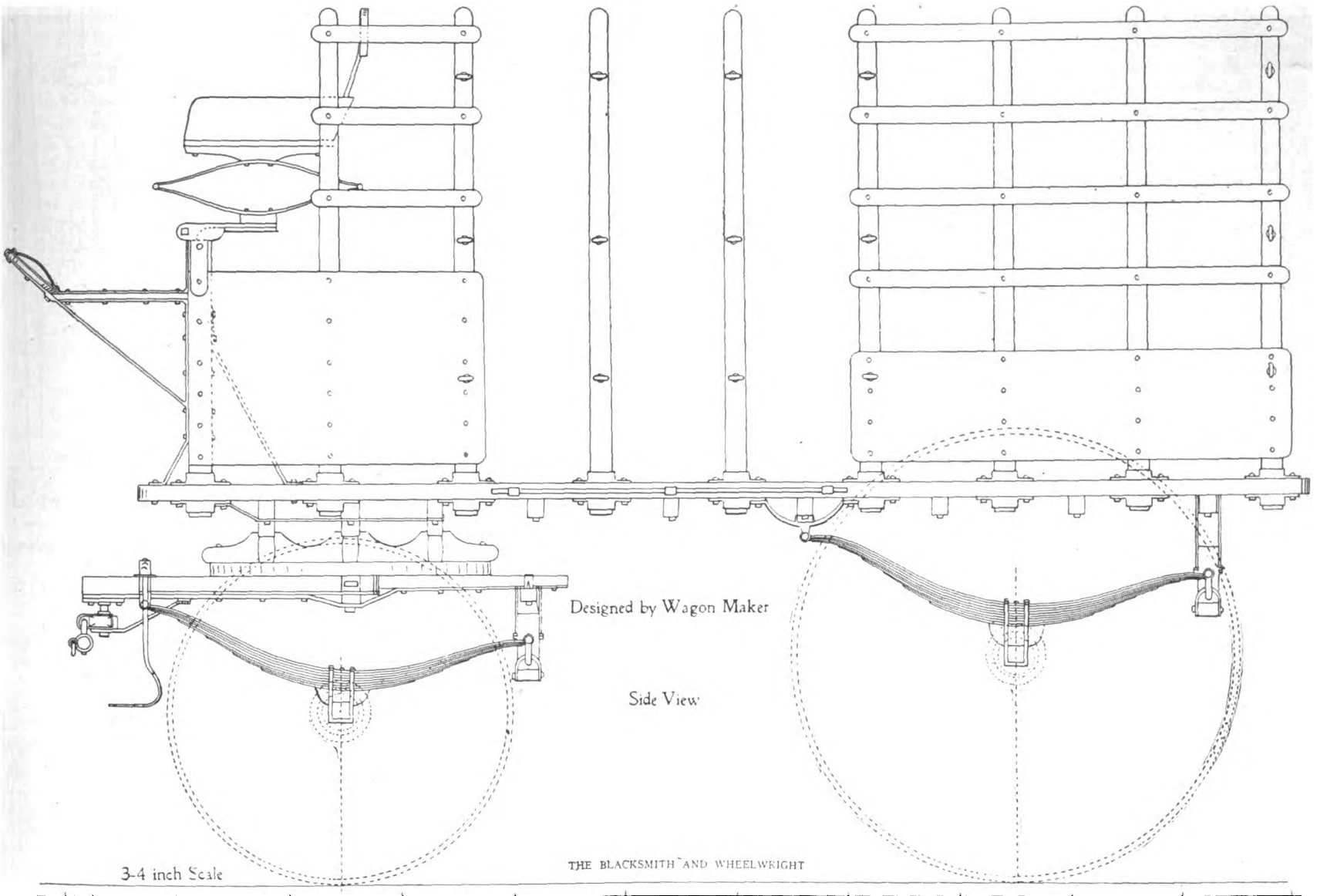
BY WAGON MAKER.

Trucks of this kind, as illustrated in the four views, are built in various sizes, and are known as one, two or three horse stake trucks. The sizes of axles for light trucks are front, 1⅜ or 1½ inches, and for rear axle 1½ or 1⅝ inches. For medium size trucks, front, 1⅝ or 1¾ inches, and for rear axle 1¾ or 1⅞ inches. For heavy trucks 1⅞, 2 or 2⅛ inches for front axles, and 2, 2⅛ and 2¼ inches for rear axles. These are the proportions for the regular sizes of trucks, but the length of the truck and position of the hind wheels depend on the different sizes front and back. On some the axles are alike front and back, while on others the difference in size is ¼ inch instead of ⅛ inch, as given above. This also applies to the spring. In case the weight of the load is unequally distributed between front and rear wheels on which the springs rest, the dimensions for wheels, springs and axles must be calculated to support properly the amount of weight of the load.

The supposed weight of a light truck is 1,500 pounds and its carrying capacity 2,500 pounds. The medium size truck should weigh 2,000 pounds, and carry 3,500 pounds, and the heavy truck should weigh 2,500 to 3,000 pounds and carry 4,000 to 5,000 pounds. These are the proportions followed as a basis by expert wagon builders, and dimensions for wheels, springs and axles are calculated on the above basis.

The length and width of bodies depend on the weight of the material. If light and bulky the bodies are made wider and longer. For instance, most of the bodies are made 4 feet 2 inches wide and 10 feet long, but others are proportioned 10 feet for light trucks, 11 feet for medium trucks, and 12 feet for heavy trucks. To carry bulky goods they are made 13, 14 and 15 feet long. The same proportions apply to the widths across. The widest across the body is 4 feet 6 inches to 4 feet 8 inches, for a 5 feet 2 inches wide truck out to out; if the body is wider, the wheels must be recessed, and when built as wide as 70 inches, the rear wheels are made as low as the front ones and the body is hung 5 inches above the wheels.

The illustrated side view shows that the body is the same height from floor, front and back, or hung level, while many of the same styles and makes are lower in the rear. This facilitates loading and unloading from the rear end of the body. When covered, the sills are either curved or straight. The two center stakes on the sides are removable, so that the loading and unloading can be done in that direction and are run lengthwise to the platform on which the goods are stored for loading or unloading.



The construction of the seat is most important when comfort and usefulness is considered. On most of these wagons the seat does not rest on springs and is made without a spring cushion, therefore the driver receives a lot of jolting. Another good point is the turning of the seat, which can be tipped upside down when it rains or when in the way of loading. These seats are hinged to the posts, but the supports are stationary to the posts and the hinges on which the seat block and springs are bolted move upward and turn the seat.

Construction of the Body.

Notable improvements have been made in the construction of such trucks, which are of considerable benefit to the buyer and user of such wagons and the difference in cost is very slight. The old way was to make the sills 1½x4 inches, all the cross bars mortised into the sills, and bottom boards put on top of the sills and cross bars. Another way was to lower the inside cross bars ⅝ inch below the top surface of the sills, and the cross bars were lapped and mortised to the sills. The bottom boards being ¾ inch thick rested ⅛ inch above the sills, and after the sills had been ironed with an ⅛ inch plate, made a level surface. Either way made a weak body; the sills and bottom boards were not strong enough to counteract the heavy load, and the result was the settling of the sills in the center. To prevent this weakness, edge plates were resorted to, which made a far stronger and better body, but added considerably to the weight.

A far better way, less work and less expense, is to use three or four sills. If made with three sills, one is on each side and one in the center. If made with four sills, one is on each side and the other two are equally divided between the side sills, as shown on the bottom view. The two end cross bars front and rear are mortised into the side sills and the two center sills are mortised into the end cross bars, all level with each other.

There are three transom gear bars on which all the four sills and bottom boards rest; same with the rear spring bars. Besides those there are four cross bars equally divided, making nine cross bars and two end bars. The nine cross bars are bolted to the sills and the bottom boards are supported by it. The size of the side sills is 1¾x6 inches and the center sills 1¾x3¾ inches, which are strong enough for the heaviest of trucks for a length of 10 feet to carry 5,000 pounds without the addition of edge plates, but if edge plates are needed the truck could be built with three sills, the center sill having a plate each side and side sills either on the inside or outside surface. The plates are ¼x1¾ inches, and with the addition of these plates considerable carrying capacity could be added.

Another improvement is the stake sockets,

and experience shows that all stakes having for support the sills only, get loose. To prevent this, malleable iron sockets were bolted on top of the sills. This was considered a great improvement over the old way, but now sockets are put on opposite each other for stationary or shifting stakes. Two sockets, including the sills, make the support for the stakes 4 inches, while the old way it was 1¾ inches only.

The two front and two rear side boards are bolted to the stakes without notching, but all the rails are notched in the stakes ¼ inch deep. This is best shown on the back view.

To the two front center posts are bolted a malleable or forged socket one to each post, which support the seat. Each socket is bolted with two bolts for each post and the rear ends must be as wide as the spring plate to which the springs are bolted. This socket joint is liable to wear in time, due to the side motion of the seat. To prevent this a clip is fitted over the spring and bolted through the spring block, lapping over the stationary sockets or socket extension. When this seat is turned it rests on the foot board.

Five posts on each side of the body and three on the rear end have chain eyes, for the chains to hook in, or go through them. On the sides of the sills and rear end cross bars are iron rails for ropes or chains to fasten to. These rails are very important to have, to keep the goods from slipping sidewise or backward.

Another important subject is the iron strips 3/32x2 inches screwed every 5 to 6 inches on the sills and bottom boards. This keeps the bottom from wearing. All such strips should be well white leaded before they are screwed into place.

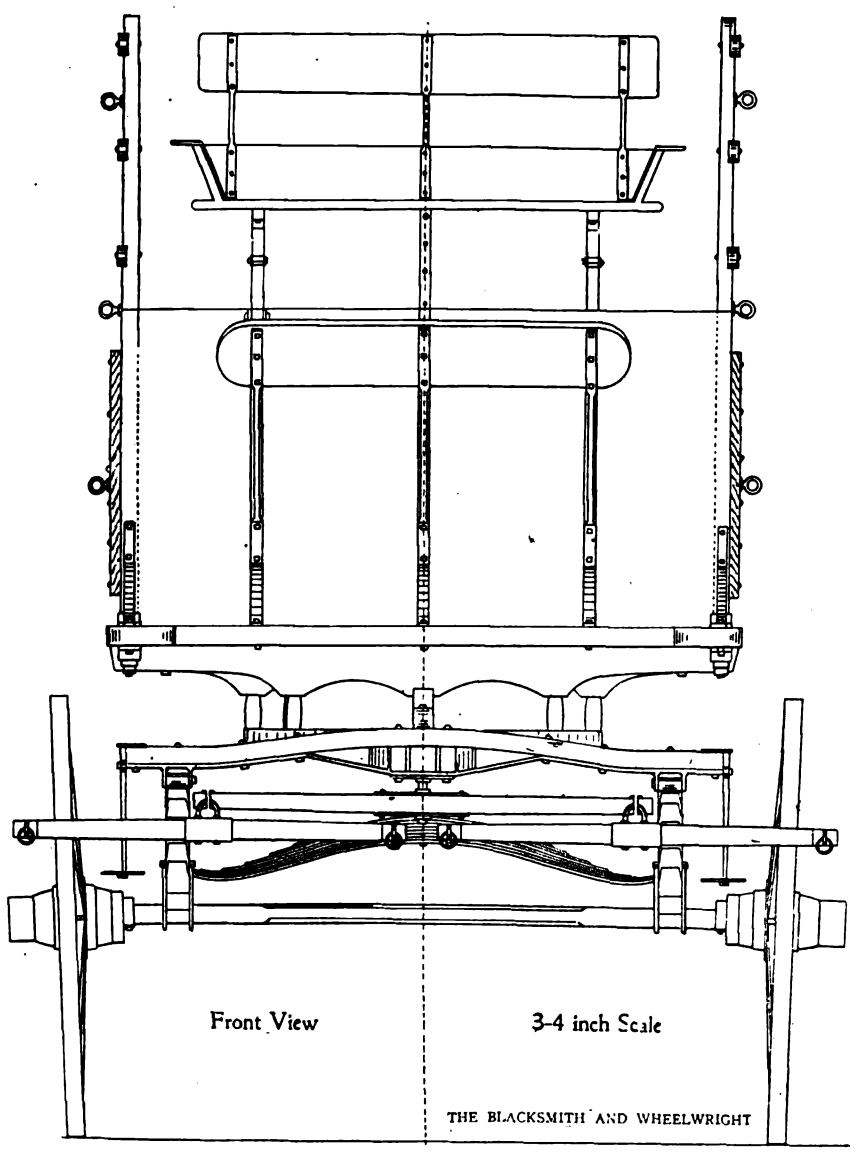
The body is suspended on six wagon springs, four side and two cross springs, which style of suspension has given the most satisfactory results for heavy business wagons and trucks. As the wagon is a heavy one and always drawn by two horses, the shaft-irons have been discarded, but on all well made wagons the roller bearing fifth wheels are used.

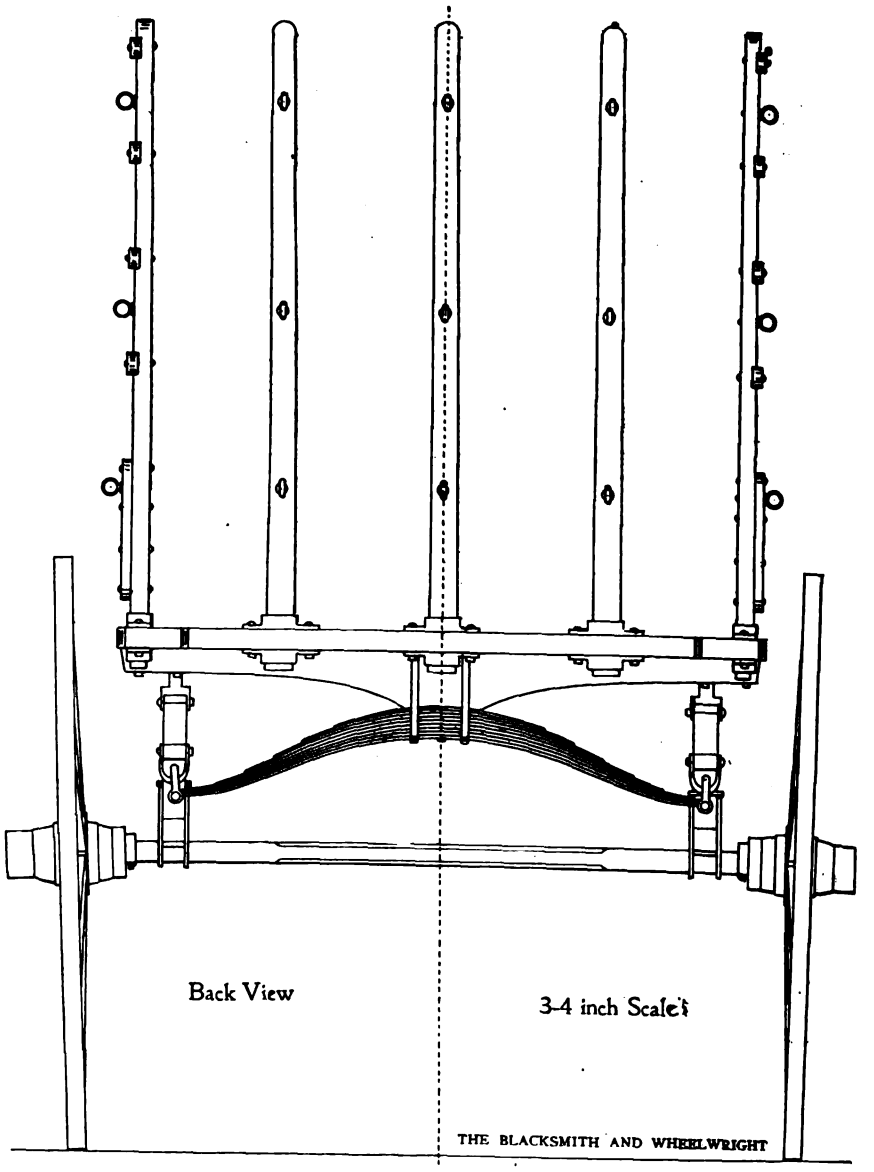
Front Sarven Wheel Dimensions for Heavy Trucks:

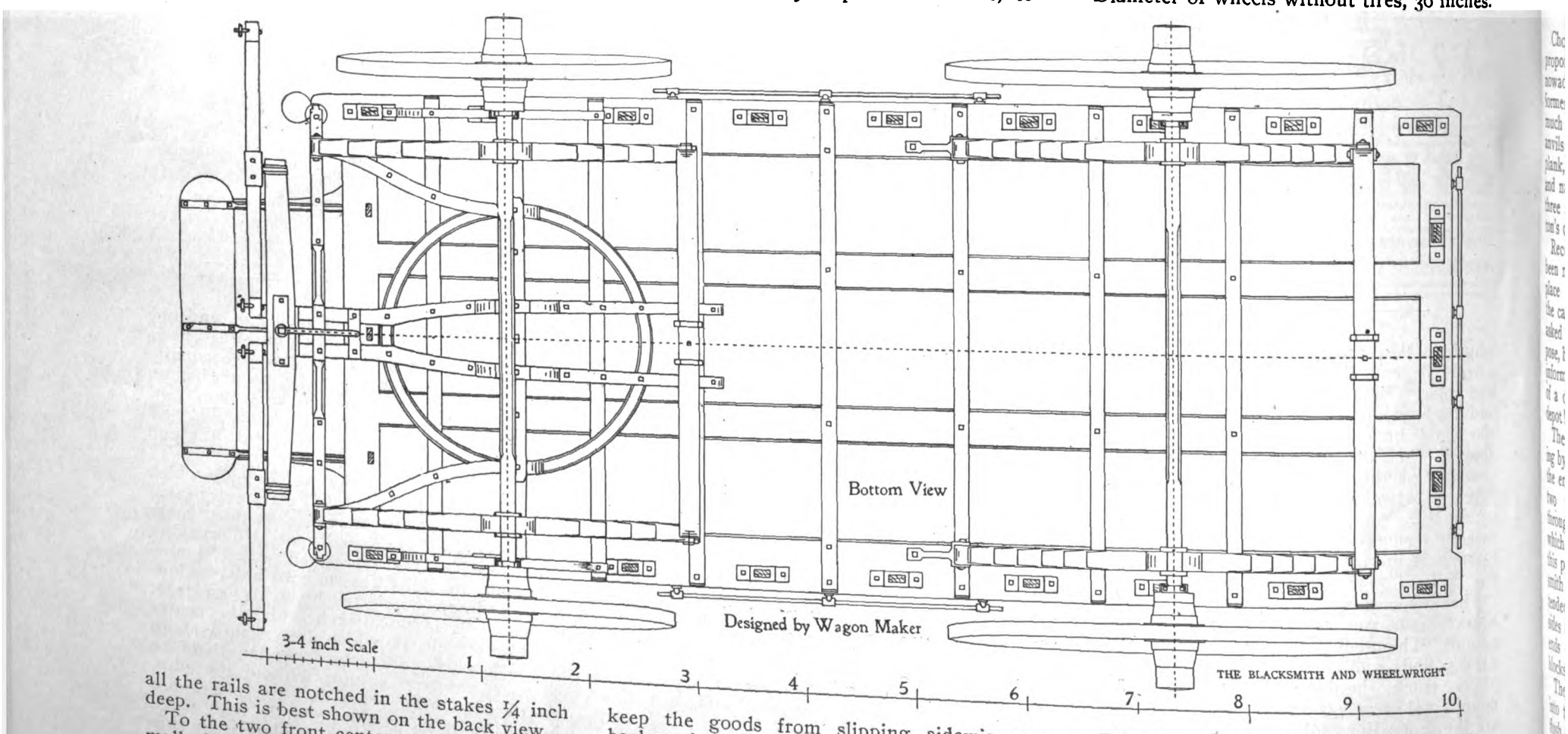
Diameter of wheels without tires, 36 inches.
Diameter and length of hubs, 7x9½ inches.
Width of spokes, 1⅞ inches.
Number of spokes, 14 and 16.
Thickness and depth of rims, 2x2¼ inches.
Width of tread for each wheel, 1⅞ inches.

Rear Sarven Wheel Dimensions for Heavy Trucks:

Diameter of wheels without tires, 48 inches.







Diameter and length of hubs, 7½x10 inches.
Width of spokes, 2 inches.
Number of spokes for each wheel, 16.
Thickness and depth of rims, 2x2⅜ inches.
Width of tread for each wheel, 1⅞ inches.
Size of round edge tires front and back, ⅝x1⅞ inches.

Dimensions for Wagon Platform Springs:

Front Side Springs.
Length of springs center to center of bolts, 4½ inches.
Open out to centers of bolts, 7½ inches.
Width of plates, 2½ inches.
Number of plates, 7.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Displacement of center bolt, 1½ inches.
Front length, 21½ inches.
Rear length, 20 inches.
Clipped to axle.

Front Cross Springs:

Length from centers of bolts, 41 inches.
Open out to centers of bolts, 7½ inches.
Width of plates, 2½ inches.
Number of plates, 7.
Thickness of main plates, No. 1.
Thickness of other plates, Nos. 2, 3, 3, 3, 3, 3.
Clipped to head block.

Rear Side Springs:

Length from centers of bolts, 43½ inches.
Open out to centers of bolts, 7¾ inches.
Width of plates, 2½ inches.
Thickness of main plates, No. 1.
Thickness of other plates, Nos. 2, 3, 3, 3, 3, 3, 3.
Displacement of center bolt, 1½ inches.
Front length, 22½ inches.
Rear length, 21 inches.
Clipped to axle.

Rear Cross Spring:

Length from center of bolts, 43½ inches.
Open out to centers of bolts, 7¾ inches.
Width of plates, 2¼ inches.
Thickness of main plates, No. 1.
Thickness of other plates, Nos. 1, 2, 3, 3, 3, 3, 3.
Clipped to cross bar.

Plain wagon axles.
Front, 1⅞ inches.
Back, 2 inches.

SOME ANVIL BLOCKS.

How the Smith May Make Them or Build up a Forge.

BY JAMES F. HOBART, M. E.

Chopping blocks and anvil blocks of decent proportions are becoming very scarce articles, nowadays, but we won't worry about the former for as there is little wood to chop, not much block is necessary. But when we find anvils mounted upon contraptions made from plank, and worse yet, from scantling spiked and nailed together, then we feel desirous of three feet of butt-log from George Washington's cherry tree!

Recently, the writer saw an anvil which had been nicely mounted upon a heavy casting in place of the traditional block. So well did the casting seem to fit the anvil, that it was asked if the base was designed for the purpose, but judge the surprise of the writer when informed that the anvil block was the base of a discarded cream separator from a milk depot!

The anvil was fastened firmly to the casting by means of two ¾-inch bolts, shown in the engraving. The bolts were put through two three-cornered blocks of wood and through a couple of lugs inside the casting which came in the right place to be used for this purpose. If there had been no lugs, the smith who rigged up the device said he intended to drill a couple of holes through the sides of the casting, turn hooks in the lower ends of the bolts, and fasten the wedge-blocks in that manner.

The writer suggested that the nuts be cut into the tops of the blocks so as to leave a flush surface to be used as tool shelves, or that, better yet, a pattern be made for a casting to be used instead of the wedge-shaped blocks. The pattern could be made so as to give a regular shelf, as wide as desired. It could be recessed to receive the nut and washer. Then, a bit of sheet-iron laid over the hole, would leave the tool shelf smooth, the nut would be entirely hidden, and the shelf could be instantly cleaned at any time by picking up the sheet-iron piece and dumping the dirt and scale off of it.

This anvil was placed directly upon the cast iron, and necessarily gave a slightly peculiar ring when tapped with a hammer. If the smith desires to retain the old-time anvil ring, all that is necessary is to place a circle of wood under the anvil as shown at A, in the illustration. A circle as large as the top of the casting and ¾ inch in thickness will do the trick and also serve to close the hole in the casting under the anvil feet.

One of the finest anvil blocks I ever saw was made of a barrel—or rather in a barrel. And just an ordinary flour barrel at that. When the shop was built, the largest piece of timber on the job was 2x8 inch stuff, and that is not an extra good size for anvil blocks, although a block can be made from it by building up and shrinking on a couple of heavy, bands, so a barrel was placed where the anvil had to stand. A hole was dug in the ground and the barrel set in until the anvil when placed on top of the barrel, was at exactly the right height and in just the position desired by the smith. Then, the dirt was tramped lightly around the lower part of the outside of the barrel and a sack of cement was mixed with three sacks of fine sand.

The cement and sand were thoroughly mixed while dry. They were turned on a smooth floor, with a shovel, at least four times. Then water was added until the mixture would run off a shovel just like thick mortar. It would not fall off in chunks, but would slide off in pats—just like the thick mud which gives so great resistance to the wheels of a loaded wagon. A bucket full of the cement mixture was poured into the barrel, then clean stones, brickbats and pebbles were pushed down into the cement mortar until it would take no more. The stones must be clean if this kind of concrete is to be a success. A layer or coating of dirt on the stones will prevent the cement from binding the stones together just as surely as a coating of oxide will hold up a weld between two pieces of iron.

As soon as the portion of mortar has been worked full of stones, slide in another bucket full of cement mixture and add more stones. Continue this until the barrel is full within three inches of the top. At this point, two courses are open, as follows: First, place four stones or brickbats, one under each foot of the anvil and juggle the stones until the anvil stands just right and about three-quarters of an inch (the bottom of the anvil) below the top of the barrel.

Next, mix up some more cement and sand, as described, if there be not enough left, and fill the barrel within one and a half inches of the top. Pack this layer of cement mortar just as full of small clean stones as you can. Press down a lot of them closely together under the anvil, then fill the remaining space between anvil and barrel. The object is to pack in as much stone as possible—the more stone and the less mortar, the stronger the concrete.

But be sure to leave an inch and a half clear space below the top of the barrel. This space is to be filled with neat cement. That is, cement and water, with no sand, mixed just thick enough to be worked easily into the three-quarter inch space underneath the anvil, and packed around the anvil, level with the top of the barrel. Smooth off the cement level with the top of the barrel and do this nicely, for it will always be in sight and the rougher you leave the surface, the worse it will look and the more bother it will be. Smooth it down nicely and make a good job of it. If it be desired to make a few shallow pockets or grooves in the top of the anvil block to hold a center-punch, chalk, etc., press into the top of the green cement, a bit of wood which has been rounded off to the exact size and shape of the holes or pockets required. But don't make these places very deep, and don't make them with square-down sides. The holes should never be more than ¼ or ⅜ inch deep, for dirt and oxide must be frequently brushed out of these "pockets" and straight sides of deep holes will be a delusion and a snare to the smith for all time.

A pretty good pocket can be formed by pressing into the soft cement, a cake of soap, the corners of which have been rounded off by use. Or, get from the house one of the little oval dishes with a smooth round bottom, about four inches long and two or three inches wide in the middle. Press either or both of these into the concrete and the pockets will be formed nicely.

The pieces must be left in the concrete until the "initial set" takes place—probably an hour or two hours—longer in cold, and a shorter time, perhaps, in warm weather. Test the concrete with the finger, and when you can't push the ball of the finger into the surface of the concrete, then tap the pocket forms slightly and pull them out of the concrete.

After the barrel has been filled over night, or if filled in the morning, then just at night, cover the whole business with grain sacks, canvas, or old clothes, and wet the whole thoroughly, either with a hose or by pails of water; and keep it wet for a week without once ever removing the rags. The longer the concrete is kept covered and moist, the harder it will become, and not a blow must be struck on the anvil for at least two weeks in summer or three in winter. The anvil may be used, perhaps, in two or three days, possibly without breaking the concrete, but the anvil block will not attain what is called full strength for about 28 days of being kept moist, therefore, if you want the best possible job, then don't use the anvil for four weeks after the concrete is put in position.

There is a way by means of which the concrete may be cured in three or four days and the method is very simple indeed. All that is required, is the cloth covering for the anvil block as described above and a little steam. The steam need not be under pressure. Just vapor from boiling water is all that is required. Push the open end of a steam pipe under the rags and turn on a little steam—just enough to keep the concrete hot and moist. As long as a little steam escapes in several places from the sacking, it is probable that the steam supply is sufficient.

The steam kettle used by wagon makers to supply vapor to the steam box for bending carriage work will furnish all the steam needed; and so will a water front from a kitchen stove. All that is necessary will be to place the water front or the kettle in or over a small fire, and keep a little water at all times in the kettle or front. The steam will cure the concrete in two or three days as hard as it will be cured by 28 days sprinkling. Another good way to cover anvil blocks, either for steam curing or for air-curing, is to build a fairly tight wooden or sheet-iron box around the anvil block and turn steam directly into the box and keep up the steam supply for the time stated—at least 48 hours continuously.

After the proper hardening has been accomplished, the anvil is ready for use without further effort. But a much more satisfactory job will be secured if the outside of the block be finished a little before it is turned over to the blacksmith. And, another thing: The smith may use the anvil block without further finishing of any kind, and for that matter, it is not even necessary to remove the barrel in which the block was formed.

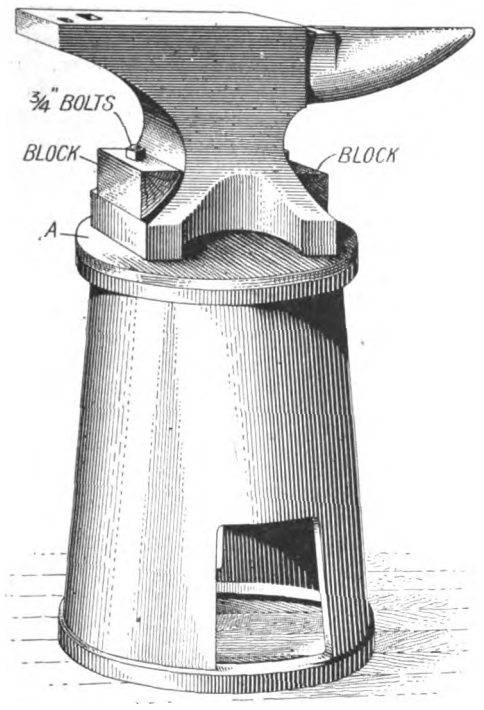
In fact, the barrel may be left right on the anvil-block, and it will last there for years unless somebody pulls off the hoops and staves purposely. Should a thin sheet-iron "barrel" be rolled up and the concrete placed in this instead of in a flour barrel, then the anvil block needs no further treatment and presents a finished appearance for all time.

But when a barrel is used, it may be carefully removed a few days after the concrete has been tamped into it. The hoops should be sawn in two or three places and the staves carefully removed so as not to mar the concrete. If this be done while the concrete is comparatively soft, it is easy to work off any unsightly ridges which may be caused by some of the barrel staves not quite matching each other. Frequently, such marks will be found upon "barrel-formed" concrete. The marks in question may be avoided to a great extent by carefully going over the inside of the barrel before pouring and tamping the concrete. Look carefully along each and every joint between the staves and where two are found offset more or less, carefully bring them even with each other, using a light ham-

mer for this purpose, and tapping on the inside of the barrel, not upon the outside thereof. While a pretty light blow will move a stave which projects inwardly, the staves may be hammered to pieces from the outside, before they will slide over each other. The principal of the arch comes in here!

But, as stated, should there be unsightly ridges in the concrete after the barrel has been removed, proceed to work down the surface until it is smooth. For this purpose, nothing is better than a piece of soft coarse sandstone. Wet the sandstone and the concrete and rub the stone over the projecting ridge until it has been ground down smooth. Sand added to the water with which the grinding surfaces are wet, will hasten the process considerably. It may be added here, that if trouble be experienced in making the staves of the barrel stay in line after they have been hammered smooth, that wetting the barrel before trying to line up the staves, will cause them to stay right where the hammer places them.

It may be necessary to give the staves time to swell a bit, after wetting them, but unless the barrel is too much dried out, the staves can be made to go into and stay in place a very few minutes after applying the water. Hot water will hasten the matter a good deal. So will steam from the boiler with which it is proposed to cure the concrete by the low-pressure steam method. It can also be added that with the proper appliance for using high pressure steam, the anvil block may be given 28-day hardness in eight hours by curing it with steam at 150 pounds boiler pressure.



Old Casting for Anvil Block.

Having rubbed down all the unsightly projections which may have been found upon the concrete anvil block, proceed to finish the surface by giving it a couple of coats of cement and water, mixed just thick enough so it can be applied with a brush, same as whitewash. If possessed of a fancy for an extra nice finish some hydrated lime may be added to the cement wash and the anvil block will shine in a coat of stucco which may be tinted with metallic oxides to any desired color.

If the anvil block is to be coated as above, care should be taken to do so just as soon as the barrel form has been removed and before the surface of the block has been soiled with greasy finger marks. Grease will not let cement finish adhere well to the surface over which it may be spread. Therefore, should the surface of the block have become dirty and greasy before the wash is applied the surface of the concrete should be brushed over very smartly with one part muriatic acid (hydrochloric) in nine parts of water. This mixture boils as it touches the concrete and dissolves off the surface of the block by attacking some kinds of the concrete material, and by dissolving out the crystallization caused by hardening of the cement. This causes a new concrete surface to be exposed, which is free from grease or other paint-repelling matter, thereby allowing the cement wash to be applied in a manner which will give a lasting job.

It is necessary, however, to wash off the free acid before applying the cement wash. Any free acid left on the concrete surface, even if it has dried, will continue to act slowly until the acid has exhausted itself, and the slow constant action of the acid will surely loosen the film of cement wash and cause it to peel or flake off as surely as if it had been applied over a coating of grease. Hence, it is absolutely necessary to wash off thoroughly every trace of the acid before applying either cement or cement wash to a concrete surface which has been acid-cleaned. And "thorough" washing does not mean dabbing the stone with a pint or two of water. It means that the concrete must be washed thoroughly with lots of water, buckets of it at least, and it is better to turn the hose on the block and scrub and flood the entire surface alternately until it is dead certain that not a trace of acid remains upon the concrete.

Cement wash will stick when the concrete surfaces is thus treated, likewise new concrete may be joined to old by cleaning the surface in a similar manner. The acid dissolves off the surface and leaves it in such shape that cement can adhere—something not often possible when new cement is placed against old and dry work. As soon as the acid has been washed off, apply the cement wash. Do not wait for the concrete to dry before applying the wash which should be put on, freshly mixed, while the concrete is wringing wet.

In the same manner as described for making an anvil block, a smith may build up a whole forge, and even the hood over the fire may be constructed in a similar manner. Just nail up a wooden form with space inside of it the exact shape the concrete is desired, then pack the wooden form full of cement mortar and pieces of large stone, and when a week old, the boards may be carefully removed and the forge finished by cement wash. The forge may be used before four weeks have elapsed, but it will be better to let it stand that length of time.

However, if the forge must be used quickly after being made, take care to keep it as wet as possible for four weeks. Wet the surfaces frequently while using the forge, and at night, wet every portion of the concrete thoroughly. Concrete cannot harden unless wet. Lime mortar hardens by taking up carbon from the air, but cement hardens by crystallization, and for that purpose, it must have water, therefore, keep the concrete wet for a month.

The writer, on one occasion, had to make a little rivet forge do the work of a permanent forge in a repair shop. The little forge was so small on top that there was little room for coal and no room at all for the tools and other articles which it is convenient to keep on top of a forge. Accordingly, the little rivet forge was given an addition in the shape of a concrete top, three feet wide and about two inches thick. Some wire cloth of about one inch mesh was formed around the forge, then concrete was plastered on, the wire cloth being temporarily supported by sand, the forge having been turned upside down and the sand on the floor being piled and formed as necessary to leave the holes and pockets required in the new forge top.

The scheme was very successful and the forge is still doing duty with its large and commodious top. No more does the smith have to keep the tongs in his pocket and the poker in a nail-keg.

File Pipe Wrench.

Utilizing a Stillson on brass or copper piping is bad practice as it will mark or cut the metal. A handy pipe wrench can be made from an old file and it has an advantage over the former tool as it will not injure the tubing. An old 12-inch half round file should be chosen and ground fairly smooth on the flat side; just enough to remove the points of the teeth for a short distance. Next, the end should be annealed and bent into shape. The size of the curve will depend upon that of the tubing. A file bent around an inch pipe will take three-quarters. A hole is next drilled and tapped to take a long set screw. This device will hold brass or copper tubing securely in a very effective manner.

If some folks had to hustle to keep warm they would freeze to death.

AN EFFECTIVE HARVESTER.

And How an Ingenius Blacksmith Worked to Invent and Perfect It.

From E. R. Sizer, Idaho.—Probably no trade in the mechanical line calls for more intelligent inventive ability than the blacksmith trade, for the man at the forge has to figure out different ways of doing the many hundreds of different jobs he is called upon to do, and consequently his inventive ability is constantly at work to devise better and more economical ways of accomplishing certain results.

In 1899, Cornelius Quesnell, a blacksmith, conceived the idea of building a machine that in one operation would cut, thresh and sack the farmers' grain. Up till this time the harvesting of grain was a very expensive and laborious undertaking, being carried on with binders and headers, stacked and threshed with a stationary thresher with either steam or gasoline engines as power. It required lots of help and cost the farmer nearly half his crop to put it into the sack from the standing grain. There were certain "combined harvesters," as they were called, which required about five or six men and from 22 to 36 horses to operate, cutting, threshing and sacking the grain in one operation, but they were very

A. M. Anderson, at top. Cornelius Quesnell, below.

clumsy and expensive, and were only suitable for the large grain grower with from 500 to 1,000 acres of grain.

Mr. Quesnell was engaged in the blacksmith business at Viola, Idaho, and he proposed to build a machine with which a farmer could reap what he sowed, that is, take the crop off of the ground with the same stock and help that it required to put the crop in. He proposed to build a machine that four horses and one man could operate, which would cut, thresh and sack the grain for the farmer. He worked out the details of his machine as he found time, and finally moved to Moscow, Idaho, where he opened a shop, which he successfully worked for some time. Here he finally interested Mr. A. M. Anderson in his invention. Mr. Anderson also ran a blacksmith and wagon shop in Moscow, and quickly saw the value of an invention such as Mr. Quesnell had planned out. Together they worked till they succeeded in putting out the first machine which was tried out in a field near Moscow and threshed several sacks of grain, and gave the inventors new ideas and practical experience to work on, and the encouragement to go ahead, as they saw they were on the right track.

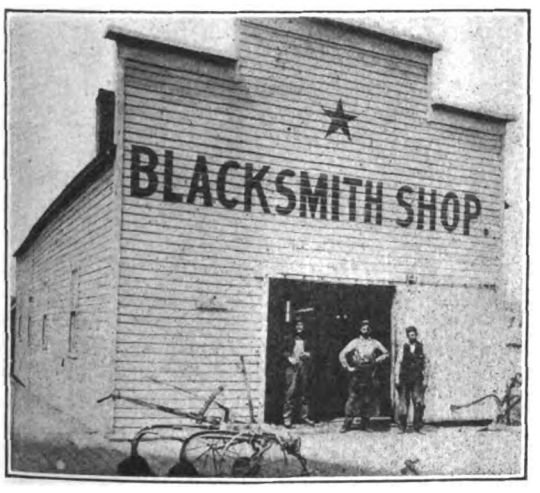
Now what they most needed was capital to

work on and perfect the machine, and in trying to interest men with money in the invention, it seemed a natural coincident that the one who became interested and invested in the enterprise, was Senator Jerome J. Day, who in early life was a blacksmith's helper, starting to learn the trade in the shops of the Cœur de Alene mining district, which he later "struck it rich" as the saying is, and was one of the locaters of the famous "Hercules Mine," and now a millionaire, and one of the leading

A man and a boy harvesting with the Idaho Harvesting Machine.

men in the politics and commercial life of North Idaho. Mr. Day, with the genuine blacksmith's mechanical ability, was quick to perceive the advantages of Mr. Quesnell's invention, and so lent his energy and influence to the project, and a stock company was organized, and capitalized for a million dollars, with Jerome J. Day, president, Cornelius Quesnell, vice-president, Andrew M. Anderson, secretary-treasurer, and a board of directors and managers, consisting of some of the best business men in Moscow and the famous Palouse country. A factory was established and work begun on a scientific basis, with the best mechanical engineers and mechanical draftsmen the company could procure, with Mr. Quesnell, Mr. Day and Mr. Anderson (the three blacksmiths) at the head. The designing of the machine was left to Mr. Quesnell, principally, although valuable suggestions and improvements were adopted, whenever shown to be of value, from others. The progress was faster from this time on, and at the present time the company has a large factory, with up-to-date machinery and methods, and are over-run with orders for their machines. The entire out-put of the factory was sold long before it was made in 1911, and the output for 1912 has all been sold, with thousands of orders for machines which the company is unable to fill on account of not being able to manufacture them.

The present machine is an eight foot cut, which requires six horses and two men to operate, and cuts from ten to twelve acres per day, at a cost of about a dollar an acre. When this is compared to the former cost of harvesting with the old binder and stationary rig,



Shop where the First Idaho Harvester was built.
Mr. Quesnell is designated by the Cross underneath.

which was about $4.50 to $6.00 an acre, the saving is quite apparent, to say nothing of the fact that the farmer is independent of outside help. Where he formerly had to hire from six to a dozen men and several teams during harvest, he now cuts the grain and threshes it with his own teams and his boy to sew sacks, and he can thank Cornelius Quesnell for the whole thing, as he was the bona fide inventor of the machine. Of course there were many good inventors and mechanical engineers helping in the designing and perfecting of the harvester, but Mr. Quesnell is easily the superior of any of them in first-class inventive skill. With a mechanical engineer's education, Cornelius Quesnell's name would have undoubtedly been as familiar with the American people as the great Edison, or any of the great mechanical minds in the world of invention, and it is fitting that he should have his name placed among the great men who have benefited mankind with their inventive genius. He is still actively engaged in designing a new harvester and says he will have one soon that will cut, thresh and sack the grain with only one man and four horses to operate it.

Referring to the illustrations it is apparent that the machine is pushed by the horses. The grain is cut by the sickle, carried up the platform to the cylinder, which is eight feet long, the entire width of the machine, where it is threshed, falling into the sieves, which are also the whole width of the machine. The fans throw a strong blast of air the entire length of the sieve and cleans the grain, after which it falls into a conveyor which carries it to the elevator which empties it into the "recleaner" which is in reality a small fanning mill. From the recleaner it goes into the sacks, and is clean enough for seed, or milling without being handled any more. A return elevator on the machine takes care of any white caps or unthreshed heads that may happen to pass through the machine, and returns them to the cylinder, where they are threshed over again. The whole machine is compact and light, and as neat a piece of machinery as one would care to see, having roller bearings at all points, and only the best of material is used in the making. The machine sells for $1,100, and will pay for itself the first year, in the saving in time and help during harvest, and a blacksmith did it all.

The Champion Horseshoe Company.

The Champion Horseshoe Company, Pawtucket, R. I., which has just purchased the Pawtucket Foundry Company property in that city, has ben incorporated under Rhode Island laws. Edwin A. Smith is president, George L. Bowen, vice-president and general manager; Donald E. Jackson, secretary and treasurer, and George L. Markley, assistant general manager. Eli Batty is superintendent of the plant and James E. Batty, assistant superintendent. The active men in the company have been prominently associated with the Rhode Island Perkins Horseshoe Company, Valley Falls, R. I. Mr. Bowen was connected with the company as its general sales agent, Mr. Markley was the western representative, Eli Batty the assistant superintendent and James E. Batty the master mechanic. Edwin A. Smith is a wealthy resident of Providence. The new company has purchased its equipment and expects to have goods on the market in June.

It is the practical man who succeeds nowadays. You must be familiar with the working side of your business, know how things ought to be done, and know how to do them yourself. Otherwise you cannot get them done well by others.

The man who makes good when conditions are bad deserves a lot of praise.

VARIED WAGON STYLES.

Famous Vehicles That Are Not Now In General Use.

One of the demands made upon the wagon manufacturer, says a writer in the New York Sun, and one that taxes his originality to the utmost, is that made by the business house that wants a wagon of distinctive design. There are specially built wagons for all sorts of business, but it is the men in the same line of business, whose wagons must necessarily be of the general type required by their particular needs, who are the most anxious to have their deliveries made in vehicles that shall be as unlike as possible to those employed by their competitors. It is in the designing of delivery wagons for such concerns that the ingenuity of the builder is brought into play.

Naturally the most conspicuous feature of any business requiring the delivery of goods too bulky to be sent about the city by messenger is the delivery wagon. Because it is the public representative of the business house and as such must have an appearance that will reflect credit upon the concern whose merchandise it transports, careful business men lavish much care upon their wagons. They realize that as it goes up and down the streets of all neighborhoods, stopping at all sorts of houses, the firm name emblazoned on its varnished sides is seen by more people than ever would be likely to pass the quarters of the firm itself.

The big retail shops, for instance, must be particular about their wagons. Their customers do not like to have their purchases delivered at the door in a shabby, carelessly groomed equipage, and the heads of these concerns realize that they must be as exacting about the appearance of their wagons as they are about the quality of the merchandise they carry.

A great deal of money is spent on delivery wagons. Many businesses charge up the money thus spent to general advertising and regard it as money well spent. A woman especially appreciates having her purchases sent home from a shop which makes it a point to keep its delivery turnouts immaculate. The same is true of men who make purchases for business purposes which must be delivered by wagon.

The Conestoga Wagon.

Of distinctively American commercial vehicles the first one was the Conestoga wagon. This took its name from the locality where it originated, and at one time more than 3,000 of them dotted the roads of Pennsylvania which ran from Philadelphia to nearby towns. This vehicle was so famous in the early days that its drivers were able to demand a special sort of cigar for their use from the cigar makers. This was the stogey, first made for the benefit of the Conestoga teamsters. They wanted a substantial, long smoke to ease the rough hauls over the provincial roads, so the cigar makers invented this cigar for them and made it a foot long, too.

At the time the Conestoga wagon was looked upon as a triumph of the wagon maker's art. It was a freight carrier and was well adapted to the demands which brought it into being. It passed away with the coming of the railroads, when the reason for its manufacture ceased to exist. The idea the builders of this wagon sought to carry out was to build it on lines which would enable it to cover the ground as easily as a ship sailed the seas. The body of the wagon was shaped like a boat with the bottom curved. This enabled it to carry a secure load over the mountains of Pennsylvania, as the freight when properly packed in it would not shift, regardless of the angle at which the vehicle might be tilted.

The body of the wagon was covered with heavy cloths stretched over arching wooden bows, six or eight in number, the middle ones being the lowest and curving upward toward the back and front. The wagons carried from four to six tons, the load being carried up to the tops of the bows. One ton for each horse was the rule for determining capacity and the wagons were loaded to capacity. The driver, finding no room in the wagon, rode the near horse of the first pair, but even then he was provided with shelter, for the top of the wagon

extended out in front nearly to the heads of the first team of horses.

The owners' tastes ran to brilliant colors in painting their wagons, and the same love of bright hues was extended to the reins, which were colored scarlet and orange and green.

More than a hundred of these wagons going along the road in a row and so close together that the noses of the leaders were in the trough of the wagon in front was a common sight in those days. The Conestoga wagon was an important art of the transportation facilities in Colonial war times. It came prominently into notice for the first time to people outside of the section where it came into being in Gen. Braddock's ill fated expedition through the wilderness, when he opposed his Grenadiers in solid formation against the guerrilla methods of the Indians. Gen. Braddock petitioned the Pennsylvania Assembly to furnish him with 150 Conestoga wagons to carry his army's baggage, but twenty-five was all he could get. Franklin remarked at the time that it was too bad Braddock's troops had not been landed in Philadelphia, where every farmer roundabout was the owner of a Conestoga wagon.

During the Revolutionary war this wagon was used more than any other form of conveyance for the transportation of munitions of war. In 1780 President Reed of Pennsylvania wrote to George Washington that "the army has been chiefly supplied with horses and wagons from this State." Further on he regretted the circumstance that an additional demand for 1,000 teams was to be made upon his community, and he expressed the opinion that his State could not stand it. This in spite of the fact that practically no other type of vehicle for transporting freight was in use in that neighborhood, which shows how generally the Conestoga wagon was employed.

In the next war in which this country was engaged the same type of cart was depended upon to do the bulk of the carting for the army. The greater part of the military supplies was hauled to the scenes of action by the Conestoga wagon. But perhaps it was during the westward movement of emigration, when thousands hiked across the plains, many of them without stopping until the other ocean was reached, that the Conestoga became a nationally famous wagon. It was dubbed the "prairie schooner," a name probably suggested by its close resemblance, from a short distance, to the lines of a sailing vessel, due to the shape of its body and the white canvas cover.

The direct cause for the production of the Conestoga wagon and its usefulness in the early days was the condition of American roads. Some of them were hardly more than trails, and even the best of them were primitive, as roads are built today. In New England, for instance, the first roads were known as "trodden paths" and are so styled in the early court records. They were seldom more than two feet wide, covered with pine needles and fallen leaves.

They were first marked out by the moccasins of the Indian hunter, following whom came the white settler in his clumsy, often homemade hobnailed shoes. Wandering droves of cattle trampled down many of these early roads through the wilderness and even in the towns. Pearl street, here in New York, is an example of a street with such a beginning.

When wealthy colonists increased to an extent that enabled them to bring horses from Europe these trails became bridle paths. Increasing communication and commercial intercourse between the colonies led to the building of corduroy roads so that the rapidly developing transportation business could be carried on with wheeled vehicles. Swampy spots, holes and washouts were filled in with brush and logs. It was on these roads that the Conestoga wagon became so important a vehicle, with its boat shaped body and its wheels with tires a foot wide.

The Concord Wagon.

For passenger traffic the Concord coach at a later date became as famous in its own field as did the heavier vehicle. The Concord coach carried no freight but had accommodations for a large number of passengers. It made its appearance in 1827, taking its name from the town of Concord, N. H. Considering the time of its production, it is said to have been the most perfect vehicle of its class ever made. In fact, with some slight necessary changes the Concord coach is in use today on rough roads in some mountainous parts of the country, and the old time stage coach that figured in so many Western romances was of the Concord type.

These coaches ran from one station to another, covering a regularly allotted part of the distance from one city to another. The horses were changed at specified stages, after the manner of the English coaches, and this custom gave rise to its name of stage coach. But the Concord coaches were much more comfortable and much lighter than the English coaches.

One of the most important features of the work done by the Concord coaches was the carrying of the mails. Lively work was expected of men and horses around the time when mail carrying contracts were to be given out, to fit them for the test upon which the getting of the contract depended. This test was the speed with which the President's message was delivered to the towns along the route. Fast records were made by these coaches.

One driver, Dan Gordon, declared he carried a President's message thirty-two miles in two hours and twenty minutes, including the time consumed in three changes of horses. Another driver, Dan Noble, set up a record for the run from Wheeling to Hagerstown, 185 miles, in fifteen and a half hours.

The Concord coaches played as great a part as the Conestoga wagons in the development of this country. By 1832 there had been established 106 lines of stage coaches to handle the passenger traffic from Boston alone. As one example of the direct influence of these lines in the encouraging of new enterprises, it can be said that the *Boston Traveler* was a newspaper which was originally established as a stage coach paper, and so got its name.

Some of these old coaching routes were called upon to bear heavy traffic for those days. When the steamboat was improved to such an extent that it would go right along without stopping for repairs a line was established to run between New York and Providence. The stage coach lines between Boston and Providence then became most active. As many as twenty coach loads of passengers bound for the steamboats, and as many going from the boats to Boston, rolled over the road each day. Even then, transportation rates were attacked when they were thought to be too high by the citizens. The regular rate for this trip having been set at $3, people kicked about it. A rival line was then started, which charged $2.50. One of the earliest rate wars between transportation companies was the result of this 50-cent cut.

The war waxed hotter and hotter, until the old company determined to institute the freezeout. It offered to carry first-booked passengers for nothing. The new line came cheerfully back with a proposition to its patrons not only to carry them for nothing but to supply a dinner at the end of the ride free gratis for nothing. The old one then raised the ante by offering to carry people free, to give them a dinner when dinner time came around and to throw in for good measure a bottle of wine.

Those were great times for the nervy and enterprising. They would ride back and forth through the beautiful New England scenery, live on the best the land could supply in eatables and drinkables and not spend a penny. Then a rate agreement was arrived at between the two warring companies, who really felt they must safeguard their treasuries. A rate of $2 was fixed for the trip from Boston to Providence, or the other way, as the standard for all companies.

Commenting on the speed attained by these coaches, the editor of the *Providence Gazette* wrote:

"We were rattled from Boston to Provience in four hours and fifty minutes—if any one wants to go faster he may send to Kentucky and charter a streak of lightning."

But the railroad train did even better.

It is not hard to settle a case in court if neither side has much money.

George Washington's Chaise.

On an elevated stand constructed for the purpose, upon the lawn of Mr. Walter Scott, Cheshire, Conn., is conspicuously displayed one of the most remarkable vehicles of modern times.

Unlike the "Deacon's One Horse Shay," immortalized in verse by Oliver Wendell Holmes, which collapsed at the end of its one-hundredth year, this chaise bids fair to go to the Deacon's 200 or more years better, judging by its well preserved condition.

Tradition says it was imported from England in the year 1702, and at one time was owned by Dr. Allsop, a flourishing physician of Middletown, Conn. Mr. Scott who purchased it about 15 years ago, says its authenticity is unquestioned, having traced it back almost to its importation. The title of the "George Washington Shay" was derived from an incident occasioned by Washington's occupancy of it during a journey from Middletown to Hartford as a guest of Dr. Allsop.

It still retains the evidence of thorough

The George Washington Chaise.

workmanship so prevalent when hand craft was almost universal. Its various parts are constructed of heavy material, even to the strap springs. With the exception of a modern top covering and a recent upholstering, it is practically as originally built. Its usefulness is limited to parades on festival occasions being drawn by two horses abreast. The following lines in relation to it were written by a poetic visitor:

Walter Scott of the Waverly Inn,
Enjoys a fame no other can win,
Jovial, happy, honest and free,
As king of hosts, all men agree.

Among relics galore of a former day.
He cherishes most his ancient "Shay,"
His country seat in Cheshire town
Is praised by guests the world around.

To Make Different Concrete Mixtures.

A rich mixture is composed of 1 part cement, 1½ parts sand and 3 parts gravel or crushed stone. This mixture should be used for structural parts where water is to be kept from columns and other parts subjected to high strain.

A standard mixture is composed of 1 part cement, 2 parts sand and 4 parts gravel. This should be used for machine or engine reinforced foundations subject to vibrations, for reinforced beams, columns, arches, floors and for watertight work such as tanks, conduit sewers, etc.

A medium mixture consists of 1 part cement, 2½ parts sand and 5 parts gravel. This mixture is used for ordinary floors and machine foundations, piers, thin foundation walls, abutments, retaining walls, sidewalks and heavy wall sewers.

A lean mixture is composed of 1 part cement, 3 parts sand and 6 parts gravel. This mixture should be used only for unimportant mass work, heavy walls backing stone masonry and for large foundations supporting a stationary load.

SHOEING AND BALANCING.

It Should Vary Widely According to Conditions and the Horse.

The following article appeared in the Horse Review, written by "Marque," and will no doubt be of interest to horseshoers in general, and particularly those who work on trotting and pacing stock.

It is only once in a while, nowadays, that one sees a fast trotter wearing other than the simplest pattern of shoes. One can review the good Grand Circuit trotters of 1911 and after doing so come to the conclusion that there is a dearth of material upon which to hang "shoeing stories." Front toes, a trifle squared, or with low grabs brazed well back on the inside rib of the plate, or around the outside of the toe, plain at the heels or with knife-edge calks to hold the foot and keep it from sidestepping; behind slightly squared or rounded toes, or perhaps low grabs around the outside of toe, flat calks at the heels, is the way the shoeing is diversified in these days.

The angles of the feet and the length of the toe, bear far more relation to balancing and hanging up than do the style and pattern of the footwear. The longer I observe trotters, the more I am inclined to believe that in the angle and length of the feet the greater part of the balancing problem lies.

When we have succeeded in producing real "thoroughbred trotters," weight will no longer be a factor, and we are already fast reaching that point. Nor will anything be used but the simplest of calks and, occasionally, grabs for the few horses that they are found beneficial to. But the trainer will always find it "up to" him to ascertain the proper angles and footlengths. One could write columns of advice anent the style of shoes that should be tried in order to remedy various faults of gait, and not one item of the whole would be useful to the interested reader if the shoes so recommended were not nailed on toes that were of the correct length and the angles of which were also correct.

As for weight, I do not care how big or strong trotters may be, they cannot carry excessive weight and step the clip required nowadays. It is true that powerful, bigfooted horses such as R. T. C., usually require more weight to balance them than do such dainty things as Dudie Archdale and Joan but even R. T. C., could be anchored with a few ounces additional weight. Oldtime trainers, when I discuss these matters with them, poo-hoo the idea that "weight" will tire a horse, proclaiming that if it is necessary to balance one, that trotter can carry it, without harm, etc., etc., but I don't believe their argument is practical, in view of the constantly increasing clip our trotters are going. In the first place, weight, in ninety-nine cases out of one hundred, isn't necessary to balance them, our best present day trainers not depending upon it as did the older generation. Drivers used to take more hold of their horses than they do at present, and the average one twenty years ago plodded along with heavy shoes, taking a big hold of the iron, and breaking when he desired to rest himself. Perhaps breeding has largely brought about the radical change. Then, too, the trainers have surely learned a lot about their trade. Nowadays trotters are balanced "on a pivot" as it were, and very few of the good ones wear much weight or take much hold.

It stands to reason that foot angles and lengths contribute largely to perfect or imperfect balance. In order to convince yourself on this point, lead out half a dozen or so horses and then make a careful examination of the way in which they stand on their legs. No two of them will be found similarly conformed as to the slope of shoulders or hips, nor will any have front or hind pasterns that are set at the same angle. Some will be found to have short pasterns, others long ones, and there will be a noticeable dissimilarity between each and every one when they are examined as to the way their legs are put on their bodies. If one could take accurate measurements of the legs and the angles of the pasterns, and by experimentation arrive at some rule of averages, it might be possible to put shoeing on a scientific basis. I say it might be possible, but even that method would be faulty, for the action of the muscles and the movement of the joints present a complex equation all their own.

A horse may stand straight on his legs, and when viewed from all angles, he may appear to be of well balanced conformation; but once he is "moved up" it becomes apparent that he is foul gaited. This is due to the tension and action of his leg muscles which, upon being flexed, pull the legs into irregular movements, thus causing such common faults among trotters as speedy cutting and scalping, knee hitting, etc., and among pacers, cross-firing, knee hitting, etc.

One of the most interesting and valuable works on shoeing and balancing, is that of Rudolf Jordan, Jr., entitled "The Gait of the American Trotter and Pacer." The basis of all his theories and examples is to be found in the footprints left by the trotter or pacer when speeding over a specially smoothed surface. Mr. Jordan, without doubt, made a profound study of his favorite subject, but I think that he permitted his "footprint" hobby to dominate his efforts, thus losing sight of the all important fact that the impression made by the feet on the track does not tend to describe the movement of the legs.

As a good example of my meaning, I may cite the case of Lou Dillon 1:58½. She was termed a "cross-legged trotter" and when speeding towards one it seemed that her front feet were being revolved one over the other, and that her legs crossed each other in each stride she made. Yet Lou's footprints gave no evidence that her legs had described other than the regular movements or that her front action was in any respect freakish. I have no doubt that there is virtue in Mr. Jordan's theory, but I do not think it supplies the key which will unlock all the secrets of true balance. Further evidence is provided by his experiments with Lou Dillon, when Budd Doble wintered her at San Jose, Cal., in 1904. Mr. Jordan measured many of her strides and found among other features that she strode farther with her right hind leg than she did with her left. According to his own theory, this would indicate that she was not in perfect balance, and that her stride lacked uniformity of rhythm. But Lou was a "flying" trotter as all agree. Perhaps it might be argued that if her stride could have been perfectly attuned, she would have trotted much faster, but I for one am not going to seek perfection in anything that pertains to equine or human nature or endeavor.

This feature also recalls the case of Beuzetta, 4, 2:06¾. When Guss Macey had her, giving her the world's race-record for a four-year-old filly, she used to fuss with her head and was inclined to carry it to one side. The critics said that if she was trained so as to carry her head straight she would trot seconds faster. When Orrin Hickok trained her in her five-year-old form and brought her out all squared away, according to the critics' desires—but Beuzetta no longer had her speed! There are occasions when with horses, as well as other things, it is well to "let well enough alone."

So far all efforts to reduce shoeing and balancing to a science have proved a lamentable failure, and it is my observation that the term "scientific," as applied to the regulation of the gait of trotters and pacers, will always be a myth, or rather, a misnomer.

And as for giving long distance advice on the subject!—that, too, is untenable. Too many features, aside from shoes, calks, toe-lengths and foot angles, enter into the balancing proposition and make the whole anything but a question of experiment. Those who give advice upon balancing can do just one beneficial thing, and that is, cite instances wherein certain shoeing did good in the cases of certain horses. Your faulty-gaited trotter may be troubled the same as the one which was squared away by the use of some sort of shoes, but when you try the precise process you are more apt than not to find that it will work just the other way.

Some years ago, when Murray Howe was on the Review's staff, he told us that the manner in which horses were checked, the method of rigging their heads and the tension exerted by the driver on the reins, constituted as important factors in solving problems of balance as did shoes, calks and weights, and Murray surely knew whereof he wrote, for no man of his or any other time made a more exhaustive study of the subject. Certainly he was in position to write authoritatively. I used to travel a great deal with Murray, and I have seen him offer suggestions to trainers (upon their request), which greatly improved the gaits of their pupils, but as for giving long-distance advice he used to say, "if I could do that successfully, it wouldn't take me long to become a bond holder."

Some horses are particularly sensitive as to how their heads are rigged and checked, while others do not seem to mind these features at all. I recall an occasion when a change of bridles caused a horse to race in very bad form, and a return to his old rigging squared him away instantly. I was swapping yarns with Billy Kope, in his shoeing tent, when a driver came in leading a horse that had recently joined his stable. Owing to some disagreement between the steed's former driver and the owner, the horse changed trainers in mid-season and had trotted the bad race referred to for his new trainer, who said:

"Billy, you used to shoe this horse for Mr. A., and I want you to see if those he is now wearing are the same that he has been racing in. I have an idea that those shoes were changed before he was turned over to me."

Kope examined the shoes and announced that they were the same ones he had put on two weeks before.

"Well, what do you suppose is the matter with the horse?" asked the driver.

Kope was always a very frank man, and turning to the reinsman said:

"I noticed that you had this horse checked pretty high last week when you raced him, and if I am not mistaken, he used to wear a nose band. Better find out about the bridle, I would suggest."

Presently the driver returned and reported that the caretaker had informed him that the bridle formerly used on the horse didn't go with his harness, belonging to another horse. Soon after we walked out to the track to see the steed work rigged in his old way, and were pleased to note that he "was himself again."

Horses that become used to wearing a nose band are practically helpless without it. I have seen the steadiest and best-mannered ones break wildly when their nose bands broke. It seems to give a horse accustomed to wearing it a sort of easy rest for his head, and once this support is lacking he becomes unbalanced.

As for changing the angles of the feet, it is like bits, checks and rigging; some horses are not affected by even radical changes, while others are most sensitive to the least shortening of their toes or raising of their heels. If the farrier carelessly rasps off an eighth of an inch from the front part of some horse's feet, they are immediately thrown off their balance and it is necessary to raise and extend the toes with strips of thin leather in order to repair the damage. I stated early in this article that the length of the toes and the angles of the feet play a large part in gaiting the trotter or pacer, and I must again emphasize this fact as one recognized by all trainers. You can put it down in your little book that once you strike the correct foot angles for your horse or horses, a great deal of your shoeing difficulty is solved for good and all.

A piece of metal of such a shape that it is hard to hold and too small to bolt on a drill-press table makes a difficult thing for drilling. Such a piece of metal can be kept from turning by placing a stiff piece of paper or emery cloth between it and the table. This method is very effective.

Many a bell with a deadened tone due to a cracked rim, can be given its original clear ringing sound by sawing out the crack with a common hacksaw. Make the saw cut along the line of the crack. The opening caused by the saw will allow the free vibration of the metal.

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MAY, 1912.

PARTIAL CONTENTS.

BEING BETTER THAN THE AVERAGE.

Success in this life, in any line of work, consists in knowing more about your business than the average man, or being able to do your work a little better than the average man.

Humanity is like a vast river flowing steadily onward. As long as the surface is not disturbed, no single drop of water is distinguishable from any other drop. In the great stream of humanity, one man is not distinguishable from another, unless he does something which raises him above his fellows.

Mediocrity is the rule—conspicuous ability the exception.

Close application and painstaking care, are so rare that the man or woman who practices them will after a while attract attention, and receive his reward.

Most people are in too much of a hurry to get ahead. A young man goes into a shop for instance, where there are quite a number of employees. He works faithfully and does not shirk when his employer is absent. He plods along month after month, and perhaps years elapse and he does not see that he has gained any advantage by all his careful attention to his employer's interest or his endeavors to acquire skill and speed. Sometimes he thinks that all his efforts have been thrown away, but the time will surely come, when a man of this sort will attract attention, and be raised to a position of responsibility and trust that he could never acquire by slipshod and careless methods.

A man starts a blacksmith and wheelwright shop, we will say. He does his work as well as it can be done, or as he knows how to do it, and treats people honestly and squarely, and yet gets along slowly. He feels that his attempts to do right are not appreciated. Confidence, we all know, grows slowly. It takes a good while for a man so to impress himself upon a community as to secure that community's entire trust, but when it is once secured, it can be held by the very methods which have secured it. After a while people begin to say of such a man that if a good job is needed go to him. He will never slight your work, or overcharge you; you don't need to make any bargain with him beforehand to prevent being cheated.

Little by little, this man's reputation spreads for skillful work and honest dealing, and after a while his business increases to such an extent that he is prosperous. He has done his work a little better than his competitors. He has treated people a little more honestly than his competitors, and he is reaping his reward.

TIME CARDS ARE USEFUL.

Very few blacksmiths or wheelwrights have time cards or other practical methods of recording every item of labor and material that enters into a job. Yet they all should do so, and the employer himself should keep his own time as scrupulously as his workmen do theirs.

This need not be done to facilitate an espionage or spy system on workmen to see how they put in their time. A workman who must be watched, or an employer who watches, are not of much account.

But if both workmen and employers were to keep account of the time they consume in doing each particular job they would probably be surprised to find how difficult it is to make the aggregates foot up an entire ten hour or eight hour day's work. They would likewise be surprised to learn the time that is usually consumed between the various jobs of the day, and yet it would be time that some would hardly feel like charging up to the customer.

Do not forget that the up-keep expenses of the shop go on constantly. Some of these up-keep expenses are just as heavy when all or any one may be idle or preparing to do a job of work as when all are actually accomplishing it. The wage of the workman goes on just the same and the cost of living of the employers goes on just the same.

No doubt many a shop is doing what may properly be called an unprofitable business simply from this neglect to see that all the time of the working day is accounted for. It may be held that the customers should not be called upon to pay for the whole time of the working day, but whether they should be or not, the shop owner must pay for the whole of the time.

While there is danger in being a slave to system rather than have system be our slave, much more is lost from a lack of system than from too much system.

The guess-work and "rule-of-thumb" methods of doing business cannot be carried on successfully today in most lines of business, and the blacksmith and wheelwright business is no exception to the rule.

FLY TIME IS AT HAND.

Soon after this issue reaches our readers, that troublesome pest, the fly, will be in more or less evidence about the blacksmith shop. This should not be so. A very little effort on the part of the community in general—not on the part of a few individuals, but of all—would get rid of them. In fact, not more than a tenth part of the work that is every year done to secure protection after they arrive, if done in a preventive way, would secure immunity for both man and beast.

Not only are flies troublesome but they are the greatest breeders or carriers of disease that exist. A physician informed the writer the other day that most contagious diseases, like small pox for instance, are not spread by persons so much as by insects. How true this may be cannot be easily proven, but every blacksmith knows how much trouble flies give him in the shop and especially in tormenting horses that are to be shod.

There is but one way to be immune from flies, and that is to be extremely clean. Keep everything in the shape of garbage in closed receptacles and leave no refuse whatever in the roads, yards or buildings. If this be done, and sticky fly paper or some other fly destroyer be used for such as may survive the cleaning, they will not be very troublesome.

Remember, however, prevention is better than cure. Don't let the flies get a start, and with just a little care and attention, your shop can be kept practically free from them all summer. But the work must be general; it will be of little use for you to destroy the breeding places if your neighbors will not do the same.

DUPLICATE NAMES.

It is obviously an unpleasant duty to again ask readers who send letters to us to kindly give their names and post-office addresses accurately and plainly.

There is scarcely a day that we do not have letters returned from the post office owing to a lack of attention to this important but not difficult deail.

Let any one examine the official postal guide for a few minutes and he will be astonished to learn the number of post offices of the same name there are in the country. With no intention of going into the matter fully, it should be sufficient to say that there are 11 Aberdeens in the guide besides the one in Scotland; there are 15 towns by the name of Adams; there are 18 Albions; there are 20 Arcadias; 31 Arlingtons and 19 Avons. These named are but a few of duplications all through the postal guide, although we have picked out examples here and there that occur in the first letter of the alphabet. Then there are a good many post office names that are spelled so nearly alike that unless they are written with unusual plainness and care, it is impossible to distinguish them. For illustration, there is a town named Artemas and one named Artemus, one named Amber and one named Ambar, one named Anselma and another named Anselmo. Thus we might go on to the extent of several pages citing illustrations of duplicate names and names that are near duplicates that is next to impossible to distinguish them.

In view of these facts, will our readers kindly remember that it is our purpose never to neglect them? Whenever it seems to be the case it is safe to set it down to the fact that either the letter did not reach us or that some error of omission or of commission in the address given was the cause of it.

Start out to meet trouble and you won't have to go half way.

PRICES FOR AUTOMOBILE REPAIR.

An esteemed reader asks us to give a price list for automobile repair work. We should be glad to accommodate him and others, but on investigation, there seems to be such a wide variation that such a list would be confusing and misleading rather than useful.

Some cars are so much more accessible than others that the same job done on one would require three times as much labor as on another. Then the material is of the widest possible variation. The fitting of a replacement in one car may be done easily and quickly, and the same replacement in the case of another car might consume double the time.

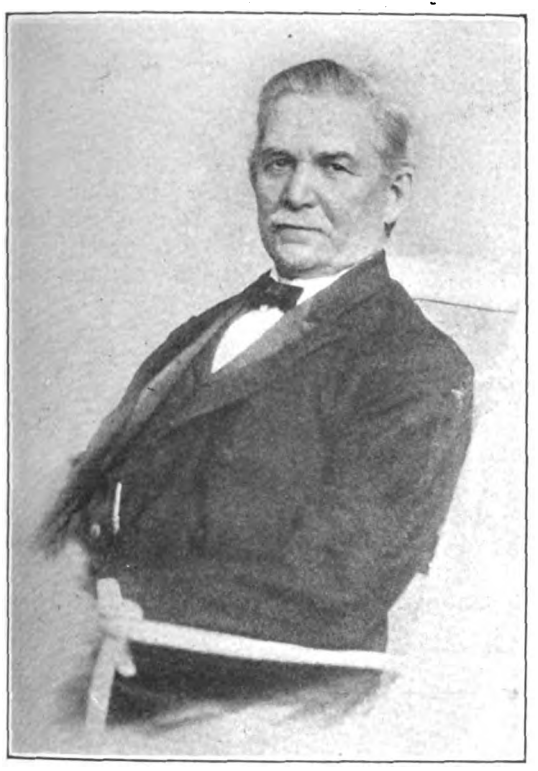
The fairest method and the most business-like, considering this wide variety of material and construction, is to charge by the hour. In our opinion, time charges should never be less than $1 an hour, and if accompanied by the use of machinery and power, the price should be much more.

This may seem a high price for some localities, but no fair minded customer will find fault with it. Any other way of charging is simply a "gamble" and business that is conducted on chance is extremely uncertain.

Death of Elias G. Heller.

We are pained to announce the death, March 22, of Elias G. Heller of the well-known firm of Heller Bros., Newark, N. J. The immediate cause of his death was pneumonia, following a stroke of apoplexy some two months previous.

Mr. Heller was born in Newark, N. J., April 27, 1837. He was of German and French



The Late Elias G. Heller.

parentage. At an early age he learned his trade of file and rasp making with his father, who had started the business in Newark in 1836. At the outbreak of the Civil War, he succeeded his father in the business of manufacturing files and rasps and located in the heart of Newark. The business grew and prospered to such an extent that in 1872, he together with his brothers, were compelled to seek larger quarters and they moved to the place where the plant is now located, corner of Mt. Prospect and Verona avenues. In a few years he saw the necessity of using a superior and uniform grade of steel in the manufacture of files and rasps, and he started in 1880 to manufacture the steel which greatly assisted him in maintaining a high grade of goods. In 1885 he started in the manufacture of a line of farriers' and blacksmith tools made from his own production of clay crucible steel. The business has had a steady and increasing growth until today the goods are known as standard by hardware men throughout the world.

He was deeply interested in church and charities and was president of the board of managers of the Women and Children's Hospital, and other charitable institutions in Newark.

He was not only president of Heller Brothers Company, but held the same office in several other philanthropic and business associations including the File Manufacturers' Association of the United States.

About ten years ago Mr. Heller arranged to retire from the active management of his business in favor of his sons, Paul E. Heller and Arnaud G. Heller. He is survived by the widow, and three sons, Paul E. Heller, Arnaud G. Heller and R. Arthur Heller, the latter being an attorney-at-law. He leaves a large estate.

Funeral services took place at the Forest Hill Presbyterian Church March 25.

Still Active at Nearly Four Score.

One often hears a blacksmith say, "I've shod horses for 35 years and think I'm entitled to retirement or a pension." He certainly is for is he not

"Toiling, rejoicing, sorrowing,
Onward through life he goes,
Each morning sees some task begun,
Each evening sees its close."

But here we have an instance of a man—Mr. Edward Clark of Middletown, Conn.,—now at the age of 78 years, who has toiled at the forge and anvil for 61 years, and is still active. Ninety-four years ago his shop was erected by Timothy Loomis, who for 46 years occupied it as a blacksmith shop. When Tim Loomis died, Mr. Clark took possession and has opened up every morning for the past 48 years. During his long life of usefulness, Mr. Clark carefully estimates that he has shod 25,000 horses and 15,000 cattle. The original ox frame is still in service but is seldom used.

A few years ago the old bellows gave way to a modern blower, otherwise the interior looks its age. Mr. Clark is a splendid physical example of what correct habits will accomplish, and bids fair to last many more years.

Monkey Wrench Pipe Cutter.

Sometimes in the repair of gasoline engines or automobiles it is necessary to fit new piping. The usual method of cutting is with a hacksaw which involves considerable labor. A simple tube cutter and one that is inexpensive and made easily consists of an ordinary monkey wrench to which cutters are fitted. These steel discs can be obtained at any hardware store for a few cents. A small hole is bored through each jaw of the wrench and a stove bolt passed through the disc and tightened. A little space should be allowed for the latter to turn. To cut different sizes of pipe, it is necessary simply to adjust the jaws.

Shoeing and the Laws of Nature.

Disregard of the laws of nature is the cost of much foot lameness in horses. It is very seldom we see a colt that is lame in his feet, but a year or so after he is shod and put to work he may go lame. What is the reason? Bad handling and shoeing and leaving the shoes on too long before resetting, I think are the causes of lameness. The usual method of shoeing with the shoe as commonly seen, with calks from one-half to one inch high, may be a very popular method of shoeing, but it does not bring a natural bearing of the foot on the ground. When the colt is unshod one-half or more of his weight is borne by the frog of his foot. As soon as he is shod with the ordinary shoe with high calks the frog is nearly useless to him, and the whole weight of the horse rests on the shell of the foot nearly all the time. If the walls and sole of his foot are a little thin, the shoe being on the extreme out edges with no frog support, the center of his feet keep settling down, and soon he has a flat foot or convex sole and is generally more or less sore. The feet often become contracted from being raised up from the ground by calks and the frog diminishes more than one-half in size and gets dry and hard, and the horse goes lame or sore and gets corns on his feet.

Now let's suggest a remedy. We must have good calks in this country most of the year. Owing to this fact we must use a shoe with a bearing under the frog. This calls for bar shoes. Some blacksmiths will tell you that you don't want them, and you don't unless they fit the foot. But when properly fitted they will do the business. While some horses with flat, thin feet can be made to go without being sore, yet there is nothing to keep the foot from becoming more convex all the time and soon he is a cripple. The shoe cannot be made concave enough to keep the bearing off the sole of his foot. As the foot grows out the shoe draws forward under the heel and as ordinarily made it gets narrower under the heel all the time. Thus it draws the heel under and makes it narrower. If made with a bar the foot would have the same bearing at the heel all the time. The front feet of more than half of the horses at eight years of age are not as wide within an inch of the heel as when first shod.

The frog of a horse's foot is intended to take the concussion and jar off the foot and leg when traveling. How can it do this when it does not touch the ground? I believe that if the horse could have a natural bearing on his feet as he did in colthood there would be far fewer ringbones and sidebones and less navicular lameness, and much less trouble with the fore feet. I would like to hear from others on this subject.—National Stockman and Farmer.

PRACTICAL FORMULAS.

Under this heading will be published each month a few formulas that have for their purpose the saving of time and money in the blacksmith and wheelwright trade. Although they have not invariably been tested, they come from reliable sources and it would be esteemed a favor if our readers would give their experience with their practical application, whenever possible.

Black and Gold Varnishes.

A black varnish for covering leather and which can be roughly handled without fear of breaking, is made up in the following manner: Mix 30 parts of rosin with the equal quantities of turpentine and turpentine oil; add 6 parts of sandarak gum and 120 parts of shellac, after which dissolve the whole mixture in 900 parts of alcohol of 90 per cent. Filter the liquid through fine linen and then mix it thoroughly with 15 parts of fine lampblack which has been dissolved in a little alcohol.

A good gold varnish is made in the following manner: A suitable quantity of shellac is dissolved in the same weight of concentrated alcohol. To this solution is added a 0.5 per cent. solution of boric acid in alcohol, which gives the varnish its consistency. However, the varnish made in this manner is colorless, and in order to produce a golden shade picric acid is added until the desired degree of yellow is reached.

Glass Polishing Powder.

A preparation in powder form which may be used to clean up or polish the surface of fine glass such as costly mirrors, etc., may be made by rubbing calcined magnesia down with pure benzine. This must be continued until the mass formed is sufficiently soft to allow drops of liquid to be pressed out of it. Since the benzine is so very volatile, the mixture must be kept in closely stoppered bottles, preferably those employing ground glass. To use, a little is placed on a wad of cotton or soft rag and the glass rubbed with it.

Cleaning Shellac Brushes.

A shellac brush may be cleansed readily and easily in soap and water if it be taken in time and the work done quickly, before the shellac has had time to set. Alcohol is generally used for this purpose because of its cutting action on the gum, which is the principal ingredient.

Welding Compound.

Take two parts of powdered borax to one of nice clean sand. Be sure the sand is cleaned of all dirt. For welding you want a flux that will flow over the work. In welding springs, you may use iron chips from the bolt cutter, placed on the scarf or lap.

It's the early start that gets a man there ahead. The foot gained in getting away from the scratch has won many a race.

CORRESPONDENCE

One Way Only to Shoe a Horse.

From O. F. Jarvis, Virginia.—A colt has a natural shaped hoof. Keep it natural. If we undertake to make improvements we are very liable to fail, and the poor animal suffers in consequence of our blunders. The great trouble in shoeing nowadays is for the want of a well-made shoe. I seldom see a factory shoe yet that I would drive without altering the shape and make, by thinning the inside edge, at least one-half an inch round the toe, widen the heel, etc. Never drive a flat shoe; concave it so you can touch with the small blade of a pocket or penknife every nail driven, while, at the same time, turn up the foot, pour it full of water, and retain it. Let the frog alone. Have the heels merely tipped off, and never weaken the heel braces. A healthy hoof is one where nature has not been interfered with. The frog is nature's oil reservoir, which supplies that horny substance called the crust or wall of the foot, and gives tenacity. But if a hoof is damaged by bad shoeing, or by an accident, the next thing is to apply the remedy and return to nature. As I have had an experience of over fifty years, and have two shops running. Some other time I will give the brotherhood my experience on crippled feet, hoof-bound, etc. I can warrant a cure for contracted hoofs every time.

I feel anxious to see the horse race not so badly abused by the human, or rather, inhuman race.

Shoeing Vicious Horses.

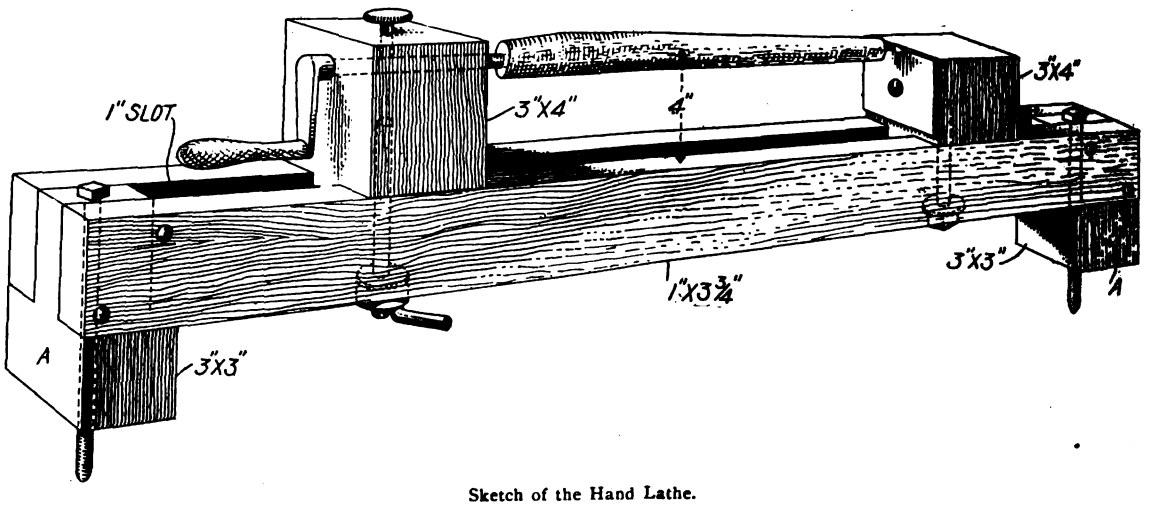
From Harry Babcock, New York.—For shoeing vicious horses and mules I put on a war bridle and it works fine. This I made as follows: Take a short piece of ¼-inch chain long enough for a bit. Make and weld a ring in one end. Now take ¼ inch chain about 12 to 16 inches long. Make a ring like the first one and weld the two chains together. Take a good strong cord from ten to twenty feet long and fasten one end in the end of the long chain. Pull this through the ring in the other end of the bit. Take a strap one inch wide with a loup in each end. Have the strap long enough to go over the head and hold the bit in the horse's mouth with the loups. You can fit the bridle to any size head in a jiffy. If your horse is inclined to jump and kick, you can put this bridle on and give it a sharp jerk. Lead the horse up to the side of the shop and pass your cord through a ring in the wall that is solid and will not pull out. Draw his head up close to the ring. Bring your cord over his back. Pick up his hind foot with one hand, and with the cord in the other hand, wind the cord around the fetlock three or four times and hold tight, at the same time talk gently to him. Now if he tries to jerk or kick, he jerks himself and not you. His attention is soon on his jaw and you can work at his feet all right. When he first tries it, be on your guard and do not let him throw himself on you. This will work fine on most horses, but it will not work as well on others. I would give a lot of other kinks but I don't want to take up a whole page of the paper, for there are a lot of older brothers who have shod more vicious horses than I have, although I shoe a lot every year. I have in my shop the Hemphill shoeing stocks and they work fine.

A Miniature Anvil.

From B. Lester, Nebraska.—I recently made a small anvil of the following dimensions: Total length, 1¼ inch; length of face, 13/16 inch; length of horn, 7/16 inch; total height, ½ inch; width of face, 7/32 inch; table, 3/32 inch; base, 7/16x15/32 inch; hardie hole, 1/16 inch square; punch hole, 1/32 inch in diameter. It is made of tool steel. The hole through the lug on top is for the chain. It makes a nice watch charm when gold plated. I made by hand the drills for drilling and drilled them under a large hand drill. It balanced perfectly.

A Hand Lathe.

From J. P. O'Brien, Pennsylvania.—This drawing shows a "spoke lathe," as it was called many years ago when wagon and buggy spokes had to be made by hand, as I had to do when I learned the trade 45 or 50 years

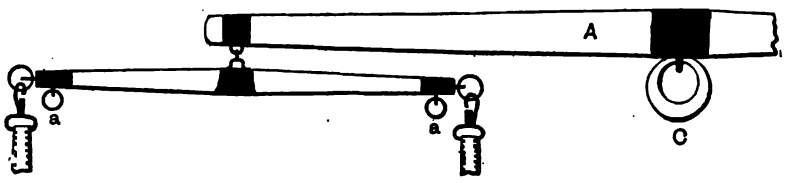


Sketch of the Hand Lathe.

ago. But it is useful at the present day. I have one, and have use for it often to make odd sized spokes for repairing, axe handles and a variety of wood shapes, also for working over old spokes. I have made a good many Sarven wheel spokes while repairing Sarven wheels when they first came in use. I can make as neat a spoke on such a machine as they make on a real spoke lathe, but not as fast. They are shaped and tenoned as desired. The body of the lathe should be of two pieces of wood as shown, 1 inch and 3¼ inches, and a 1 inch slot in the center. They should be bolted together at each end at the foot blocks A, A. It can be screwed on the work bench at any convenient place, or on a shelf out of the way of other tools, by the screws shown. It should be long enough to put a long axe handle in, or even a sledge handle.

A Wide Apart Pole Yoke.

From F. B. Collins, Illinois.—It is often desirable to hitch horses well apart when drawing heavy loads, and to do this successfully a long yoke and short yoke attached at the ends the same as whiffletrees are necessary. Fig. 1 shows one-half of the neck-yoke, A, with the short yoke, B, attached. The short yoke should be about twenty-four inches long, and the long yoke of a length that will allow the



Pole Yoke.

ends of the two short yokes to be twenty-six inches apart. Iron the short yoke with rings, a, a, for breast straps, and large rings for side holdback straps; the latter may be used for the breast straps if no side holdbacks are used and the small rings for short holdbacks. Turned oval bars are the easiest to iron, and if well proportioned and turned of split timber they are neat and strong. The pole ring C should be large, and connected with the yoke staple by a smaller ring. This mode of attachment gives free play to the yoke. The yoke for ordinary purposes should be about two inches in the center, and the short yokes one and one-half inches.

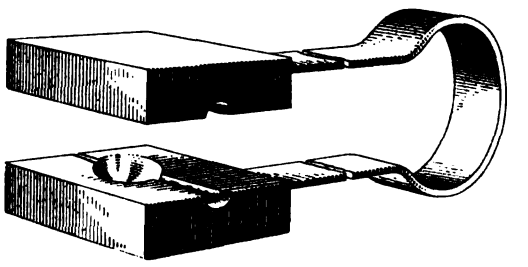
Why Prices are Good.

From G. W. Lancaster, Kansas.—I have had a good trade all winter. Prices are good here. A good all-around man is hard to get. I see some of our brothers in other places are not getting enough for their work. I think they are too easy. When a man comes for his job and asks, "How much?" they will say, "Well, I used so much wood and a few bolts, a piece of iron, screws and paint, and I guess it ought to be worth about 30 cents." My way of telling a customer the price is to keep a stiff upper lip, hold my head up like a giraffe or higher and say, "Forty cents, sir."

Yours for good work and honest prices—prices that will live and let live.

Making Eye Bolts.

From A. S. MacMillan, Canada.—I have noticed quite a discussion of late in your valued paper, regarding the various ways of making eye bolts. I noticed that among all the different ways, not one showed how they were made with the steam hammer or trip hammer. This is a section of work I should



Making Eye Bolts. Fig 1.

like very much to see more of in your paper—namely, tools used below steam or trip hammers, to do various work. In future I intend to give my time in looking up various tools

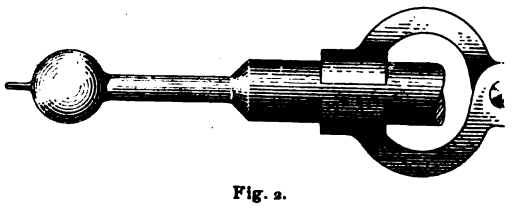


Fig. 2.

and their uses under a hammer, which will probably make some of the other brothers of the craft give their ideas too.

In making eye bolts under a hammer, they are generally made out of solid mild steel drawn down to the required size. The first thing needed to make them is a swage for use

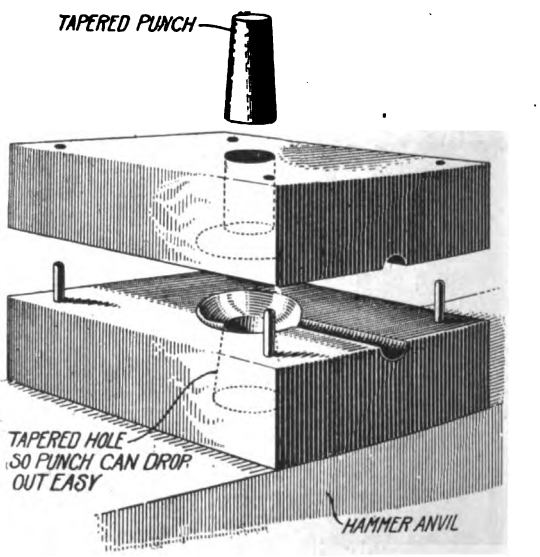
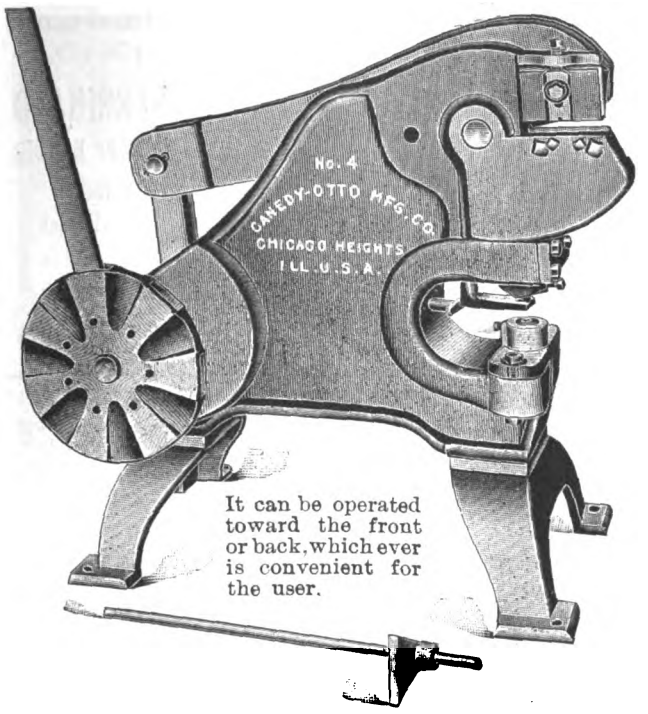


Fig. 4.

under the hammer, shown in Fig. 1. You will see from Fig. 2 that they are made to form a ball-shape first. One thing you have to be

(Continued on page 188)

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ¾-in. and ¼-in punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

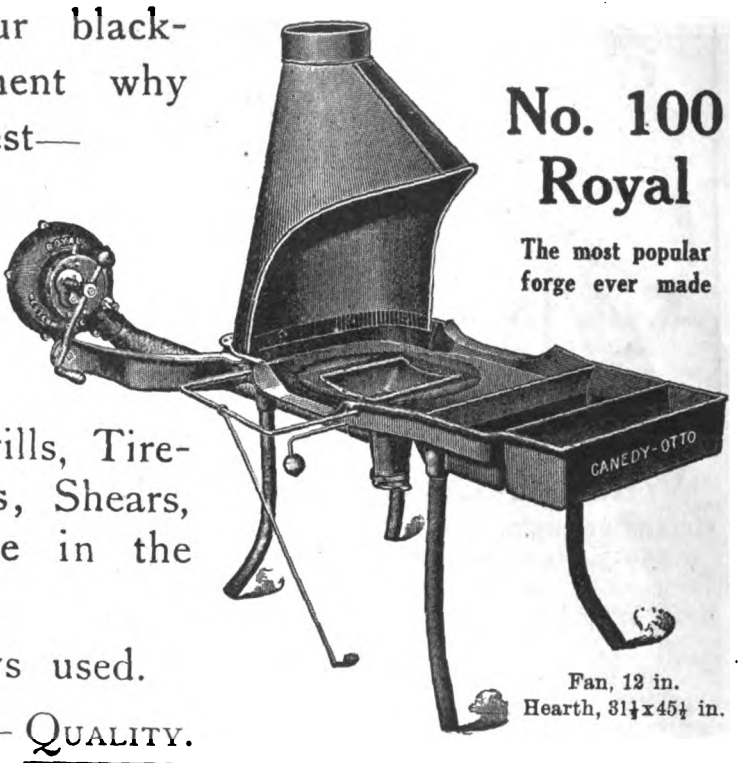
CANEDY-OTTO

It costs no more.

Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.



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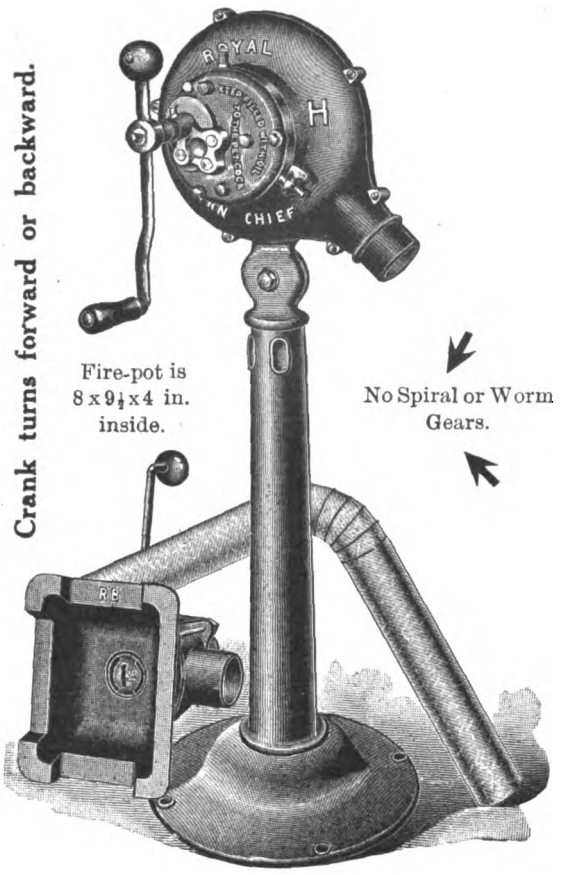
The most popular forge ever made

Fan, 12 in.
Hearth, 31½x45½ in.

FORGES
BLOWERS

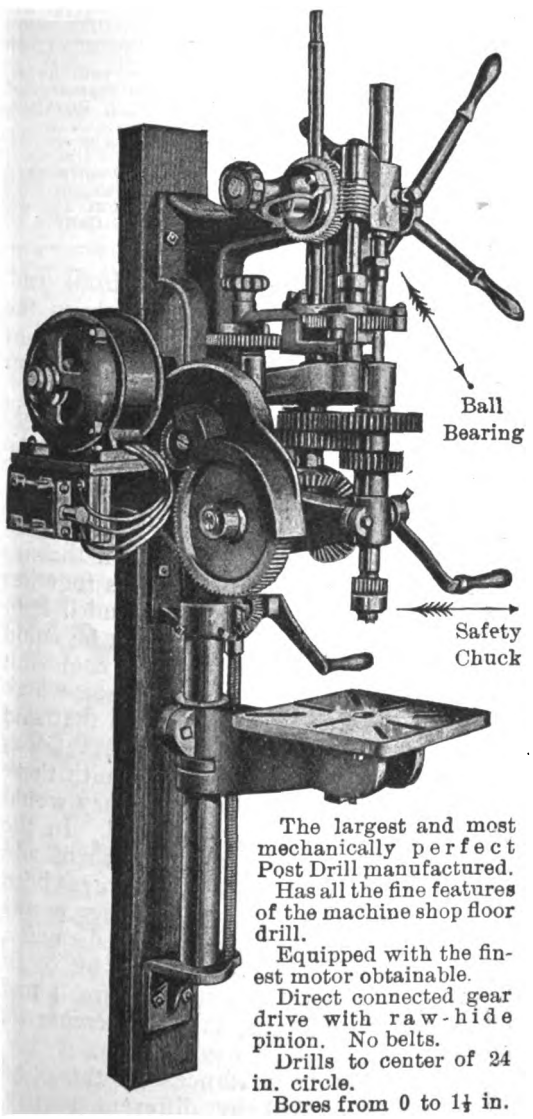
Royal Blower

(Ask the man who owns one)



PUNCHES
SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

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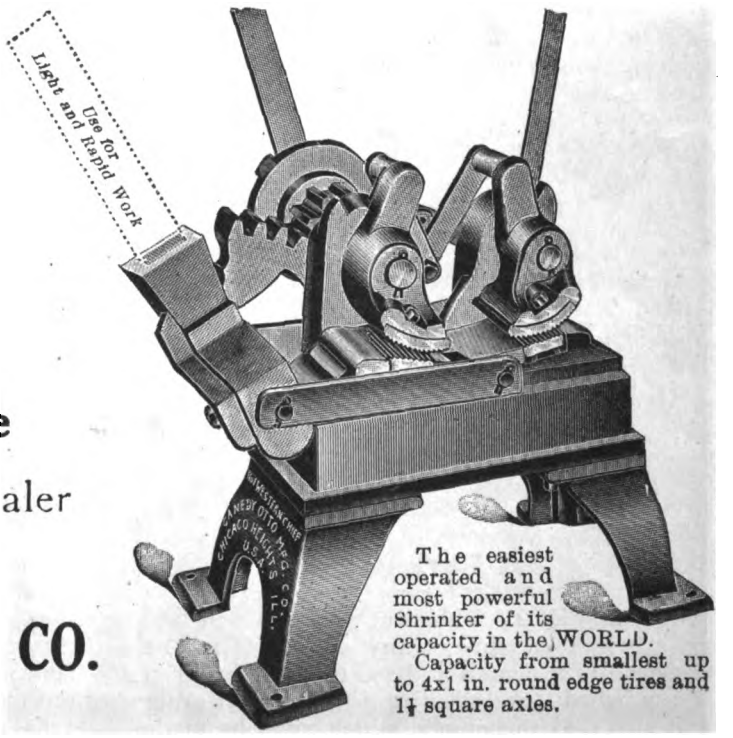

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Capacity from smallest up to 4x1 in. round edge tires and 1½ square axles.

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PATENTS FOR INVENTIONS.
H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

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We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., Publishers, 71-73 Murray Street, New York City.

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WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

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If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

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Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. Davis & Davis, 908-914 G. St., Washington, D. C., and 220 Broadway, New York City.

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Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

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Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

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If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

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I am looking for a good business; will pay cash if price is right. B. W. BUYER, Box 975 Cherry Valley, Illinois.

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Of pleasure and commercial automobile and other bodies for the trade. No order too large or too small to receive prompt attention. Write for information and get acquainted. GEO. J. MERCER, Automobile Body Designer, American Building, Columbus Circle, New York.

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Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

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McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

THE BEST BLACKSMITH TONGS IN THE WORLD.
They will hold any shaped iron tight without any grip of the hand. Good testimonials. Write the EUREKA TONG COMPANY, Tupelo, Miss.

BLACKSMITHS.
Tire setting season is now here. Send one dollar for my booklet telling how to build and operate a serviceable oil tire heater. Cheaply built and operated. I have used it for two years with perfect success. Address, P. V. Ramsey, Box 42, Fairview, Oklahoma.

MANAGER FOR WAGON SHOP WANTED.
A large concern in one of the chief eastern cities uses heavy delivery wagons. It maintains a shop to make and repair these. It also builds new wagons and repairs old ones for outside concerns. A competent superintendent and business manager is wanted. One who can see that work is well and economically done, and that the business is pushed along profitable lines. State experience and salary expected. Address AMERICAN, Box 654, New York City.

FOR SALE.
Good blacksmith, wagon and horseshoeing shop. Good location and fine opportunity for a sober, industrious man to do a nice business. Owner wants to retire on account of ill health. Apply to WILLIAM DUX, Western and University Ave., St. Paul, Minn., or NICOLS, DEAN & GREGG, St. Paul.

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Complete Wheelwright business, 40 years at the same place. Good business in growing town of 8,000 inhabitants. Old age reason for selling. Information furnished. Address J. A. FISHER, Lake City, Fla.

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Half interest in blacksmith and wagon shop. Averages over $1,500 in work monthly. Plant easily worth $5,000. Will sell my interest for $2,000. Address E. E. GRAY, Astoria, Oregon.

FOR SALE.
A first-class blacksmith and repair shop with modern tools and a good stock in a good Iowa town. Address W. L. JENSEN, Dike, Iowa.

FOR SALE.
Good six room house, power shop. Asthma reason for selling. Will send photographs of buildings and other parts of town on request. Address R. E. KEENE, Wilsey, Kansas.

FOR SALE.
Blacksmith and wagon shop located in Lyman County. Doing good business, good reason for selling. Address LOCK BOX 22, Murdo, South Dakota.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORKS, St. Cloud, Minn.

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Martin Horse Rack Company, manufacturing rights, materials, etc. Splendid opportunity for enterprising blacksmith to start paying business in his own shop with but litte outlay. Write for particulars. MARTIN HORSE RACK CO., Sidney, Ohio.

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General Blacksmithing and Wagon Repairing Shop, horseshoeing, also tools, stock and shop and lot all for sale. For particulars address NELS H. NELSON, Box 113, Canova, So. Dak.

FOR SALE.
Shop, stock and tools. Doing general work, shoeing mostly. Size of shop 30 x 60. Two brick forges, electric. Stock and tools worth $800, will sell all for $1,500. A good chance. Address H. SHINDORF, Holly, Mich.

FOR SALE.
Must sell at once shop, tools, stock and three lots. Will sell at a bargain, or will rent shop and tools. Renter buying stock must be a good man. Address ED. te GROTENHUIS, Crawford, Colorado.

FOR SALE.
Blacksmith and Wagon shop, also five-room house, on account of sickness. Work for two men year around. Only shop in town. Address C. J. VOSEN, Royalton, Minn.

WANTED.
Wanted a sober honest blacksmith or wood-worker. Will sell half interest in blacksmith and wagon shop for $300. Situated at Paige, Calif. Come out and see the Golden State. Write A. WITT Paige, Calif.

(Continued from page 186)

careful about is the size of the steel you start with. If you want to form a ball say 2 inches in diameter, it is always best to start with steel a size smaller, say 1⅞ inch diameter, because while in the swage it gathers stuff

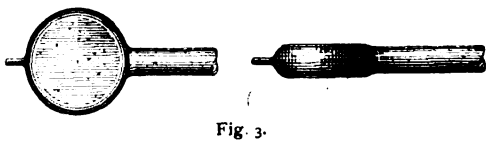

Fig. 3.

owing to the edges all being forced to the center. You then take it from the swage and flatten it down to the size required, as at Fig. 3. Then put it into the punch die at Fig. 4, and punch it with tapered punch

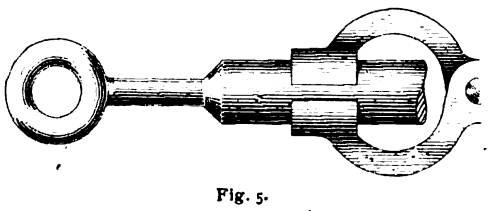

Fig. 5.

shown at Fig. 4. Take out and you will find an eye bolt capable of any strain. The one essential is to watch and see that the holes in the punch die are exactly opposite each other and also that the punch, which must be made out of tool steel is tapered as shown at Fig. 4.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

Sleigh Bolsters and Other Matters.

From R. R. Tichenor, Minnesota.—I see in the March issue that H. P. R. of Iowa wants to know how to set the bolsters on an oscillator bob sled. My way is to take the runner and set it on the bench and mark where it starts to raise from the run and then measure the distance to the end. Then find the center between these two points. Then for the front sled, set the center of the beam 1 inch ahead of the center, and the back one 1 inch back of center. This makes a difference of two inches in the set of the bolsters. I have used this rule 30 years and have always had easy running sleighs and the shoes always wear out even. As to how high to set the roll, I have never used any regular height, as the runners are not always the same. So I take the width of the runner at the front end. If it is 4 inches wide, I put the hole in the center and about 2½ inches from the end, or enough so that I can get in the rivets that holds the cheek irons on in good shape.

Now I wish to ask a few questions and do not all answer at once, or there will not be room in the paper for them.

I had a man tell me a few days ago that he had a steel crowbar that broke and he took it to the blacksmith and he put it in the fire and just warmed it and put the ends together and hit it a few light blows and handed it to him and it was not so hot but what he could hold it in his hands, and he said he could not see where it was welded. In the shop where I learned my trade, there was a man that said he knew of a shaft in a saw mill that was broken and that there was a blacksmith there who said he could fix it all right if they would take it to his shop, which they did. In the morning the shaft was ready for them and you could not see that the shaft had ever been heated and that there was no hammer marks on it, and the shaft was 4 inches in diameter. The same man fitted a piece in the bit of an axe so that you could not tell where it had been broken and did not start the temper on the steel.

I could give more instances of this kind that I have been told by different parties. Now what I would like to know is if this has

been done why it cannot be done now? Who can tell?

I see that F. J. Kendall, Colorado, says he has used oil of cedar to cure corns on horses and never failed to cure. Now I will say that I have used oil of cedar, 3 parts, alcohol 2 parts, glycerine 1 part. I have used this for about 40 years for both man and beast, and I have never failed on a cure and I have had some as bad cases as he speaks of. I also use it for a liniment for almost everything and I have never found anything to equal it for chapped hands.

Tire Setting.

From B. Lester, Nebraska.—I see a lot of talk on tire setting, both hot and cold. I prefer the hot set, as I have never seen where any one explained how cold iron is shoved together without breaking. Also, how do they move the bolts where a tire is very loose? I would like to still further comment along this line. Now a pointer on hot setting. Many in measuring the amount of shrink in tires use dividers. This is where they make mistakes in getting the right amount of draw, thereby getting the tire too tight or too loose. A little thought on the matter will explain the error. The gauge is just as easy and is correct.

Making a Shovel Handle.

From H. W. Bigelow, California.—I see that Brother Macmillan has shown us how to make a shovel handle. Now I will tell him I can make one while he is using the hack saw. Take a piece of pipe the size wanted; cut it off the right length; then take a piece of ⅜ inch iron the length wanted. Run through the pipe and braze it in and bend around and weld the ends and flatten out. Punch two holes, saw in the handle and put in the rivets.

From J. C. Van Zant, Oregon.—Here is something that few of the craft seem to be wise to: When the forge fire has been idle for quite awhile, and is apparently gone, a handfull of clean sawdust thrown on without any stirring will start the same. It may save you a lot of valuable time. Try it, brother.

Uses for a Triphammer.

From B. Lester, Nebraska.—In answer to G. M. L., Ohio, I would say as to a trip hammer that it much depends where he is located. In my estimation a hammer would be of most value in a country where plows and listers are largely used.

Working Aluminum.

The average machinist does not have the same opportunity to machine aluminum as steel, wrought and cast iron or brass and may be in doubt as to the best methods of doing the work. The metal should be worked dry in most cases, except in tapping or when a fine finish is needed when turning. In this case a very light chip is taken and the metal is lubricated with turpentine from time to time. Aluminum, in common with other cast metals is lifeless; that is, long curling shavings cannot be taken off it as with steel, but the metal is removed in a shower of small chips as in cutting cast brass. The metal is easily torn, especially in turning and in cutting threads in a lathe, where the tool may dig in unless handled with care and rip out rough threads. For a nice surface finish, either in lathe or planer use a broad tool with a light cut. Aluminum can be cut as fast as brass if a light chip is taken.

Pleasure is often the stepping stone to a lot of misery.

Thompson's Gearless Automatic Gasoline Engine.—This engine is manufactured by J. Thompson & Sons Manufacturing Company, 31 Oak street, Beloit, Wis. They say for simplicity it cannot be surpassed. They have issued recently a handsome catalogue giving full particulars of this engine and would like to send a copy to every reader of this paper who is thinking of putting power in his shop. They make a variety of different sizes and give 30 days' free trial and a five years' guarantee. Write at once and mention The Blacksmith and Wheelwright. This company also makes feed mills and some of our readers who have put in gasoline engines have also put in feed mills.

Beaver Dam Marsh Horseshoes.—Frank Heinig of Beaver Dam, Wis., makes a horseshoe which enables a horse to go anywhere that a man can go on marshy, boggy or meadow land. It is made of malleable iron and is adjustable. But consult the advertisement and you will learn where you can buy this shoe. Or you can write direct to Mr. Heinig for his circular with prices and discounts. Some of our readers ought to be in a position to sell a good many of these shoes to their customers.

B & W—4|26|'12, 3.15 p.m.—THREE—

The Woodworker's Friend.—Many of our readers will no doubt be interested in the advertisement in this issue of John Whisler, Gibson, Iowa, wherein will be found described a device which he calls "The Woodworker's Friend." He says that this is a machine with which a woodworker with his engine can do more work in one hour than a shop full of men can do by hand in the same time. Send immediately for descriptive circular and price, and find out all about this interesting machine.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Soldering Granite Ware.

From F. P. Campbell, Ohio.—I would be pleased to have some of the readers of The Blacksmith and Wheelwright tell me how to solder granite ware; that is the name given for it in these parts. I refer to the mottled, streaked ware that is used in itchens and for cooking and such purposes.

A Base Ball Cover.

From S. B. G., Pennsylvania.—Will some one describe through the columns of The Blacksmith and Wheelwright a scientific way of laying out a pattern for a baseball cover?

A Form of Eczema.

From August Grothmann, Nebraska.—We have a horse that has something wrong with his legs or feet. He has wrinkles or bunches in the long hair on the fetlocks. Sometimes small sores appear. Sulphur and sweet oil will heel the sores but the wrinkles and bunches seem to remain. He rubs his tail and mane some. Can you tell me what to do?

Reply—We are inclined to think that the trouble is some form of eczema, which in horses is more common on the heels and lower parts of the limbs. It may be due to indigestion or faulty feeding, care or use. Keep the stable clean and well aired, give the horse a course of sulphur—one ounce daily—or half an ounce of bisulphite of soda daily, and do not give too stimulating food. As for the bunches, if they are not too prominent, bathe with any good astringent, or use as a dressing, say, sugar of lead one-half ounce, carbolic acid one dram, and water one quart. If the bunches are very prominent they may be cut or burned out with caustics, afterwards applying persistently the astringent dressing.

Cutlery from Old Horseshoes.

Inquiries have been made by the United States consul in Tientsin as to who are the manufacturers in China using old scrap iron, old horseshoes, etc., for the production of knives. The manufacturers are the many blacksmiths in the towns and villages of the interior. Manufacturing in China has only in a few instances reached the factory stage. The supplies for the vast mass of its great population come from small shops with only one or two workmen, usually the proprietor and his sons.

The material chiefly used in the manufacture of knives, Chinese razors, etc., is old horseshoes, made of very soft iron. Those that have been sold there come from Glasgow and Hamburg. It is an absolute necessity that the old shoes should be of very soft iron. The native blacksmiths will not buy old shoes of harder iron, nor will they touch those made of steel. The investigations I have been making on this subject have proved interesting. I have been unable to find any reason for their refusing steel shoes, except that they like iron which is easily workable by their primitive methods. I purchased, as an experiment, a Chinese razor, down in the native city, for which I paid 20 t'ung-tzus (in American currency about 9 cents). Upon the strop this implement, the cutting edge of which is about 2 inches long, would take a fair edge but would not hold it, requiring any number of stroppings before the act of shaving could be completed. After manufacture the blades are simply case-hardened.

One British import firm here, about a year ago, brought over a cargo of old horseshoes from Australia. It was found impossible to dispose of them, as the native blacksmiths said the iron was too hard. Another difficulty in making shipments of this sort is that a considerable percentage is lost by pilfering, as scrap iron is not crated or boxed.

CARE OF THE HORSE.

Colic, Founder, Feed, Distemper and Dangerous Exposure.

When a horse is tired, he is much more subject to colic. Do not change the feed on the horse during heavy spring work. There is much more danger in feeding corn or wheat than there is in feeding oats. Water your horses when you first bring them in from the field; then let them eat hay for a half hour, and give them their grain last. Pull their shoes off while doing the spring work.

Remember, the horse will have a heavy coat of hair, and will, therefore, sweat easily and be all the more likely to catch cold and get pneumonia. For the first week or two bathe the neck and shoulders with cold water every night after the day's work is done. See that the collar fits snugly and that the hames are buckled up tight. The shoulders are less likely to be scalded and bruised without a pad than with it. If the horse gets sweenied, he will have to be laid off for several months. Guard against that dangerous disease—azatouria. This disease almost invariably comes on after the horse has been resting two or three days during a storm and kept on full feed. Reduce the grain at least one-half while the horse is not at work.

Founder is caused from too much feed, a sudden change of food, or a drink of water when the animal is warm. Distemper is espe-

cially liable to attack the young horses in the spring of the year, just when their services are most valuable. This disease is contagious, and care should be exercised against exposing the young horses to the infection. The most common way that young horses get this disease is when they are taken to town and allowed to drink out of public watering troughs and tied to hitching posts where other horses have been tied that had the disease.—G. H. Glover, D. V. S.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

THE GASOLINE ENGINE.

How to Locate Some of the Mixture and Ignition Failures.

BY E. W. LONGNECKER.

The items to be considered when an engine fails to start are not a few but many.

Whether stationary, portable or automobile engine, the operator who turns the wheels over several times and fails to get a start becomes anxious and begins to consider or rather puzzle his mind as to what might be the underlying cause of it.

The operator who is anxious to get his engine to running so that he may get the regular service out of it knows how quickly an hour or two may be wasted in "fussing" with a stubborn engine, and as the minutes fly and no work is accomplished his anxiety and perplexity seem to increase so that he is hardly in a frame of mind to give the matter that careful consideration that it really needs to locate and remove the cause.

But since he cannot see into the combustion chamber to note the character of the spark, if any at all, or into the carburetor or mixer to see if there is really any fuel, he begins to wonder which it is that is bothering him.

He concludes that either the mixture isn't right or the spark is at fault. And in many instances this is true. Especially may he look to the spark or the mixture if there is one impulse occasionally only.

But what could be wrong with the mixture? Well, in the first place it may be too rich or too lean with gasoline by reason of which it will fail to ignite. Or it may ignite only an occasional charge, which by reason of bad proportion will cause the mixture to burn slowly and cause the succeeding charge to be fired as it enters the combustion chamber through the inlet valve. This results in backfire or firing into the carburetor.

Then sometimes the accumulation of dirt under the valves will hold them off their seats and thus allow the mixture to escape as the piston comes upon the compression stroke.

Now concerning ignition, we know that there are hundreds of little things to think of that might interfere with it. If the jump spark is used there may be a foul or dirty plug, or the points may be too far apart, or they may be coated with moisture from condensation.

They can be cleaned with gasoline and waste or cheesecloth and smoothed with fine emery cloth and the points set from a sixteenth to a thirty-scond of an inch apart.

If the make-and-break method is used some of the trips that actuate the motion of the electrodes or sparker points may have too much lost motion. There may be looseness of a joint that should be rigid, or the contact mounting may have fallen off and no contact at all or a very imperfect one at best is the result.

The battery, magneto, dynamo? Are they in condition to give out a good efficient current? If so, has the current proper conductors so that it can get to the ignition points in sufficient volume to do its office work?

This now causes us to consider the wire. It may be broken under the insulation and thus the break is concealed, or the insulation may be worn off or ruptured at some point which may contact with some of the metal parts of the engine and result in a short circuit. There may be dampness or water on the spark coil that will affect its service. Even the current switch may be found at fault on account of a loose binding post nut. The thumb nuts on the binding posts of spark plugs, engines and elsewhere are not infrequently at fault.

We have here endeavored to point out some of the more common causes of failure to start, due to ignition and mixture principally. The remedy in each is apparent.

The "E D" Short Turn Gear.—This is now manufactured by the Eadie Vehicle & Gear Company, New York City. This is a New York State Corporation recently organized to succeed the Eadie Vehicle Gear Company, which was a New Jersey Corporation. This company is just recovering from the effects of a disastrous fire and will be in shape to fill orders promptly before the close of the present month. Every set of Eadie gears is guaranteed. Ask for new catalogue just out, and mention The Blacksmith and Wheelwright.

Greenfield Tap & Die Company.—A holding company, to be known as the Greenfield Tap & Die Company, with a capital of $1,000,000 preferred stock and $1,000,000 common stock, was organized in Boston, April 2d. The new company will control the Wiley & Russell Manufacturing Company and the Wells Brothers Company, both of Greenfield, the two largest manufacturing industries in that town. Turner, Tucker & Company of Boston secured an option recently for two-thirds of the capital stock of the Wiley & Russell Manufacturing Company, the option price being $600,000. This is about $1,800 a share. Charles P. Russell, who is the president and treasurer of the Wiley & Russell Manufacturing Company, established the business many years ago. He is now 72 years old and desires to retire from active business. After securing the option on the Wiley & Russell Manufacturing Company, Turner, Tucker & Company formed a merger of the Wiley & Russell Manufacturing Company and the Wells Brothers Company. The officers elected follow: F. O. Wells of Greenfield, president; W. M. Pratt of Greenfield, vice-president; F. H. Payne of Boston, treasurer; the above and J. W. Stevens of Greenfield, A. C. Dutton of Springfield, J. H. Drury of Athol and W. J. Carlin of Boston, directors.

Simonsen Hot Trimming Shears.—These are made by N. C. Simonsen, Sioux Rapids, Iowa. They are especially for trimming cultivator shovels, cutting out plow points, etc. The shear is designed especially for hot shearing and is for sale by supply houses, everywhere, or ought to be. If your dealer does not keep it write at once to the manufacturer as above for descriptive circular and prices and mention The Blacksmith and Wheelwright.

Wilcox Carriage Hardware and Gear Irons.—Our readers who may be in need of fine finished forged carriage hardware and gear irons should write at once to the D. Wilcox Manufacturing Company, Mechanicsburg, Pa., for their latest circular and price list. The forgings of this company are of the highest quality. In writing do not fail to mention The Blacksmith and Wheelwright.

Jessop's Steel.—Our readers who have not yet decided to try Jessop's steel would do well perhaps to order some from their dealer and give it a trial. The superiority of this steel for making tools is acknowledged by large numbers of blacksmiths and it is for sale by heavy hardware and supply houses everywhere. It will be no trouble, therefore, for any of our readers who want to test Jessop's steel to secure it.

We learn from Buob & Scheu, Cincinnati, Ohio, that they recently bought out the buggy top and trimmings department of the Warner Pole and Top Company of that city.

Hart's Improved "Duplex" Adjustable Die Stock.—These are said to be dies that do not require any reversing and can be sharpened on a grindstone. The goods made by this company are of the highest quality throughout. Write at once to the Hart Manufacturing Company, 81 Wood street, Cleveland, Ohio, for their illustrated catalogue and price list. In writing do not fail to mention The Blacksmith and Wheelwright.

Common Sense Tire Remover.—At this season of the year of course our readers will have a great many tires to set and should be interested in any device for removing tires from wheels without injury to the rims. Such a machine is made by the Common Sense Tire Remover Company of Dowagiac, Mich., and will be found illustrated and briefly described in our advertising columns. One man can handle it and it takes up but little space. When not in use it can be hung on the wall out of the way. The trade generally sells this machine, but if your dealer does not have it write direct to the manufacturers as above for further particulars and prices and mention this paper.

A Book on Horse Ailments.—Dr. W. F. Young, P. D. F., 55 Temple street, Springfield, Mass., has brought out a book which tells how to remove blemishes on horses, cure lameness and a great many horse ailments. It goes into details, giving minute instructions. One of these books will be sent free to any reader interested who will take the trouble to write for it. Dr. Young is proprietor of the well-known liniment "Absorbine" for bog spavin, thoroughpin, wind galls, puffs and swellings. This liniment allays pain and stops lameness. It is for sale by druggists generally throughout the country, or can be obtained direct from Dr. Young for $2.00 per bottle, expressage prepaid.

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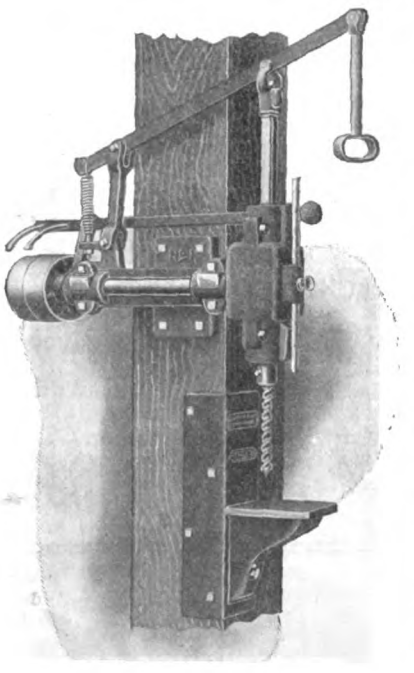
"The "Ideal Engine" for Blacksmiths.—This is manufactured by the Bluffton Manufacturing Company (White Block), Bluffton, Ohio. It is being introduced, we understand, at a particularly low price and can be furnished in horse power from 1½ to 35. A postal card or letter will bring full particulars.

A Valuable Machine.—One of our subscribers writes us with respect to a blacksmith's device manufactured by George Sears & Co., of Onslow, Iowa, that it is the best machine that he has ever had in his shop. He says he has a No. 3 machine. See advertisement of this concern on another page and write to them for descriptive circular and prices. This may be just the machine that you may want in your shop.

A Substantial Post Borer.

Anybody who has worked around a blacksmith shop knows just what an



For Boring Posts.

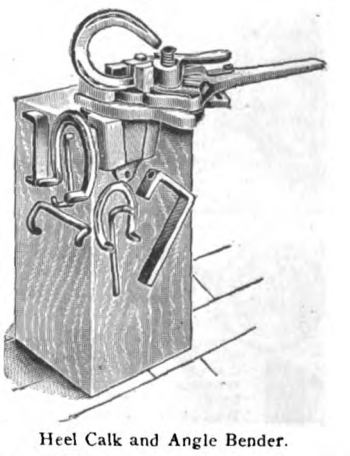
advantage it is to have a boring machine. To meet the demand for a first class machine of this type, J. A. Fay & Egan Company, have brought out a series of Post Borers. The Fay-Eagan No. 1 Post Borer, shown herewith, is such a tool. It is for general work in all kinds of plants, and can be quickly and easily installed in any part of the shop by bolting it to a post. It bores holes up to 1½ inch in diameter, rapidly and accurately. The mandrel is always in one position, and is driven by encased gearing. The stroke of the spindle is 9 inches; the table bracket has a vertical adjustment of 7 inches. It is equipped with tight and loose pulleys, and makes 650 revolutions per minute. It is made of the best material, well built, strong and substantial, and is in every way a perfect post borer.

For further information, prices, etc., on this or other types of post borers, address J. A. Fay & Egan Company, 175-195 W. Front street, Cincinnati, O.

"Rochester" Helve Hammers.—The "West" Tire Setter Company, of Rochester, N. Y., reports that business has been very good in their line of "Rochester" helve hammers. They have just received an order from Buenos Ayres for one of their large tire setters for handling wheels 6 feet 6 inches in diameter, down to 30 inches, tires 6 inches wide by 1½ inches thick, and all lighter sizes.

Heel Calk and Angle Bender.

The horseshoer and jobbing blacksmith will be interested in this combination device, manufactured by D. A. Hinman & Company, Sandwich, Ill. It will turn a plain heel calk, any length desired, to right angle with face of shoe in three seconds, instantly gripping and adjusting itself to any thickness of shoe and making an absolutely perfect calk bend. As an angle bender, will bend flat stock up to 2 inches wide by ½ inch thick, and round or square stock up to ⅞ inch. There is no ad-



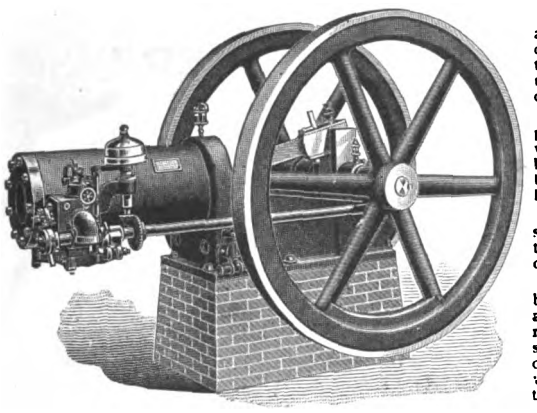
Heel Calk and Angle Bender.

justment of any kind necessary in operating this machine except on light, thin stock, for which work the back dies are moved slightly forward. Many of the smaller sizes of stock can be bent cold to advantage.

As will be seen this device is a money maker. The price is low. For full particulars, address the manufacturers and mention this journal.

OUR SERMON:

Text:—By the looks and the price ye shall know them.



Would it not be possible to make an anvil to sell for two cents a pound out of cast iron? but show me the blacksmith that would buy one. Any intelligent mechanic will pay from ten to twelve cents per pound for a good steel anvil.

If you see a gasoline engine with the push rod on the side to operate the valves, the valves in the cylinder head, hopper on its back or ribs around the body of the cylinder, you can bet your boots it is of the two cent kind.

Manufacturers who are looking constantly for improvements can't publish the price, as this changes with the quality of the article.

The Capital gasoline engines have been on the market for 18 years. They are made packingless, without the push rod, but with a steel revolving cam shaft and without ribs on the body of cylinder. We have the best in the world. For a short time to introduce this wonderfully built engine

We Have Cut The Price In Half.

GET NEXT TO OUR PROPOSITION.

C. H. A. DISSINGER & BRO. CO., Lancaster, Penna.

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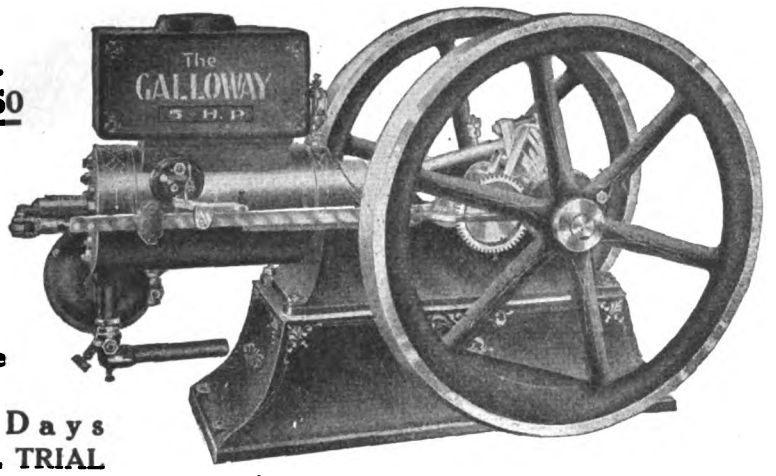
5 H. P.
$119.50



Built For Service

30 Days FREE TRIAL

THE GALLOWAY GASOLINE ENGINE

Owned and Made Exclusively by the William Galloway Co., Waterloo, Iowa

will run your shop at several times its present capacity and enable you to take lots of jobs that you have to turn down now because you have not the capacity.

It will enable you to do work you couldn't do without it.

An absolute necessity for all high grade, careful work.

You can reduce your charges on much of your work and still double your profits.

Only Four Things To Do:—Turn on the switch, turn on the oil, turn on the gasoline, give the fly-wheel a start, and the Galloway will go right along all day without further attention. It's the ideal power for a small shop and it's got the capacity to take care of your growing needs.

The Galloway Engine has been a standard engine for fifteen years. Thousands in every day use in every state and territory.

The Galloway Horse Power is rated by actual brake test. If you try the Galloway Engine you will find it is not over-speeded. Remember, the bore and stroke count and you don't have to drive your engine faster than you ought to drive it to get the rated horse power.

We make this engine in seven sizes up to 28 Horse Power. Three or four styles in every size.

Note my SPECIAL PROPOSITION TO BLACKSMITHS.

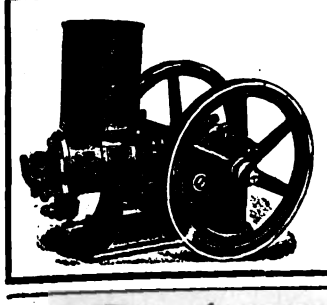
I have a plan by which every blacksmith can pay for his own machine. It's good, it's out of the ordinary, and you will be overlooking a big chance if you don't write for my proposition. Ask for my free information on Stationary and Portable Gasoline Engines from 2 to 28 Horse Power. We make the best and we price them at reasonable figures.

Beautiful, sensible CATALOG FREE FOR THE ASKING. Write to-day.

WILLIAM GALLOWAY, President,

THE WILLIAM GALLOWAY COMPANY,

1555 Galloway Station, Waterloo, Iowa.



THE CHAPMAN ENGINES

Are built to give the longest life in the most reliable always-ready manner. **THEY HAVE GOT THE STUFF IN THEM** to do hard work and keep at it year after year. **THEY ARE DESIGNED** to do more work with a gallon of gasoline than any other engine you can find at any price. **LET US PROVE IT.** Two and five horse hopper cooled or with large tank they will save money for you every day they run.

Address **H. L. CHAPMAN, Box B, Marcellus, Mich.**

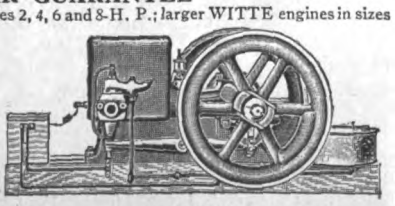
AN HOURS WORK ONE CENT!

ONE CENT

That is the average cost per horse power hour when doing the work with a WITTE gas, gasoline, distillate and naphtha engine. Why pay 25 to 50 cents per hour for one hired man when for **one cent** the **work of several men** can be done better and quicker. You can do the work just when you want to and **ninety-five per cent of the money you are now wasting** then goes into your own pocket. We ship every engine complete with all instructions, nothing is lacking, simply put in fuel and water and it is ready for work. You take no risk for WITTE engines are good engines. They **"stay good."** That is why we can give you a

FIVE YEAR GUARANTEE

The WITTE JUNIOR is built in sizes 2, 4, 6 and 8-H. P.; larger WITTE engines in sizes 10 to 40-H. P. Spend **one cent** for a postal card, **state the size engine you need** and let us send you our new free catalog with the best proposition ever made on this "money-saving" engine. A **special inducement** to introduce in new localities.

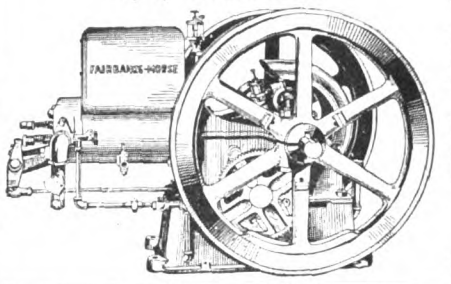


WITTE IRON WORKS CO.

1606 Oakland Ave., KANSAS CITY, MO.

FAIRBANKS-MORSE TYPE "H"

1, 2, 4 and 6 H. P.



The Engine for Your Shop

An Efficient, Economical Power. Built in the right sizes for small power jobs. Simple construction; will give dependable service for years.

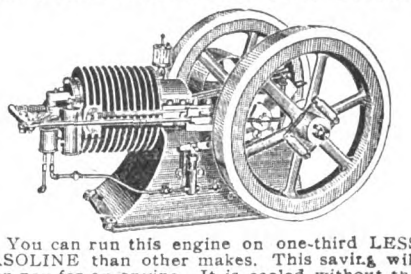
The product of 33 years of engine building. They demonstrate their qualities while working in your shop; making the best proposition for agents.

Send for Catalog No. 655 H. H.

FAIRBANKS, MORSE & CO.

900 So. Wabash Ave., Chicago, Ill.

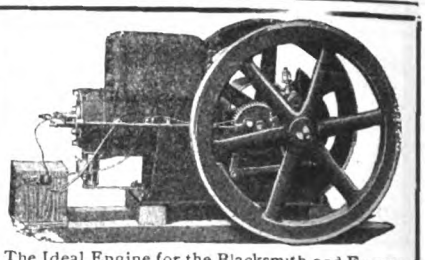
LET THIS ENGINE PAY FOR ITSELF.



You can run this engine on one-third LESS GASOLINE than other makes. This saving will soon pay for an engine. It is cooled without the use of fans or water. You run no risk of a "freeze up" in cold weather.

Try before you buy. Get our proposition.

GADE BROS. MFG. CO., 200 Main St., Iowa Falls, Iowa.



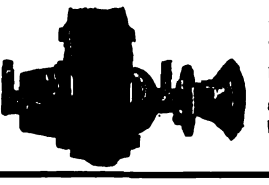
The Ideal Engine for the Blacksmith and Farmer. Has all the good up-to-date features. The very low introductory prices on this high grade engine will surprise you. Sizes 1½ to 35 H. P.

A Postal Card will bring you full particulars

BLUFFTON MANUFACTURING CO., White Block, Bluffton, Ohio

THE D. C. MAGNETO

is just what every blacksmith owning a gasoline engine needs. **A new one and a Winner. Better than an everlasting battery.**

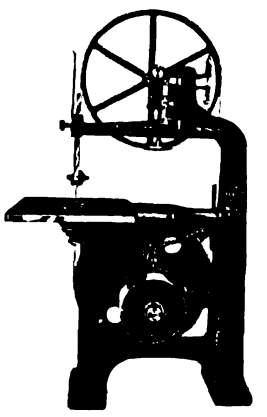


INCREASES THE POWER

of any gas or gasoline engine. Starts and runs engines without batteries.

Write at once for particulars and price

MOTSINGER DEVICE MFG. CO.
879 Cherry Street
Pendleton, Ind.



BAND SAWS

30 - 33 - 36 or 42 inch Wheels

We will sell you a band saw of either of the above sizes, guaranteeing it to be better in every respect—a machine which will turn out finer work and more of it with less power than any other make of the same size

Our special band saw catalog, sent free to blacksmiths and wheelwrights upon request, gives full details.

Write for it.

J. A. Fay & Egan Co.

175-195 W. Front St., Cincinnati, Ohio.

Edwards Shears

For twenty years the **Two Leading Low Priced Shears** in the U. S., representing the **Greatest Value** for the **Least Money.**

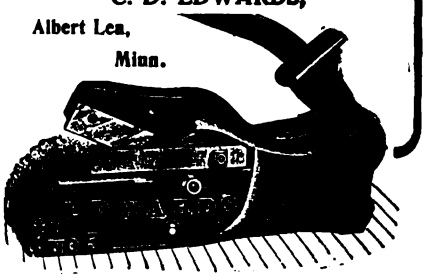
No. 5, weighs 200 lbs., cuts 4x¼ inch soft steel.
No. 10, weighs 430 lbs., cuts 4x⅝ inch soft steel.

At their price you should have had one long ago Order One from the first iron man that calls on you. **They All Sell Them.**

Write for descriptive circular and prices.

C. D. EDWARDS,

Albert Lea, Minn.



Buy Your Hand Made Knives of

WOODWORTH

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WOODWORTH KNIFE WORKS

NUNDA, N. Y.

FOR TRIMMING CULTIVATOR SHOVELS, cutting out plow points, etc., use a

SIMONSEN HOT TRIMMING SHEAR

A shear designed especially for HOT shearing. For sale by jobbers everywhere. If your jobber does not handle, write me, giving his name and address, and I will see that he does.

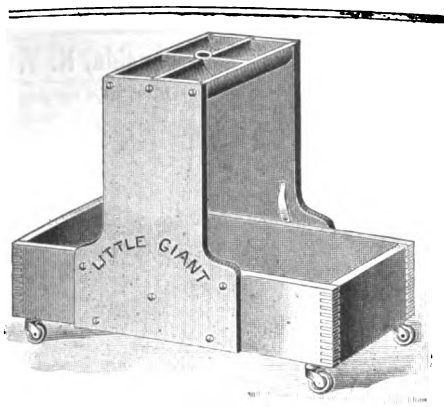
CIRCULARS FREE.

N. C. SIMONSEN, SIOUX RAPIDS, IOWA.

Do you want anything? Is your shop for sale, or do you want to buy a shop or hire a man? If so, a "Want" advertisement in THE BLACKSMITH AND WHEELWRIGHT will bring you good results. See terms at head of the "Want" Department on another page.

"Firestone" Tires.—No reader will fail to notice the attractive announcement in this issue of the Firestone Tire & Rubber Company, of Akron, Ohio. Nearly all of our subscribers are favorably situated for putting on rubber tires and can make this feature of their business profitable if they will take an agency and make a specialty of doing this kind of work. The use of rubber tires is increasing all over the country. The owner of a carriage who has once enjoyed the luxury of rubber tires, will never be without them. Write at once to the above company for their special terms, and mention The Blacksmith and Wheelwright.

"Little Giant" Tire Setter.—The Keokuk Hydraulic Tire Setter Company, 1301 Main street, Keokuk, Iowa, have an announcement in this issue of their "Little Giant" tire setter which they say makes work easy. It is said to be simple in construction, powerful and durable, containing no levers or wedges. They want every reader who does not have a tire setter to write to them at once for descriptive circular and prices.



ATTENTION, BLACKSMITHS!

The New

Little Giant Farriers' Tool Box No. 2

16 Inches High

To meet the demand of tall farriers.

MADE BY

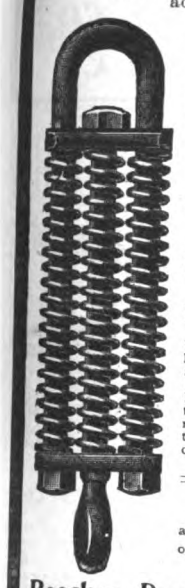
B. B. NOYES & CO.,

Greenfield, Mass.

ASK YOUR DEALER FOR THEM.

A QUICK AND READY SALE

Follows an explanation of the advantages of



BEECHER DRAUGHT SPRINGS

All wagon owners need them

We want agents. Will you represent us? Our proposition is particularly pleasing.
Write for circulars.

For simplicity, durability and usefulness our Draught Springs simply cannot be equalled.

They act as a cushion to the horse's shoulders; they HELP horses START heavy loads; they assist in drawing the load after it is in motion. They prevent collar wounds; they save from twenty to thirty per cent. in harness repairs, prolong the life of the team and increase their working capacity.

You can make money as well as please your customer by selling our Springs.

Beecher Draught Spring Co.

NEW HAVEN, CONN.

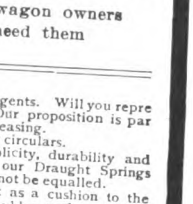
THE WOOD WORKER'S FRIEND

Are you interested in a machine that you and your engine can do more work with in one hour than a shop full of men could do by hand in the same time? If so, **get circulars and price** on our all-steel jointer head. The price is right and the goods are right. Sold through your jobber, or write direct. Manufactured by

JOHN WHISLER - Gibson, Iowa

Don't Cut Out A SHOE BOIL, CAPPED HOCK or BURSITIS, FOR

ABSORBINE



will remove them and leave no blemishes. Cures any puff or swelling. **Does not blister** or remove the hair. Horse can be worked. $2.00 per bottle delivered. **Book 6 K free.**

Cassville, Wis., Jan. 31, 1911.

"A short time ago I procured from the druggist a bottle of ABSORBINE. This I used on one of my horses affected with Shoe Boil and received good results." (Signed) Fred. W. Kirschbaum.

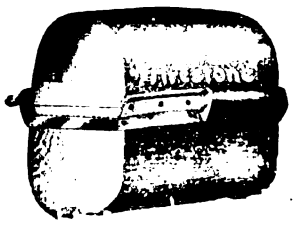
ABSORBINE, JR., liniment for mankind. For Boils, Bruises, Old Sores, Swellings, Goitre, Varicose Veins, Varicosities. Allays Pain. Price $1 and $2 a bottle at druggists or delivered. Will tell more if you write. Manufactured only by

W. F. YOUNG, P.D.F., 55 Temple St., Springfield, Mass.

Equip Your Customer's Carriages With the Best

"Firestone" TIRES

Internal Wire



SIDE WIRE TIRE

for severe service

Cushion

It is to **your** interest to equip your customer's carriages with the best rubber tire made. The Firestone reputation for unvarying high quality, conceded by the whole carriage trade and by individual owners as well, is based on superior mileage in actual service, which no other tire can hope to give.

The Firestone Company are rubber tire specialists. All our efforts are concentrated on perfection in tire manufacture. No other product divides our interest or attention.

Mr. H. S. Firestone, President and General Manager of this Company, has been identified with the carriage tire industry for more than fifteen years, maintaining his position as leader throughout by strict adherence to the one principle of quality.

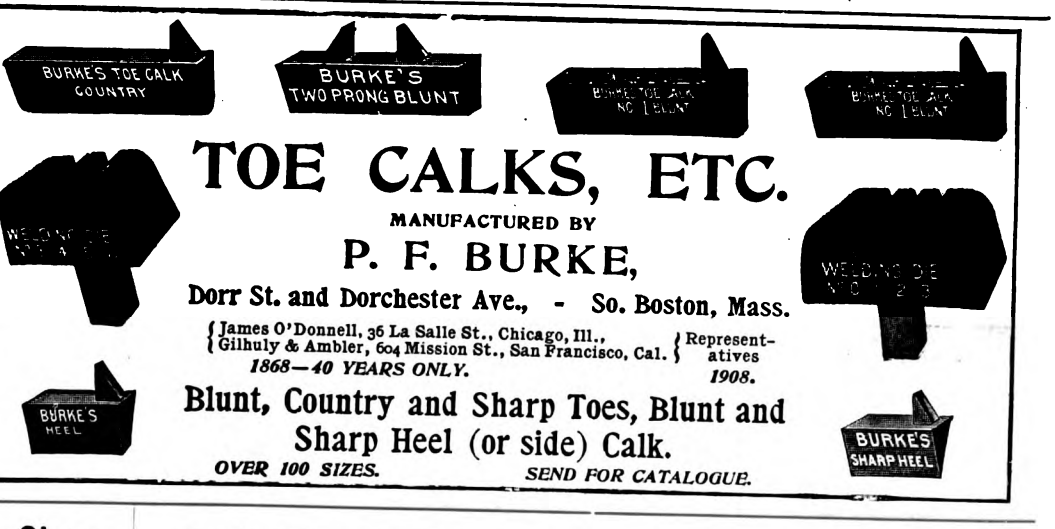
Write today for latest quotations on carriage tires, stating how many you expect to use this year.

The Firestone Tire & Rubber Co., Akron, Ohio

"America's Largest Exclusive Tire and Rim Makers."

Branches, Agencies and Dealers Everywhere

BURKE'S HORSE-SHOER'S VISE.



TOE CALKS, ETC.

MANUFACTURED BY

P. F. BURKE,

Dorr St. and Dorchester Ave., - So. Boston, Mass.

{James O'Donnell, 36 La Salle St., Chicago, Ill., Gilhuly & Ambler, 604 Mission St., San Francisco, Cal.} Representatives

1868—40 YEARS ONLY. *1908.*

Blunt, Country and Sharp Toes, Blunt and Sharp Heel (or side) Calk.

OVER 100 SIZES. *SEND FOR CATALOGUE.*

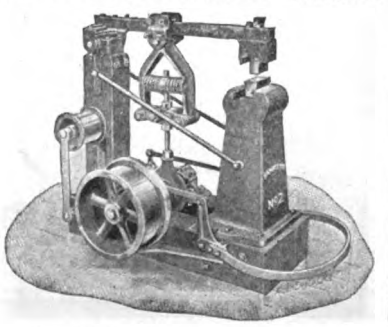
The HAWKEYE HELVE HAMMER'S Built in Three Sizes.

11 years in successful operation. Fully guaranteed. Note the principle of stroke. Double the capacity of any upright hammer of the same weight and price.

For price and descriptive literature write,

The Hawkeye Mfg. Co.

CEDAR RAPIDS, IOWA, U. S. A.



GENUINE

ARMSTRONG BOLT DIES

are adjustable to variations in size of NUTS.

MANUFACTURED BY

THE ARMSTRONG MFG. CO.,

316 Knowlton St.,

BRIDGEPORT, - - CONN.

NEW YORK. CHICAGO.

Catalog mailed on Request.

The Screw Plate

The Tap Wrench furnished with it

Green River Screw Plates With Adjustable Drop-forged Tap Wrenches

Send for Catalog 35C

SOLE MAKERS

WILEY & RUSSELL MFG. CO.

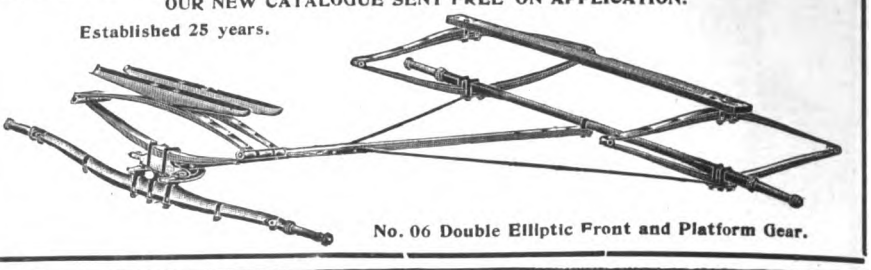
GREENFIELD, MASS., U. S. A.

SCHUBERT BROS. GEAR CO., 44 Cedar Street, Oneida, N. Y.

Designers and manufacturers of high grade vehicles and gears in the white, tops for carriages and automobiles, automobile bodies, also trimmings.

OUR NEW CATALOGUE SENT FREE ON APPLICATION.

Established 25 years.



No. 06 Double Elliptic Front and Platform Gear.

"THE 1894"

UPSET, PUNCH AND SHEARS COMBINED.

HAS compound lever action and in connection with an eccentric, working on hardened bearings, making it one of the most powerful and easy working machines offered the trade.

Will upset wagon tire, including 4 inches wide. *We guarantee* them to cut ¾ square and 1-inch round iron and 3½ x ½-inch flat bars. Will punch iron ⅜-inch thick and will punch ¾-inch holes in boiler plate 5 16 thick.

The Upset is admitted by all who have used it to be the SUREST AND EASIEST WORKED.

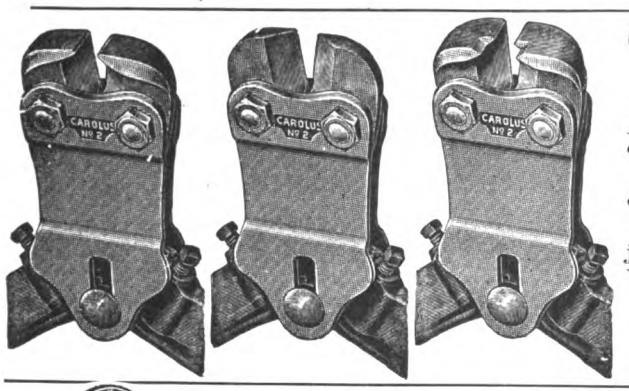
Will Upset Axles or iron from ¼-inch to 1-inch thick.

One man can handle and correctly set, and do all ordinary work alone.

Requires no change; put in the work and pull the lever, and the job is done. Is the strongest (weighs 500 pounds), handiest and most durable machine made.

LUTHER MFG. CO.

OLEAN, N. Y., U. S. A.



"CAROLUS" BOLT CLIPPERS AND NUT SPLITTERS

Are the simplest, most complete, practical and durable tools of this kind made.

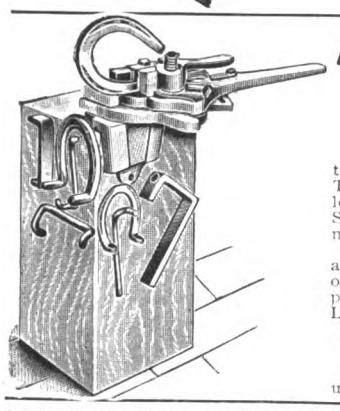
Three different styles as shown in the cuts attached.

Insist on getting these tools. If your jobber cannot supply you, write us and we will take care of your order.

Both Horizontal and Vertical Cut Bolt Clipper.

CIRCULARS AND PRICE SENT FREE.

CAROLUS MANUFACTURING CO., Sterling, Ill.



A Money Maker For You

The Hinman Combination Heel Calk and Angle Bender

Every Horse Shoeing and Jobbing Shop can employ one of these Benders at a big saving of labor, time and money. NOTE THE RANGE OF WORK: It will turn a plain heel calk, any length desired, to right angle with face of shoe in THREE SECONDS, instantly gripping and adjusting itself to any thickness of shoe.

As an ANGLE BENDER, will bend Flats up to 2x½ in., and Round or Square stock up to ⅞ in.; adjustment necessary only on very light, thin stock. No shop, large or small, complete or in position to handle the work of the day without one. Let us send you circular with price and discount.

D. A. HINMAN & CO., 50 First St., Sandwich, Ill., U. S. A.

If your Supply House does not carry this machine write us direct and we will take care of your needs.

PATENTS

C. L. PARKER,
Late Examiner U. S. Patent Office,
Attorney-at-Law and Solicitor of Patents.

American and Foreign Patents secured promptly and with special regard to the legal protection of the invention. Handbook for inventors sent upon request.

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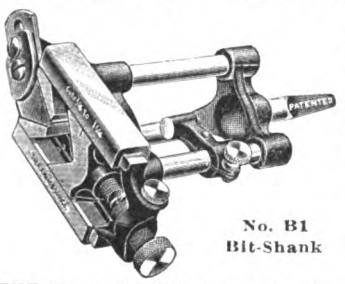
ESTABLISHED 1873.

$60 Lathe. Gap Lathes, Turret Engine Lathes and Shapers. Screw Cutting, Foot and Power Lathes. Hand and Power Planers, Hand and Power Drills, Chucks, Emery Wheels. Outfits. Tools especially for Blacksmiths, Electricians and Bicycle work. Catalogue Free.

SHEPARD LATHE CO.,
171 West 2d Street, Cincinnati, Ohio.

WOOD'S "UNIVERSAL" HOLLOW AUGERS

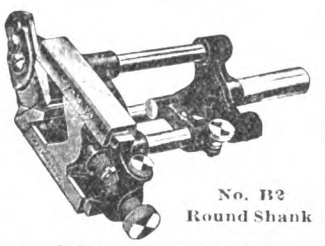
For Cutting Perfect Tenons on Spokes



No. B1 Bit-Shank

- Every Part Steel.
- Wearing Parts Hardened.
- Simple, Durable, Accurate.
- Cuts from ¼ to 1⅛ in. Dia.
- Round and Square Shanks are Interchangeable.
- It Will Pay You to Investigate This.

Write for circular, or ASK YOUR DEALER—he has it.



No. B2 Round Shank

THE A. A. WOOD & SONS COMPANY, Sole Manufacturers, Atlanta, Georgia, U. S. A.

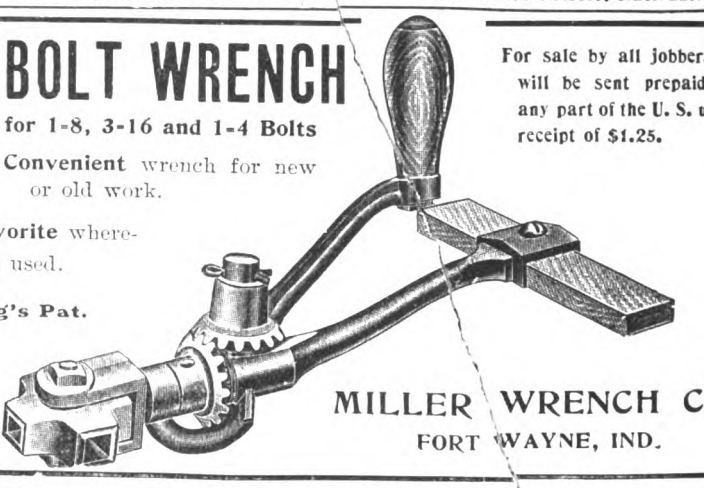
TIRE BOLT WRENCH

Suitable for 1-8, 3-16 and 1-4 Bolts

The **Most Convenient** wrench for new or old work.

A great **Favorite** wherever used.

Lang's Pat.



For sale by all jobbers or will be sent prepaid to any part of the U. S. upon receipt of $1.25.

MILLER WRENCH CO.
FORT WAYNE, IND.

Trussed Platform Wagon Gear Complete, Ready for Body.

In ordering, give full specifications, or such descriptions as will enable us to make up specifications.

Also Combination and Three-Spring Gears in several styles.

1,000 Styles and Sizes "SELLE GEARS." WRITE FOR CATALOGUE 3.

THE AKRON-SELLE GEAR CO., Akron, O., U. S. A.

A Woman's World-Tour in a Motor

Is the title of a book just published, which everyone will enjoy reading.

Harriet White Fisher is the author, and some of the adventures as described in her book are of the hair-raising order.

It seems almost incredible that any woman should have deliberately invited the troubles she encountered, or should have been able to overcome them triumphantly and return to her home in Trenton, N. J., without a really serious accident.

The book is intensely interesting.

It is elegantly printed on fine paper and contains numerous illustrations from photographs taken by Mrs. Fisher or some member of her party.

The book has interested us so much that we have decided to offer it to our subscribers at the publisher's price of **$2.25** per copy, postage postpaid.

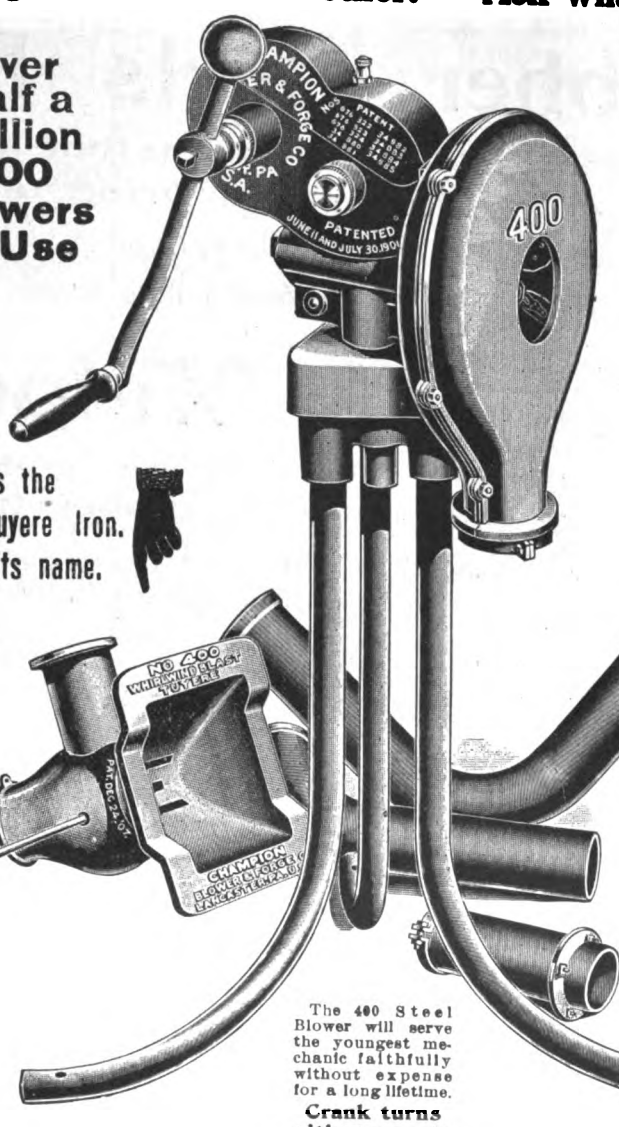
Address all orders to

M. T. RICHARDSON CO.
71-73 Murray Street New York City

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say

No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:

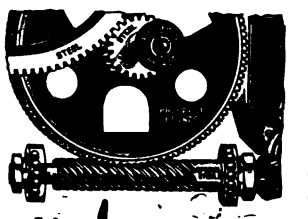
676,322	34,882
676,323	34,883
676,324	34,884
34,880	34,885
34,881	697,629

Also Great Britain Patent No. 9,462, May 25 1900.

The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

The Blower for Quality, First, Last and Always

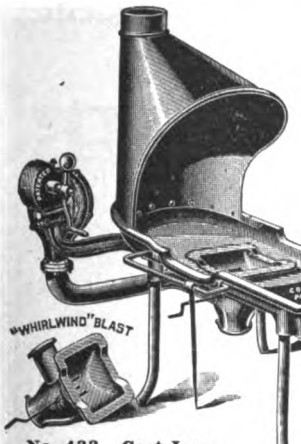
THE FAMOUS 400



It's all in the Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost



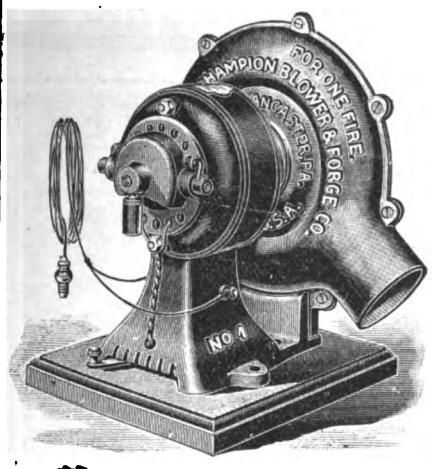
No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

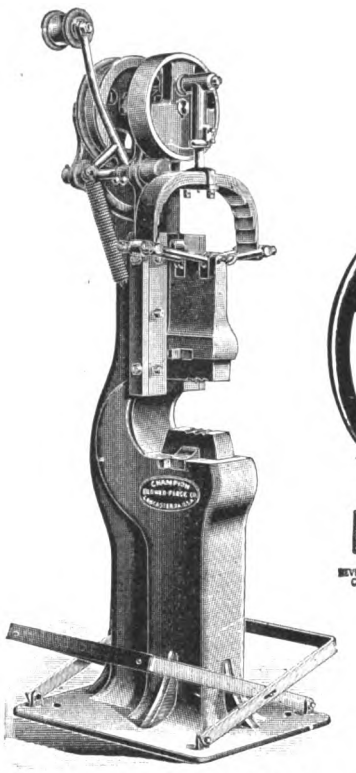
Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

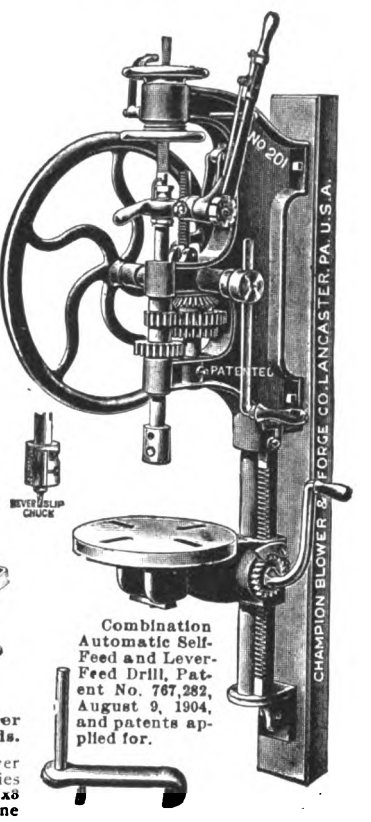
Motor capacity 35% above requirements





The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x8 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



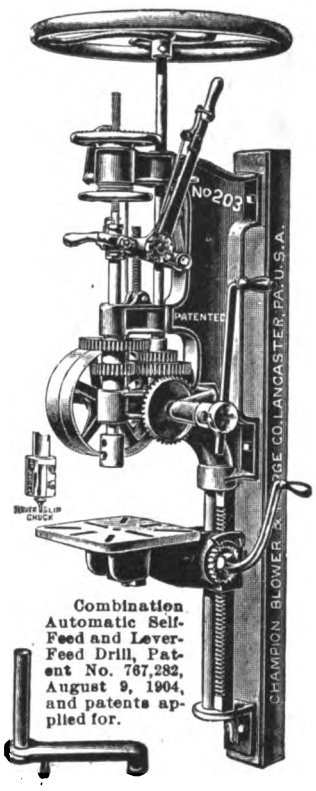
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

The Champion Latest Invention!

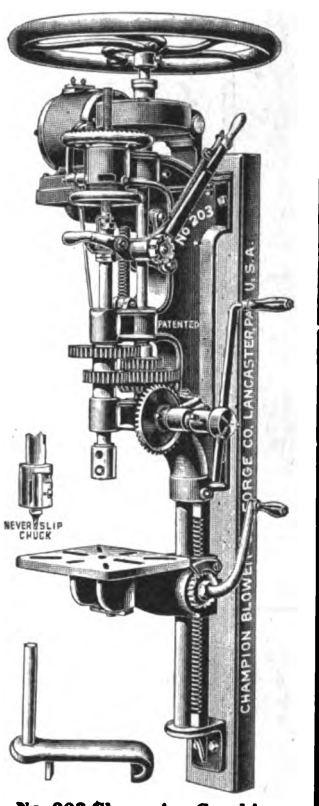
Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.



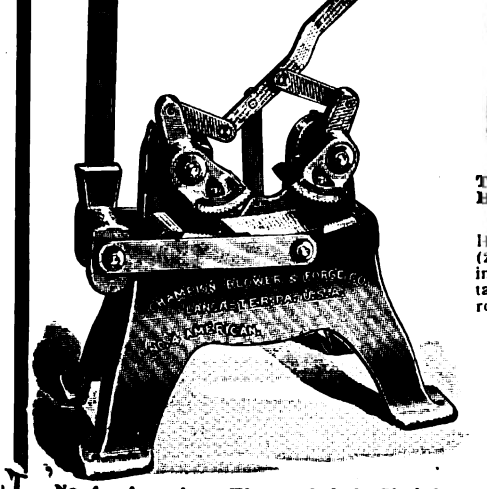
No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.



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Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

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THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

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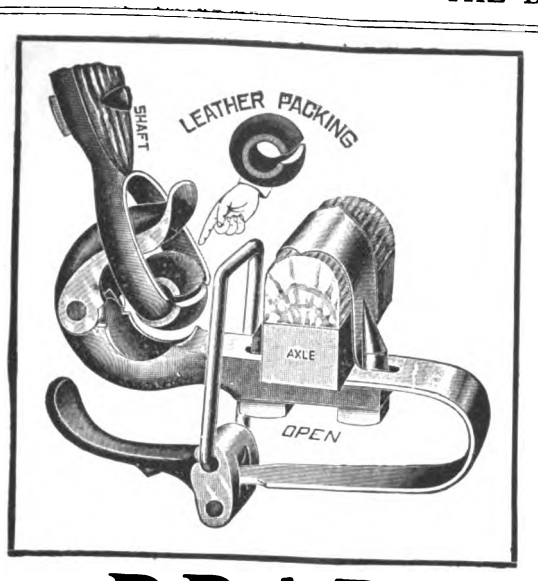
The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.



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A packing that will outwear any other packing ever made. It fits the ball and socket. It is held in place by a spring steel retaining ring. It may be put on and taken off in a jiffy, and it stays where it is put.

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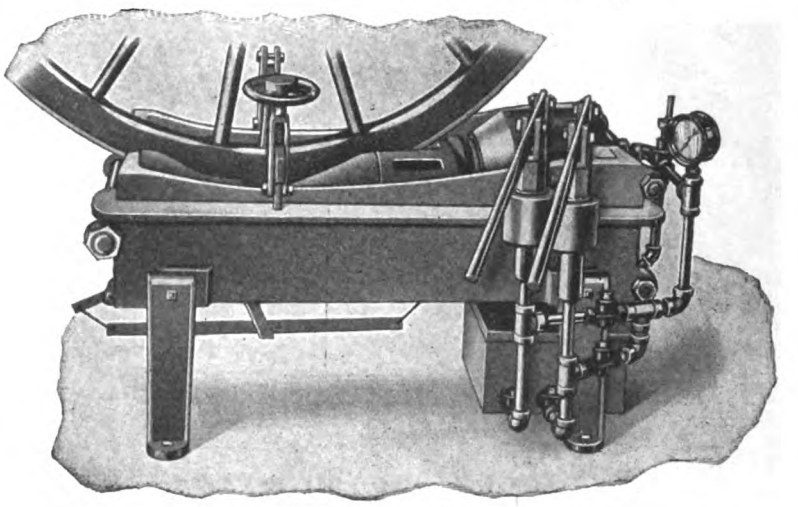

The most powerful. The most durable.
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No long LEVERS. No WEDGES.
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THE MACHINE YOU WANT.

Write NOW for prices and description.

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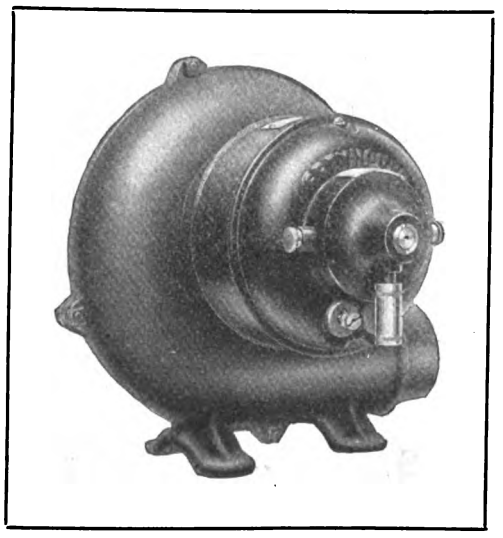

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Note the difference in construction over other makes:

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other Hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented **Friction Clutch** fitted with **Ball Bearings,** absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the Hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented. no sale.

Made in two sizes:

3 inch square, 40 lb. ram—shipping weight, 1,150 lbs.
4 " " 80 " " " " " 1,800 "

Write any jobber for prices, or

Macgowan & Finigan Foundry and Machine Co.,
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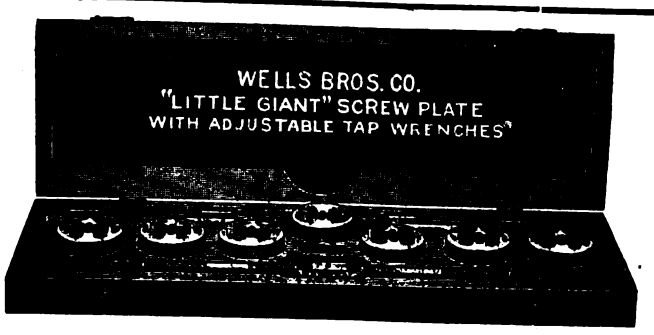

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A LITTLE GIANT Screw Plate will cut more miles of thread than any other plate.
Look it over. It's sound. It's built on sound principles.
You get an adjustable die, yet it is as rigid as a solid one.
We guarantee our tools.

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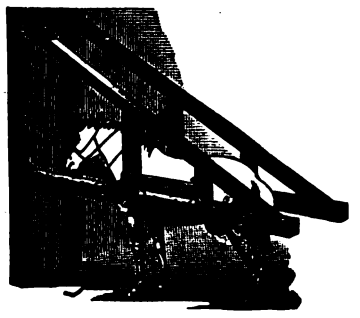

A perfect Automatic Device to hold the foot in any position perfectly solid.

Write at once for circular which describes the advantages of our stock in detail.

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Sell Carriage Tires That Are Best Known —And Most Wanted

Most dealers who read the BLACKSMITH AND WHEELWRGIHT are doubtless selling Goodyear Carriage Tires.

Some, for one reason or another, have not yet come to handle these popular rubber tires.

Perhaps because we have failed to direct your attention to our tires—to prove their superiority.

Please consider this:—

Goodyear Carriage Tires have been on the market for 13 years—long enough for carriage owners to test them. Here's the result:

Today these tires far outsell all others.

The demand, last season, was one-fourth greater than the preceding season.

The present season now indicates an almost doubled demand over last season.

Of the 200 American Carriage Makers, 148 have adopted our tires, because they know "Goodyears" are certain to give satisfaction and are asked for by carriage buyers.

Carriage dealers handle more Goodyear Tires than any other kind.

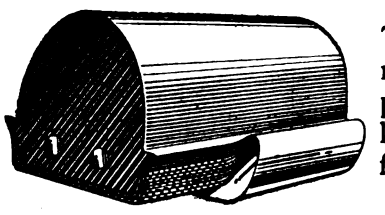
Altogether, nearly 4,000,000 of our Tires have been used.

Truly a remarkable record that only a remarkable ***tire*** could have made.

And these tires which give the most service are most wanted. ***PAY YOU as much PROFIT per set*** as common-place carriage tires that are twice as hard to sell.

Serve your customers' interests and ***your*** interests by pushing this leading brand of carriage tires.

The Famous "Wing" Tire



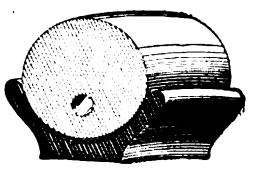
THE GOODYEAR "WING" TIRE

For years, the Goodyear "Wing" Tire has been the sensation of carriagedom. The patented ***wing*** presses against the channel and keeps mud, grit and moisture away from the tire base.

And this tire, being of ***tough, springy*** rubber, is wonderfully ***easy-riding.*** It protects the vehicle and lengthens its life.

Our "Eccentric" Cushion Tire

is especially designed for lighter vehicles, runabouts, etc. Note the wire hole below the center. This increases the wearing depth of the tire one-half. This tire stays firm in channel. A high-grade, resilient Tire, remarkably easy-riding.



THE GOODYEAR "ECCENTRIC" CUSHION TIRE

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Drop us a line today and receive, by next mail, our handsome ***New Carriage Tire Book,*** together with dealer's Prices and Terms.

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Branches and Agencies in 103 Principal Cities.
More Service Stations than any other Tire.

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Rubber Tires for Carriages

THE L. S. P. CALKING MACHINE.

THIS MACHINE IS IN USE BY THE U. S. GOVERNMENT, AND NEARLY EVERY CIVILIZED COUNTRY IN THE WORLD, AND IN THE BEST SHOPS ALL OVER THE U. S.

Read What a Few of the Many Users Have to Say.

February 9, 1912.

L. S. P. Calking Machine Co.

Gentlemen:—Enclosed please find last payment on Calking Machine, $17.50. Would like to say for the machine, it is the most labor saver machine I have in my shop. It not only does the work it is intended to do, but it does it better than can be done by hand. Wishing you all success,

Very truly yours,
(Signed) John Morrell,
Pennington, N. J.

January 29, 1912.

L. S. P. Calking Machine Co.

Gentlemen:—I received my Calking Machine January 3rd, 1912, and set it up and tested it thoroughly, and I must say it is the greatest machine that ever went into a shoeing shop. It will do more and better work than two men with a hammer. I would not take four times as much as it cost if I could not get another one just like it.

Yours truly,
(Signed) J. F. Steinbroner,
Linesville, Pa.

January 29, 1912.

L. S. P. Calking Machine Co.

Dear Sirs:—In regards to the L S. P. Calking Machine bought of you, if you wish a testimonial from me you can write anything you wish and I hereby authorize you to sign my name. For you cannot say too much for the machine.

(Signed) G. W. Conn,
Paint Lick, Ky.

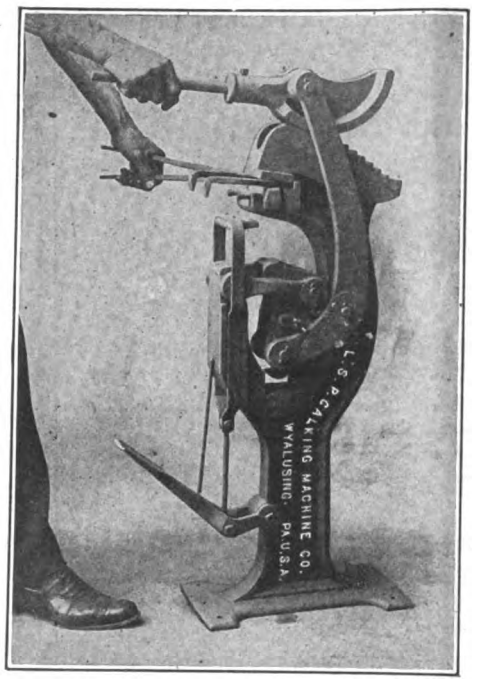
WAR DEPARTMENT.
OFFICE OF THE QUARTERMASTER,
Fort Ethan Allen, Vermont.

January 23, 1912.

L. S. P. Calking Machine Co.,
Wyalusing, Penn.

Gentlemen:—The machine received from you recently is very satisfactory. My blacksmith states it does the work of four men.

Respectfully,
(Signed) R. J. Fleming,
Captain 10th Cavalry, Quartermaster.



WELDING SHARP TOE CALK ON L. S. P.

WHAT THE MACHINE WILL DO.

With one pull of the lever, it will completely make either a sharp or blunt heel calk, of any desired length, on any size shoe, with the stock where it is needed, and no galls or cold shuts, producing a perfect calk. One pull of the lever welds either a sharp or blunt toe calk, and forms clip or not, as you may desire. No weld like the pressure weld, no losing of toe calks.

It has a shear to cut off the end of shoe for shoeing flat or with pads. It works finely on old shoes, and resharpening. It makes the Single or Double Block Heel, or the "Phila. Kink," without the use of hammer, or change of dies. And in Changing Dies, you have no bolts or screws to bother with, all dies pick right out with the fingers.

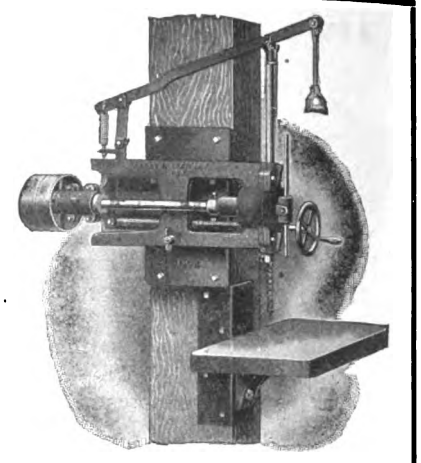
The machine is made of the very best material and by the best mechanics, and is fully warranted and guaranteed.

WRITE TODAY FOR TESTIMONIALS AND PRICES.

"The extreme of hand labor is the extreme of extravagance."

The L. S. P. Calking Machine Company
WYALUSING, PA., U. S. A.

National Machine Company
BRIGHTON, ONTARIO, CANADA.



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A Post Borer is an essential tool in the blacksmith and wheelwright shop, and should be "first-class" and "perfect" in every way.

We make such borers in different sizes and styles.

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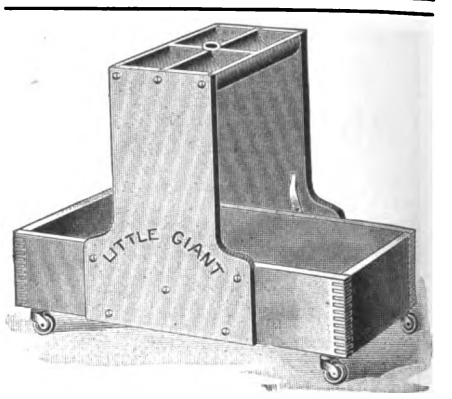

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The New
Little Giant Farriers' Tool Box No. 2
16 Inches High

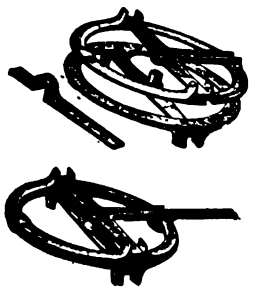
To meet the demand of tall farriers.

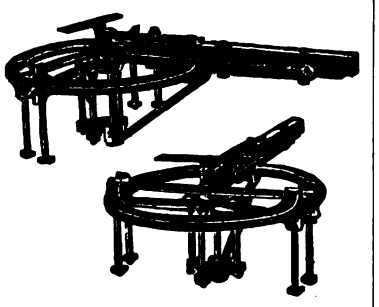
MADE BY
B. B. NOYES & CO.,
Greenfield, Mass.

ASK YOUR DEALER FOR THEM.

TIRE HEATERS for all fuels and purposes. Oil, Artificial Gas, Natural Gas and Gasoline Tire Heaters. Also Tire Coolers.

OUR GOODS ARE THE BEST IN THE MARKET FOR THE BEST RESULTS WITH HARD SERVICE.





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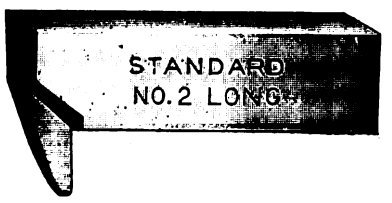
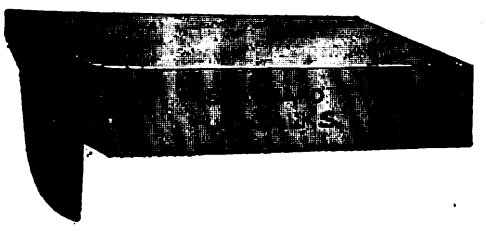
(HOT FORGED)



Standard Toe Calks are made from the best of Toe Calk steel by experienced men, and both our Joliet and Cambridge factories are thoroughly up-to-date as to equipment.

These are the reasons why **Standard Toe Calks give satisfaction,** why more **Standard Toe Calks** are sold than all other makes combined, and why the man who makes his Calks is becoming as rare as the man who makes his Horse Shoe Nails.



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FRANKLIN STEEL WORKS
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THE

BLACKSMITH AND WHEELWRIGHT

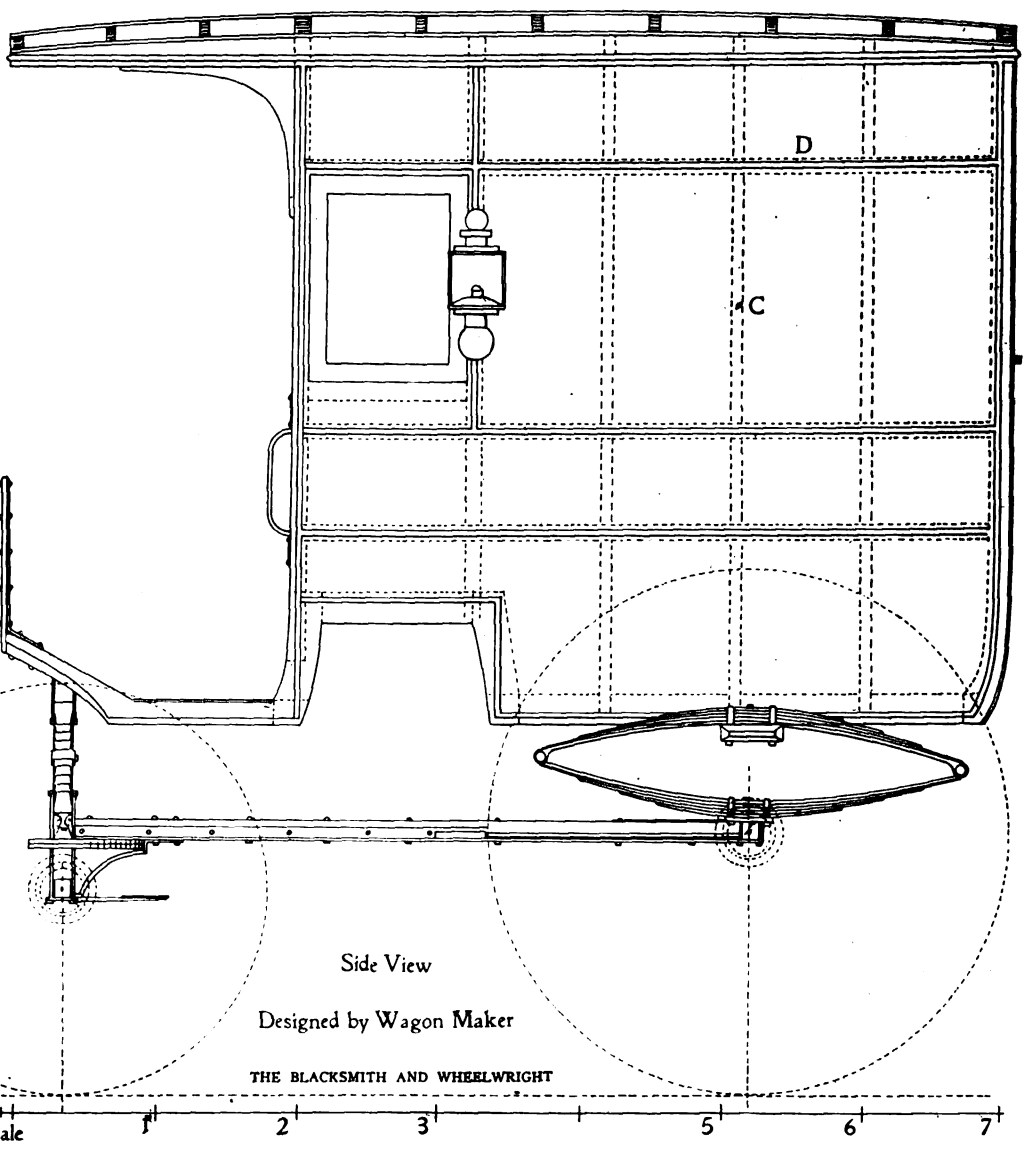
Vol. LXV. No. 6. NEW YORK, JUNE, 1912. TERMS: ONE DOLLAR A YEAR

CUT UNDER DELIVERY WAGON.

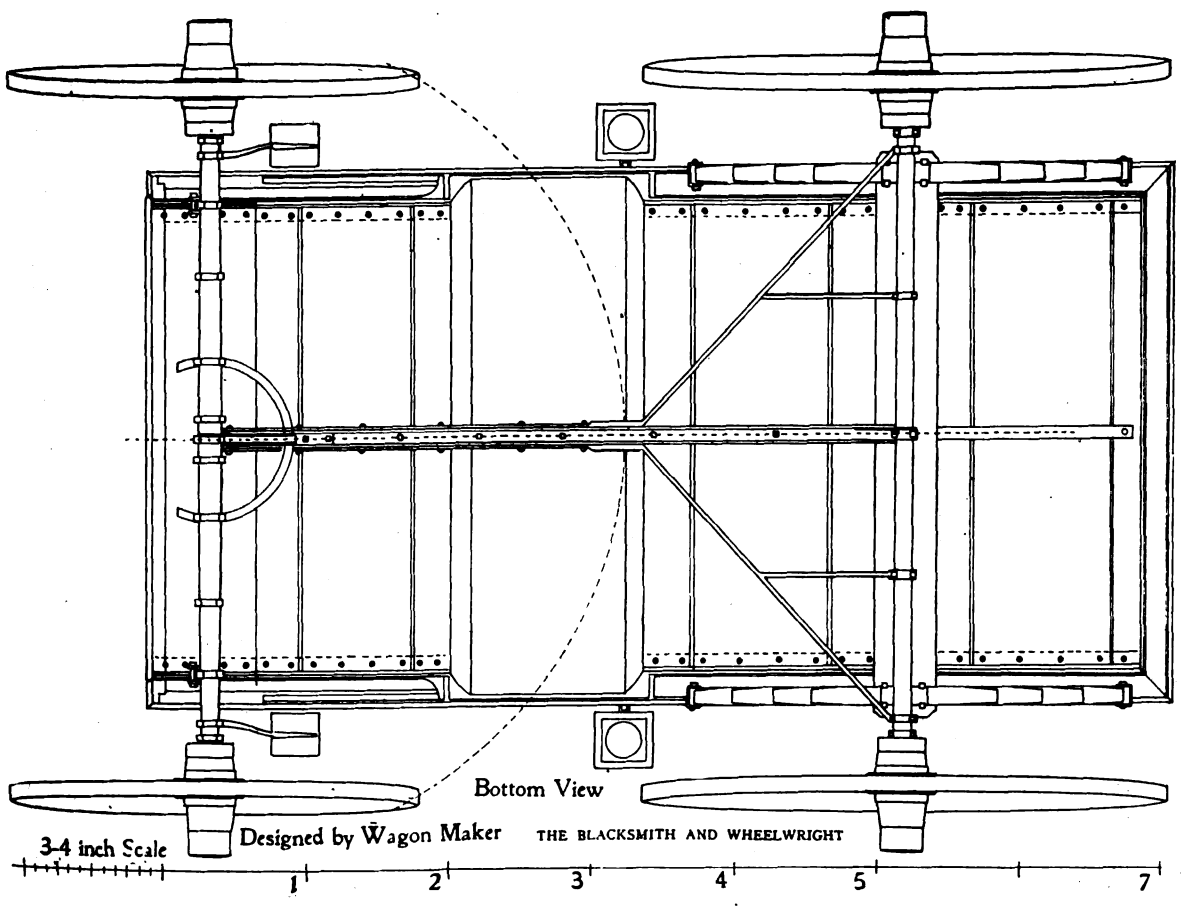
Working Draft and Full Directions for Its Construction.

BY WAGON MAKER.

Delivery wagons are built in various sizes, with straight sills, or with the wheels to turn under the body; that is, with a wheelhouse. The construction is generally to suit the merchandise, wares or commodities, so that they are carried without breakage, and the load is commensurate with the dimensions of the entire vehicle. The straight sill body is a stronger, a cheaper and in some respects, a more convenient one. The cut-under makes the body weak and the sills must be heavier, besides it must be strengthened with iron or steel plates. With straight sills, 1⅜x4 inches, including the side panels or side boards, is all that is required to carry a load from 800 to 1,000 pounds without straining the body. With a wheelhouse the rockers must not be less than 2½ inches deep, 1½ inches thick on the bottom surface, and the rocker plates ⅜x2 inches. This is a great difference when the two kinds of bodies are compared, but experience has proved that the construction of the bodies with the wheelhouse should not be made lighter for its foundation. The rocker plates need not go to the rear end bar, but should be level with the rear surface of the spring bar. This body is suspended on three elliptic springs, but some are preferred with four elliptic springs, and a light half fifth wheel shaft front gear. These gears have the appearance of carriage work, making a decidedly better finish than the regular wagon gear, but nevertheless the wagon gear is preferred because it is less expensive and equally as strong. For superior riding qualities and flexibility, the four spring suspension without a reach is preferable. A three spring reach gear is always stiff, and if made light it will not stand the strain, but the price for a wagon has a good deal to do with its style and construction. The buyer does not look closely into the details of construction. The saying is "it will do the work and the price is right," but nevertheless it pays the buyer to buy what he needs, not what he wants, and the wagon-builder should be the man to explain and post his customer on the various merits in certain styles and finish of wagons.



The above holds also good with the height of the wagon from the floor. Straight sill wagons generally have wheels 42x44 inches, a 38 to 40 inch wide body, 5 feet width of track, and front wheels lock against the body. With such a width of track and amount of turn against the rub-iron is sufficient, but if a wider body is needed and a 56 inch wide track is in use, the construction must be changed to suit the needs of the buyers and owners. Under such restrictions the front wheels are lowered from 42 to 36 inches and if the height of body from the floor is desired 30 inches, the wheelhouse is made 10 inches deep, while on this draft it is 8½ inches, and the height of body from the floor is 31½ inches, which leaves about 5 inches space between tires and bottom surface of wheelhouse.



A straight sill body with straight side surfaces is easier to build than the wide bodies with 2 inch turn-under and curved side surfaces, while the difference in construction is considerable and the price of the finished wagon therefore a great deal higher.

On this design to allow the body to be suspended lower, the rear springs instead of being clipped or bolted under the cross bar, are slipped above. On this account the body can be suspended 2½ inches lower, that is the thickness of cross bar and springs, which is a great advantage and no extra labor is connected with it.

Framing and Finishing the Body.

The entire length of this body is 7 feet 3 inches and the length outside of posts 5 feet 1 inch, but on account of the wheelhouse the loading space is 3 feet 6 inches only. Here is shown a disadvantage for certain material which has length, but is deficient in breadth, wherein the straight sill body has the advantage, but for carrying heavy barrels the low down and wide body is preferred. In case a certain amount of barrels has to be carried, the length and width of the body must have sufficient room to move the barrels in or out, but the outside width across must not exceed 55 inches for a 62 inch wide track, out to out. in case the length of the body rear of wheelhouse is deficient, the gear must be lengthened in proportion.

The depth of sills is 2⅝ inches for the edge plates and ⅝ inch for thickness of bottom boards, which are fitted in across on cut-under bodies. The width across the bottom surfaces of the sills is 1⅝ inches. To this is added the amount of turn-under and planed down to shape of the turn-under line which is same on rear end as on side surfaces. On the upper wheelhouse pieces, shown at A B, back

view, by dotted lines, the thickness can be reduced to avoid the heaviness, but will take more time to fit the edge plates. To frame the rockers, it is best and strongest to do so

The rear part on this body is paneled top and bottom, and screened between. The lower part is closed, 26 inches, with two panels and all joints covered with moldings. The upper part is a grooved-in panel, grooved in the posts and top rail, and laps over the cross rail, finished with a molding. The space between the two has two wire screens hinged to the posts and locked at the center. These iron frames are fitted by the smith with hinges welded on and screened afterward. This space on the same is left open. Others have a curtain or a screen, and roll-up curtain. The screen shown on the front view is the same as on the back view, but such screens in two parts, are also fitted back of the driver's seat when valuable merchandise is carried. In such cases both are locked and generally made in two parts and thrown open toward each side. The seat in such cases has no lazy-back, but if a lazy-back is wanted it is made with hinges so that it can be put flat on the cushion top. These backs are also made half the width of the seat or across and made in two parts.

Open from out to out, 9½ in.
Number of plates, 5.
Width of plates, 1½ in.
Thickness of main plates, No. 2.
Thickness of other plates, Nos. 2, 2, 2, 3.
Clipped top and bottom.

Fan Tapered Front Axle:

Size of axle arms at square ends, 1⅜ in.
Size at center, 1x1⅝ in.

Coach Style Rear Axle:

Size of axle arms at square end, 1⅜ in.
Size at center, 1½ in.
Width of track, 60 in.

Width of body:

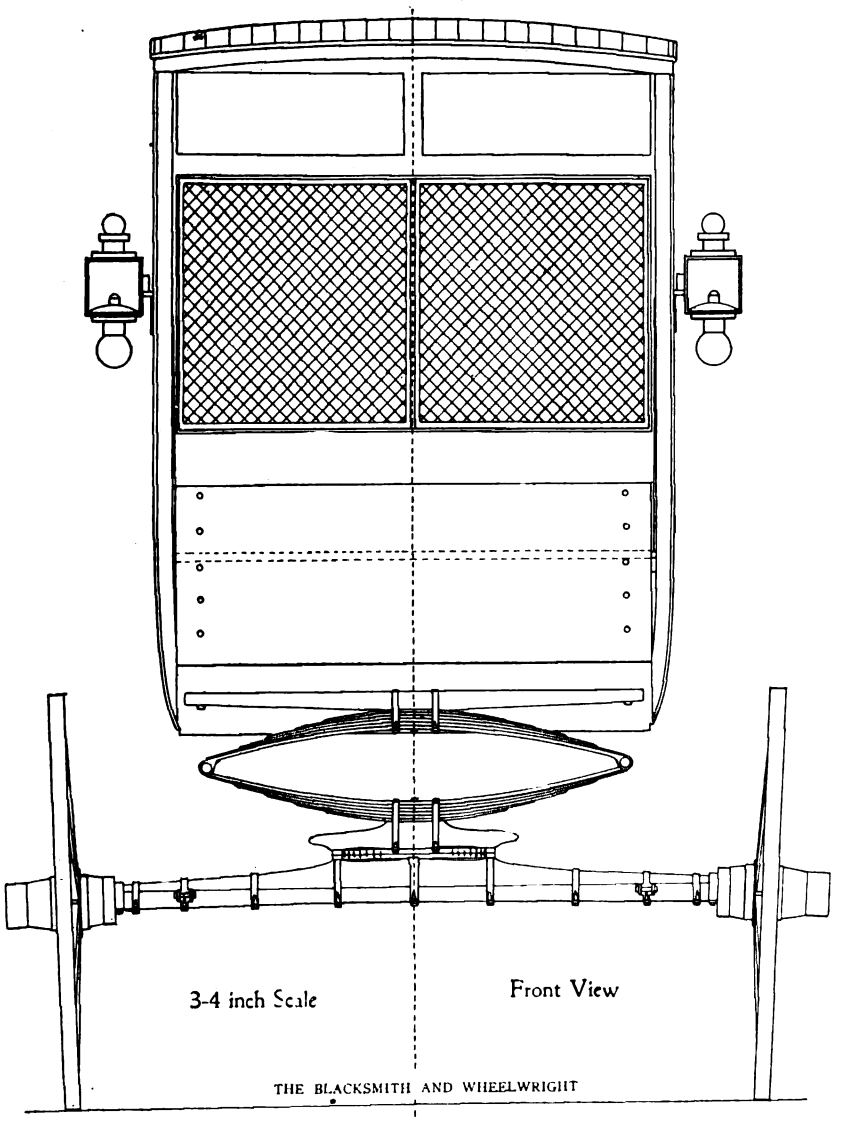
Width of dash and across toe bracket, 40½ in.
Width across outside rockers, 40 in.

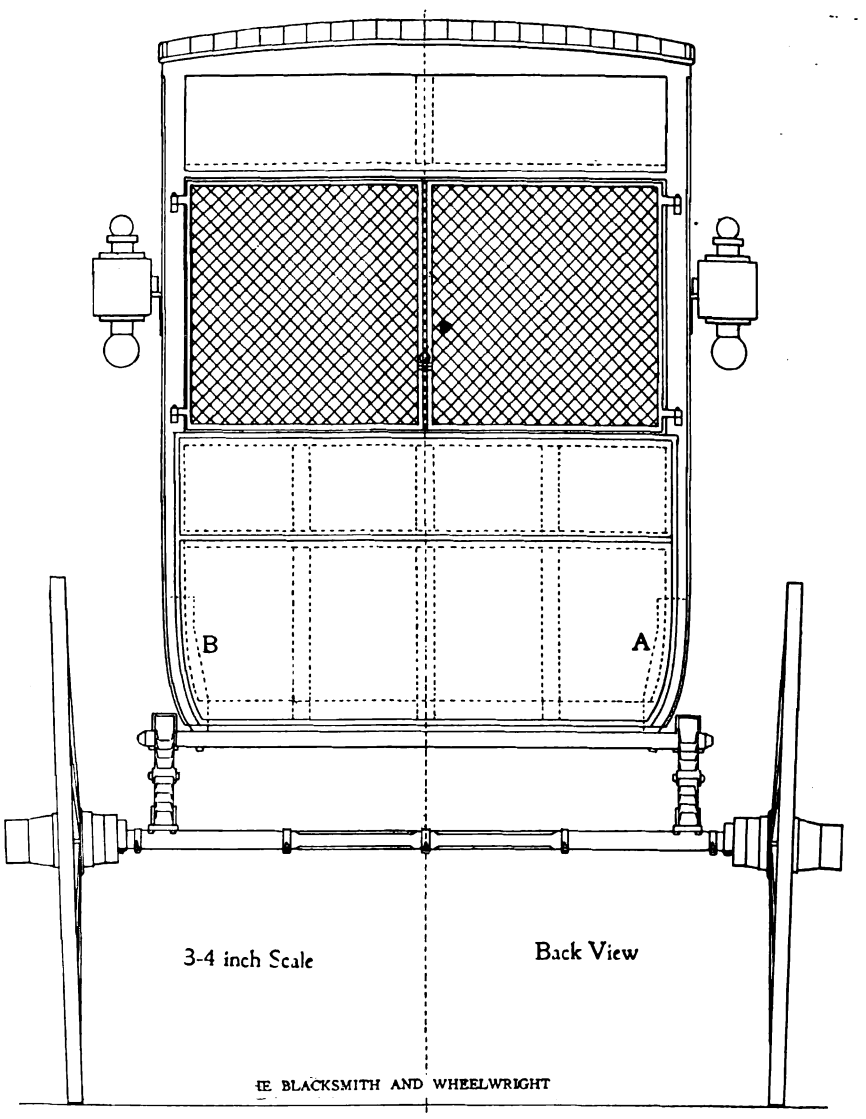
The Dimensions for Warner Wheels for a Three Spring Wagon:

Diameter of wheels without tires, 34x43 in.
Diameter and length of hubs, 3⅞x7½ in.
Width of spokes, 1 15-16 in.
Thickness and depth of rims, 1⅜x1½.
Number of spokes front and rear, 14 and 16.
Thickness and width of steel tires, ⅜x1⅜ in.

One Elliptic Spring Front:

Length from centers of bolts, 36 in.
Open out to out, 9½ in.
Number of plates, 6.
Width of plates, 1⅝ in.
Thickness of main plates, No. 1.
Thickness of other plates, No. 2, 2, 2, 3, 3.
Clipped top and bottom.





with tenons drawn to the shoulders with draw pins. Fit well, glue, draw tight with the pins, and clamp. When dry remove the steel pin and replace with a wood one. Fit the edge plate well to the rockers so that it will not twist them. Paint the rockers and plates with thick white lead and screw them tight with No. 16, 1¾ inch long screws.

If the glass frames are stationary for a light body, the four front posts are made 1⅜ inches square, but if made to drop, 1½x2 inches should be the size, or sufficient for the glass frames to work up and down easily with a ⅜ inch thick panel to cover it on the inside. The six inside posts are made as light as ¾ inch square to 1⅛ inch, depending on the various loads carried, covered with ⅜ to ½ inch thick panels. If covered with sheet steel 1-16 inch thick the framing is the same and all surfaces are covered with white lead on wood and metal.

The rear corner posts are dressed 2x2 inches and all joints covered with moldings, same as the side surfaces. As wide steel sheets are used on wagon bodies, they are liable to bulge outward or rattle; they are fastened to the posts. For instance on this body is a panel 23x45 inches. To avoid the sound created by running over stone pavement, the sheet is tacked to the post C, on the side view, and if these two spaces are too large, do the same with the two other posts and cover the nail heads with moldings which always give finish to the body. For the same reason molding D, is put on to reduce the width of the panels and produce a separate space for lettering or ornamentation.

The top rails are 1⅛x3 inches, 2¾ inches deep, when beveled at the center, and 1½ inches at the ends. The rear end is generally a little deeper than the front end. Seven top curves are ⅞ inches square, the front end curve 1⅜x1½ inches deep, curve about the front posts ⅞x1½ inches and rear end top cross bar 1½x2¾ inches curved on top surface to the regular shape. This top is covered with ¼x2 inch strips close together beaded on one side. These are also covered with ¼x1⅜ inch strips beaded on both sides with 1 inch space left between. When put close together, 2 inches wide, 22 of them are required.

Two Elliptic Springs Back:

Length from centers of bolts, 36 in.
Width across top rail, 44 in.
Extreme height of body, 60 in.

PAINTING METAL BODIES.

Why This Gives Trouble to Both the Owner and the Painter.

From A. H. Mauerman, Wisconsin.—I will ask a favor of you about paint coming off automobiles. I am an owner of a Clark car and have had it about a year. The paint is flaking off on the back seat and one rear door. The body of the car is made of aluminoid. Now I do not know whether it is the paint or if it is caused by cold freezing weather. The paint just came off during the cold weather in January, when it was about twenty degrees below zero. The spots are not very large. The space on the seat is about two feet long and a foot wide, and the space on the rear door is a round spot about five inches across. I had the car covered all through the winter, cleaned it up good before putting it away, and it is not damp in the shed.

Reply by M. C. Hillick.—The metal car body is giving the painter and the car owner about an equal share of concern, for both are having their troubles with it. Especially during the past winter has the metal body furnished an oportunity for everybody interested to pass an opinion, expert or otherwise, upon the wearing properties of paint applied over it. In getting at the relative paint values, as shown upon the wood and the metal body, we must first recognize the fact that there is a decided difference between the two in their capacity to receive and retain the paint fabric under the varying and exacting conditions of service.

When the primary coats are in place and the precise requirements of the metal surface have been given due allowance, there is no reason in the world, that we are aware of, why the finish on the metal surface shouldn't wear as well and as long as a like finish should wear on the wood surface. Barring accidents we believe that it will. In going about the work of painting the metal body, if a new sur-

face, the naturally negative face of the metal must always be taken into account. Instead of using the same amount of oil necessary for a pigment to be applied to the wood surface, this quantity needs to be reduced to quite an extent, otherwise it will dry slow and uncertainly and the chief purpose of the priming will be defeated. The metal will not absorb oil to any appreciable extent except it be present in the pigment in connection with a considerable quantity of turpentine. Under this adjustment of ingredients the oil is sufficiently reduced in body to at least get a fair foothold, and this means much for a paint on the steel car.

Of surfacing paints for the metal car body there is a big brood to pick from. Transparent primers, white lead, red lead, mineral brown paints, and paint combinations made up largely of two or more of these paints, constitute the leading first coat materials. Practically any of these paints, if made up with the proper proportions of thinning and binding mediums, will give good service. Use, say, for the primer, one-third raw linseed oil and two-thirds turpentine with a few drops of coach japan to each pint of the mixture to clinch the drying contract. The next coat should carry one part oil to 6 or 7 parts turpentine. Above this coat bring the painting and finishing processes along in quite the same way as for the wood surface. This, in a brief way, is the sum of the whole matter of getting a durable finish upon the steel car.

Other things being equal, the finish upon the metal car body worked up in its primary stages as above outlined should wear in a very strong and durable way.

The experiences of Mr. Mauerman is not unusual in connection with the steel car, although ordinarily it occurs on a surface recently painted and varnished that has first been subjected to a high heat during which the metal has expanded. Removing this same surface to the cold outside air and forcing the metal to suddenly contract is about certain to break up the finish and force it to peel and flake off.

This same disastrous termination of the finish occasionally occurs on cars that have been in service for several months, or for a year or more, and is primarily due to the sudden contraction of the metal during unusual extremes of zero weather.

The substance of the situation is that the painter's skill in painting and finishing the car in the best possible manner must be supplemented by reasonable care and attention to the work when in service by the owner.

What the painter has wrought on the surface of the car may be classed only as a "passing show" unless the owner elects to give the finished work proper caretaking.

Nothing helps the surface more to withstand the bitter days of service to which it is exposed than a good foundation of varnish. This, for a first class job, should consist of a coat of varnish color, two coats of clear rubbing varnish, and one coat of finishing varnish. Such a surface of varnish when it has worn to a point where it needs a renewing and renovating treatment, has sufficient depth and substance to respond to the mediums applied and "comes back" with much of the lustre and brilliancy of its former self.

As a concluding word, the metal car body should be well and carefully painted and finished, and during its days of service it is entitled to all the care and attention that the appreciative owner is able to give it.

Technical School Exhibition.

The thirty-second season of the day and evening classes of the Technical School for Carriage Draftsmen and Mechanics, closed April 8. The regular annual exhibition of work done by the students during the season, was held April 15, afternoon and evening, in the school rooms of the Mechanics Institute at 20 West 44th street, New York City. The rooms were filled with interested visitors. Many foremen, draftsmen and superintendents from the local factories were present and examined the specimens of work on exhibition. Much favorable comment was heard about the original designs of automobile bodies, and the scale and full size working drawings of same showing the best manner of framing the various parts together, and the "pricking off" of parts requiring this treatment. One of the students went a step further and actually made a touring body one-half full size from his original design. This body was well worked out and perfectly constructed ready for the panels, and attracted a great deal of attention. Similar work was done last season on a limousine body. The exhibit as a whole was fully up to the best previous one, and was said by some to be the best the school has ever made.

There were six graduates this year, four from the day class and two from the evening class.

The School has a correspondence department which is kept open the year round and pupils may enter at any time. Full particulars in reference to all departments of the school, may be obtained by addressing Andrew F. Johnson, 20 W. 44th street, New York City.

THINGS THAT SAVE TIME.

Callipering, Handling and Storing Horseshoes —a Shoe-Pole and System.

BY JAMES F. HOBART, M. E.

"Mr. Blacksmith, did you ever stop to think that the biggest things in the shop are the smallest? That the most important points are the little details which you have to look at twice to see once? It's a fact, nevertheless, and the smith who gives the most attention to the little details, is the man who is the most successful and who is doing the best paying business. There is hardly an exception to this rule, either in the smithing business or in any other!"

"But how can that be, Mr. Hobart? If a man is looking after details all the time, how can he do anything else? Seems to me he had better be looking after the more important parts of his business and let his men take care of the details!"

"That's where you are dead wrong. There is nothing to look after in any business, except details. In fact, the entire proposition of shoeing a horse, ironing a wagon or repairing an automobile is nothing but a collection of small detail operations. The proper doing of these results in a successful job. The omission of one or more causes a poor job to be done and the failure of a number of detailed operations causes the work to be a failure."

These are what causes success or failure, not only in business but as a mechanic as well. If he lets a shoeing job go out to a doubtful customer without collecting immediately, he is losing profits through a lack of detail. If he lets his stock of shoes get low and has to

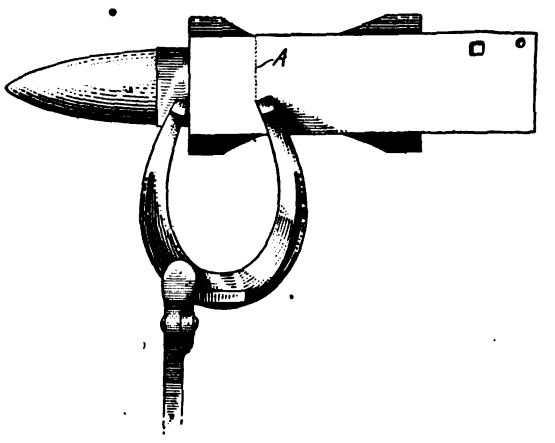


Fig. 1.—Measuring Heel Opening in a Shoe.

forge a different size on account of the lack of required sizes, then he is losing money through failure to attend to stock details. The loss of time in forging down an odd sized shoe is just as much a loss of profit as though the smith had hired a journeyman to do the forging and had paid him by the hour."

"Well, I reckon that's so, although I never thought of it that way before. But say, how is attention to detail going to help any; when a man is himself working?

"Why, in this way: Just step with me into the nearest blacksmith shop, sit down beyond the reach of calk-welding sparks, and keep both eyes wide open for a few minutes. Don't say a word, but watch the man at the fire and the man who is driving shoes. If you don't see details worked to the limit, or time wasted utterly inside of ten minutes, then I'll miss my guess."

"Well, Hobart, here we are, and there is the man at the fire, fitting up a set of medium heavy shoes. Now, what details shall we watch?"

"Look for everything. No movement is too small not to be studied. Every time the smith makes a false movement, or makes two motions for which one is a plenty, then he is losing a part of his rightful profits. He is doing unprofitable work when he might produce results. Here he comes from the floor, with a shoe which he finds needs opening at the heel about 1/8 of an inch. Now then, how is the smith going to know quickly, and with as little loss of time as possible, when he has opened that shoe exactly 1/8 of an inch?"

"Why, he will tell by his eye, won't he? Seems as though he ought to be able to tell when he has opened the shoe that amount?

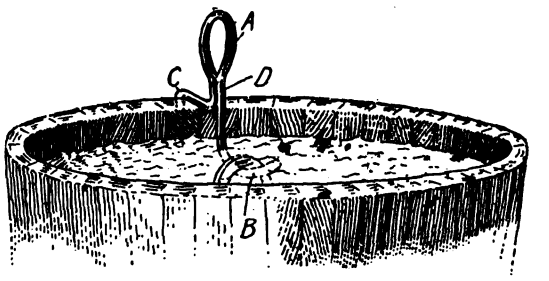


Fig. 2.—Quenching Tub Arrangement.

That's the way I would do the trick, or, if I wanted to be dead sure, I would lay the shoe on a stick, with one heel-calk over the end and give the other heel a tap with the hammer, thus making a mark on the stick. By measuring again after opening the heel, I could see just how much the shoe had spread beyond the mark."

"That way will do the trick, Mr. Smith, but it takes too much time. There is the stick to be kept where it can be got at all the time. Then the placing of the shoe in position, the tapping with the hammer and the getting back to the anvil again, then back to the stick after opening the shoe—all these things take time, and it is in the saving of time that attention to detail must show results. As for the judging by his eye, the amount the shoe has been opened; that method is not to be depended upon. A man can measure pretty correctly with his eye, a distance of an eighth, a quarter, or a half an inch, but when he tries to tell if a certain distance has been increased an eighth or three-sixteenths of an inch, then he is almost sure to fail, especially if the distance in the beginning is large compared with the distance it is to be increased. Try it. You can't hit right twice in ten times!"

"Well, then, what is the proper way of pulling off this stunt? I have fitted a pile of shoes but I don't remember of ever bringing up against this point before."

"Just watch the smith, and we will see if he is alive to giving the proper attention to that detail? There, did you see that? He actually measured and marked the distance apart of the shoe heels, opened the shoe and made another measurement, found it was not quite enough, and opened the heel some more and made a third measurement, and he was not over two seconds doing the five operations. Did you get that?

"No, I didn't see him doing any measurement business. How did he work it?

"Fig. 1, tells the story. He placed one heel calk against the jog of the anvil and made a quick motion, bringing the other heel across the anvil, making a faint mark in the dust and scale on the anvil. This line may be seen at A. Then he placed the shoe vertically, endwise, toe up, on the rounded portion of the anvil beak, struck one blow on the toe of the shoe and placed the shoe back again as in Fig. 1, and found it had not been opened quite enough. Another blow upon the toe of the shoe with the heel calks upon the horn of the anvil, another trial at A, and the shoe was found opened the required distance. Not a motion was lost and the five movements, to say nothing of the two hammer blows were made in not over four seconds!"

"That surely is 'going some.' Wonder if the man can keep it up all day?"

"Am pretty sure he can. He tells me that he and his helper have put on sixty shoes today, and it is only four o'clock now. He also says that some days last winter when the ice was bad, they fitted and drove 108 shoes one day and 104 another day. They can't make

many false motions and keep up that rate of work!"

"I should say not! By George, I don't see how they do it. Shouldn't think there would be time enough to hunt out all those shoes and fit them!"

"There would not be time enough if a single motion were wasted. But there isn't. Just notice the time saved for the driver when a shoe has been made ready and passed into the water tub. In most shops, you will see the smith hold the shoe in the tub a few seconds while it cools off. Then he will throw it upon the floor in front of the anvil. Either this, or he throws it into the quenching tub and the driver loses time in fishing the shoe out with a pair of tongs. But you see none of this nonsense here. The quenching tub is fitted as shown by Fig. 2, with a sort of hook, A, resting at C, upon the edge of the tub and the shoe, B, is dropped from the tongs of the fitter, directly upon the hook as shown at B. Thus, there is no time lost holding the shoe while it cools. It is simply dropped upon the hook, and when the driver wants that shoe, he simply lifts the hook by means of the handle A, and there is the shoe, out of water, right at hand, and with no fishing or waiting."

"A detail of the hook is shown by Fig. 3, and it will be noted that it is formed of a simple piece of ⅜ inch round rod, bent back upon itself as shown, and welded at D. Perhaps it took the smith fifteen minutes to make this hook complete. I doubt if he spent more than that much time on the job, but see the minutes and the hours which this simple little device has saved for the fitter and the driver!"

"Right here is another big thing and one which is not too little, either. Did you notice

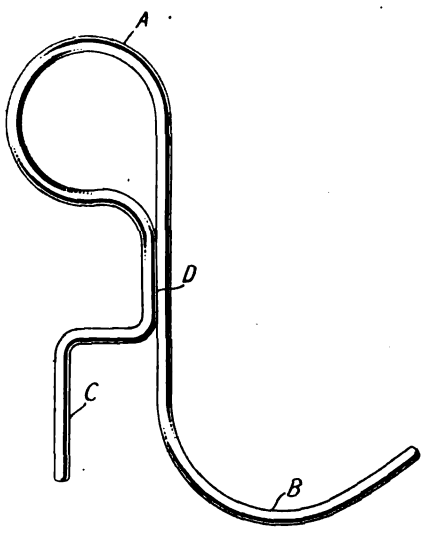


Fig. 3.—Quenching Hook.

how long it took that fitter to pick out just the pair of shoes he wanted for that tender footed animated hat-rack, there by the door, and by courtesy called a horse?"

"I noticed it didn't take him long. Sort of fished the shoes down from over head, didn't he? There's a lot of shoes hanging from the ceiling, I notice."

"Yes, that's where he got that pair of shoes, and I noticed that it took less than four seconds for him to locate and take down that pair!" Do you note the fine and pleasing arrangement of the inside of the shop? How the shoes are all systematically arranged on ⅜-inch pins driven into the overhead floor joist and into the walls? Note that two rows of shoes form a sort of frieze or dado around the entire room, and that above the dado, a lot of pictures of horses and carriages have been arranged where they are entirely out of the way and where the pictures add greatly to the appearance of the shop? Note also the many tie-chains and snaps. One has been located each foot of the length and breadth of the shop so that a horse can be instantly made fast anywhere. Then as the horses come in—they all come in at the back door and leave by the front door—the animals are easily bunched together when good natured ones come in and the shop is crowded, but when an ugly horse comes along, it can be hitched apart from the others and given all the room necessary even when the shop is crowded with 15 or 20 horses."

"That shoe arrangement does sure look good to me. It makes a mighty pleasing appearance too, and the shop is one of the best appearing I have ever been in, still there's nothing new, except the shoes, the pictures and the way they are hung up."

"That's all, Mr. Smith, and it shows what great results can often be obtained from very simple things and a little head-work. The owner of the shop tells me that he has over half a ton of shoes distributed around the joists overhead and on the walls. Have you noticed the system used in arranging them? Away back at the far end of the shop there are the mule shoes, and next the odd shaped shoes which are seldom used. Then comes the heavy horse shoes—all varieties of 'em; then, toward the front of the shop, the lighter shoes appear and closest to the fitter's fire are the

Fig. 4.—Shoe Pole.

shoes most commonly used by the shop trade. In the far front corner, are a few shoes for trotters, and away in the very apex of the two side walls, I see a few pony shoes. Surely they are well arranged and the fitter can lay hands upon any particular shoe in the shop in two or three seconds."

"It sure don't take him long to select a pair of shoes. What is the fitter after now?"

"Don't you see he is going after a pair of shoes for that bay horse? That pole is his shoe-pole. Fig. 4 is a sketch of it. The pole is made of a common hoe-handle, ferule and all, with a bit of ⅜ inch rod bent up as shown and driven into the end of the pole. Watch the fitter. With that pole, he easily picks off one shoe or two, as he wishes, without disturbing the other shoes upon the pin. And the same pole is used in placing shoes upon the pins. Note how wide the pole hook is made. That is for placing shoes on the overhead pins. The shop boy can put four shoes on that hook, reach up and deposit the four all at once upon the pin where he wishes to keep those particular shoes. It doesn't take long to hang up a couple of hundred horseshoes with that rig. And just notice where he keeps the pole—right there at the end of the forge where he can grab it without losing a single motion when he shuts off wind from the electrically driven blower used in his shop. By the time some men would be ready to start after a pair of shoes, this man has shut off the air, picked up the shoe-pole and is halfway across the shop with his eye right in the very shoe he needs at that minute."

"He sure is doing some slick work. I'm going to look into this business a bit after I get home and see if I can't cut out a lot of fool motions that take lots of time."

"Did you see that trick? That was one of the neatest I ever saw a smith do, and he did it so quickly that if I hadn't been looking right at him, I would have missed it. But it was slick, all right."

"What was it? I didn't see him do anything except drop the shoe on the floor just as he was trying it on the foot of that roan horse."

"Drop nothing, Mr. Smith. He didn't drop that shoe accidentally. He put it down on purpose and while it was down, he spread that shoe all of an eight of an inch. He found the heel of the shoe a little narrow, and instead of making a trip to the forge and back again, he just dropped that warm shoe on the floor, with the punch sticking in the second hole, then he pushed a hoof-knife between the heel calks,

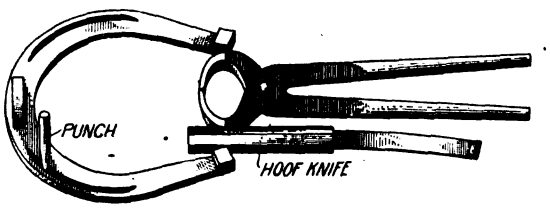


Fig. 5.—Spreading a Shoe.

laid the pincers beside the knife, and pulled outward on the legs of the pincers and actually opened that shoe an eighth of an inch in half the time it has taken to tell about it. Why, he didn't even let the horse's hoof slide off his knee to do the trick. It was a slick bit of business and no wonder they can fit 108 shoes a day in that shop and then go to a bowling alley in the evening, just for a little exercise. They don't make an extra motion, either of those two smiths, and the way the work rolls off all finished is good to see. Come on, and I'll introduce you to the fitter. He is the man of the shop, and his shop is the one described in the letter about "Just Buckeyes," in the March issue of The Blacksmith and Wheelwright.

"Mr. Evans, let me make you acquainted with Mr. B. Smith of nowhere in particular and everywhere in general. Mr. Smith, shake hands with Mr. Thomas Evans, of Barberton, Ohio!"

DIFFERENT METALS.

What They Are Made of and Their Qualities and Uses.

The up-to-date blacksmith ought to know, and he does know, in many cases, the composition of different metals, yet in these days of new material it is impossible to keep fully up with developments. The following will be read with interest:

Pressed Steel.—The reader will doubtless be familiar with the name of this material. This form of metal is mild steel pressed in dies—either hot or cold—from sheet metal, this process being used as being the simplest way of forming certain parts. Forged steel is another name for mild steel after it has been heated and hammered to shape.

Case-hardening Steel.—Yet another steel which enters into the matter is case-hardening steel; this is very pure steel containing a very low percentage of carbon, phosphorus, silicon, and manganese. It is soft and tough, and capable of being made extremely hard on the outside surface by a process known as case-hardening, which means, briefly, adding carbon to the surface. It is valuable for its hard wearing surface and toughness. Till comparatively recently case-hardening was an art rather than an exact scientific process.

Cast Iron.—This almost universally common substance is iron with carbon and various impurities melted together; it is hard, has good wearing qualities, and is comparatively brittle. As its name implies, it can be cast—that is, heated up to a liquid state and formed to any desired shape by pouring into moulds—and it is therefore very suitable for making cylinders, etc.

Malleable Iron.—One form of cast iron is known as malleable iron, a process of its formation being annealing—that is, heating and allowing to cool slowly—when the metal has the properties of wrought iron, that is to say, is very tough and strong. The advantage of this form of material is that it can be cast to any shape and yet have the toughness of a forging.

Wrought iron is fairly pure iron which is easily forged; it is ductile, and its principal property is toughness. Wrought iron rolled into sheets is termed sheet iron.

Brass.—This substance is an alloy of principally copper, zinc, and tin. Appearance is one of the deciding factors in its use, added to which are the facts that it casts nicely, is easily machined, and can be soldered.

Gunmetal.—Yet another alloy, which consists of copper, tin, zinc, etc., in proportions which vary from those of brass. The zinc has a hardening effect upon the composition. Gunmetal is used on account of its good wearing properties.

Phosphor-Bronze.—Another alloy of copper, tin, zinc, etc., is also employed where hard wearing qualities are required; it is tougher than gunmetal, the proportion of copper giving it this quality.

White Metal is an alloy of tin, zinc and lead; it has excellent wearing qualities, and is used where the minimum of friction is essential, such as in bearings of crank shafts, connecting rods, etc.

Aluminum is an alloy of aluminum, copper, and small impurities, such as iron and carbon. It is used on account of its lightness, and has a further advantage in that it is easily cast. The amount of copper present in the alloy adds to the toughness but increases the weight.

Copper is a metal which is used on account of its being easily drawn and bent, and because of its good appearance; moreover, it is not at all brittle, and is not affected by water, oil, or gasoline.

Spring Steel.—Briefly, this metal has such a percentage of carbon that it is possible to temper it, thus hardening the steel in such a

way that it has the property of returning to its normal shape after being bent within limits.

Rivet Steel.—For rivets a special quality of soft tough steel, known as rivet steel, is employed. This can be hammered cold without cracking, and is a fairly pure steel, very ductile, owing to the absence of much carbon and certain other constituents.

Stampings.—Steel which has been forged between dies is known as stamped steel. For stamping, any steel that is suitable for forging can be used, and the principal advantage of the process is that it is a very suitable way of forming a large number of parts of one design.

Steel Tubing is mild steel formed by drawing through a die either cold or hot; it produces a very strong and light form of material, and can readily be joined by brazing.

Magnet Steel is a carbon steel which has been tempered; it is very hard and retains its magnetism for a long period.

Steel Strip is formed of mild steel with additional carbon; it is rolled and thus toughened, and given "spring."

Nickel Chrome Steel, like other steels, is formed of iron with the usual elements, but with a larger percentage of nickel and chromium, these elements having the effect, up to a certain point, of increasing the toughness of the metal as a whole, and very great toughness is the outstanding feature of this material. It is the highest class steel, but it is expensive to buy and to machine.

Sheet Steel is rolled out from mild steel.

Rustless Steel is mild steel specially treated with an anti-rust process, whereby it is made impervious to the effects of the atmosphere, water, etc.

Axle Steel is best described as being of a high quality mild steel, containing either a larger percentage of carbon, nickel or other element to give toughness, and thus render it suitable to withstand constant shocks.

Porcelain, which enters into the construction of electrical fittings is made from baked clay; it has high insulating properties, and is able to withstand great heat.

Vulcanite, which is formed from rubber and sulphur baked together in a closed box, is also used for its insulating properties.

Welding Is More Common.

It would not be too much to state that the use of autogenous welding has revolutionized motor vehicle repairing. Parts which only a few years ago would have been thrown away as useless are now, thanks to the acetylene blowpipe, repaired and again put into use.

Starting first with the repair of cracked water jackets and burning on broken lugs to castings, the use of the blowpipe has gradually extended until almost any work seems possible with it. The repairing of broken crank shafts is now quite frequent, and it is very seldom, if the work has been properly carried out, that the shaft breaks again at the welded place.

Welding teeth into a gear wheel; welding up a pressed steel frame after a breakage, or after having been cut to extend the wheelbase; welding on a scroll iron broken off in an accident; welding brackets on to frame, etc., are only a few instances of what can be done. There is one metal which has been found impossible to deal with satisfactorily by welding, and that is aluminum. This, unfortunately, is the metal in which the most breakages are found in motor vehicles.

Of course the bar to acetylene welding is the cost of the outfit which is so high that a good deal of work must be done to make it profitable.

Estimating for Automobile Repairs.

In many cases it is necessary to estimate for the cost of repairs before the work can be put in hand. In order to be able to do this with any degree of safety, it is necessary to make a very careful examination, and often to take the car partially down. If, after this is done, the order is not secured, it would represent a considerable loss to the repairer. A repairing firm cannot take the risk of losing money in this way, and it is, therefore, absolutely necessary to specify a certain sum which the owner must pay for estimating if the work is not placed. The owners of cars do not like the inclusion of this clause, but it is doubtful if it can be avoided. It is really for the owner's protection as much as that of the repairer, as, if an estimate is given without careful examination, it is generally more or less a shot in the dark, and either the price is fixed far too high, in which case the owner suffers, or too low, in which case the owner also suffers, as the repairer, like anyone else, does not like working at a loss, and does no more in a case like this than is absolutely necessary; while in car repairs, as is well known, there are always a number of small items that crop up in carrying a repair through, which, while not specified, add very greatly to the satisfaction that the work will give if they are done.

HOT OR COLD FITTING.

In France the Best Authorities Favor the System of Fitting the Shoe Hot.

In France, where veterinary science has flourished, and has been productive of most beneficial results, many excellent works on horseshoeing have appeared during the past century. With an intimate knowledge of the structure and organization of the horse's foot, the majority of these writers attempt to establish the practice of shoeing on a really scientific basis; and to make it not only subservient to the defence of healthy organs, but also to remedy their diseases and defects.

It appears from military tests made that with hot fitting, out of 650 horses, the effective strength of a regiment, during every month from 55 to 60 lost their shoes in marching or manœuvering, but since the employment of cold fitting, or, in other terms, the regiment has not marched for an hour without losing a shoe. With the system of hot-fitting, the same regiment lost only one shoe in a journey of eight stages. After an extensive experience, the observer arrives at the following conclusions:

1. The hot fitting is not attended by any danger or inconvenience when properly practiced (that is on hoofs the soles of which are pared).

2. The solidity of hot shoeing (or fitting) being greater than cold, the workman having more facility for the former than the latter, and also owing to its requiring less time, we are of the opinion that in the army the preference must be given to the hot fitting.

The Central Society of Veterinary Medicine of France, composed certainly of men most competent to judge, after discussing this question, came to the following conclusions, which were accepted unanimously by the profession:

1. Hot fitting is undoubtedly superior to the cold fitting, executed in the manner recommended and practiced at this time in that it always allows the workman to make the shoe to fit the foot, a fundamental rule in good farriery.

2. The cold shoeing as now practiced, at the same time that it is generally more difficult and requires a longer time, is for this reason more expensive, while it is generally less solid and less durable..

3. Nevertheless, skillfully practiced by an able workman, cold shoeing may be resorted to with benefit in exceptional cases.

4. The inconveniences attributed to the horse shoeing are also applicable to the cold method, excepting always burning the sole.

5. That this rare accident never produces the bads effects attributed to it.

6. Consequently there does not now exist any plausible or valid reason for substituting cold for hot shoeing.

7. Lastly, the advantages attributed to shoeing that which allows the preparation of the shoes without the horses being present, and applying them away from the forge, are not sufficiently demonstrated; and in any case, if they were, they could not compensate for the inconvenience inherent in this procedure.

And one of the highest authorities on shoeing, Professor Ray, of Lyons, thus sums up the advantages and disadvantages of both methods:

Advantages of cold shoeing—Cold shoeing does not expose the horse to the danger of having his feet burned. It is preferable for weak, flat, or foundered feet with thin soles.

Inconveniences of cold shoeing—The greatest defect in cold shoeing consists in its want of solidity. When we fit a shoe cold, the horn is hard and resists every blow of the hammer, while by the action of heat, it is a little softened, and permits a more exact adaptation It is less solid, particularly in wet weather. When the atmospheric temperature, however, is less inconstant, its durability is greater. This phenomenon is not observed with hot shoeing.

In military campaigns cold shoeing offers less resistance to the deteriorating action of humidity, mud and bad roads. Veterinary surgeons have described the inconveniences of cold shoeing in time of war, in connection with its defective solidity and the difficulty in adopting it. This system of shoeing always necessitates making the foot to fit the shoe. It is difficult of application in cases where regiments are on the march, if the farriers are obliged to seek for the horses in their billets. It takes a longer time and it is not so easy. Its duration is less among town's horses which run on paved roads, as they wear out their shoes in less than from 15 to 20 days. After this shoeing, the horn is more brittle, and shoes are more frequently lost. Lastly, cold shoeing is less economical.

Advantages of hot shoeing—in hot shoeing, the shoe is more readily adapted to the foot. The shoes which have been fitted hot to the hoofs are applied more equally. There is a better adaptation of the clip at the toe, and a more intimate adhesion is obtained between the iron and the surface of the horn.

One French writer thinks that the caloric that impregnates the horn favorably disposes it for the reception of the shoe; that it destroys the absorbent, spongy, hygrometrical properties of the horn, and reneders it insensible to external influences. With some show of reason, the effects produced on the horn by the hot iron have been compared to those of fire on pieces of wood whose extremities are superficially carbonized before being buried in the ground. Every one knows that this operation contributes to the preservation of the wood by preserving it from the action of humidity.

He put the two methods to the test of what was looked upon by competent authorities as a convincing experiment. He took two feet from a dead horse, one of which had been shod in the ordinary manner by fitting the shoe to it while hot, and the other by the cold plan, according to the prescribed rules. These feet were immersed for twelve days in the water and mud of a pond, and afterwards washed and exposed for eight days to the action of heat. At the end of that period the foot that had been fitted with the cold shoe, the hoof of which was previously swollen under the influence of humidity, had lost a great part of its primitive volume by the action of the heat. The shoe projected slightly all round the foot, although it had been closely fitted to the inside quarter according to rule. It was not so firm on the hoof; the nails were not so solid, or so well incrusted in the wall. With the other foot shod on the hot method, nothing like this was observed. After as before the experiment, the solidity of the shoeing was excellent. It was this test that led him to believe that the caloric which impregnates the horn disposes it favorably for the reception of the shoe; that it destroys its absorbent, spongy, properties, and renders it insensible to external influences.

With regard to the risk of injury from burning the sensitive parts enclosed within the hoof, another French authority showed, in a most conclusive manner, that a very long continued application of the hot shoe was required to affect the vascular parts of the foot. Applying a small thermometer to the inner surface of the sole, and bringing a hot shoe in contact with the ground aspect of the foot, he found it required three minutes' burning to produce any effect on the thermometer. And a French veterinary has watched workmen who were unconscious of his presence, in order to note the exact number of seconds during which they held the hot shoe to the foot. These observations proved, that, in shoeing 100 hoofs, the hot shoe was kept in contact with the horn on an average of from 46 to 47 seconds; that the maximum of this application was 80 seconds, and the minimum 29 seconds. He never knew of a horse being injured in this manner.

It may be useful to know his conclusions as to the relative influence of various degrees

of temperature on the foot. The shoe warmed to a dark red heat, the carbonized portion of the sole not having been removed by the buttress, transmits more caloric to the living tissues within a given time than the shoe heated to a bright red. The thickness of the sole being the same, the shoe heated to a dark red causes a deeper a more severe burn than the bright red one.

These experiments confirm that it is not the shoe heated to bright red that most frequently causes burns of the vascular sole, but rather that which is scarcely red or black heated. Latterly the advocates of cold fitting blamed the hot method for causing dryness of the horn and contraction of the hoof; but they either kept out of sight, or were not cognizant of the fact that these conditions were complained of when nothing but cold fitting was known.

Alluding to the experiments that had been instituted to ascertain the relative value of the two methods, a writer says, "From whence arises so great a difference in the results, which is completely to the disadvantage of the cold fitting? It is because the hot shoe, in fusing the horn with which it comes in contact, imprints itself, it may be said, like a seal into sealing wax, and in this way the foot and shoe are in the same relation to each other as surfaces that exactly coincide, while no matter how expert the workman may be in using his tools to level the horn in a cold state, he can never do this so completely as may be done by making an impression with the heated shoe and consequently establishing between the margin of the hoof and the shoe in exact coaptation. It may be added, that when the horn has been softened by the action of heat, the nails enter it with more facility.

The prevention of slipping has determined, more or less, the form of nearly all the shoes and methods of shoeing proposed in recent times. Indeed, it appears to have been, next to the preservation of the wall of the hoof, the chief desideratum from the very earliest period. We have observed that the primitive shoes had calks to grasp the earth, and, in addition, well-lodged nail heads, that stood high above the level of the shoe, and while keeping the animal's foot on a plane parallel with the ground, endowed it with the grasping powers of a double row of catches such as no modern shoeing has furnished.

High Prices for Horses.

"Horses of all commercial types are selling this spring at the highest prices that I can recall," was the report of one of the largest dealers in horses to a New York Herald man last month, in commenting on trade conditions in the old Bull's Head market. "I don't know how to account for it," he continued. "For almost two years horses had been declining in price in all the great markets of the country, and I have so stated repeatedly to the Herald. I am free to confess that it began to look as if the motor vehicle had the old horse a-going, but, say, he has come back with all four feet this spring. We are selling a raft of them and are paying more for good ones than we ever paid before. I suppose the fact that so many breeders and farmers have stopped raising coach horses may account for the scarcity of that kind, but how are you going to account for the high price of draught horses on this theory, when we know they are raising more today than at any other time in the past? If there is any other explanation than that more big horses are being used, then I would like to know what it is."

When to Buy a New File.

One cannot discard a file whenever it has lost its first keenness, but there comes a time, much sooner than is usually supposed, when an old file does not pay. It is not difficult to calculate when this time has come. Say a man receives 25 cents an hour, and is using a file that costs 25 cents. Whenever the use of an old file takes that man half as long again to do a piece of work as a new file would take, then in three hours' work with an old file the price of a new file has been lost. The time to throw away the old file has come before that stage was reached.

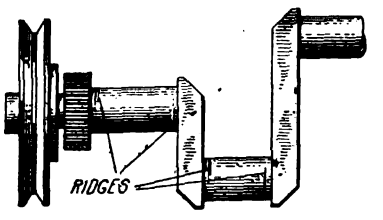
It's human nature to want to lose rather than see some other fellow win.

AUTOMOBILE REPAIR.

How to Remove the Uneven Ridges in the Crank Shaft.

The result of practical experience has over and over again shown that the chief source of worry as regards running an automobile is not to be found in the large and spectacular breakdowns which unfortunately occur from time to time, but in the small troubles which almost appear to be too slight to be worth recording. As a matter of fact, however, it is the neglect of the small troubles which very frequently give rise to the occurrence of the larger ones.

On one occasion a car was being overhauled, which by the way should be made a matter of routine, and should not be deferred until trouble begins to show itself, and when the engine had been taken to pieces it was found that the crank shaft had a few slight ridges on it, which had been caused by the uneven wear of the bearings. The unevenness was nothing very serious, and as a matter of fact, required close observation to see the trouble at all, but the indications were there, and if the unevenness had been left there would have been serious cutting, and possibly overheating of the bearings later on, with the usual



Scored Crank Shaft.

results, a nasty breakdown probably miles from anywhere, and in every probability going uphill. As the mechanic in charge had his head screwed on the right way, he put the matter right in a very short time by polishing off the surface upon the crank shaft. This he did by taking a sheet of very fine emery cloth and saturating it with oil. He did not use kerosene as this would have been of no use for the purpose. When the cloth was thoroughly well soaked with oil, he encircled the shaft with the emery, and by making a steady even motion in working it up and down he succeeded in removing all the rough surfaces. When this had been done, he washed off the surface thoroughly with kerosene, so as to make sure that no little bits of emery were left lying about and the crank shaft was then as good as new for its purpose, and ran perfectly well.

ORIGIN OF WHEELS.

They Date Back Far Into the Mists of Antiquity.

From The Spokesman.—Simplicity is the chief characteristic of the most useful things the world possesses, and few among them are more simple than wheels. Their mechanism can generally be grasped in a moment, but in spite of their almost childish construction they are man's best friends—friends on whom he confidently relies for a thousand and one duties. Indeed, to such an extent do we put out faith in them that it is beyond the power of the human mind to imagine what the world would be like if wheels became non-existent. But there is no danger of such a calamity befalling us, for we may be pretty sure they will continue to revolve in some shape or form until time shall be no more.

Their origin must certainly date back to that problematical period which is known in the vernacular as "the mist of antiquity." Even the Garden of Eden probably contained the germ of the idea, for the nearest approach in nature to traveling on wheels is to be found in the movements of certain round gourds. These when dry roll along the ground rapidly, and so transport their contained seed to a distance. In the Eighty-third Psalm is this passage: "Make them like unto a wheel," which is said to refer to the wheel-like running of the gourds. It is by no means unlikely that the first wheel made was suggested to primitive man by the action of these particular gourds, for not once or twice, but over and over again, inventors have found inspiration in the fairyland of Nature.

Nevertheless, be their origin what it may, the fact remains that they have withstood the whirligig of time as well as the ingenuity of man; nothing has ever been invented to supplant them for the particular and special offices which they fulfill. They are as permanently fixed in the human economy as the everlasting hills or the eternal sea. Of a truth, wheels have never had a real rival, and even an Edison has not devised anything to take their place, while the weird imagination of our novelists, scientists or otherwise, has not hit upon a means of mechanical locomotion where wheels are conspicuous by their absence.

Although to the casual observer wheels may seem unimportant and insignificant, the more closely one investigates the subject the more one's wonder grows at the amazing and absolutely necessary part they play in the drama of life. It will be found that in some shape or form they are mixed up with almost everything connected with the world's work, and with a good deal of its pleasures, too. Indeed, there can be no question that the onward march of civilization has been not a little due to their influence, and, undoubtedly, the growth of the British Empire owes a considerable debt to them, while most of the comforts and conveniences we enjoy are their outcome, for machinery is the leading feature in every kind of manufacture, and what would machinery be like without wheels? Therefore, it cannot be considered exaggeration to say that they are the very backbone and mainstay of the world's activity and life.

Even the planet on which we live can almost be called a wheel, as it is ever revolving slowly, but surely, in the fashion of a wheel. And almost everything that is used as a means of mechanical locomotion runs on wheels—our forefathers traveled in coaches and postchaises, we go hither and thither by trains, motors, bicycles, carriages and steamboats of all kinds, and to each and all of these wheels are a sine qua non. But to help in locomotion is by no means the sole mission of the wheel, for most things of daily use and utility are largely controlled and worked by its instrumentality. In fact, one could demonstrate that, directly or indirectly, almost everything is indebted to it, for it is often a very modest piece of machinery, doing its work out of sight, but not the less efficiently because it is not always seen on the surface of things. For instance, miracles are enacted for us by wheels in connection with the day's work. We find the proper hour to leave our couch by their power in the form of a watch or clock. We bundle out of bed and sit down to breakfast, when we find that the food we eat at that meal would not have been there except through the aid of wheels. Then their instrumentality takes us to the city or wherever we want to go, and they are, in some way or other, concerned with every kind of business in which men are engaged.

It will thus be seen that Western Nations live more or less in an automatic age, but we have not yet adopted a mechanical means of conducting our devotions, such as the praying wheels used by the Hamaist Buddhists, who assume that the efficacy of prayer consists in the multiplicity of its repetition. These instruments are of various ages, from small cylinders turned by hand to huge ones driven by water or wind. Long strips of paper, with a written or printed formula repeated hundreds or even thousands of times are wrapped round these cylinders. As the cylinders revolve the paper rolls uncoil, and so the prayer is said. A traveler in Tibet speaks of a praying wheel holding 1,400 thin leaves, on each side of which the prayer is printed ten times. "This gives 28,000 prayers, all of which are put to the worshipper's credit in the world to come if, with the touch of his fingers, he makes the wheel revolve once."

We all know what we will do in case of an emergency, until the time comes.

It is a common fault not to appreciate a favor until we need another.

It isn't economy to waste a dollar's worth of time trying to save a penny.

SIMPLE REPAIR WORK.

The Wear of Pins and Journals and How to Harden the Metal.

There is considerable wear caused by pins or journals moving in holes or bearings, such as gear-actuating levers and links and brake rods in automobiles. Also universal joints may be included, with their swivel pins; and methods of fitting and casehardening without wrapping or otherwise spoiling the shape or material of the part,

As the first example we will take the simple fork end and lever shown in Fig. 1. After a time the hole is worn out of shape by the case-hardening pins, leaving it oval, and therefore slack and noisy. The best method of effecting a repair is to ream the hole out to such a size larger as will completely remove the worn surface and leave a perfectly round hole and then fit a new pin. If the wear is considerable, the hole must be reamed out at least ⅛ in. above its original size. Then a piece of solid metal is fitted, passing through the two holes for a fork as shown in Fig. 2. This is brazed in place in the usual manner, using spelter, or brazing wire, with borax as a flux. The next operation is to drill a hole through in the position of the original, but 1-64 in. below its finished size, and treat the part fitting between the fork in a similar manner. Next we remove the piece of metal spanning the fork with a hacksaw, and close in the jaws, if necessary, to fit the component part. The two are then fitted together in the usual way, and the holes finished with a reamer to suit the pin. The latter should be a good push fit without any slackness. If secured by a split pin, a washer should be used, when required, to prevent side play. In the case of a bracket being a fixture to the chassis, and not detachable for brazing, a bush, if required, must be screwed in. The hole is planed out to such a size as will leave at least ⅛ in. of new metal when the pin is fitted. For example, a ½ in. pin. would require a bush screwed ¾ in. A fine thread is always best for the purpose—say, 20 threads to the inch. To assure a tight fit it is always advisable to make the bush tapered on the thread, about 0.003 to 1 in. of its length.

The methods described can be adapted to various other parts, such as universal joints. In the case of a wide fork end the holes can be bushed separately. If the holes or bearings are large, a piece of tube can be used for bushing, instead of a solid piece of metal. A better job can be made of such parts if the bushes are screwed in before brazing. Care must be taken to anneal the parts first, as they are invariably hardened. In case of a piece such as that shown in Fig. 3 requiring to be bushed, the repair is a matter of some difficulty. It would be found cheaper to make a new piece. To ream the swivel bearing to fit the pins, they should be placed together in working position. To ream them separately is most convenient and easy, but in assembling, unless great care has been taken, the holes will not come into line for the pin to pass through. Slackness will sometimes be found endways between the faces. This is best taken up by closing in the fork, and refitting. It can also be done by fitting washers between the faces of the required thickness.

Another repair is sometimes necessary to a universal joint of the type shown in Fig. 4. The square end of a driving shaft fits in the square sleeve, forming a telescope joint; after a time the sleeve will wear loose, and rattle when revolving. There are two ways of remedying this defect—firstly, by heating the sleeve and closing it in. It must be gently hammered, while red-hot, along the four edges to produce an even shrinking. Care must be taken not to cause the sides to curve in, or difficulty will be experienced when fitting. After cooling, it can be filed out to fit the square end of the driving shaft. Sometimes the square end of the latter will have worn out of shape. If so, it is annealed in the usual way, and filed into shape again, the sides being made perfectly parallel lengthways, and square with one another. Fitting of the square end should be done before fitting the universal joint pins, as the fork end invariably requires setting after being heated and hammered.

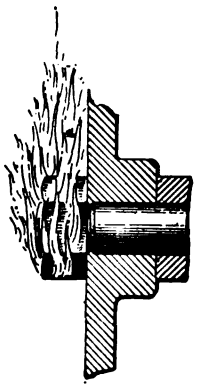
The second method of repairing is to anneal both parts, and reduce the square end of the shaft about ⅛ in. on each face. Plates are fitted on the latter, being pinned securely, and all four brazed on in the usual way. The easiest method of brazing the plates is to fix the shaft vertically on end, making a fine clay mould around the square, leaving the top open. Then spelter is run down all four faces at the same time. The square end of the driving shaft and the sleeve should be a fairly tight sliding fit.

Casehardening of the parts mentioned is quite an easy matter if done with sufficient care. The parts are heated to a bright-red heat and plunged in finely powered prussiate of potash, or other hardening compositions, the operation being repeated three or four times to get a good deep skin or case. Finally they are plunged in lukewarm water while still red hot. Very cold water tends to crack the surface, thus weakening the part. It is also important not to overheat, or the results will not be satisfactory, as decarbonization is likely to occur. In hardening parts such as Figs. 3 and 4 it is necessary to fill the holes well with potash, or whatever hardening composition is used; these being the bearings, are therefore the surfaces needing to be casehardened. The method of plunging is also an important consideration if warping of the parts is to be prevented. In parts such as Fig. 1, 2 and 4, the parts marked A should be the first to enter the water. After plunging, a rapid up-and-down movement is continued in the water until cooling is complete. In the case of Fig. 4 it is best to treat the fork ends first, and then to harden the sleeve, using hot water or oil. Repairers find this such a difficult piece to harden that more often than not it is left untreated. With Fig. 3 and similarly shaped parts the end of the largest hole is the first to enter the water, it being kept vertical until cool. If plates have been brazed on, care must be taken not to overheat, keeping them well below brazing temperature. Even with the greatest care warping will sometimes take place, but it is no difficult matter to lap out a hole or to rub down a high place with emery or carborundum. When reaming out, before casehardening, the holes should be a good fit, as there is a tendency to increase in size, rather than shrink, as would be expected. Pins should be casehardened in a similar way and plunged vertically. If of any great length they are best treated before being finished to their final dimensions, and then finished by grinding. Only a few examples have been given in the foregoing, but the principles are adaptable to numerous parts.

REMOVING A NUT.

One Way to Do It Without Injury. Sense in Place of Muscle.

In the course of overhauling an automobile it was found that one of the nuts was particularly tight and was very difficult to remove. Now a motor car mechanic need not necessarily be a heavy-weight prize fighter, and it will not hurt if occasionally he has a little more brains than strength. Some men

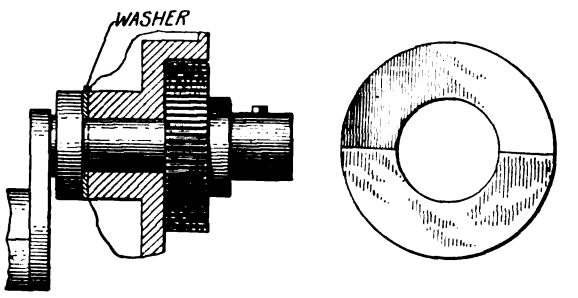


To Loosen a Nut.

confronted with an awkward nut would have lost their head and their temper, and gone at it with brute strength. This would probably have succeeded in wrenching the stud clean off, and he would then have spent a few hours in repentance while he drilled out the stud, retapped the hole, made a new stud and screwed it into place. As the mechanic in question did not feel like doing a lot of unnecessary work of this sort he thought the matter over before doing much. First of all he looked around for some kerosene to pour over the nut, thinking that if he lighted this, before the stud got too hot, it would make the nut looser enabling him to work the nut off the stud in the usual way. As he could not find any kerosene, he used gasoline which answers just as well for the same purpose. The nut, however, was too firmly on the thread to allow of its removal by the simple application of a spanner, so the mechanic had another period of thought. He decided to pour some gasoline over the nut periodically and let it soak for an hour or so, after which he repeated the warming up process again, and this time, when the gasoline had burnt itself away, he attacked the nut gently but firmly with a spanner with a piece of iron tubing through the end of it to get more leverage, and then he had the satisfaction of finding the nut come away cleanly and sweetly. Of course, the whole thing is absurdly simple, but at the same time there are some men with big muscles in the world who would have gone the shortest way to work and smashed things up.

A Worn Bearing.

A blacksmith repair man may be required to remedy a worn main engine bearing. In one instance, when a car was out on a rather hilly district, which, owing to the small horsepower of the car, necessitated gear changing on every little rise, it was noticeable that at the moment of changing back, and as the engine was pulling up a hill, a distinct thump was to be detected, which, upon investigation, turned out to be due to a good deal of play on the ends of the main bearings of the crank shaft. This caused the crank shaft to drop



A Washer for a Bearing.

bodily back while the car was on an incline, the crank shaft literally tending to "fall down hill," and this, owing to the small clearances which obtain in a motor car engine, brought the balance weights on the crank shaft into contact with the webs on the top half of the crank case. This, of course, was an evil which had to be remedied with very little delay, as continual knocking of this sort would soon destroy the engine. When the car arrived at the shop, the crank shaft was taken down, and two washers were turned out of a piece of brass. These were then sweated on to the ends of the bearings, and were of course cut into halves, so as to correspond with the halves of the bearings. These were then fitted into place again as shown in the illustration, and the brass extensions were fitted so as to present an even surface to the crank shaft projection, and on running the car again it was found that this simple device was sufficient to take up the end play on the crank shaft. In this way the knock was obviated for a very considerable period, and the device was the means of saving the expense of new bearings. Care should be taken, when taking down the crank shaft, to mark the timing gear, or otherwise on re-erection it will be found that the timing is incorrect and the shaft will have to be taken down once more.

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JUNE, 1912.

PARTIAL CONTENTS.

THE BUSINESS TREND.

It seems fair to say that mechanical power and improved machines and tools have reduced the blacksmith work to be done and cut down the time necessary to do it faster than the natural growth of the country has increased it.

But practically the same condition exists in all other channels of business, mechanical and otherwise. We observe evidences of this almost every day. Just as this is being written an electrotyper and engraver who has for many years done the work connected with The Blacksmith and Wheelwright is complaining because so many have recently gone into that business in this city, making competition sharp and not giving any one firm enough work to do. When he was reminded, however, that these "interlopers" had to do something to get a living and that all other channels of such business were equally overcrowded, he quickly saw that he could not fairly complain.

The blacksmith business has suffered no more than many others from the invasion of those who are looking for something to do, having either fallen out in the struggle in some other calling or are crowded out by some change in business conditions over which they have no control.

It sometimes seems as if the industrial world were undergoing an entire transition of methods and conditions. In any event, it behooves blacksmiths as well as all other business men to closely watch the trend and keep fully abreast with the van of progress.

Looking backward, we have seen again and again where failure to keep up with the times has been followed by business decay.

Take the single instance of the automobile invasion. It must be admitted that in some localities it has seriously affected wagon-making and horseshoeing but it has created just as much business as it has destroyed, only it is in a somewhat different line. Not that the horse and wagon and carriage will ever be wholly displaced, by any means, but they will divide business with the automobile. Yet blacksmiths and wheelwrights should get in line for whatever work the automobile makes in the way of repair and replacement, for it properly belongs to them. No one can do it better, provided they acquire a fair knowledge of automobile construction, and to do work with a little more precision than the ordinary blacksmith business calls for.

Again, blacksmiths are not called upon to do as much wrought iron work as they were years ago, tools and implements being now manufactured at far less cost than if made by hand. Yet these tools and implements are short-lived as compared with those which they have displaced and they require far more repair. Thus they create about as much work as they have destroyed, and the smith is the right man to do this repairing also.

Altogether, the outlook is anything but gloomy. But it will not do to look backward or wait. Those only who keep up with the march of progress will succeed.

TIME TO RAISE PRICES.

Have you raised your prices yet? The cost of living has raised, the price of stock has raised, labor costs more, and it is safe to assume that you did not charge enough for work even before this rise in other prices. This makes it clear that if you have not raised your prices for work within the past year or two you must be at present doing business at little or no profit.

It is true that some of your customers will complain if they are charged more than formerly, but such complaints will, of course, be made without knowledge or reason. Such complaints remind us of a story current some years ago which ran something like this:

"How much do you ask for those buttons?" asked a man of a merchant.

"Fifteen cents a dozen," was the reply.

"I'll give you 35 cents."

"I did not say 50 cents, I said 15," replied the honest merchant.

"Well, I'll give you 10 cents then."

This is often the case with the man who has work done at a blacksmith shop. He knows little as to how much should be charged for a given piece of work, but he is often satisfied if he can get it for less than the price at first fixed. He goes to the shop and waits, for illustration, while his horse is being shod. Possibly he "keeps tabs" on the time it consumes. The work may be done in a half hour and the charge may be a dollar. "Two dollars an hour for work," the customer says under his breath; "rather profitable." Yet he will go to the doctor and pay him a dollar for five minutes work, to the lawyer and pay him $10 for a few minutes work, and to the merchant who in two minutes measures off a few yards of cloth at a profit of a dollar, and thinks nothing of it.

It never occurs to him—nor often to the smith himself, for that matter—the hours of the day that the smith puts in his time for absolutely nothing.

THE HELPFUL SPIRIT.

Somebody has likened the world to a ship and humanity its passengers. No matter how anxious an individual may be to get to port, he can only reach it with all the others. The progress that pushes forward all insures the progress of the individual. The individual is not superior to society and never will be.

But be this as it may, and whether enduring and permanent prosperity may best be secured by the every-one-for-himself plan or by the each-for-all plan, there is nothing that so sweetens the world as self-sacrifice and consideration for others. In the long run this is the highest wisdom for the individual as well as for the whole. "Whosoever will save his life shall lose it, and whosoever will lose his life, the same shall save it."

It may be said with the utmost confidence that no other class exercise this feeling of brotherly love as much as do the blacksmiths. Were they as a class sordid and ensouled by the idea of self-interest, we could not begin to make as good a paper for them as we do. When they help each other through this journal, they help us, and they likewise get back far more than they give. So this feeling of mutual helpfulness blesses him that gives and him that receives.

THE CASH SYSTEM.

Just how and why the credit system became so common in the blacksmith trade is not fully apparent, but quite likely it is due, more than anything else, to a prevailing feeling that blacksmiths are "easy," to use a common expression.

It is gratifying to note that one Canadian smith recently made up his mind that he himself was as much to blame for giving credit as any one else. He reasoned thus: "I do the work and have carried men on my books from year to year, for eleven years, and it has been proven, without a doubt, that no matter what degree of care is exercised some one gets away with some of my hard earned money. If I continue along the way that I have been doing I will eventually end up broken down in health, with lots of accounts on paper, called a fool for working so hard, always short both in pocket and home comforts, not a cent in the bank for exigencies of sickness, or disablement, and marked 'honest but slow pay' with the supply houses. I will start my shop on the cash system, let all others have the credit, if they so desire. Then next morning I called on my neighbor to talk the matter over with him and after going into the subject he in turn went to see his woodworker, and we all three agreed to take the stand together. We had an advertisement in our local newspaper, and proclaimed our intention to the trade in the district for three issues. In this way we started out on the new trail, and up to now I have yet to hear the first word of dissension to the plan; in fact, several of my customers have said to me, 'it is a fine thing; you should have started it years ago.'"

This blacksmith says he has found that this cash plan works first-rate, and although some of his customers could not quite understand that he meant every word, he said, "the light finally began to shine in their case hardened souls," and most of them took to the cash system without grumbling.

The blacksmith has certain expenses which must usually be borne weekly, as for instance, the pay of his workmen, and other bills like pay for stock, must be met promptly according to agreement. It is not only that he needs cash payments to meet these bills, but he

needs them to protect himself from the unscrupulous debtor who intends never to meet his obligations.

WELL WORTH NOTING.

Those who have the time to spare and who are interested in industrial tendencies will find it instructive to analyze the recent advance bulletin on manufactures, issued by the census bureau. This is specially important in view of the recent agitation of the question of greater "efficiency" in this branch of production.

Right here it may be stated as a singular fact that greater efficiency is being urged in the case of manufactures where we can already produce far more than we can consume or find a market for, and very little is heard in relation to greater efficiency in the case of agricultural production where we cannot produce as much as we can consume or find a market for.

But let us note the progress in efficiency in manufactures, taking the government investigations as a basis. Unfortunately, we have no data later than 1909, the census figures not having been brought anywhere near up to date.

It appears that during the ten years from 1899 to 1909, the number of manufacturing establishments increased 29.4 per cent.; the average number of wage earners employed, 40.4 per cent.; the value of materials consumed, 84.6 per cent.; the value of products, 81.2 per cent.; the value added by manufacture, 76.6 per cent.

In other words, the per cent. of increase of production was twice as much as the per cent. of increase of workers. It would seem from this that there is no great need of worrying over greater efficiency of manufactures, of which we already are producing more than we can consume, and in which production we are marvellously efficient and constantly growing more so, and neglecting efficiency in farm products output, which we cannot produce in sufficient volume to meet the demand.

It may be of interest to know that, according to the figures referred to, the gross value of manufactured products in 1909 exceeded that in 1899 by more than $9,000,000,000.

INVITATION TO CALL.

Whenever a reader comes to the city we shall be glad to have him call at this office and see us. If he chances to be unfamiliar with the city we may be of some service to him. Being in a strange city is about as bad as being out at sea without any chart or rudder. Although one may get his bearings, so to speak, give him time enough, yet it is a great time saver to have some one to direct him.

It is needless to say that the editor feels that each reader of this paper is a friend, and he wants to assume the obligations of a friend to each and all of them.

Most business men find opportunity for a little leisure and travel in summer. Why should the smith be an exception? With the right kind of relations of the craft one with another, the blacksmith business might be put on a plane of prosperity and dignity—and we do not speak of "dignity" in the sense of loftiness but rather as being honorable and worthy of fair remuneration—so that those who follow it might have leisure as well as those employed in other trades or professions.

But in any event, our readers will please remember that they will be warmly welcomed whenever they call to see us.

PESTILENTIAL FERTILITY.

That old maxim, "A stitch in time saves nine," seems to have somewhat gone out of currency. Nevertheless, it is good practice to follow and is well to keep in mind. Last month we referred to the advisability of combined warfare on the disease breeding and annoying filth reveller, the fly.

In some parts of the country systematic and combined efforts have resulted in temporary extermination, but of course the war must be continuous. The point, however, is that it has been found advisable to meet the pest rather more than half way, so to speak. Begin early, and be thorough and systematic in the war of extermination, and the subsequent work need not be very heavy or burdensome. The main thing is to kill the first fly.

A doctor in Washington, D. C., has demonstrated that from a single female fly in a single season, 8,273,684,211 flies may descend. Making allowance for an inaccurate few hundred millions, more or less, it certainly pays to "swat" the first fly, for in this case a stitch in time saves a good many billion.

CORRESPONDENCE

The Greatest Linguist.

From Charles Barker, Connecticut.—In the year 1837, the ship "Betsy," Capt. Howell, engaged in the West India Trade, owned by the shipping firm of Henry Trowbridge & Sons, of New Haven, was nearing port when she fell in with a sailing vessel apparently in distress. Capt. Howell heaved to, and discovered a shipload of black men wildly gesticulating. Being unable to get information, he decided to take the vessel into port. Exercising friendly pantomime, and donating provisions, he delegated a portion of his crew who worked the vessel into New Haven harbor. The collector of customs found no cargo, but plenty of ballast, and over a hundred black men, all unable to speak English or Spanish. The linguistic scholars of Yale University were appealed to for assistance, as were many other linguists, but all were baffled in an effort to understand the gabbling gibberish of the blacks. An interested spectator said he "knew of a man whom he thought might understand their language" and his suggestion was taken up and his man was immediately sent for.

Arriving on board the vessel, he declared he could not converse with them, although pretty well up in languages, but he would agree to remain aboard twenty-four hours and report results. He did so, and the next day announced that he had mastered their language sufficiently to learn that the men were natives of interior Africa, were lured to the coast by bad negroes, captured by a white crew and forced on board their vessel which proved to be a Spanish slave trader bound for the United States. Their chief, who believed land was near, conspired with his subjects, and slew the entire crew, throwing their bodies overboard, and attempted to navigate the vessel toward land when picked up by the "Betsy." The Spanish government demanded the return of the vessel with its passengers, which the United States eventually permitted. The man who unravelled the mystery was no other than Elihu Burritt, christened by Edward Everett "The Learned Blacksmith," and alluded to by the Poet Whittier as "One who stammered in a thousand tongues."

Advice to the Craft.

From C. G. S., Missouri.—It is with pleasure and profit that I have read the interesting articles in your valuable journal for the past sixteen years. I think I have saved every copy. I recommend it to all the trade as it keeps the men thoroughly posted in the new tools and kinks that are being used.

I want to say something concerning the mail order houses. I think that papers true to the craft will not advertise for them, but will, to the contrary, fight against them. A mechanic is often considered simply a machine and in some cases the heavy hardware house grinds all the money out of him they can and gives him little in return. A smith should be a merchant and have the same buying privileges that the hardware man has. He should also be educated as to costs and the expense of doing business. It would be a good plan if he were to put the cost of the articles he sells, so that the public could see them and know what he pays. He is entitled to a profit, not only on the goods themselves, but for the expense of carrying them in stock. Then he deserves a fair compensation for using his strength and talent in putting them together for his customers' benefit.

Almost all farm products have advanced in price recently, and the smith should consider this also and get something to cover the extra cost of the goods he uses in the shop. There is also an advance in the price of labor to consider as well as the cost of living. Many blacksmiths have no system in their business, and do not go into the matter of the capital they have invested or insurance and taxes. Some of the farmers will howl no matter what you charge, but the smiths are entitled to a profit as well as anyone else. Do good work and get a good price for it. Never allow a job to leave the shop until it is finished in the best possible manner. I wish the craft a successful season and hope they will loyally support the worthy trade paper which I and they have taken so long.

Handy Tools for Plow Work.

From Joseph Call, Virginia.—I will try and explain, by the aid of the accompanying illustrations, three different tools, all of which will be found convenient for all smiths that have plow work to do. Fig. 1 is a tool for holding plow bolts, to prevent their turning while taking off the nuts, when shares are to be taken

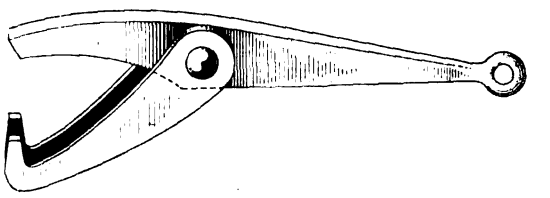


Fig. 1—Handy Tools for Plow Work.

off for sharpening. All know how difficult and vexing it is to take nuts off of bolts that have no square shanks and have become rusted, as we very frequently find in plows brought to the shops for sharpening. I first take a piece of steel—an old spring leaf will do—18 inches long, and one and one-half by one and one-fourth inch long, as shown in

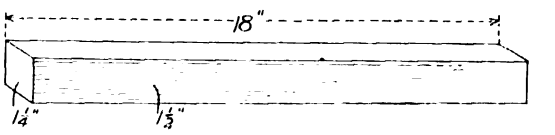


Fig. 2.

Fig. 2. I next place it in the fire and forge both ends down, and shape as shown in Fig. 3. One end is finished chisel-shaped, and tempered, as this is the point that presses against the head of the plow bolt. The other end is swaged down and bent, forming a ring on the end for a convenient hand-hold; it also answers for hanging it to a nail when not in use.

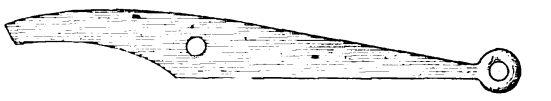


Fig. 3.

I next drill a three-eighths inch hole through this, 8 inches back from the point, as shown in Fig. 3. Next I make two claws as shown by Fig. 4, with a three-eighths inch hole in one end, and place one on each side of Fig. 1, and put a bolt or rivet through, but I do not fit tight, as these claws must work loosely in the rivet so that they can be easily adjusted.

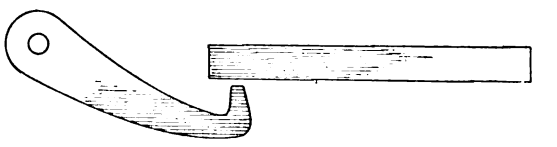


Fig. 4. Fig. 5.

Fig. 1 shows the bolt-holder complete. Anyone can readily see how it should be worked. For instance, turn a plow upside down, and there is not a bolt in a share that cannot be held firmly by simply hooking the claws on the edge or bar of the share, the chisel-shaped point against the head, and then putting your hand on the furthest end, next to the ring, and

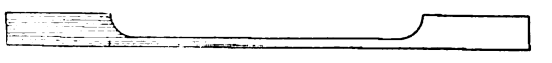


Fig. 6.

pressing downward; this will sink the point into the bolt-head, and push it tight in the hole, thus holding it firmly. The nut may easily be removed with a wrench. By this simple device many a bolt may be loosened in a minute, which otherwise would necessarily be cut out and ruined.

A bolt-holder for holding plow bolts or any

other countersunk headed bolt which would be ruined if screwed up in the jaws of the vise for recutting threads. I use a piece of steel, as in Fig. 5, 8 inches long, three-fourths of an inch wide, and three-eighths of an inch thick. I heat it in the center, and forge it out thin,

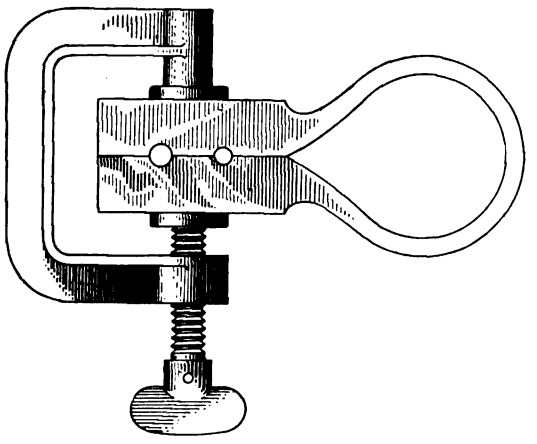


Fig. 7.

as in Fig. 6. After this is done I heat it for shaping as in Fig. 7. When cold the inner edges of the thick ends are filed square, so that they fit close together; clamp the ends together with a clamp, as in Fig. 7, so that the holes to receive the bolts can be drilled

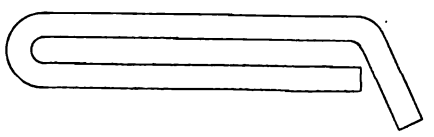


Fig. 8.

through. Now, if I want this to hold a three-eighths and seven-sixteenths inch bolt, I drill the hole one-sixteenth of an inch smaller than the bolt to be used; if for a three-eighths bolt, I drill a five-sixteenths inch hole, so that when it is to be used it will grasp the bolt tight

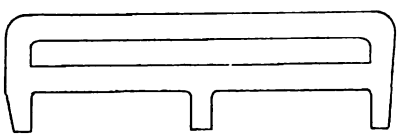


Fig. 9.

enough to hold so that the threads may be cut. It should be understood this is to be used in the vise. The object of drawing it down in the center is to make it springy, so that it may be opened and closed by hand, for receiving the bolt, and it also may be hung on a nail

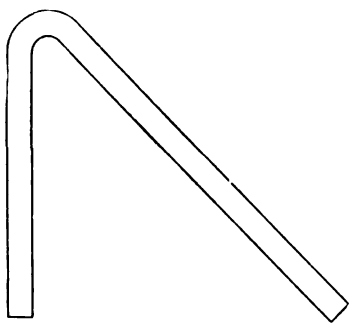


Fig. 10.

near the vise, where it always will be handy.

My next is a device for holding slip shares; this is to take the place of tongs while sharpening, pointing, or while welding the short landside to a new slip share. This device is not only to take the place of tongs, but it will

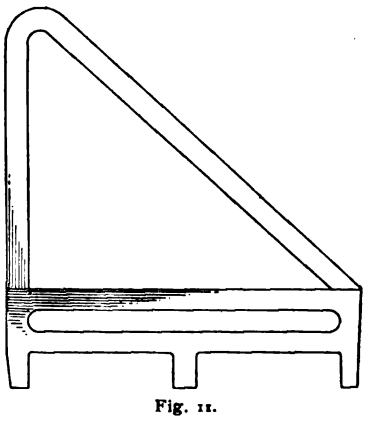


Fig. 11.

save a great deal of trouble. Without it, as a general result, slip shares are liable to warp or spring out of shape while sharpening. This is made of wrought iron. First, take a piece of five-eighths inch iron, 16 inches long, and bend as in Fig. 8, leaving a space of three-eighths of an inch full between the bars for the admission of hook-bolts. Next place open ends, as seen in Fig. 8, in the fire for welding. After this is done, weld two more tits on as represented in Fig. 9. These tits, one on each end and one in the center, are the points that belong on under side of slip share when in use. Next take a piece of five-eighths inch round iron for the handle, 30 inches in length, and bend as in Fig. 10, for welding on to Fig. 9. Next weld the ends of Fig. 9 to ends of Fig. 10, so it will look as in Fig. 11. Next

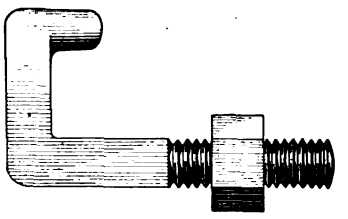


Fig. 12.

make two hook-bolts, as represented in Fig. 12. Make them of good iron, with thread and nut on one end, and the other end shaped as in Fig. 11, making the screw end long enough so that nuts never need be removed while applying or removing from the share after it is shaped. The screw end should also be thin enough to pass through the slot next to the brads in Fig. 9, and so that it may be slipped from one end to another. The hook-bolt should be made strong in the first bend, so that it will not bend while being screwed up on the share. The little tip, as shown in

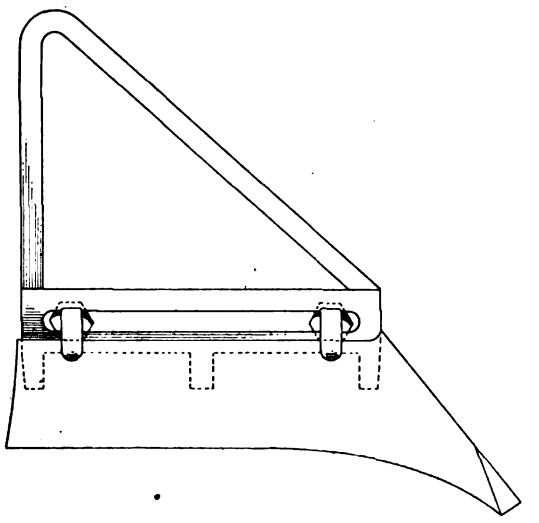


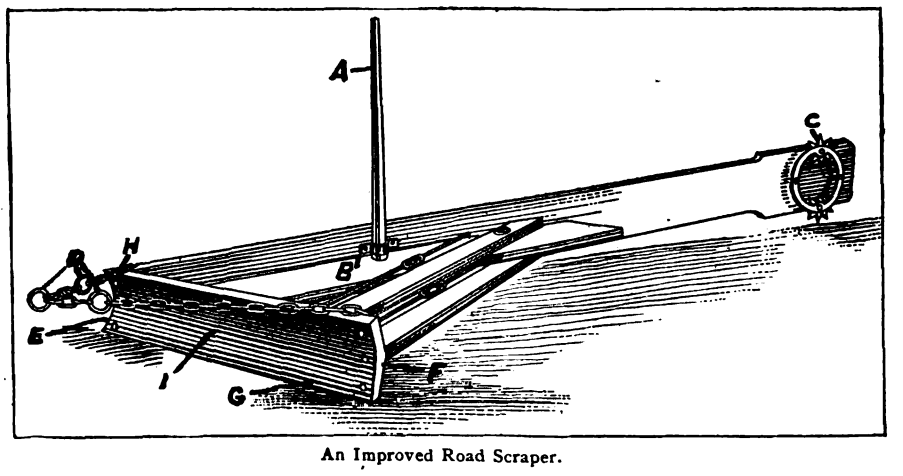
Fig. 13.

Fig. 12, on the end must be round, so that they may go into the hole of the plowshare.

To put it together, take the top off Fig. 12, and pass through the slot of Fig. 11; put the nut on it, and it is ready for use. Remember there are two pieces like Fig. 12. The share is placed between Fig. 11 and Fig. 12, as shown in Fig. 13. The hook-bolts may be moved to suit any hole in the share and by a few turns with a wrench it can be put on or taken off. This tool should be kept near the forge, where it will be convenient, as it will be found indispensable when working on slip shares.

An Improved Road Scraper.

From John S. Pitner, West Virginia.—I have been taking The Blacksmith and Wheelwright for upward of 20 years and it has been a great help to me in my business, I send you an illustration and explanation of my road scraper. As shown in the sketch, A is the guide handle and the man stands on the running board, B. By so doing, he can throw his weight out on it and make it run on the point or nose and cause it to take a deeper hold in water. C is the sprocket wheel on the rear end or tail, for the purpose of steadying it from jumping around. D is the three different hitch ring. The center ring pulls straight, the other two rings pull it sidewise. The position of the chain in the illustration is right for digging in when wanting to use for dragging and filling holes. If you hook at D you have the best drag that was ever made. The King drag is not in it with this. When you want to plow water tables out, throw your chain under the rear end of the moldboard, I, and over the top. The moldboard is of steel 5 feet long and 14 inches wide, concaved to 40 degrees with cutting edge on both sides. When working roads that can only be worked on one side, use the guide handle, throwing it one side or the other as may be desired. The price of this road scraper is $20 or six for $100.

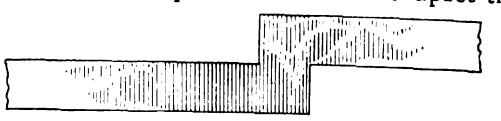


An Improved Road Scraper.

Rocker Plates.

From Wagon Man, New York.—The question has often been mooted about the corners of rocker plates; should they be welded or upset? To the many questions that have been asked upon this subject the following answers and illustrations are given:

Fig. 1 represents what might be termed a "close or short square corner." To upset this



Square Corners in Rocker Plates. Fig. 1—The Close or Short Square Corner.

corner would require much labor, and if the iron were three inches by one-half inch there would be many cold shuts formed before the corner became perfect, unless a thorough welding heat were taken each time. As before mentioned, this would be a laborious and costly method; neither could the mere scarfing

Figs. 2 and 3—Illustrating the Best and Most Safe Method as Suggested by the Author.

and welding be advanced as a sure and safe method.

In Figs. 2 and 3 is given an exemplification as to what would be the best and most safe method, which is done as follows: Upset the piece, Fig. 2, sufficiently to allow of the corner, and to form a V-shaped point or projection

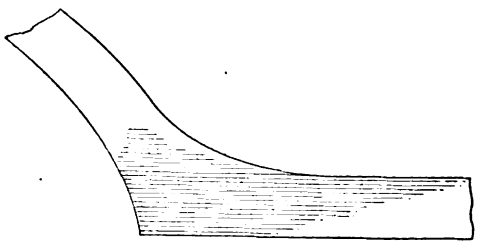
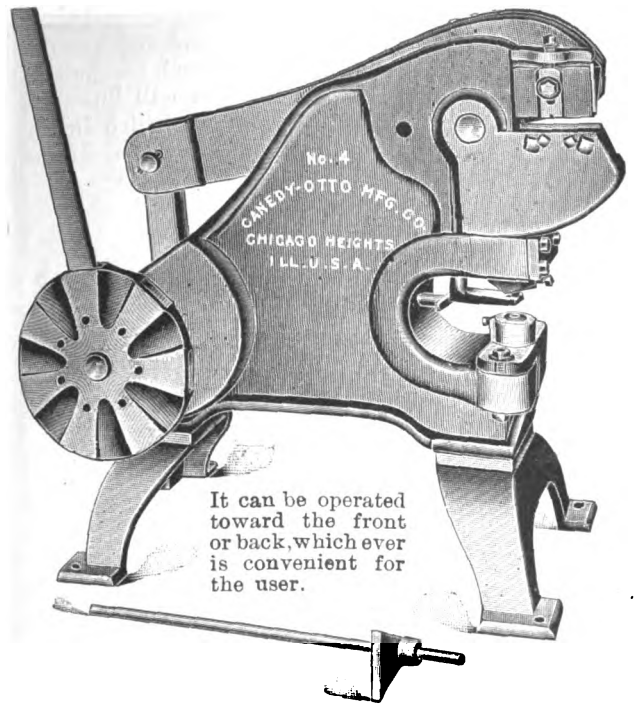


Fig. 4—To Upset and Form a Full Round Corner on the Upper Side.

on one side, as illustrated. Fig. 3 is put through the same process, so far as relates to upsetting; we then apply a sharp chisel, and split the projection caused by upsetting, and so shape it as to allow of the insertion of Fig. 2. After the pieces are sufficiently heated for welding, allow the helper to take out what might be termed the "she" part of Fig. 3, the smith to handle Fig. 2 or "he" part. With a good heat, properly worked, we get a much better corner than we can by plain scarfing

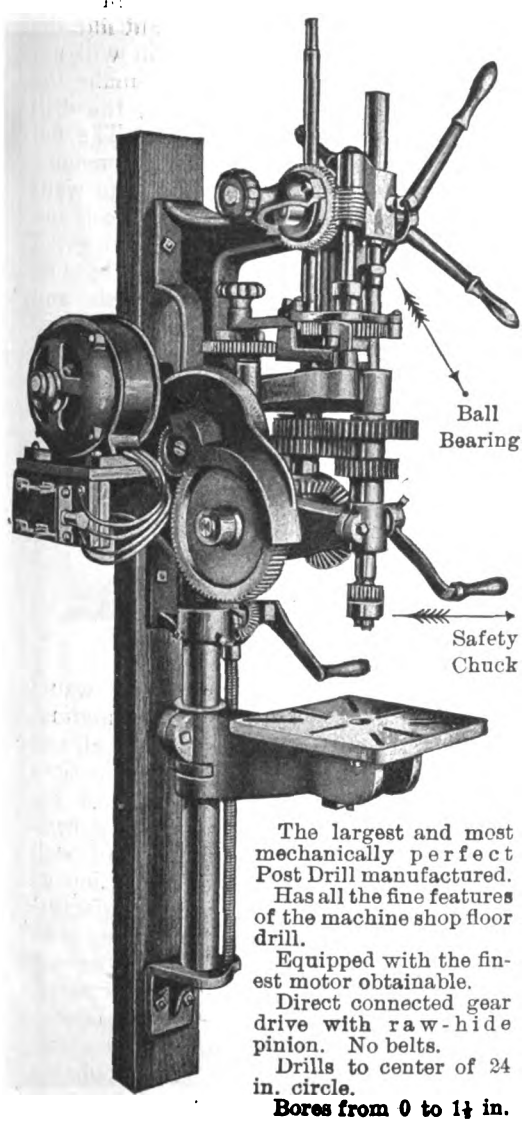
No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ¼-in., ⅜-in. and ½-in. punches and dies, also a lever bar.

FORGES
BLOWERS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

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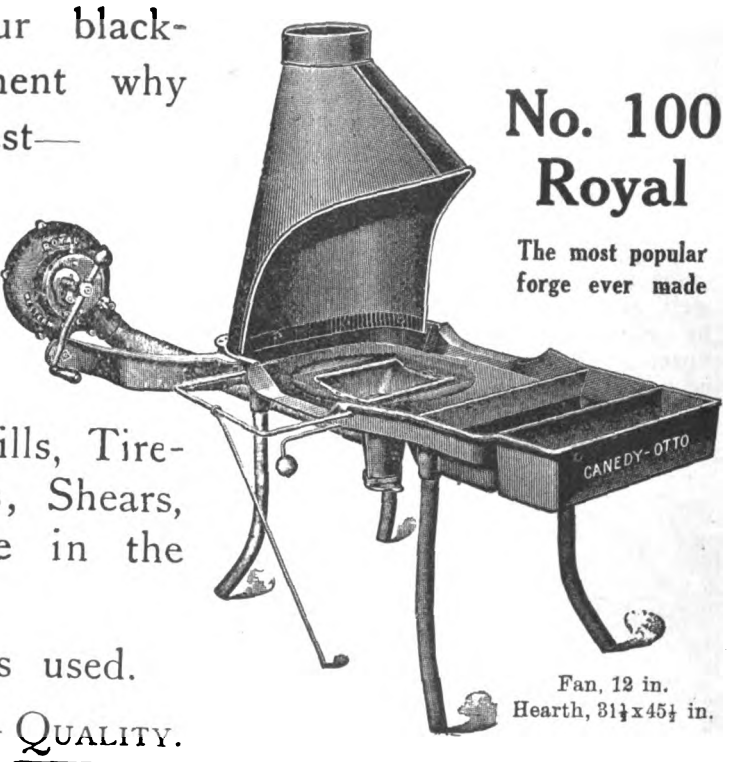
There's a reason — QUALITY.



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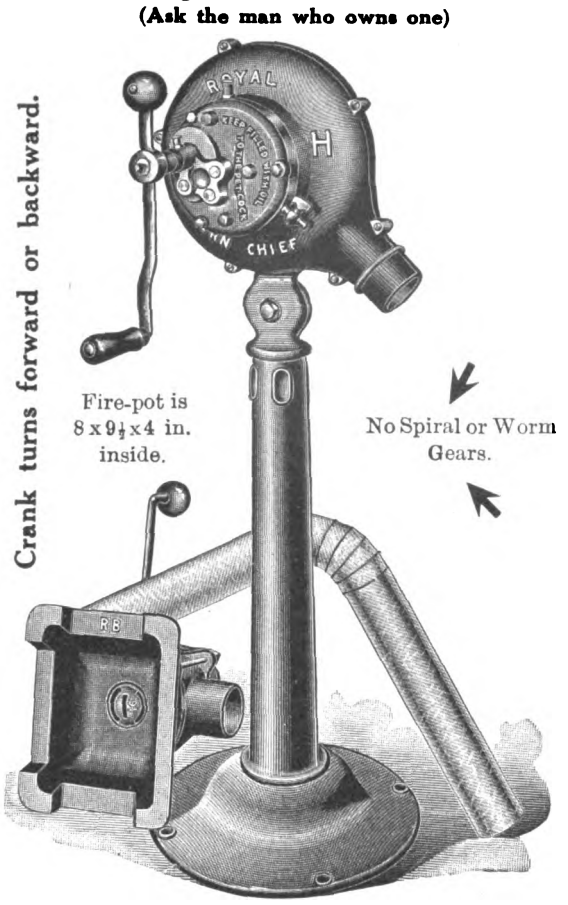

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DRILLS
TIRE-SHRINKERS

Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

Give name of supply dealer or jobber.

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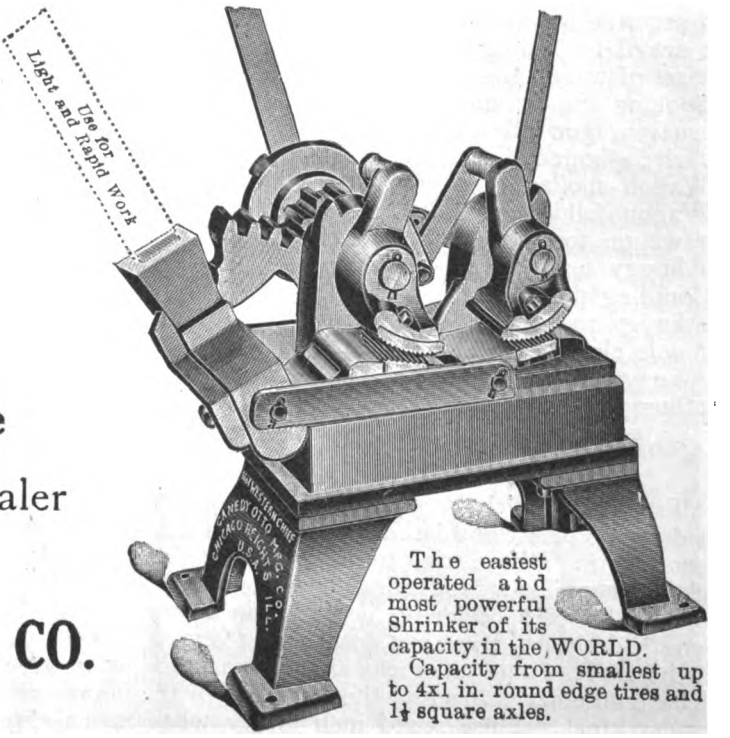
(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1 in. round edge tires and 1½ square axles.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

and welding, and much quicker than by upsetting, and, on the whole, a corner that will perform all that is required of it without giving way a particle.

For the back corner of the cut-under of coupes, it is better to upset and form a full round corner on the upper side, as is shown in Fig. 4; but three or four heats are required to turn and form a perfect corner of this kind, the upsetting being done in the vise, and corner squared on the horn of the anvil. In cases as represented by sketch, Fig. 4, it is well, and, in fact, it facilitates the operation, to weld the corners; the ends should be well upset and a light or short corner turned upon each end, so as to allow of lapping well while

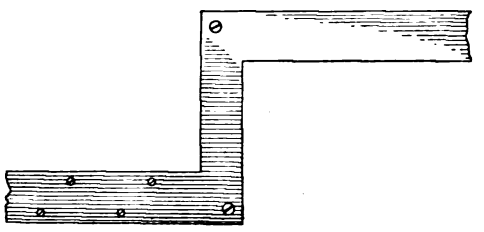


Fig. 5—Shows Where the Screws Should be when Drilling.

welding. If there be not a third person by to assist in the welding process, it will be found rather difficult work to perform the thing satisfactorily.

In drilling there should be a screw in each corner, as marked in Fig. 5, and where the screws are set alternately in or on either edge, the proper distance between the screws should be not less than five inches on the same side, and not nearer the edge than in the heavier-sized plates, five-eighths or three-quarters of an inch. Where narrow plates are used, and the screws are in the center of the plate, the distance between the screws ought not to be less than three inches.

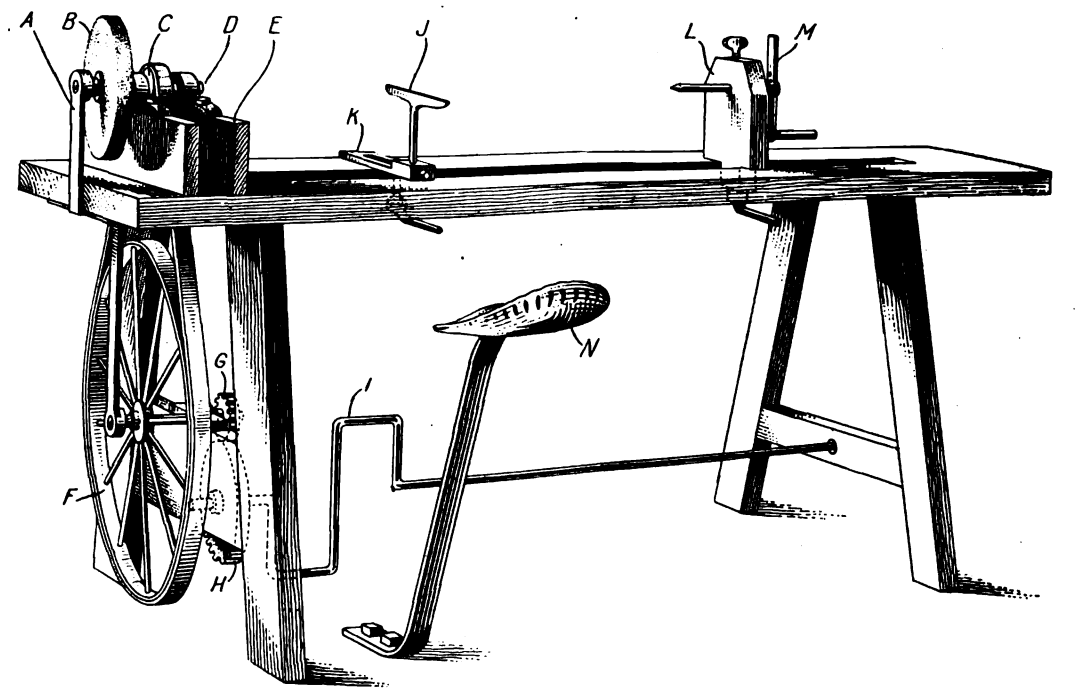
Prices for Work.

From C. R. Edwards, Missouri.—The following are my prices:

Old shoes, reset	$1.00
Old shoes, retoed	1.20
New shoes, No. 1 to No. 5	1.75
New shoes, No. 6 and No. 7	2.00
New Neverslip shoes	2.50
Neverslip shoes reset	1.00
Neverslip shoes recalked	1.00
Plow sharpening, 12 inch	.25
Plow sharpening, 14 inch	.30
Plow sharpening, 16 inch	.35
Plow pointed, 12 inch	.75
Plow pointed, 14 inch	.85
Plow pointed, 16 inch	1.00
New plow shares	3.00
New plow shares, 14 inch	3.25
New plow shares, 16 inch	3.50
Sharpening disc blades	.25
Rolling cutter blades	.35
Cultivator shovels	$2.50 to 3.00
Sharpening cultivator set	.50
Trimming cultivator set	.75
Setting 4 wagon tires	2.00
Setting 4 buggy tires	2.50
1 set of one-inch buggy stubs	7.00
1 set of 1⅛-inch buggy stubs	8.00
1 set of 1¼-inch buggy stubs	10.00
1 set of 1 x ¼ buggy tires	6.00
1 set of wagon tires	10.00
Spoking and rimming 4 wagon wheels	20.00
1 new wagon axle	3.00
1 circle hound	3.50
Wagon spokes, each	.25
Wagon felloes, each	.25
1 wagon tongue	3.00
1 buggy tongue	3.00
Coupling pole	1.00
1 buggy reach	1.25
1 pole circle	1.50
1 buggy shaft	1.75
1 buggy cross wire	1.00

A Home Made Wood Lathe.

From E. S. Nicholson, Indiana.—I send you a drawing of a wood lathe I made which does good work. I have tried to make the drawing plain enough for your draftsman to understand. I used 2 x 8 for the bed. It can be any length desired. Mine is 5 feet; legs 1½ x 2½ inches. Head and tail stocks are 7 inches high. I have an emery wheel on the left hand of the emery stock. I use a 2½ inch pulley wheel on top, a 24 inch fly wheel, and two cog wheels as shown. The cog wheels give it great speed. The wheels can be found in most any old junk pile. The seat is an old mowing machine seat bent at the foot to fasten to the floor. It is not every one who can afford to buy a lathe, and this will answer the purpose. In the illustration, A is the end pressure brace. B is the emery wheel; C is a 2 inch pulley;



Home Made Lathe of Mr. Nicholson.

D is the head stock; E shows the blocks for the shaft to run on; F is the fly wheel; G the cog wheel, 3 inches in diameter; H is the large cog wheel, 8 inches in diameter; I is the pedal for turning, made of ¾ inch iron; J is the tool rest; K is the block for the tool rest; L is the block for the tail stock; M is the tail stock; N is the seat. I used the bearings of an old binder for the head stock.

A Bit Extension.

From E. R. Sizer, Idaho.—It often happens that a blacksmith finds it necessary to drill a hole in some place, where the ordinary drill bit is not long enough to reach, and an extension has to be added to make the drill the required length. The average bit extension, with chuck on the end for holding the drill, is a clumsy affair, and a neater, handier extension

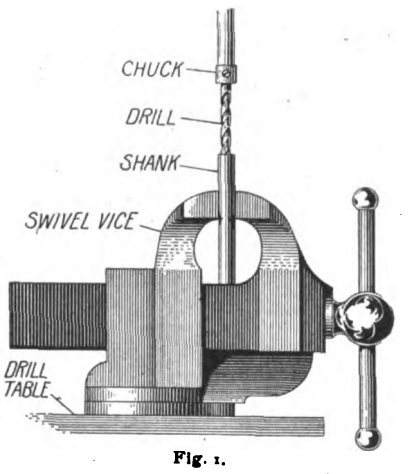


Fig. 1.

can be made in a few minutes which will hold the drill firmly and is cheaply constructed. It is an old trick, but may be new to some. To make the extension take a piece of rod (round iron of any kind will do, but cold rolled is preferable) a little larger than the drill you wish to use, center one end and punch a mark to start your drill. I like a chuck to my drill press which will take any size drill from 1/16

Fig. 2.

inch to ½ or ⅝ inch shank, and use the straight shank drills. Then if you break your drill, you can still grasp the piece left, and do fairly well, where if you had a chuck that would hold only one size shank, like ½ or ⅝ inch you would have to throw the broken drill away. I have a small bench vise, with swivel base, to bolt on the face plate of the drill press, and find it very convenient to hold various pieces while drilling. Put the rod in the vise on the drill table and drill with the bit you wish to extend, making the hole about 1¼ or 1½ inch deep. Now measure the depth of the hole and mark with a center punch on the side of the rod, and drill a hole that will just miss the end of the hole which you drilled in the end of the rod. Then grind the end of the drill flat, and square up the ends of the holes. If more convenient, you may simply file a slot half way through the rod to intersect with the hole, Fig. 1. File or grind a flat on the shank of the drill, catch the drill in the vise, and drive the shank down onto the drill, so the flat face on the drill shank slips onto the flat filed in the extension, and your extension is com-

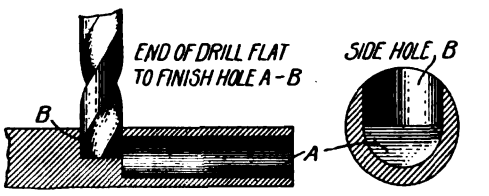


Fig. 3.

plete. By studying the sketches, it will be clear how to proceed.

Where the extension must enter the hole after the drill, file the shank of the drill down some in the vise; then catch the "business end" of the drill in the drill chuck and file the shank round while it turns and you will get it true. Then file the side flat, and make the extension of the same sized iron as the drill and it will follow into deep holes. The flat holds the drill from turning in the extension.

I want to say to all blacksmiths who want to repair automobiles and gas engines, and have no knowledge of the subject, to get a copy of "Plain Gas Engine Sense" by Osborne, advertised in The Blacksmith and Wheelwright. It is a small book, but contains more plain, common sense instruction, put in language which the ordinary man can understand, than any book on the subject I have ever seen, even though they cost four or five times as much. And I also wish to state

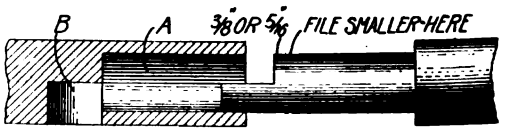


Fig. 4.

that any blacksmith or machinist who wants to handle steel, in hardening and tempering, and works intelligently, must study steel, and read books on the subjects, while he practices and experiments with steel, and one of the best books for the steel worker is "The American Steel Worker," by Markham, and well worth the price asked. I hold a position as foreman blacksmith with a large manufacturing concern, and do all the hardening and tempering, from common cold chisels to sub and punch press dies, reamers, milling cutters, etc., and I know what I am talking about. The blacksmith who wishes to advance and become better workmen, must read books as

(Continued on page 226)

(Continued from page 224)

well as work at the trade. Books, after all, are only somebody's experience, written and printed in book form, and you who have profited by someone else's experience written in The Blacksmith and Wheelwright, can just as surely profit by reading some of the books published and for sale by the publishers of this paper. I can give any one desiring them, the names of several good books on steel and machine work, and I think if we would volunteer lists of good books which we could recommend to blacksmiths, and read them ourselves, and get them into the hands of apprentices and helpers, we would advance the blacksmith trade a step, and help some brother seeking for knowledge.

How He Runs His Gasoline Engine.

From G. K. Watson, Mississippi.—I find that there are two kinds of gasoline engineers floating around in this world.

I bought my first gasoline engine more than two and a half years ago, which I have used from one to three days each week grinding corn into meal and freezing ice cream. I purchased the engine for a 4 h.p., using it nearly two years, when my customers increased to such an extent that I needed more power. I began to turn over in my mind the possibility of purchasing a new and larger engine. I found that I could not do this as I had no money. I took the governor to pieces and shortened the governor stem, thereby increasing the capacity and speed of the engine. Later this began to become too slow, I then enlarged my fly pulley so as to make the mill run about one thousand per minute. This last improvement brought the capacity to seven bushels of finished corn meal per hour.

I have been using kerosene oil nearly ever since I started, at a cost of six and a half cents per gallon against gasoline at eleven cents. I found that one gallon of kerosene would run my engine just as well as with gasoline thereby saving the excess in cost of four cents or forty cents a day, ten dollars and forty cents per month. By some study and experience I have learned how to use my exhausted dry batteries twice as long, thereby cutting down another expense.

Of course while making these alterations several engineers came around putting in their knowledge. On one occasion when a bolt broke out of the crank thereby straining open the cap so I could not use it, I received the advice that it was ruined and might as well throw it in the scrap pile and purchase a new one. It was not the cost of a new one, but the loss of time and customers while I waited for the new piece to come from a far away factory. I melted the metal from the bearing and proceeded to a shop, where by careful hammering, I soon brought it back to its former position, putting in some bolts from the shop, which lasted until I could order new bolts. I make my springs from an old coiled door pull spring when in need of new ones for rig which wear and break, but received some advice from a bystanding engineer to the contrary. This engineer always scoffed at me when I would pick up the dry cells thrown out by the automobile owner. I can fix them so as to use them on both stationary as well as automobiles and create as strong current as before. I hope this will be of some benefit to people living far back from railways where it is hard to get batteries.

The engineers who did not appreciate the trouble of probably having to crank his engine several times before it would start on kerosene says, "I can't see the saving by the use of either kerosene or old worn out batteries."

It is but little trouble to secure a three way valve, a small tank and a few feet of pipe. Cut your regular gasoline pipe in some convenient place, put in the three way valve, connect your pipe from it to the small tank; when finished fill the larger tank with kerosene. Start your engine on the gasoline and when your engine gets warm enough so you cannot rest your hand on the cylinder, turn the three way valve so the kerosene will feed into engine. Just before you stop the engine cut it back on the gasoline tank, letting the engine run long enough to use up all the kerosene still remaining in the pipe and carburetor. I have no trouble whatever and save nearly the cost of a new engine by such methods. Think of it, ten dollars and fifty cents a month by the use of kerosene and one-half the cost of batteries. One set will run my engine six months before exhausting themselves. Work them over and use another six months before discarding them at a cost of twenty-five cents for renewal.

The Cause of Iron Rust.

British investigators estimate that the rails of a single railway system in England lose 18 tons in weight every day, and that the larger part of this loss is due to the effects of rust, says Railway and Locomotive Engineering. The problem of rust is of great economic importance, not only because of such losses as that just mentioned, but also because of the great expense involved in repainting iron and steel structures in order to preserve them. Thus $10,000 a year is spent in painting the great Scotch bridge over the Forth. Recent experiments indicate that pure iron in the presence of pure oxygen does not rust. It appears to be necessary for the production of rust that some acid, notably carbonic acid, shall be present. When iron is subjected to the action of water containing traces of acid, and in the presence of atmospheric oxygen, it always rusts. The rapid rusting of iron in railroad stations is ascribed to the presence of sulphuric acid derived from the smoke of locomotives.

If obituaries are true, then most of the really good people must be dead.

Most of our prayers are more like orders than petitions.

Soldering Aluminum.

Although there are various methods and compounds for soldering aluminum, any of them depend more upon the way the work is done than anything else. Unless considerable experience has been had it is better to purchase solder than to attempt making it. Zinc can be used but does not form a very strong joint. Tin can also be used, is more nearly the color of aluminum, is stronger than zinc, but is very difficult to work. A small proportion of phosphor tin added to pure tin makes it work more readily and is the basis of most aluminum solder.

The chief difficulty in soldering aluminum is that the heat is dissipated so rapidly that it cools the soldering iron and furthermore aluminum oxidizes instantly upon exposure to the air. This extremely thin film effectually prevents a perfect union being made. If the parts are well heated and melted solder kept hot while the iron is allowed to stand on it, the surface can be scraped beneath the melted solder by the point of the soldering iron, thus preventing to a certain extent the oxidization. In this way the metal can be tinned. When both parts to be brought together are well tinned, the parts can be united with some chance of success, nitrate of silver, resin, or zinc chloride being used as a flux. A soldering tool of nickel gives more satisfactory results than a copper one as the latter alloys with the tin and soon becomes rough.

If the surface is of such a shape that it cannot be readily cleaned by scraping, it can be cleaned by dipping it into a solution of nitric acid in three times its bulk of hot water containing about 5 per cent. of commercial hydrofluoric acid. This causes a slight action on the surface of the metal as shown by bubbles. Rinse the metal after removing from the acid bath and dry in hot sawdust. The following formula, in the hands of a competent man, can be used to unite aluminum or aluminoid parts:

Tin—10 parts.
Cadmium—10 parts.
Zinc—10 parts.
Lead—1 part.

The parts to be united must be thoroughly cleansed and allowed to stand two to three hours in a strong solution of Hypo-Sulphate of soda before being operated upon, or cleaned in the acid bath described above.

Cleveland Concord Express Axles.—If we have any readers who are not acquainted with the Cleveland Concord Express Axles, No. 6½, manufactured by the Cleveland Axle Mfg. Company, of Canton, Ohio, we recommend them to turn to the advertisement of this company on another page, and then write at once for a souvenir which this company will send on receipt of a postal card. It is said these axles will outwear any wagon.

"An Hour's Work for One Cent."—This is the phrase which heads the advertisement of the Witte Iron Works Company, 1606 Oakland Avenue, Kansas City, Mo., to be found on another page. This company manufactures the Witte Jr. Gasoline Engine in sizes from two H.P. up to eight H.P. and a special guarantee for five years goes with each engine. But consult the advertisement and write to the company above for their new catalogue and special proposition.

Tire Bolt Wrench.—This wrench is manufactured by the Miller Wrench Company of Ft. Wayne, Ind., and will be found briefly illustrated and described in our advertising department. Dealers and jobbers everywhere sell it. Our readers are recommended to ask their dealers to see this wrench. It is convenient for both new and old work and it is said to be a great favorite wherever it has been introduced.

Wool Fat—What Is It?—Turn to the advertisement of the Corona Mfg. Company, 102 Corona Block, Kenton, Ohio, and you will learn exactly what it is. It is said to be great stuff for curing old sores on horses and cows. Wool Fat is extracted from the wool of the sheep and does not differ from the secretions in the skins of other animals. Wool Fat will penetrate the hoof and will positively grow a new hoof. This company wants to show our readers how it is done and makes a special offer to send a two pound can free. They take all the risk and want you to try it because they are aware they say of the marvellous results which can be obtained from it. Write at once for a trial can and special terms to agents.

Chapman Engines.—Are made by H. L. Chapman, Box "B," Marcellus, Mich., see illustration in advertisement on another page. Mr. Chapman says his engines are designed to do a large amount of work with a gallon of gasoline. He stands ready to prove that he can accomplish all that he claims to accomplish in his advertisement. If you are interested write for descriptive circulars and price and mention The Blacksmith and Wheelwright.

Great Free Offer.—It hardly seems necessary to direct attention to the full page announcement in this issue of the Rowe Ring-Point Company of Hartford, Conn., in which you will find their Catfoots shoes illustrated and described. These shoes are not an experiment. They have been in use in Germany since 1880 and have been a success. This company will send one set of shoes absolutely free, charges prepaid, to the first horseshoer answering this advertisement in each town with paved streets. Write at once for illustrated leaflet with full particulars and directions. Read the advertisement carefully, otherwise you will not know whether you are interested or not. Do not fail to mention The Blacksmith and Wheelwright, as that is a condition we understand of making you the proposition of a present of a set of shoes.

United States Vehicle Tires.—The manufacturers of these celebrated tires announce that they make the right tire for every kind of service from pony cart to omnibus. Their line covers an internal wire solid rubber vehicle tire, a side wire solid rubber vehicle tire, and two types of cushion tires, one with the center wire and one with the low wire hole. These tires are made with extraordinary service-yielding qualities and are a good proposition for any blacksmith or carriage and wagon repair man to consider. Nearly all of our readers are putting on rubber tires and they should write to the United States Tire Company, New York City, for further information, not forgetting to mention The Blacksmith and Wheelwright.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

Soldering Granite Ware.

From William R. Parisen, New Jersey.—I see an inquiry from E. P. Campbell, Ohio, asking how to solder granite cooking utensils. I have done the job in this manner: Make a soldering solution of muriatic acid killed with as much zinc as it will dissolve and add a small lump of sal-ammoniac. With a ball peen hammer dent in the hole and then scrape off all the enamel until the iron is clean. Tin all around the hole with soldering iron and then draw the solder over the hole. If the hole is large, take a copper rivet and burr and rivet up the hole and then solder as above.

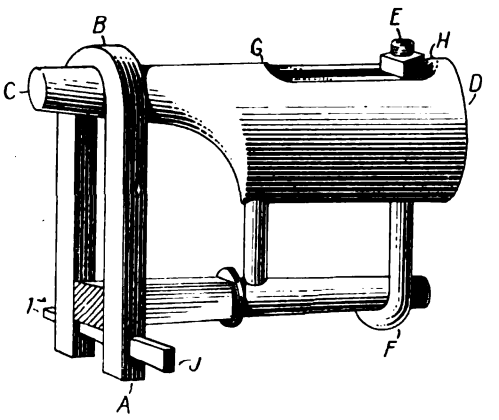
Cold Tire Setting Is Best.

From L. L. Warren, Texas.—I want to congratulate Gus Wilson of Kansas on his sermon last month on cold tire-setting. I feel like saying "Amen" to him and calling him brother. I have always wanted to tell my brother craftsmen what my experience has been with cold tire-setting, for my experience is about as old as Mr. Wilson's. I have only been in the business between nine and ten years, and during that time I have used five different makes of cold tire-setters, so I can speak from experience also.

Cold tire-setting is now, and always will be, the best way to shrink tires. It is the most satisfactory and the most scientific. I think there are but two classes of blacksmiths that harp against cold tire-setting; one is the man that is not able to buy and is afraid some of his customers will go to his competitor, which they will always do. The other is the man who has tried some cold tire-setter that wouldn't do the work right because it would shrink a tire too much in one place and kink or dish out a wheel and wouldn't stop automatically just when it ought to even if he did keep on pulling the lever. With most any edge grip machine any tire can be set perfectly if the right care is taken in doing the work, but there is no man that can set a tire perfectly with any machine on any wheel, without considerable care. Yet a man can learn to do the work with speed and still use care. I can with no hindrance set four wagon tires in twenty minutes from the time I go outdoors after my first tire until I have the last one back on, and one day last summer I set four buggy tires in eleven minutes from the time I started outdoors after my first tire until I had the last one back on the buggy. I got two dollars for it and guaranteed the job to stand until the next season.

For Setting Buggy Axles.

From W. D. Wood, Ohio.—I saw in a recent issue where a friend wanted to know how to set a buggy axle without taking the axle off. The machine shown in the sketch is easy to make, and is indispensable in a shop. From A to B is 10½



To Reset an Axle.

inches, from C to D is 13 inches, from E to F is 8 inches, from I to J is 8½ inches. I hope this outline will help the inquirer to make one. The axle is shown inserted for setting.

Making Bar Shoes.

From D. G. Lawson, Pennsylvania.—I will try to tell how I make a barshoe.

First I shape my shoe as in Fig. 1. Then I

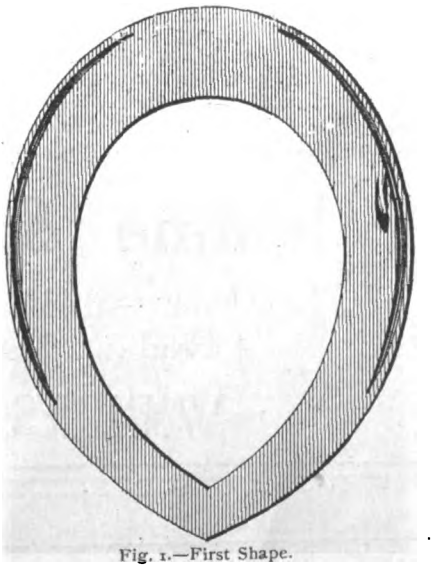


Fig. 1.—First Shape.

take a good welding heat and weld, put the shoe on the horn of the anvil and strike the projecting end down, first on one side of the weld and then on the other. That brings it into the shape shown in Fig. 2. I next lay the bar down flat on the horn and plate it out thin. If after that I want it to look still thinner and to finish it with unusual care, I take a ball

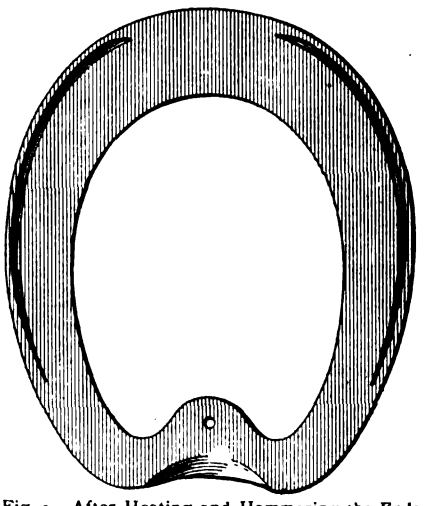


Fig. 2.—After Heating and Hammering the Ends.

hammer and thin it at the heel as shown in Fig. 2.

To fit the shoe to the foot I punch a hole in the bar and then fit the shoe on like a common shoe, keeping the bar from bearing on the frog, but getting a good fit to the foot all around.

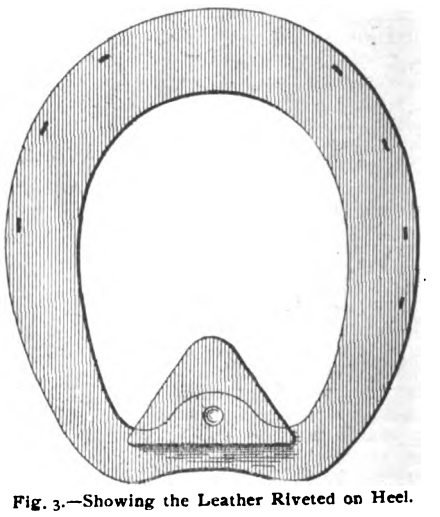


Fig. 3.—Showing the Leather Riveted on Heel.

Then I take a piece of leather as thick as I want to make my frog bearing, and rivet the leather on the bar with a copper rivet, as in Fig. 3. My shoe fits the foot, the leather gives the frog pressure, and when the foot comes down on the shoe the fit is perfect.

Diploma for Horseshoe Exhibit.

In the shop of E. H. Tucker, Norwalk, Conn., is displayed a framed diploma, dated 1870, for a horse shoe exhibit at the State fair. It was awarded to the father of the present proprietor.

A Valuable Booklet Free.—Every reader of The Blacksmith and Wheelwright should send a postal card or letter to the Pennsylvania Coal and Coke Corp., Whitehall Building, New York City, for a copy of their little booklet which they publish relative to their Webster Smithing coal, which contains valuable information concerning the use of coal for all blacksmiths. Many blacksmiths do not realize how much good work and a good job depends upon the quality of coal used. The Webster Smithing coal is practically free from sulphur, it fuses iron or steel quickly, and it insures a firm weld. It is a well known fact that welding is impossible with sulphurous coal. This coal is also said to be free from dirt or slate. In other words, it is pure coal, high in heat producing efficiency. It ignites quickly and burns long with an intense steady heat. Many large shops throughout the country are using this coal exclusively. The Webster Smithing Coal is mined from one basin in Cambria Couty, Penna. and runs wholly uniform. It is sold by local dealers throughout the country but if yours cannot supply it, write for terms direct to the Pennsylvania Coal and Coke Company at the above address. If you try a sample ton of this coal, you are likely to want carloads of it, and whether you are interested in the coal or not, do not forget to send for the instructive and interesting booklet, which will be sent free to any part of this country, and in writing for it mentjon this publication.

Wheels in Stock.—Our readers who may be in need of wheels should turn to the advertisement of the Muncie Wheel Company, P. O. Box 548, of Muncie, Ind., on another page and write to them for prices. Jobbers generally handle Muncie wheels, but if your jobber does not handle them, you can get full particulars by writing direct to the company as above. This company also makes a complete line of vehicle wheels, gears and automobile wheels.

Victor Horse Shoe Pads.—These pads are made by the Victor Rubber Company of Springfield, Ohio, and are said to be most satisfactory to the blacksmith and most satisfactory to the horses. They are made of good live, long wearing, rubber and the best oak tanned leather, coupled with what is described by the manufacturer as perfect workmanship. Ask your dealer for them and if he does not keep them write direct to the company as above.

The Latest and Cheapest Punch.—This device is manufactured by the Tomlinson Mfg. Company, of Severly, Kansas, and will be found illustrated and briefly described in our advertising department. It will punch one-half inch iron and works five times faster than drilling. A twist of the wrist firmly locks it to the anvil. Send a postal card at once for descriptive circular and prices and mention The Blacksmith and Wheelwright.

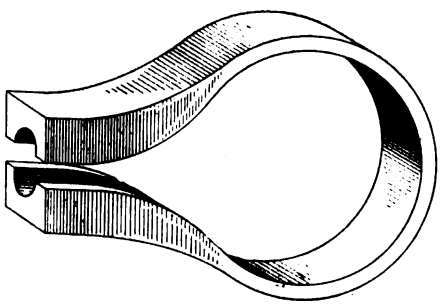
We understand that the Sidney Tool Company of Sidney, Ohio, manufacturers of a variety of woodworking machines and supplies for blacksmiths and wagon makers, has broken ground for a two-story brick addition to their factory, which will increase their output at least one-third. It speaks well for the popularity of the various woodworking machines made by this company that an enlargement of their factory is necessary.

Soldering Granite Ware.

From Theodore Jiricek, Wisconsin.—Brother F. P. Campbell from Ohio wants to know how to solder granite ware or so-called enamel ware. First take a good sharp scraper or file and clean and scrape the parts where the enamel or glazing has been chipped off. Then take a small brush and use Allen's Soldering Salts which he can get from Montgomery Ward & Co., Chicago, Ill., and use common solder.

For Holding Plow Bolts.

From James Halladay, Kentucky.—The

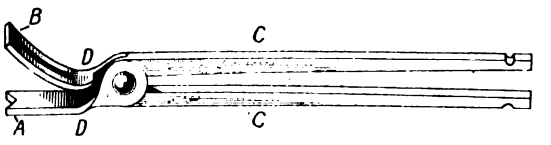


For Use with the Vise.

sketch shows a good device for holding plow bolts in the vise while running down the tap. By using it there is no danger of running down the head. Take a piece of heavy spring steel about ten inches long. Swell the ends and cut grooves to nt the bolt head, then bend to shape, as shown in the illustration. The bolt head will come between the two ends and in the groove cut for them, while the tool is screwed tight in the vise.

Tongs for Handling Plow Lays.

From A. S. Bretz, Illinois.—I have in use a pair of tongs which I find very useful when sharpening plow lays. The jaws A and B are made of iron, 1½ x ⅜, and are three inches long from the end to point at D. One jaw is made concave so it will fit the top of the lay



Plow Lay Tongs.

while the other will lay flat on the bottom side of the bar. The jaw B has a slot cut in it 2½ x ½ inches.

The handles C C are made of half-inch oval iron, fifteen inches long, drawn on the ends a little and nobs worked on them, so that when clamped on the lay with a ring it won't jar off.

Still Favors the Horse.

The Studebaker Corporation, through its export department, New York, has just exported for the personal use of the Crown Prince of Germany a Studebaker light driving wagon. The Crown Prince of Germany, an enthusiastic motorist, is in like manner an enthusiastic horseman, and will personally use this Studebaker driving wagon in the pastime pleasure of exercising his horses, and he is reported to have some good ones.

Sticking Gaskets.

Where asbestos and some other materials are utilized for gaskets they are apt to stick to the metal and upon overhauling must be scraped off. This means making new members and a loss of time and a source of expense to the owner. A tight fit may be made by rubbing the packing and metal parts with dry graphite. This is not affected by heat and will allow the gaskets to be removed as a whole.

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QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Remedy Wanted for Brittle Hoofs.

From R. L. Hutchinson, Ohio.—I have some horses to shoe that have brittle hoofs that will not hold a shoe. They break out around the nails and get loose. This occurs in the summer when it is dry weather. I would like to have some remedy for this if there is any, and maybe some of the brothers know of something to help me.

A Water Forge Blower.

From W. Hay, New Zealand.—I would be pleased if any of your readers could give me information how to fit up a water blower for a forge fire. I find much useful matter in every journal but don't mind seeing how a water blower is fitted up.

Soldering and Retinning.

From O. C. Cox, Texas.—Will you kindly give the best recipe for hard soldering and retinning soldering irons?

Also the best way to repoint plows. I wish you would give a drawing of the piece to go on the point.

Wagon Axles.

From A. V. Wristen, Nevada.—I would like some brother to tell me the easiest and best way to mark out a wagon axle.

A Crooked Foot.

From L. B. Keeton, Oklahoma.—I have a jack that I am shoeing and he has a crooked foot. I would like to know how to shoe him to straighten his foot.

Seasoning Lumber.

From Edward Long, New York.—Kindly ask some of the brethren if they can tell me a good way to season lumber.

Grinding the Lawn Mower.

From the Heath Foundry and Machine Manufacturing Company, Plymouth, Ohio.—Through the kindness of one of our customers, our attention is called to an article in your April number under the above heading, by A. E. Bachman, who sets forth the different methods of grinding lawn mowers. Mr. Bachman concludes by stating that a lawn mower cannot be ground successfully without being torn apart, and the reel knives removed. He states that to "grind it as you find it is a little better than filing because the blades cannot be ground their entire length, so filing must be resorted to at the ends." With the methods for grinding the lawn mower in use for the past three years, the reel knives of practically all mowers can be ground their entire length, and a great majority of the straight blades can also be ground without removing them from the mower.

How much profit would there be in taking the mowers apart, which are often badly rusted, and grinding the reel, and also removing the straight knife, when competing with one of the grinders which does not require any dismantling of the mower and which does a first class job?

If Mr. Bachman could see the large number of unsolicited testimonials of pleased users of this style of machine, he would change his mind. His opinion is based on the early types of grinders, which, owing to the point the grinding wheel touching the knife, would not allow the reel knives to be ground the entire length of many mowers.

We believe many readers of The Blacksmith and Wheelwright who are using this type of grinder can bear us out in the foregoing statement.

Believes in Organization.

From T. D. L., New Zealand.—I would like to see the blacksmiths do in America the same things we are doing in this country. Here we have formed a Master Farriers' and Blacksmiths' Association, and with the iron merchants we draw up fixed prices for all classes of shoeing once a year. If the smiths everywhere would do this, and the dealers in their supplies would back them up in getting good prices for their work, they would be far more prosperous. We even go so far here as to favor dealers not supplying goods for cash or otherwise, those who do not join the association. The dues for the association in this country are $5.00 a year. It has thus far worked very well.

Want Advertisements.

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED.

will be inserted under this head at 2 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1. Address

M. T. RICHARDSON CO.,
Publishers of The Blacksmith and Wheelwright
71-73 Murray St., New York

PATENTS FOR INVENTIONS.
H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.
We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., Publishers, 71-73 Murray Street, New York City.

WANTED.
WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

CASH FOR YOUR BUSINESS OR REAL ESTATE.
If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

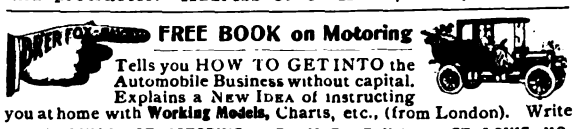
PATENTS.
Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. Davis & Davis, 908-914 G. St., Washington, D. C., and 220 Broadway, New York City.

BROTHER.
Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

WE BRING BUYER AND SELLER TOGETHER.
If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

DESIGNS, DRAWINGS AND SKETCHES.
Of pleasure and commercial automobile and other bodies for the trade. No order too large or too small to receive prompt attention. Write for information and get acquainted. GEO. J. MERCER, Automobile Body Designer, American Building, Columbus Circle, New York.

MECHANICS.
Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.



FREE BOOK on Motoring
Tells you HOW TO GET INTO the Automobile Business without capital. Explains a NEW IDEA of instructing you at home with **Working Models,** Charts, etc., (from London). Write
DYKE'S SCHOOL OF MOTORING, Box 10, Roe Building, ST. LOUIS, MO.

PATENTS.
C. L. PARKER, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

BLACKSMITHS.
Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

FOR SALE.
McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

MANAGER FOR WAGON SHOP WANTED.
A large concern in one of the chief eastern cities uses heavy delivery wagons. It maintains a shop to make and repair these. It also builds new wagons and repairs old ones for outside concerns. A competent superintendent and business manager is wanted. One who can see that work is well and economically done, and that the business is pushed along profitable lines. State experience and salary expected. Address AMERICAN, Box 654, New York City.

FOR SALE.
Complete Wheelwright business, 40 years at the same place. Good business in growing town of 8,000 inhabitants. Old age reason for selling. Information furnished. Address J. A. FISHER, Lake City, Fla.

FOR SALE.
Half interest in blacksmith and wagon shop. Averages over $1,500 in work monthly. Plant easily worth $5,000. Will sell my interest for $2,000. Address E. E. GRAY, Astoria, Oregon.

FOR SALE.
A first-class blacksmith and repair shop with modern tools and a good stock in a good Iowa town. Address W. L. JENSEN, Dike, Iowa.

FOR SALE.
Blacksmith and wagon shop located in Lyman County. Doing good business, good reason for selling. Address LOCK BOX 22, Murdo, South Dakota.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORKS, St. Cloud, Minn.

FOR SALE.
Spark plugs, batteries, coils, copper tubing, cable, connectors, terminals, spring wire, machine, cap and set screws, hex and castellated nuts, spring cotters and washers, taper pins, drill rod, cold rolled; face plates, angle blocks, cut gears, etc. Prices right. BICKNELL M. & S. CO., Janesville, Wis.

FOR SALE.
11 x 4 Barnes F. P. lathe, $65; 18-inch lathe, $165; 20-inch lathe, $225; 18-inch plain lathe, $100; miller, $125; 36-inch band saw, $55; 6-inch stickers, $35 and $75; 12-inch jointer and attachments, $90; 27-inch planer, $125; 3 drum sander, $125; belt sander, $30; jig saw, $20. Many other bargains. BICKNELL M. & S. CO., Janesville, Wis. Sec. Hd. Mach. Dept.

FOR SALE.
One "Witte, Jr." gasoline engine, 6 h.p., nearly new. Reason for selling, quitting business. For price write to FINERUD BROS., Preston, Minn.

FOR SALE OR RENT.
Blacksmith and wheelwright shop with ten room new modern house, barn, two acres of land, etc., in village 65 miles from Chicago, in Northern Illinois. Shop can be bought separate, address WILL BUDDE, Big Foot, Ill.

PLOW SMITHS TAKE NOTICE.
I have a preparation for hardening plow lays that I have used over fifteen years. I will guarantee that lays will scour in any kind of soil if my information is followed. On receipt of $2.00 I will send full particulars by return mail. Address CARL A. GORDER, Belgrade, Minn.

BLACKSMITH SHOP AND TOOLS.
For sale or trade cheap. In good live town, only one other shop in town. For information address G. A. HENRY, La Cygne, Kans.

WANTED.
Horseshoer and wood worker. All around blacksmith. Single man preferred. Address, A. M. HIESTAND, Martinsburg, Ind.

FOR SALE OR LEASE.
At a bargain. Blacksmith shop doing a good business in sugar beet and fruit district; tools, stock and land, with or without house and orchard. Address for full particulars and price, WILLIAM HOLMES, R. D. No. 1, Ogden, Utah.

FOR SALE.
Patent right to make a new trip hammer; will sell to one blacksmith in each State in the Union, so the price can be in reach of all. I will compare this hammer with any $100 or $125 hammer on the market to-day. The most of the hammer, except a few castings, can be made in any blacksmith shop. To any one answering this advertisement and enclosing 25 cents, I will send photo and full description. This charge is for elimination of unprofitable correspondence. Address S. K. JENSEN, El Campo, Texas.

SPLENDID OPPORTUNITY.
For a good mechanic with some capital. Fully equipped up-to-date power repair shop, horseshoeing department in connection. Will sell half interest or all. Money maker for the right party, good farming country. Address, J. L. McDANIEL, Box 494, Prague, Okla.

FOR SALE.
Blacksmith wagon shop and implements, seven room house, barn and shed. Work for two men. Sell on account of going West. Will sell cheap, also full set of tools. Address JOHN A. MELLGREN, R. F. D. No. 2, Carver, Minn.

FOR SALE.
Blacksmith and shoeing shop; work for two men; in warm climate; 5 acres of land; 7-room dwelling; all for $1,800. Information furnished. Address W. F. PIERCE, Lauderdale, Miss.

BLACKSMITHS!
One gallon of crude solar or kerosene oil heats a set of tires in any oil heater. Send one dollar for booklet telling how to build and operate the same. Address P. V. RAMSEY, Fairview, Oklahoma.

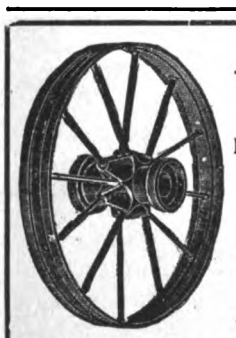
FOR SALE.
Electric blacksmith and shoeing shop. Plenty of work and good prices. A snap for cash. Quitting the business. J. A. SIDLE, Emmett, Idaho.

WANTED.
Brother smiths send $1.00 for sample pair of my Patent Tongs and shop right. Your money back if not satisfied. Address GEO. E. THURSTON, R. R. No. 2, Everett, Wash.

WANTED.
Place as apprentice in blacksmith shop. Power shop preferred. Address BOX 10, Rice, Kansas.

FOR SALE.
First-class and up-to-date blacksmith and wagon shop, located in Saline County, Kansas; first-class territory and only shop in town. A bargain if sold soon. Address for particulars, A. C. WOERNER, Kipp, Kans.

FOR SALE.
Blacksmith and wagon shop in Southern Minnesota. Large territory. Work for two men. Reason for selling, disabled. W. L. MAUST, Ostrander, Minn.



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All Standard Types
Special Inducements to Blacksmiths
Write To-day for Agency
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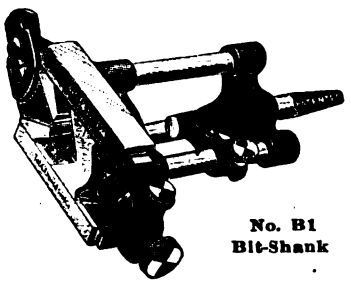

Every Part Steel
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Round and Square Shanks are Interchangeable.
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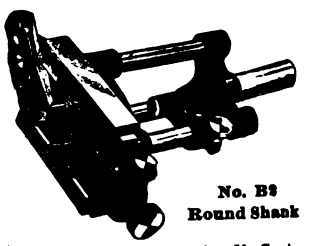
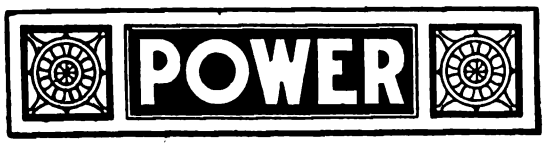


THE A. A. WOOD & SONS COMPANY, Sole Manufacturers, Atlanta, Georgia, U. S. A.

"Justrite" Plow Blade and Disc Sharpener.—If any of our readers have not yet investigated the "Justrite" Plow Blade and Disc Sharpener manufactured by the Strite Governor Pulley Co., 302 South 3rd Street, Minneapolis, Minn., it might be to their advantage to do so at once. See advertisement on another page and write for particulars and prices, unless your dealer keeps this device.

The Little Giant Farriers' Tool Box.—This box is strongly made and extremely convenient. It will be found illustrated and described in the advertisement of B. B. Noyes, & Company of Greenfield, Mass., on another page. Dealers everywhere sell it or ought to, but if your dealer does not keep it write direct to the manufacturer as above and mention The Blacksmith and Wheelwright.



In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Lost Power From Poor Ignition.

BY E. W. LONGNECKER.

Nothing is more annoying to the average gasoline engine operator, than to see his engine gradually losing power, and to restore to it lost power is his desire and ambition. In the large majority of instances, the engine will again find its lost energy by the removal of one or more causes that may appear trivial in their nature.

Above everything, the operator should not forget that there is a cause for every abnormality, and since he is largely responsible for the condition of his engine, it is up to him to locate the cause of every trouble and remove it.

So often in the earlier days of the gas engine, when batteries were almost the exclusive source of the ignition current, did we find a weakened battery the cause of lost power in the gas engine that we were in danger, for a while, of regarding it about the sole cause. The idea gained such a hold on us that we came to examine by force of habit, first of all in each case of weakened power, the battery and its wire connection. And we find to this day that the habit serves us well and is replete with helpful experiences.

Many a lame engine that could scarcely keep itself in motion was restored to power by the touch of a new battery that was able to supply a current of sufficient strength to emit a healthy and igniting spark for every charge of fuel admitted to the engine. A weak battery is not always at the bottom of power loss, but it is a great factor in it. Along with weak batteries and other current generators, short circuits in the wires, spark evils, spark plugs, etc., are fruitful sources of weakened and lost power. One of the first things we listen for, when we have occasion to examine a weak engine, is misfire or missing explosions. If the engine is running at all, the peculiar hobbling or sputtering and stammering character of the exhaust will direct the attention to missed explosions and gives one at once a clue to the cause of the trouble. Such a condition tells me that if perfect and regular ignition is restored the power of the engine will also be restored. We then set about to determine whether the cause is in a weak battery, a short circuit in the wires or spark coil, a broken or loose connection at some of the

binding posts, a wire broken within the insulation, fouled or dirty spark plugs, loose electrodes or terminals or broken insulation in the spark plugs.

Such are the causes in connection with the ignition system that are responsible for loss of power in the gasoline engine and the operator who will locate the cause and remove it will see his engine respond promptly and satisfactorily.

A Good Stable Liniment.

A good stimulating liniment is made by combining two fluid ounces of alcohol; two fluid ounces of oil of turpentine; one liquid ounce of liquor ammonia and water to make one pint.

This liniment is stimulant and irritant. It is applied by the hand, and, in order to get results, should be applied with smart friction (well rubbed in). It is useful in cases of sprains or bruises, after the acute inflammation has been allayed by heat and soothing applications. In cases of slight enlargements resulting from sprains, bruises or other causes, its application, followed by bandaging, tends to increase the activity of the absorbents and reduce the enlargements. In case bandaging follows its application, care must be taken not to repeat it too often, else it will blister. This liniment will mix with water in all proportions, hence the addition of water will weaken it, which is often advisable, and is indicated by too great an irritation to the skin. The attendant must be the judge of the action required, and make the liniment strong or weak, accordingly. Of course, a liniment of this nature should never be applied to a raw, irritated, tender or acutely inflamed surface, except where the tenderness has been caused by the application of the liniment and continuation of the irritation is desired to reduce enlargements or allay deep-seated irritation.

Corns on Horses.

The small swellings or tumors on the sensitive heel in the triangular space between the bars and the wall of the heel often cause horses great pain. These are found in the fore feet only, and almost always on the inside heel. They are caused most frequently by bad shoeing or from wearing the shoe for too long a time. These growths do not always cause lameness, although, as a rule, they do. They are, however, always sensitive to pressure, and usually appear as tumors of a hard, corny character. Neglected corns are liable to fester and must then be laid bare by the knife and be poulticed. Neglect of this treatment results in the matter or pus finding its way up through the coronet. Thus quittor may result.

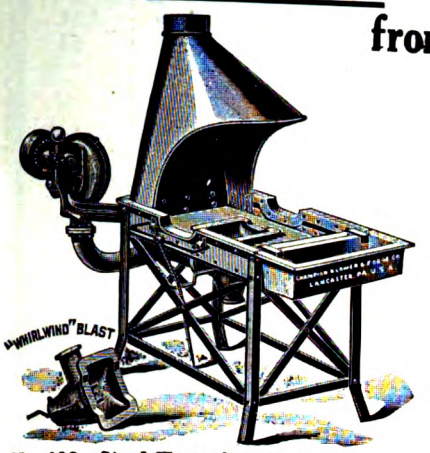
Give the foot a careful dressing by paring the heel, and bathe the corn with a weak carbolic acid solution. After doing this, place a fold of muslin over the corn and then over all a bran and linseed poultice. A complete rest from work, hard roads and shoes should now be given the animal until the corn has entirely disappeared. When the feet are again shod, leather should be used as a protection. Many corn salves are recommended, but unless the corn be removed and the pressure taken from the wound, there can be no cure, even though the tumor is pared away.—*Dr. C. L. Barnes.*

The Vehicle Year Book.—We have received from Ware Bros. Co., of Philadelphia, a copy of their Vehicle Year Book for 1912. It is, as usual, a highly creditable volume and very useful as a reference book for the carriage trade. It contains a large number of color plates with working drafts for the manufacturer of automobile delivery wagons and trucks. Also a number of horse-drawn vehicles, including a phaeton, a rockaway and an extension front coach. The volume contains a carefully compiled list of carriage and wagon manufacturers, motor car manufacturers and automobile body and top manufacturers. It is superbly printed on a fine quality of paper, and it is a very interesting book from cover to cover.

Sell Rubber Tires.—Very many of our readers who have never done anything in the rubber tire business and are favorably situated, could add considerable to their income every year by taking an agency for rubber tires. They are growing in popularity all the time. See announcement in this issue of the Goodyear Tire and Rubber Company of Akron, Ohio, and write at once for further particulars concerning their tires and special discount to agents and dealers. This company has recently brought out a little book which they call the "New Carriage Tire Book." It contains valuable information and a copy will be sent to every reader who will write for it and mention The Blacksmith and Wheelwright.

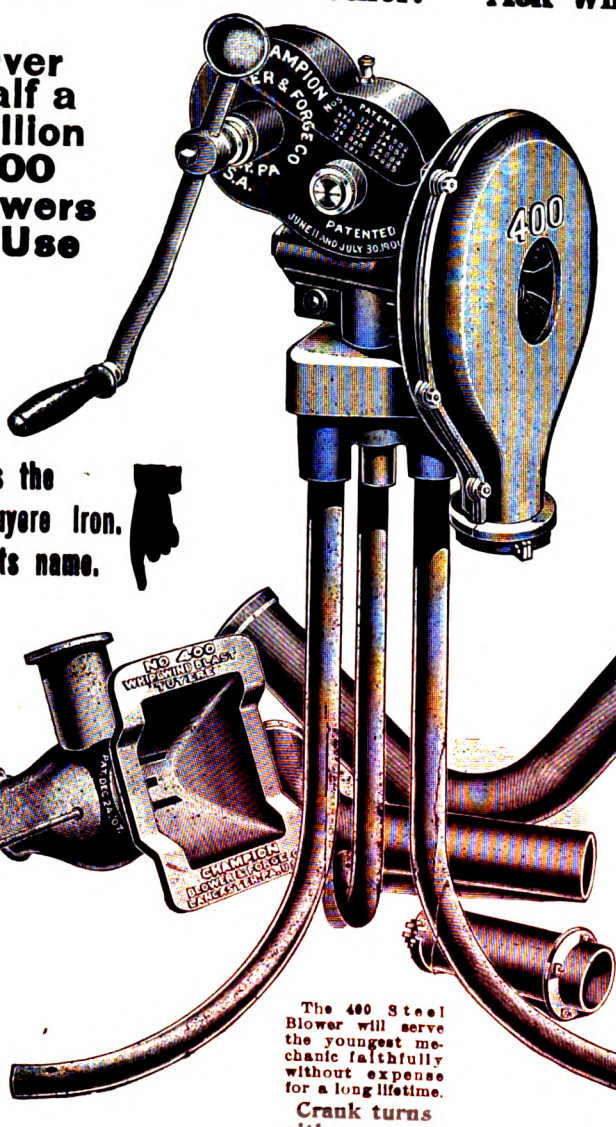
Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:

676,322	34,882
676,323	34,883
676,324	34,884
34,880	34,885
34,881	697,629

Also Great Britain Patent No 9,662, May 25 1900.

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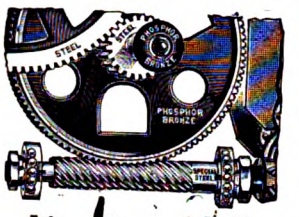
THE FAMOUS 400



It's the all in Spiral

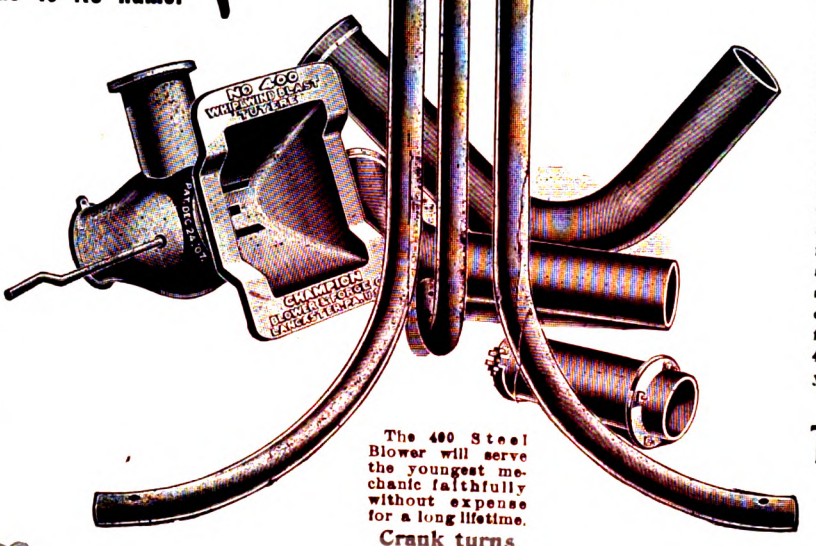
The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.

The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.



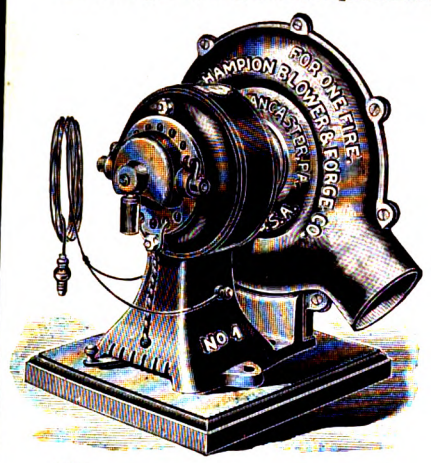
The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

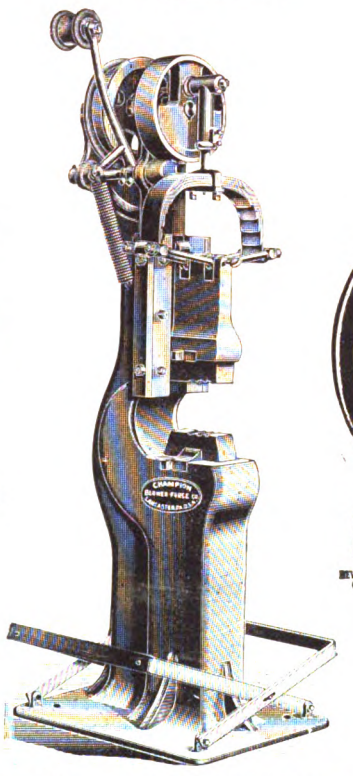
Motor capacity 35% above requirements



The Champion Latest Invention!

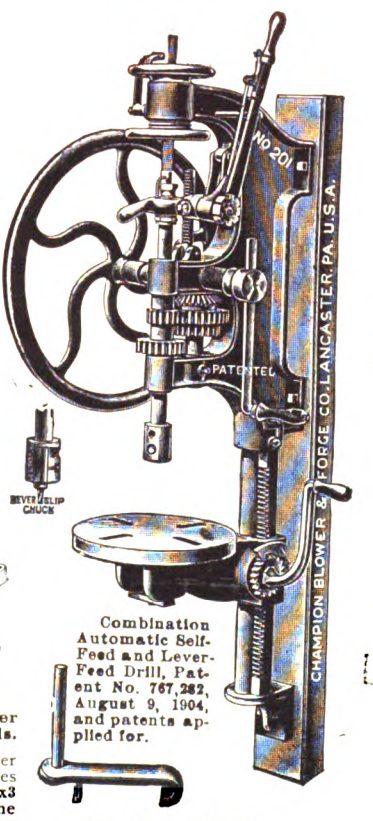
Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



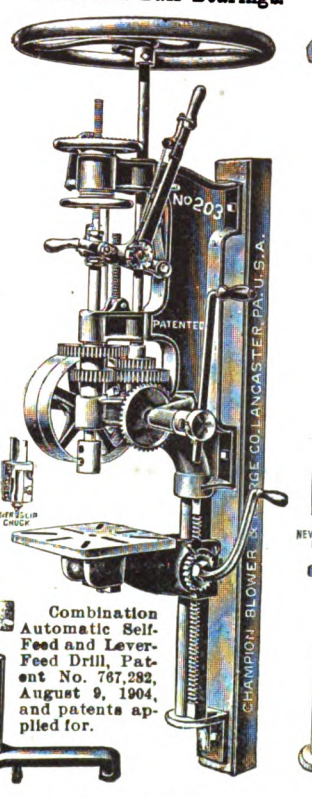
The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



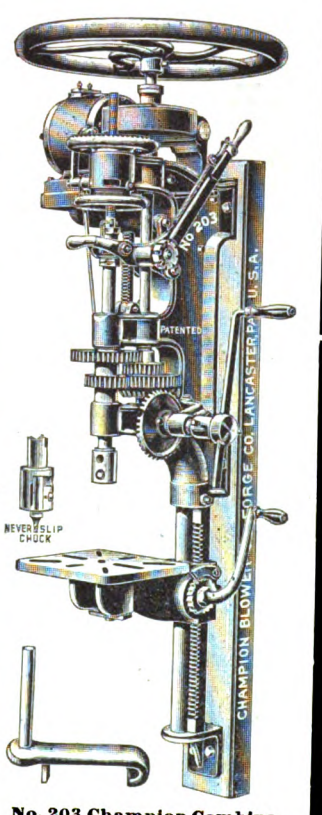
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.



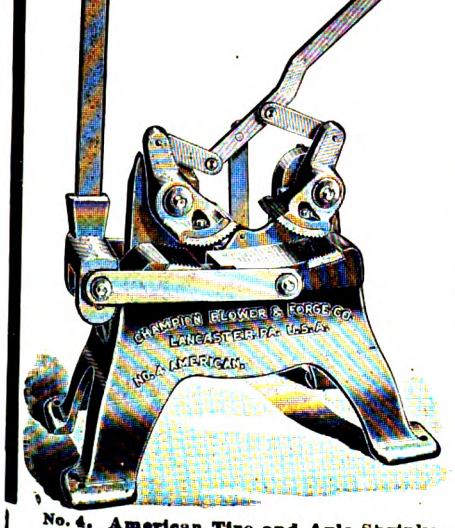
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.



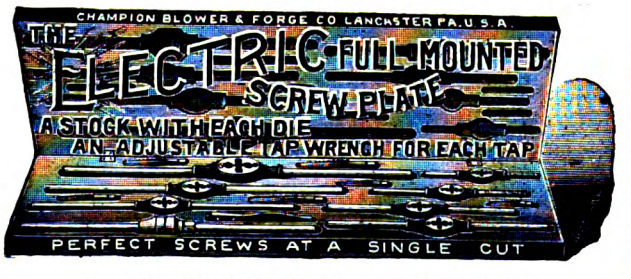
No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



No. 4. American Tire and Axle Shrinker.

Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.



No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

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Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

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There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXVI. No. 1. NEW YORK, JULY, 1912. TERMS: ONE DOLLAR A YEAR

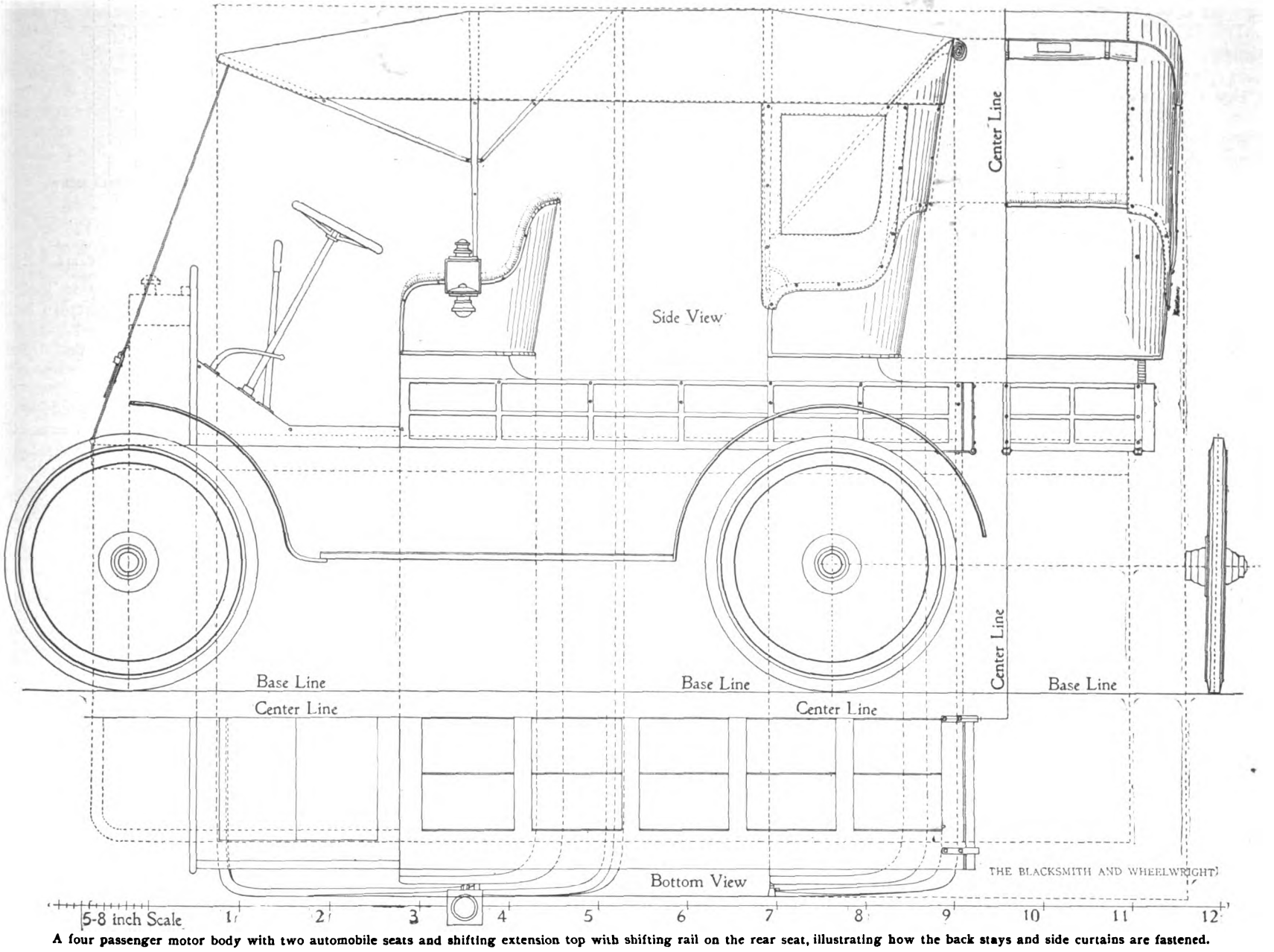
INTERCHANGEABLE BODIES.

How They May Be Made for the Same Chassis of Motor Wagons.

BY WAGON MAKER.

Interchangeable horse vehicle bodies have long been made and will be made occasionally, but they are of far more consequence on motor wagons and trucks. A horse vehicle gear costs very little, while a chassis with its machine is very expensive, and the advantage of interchangeable bodies for it is thus plainly apparent.

With these drafts we illustrate three different kinds of bodies on the same chassis. Take for instance a business wagon body fitted with two automobile seats and an extension top.



A four passenger motor body with two automobile seats and shifting extension top with shifting rail on the rear seat, illustrating how the back stays and side curtains are fastened.

The same body can be fitted with three seats by shifting the front seat six inches forward and the rear one ten inches backward, and lengthening the top, thus making a very practical passenger phaeton. As the space is very large between the seats two auxiliary seats can be placed there with very little expense and the top left as it has been designed and illustrated. The extension top is made to shift, and can be removed, including the rear seat, and we have a business wagon without a top, such as is used almost everywhere. If wing boards are needed, they can be made to shift and a close paneled body can be fitted on top of the wing boards. Such changes are inexpensive and are daily made for those who need them. The three illustrations will give the idea explained above.

DETAILS OF CONSTRUCTION.

The length of the front is 27½ inches and the length of the body without the gate is 6 feet 7 inches, its depth 9 inches, and risers 3 inches, making the entire depth including ¾ inch for thickness of seat 12¾ inches. The foundation for the body consists of two sills, two end cross bars and four inside cross bars. The sill sizes are 1½x5 inches, the end cross bars 2⅛x3 inches, and the four inside cross bars 1½x3 inches. The thickness of the bottom boards fill up the space between the end cross bars.

All the cross bars have tenons 1¾ inches long and ½ inch thick, mortised into the sills. The ⅝ inch thickness on the end cross bars are lapped on top of the sills, filling up the space and at the same time strengthening the structure. The 9 inch by 6 feet 7 inch body sides are ¾ inch thick, are rabbeted 3-16 inch into the sills and drawn down with four strap irons on each side, and the boards are molded as shown.

At the front under the seat are four posts, two on each side, mortised into the sills and screwed against the board sides. On the top edge are two cross bars mortised into the posts, level with the top of the risers and to which the seat is screwed. The posts are 1x1½ inches, the risers 1⅛x5 inches, which are screwed to the inside surfaces of the boards. The posts are cut ⅜ inch into the risers, leaving more timber for the cross bar tenons. On the rear end there is a corner iron let in level with the cross bar, screwed to the bar and to the board sides to give strength to the rear end.

There are no side stays to keep the boards in position, therefore the iron stay must be put on inside. The rear seat riser is on iron stays with pins in one for each side so that the seat cannot slip. There are four bottom boards ⅝x8 inches and two side pieces to fill up level with the rest of the boards. All the bottom boards are screwed to the cross bars and sills. All tenons are white leaded and drawn up to the shoulders with pins. All the bottom boards coming in contact with the cross bars are white leaded, so that they are not affected by dampness. The bottom board joints are left open 3-16 inch. The front part is separated from the main body, but has the same width apart.

The sills and the two cross bars are all the same size, 1½x3 inches, and are mortised the same as the main sills. The two side pieces are 1¼ or 1⅜ inches thick and are screwed against the sills. The bottom board can rest on sills if the space allows it, or can be rabbeted into the side pieces. The chassis is 33 inches wide outside, and 8 feet 7 inches long from dash to rear end, but in case a long body is needed, a great deal of length can be added to the rear end. On this design the length of the body from the center of the wheels to the rear end is 18 inches only, and another 18 inches can be added to that length.

THE SEATS.

The seats as drawn can be paneled, that is poplar or bass wood panels with grain up and down, sheet iron, sheet steel, aluminum or substitutes of this kind of metal, but in all cases a rail is needed to fasten the panels and the trimming to.

The rails can be framed of separate pieces, but this is such difficult work that it does not pay and when done the rails are too heavy, therefore bent rails are used. Send the wood bender a full size side view of the seat or seats, give the width across and the amount of flare each side and order that the rail should be bent in two pieces for each seat and the joint to be spliced in the center. They are bent also in one piece, but they are handled better by the body maker in two pieces.

The lower front ends are either lapped or mortised to the seat frame, to give strength and stability to the seat strainers ⅜x1½ inches in size, and about four inches apart. These strainers, rail and seat frame, are nicely leveled and over this the panels are bent and fastened. To cover the nail heads, moldings are fitted. Metal moldings are the best as they can be well fitted and screwed. These screws are sunk below the surface and leveled with solder, which makes

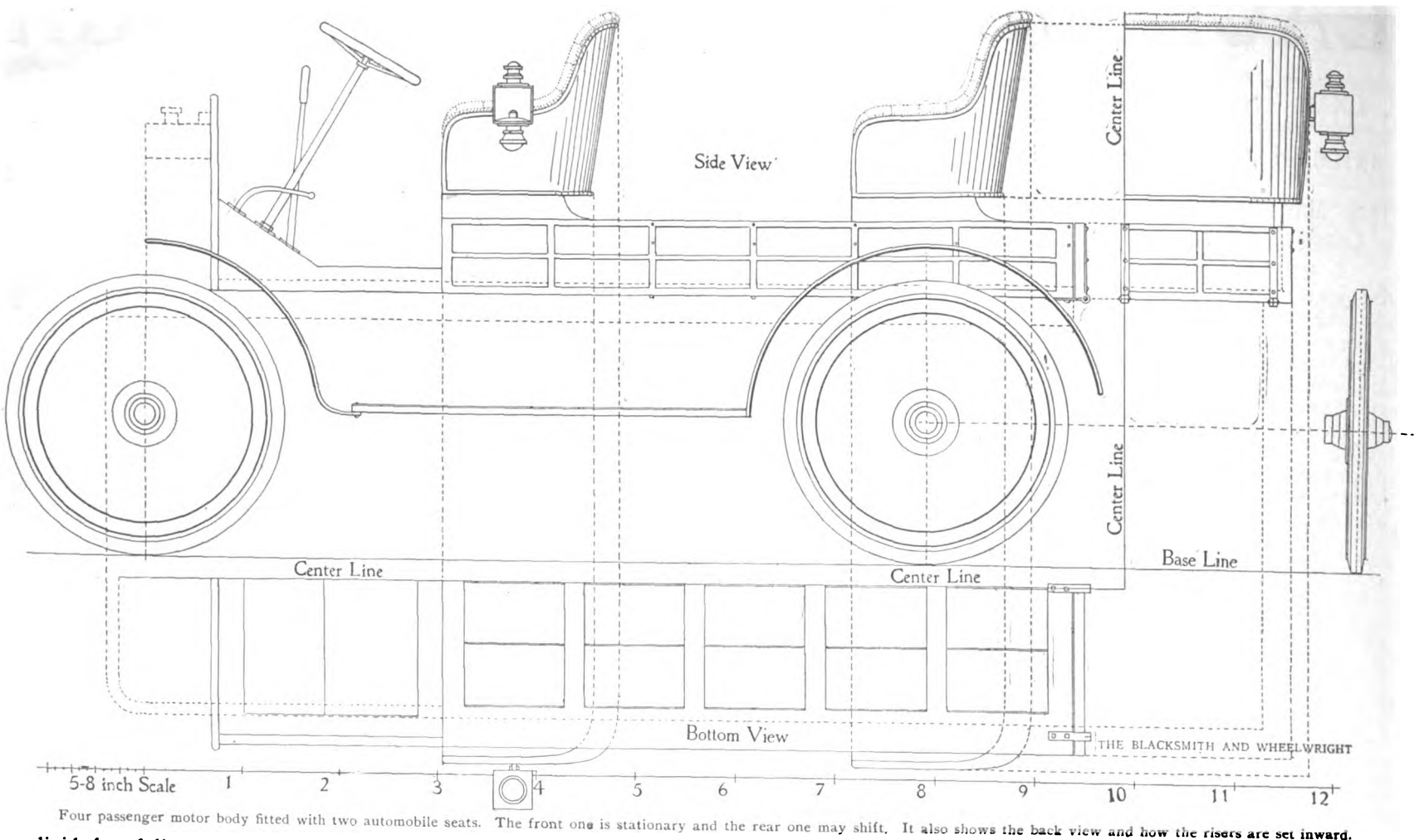
the very best kind of work, and is far superior to wood moldings bradded on.

The length of the extension top is 8 feet 4 inches, divided as follows: Front part 35 inches, center part 40 inches and rear part 25 inches. Height from rear seat to outside of bow 46 inches; drop of front vertical bow ½ inch; drop of front bow 6½ inches, and rear bow 3⅝ inches; depth of side quarters at rear vertical bow 12 inches; width across the bows 47 inches and width across slat-irons 44¾ inches.

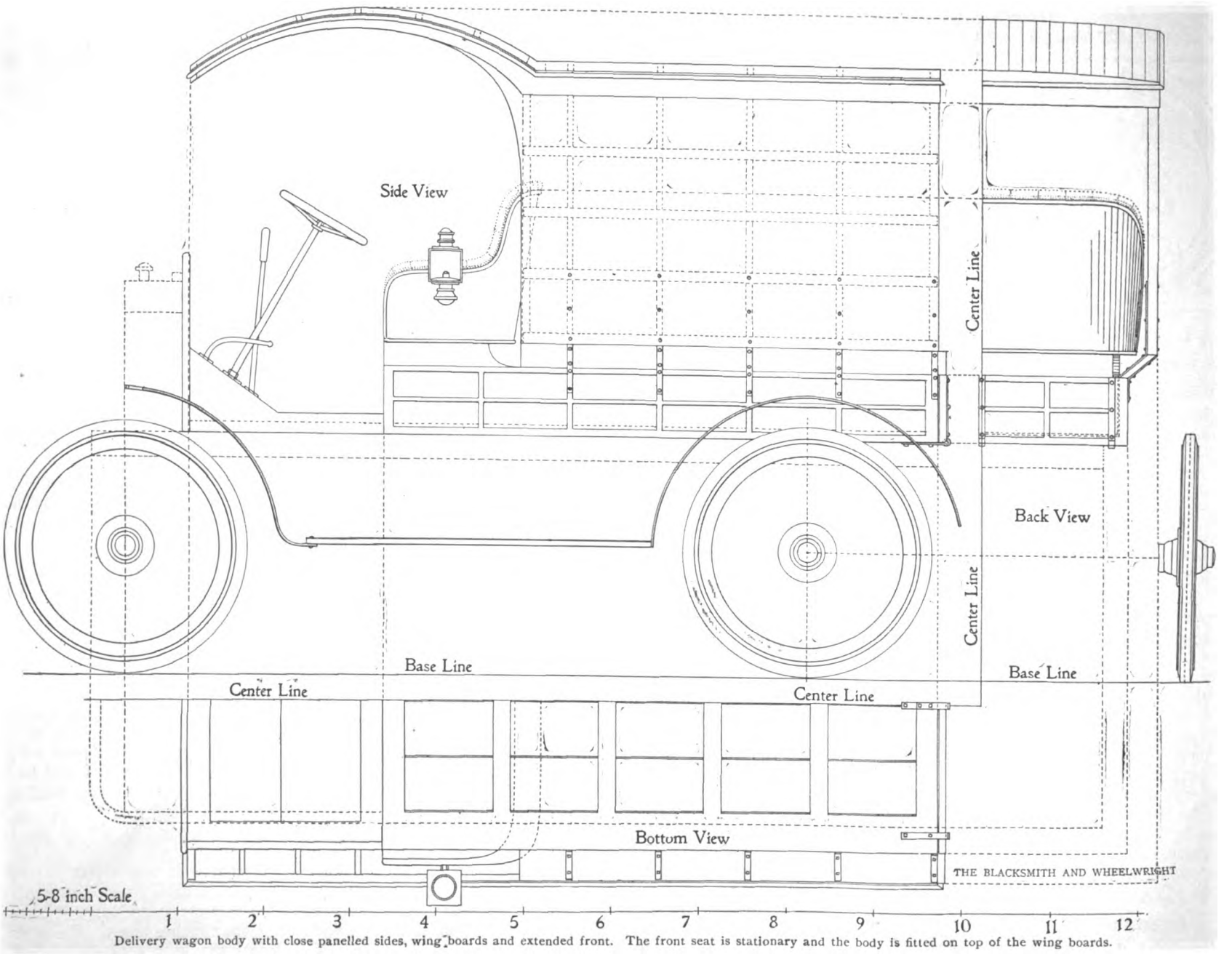
The rear bow is contracted on the draft; that it the bow is narrower, but this is not necessary. If not contracted the bow drops easier over the seat, but the appearance is better when contracted.

The side curtains and front apron are made similar to carriage work; the only difference is that every curtain and hood is larger. The rear side curtains have celluloid lights, which roll up with the curtains. For the rear curtain on the rear view is shown a carriage light, but a large celluloid light is better. The back stays on the rear end are square, making a square back curtain, but on the side it must have the shape as drawn on the side view to look well. For curtain fasteners the auto pattern is used, as they are of the most improved kind. The seat trimming is either plain, as usually made for runabouts, or tufted. The plain is most suitable for exchangeable bodies.

The close paneled body is only part of a wagon body because it is fitted to the lower part.



Four passenger motor body fitted with two automobile seats. The front one is stationary and the rear one may shift. It also shows the back view and how the risers are set inward.



Delivery wagon body with close panelled sides, wing boards and extended front. The front seat is stationary and the body is fitted on top of the wing boards.

They can be fitted in two ways direct on the upper body rail, making the body 40 inches wide or on the wing boards, making the body 48 inches wide. The wing boards on which the body rests, as shown on the back view, are made to shift. Without a body resting on it the wing board irons rest in sockets, therefore are easily put on or removed, but as there is considerable weight when a paneled body rests on it and to make it sufficiently strong to support it, the stays are made to lap on the outside and inside with a rest on the top body rail bolted with two bolts for each stay.

If the upper body is the same width as the lower one, no bolts are needed. On the inside surface of each post is an iron 3-16x7/8 inch, 20 inches long. These irons are 7 inches below the bottom rail of the body and each slips into two sockets which are fastened to the lower body posts. In this case the body is simply lifted from or put into the sockets without any bolting.

The construction of the body is similar to the regular wagon bodies. The end posts are 1⅜ inches square. The inside posts are ⅞ inch square and the top rails 1¼ inches thick. On account of the extended front, and being so light, these rails should have an iron plate 3-16x⅞ inches, tapered toward the front to ¾ inch. The top is covered with ¼x1¾ inch strips, either close or 1¾ inches space between, and covered with imitation leather cloth. Its edges are covered with clip moldings. The side surfaces are covered with ⅜ inch thick panels and joints must be on the rails.

AUTOMOBILE PAINTING.

But This Will Also Apply to Some Classes of Horse Drawn Vehicles.

From M. C. Hillick, Pennsylvania.—As a rule it is not necessary to burn the paint from the car when it is shopped for repairs. Nor is it even essential to put on a number of coats of rough-stuff and rub the surface down with artificial rubbing brick. These latter operations simply represent extreme methods of meeting surface emergencies and need not often be resorted to.

Instead, when the car comes to the paint shop, get it in a good location and put it up so the wheels run clear. These latter remove. Also, take off other furnishings which are in the way and likely to hinder quick painting operations.

Usually the body of the car is splashed up more or less with grease and oil to remove which wet up some cotton waste or a piece of woolen cloth with turpentine and rub smartly.

Then to beat off the dirt nibs, and smooth up the surface, and remove the scum of gases and road accumulations, give the surface a light rub over with a felt pad moistened in clean water and dipped in pumice stone flour, after which wash the surface thoroughly.

If the surface is to go black, or dark blue, or even dark green, apply first a coat of straight drop black. Get this color—and for that matter, all colors—ground in japan, and thin with turpentine, adding for this coat one part raw linseed oil to four parts turpentine. Let the color stand over night before recoating, thus giving it ample time to grip hard and fast to the old paint foundation. If blue or green are used over the black thin the color with turpentine and apply a thin coat. Then take some of the color, say about 3 ounces, and stir it into a pint of rubbing varnish. Use a flat, half elastic bristle varnish brush to put this varnish color on, and flow the material in plentiful volume. For the next coat, which after two days may be put on, add a tablespoonful of color to a full pint of rubbing varnish. This will serve to keep the color nice and true to its original shade. Rub this coat, when dry, with pumice stone flour and water, clean up carefully and finish with a good grade of body finishing varnish.

This is about as simple and quick a process as can be used for good work. For the color coats use double thick, 2 inch camel's hair brushes; for the varnish color use 2½ inch half elastic bristle brushes, and for finishing use full elastic bristle brushes, all of first-class quality. It never pays to use a cheap, inferior brush.

For the chassis or running parts, clean up with two parts crude oil and five parts turpentine, using also a steel scraper or two to loosen up the hard old paint layers. The main part of the chassis painting is to get the parts cleaned up in good shape.

If any of these parts are plated or scaled off in a way to expose the metal, touch all such places, after cleaning, with a bit of lead paint. Let this dry well and then sandpaper the parts all over uniformly and put on a coat of color prepared as above detailed. Next lay on a coat of varnish color and in due time finish with a single coat of heavy gear or chassis finishing varnish.

All of the above work, with some instruction and practice, the handy, non-professional painter can do well enough perhaps to satisfy himself and his friends who are not over exacting.

We advise the use of varnish for the outer coats because varnish is not only a natural protector of the color coats, but during service it will stand up and hold its gloss under the erosive effects of the various cleaners and polishes better than most, if not all, other kinds of finishing materials. The high gloss surfaces need only to be washed with clean water after road service until the varnish loses its brilliancy, after which time the various trustworthy varnish cleaners and polishes may be used to advantage.

HORSE PARADES.

A Fine Spectacle That Is Gradually Spreading Over the Country.

From a Practical Horseman, New York.—The Horse and Vehicle parade in New York City on Memorial Day, came fully up to the standard of previous years, both in general display and excellence. The Blacksmith and Wheelwright is particularly interested in the showing of heavy truck, express and delivery wagon horses, weighing from 1000 to 1800 pounds, and with especial reference to the front feet which is quite a problem considering the pavements of every description that these horses are worked on. In some sections of the down-town district where there is so much of the old style of pavement of stone set from one to two inches apart and filled in with sand and pebbles, the conditions are such as to seriously injure the horses' front feet. This wear and tear is especially heavy where horses are often obliged to take a speed faster than a walk, and in such cases the back bar shoe or plate shoe is being used generally on the fore feet.

The writer took 9th and 10th streets to get the best view of the 1,000 working horses of New York on parade. Particularly noticeable was the splendid display of ice wagons and big teams. There were in one instance 50 teams with artistically painted wagons that alone made a showing worth going far to see. This class of animals especially need hoof protection as also do the cavalry horses of the traffic police squad. These last are shod with the back bar shoe. They give a somewhat club foot appearance to the animals' foot owing to the straight bar at the rear. The common-sense shoe recommended by Mr. Albeck of Iowa who gave an account of his plate shoe with a V-shape back or rear, does not change the appearance of the hoofs as does the bar shoe previously referred to, and protects the frog much better than the old flat bar over the frog, which he described in a recent issue of this magazine.

Among the noticeable stock in the parade one prize went to a white mare 28 years old. She looked as fresh as a colt. She takes a blue ribbon every year. Another perfect and beautiful animal 7 years old was an iron gray. Her feet were rasped down clean so as to show almost white with every nail mark in evidence. It seemed to me that there was a little too much trimming done on the fore feet. The hoofs were perfect but were small for the weight of the animal, and it seemed as if they would hardly stand the rough work they must endure for fast traveling on the hard pavements. She had a blue ribbon of course and deserved it.

I wish to offer a pointer on the round or plate shoe. This shoe is of value as a protector but the straight bar at the back it seems to me is an error, though a very plausible one. The horse will not strike the back of the frog if the shoe is left open with a V-shape at that point, whereas on the fixed back bar, the pressure upon the frog is apt to be painful at times. All who are interested in that most useful and admirable animal, the horse, cannot fail but to be delighted with the working horse parades of New York City. They not only furnish a spectacle which calls out some of the most prominent people in the city who have humane feelings, but they inspire an emulation among horse owners and drivers which has a good effect.

This annual parade is so much more successful and interesting than the ordinary individual would imagine, that I desire to suggest something of the sort in the smaller cities and towns of the country. These would not only dignify the trucking and commercial vehicle work, but would instill a feeling of pride in the heart of every owner and driver of the horse. The wagon decorations may be elaborate or simple. Of course the horse is the chief object of interest and in every case should receive the most consideration. In the New York parade the harness was in the best condition and the horse himself was decorated tastefully, attractively, and in some cases elaborately.

The Work-Horse Parade idea is gradually spreading over the country, and wherever it has been tried, so far as we know, it has proved a success. No parade was held in Chicago this year, which is rather remarkable, for Chicago is said to be the biggest teaming city in the world. Boston, New York, Philadelphia and Baltimore, all report that this year's parade was the best thus far held.

Boston, which is the pioneer, helds its tenth annual parade with 1353 horses in line. The youngest animal exhibited was a foal, born three months ago in a city stable, its mother being a huckster's mare. The oldest horse was 39 years, and he showed up in excellent condition. The old horse class at Boston had the astonishing number of 85 entries. It was divided into five divisions, the oldest horses coming in the last division. In that division, the first prize was a gold medal; in the other divisions the first prize was a silver medal; and in all the divisions there were numerous other prizes of money and ribbons. An "old horse" in this sense is one who has worked for ten years or more for its present owner. This class always arouses interest and enthusiasm, and it has proved successful at county fairs and horse shows generally. There were five championship classes at Boston, for light-weight, middle-weight and heavy-weight horses respectively. Three drivers gave exhibitions of driving without reins, and there was an interesting competition between the drivers of six and four-horse teams.

Glanders or Distemper.

C. L. Barnes, of the Colorado Agricultural College, gives some very important information to horse owners. He says:

The question often arises in the stable—has the horse that is ailing a case of glanders or distemper (strangles)? Unless one be familiar with the symptoms of the two diseases, it may be difficult to arrive at a correct diagnosis.

Most everyone who has handled horses has seen cases of distemper, the symptoms being as follows: The colt is more often affected than the mature horse, and is seen to be "off its feed" and having some difficulty in swallowing. The animal's coat is rough and a general unthrifty condition is very noticeable. In a very few days a doughy swelling appears in the angle of the lower jaw, thus causing the animal to carry the head stiffly. The swelling eventually softens of its own accord, breaks and discharges a thick, creamy pus. Along with the symptoms will be seen a discharge from one or both nostrils, usually continuing until complete recovery.

Glanders, on the other hand, as usually seen, is more of a chronic disease. The most marked symptom observed is a chronic, bloody discharge, usually from one nostril. If one examines the nose carefully, ulcers will be observed, from which the pus escapes and drops from the nostrils. After several months the lymphatic glands located inside the lower jaw will be found to be enlarged and extremely hard. These lymphatic glands do not form pus as in distemper, but remain hard throughout the course of the disease.

Skin glanders is called farcy. With this form of glanders will be noticed a swelling

of the lymphatics along the inside of the legs. These glands in time soften and form pus. The pus from a farcy leg is of a greasy nature, so that it does not stick to the hair the same as ordinary pus.

Distemper is what might be termed a benign disease, while glanders is extremely contagious and deadly, not only to other horses, but to man, and is incurable. For this reason, when in doubt as to whether a horse is suffering from distemper or glanders, it is well to have your horse tested with mallein by a skilled veterinarian and not run the risk of losing all the horses on your ranch.

AUTOMOBILE RADIATOR REPAIR.

The Necessary Tools and How Best to Do the Work Correctly.

From J. N. Bagley, Nebraska.—Few blacksmith shops over the country make it a point to repair radiators. They are usually sent to the factory or to some one making a specialty

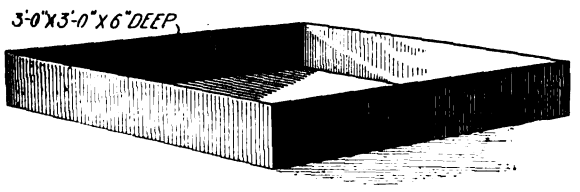


Fig. 1.

of repairing them. But almost any repair man can do the bulk of this work if he is fixed for it, and the cost of the necessary tools will not be such that they cannot be had in every shop.

A list of tools which can be used to good advantage for this work is as follows: A pan for testing, about 3 feet square and 6 inches deep as shown in Fig. 1. This pan should be made out of good heavy galvanized iron. At to the soldering irons, Fig. 2 shows a variety of shapes that will be found very useful in repairing radiators. "A" should weigh about 1½ pounds and be forged to a long slim point as shown, after which it should be bent to form a small curve about the size of the radiator tube. B and C will be found very useful in reaching into the tubes about center way. D will come very handy in soldering the tubes to the top and bottom of the radiator. F will answer well for the small seams where but a

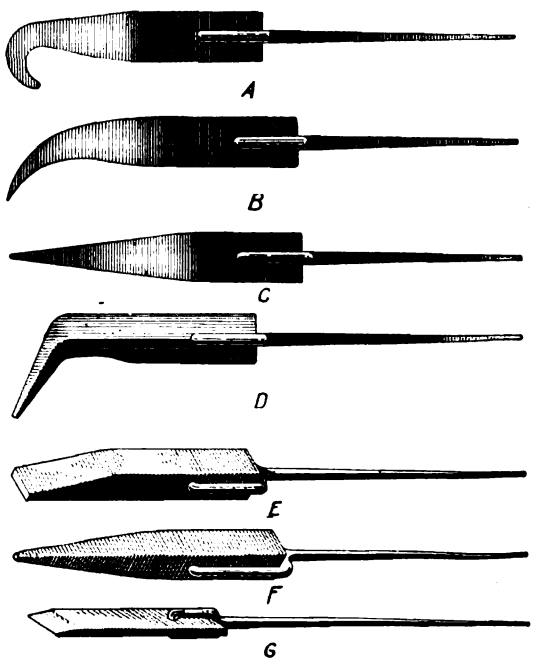


Fig. 2.

little solder can be put owing to the looks. G should be used for a flat surface.

Fig. 3 represents a tool for slipping the fins apart so the tubes can be got at.

Fig. 4 shows a pair of tongs or pliers with flat bars extending an inch or so to either side, and will be found extremely valuable in taking the kinks out of the fins after they are pushed back to place.

An acid that will answer well in most cases may be made as follows: Take muriatic acid and place into sheet zinc until it will cut no more. Strain it into a glass jar and add ¼ as much water as acid. To each pint of prepared acid add a piece of sal ammoniac about the size of a hickory nut. This aids in keeping the irons in good shape. This acid may be placed on the work with a small brush, or a glass dropper which may be purchased at any drug store.

Success will depend much on the condition of the soldering coppers, consequently much care should be taken to keep them bright and clean. The irons may be heated in a forge, but the cost is small to purchase a small gasoline furnace, and this should be used, as the irons will not be so apt to be overheated as in the forge.

Locating the Leaks.

As soon as the radiator to be repaired comes to the shop locate the leaks. This is done, not as many do it, by filling the radiator with

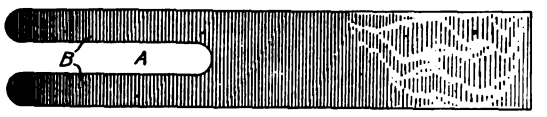


Fig. 3.

water, but by filling it with air. Fill the pan, Fig. 1, with water to sufficiently cover the radiator. Now stop all openings in the radiator with a rubber cap, and with a small hose slipped over the drain cock at the bottom, the radiator may be tested for leaks. As fast as a leak is found it should be marked with some edged instrument, and so on until all are located. Remove the radiator from the testing pan and repair all the leaks, first by pushing the fins apart, as shown in Fig. 5, with the use of tool, Fig. 3.

After repairing all the leaks that are marked, take the radiator to the testing tank and see how many leaks are still to be found. After the leaks have been repaired and the radiator will hold air, the next step will be to straighten the fins back to place, which is done with the

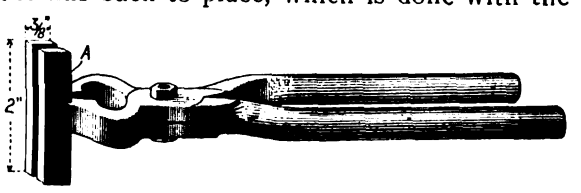


Fig. 4.

same tool that they were separated with. After they are again spaced correctly there will be some kinks in them, which can be removed with the pliers, as shown in Fig. 4.

In Fig. 5 is shown the manner in which the fins may be separated to repair the bursted tubes. Of course if the radiators are sent to the factory they are taken down and new tubes placed, but as there are few who care to undertake this we will not go into details, for in most cases a soldered tube will give good results.

When the radiator has been repaired and the fins are put neatly back to place it should be thoroughly coated, fins, tubes and all, except the brass, with a coating of stove blacking. This will cover the bright spots of solder and make the job look much better. Next in order will be polishing the brass, which adds

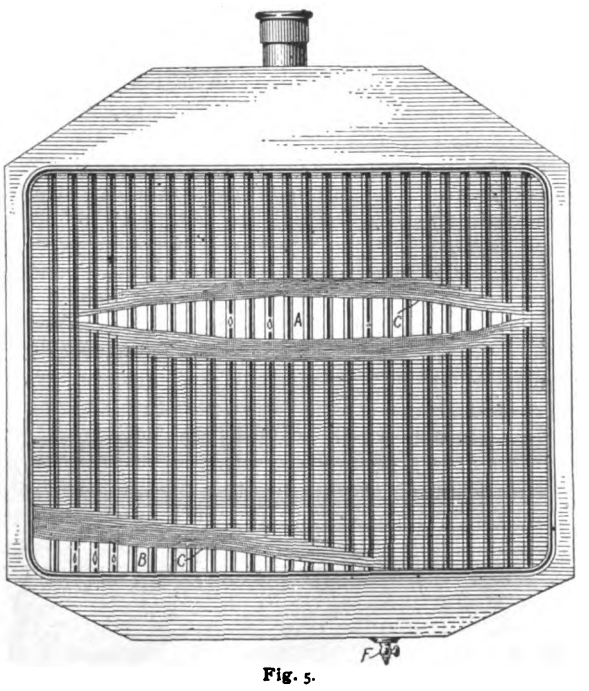


Fig. 5.

much to the looks of the job, and to the satisfaction of the owner.

The irons should be cleaned and retinned before putting away, and this may be done by heating them to a heat that will melt solder and plunging the ends into the acid, as already described. This will clean them and they will again take tin quite freely. They should now be wiped with a damp cloth and hung up for the next job.

In using the sticks of solder they will become so short that they cannot be held in the hands. When they are so short they should be soldered to a fresh stick. In this way the scraps will be used up as soon as made and no waste of solder will be had. Many repair men do not care to attempt radiator repair and as soon as one becomes accustomed to the work he can solicit work from adjoining towns, and it will be but a short time until there will be radiator business coming in to keep a man busy most of the time. In most places in the Western States the price charged for radiator work, solder and acid included, is one dollar an hour.

Many times the tubes of the radiator become stopped and prevent the circulation of water. In this case the motor will overheat and the water will boil. In most cases this sediment can be washed out with water, although I have seen them stopped until it was necessary to remove the bottoms and run a small wire through the tubes. In case it is necessary to remove the bottom, care should be taken not to get the bottom hot enough to unsolder the tubes from the plate, which they pass through.

The testing pan, Fig 1, should be emptied as soon as through use, as the acid in the water, which comes from the radiator being dipped in and out, will eventually eat the galvanizing from the pan and it will soon rust out. The pan should be washed and set up to dry.

STEEL WORKING.

Some Information to Correct Various Erroneous Ideas and Statements.

BY JAMES F. HOBART, M. E.

A long time ago—possibly two years—E. R. Sizer of Idaho, called me to account rather sharply for statements I had made concerning steel and the difficulty in welding it. He invited me to come "out into the woods" and he would show me. I have the impression very strongly that I have "been out in the woods" even to Mr. Sizer's own state—only I didn't see any woods there. I was on the wrong side of the mountains for that, for the entire country was bald-headed and didn't wash—only once a year, when it rained, and that was from November to March.

I have seen them work steel in the mines and elsewhere, and every smith had his bunch of pet theories and compounds and had gotten into such a rut that each thought he couldn't work unless he did it a certain way and with his own particular compound. It is this business that I get up on my hind legs against. The smith is all right; there is no man who should be more honored than the blacksmith, but he wants to "come out of it" and not do things a certain way just because his grandfather did.

The smith has been honored above all men from Tubal Cain down to the present time, but—I am sorry to have to say it—some of them are using the same old methods, apparently for the one and only reason that the gentleman in question used them also! I want the smith to quit doing things just because somebody else does them. I want him to do things because they are necessary for the work in hand.

Incidentally, I will inform Brother Sizer that I can weld steel—tool steel at that—under certain conditions, and that neither myself nor any other smith can weld it under certain other conditions. And when I want to weld steel, I don't have to hunt up all the borax in the shop or one or more of the compounds, without which some smiths think they cannot work. If I cannot get borax, I will make the weld with common lime—and make as good a weld as can be made with the variety of steel used too. It is usually the amount of carbon in the steel which fixes its welding qualities, and steel which will weld readily, is not fit to make files of. Therefore, if a file can be welded readily, it is evidence that the purchaser of the file did not get as good material as he was entitled to when he purchased the file in question.

There are ways of making welds with high-carbon steel, but such welds are not to be

trusted. They may hold, or they may not—probably the latter. To join two pieces of high carbon steel the smith may use a flux made up largely of carbon and some filings or borings of soft steel or iron. Frequently such welds may be made by interposing a piece of thin Russia iron between the pieces of steel. Again, a piece of soft steel may be welded to the steel and the second piece of steel in turn welded to more soft metal, then welded together, thus practically uniting the two pieces of steel by means of three welds.

But even these methods cannot be relied upon to produce a union between two pieces which is as strong as the unwelded stock. The articles may stick together well, or they may not. The odds are that they will not. It is for this reason that welds of any kind are tabooed in automobile repairing and manufacturing. Welds are not permitted there. Why? Because they are not to be trusted. Again in structural work. Where do you find that welds are made, even with the low carbon steel used for angles and channels?

"No welding should be allowed on any steel that enters into structures."

That is the verdict of The American Society of Civil Engineers (transactions of 1893) and it goes to show that if welds on low carbon steel cannot be trusted, that those on high carbon material are problematical indeed. But for all of that, I have welded the sheets of steam boilers ten feet in diameter, and while Engineer in the War Department of the U. S. Army, I designed, constructed and placed in the Steamboat "Ordnance" a welded boiler of the Scotch type which has never started a seam or developed any weakness whatever.

When a boy—I was brought up in a blacksmith's shop, and a good one was a part of my father's business equipment—I early learned to weld the native iron made in Massachusetts early in the 19th century, and known locally as "Groton" iron. This stuff was so impure, so alloyed with other substances other than iron, that when heated it smelled almost exactly like a striped snake—when that reptile has been teased until it gave off its peculiar odor. The only way "Groton" iron could be welded, was to take a low welding heat on it and quickly screw the two pieces in a vise, pressing them together until nearly cold. Then another heat could be taken and the weld finished in the usual manner. Some kinds of steel—those of too high carbon to weld under the hammer—may be joined in this manner, but the weld never can be depended upon. It may hold, or it may not, and the cutting tool quality of the steel will be impaired if the carbon content be above a certain percentage. The restriction placed upon the use of welds by automobile and structural work, certifies to this.

All this goes to prove the stand taken by the writer, that files which can be readily welded, are made from a steel of too low carbon percentage to do good work as files and if Mr. Sizer will investigate this point, and note the difference between welding a file which wore out readily, and one which has done good service and lasted long, he will see the point taken by the writer. If it were possible to heat steel to the welding point without exposing it to the atmosphere, or to the action of the gases in the forge fire, then steels more rich in carbon could be welded without injury by burning. The use of a flux which will protect the steel from the action of oyxgen of the air and the carbon and sulphur of the fire, will enable steel welding to be performed to greater extent and with better results in high carbon steel. But such a flux is very hard to find. It is for this reason that steel may be melted in crucibles or in a regenerative furnace without injury to its peculiar properties which are impaired by welding attempts in a forge fire.

Take a piece of "razor" steel, or a bit of modern "high speed" steel and let's see a weld made in either of those? "They won't weld," you say.? "And why not, if you please?" These are varieties of cast steel, and should weld if all cast steel can be welded. If these kinds cannot, then there is a limit to the amount of contained carbon at which steel will weld, and it proves the position of the writer that files which were so readily welded as has been stated in this magazine were made of material which was better fitted for the making of spikes and shovels than it was for razors and taps.

And now, having shown that I am slightly acquainted with steel and steel working, I am going to say something regarding the Mushet steel which Mr. Sizer welded up upon a certain occasion. "Mushet" steel is so named from the party who devised the method of making it. In a similar manner, the names "Bessemer" and "Siemen's" are applied to certain makes of steel, or to steel made by certain processes. For instance: Bessemer steel is that made by burning the carbon from the molten pig iron by a blast of heated air through the molten metal. Nearly all the steel used today, is made in this manner. The carbon is burned out and then a certain quantity of carbon-containing ore, known as "spiegeleisen" is added to give to the metal, the amount of carbon required.

"Mushet" steel is made by melting malleable iron in crucibles together with charcoal and oxide of manganese. "Blister" steel, "Shear" and "Spring" steels which used to be so common and are now almost unknown to the smith, having been displaced by steel made by the Bessemer process—those steels were made by packing soft iron bars in charcoal and holding the furnace and its contents at a high temperature for a week or more. The "shear" steel used to be made by piling bars of blister steel into fagots, welding them and hammering into the desired shapes and sizes. "Spring" steel consisted of blister steel heated to an orange-red color and rolled or hammered. But these old-fashioned steels are not common now-a-days. They are of the past, and the modern steel is much better in every way than the old time kinds.

A certain kind of steel is sometimes referred to by the term "homogeneous," but this may be almost any make of steel which contains 25-100 of one per cent. of carbon. There is a peculiar condition into which steel passes at a temperature known as "blue heat" when it is almost impossible to work the steel without injury to it. Even very soft steels are injured by so working. The test is to draw the hammer handle, or some other piece of wood across the metal and if the mark made by the wood will glow, the metal may be worked without injury. But if the mark will not glow, the temperature of the steel is probably somewhere between 430 and 600 degrees, and if hammered, bent or rolled at this temperature, it remains more brittle after cooling. This applies to metal which has been heated to a red heat and cooled down to the "blue" heat above mentioned.

As a further bit of evidence regarding my position in the steel welding matter, I desire to quote from the proceedings of The American Institute of Mechanical Engineers, proceedings of 1892, by Mr. A. E. Hunt, who says:

> I have never seen so-called "welded" pieces of steel pulled apart in a testing machine or otherwise broken at the joint which have not shown a smooth cleavage plane, as it were, such as in iron would be condemned as an imperfect weld. My experience in this matter leads me to agree with the position taken by Mr. William Metcalf in his paper upon steel, in the Transactions of the American Society of Civil Engineers, vol. xvi., page 301. Mr. Metcalf says:—"I do not believe steel can be welded."

Surely, you must in all fairness, admit that there may be some truth in my assertions that steel which is hard enough to make good tools is too carbonized to weld properly. And regarding the tempering, or rather the hardening of taps and other tools by certain New York shops, if may not be known, but such is the fact, that 20 years residence in New York city has led me into quite a number of those same shops, and to the acquaintance of a number of hardening solutions as well as welding compounds.

In relation to hardening solutions, I will state that good clean cold water is good enough for me, although it can be shown that certain solution of salts and acids will give a greater hardness to steel than will plain water. But why use the steel that must be coddled and nursed to do things for which it is poorly fitted? This applies alike to trying to harden steel too low in carbon, and to weld steel too high in carbon. A brine solution is more dense than pure water. It cools the steel quicker and therefore makes it harder. But a stream of water under high pressure, directed upon a piece of hot steel will also harden it more than will mere immersion in still water.

Hardening in the oil bath will not give as great hardness as will plain water. But it enables very high carbon steel to be used without the appearance of hardening cracks. But what is the use of all this? Why use a steel with so much carbon that you cannot harden it to its full degree? Where is the gain in so doing? The tool is no harder than the one made of steel just right for the purpose, therefore why try to use a steel which must be taking medicine to enable it to keep well?

Another point has been stated in The Blacksmith and Wheelwright, and that is, "anneal the file-wrenches before using them." Now, annealing does soften steel. And it relieves the strains of forging, heating and cooling, but annealing weakens some steel in the same ratio that it softens it. But it has been shown that while annealing reduces the strength of soft steel, it increases the strength (tensile) of high carbon steel to a considerable extent. Tests show the following results:

.23	68,738	67,210
.37	85,540	82,228
.53	90,121	106,415

There you have it: If the steel from which file-wrenches have been made is low enough in carbon to permit of welding, annealing will weaken it. If the carbon is high enough to have annealing do any good, then, according to Metcalf (and Hobart) it can't be welded, so what are you going to do?

Another instance of the fondness of the average smith for complicated "compounds" and "solutions" is shown by the formula presented by Mr. Oskar Friedrich, Pennsylvania, some time ago, the formula for a "Tempering Compound" which is not for tempering at all. It is for case-hardening, and is composed of eleven ingredients, any one or possible two of which would do the trick without the others. In fact, the plain prussiate of potash, of which he prescribes one part, would, if of the yellow variety—there are the yellow and the red prussiates—do the case-hardening alone, much quicker than with the other ingredients. Those of the carbon variety, the hickory, hoof shavings, bones, hair, etc., require many hours exposure in a closed vessel with the heated metal in order to harden it, while the potash salts will do the trick while you wait.

To be sure, rails could be cut off with soft steel chisels made as described, but did the gentleman ever stop to think how much better, quicker and cheaper the job could have been done with tools made from steel fitted for the work? If that material had to be used for tools, all well and good, and I have nothing to say. But I do say that it will not pay to make tools of soft steel for such work, any more than it will pay to use old files for solid-end wrenches when good bar steel can be obtained readily.

I want the smiths to do a litle thinking, studying and calculating along these lines. They are apt to get into a rut and need stirring up a bit. But they can "jump on my neck" and need not worry a little bit about it. It is steel plated and copper fastened so jump aboard as fast as you want to, but remember one thing: Every jump must scare up an idea. Something you know, which will be interesting to your brother smiths. Some of them may know it also, but others do not and they are glad to read it, while those who are posted will read, smile, and say to themselves: "Well, I knew that as well as he did." But they like to read things they know, sometimes, as well as things new to them.

Two men can never see the same thing alike. They might chew the rag all day, and be looking at the thing they were talking about, but one would be looking east while the other was gawping west, so there you are.

Tempering Planer Knives.

The tempering of planer knives is often a sore point with the average blacksmith. When they are brought into the shop they have invariably the defiant, dogged look of the job that says, "I'm danged if I'll harden without warping." Many ways have been tried to

eliminate this fault, bolting on a heavy iron bar after heating to a cherry red; cooling off in oil and water; plunging in a slack tub, etc. The secret of success when heating steel for hardening is even heating. If the planer knives are heated more on one side than on the other warping must ensue. Let the heat be uniform throughout, and dip the knife vertically in the cooling bath, working it up and down and frequently changing its location in the bath so as to avoid overheating the water in contact. Water warmed to about 100 or 125 degrees has been tried with good results. Another method of hardening these knives to prevent warping is to place each knife in a tube or pipe about an inch larger than the knife and pack charred leather between tube and knife. Then heat uniformly until sure that the knife is at the proper heat and quench in the warm bath after removing from the tube.—Canadian Blacksmith.

AUTOMOBILE REPAIRS.

Suggestions That May Be of Assistance to the Smith Beginning Work.

Two or three actual experiences of minor automobile troubles may be given in order to show the class of work and observation which is necessary in order to keep the mechanism of a motor car in first-class condition.

The first of the incidents which will be mentioned occurred in connection with the back axle of a moderate sized car. It was noticed during the operation of greasing the car that when the back wheels were jacked up and were being turned round, a very peculiar grinding noise was heard in the back axle. This was due to the small bevel of the back propeller or cardan shaft being too deeply in mesh with the large bevel. Moreover it was found that the grease worked out very freely between the joints of the axle casing and it was therefore thought advisable to dismantle the axle and overhaul it thoroughly in order to put it right. When the parts had been taken down it was found on examination that the axle had been fitted up with new fibre washers, and that these had been fitted in a careless manner, as they were not correct in width. As a matter of fact one of them should have been a little thicker than the other and this had not been attended to. These washers were between the differential casing and the outside casing of the axle and the result of these being fitted wrongly was that the axle was not in its proper centre. This was, therefore, the evident explanation of the grinding noise in the car which had been noticed, and by filing these washers a little at a time and then trying on the outer casing they were gradually fitted in the proper position. When the axle was put into place again it was found that the grinding noise had disappeared. This was also a good opportunity to cure the large leakage of grease, and when the casing was down a brown paper washer was cut to suit the opening, and this was coated with gold size, and left to harden. Subsequently when it was put into place it was found that it kept the grease in the box that had formerly been in the habit of working out of the axle.

Another point which requires careful attention if a car is to be run in a safe and efficient manner is to give periodical observation to the conditions of the pins on the steering. After the car has run 5,000 or 6,000 miles, all the bolts and steering will be found to have a considerable amount of wear. In one such instance it was noticed that these pins on the steering and steering arms were slightly worn, and this of course caused a good deal of play on the steering wheel. In order to rectify this defect the old pins were taken out and the holes on being examined were found to be slightly oval due to the wear. It was therefore found advisable to reamer the holes for the pins in the brass bushes and it then became necessary to make new pins to fit the holes correctly. These pins were then turned up specially in a lathe. It may be mentioned by the way that a good many jobs go into the repair shop owing to slackness of the steering arms, where a little tightening in the above mentioned manner is all that is necessary. If, however, the matter is left too long it will be impossible to apply this simple remedy and the renewal of steering arms is a job of a rather expensive nature, as new ones have to be turned. When these pins had been attended to it was noticed that there was still a little play on the steering wheel and in this case the worm was adjusted so as to counterbalance the play. This, however, is not always a safe expedient, as in some cases when the worm is worn a good deal it should be renewed. Otherwise a bad accident, due to faulty steering, might be the result.

In overhauling cars it is astonishing to find how much trouble is caused by careless and injudicious work on the part of an inexperienced person. In one case the spark plug proved very refractory under attempts to remove it. It fitted so tightly into the cylinder that it was impossible to remove it with a spanner in the ordinary way, but it was highly desirable to have it removed in order to clean it and adjust the points. It therefore became necessary to take the cap off bringing the valve away and the plug and the whole of its parts was then put into the vice. After soaking them well in paraffin it was found possible to remove the plug, but after getting it out it was apparent that the thread on the plug was stripped and therefore it was of no further use. Examination of the valve thread inside the valve cap or dome showed that this was also stripped a little and therefore before fitting in a new plug it became necessary to tap it out with a screw tap and it happened that it was a rather difficult job to obtain a tap of the right size. Then on gradually screwing up the plug it was found to fit into position. The whole of this trouble had occurred through fitting in the old plug in a cross thread manner and the incident points to the fact that care should be taken when fitting sparking plugs to see that they are not entered on a cross thread. It is a very simple matter to exercise the proper precaution, and a good deal of trouble can be avoided if the mechanic in charge of the car understands what he is doing and pays proper attention to the small details of his work.

ROPE HORSESHOES.

Their Use Is Increasing In Germany and In Austria.

From Consular Assistant Louis G. Dreyfus, Jr., Berlin.—Owing to the rapid increase in the mileage of streets paved with asphalt and wood blocks and to the congestion of traffic in the large cities it was found necessary to afford greater safety for horses, to prevent their slipping and to enable them to come to a quick stop. This has been attained by fitting them with "rope" horseshoes. These shoes were first manufactured some 25 years ago but it is only during the last decade that the industry has grown to large proportions.

Various forms and shapes of shoes are used. Some are open at the back, like an ordinary horseshoe. Others are closed; and very often, besides being closed, there is a bridge or crosspiece joining the two sides. When this is the case the bridge is constructed like the rest of the shoe, inclosing a tarred rope. There are usually eight nail holes in each shoe; and in order to strengthen the bottom, and especially to make the nail holes more secure, the walls of the groove are sometimes reenforced by braces. The space in the center of the shoe is often covered over with various kinds of inserts to protect the frog from injury. The latest novelty, which has been adopted by the royal stables, is the insertion at the back of the shoe of a block of wood into which stiff bristles have been driven. This is an additional preventive against slipping. When the ground is covered with snow, a special ice plate is inserted in its stead.

It is customary to use special nails with long heads in attaching the shoes to the hoof. When the long-headed nails are used, it is possible to drive them in and to extract them without taking out the rope. These nails, which are driven between the outer side of the groove and the tarred rope, also help to hold in the rope. The tarred rope wears down simultaneously with the rest of the shoe, and it is only on rare occasions that the rope must be withdrawn and new inserted. This change can be made without removing the shoe. The average life of a rope horseshoe is 6 to 8 weeks.

Advantages and Prices.

The advantages and disadvantages of the rope shoes can be summarized as follows: Advantages—They are light and comfortable for the horse; they help to prevent slipping; they break the concussion and deaden the sound of the hoof. Disadvantages—The driving of the nails requires more care; the blacksmith must have in stock a larger quantity of shoes of various shapes and sizes. Great care has to be taken in the preparation of rope horseshoes not to overheat the iron nor to hammer it when too cold, otherwise it will crack on the anvil.

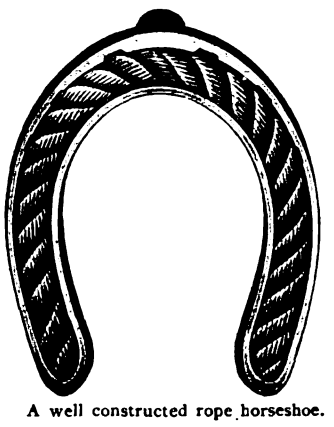
In addition to the plain tarred rope horseshoes there are shoes in which rope interwoven with wire, wood, rubber, copper, wirework, rush, etc., is used. These are heavier, somewhat more expensive, and less practical than the plain rope shoes, and therefore have not become so well established.

The sale of rope horseshoes in Germany is regulated by the Deutsches Tauhufeisen Syndikat, with headquarters in Berlin. This syndicate, which is composed of the eight principal manufacturers in Germany, was formed in July, 1911, to maintain a uniform price for rope horseshoes throughout the Empire. The individual firms in the syndicate are not in any way prevented from quoting different export prices, and it is for this reason that the rope shoes are sold in Germany for 34 marks ($8.09) per 100 kilos (220.46 pounds) f.o.b. Hamburg in bundles of 20 shoes, unpacked, while the syndicate price is 38.50 marks ($9.16) per 100 kilos.

There are no firms manufacturing rope horseshoes in this district, but, as mentioned above, Berlin is the seat of the syndicate controlling the industry and some of the large manufacturers have local agencies.

One Factory in Hanover.

From Consul Robert J. Thompson, Hanover.—In the Hanover consular district there is but one small factory making horshoes with



A well constructed rope horseshoe.

rope filling. Horseshoes of the ordinary kind are sold at wholesale by this firm at $5.50 per 100 kilos (220.46 pounds). The horseshoes with rope filling are sold for $11.25 per 100 kilos, ordinary and large size, and $12.50 per 100 kilos for the smaller sizes.

Horseshoes with rope filling have been in use in Germany very generally for the last 15 years, the necessity for their introduction having arisen with the substitution of asphalt paving for the old Belgian blocks, and they are now considered indispensable.

Practically No Sales in Kehl.

From Vice Consul Warren E. Schutt, Kehl.—The official veterinarian of the Province of Alsace-Lorraine has informed this consulate that rope horseshoes were once introduced into the district, but that horse owners and farriers found them unsuitable for use here. Consequently attempts to popularize them have been discontinued and at present sales are practically nil.

[The foregoing and reports received from other consular officers throughout Germany were accompanied by sample horseshoes, illustrated circulars in German, or lists of manufacturers and dealers. These are obtainable, upon application, from the Bureau of Manufactures.]

Their Growing Use in Nuremberg.

From Consul George Nicholas Ifft, Nuremberg.—Rope horseshoes are coming into general use all over Germany, but especially in the large cities, where there is much asphalt pavement.

Their primary purpose is to prevent slipping during icy or wet weather, but they also find favor from the fact that the rope cushion protects the horses' hoofs on the stone-block

or cobble pavements. Practically all smiths here are prepared to fit these horseshoes on demand.

Rope horseshoes are manufactured both from forged iron (pressed steel plate) and cast iron. The first are said to be the more durable and are manufactured only by a Nuremberg firm which owns the patents covering the same. They are made in several forms—light for riding horses and heavy for draft animals. The shoes are very simple and consist of an ordinary horseshoe form with a deep groove on the under surface into which a section of ordinary rope is fitted. This groove is so constructed that, once forced into the groove, the rope remains there without further fastening. The groove is made for rope about three-fourths of an inch in thickness, and to render the rope more durable, it sometimes has a steel wire running through its center.

The use of rope horseshoes in Nuremberg is not large, as the street grades are frequently so steep as to make the use of asphalt impossible. But the demand is growing. Aside from preventing slipping, the rope cushion lessens the shock of the pressure on the horse nails, which in the ordinary shoe is considerable after the shoe becomes worn down. Even without the rope the deep groove in these shoes make them much easier on the hoofs, as on soft ground the groove fills with earth which acts as a substitute for the rope in lessening the shock of the nails on the hoofs. Cast-iron rope shoes are made on the same principle as the forged, but are not manufactured in this district nor in Bavaria.

Popular in Munich.

From Vice Consul General A. Schlesinger, Munich.—According to private estimates, about 90 per cent. of the hind feet and 70 per cent. of the fore feet of horses in Munich are provided with rope horseshoes. These are considered a most practical form of shoe in Munich, but they seem to be employed to only a small extent in the country and are said not to be used by the military authorities. A special kind of rope horseshoe invented in Munich is provided with rope intersected or interwoven with wire, which seems to give greater security from slipping and to last longer than ordinary rope.

Exhibitors at the Carriage Convention.

The Fortieth Annual Meeting of The Carriage Builders' National Association will be held in Atlantic City, N. J., during the week commencing September 22, 1912. At the same time and place the annual exhibition of parts of vehicles, automobiles, models, new inventions, harness, horse equipment and materials pertaining to the carriage, wagon, automobile and accessory industries will be held.

For exhibition purposes, the committee has engaged Young's Million Dollar Pier, a large and well lighted inclosure that will accommodate all who wish to make an exhibit. The following rules and regulations have been adopted to govern the exhibit.

Exhibitors must be either active or associate members of the association.

The exhibits must be confined to models, parts of vehicles or automobiles, and to materials used in the construction of the same, or to coachmen's outfits, harness and horse furnishings. No finished vehicle will be admitted.

This exhibition is the members' own exhibition. They can take what space they may wish, from 8x8 feet to 20x100, or larger, if they desire, but no definite location can be allotted to any exhibitor on receipt of application. The space will be allotted in the order applications are received, and arrangements can be made when installing exhibits to group industries that desire to be so treated. Those making early application to the secretary will secure what advantage in location there may be, and also avoid the delay in securing their space on the day of opening. As far as possible, ample room will be furnished to all.

Applications for space should be made to the secretary, now, and should state the nature of exhibits, as well as the space required, and if on the side sections as set forth above. As far as it is possible, the space will be assigned in the numerical order of receipt of application. The sure and only method of securing the best locations is to make early application.

Payment for the space taken can be made with the application, or if the exhibitor prefers, can be made at any time prior to September 9th. Receipts for same will be returned by the Secretary, and said receipts will be received as voucher for space, when presented to the superintendent at the pier.

The exhibitor must arrange and care for his exhibit, and he must assume all responsibility therefor. Exhibits can be placed in position on Friday, September 20th, and on Saturday, September 21st, and the exhibits so placed must not be dismantled or removed from the exhibition inclosure, nor shall any hammering or unnecessary noise be made in preparation for removal, until 6 o'clock P. M., on Thursday, September 26th. All exhibits can be removed on Friday, the 27th, and Saturday, the 28th, as the lease expires on this day.

For further particulars, address Henry C. McLear, Mount Vernon, N. Y.

Legal Department

All legal questions answered free of charge. Address Communications to Editor "Legal Department," THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Right of Way.

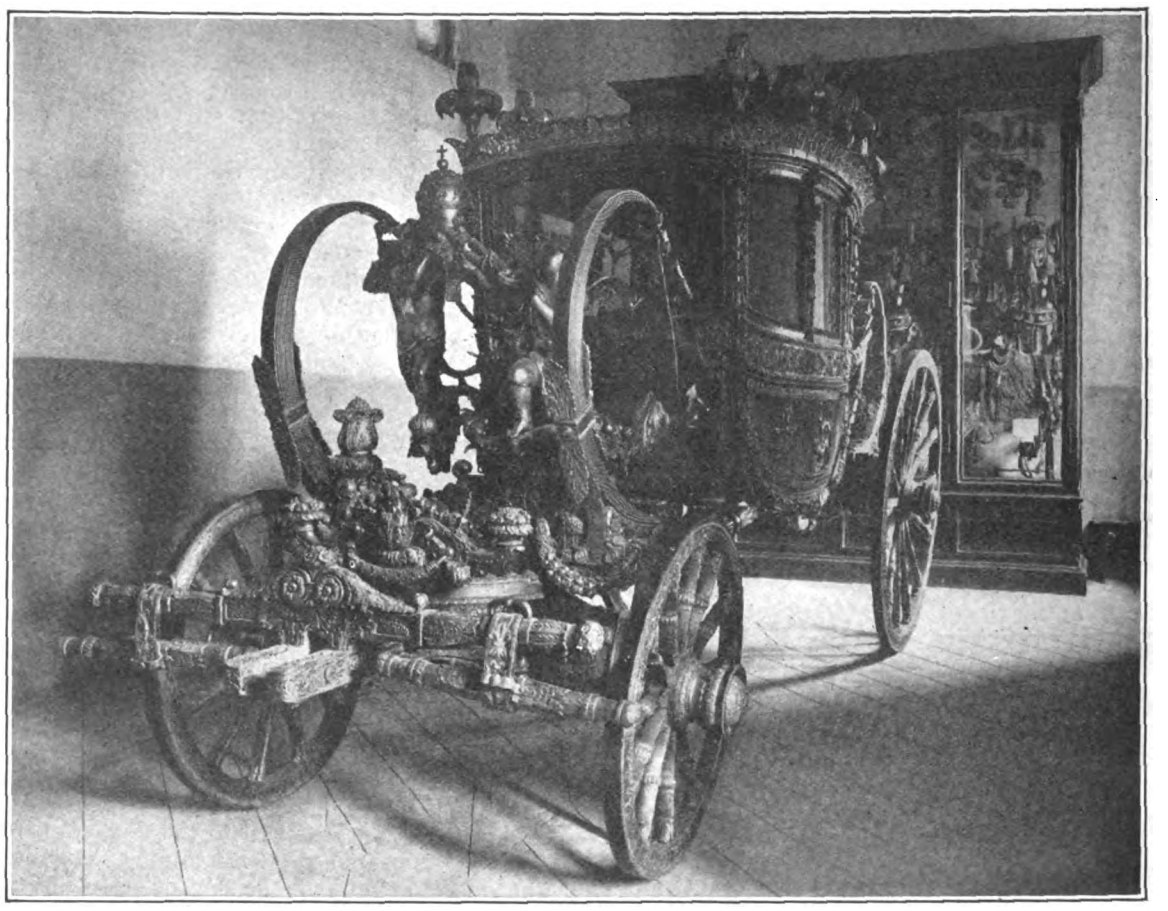
Question.—I have owned a piece of land for 32 years and to get to it have been crossing my neighbor's pasture land each year where the least damage can be done (and that is very slight) and have not been forbidden, until recently he has put up a notice to stop all passing over his property adjoining my land. I have a warranty deed of said land, which gives me all privileges and appurtenances thereto. The way I am going is the only way. I wish to know if he can stop me and if so, what steps shall I take to settle the matter. Is there any property which the owner has no right to get to, aside from a flying machine?

Answer: A right of way over another man's land may be obtained by prescription. By this is meant that if you have been accustomed to pass across your neighbor's land for twenty years or more, you may thereby acquire the right to do so, although you originally had no right to cross his property. In order to sustain a claim to a right of way under these circumstances, the following things are essential: (1) The use must in Massachusetts have been continued for twenty years or more; (2) It must have been *adverse*, in the sense that permission was not asked by you and granted by your neighbor; (3) It must have been under a claim of right; (4) It must have been continuous and acquiesced in, which means that during the twenty years the use of the way must not have been interrupted, either by the act of the owner of the land or by the voluntary abandonment of the same by you; (5) Your use of your neighbor's land must also have been open, i. e., not in secret or by stealth; (6) the owner of the land must have been of full age and competent to protect his rights and to make a deed of the property. Under these circumstances a right of way arises, which the owner of the land cannot afterwards interrupt. The facts suggested by your question are such as readily give rise to litigation, often expensive to both parties, and it may prove more economical both for you and your neighbor to arrange for a deed of a right of way across his property, than to test your rights by an appeal to the courts.

In answer to your second question, the law will imply a "way of *necessity*" where there is no other practicable manner of getting to the land. It must be a case of real necessity. If a man can get to his land by a highway or even by boat, no "way of necessity" will be implied. He cannot claim a way by necessity, simply because it is shorter or more convenient than a way which he has. But the law would imply such a way rather than force him to resort to aviation.

An Ancient State Carriage.

Mr. F. E. Saward, of The Coal Trade Journal, who was recently in Rome, Italy, courteously sends us a photograph of an ancient carriage which is reproduced herewith. Just when this carriage was built and used is not stated, but from its appearance and style it must have been when that most famous of all cities was pretty nearly at the zenith of her glory and power. At all events, we do not see how a carriage could be more elaborate. It was evidently used as the carriage of His Holiness the Pope, and it may have sometime taken an emperor up to the vatican when he called to be consecrated. Judging by the springs it must have been pretty easy riding.



A man who has followed general farming and stock-raising for many years states that his books show his Percheron breeding to have returned a greater net income than any other branch of the business. He uses registered brood mares to do his farm work.

"Every man for himself" is an out of date motto. That kind of work in any force of people seeking a common end is sure to result in the devil getting not only the hindmost, but probably many of the rest as well.

Proper belt dressing is a good thing that it is mighty easy to get too much of, which means that there is a common practice of using more of it than necessary for the best results.

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JULY, 1912.

PARTIAL CONTENTS.

"ALL'S FOR THE BEST."

Although with a severe wrench of our reasoning faculties we sometimes say in a half-hearted way, when we have some misfortune or bereavement, "All's for the best," yet right down in the bottom of our hearts we seldom believe it. When some child or other loved one is taken away, or when "unmerciful disaster follows fast and follows faster," it requires the utmost philosophy, fortitude and patience to be resigned enough to say and feel, "All's for the best."

With no intention of making light of a serious and important matter, we are reminded of the man who in trying to express sympathy for his German friend who had recently lost his wife, asked, "Was she resigned?" "Jiminy! She had to be," replied the phlegmatic Teuton; "she couldn't help herself." It is well enough to be resigned to our misfortunes when we cannot help ourselves, but few indeed really feel that it is all for the best.

When the Titanic went down, some who had no friends or relatives on board, undoubtedly tried to feel in their baffled understanding that, perhaps, after all, "whatever is, is right," but not so those who escaped in the life boats and looking back, saw the leviathan go down with their dearest on earth.

Yet as higher wisdom sees that something is really for the best that a lower form of intelligence considers a calamity, so it is fair to assume that wisdom higher still, or infinite wisdom, can see that every misfortune, sorrow or calamity is for the best. The child, anxious to play out-of-doors, cannot see that the needed rain is for the best; the ordinary man is unable to see that the existence of certain forms of poisonous animal life is for the best, although the wisdom of a Darwin, of an Agassiz, could very readily understand it.

Take the case of death itself. It is absolutely essential to life that we should shrink from it and fear it; that we should consider it a calamity. Otherwise, there would soon be no life. But while this instinctive fear of death is quite essential to the normal existence of the universe or all created things, the common lot is and must be for the best.

Of course, other places and other minds must be left to go into this matter exhaustively, but possibly the foregoing may produce serious thought, and if this be so, it will have answered its purpose.

HIGHWAY DESTRUCTION AND FEWER CARS.

It begins to look as if the automobile will result in the abandonment of macadam roads in the near future. At a recent good roads convention in Ohio the feeling seemed to be well-defined that brick pavement or concrete should take its place.

Rapid driving soon pulls the macadam in pieces, and the dust is taken by the winds into the fields or to the side of the roads. In Central Park, New York City, where the best macadam roads are supposedly to be found, they are in a terrible shape, and made so since the automobile was first admitted to these drives. It is true that tar and oil preparations keep down the dust and prolong the day of disintegration, but the putting of such preparations on the surface frequently and with care entails considerable expense, and where the land lies unevenly the wash from such roads contaminates the near-by streams and other bodies of water.

This contamination has been found so deadly in Europe that steps are being taken to have a stop put to it.

The automobile is here; it is here to stay. But in view of the evils—and evils for which no remedy has yet been found—it has brought in its wake, there is a possibility of a revulsion of public feeling which will again make for the popularity of the horse.

Blacksmiths will be interested in knowing that according to the fees collected from automobile licenses in New York State, there are no less than 15,000 fewer cars within its borders than there was in 1911. If there is not a whole lot of underhanded work or evasion somewhere, or unless the license fees are far in arrears, there are now but 85,300 automobiles in the State, whereas in 1911 there were over 100,000. We know that in some instances cars have been sold, not so much because they were not satisfactory, as that their owners were sick of riding, or had not the leisure to indulge in it. One owner, said to the writer: "I have driven all over this locality, and about all over the State, and have now got sick of it. I have made up my mind that I can't afford to have so much money invested in something that I have so little use for." Others are unfortunate enough to have accidents—due to their own carelessness, almost invariably—and this often leads them to dispose of their cars.

Here in New York City, although for long trips the automobile truck is found to be cheaper and better, for short hauls, where there is much stopping and starting, the horse is still largely used.

In any event, this is all interesting and worthy of the close watch of the horseshoer and the blacksmith who still cleaves to horse-drawn vehicle work only.

GETTING THE RIGHT START.

A reader asks us to suggest some trade or occupation for his son. He says the lad does not like the blacksmith trade and would like to learn some other.

Our advice in a matter of this sort would not be worth much. When they are quite young most boys get ideas of what they would like to be, but their opinions usually change later—and possibly two or three times. Not long ago we heard one of the best of living cartoon artists say it was his early ambition to either drive a grocery wagon or be a detective. In his childhood days the writer of this flirted both with working in a bake shop and being a lawyer. When the baker's wagon arrived with its lemon cakes and ginger snaps, the bake shop was his clear choice, but when he sat in the lap of the village attorney and cast his admiring eyes on the heavy gold watch chain that extended across the squire's ample front, he fervently acquiesced in his father's stated purpose of "making a lawyer out of him."

In most instances, young men turn away at the outset from the calling their father is engaged in, it possibly being a further proof of the saying that "familiarity breeds contempt." Often fathers do not want their boys to follow their own business. They feel they do not want them to "have as hard a time as I have had."

But other things being equal, the boy who follows the trade or business of his father has an advantage over the one who embarks in another. He unconsciously acquires a familiarity with it that it would take some time and money to otherwise accomplish. Yet after he has arrived at the age where he must begin to think about the matter, if he strongly objects to the business followed by his father, it is best to let him have his way. He may see his mistake later, and he may not; it will all depend upon circumstances.

But one thing may be stated with assurance: When your boy has arrived at the age when he must begin to make his own way in the world, and after you have talked the matter over with him, giving your own counsel fairly and not unduly, and a decision has been made, be sure and get him connected with a good man or firm—one that will follow the practice of using him just as well as can be afforded, not using him just as ill as may be and still keep him in their employ.

Just as it is a good business policy for the merchant, the manufacturer, or the workman to give as much as possible in return for a given price, so it is the best policy as well as the best principle for both the apprentice and his employer to each give as much as he can afford for the price or the service of the other.

BIG ONE WAY ONLY.

When a big steamship like the Lusitania is out on the ocean plowing easily through the water it is not apparent that much power is being applied to push her along. But let us see: Her turbine machinery develops 70,000 h.p. Reckoned as is usual, to produce as much energy as this it would require the strength of 840,000 men working 24 hours a day.

There are a good many States in this country where every able-bodied man could not produce so much power. The ill-fated Titanic was a still more powerful steamship and others are now being built larger than either.

Truly, this is an age of mechanical marvels. Not far from where this is being written a building is going up fifty-five stories and three or four under the ground. It was not begun

until some time last Fall, and it will be finished in October. It would have taken fifty years to have erected this beautiful building a half century ago.

Wonderful mechanical marvels, it is true, but how about intellectual supremacy? This seems to be rather on the wane. In this country who is there to take the place of Longfellow, of Whittier, of Holmes and of Hawthorne? In England who is replacing Darwin, Huxley, Spencer, Ruskin, Dickens, Thackerary, Tennyson, and a score or more of the intellectual marvels of the 19th century?

CUT IN HALF.

Economy is a virtue; there is no doubt of that. The want of it is to a certain extent responsible for the present high cost of living. The lack of it has caused more misery than anything we can think of at the moment, unless it be intemperance or war.

But suppose we were all economical enough to cut our living expenses right in half, what would be the result? Would it be a public benefit or an injury?

It is not difficult to determine. One-half our factories would be obliged to close down; half our stores to put up their shutters; half our railroads and their rolling stock to go out of commission. In fact, it would cut in half all our industries.

Would that be a desirable condition? We are afraid it wouldn't. The chief concern of the business world at present is not simply to produce enough to supply the wants of the people, but to induce the people to purchase beyond their needs and to make them feel that they want much which they do not need.

The only instance where further economy would be a public benefit, is in the case of food, and this is something where economy in the sense of less consumption cannot very well be accomplished. The principal reason why food products are high is because the supply is less than the demand; reduce the demand and the price will come down. But when we reduce the demand, we are liable to decrease the physical powers of the people.

When good people talk so flippantly about a lack of economy, they should not fail to distinguish the fact that in economy as well as in other things, that which is good for the individual is often not good for the mass.

PLEASE SEND LETTERS.

Nothing gives us more pleasure than the letters received from our readers. Even though we are unable to print one, now and then, it is invariably read by the Editor with interest. The other day we received a letter from a reader in Virginia. Having been on the subject of theology, we are not sure that he sent it for publication, and even if he did, it is doubtful if it would have been wise to print it and thus provoke a religious controversy in a magazine which has nothing to do with theology.

It has been said that a man's religion, his nationality and his politics are no one's business save his own. Considering the fact that he is not responsible for one and that he had little to do in laying the foundation which built up the other two, this is pretty nearly correct.

But in a class or trade magazine it is safe to assume that anything that concerns the business in which its readers are engaged is a legitimate subject for discussion.

This being the case, we want to invite correspondence from our readers upon anything that pertains to the blacksmith or wheelwright business. Although a subject may be so familiar to you that you can scarcely imagine that it would interest another reader, yet we can teach each other, and it is through this interchange of knowledge that we acquire proficiency and success.

When you have a little leisure, brother, sit down and write us. The Editor himself sometimes feels like "a squeezed lemon," and a mighty poor one at that. He has to get a magazine out month by month, from the best material he has at command; and sometimes he feels that some one else might do it better. But no one can do it better, provided he has your co-operation and suggestion.

A DOUBTFUL MAXIM.

"If a man cheat me once, he is a fool; if he cheat me twice, I am a fool."

Looked at in a strictly ethical sense, the foregoing time-honored maxim is true, but in a material sense it is neither true nor a fact. Yet it ought to be true in both the moral and the material sense.

If the maxim were true, there would be no short weight or short measure, no putting inferior berries at the bottom of the box, no inferior fruit or vegetables at the bottom of the barrel, no food or drug adulterations. Everything would be absolutely just as represented and just as it appears to the eye. But we know that such conditions do not exist, and as most business men are far from being fools, it must be admitted that a man is not a fool "if he cheat me once."

But let us go a litle further. The reason why a man is not a fool to cheat us once, is because we are foolish enough to let him cheat us twice or thrice. And thus the old maxim falls in pieces.

Were this maxim strictly true, as it should be and well might be, there would be no need of the present agitation against short weight and measure, and in favor of a law making the plain marking of goods compulsory so the purchaser might know who is the producer or manufacturer. For if the producer or manufacturer were confident that the slightest deception would absolutely prevent a repeat order, he would of course refrain from practicing it.

Going into the matter one step further, we find that the reason a man is not a fool (in a business sense, of course), if he cheat once, is because we are fools enough to allow him to cheat us twice or more. It is for this reason or condition that we have laws against adulterations, short weights and measures, etc., the public thus requiring legal protection from that which they are abundantly able to protect themselves.

In other words, if we were to refrain from making a second purchase of anything that was not absolutely as represented or as it appeared, and in the case of a tool or machine where a repeat order is seldom needed, if we were to insist on a guarantee that would insure the return of the purchase price if the machine or tool were not as represented, there would be no need of laws for public protection.

Just at present there is pressure being brought in favor of a law compelling manufacturers or other producers to place a name upon their products, so that purchasers may know where to place the responsibility in case of deception or inferiority; but another method of enforcing identified products, and a simple one, is for the public to refuse to purchase unidentified ones.

Barnum said that "the public like to be humbugged." This is not altogether true. The public does not like to be humbugged but it prefers that the government or the law shall prevent them from being humbugged rather than take the matter into their own hands.

It seems to have been forgotten that the public has really no reason to ask protection by law from that which they may easily protect themselves.

WHY THEY FAILED.

According to the carefully tabulated investigations of one of the mercantile agencies, of the 12,646 failures in the United States in the year 1911, about one-third were directly attributable to insufficient capital for carrying on the business. The percentages due to the various causes are stated as follows:

Lack of capital	31.4
Incompetence	27.0
Specific conditions	16.9
Fraud	10.6
Inexperience	4.1
Competition	2.9
Neglect	2.2
Unwise credits	2.0
Failures of others	1.3
Extravagance	.9
Speculation	.7

Assuming the foregoing to be fairly accurate, there may be a lesson in it for some of our readers. It is that the greatest bar to the success of the blacksmith today is the lack of ability to do a certain piece of work at as little expense of time and money as some competitor is doing it.

The blacksmith who today is working with his own hands only, together with such tools as may usually be found lying about any shop, can remain in business only until some competitor comes along with power and machines for doing work quickly and at a low cost. That will almost invariably put him out of business.

It is true that power and machines require money—capital—the lack of which brought failure to more than 12,000 business men in this country during 1911, but almost invariably an industrious blacksmith can get credit for the machines he really needs, for the manufacturer or jobber knows that these will make for his prosperity and put him in condition to pay his bills when they mature.

HORSES AND THEIR USE.

High Bred, Quick Stepping Fast Road Animals Needed.

A great deal has been said and written concerning humane treatment of dumb animals, especially the horse. Societies have been formed for prevention of cruelty to dumb animals, and other organized campaigns conducted for the same purpose.

These efforts have accomplished much to prevent beatings and starvation and the use of decrepit and lame animals, writes Prof. Jesse Beery in the "Western Horseman." There are yet localities where much can be accomplished along this line. There are other abuses of horses besides beatings and starvation that need attention.

Conditions have so changed in the last quarter century that the type of horse has materially changed. The fast transformation of the "mud" roads into solid, smooth macadam pikes has caused the slow, steady driving horse to be replaced by the high-stepping, high-spirited, fast road horse, that is the pride of the young man and his father alike.

The farm horse of a quarter century ago was light in weight and low bred as compared with the present-day farm horse. This light, low-bred farm horse had stumps, stones and tough sod to pull against in the field, and the tough mud when hauling loads to market. He necessarily was slow and sluggish; he couldn't be otherwise.

Several improvements in farms, by removal of stones and stumps, and use of tile ditches, together with the increased weight of farm horses, has demanded a more active, high-spirited horse.

The large draft horse of today must show plenty of knee and hock action, a fast walk and plenty of life, if he catches the eye of the farmer. Men have learned by experience that they cannot beat this high bred horse as they did his ancestors. His high spirit resents it.

Together with the arousing of public sentiment the evolution of the horse has caused a great decrease in the old time cruelty. This does not necessarily mean that cruelty has ceased, but what I do wish to show is that the nature of the cruelty has changed as the disposition of the horse has changed.

It is a very common thing to see a man driving a horse along the road at its highest speed, kept up by a continuous twitching of the rein, or tapping of the whip or both; when he stops, he stops the horse suddenly, and starts with a full burst of speed.

When you see a horse driven as just mentioned you will notice that it lasts about two years, and is then considered as "knocked out" for the roads; a new horse is bought and he, too, goes through the same grind.

It has not been the number of miles such a horse has gone, nor the number of beatings, nor starvation, but the continual "nagging" that limited his usefulness to two years.

The club bruised a small area of flesh and irritated a few nerves that scarcely aroused the sluggish brain. Nagging throws the whole nervous system out of the normal, arouses a sensitive brain and starts the blood flowing at fever heat. Such a horse truly is on his nerve. He uses his nervous energy at a rapid rate and hence his quick decline. He ages rapidly. Rheumatism, stiffened muscles and indigestion

result from such a strain upon the nervous system.

A small spot constantly irritated on a nervous horse is often the source of more annoyance than a large running sore would be to a horse of less sensibility.

Many people allow their horses to become obstinate and balk or have some sort of mad tantrum. This is just about as excusable in a horse as it is in a child.

When a man has his horse under his control, as he should, he can prevent all that wear and tear on his nerves and save the horse the suffering it endures.

Talk about a horse missing a few feeds, or a few drinks of water, but that sort of suffering doesn't compare to being "nagged" from morning till night by a clumsy, careless driver, or irritated by harness, or being in a mad fit for a half day at a time.

The higher the breeding, the more high-spirited, alert, proud horse we develop, the greater becomes the necessity for us to recognize that the form of cruelty may be shifted from the outward and physical to the nerves of a horse.

Use and Care of Files.

The novice is liable to use the first file that comes to hand, sawing backward and forward with equally heavy pressure, but he will soon discover that a tool cuts on the forward stroke only, and that if he relieves the pressure on the return movement he will husband his strength, and the teeth of the file also. In time he will buy 12-inch files and be particular as to the use to which which they are put. It is poor practice to employ a new file for work on solder. These members when new and fine should be reserved for brass and similar metals. To file well is quite an accomplishment, as the novice will probably note after surveying his attempts to obtain a smooth and even surface.

In purchasing a file it should be balanced on one finger midway of its length, and struck lightly with some hard body. If the tool be a good one it will ring almost like a tuning fork. The file should next be held nearly level with the eye, the light falling obliquely up its teeth, which should present a perfectly regular and even appearance viewed from either end. The color should be a dull, silvery gray, free from spots or mottling, except at the end or tang, where it is tempered. Files should be kept in a rack by themselves, and should not be thrown in a drawer among other tools, and if a file or two be carried on the car, they should be wrapped separately in paper or cloth to prevent injury.

Invents an "Iron Horse."

W. S. Plummer of 3105 Olive street, St. Louis, Mo., a mechanic, is trying to organize a company to manufacture in St. Louis a motor machine he has invented and calls the iron horse. The machine is designed for special use in soft plowed ground. The machine is driven by a gasoline engine, and Mr. Plummer says it will supplant the horse on small as well as large farms.

In the rims of the wheels are feet which are designed after the hoof of a horse. These feet remain even with the rim of the wheel until they almost reach the ground in a revolution of a wheel. When the hollow foot is forced down by a cam, it presses the ground beneath it and then the machine rises on its toes and thereby can be forced along the softest of earth, Plummer asserts. The feet can be regulated to protrude any distance or remain within the rim of the wheel altogether.

The machine is designed to draw plows, harrows, corn discs, reaper, planter, mower, binder, rake and wagon. The lightest will weigh about 4,000 pounds. Plummer hopes to place them on the market for as little as $500.

If your work and surroundings are not such as to make you reasonably contented and happy, it may do you good to consider the fact that at least half the trouble is with yourself.

The more light there is around a machine, the less likelihood of that machine becoming a rattletrap too soon.

No man ever learned it all. No man ever knew too much about his business. There is always plenty more yet to be learned.

CORRESPONDENCE

"EXPERT" REPAIR MEN.

What They Don't Know About Gasoline Engines Fills Most of This Space.

Frm H. L. Chapman, Michigan.—The expert repair man is all right if he really is an expert, but there are a lot of fellows who have had a little experience with one engine only, and at once they set themselves up as "experts," and of course always have a remedy for every wrong. Like some doctors who have less than ordinary ability, after a three years' school course they are ready for practice, and know just what remedy will relieve every trouble, although they may not be able to give a reasonably close guess whether their patient has the colic or rheumatism. They must do something to keep up their reputation, however, and so try an experiment, and if that fails of course they try something else, until finally they either kill or cure.

So it is with many alleged engine experts. An engine about five years old came to my shop for repairs. It was a four and one-half horsepower, four-cycle, engine with make and break igniter, and was water-cooled so far as the cylinder was concerned, but the head was only water-cooled by a small pocket on the side opposite the valves. It was 5½-inch bore and 10-inch stroke and ran at 425 turns per minute. It was used on a small farm for pumping water, shelling corn, grinding feed, cutting fodder, and sawing wood as required. It was strongly and well built, but any one who understands engine economy will see at once that it was not an economical engine; for the piston travel was a fraction over 708 feet per minute, while some engines having only 5-inch bore and 6-inch stroke and a piston travel of 475 feet per minute give strong five horsepower, while using about one-half the amount of fuel. This is a feature every prospective purchaser should look after very closely, for engines on the market today vary in fuel consumption all the way up to 125 per cent., which means that some engines require $2.25 worth of gasoline to do what others will do with $1 worth.

But I have strayed from the subject. This engine ran very nicely for something like three years, when for some unknown cause it began to lose power, and an expert was called who made some adjustments and pronounced it all right. Still it did not pull and he was called again. Failing to fix the engine, he pronounced it a case of leaky rings. Another expert was called and he succeeded in causing it to run a little better for a time, but not up to its former power, and fully a half-dozen were called one after another to repair it, but it constantly kept getting worse, until finally it refused to start. The owner had been trying to save money by getting an "expert" that would do the work at a rate of $2 to $2.50 per day, rather than pay an experienced man at the rate of 60 cents an hour. But now the engine was dead, and the "experts" could find no means of a resurrection. So the engine was finally brought to me.

On turning the engine over I saw at once there was no compression and that it was leaking by the valves. We took them out and ground them in and we also found there was a leak between the valve casing and the main casting but it was so constructed that it was impossible to re-grind it to a seat. We used a copper gasket, making it tight. Then we turned the engine over again and watched the timing of the valves. We found some one had taken off the reducing gear and placed it back so the exhaust valve closed at about 80 degrees before the crank reached the inner dead center on the exhaust stroke, when it should have been open until the crank had passed the dead center from three to five degrees.

You see the gears had been "experted" out of place, or out of time. This adjusted, we turned it again and watched the timing of the spark. We found it gave the spark at about 30 degrees above the dead center on the working stroke and tried to adjust this but found that some one had "experted" off about 3/8 of an inch from the igniter trip rod and the bolt on which the rod was hung had been changed and was too loose to give anything like accurate timing. We went to the forge and drew out the igniter trip rod to proper length and made a new bolt for it, getting it to trip the igniter at about 12 or 15 degrees in advance of the dead center, so the gases would be burned by the time the crank was on dead center.

We then thought it should start, but soon found we could get no spark, and taking off the igniter we found it short circuited through the igniter insulation. A bolt was used for the insulated pole of the igniter and it was wrapped with one thickness of asbestos paper. As there was only 1-32 inch space around it for insulation and it had two mica washers to prevent the head and nut striking the body of the casting, we turned the bolt down and used a mica tube 3-32 inch thick and two washers as before. It was then placed on the engine and tried with a little gasoline in the priming cup. It made two explosions and stopped. We tried again with the same results, and then discovered that there was water at the mixer valve. The pipe was disconnected and two gallons of water and about one gallon of gasoline drawn out.

I have known of people using a very small spray of water direct into the cylinder to get the advantage of the expansion of the water as steam, but I have never known of its being used in the tank successfully; at least there was too much water and not enough gasoline in this case.

This fixed we tried again and it would barely run. Some one had placed a reducer in the mixer valve to increase the suction. Probably this was done by some one trying to make it run on water, as they certainly did not get any gasoline to the mixer. This adjusted, we started the engine. It speeded up to about six or seven hundred per minute and locked up and stayed locked up until the engine stopped. Some "expert" had found the governor weight in the fly wheel was loose and of course it ought not to be, so it was tightened up to stay. This having been remedied, we found the governor lock lever had been bent so the engine would lock up before it would start. We straightened this to allow it to run without catching, until the governor began to act on it, then adjusted the spring to give the rated speed, and the engine ran all right and carried just a trifle over 4½ h.p. load at the belt.

With an experience of more than a hundred similar cases, it is my advice to engine owners, when anything bothers them, to go slow, and study every part of the engine carefully and follow it through with the instruction book and learn just what each part is for, and nine times out of ten they will be able to find the trouble and many times will not need to even use the wrench to fix it. Do not allow some "expert," so called, to take the engine apart; better get a good man, one who is practical, and have the work done right.

To illustrate: I was called to make a 14 mile drive to fix an engine that "just would not start." I found the battery wire was of the lamp cord kind, having about 18 small wires inside the insulation, and in placing these on the insulated pole of the igniter, three or four of these little wires had become separated from the main wire and had come in contact with the main casting. I saw at once that the battery was short circuited and in about one minute I had found it and showed it to the owner. Then I took a pencil out of my pocket and sprung the wires out of contact and the engine started the first time over although the batteries had been in contact enough to run them down very low. This was a 14 mile drive caused by a wire about 1 inch long and smaller than a No. 80 thread.

It pays to think, to study your engine, to know when something is wrong, and be able to find out what it is, and then to apply the remedy.

A Sign of the Times.

From C. W. Barker, Massachusetts.—In 1834 the firm of Dole & Osgood was established in Peabody, Mass., for the manufacture of carriages and wagons, their products reaching all parts of the world, even to South Africa, the Sandwich Islands, many points in Australia, and New Zealand. A curious feature is, their vast trade was all secured by correspondence, no agents or salesmen being employed.

In their office are hung two diplomas for

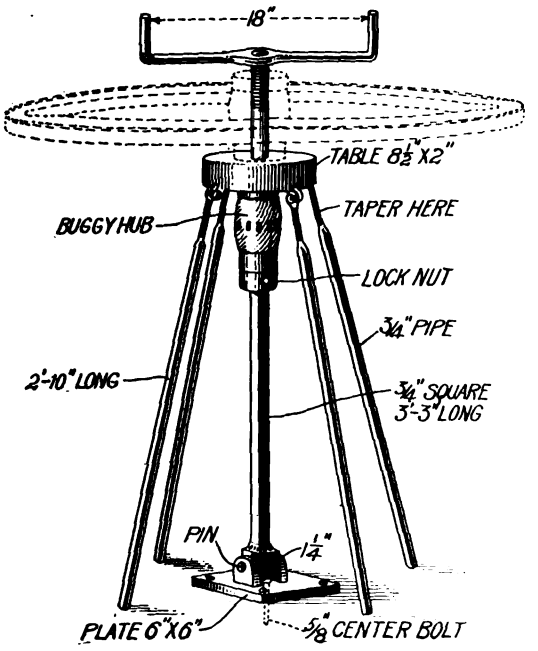
excellence of workmanship, one bearing the imprint of Sidney, 1879, and the other Adelaide, 1887. Their export trade ran into the millions during their long career, and the town of Peabody enjoyed fame as a carriage town. But to-day, alas, from a carriage point of view Peabody is rarely heard of.

A few years ago D. C. Osgood, a son of the early junior partner, reorganized his firm by admitting his two sons to the firm now styled Dole, Osgood & Co. Turning their attention to the construction of automobile bodies, filling an occasional and very rare order for an ordinary vehicle.

And this is a similar story one can pick up almost anywhere.

A Wheel Rack.

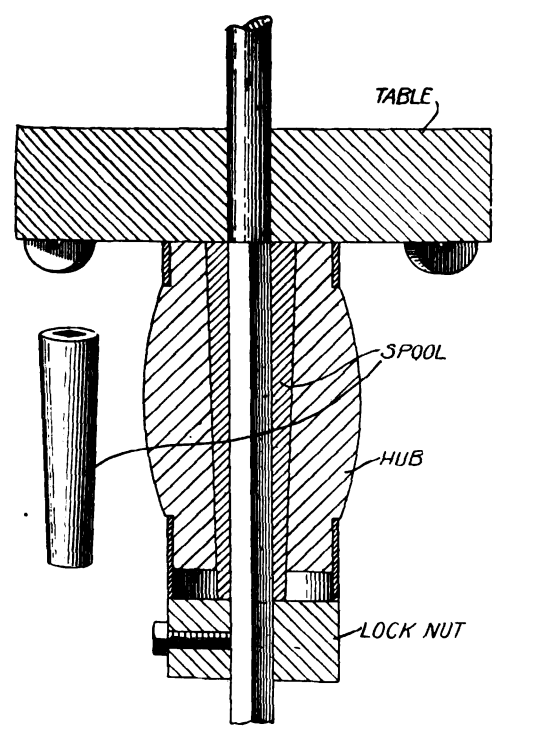
From Joseph Byczek, Colorado.—I am sending you a sketch of a wheel rack I have built and would like you to put it in the paper.



Wheel Rack Details.

I would like to help some brother wheel worker so he will not have to pile on blocks to fill out his stand according to the size of his hub. He can have the same height of his wheel whether his hub is smaller or larger and it can be taken apart and laid one side and not take much room. It is not difficult to build.

The following material is needed in its construction: Four pieces of ¾ inch gaspipe, 2 feet 10 inches long. One main rod, square, ¾, 3 feet 3 inches in length. One table 8½ feet in diameter, 2 inches thick. One buggy hub, any size. One pin 2 inches long. One plate, 6 inches square; lips may be cut out. One top piece, when bent as per illustration, 18 inches across.



Hub Perspective.

An Enterprising Establishment.

From H. J. Klasing, Georgia.—The illustration shows but a part of my shop as I have a separate blacksmith shop on the corner adjoining and a two-story paint shop. I use two motors. In the photograph I am standing in front of the door. I sell a patent draft device for heavy and light business wagons, which is simple, durable, and will prolong the life of

Part of Mr. Klasing's shop.

the horse in keeping him from getting hard jars. It enables the horse to draw more of a load and will pay for itself in a few days.

Note—On the back of Mr. Klasing's business card is printed the following aphorisms, which could not be well improved as a guide for life, both business and social:

The Best Theology: Pure and beneficent life.
The Best Philosophy: A contented mind.
The Best Law: The golden rule.
The Best Education: Self-knowledge.
The Best Medicine: Cheerfulness and temperance.
The Best Art: Painting a smile upon the brow of childhood.
The Best Science: Extracting sunshine from a cloudy way.
The Best War: To war against one's weakness.
The Best Music: The laughter of an innocent child.
The Best Telegraphing: Flashing rays of sunshine into a gloomy heart.
The Best Biography: The life which writes charity in the largest letters.
The Best Mathematics: That which doubles the most joys and divides the most sorrows.
The Best Navigation: Steering clear of the lacerating rocks of personal contention.
The Best Engineering: Building a bridge of faith over the river of death.

Good Luck to This Man!

From O. K. Cole, Tennessee.—I have been running a shop for a little over nine years. I learned the trade by actual experience in my own shop. I started in with about $50 worth of tools and material but I have about $500 worth now, including a No. 400 Champion blower, a Little Giant Punch and Shear, a 20 inch Silver band saw, a 16 in. circular rip saw with a boring attachment I made myself, that works fine, a large drill press and emery wheel. I run them with a two horse Fairbanks & Morse engine. I think it will pay anyone to put in power if he wants to stay on top. I make lots of my small tools, such as S wrenches and a pair of bolt clippers, and axle setter. I am at least $1500 better off financially than I was when I commenced blacksmithing, beside making a living for my family, which has increased wonderfully, which seems to be one failing of most blacksmiths.

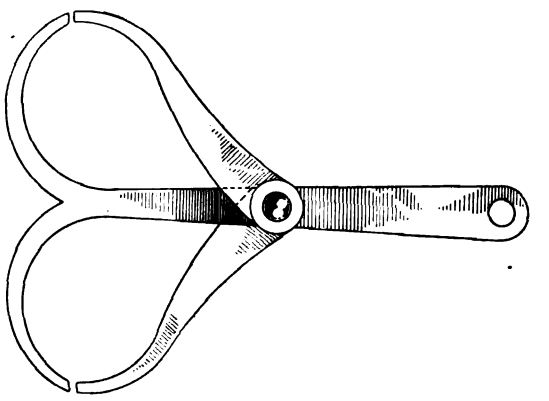
We Stand Corrected.

From D. D. S., New York.—When in a nearby library I often pick up your valuable paper and often copy many notes on metal work in which I am greatly interested. But please be careful not to lead us astray by false staements. In the June number under the title "Different Metals" the writer says "Aluminum is an alloy of aluminum," etc., which is not correct as aluminum is a metal of itself. Might as well say copper is an alloy of copper and other metals. Then at the close of the article "Porcelain and Vulcanite" is added as though they were metals. Moreover vulcanite is not made by "baking" raw rubber and other ingredients but vulcanization is done in a steam bath.

Note—Thanking our friendly reader for his criticism, the matter would have been plain and correct if it had been stated: "The metal called aluminum in common use is usually an alloy of aluminum," etc. From the use of the words "porcelain and vulcanite," it might have been implied by the reader that they are metals, but it was not so stated, and of course, it was not so considered.—Editor.

Handy Calipers.

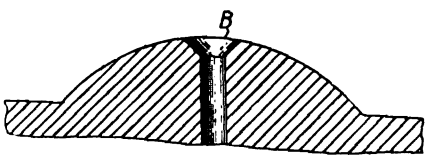
From J. K. Sullivan, New York.—The sketch shown illustrates my way of making a double caliper that will measure width and



thickness. It should be about twelve or fourteen inches long and is made out of seven-eighths by three-sixteenths tire steel, split to end. Place the rivet nearly in the center. Other than this the illustration describes itself.

For the Blower.

From G. H. E., Connecticut.—In case the bearings or journals of the blower get worn the caps may be screwed down. But no means of knowing just how tightly the bearings are screwed to grip the journal. Hence, as a rule, to prevent the journal from knock-



Control of the bearings.

ing in the bearing the cap is screwed home too tight, and undue wear ensues. The bearings should be so fitted that their faces at the joint screw tight, one against the other, when the shaft is so easy a fit that it cannot be shaken in the bearings, and yet rotates as easy by hand when the bearing is firmly screwed up as when the cap is taken off, and then the bearings will last, at least, six times as long without requiring repairs as they would if left open to take up the wear.

As to the material for the bearings, good

composition brass is the best, because, though babbitt metal is easy to fit, the dust and grit beds in it (instead of working out with the oil, as when good brass is used), and this grinds the journal down. If oil-cups are used, let them be large ones, and plaster on one side some tallow too hard to melt under the ordinary summer temperature of the bearings, so that if the oil should be all gone and the bearings get hot, this tallow will melt and flow down and lubricate the journal.

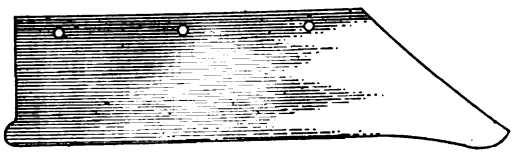
ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

More About Pointing Plow Lays.

From Anson Cummings, Illinois.—In my opinion the following is the best way to point plow lays:

Fig. 1 represents a lay that needs pointing.



Pointing a Plow Lay. Fig. 1—A lay that needs pointing.

Fig. 2 is the same turned upside down. Fig. 3 is the point ready to clamp on. We place A, Fig. 3, at A, Fig. 2, and clamp with tongs at B, Fig. 2, and B, Fig. 3, clamping the two together securely, and take our heat at A, Fig. 2, clear to the point. Next remove the tongs and weld up to B, Fig. 2; it is then like Fig. 4. Now turn the point C, Fig. 4, back, after drawing the edge thin back as far as D, Fig. 4. Take a good heat and weld up, drawing the edge thin from point to head of lay. Level the lay on the bearing block. Keep the point from drawing to land. Upset the heel at E, Fig. 2, to keep that straight, or cut it off, if too thin to upset.

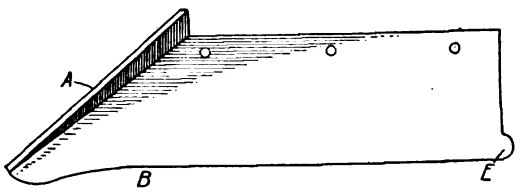


Fig. 2—View of Fig. 1 when turned upside down.

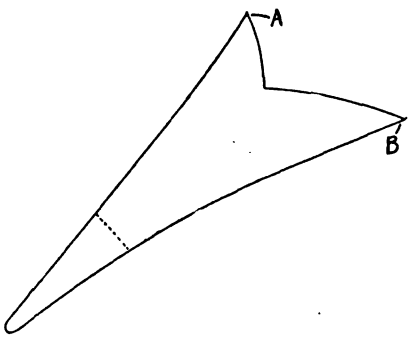


Fig. 3—The point ready to put on.

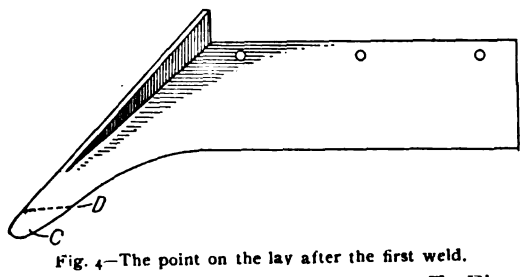


Fig. 4—The point on the lay after the first weld.

If you have the plow at the shop, see that the lay fits snugly. File it sharp on the edge. Put it on the plow and you have a good job, as represented in Fig. 5; and one good job is always an advertisement that brings other work.

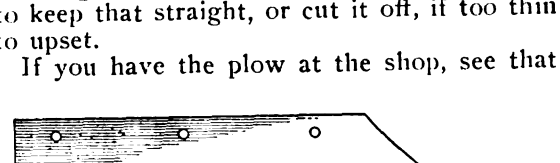


Fig 5—The job completed.

To Save Time In Making Plates.

From H. J. Gray, Massachusetts.—Some time ago I saw in the paper a plan of making plates for clamping railroad rails. I had some large plates 24x9x5-16 inches to bend, the bend to run lengthwise of plate, and one of the sides to be longer or higher than the other, viz., one side 4½ inches high, the opposite side, to be only ⅜ of an inch high. If these plates had equal sides, or comparatively equal, there would be no trouble in bending, and the most unskilled workman would be able to say just how to bend them. But, as the case was as is stated above it can be seen by most men who have had experience in drop forging that to bend as you would a carriage shackle, or clip, or any forging that had equal sides, would be disastrous. Why? Because the friction of the long side being so much greater than on short side, it would draw the short side away, and if you were to place the plate in position so as to allow for the drawing, you would have a sorry lot of forgings when through; as some would be heated more and some to a less degree, thereby making plates whose sides were not uniform. Most men would put in the long bend first by bending A in a ninety degree die (see Fig. 1), then clamping that long side to another die, and having a top die to bend the short side down (see Fig. 2), all of which would take time for clamping and expense for clamps. The dies themselves being very apt to get out of order, and the workman to become irritated, thereby causing him to become careless.

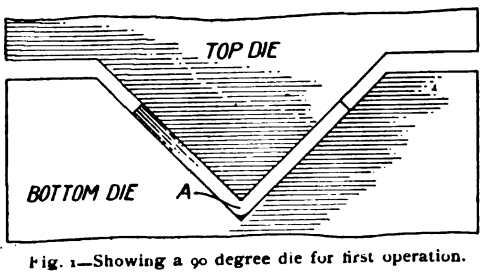


Fig. 1—Showing a 90 degree die for first operation.

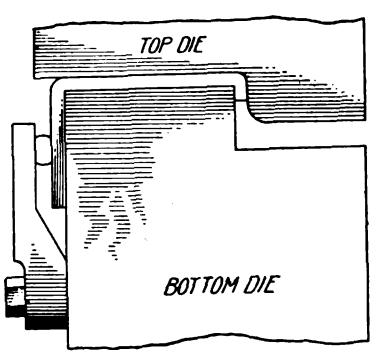


Fig. 2—Die for bending short end, second operation.

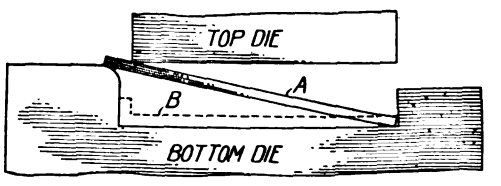


Fig. 3—Showing plate in position to receive the first blow.

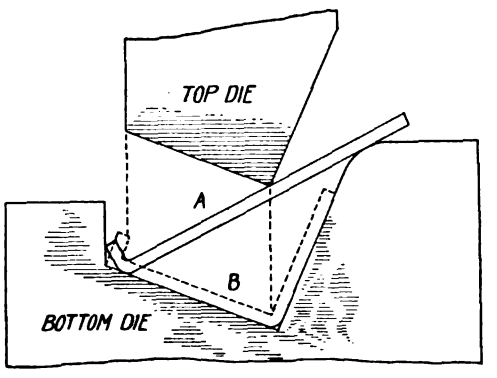


Fig 4—Die giving the last bend.

How to bend them (see Fig. 3). Here is a perfectly plain, flat, strong die, made of cast iron, which can be easily planed. The plate after heating can easily and almost instantly be placed in position for receiving the blow from top die. And the work cannot be otherwise than positive. As the reader will notice that the plate in position for being bent rests one edge against a solid shoulder, and the top die coming down forces all plates into the same form accurately. The workman has only to use ordinary carefulness and he has produced a good job.

The angle at which the stock that is to form the short bend (you will notice) is such as will allow the bend to be gradually and easily made. Now, having given this first bend to all the plates, we will proceed to give them the last bend by using the dies shown in Fig. 4. Here you see is also a positive motion. The short bend that has been given in the dies,

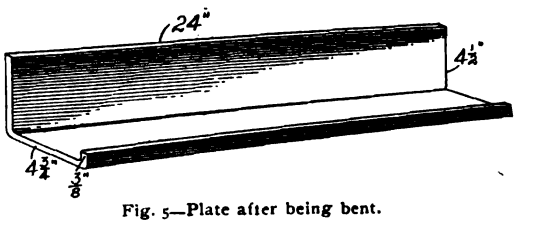


Fig. 5—Plate after being bent.

Fig. 3, is placed against a solid shoulder and the plate rests upon the opposite side of die in position to receive the blow from top die. You will also notice that the angles twenty degrees and seventy degrees forming the ninety degrees are so placed that the top die strikes the plate in exactly the same place as it will rest when completing its work. Also notice that the arrangement of these angles has been made such that the bend is gradually and easily made, and that there is a chance to give a good solid blow to the work.

Hardening Plow Lays.

From H. P. R., Iowa.—Take a common oil barrel that will hold about 30 gallons. Fill it with water. Put in 10 or 12 pounds of packers' salt and three or four cans of Lewis' lye. Then pour in a quart or more of good machine oil. Heat your lay all over evenly to a low red and plunge it in all over, point downward. This will prevent working while cooling, and the lay will be tough and hard.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Kerosene for Engine Fuel.

From F. J. Richard, Louisiana.—I would like to hear from someone who could tell me where or how a gasoline engine can be converted to burn kerosene in place of gasoline. My engine is 7½ inches bore and 12 inch stroke, jump spark. I have written everywhere I thought I could get satisfaction, but never got anything in return. If I could get an idea from some brother, I would be very glad.

For a Diseased Frog.

From J. R. Smith, Columbia.—Could some brother tell me the best thing for a horse's feet when the frog has become diseased and also with very poor hoofs? The disease of the frog is of long standing. I would be glad to hear from some one in this case.

For Brittle Hoofs.

From J. V. McNeil, Cochituate, Massachusetts.—Seeing the inquiry for something to remedy brittle feet or hoofs, I would recommend the use of some of N. Lemoine's hoof packing, as it is the greatest packing I have ever used. Let Mr. Hutchinson try a pail of it and see the good results he will get.

Shoeing Forging Horses.

From R. S. Smith, Oregon.—I wish some expert reader of The Blacksmith and Wheelwright would give me the benefit of his opinion on shoeing forging horses.

Who Can Beat This?

From J. P. Ogg, Pennsylvania.—I have a son named Samuel Ogg at Youngstown, Ohio, who pulled off, drove and finished 258 shoes in one day during the past winter. My best record was six and a half minutes for one full set of shoes driven and finished. You might ask in the paper how many the other fellows drove and finished in a day.

Buncher for a Mowing Machine.

From G. E. Stewart, Montana.—I would like to ask for a practical design of a buncher to attach to the cutter-bar of a mowing machine. If any of the brothers can help me in this matter, it will be very much appreciated.

Welding Cast Iron.

From O. T. Danielson, Minnesota.—I would like to get directions to weld cast iron, and the material and where to get it.

Little Things to Remember.

Every woodworker discovers little short-cuts in his work which materially help him to attain rapidity and perfection.

In measuring with a rule tip it on edge so that the dimension marks are adjacent to the piece being laid out, and in taking a series of dimensions, start from one point only; do not move the rule from one mark to the next.

In setting a gauge, do not rely upon the scale on the beam, but always test with the rule, the end of which can be placed against the head of the gauge, and the dimensions run to the spur.

Always tip a plant on its side when laying it on the bench so as not to dull the iron. For the same reason, always raise the plant from the work on the return stroke.

In planing end grain, never run the plane entirely across the end, but work from both edges toward the center of the piece. This prevents the splitting of corners.

In using an oil stone, there are three things to observe: (a) Use plenty of good oil; (b) clean the stone well before putting it away; (c) use the entire face of the stone, not merely the center. If these precautions are taken a stone should cut perfectly for years.

In sharpening plant irons and chisels, always rub on the bevel and never on the back, as this must be perfectly straight at all times to insure perfection in cutting.

In boring, never bore entirely through a piece, but reverse the piece and finish the hole from the other side after the worm penetrates.

Do not drive a screw into a board with a hammer, as its holding qualities will be greatly lessened.

Always drive nails and brads at an angle, as they will then hold more securely.

In sand-papering, always use a block if possible, as this will prevent rounding edges where they are not wanted.

Sand paper should be used for cleaning and smoothing purposes only; do not depend upon it for doing the tool work.

Sand papering should not be done across grain.

FIFTEEN SPECIAL SHOES.

What They Are Used For And How They Are Constructed.

In a recent issue of the Horseman and Spirit of the Times Dr. Jack Seiter, in charge of the shoeing department at the Savage farms, the home of Dan Patch and other turf celebrities, gives a series of fifteen shoes that are and have been popular among owners, shoers and drivers of fast horses, and a short outline of each descriptive of its uses. They are as follows:

No. 1—Swedged Shoe for Front Foot.

This is an ideal type of a shoe to use on a trotter, it furnishes a good flat bearing surface for the foot to set upon, is easily fitted and furnishes a good, firm foothold on either a hard or soft track. It does away with the toe grab and its difficult break-over. It is best when fitted up with a pair of heel or jar calks to break the concussion on a hard track, also makes a good bar-shoe; in fact this is the trotting horse shoe mostly used down the Grand Circuit by the leading drivers. The hind swedge shoe is also recommended, and as it gives a horse a perfect toe grab, without any elevation of the toe and no danger of a badly cut quarter, as is often the case where a toe grab is worn. A shoe of this pattern can be made quite a little lighter in weight than a plain "grabbed" shoe and at the same time furnish a better bearing surface for the foot.

No. 2—Plain Shoe for Trotter or Pacer.

This is a good type of shoe for any horse and in my opinion should be used more than it is. It's the most natural foot-gear we can apply and if more young horses were shod with it instead of all sorts of fantastic shapes and styles of shoes, we would no doubt have less bad legged youngsters; also far less faulty-gaited ones, as it permits a free break-over at any point. This shoe also can be fitted up with heel calks, or toe calks if needed. The beveled sides illustrate the way to finish off the shoe where there is danger of interfering or speedy cutting.

No. 3—Memphis Bar Shoe.

This shoe was very popular several years ago. I suppose every trainer in the country "fell for it" at one time or other. It was the cause of many a bad tendon owing to the hind bar being set ahead too far from the point of the heels. This let the foot drop down too far at the heel and then the strain of getting up and over this bar practically did the job of injury to the tendons. The front bar supplied what little virtue the shoe possessed as it furnished a good roll and break-over. Taken as a whole it was simply an exaggerated case of rolling motion shoe. By its use we can get the same amount of roll with an eight-ounce shoe that formerly required about a pound shoe.

No. 4—Memphis Nub Shoe.

This is simply a modified form of a Memphis bar shoe and has practically replaced it as a shoe to gait trotting colts with. Its use is indicated where a rolling motion is needed.

No. 5—Scoop and Rolled Toe Combination.

This is an excellent type of shoe for trotters. It allows for a good free breakover and when properly constructed the ridge that separates the roll and scoop, furnishes a fair grab or hold to prevent slipping back.

No. 6—Three Calk Trotting Shoe.

This is the style of shoe in general use when calks or grabs are needed and are supposed to break the concussion of hard tracks. The grab at the toe being set back as it is does not interfere with an easy breakover.

No. 7—Four Calk Shoe.

This form of shoe has not been in great demand of late years, but at one time was supposed to be the great and only anti-knee-knocking shoe. The four calks being sharp were supposed to keep the foot from getting in the twist as the foot was about to leave the ground.

No. 8—Bar Shoe.

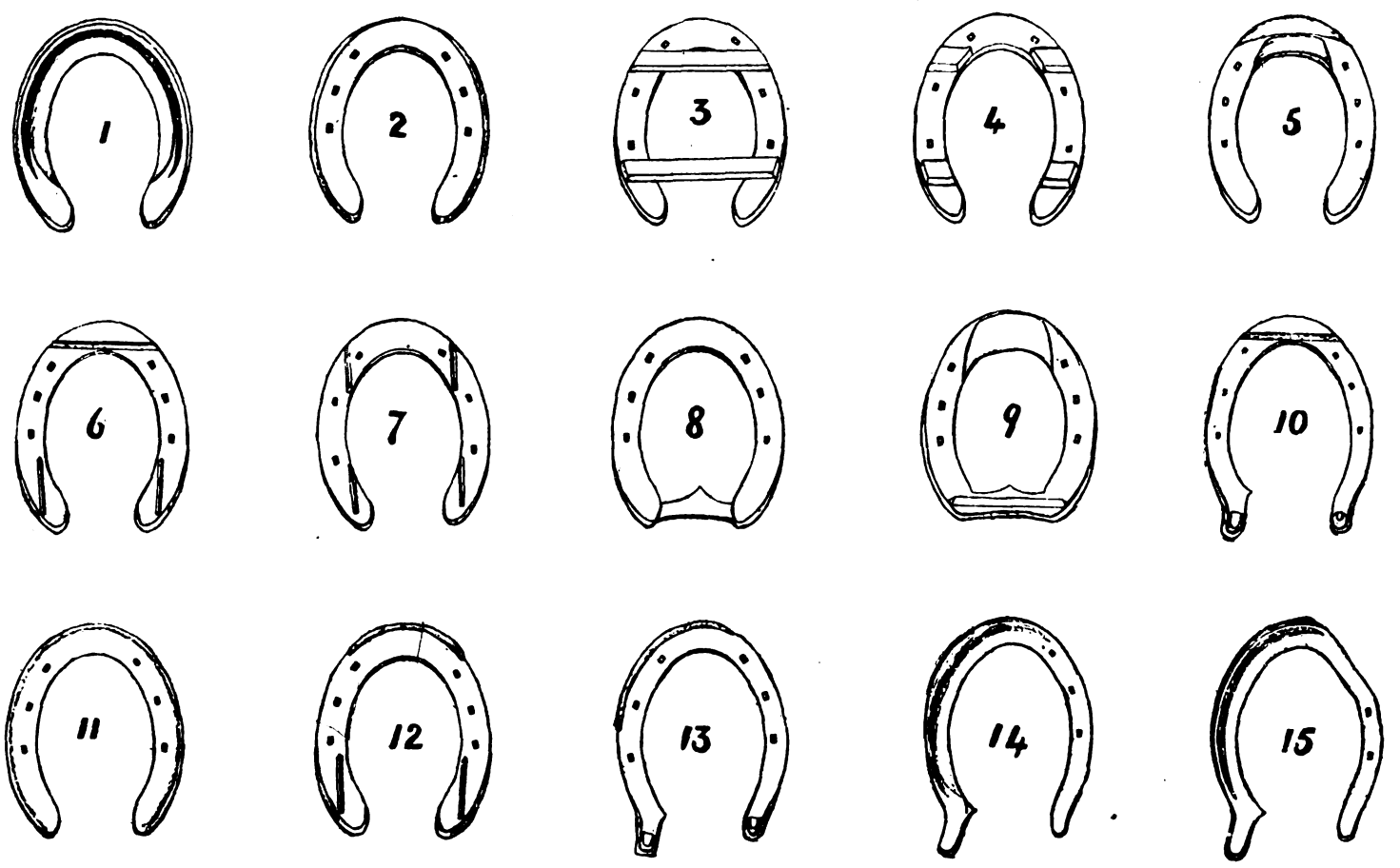
This is THE great and only shoe to use and should be worn by all race horses. By its use we get an even bearing surface all over the foot and supplies what an open shoe fails to do—frog pressure—without which no foot can be kept in a healthy condition. It may be used with any of the different type of calks or grabs.

No. 9—Anti-Elbow Hitting Shoe.

This is the invention of "Ren Nash" for years with the "Dan Patch" Stock Farm. It was used with great success on several well known Grand Circuit horses who were apparently useless as racing tools owing to the fact that they would break at the critical moment; caused no doubt by the injury to their elbows by other shoes.

No. 10—Hind Trotting Shoe.

This type of shoe is used more than any other on the hind feet of trotters, generally



A Group of Shoes Popular with Owners, Drivers and Shoers of Race Horses.

without the toe calk, but where a grab is needed this style is indicated, set back well it is not so apt to be dangerous in case a quarter is injured.

No. 11—Rim Shoe.

This is an ideal pacing horse shoe when a horse needs a good foothold. Unlike a calked shoe, it needs no effort on the animal's part to break over the toe easily. The material can be bought in all sizes, consequently it is a simple matter to obtain any desired weight of shoe. It also makes a good form of hind shoe.

No. 12—Three Calk Pacing Shoe.

This is a good form of shoe for a bold, high going pacer, the sharp calks and grab minimize the concussion and furnish a firm foothold. This is the style of shoe worn by the champion Dan Patch in all of his great miles.

No. 13—Hind Pacing Shoe.

This, as No. 12, is indicated for the same style of horse, the toe grab runs down the outside pretty well and if the foot is properly dressed it prevents a horse from going over to the opposite quarter and cross firing. This style of shoe was also worn by Dan Patch in his trial against Father Time. When we have a long sloping pastern and the low heels that goes with it, it is the rule to use a long, high side-calk on the outside heel or else let the toe grab follow the outer edge of the shoe all the way to the heel.

No. 14—Half Swedged Cross Firing Shoe.

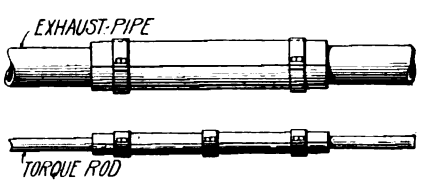
This is the shoe mostly used on our pacers. It is a good safe shoe. The outside or swedged part furnishes a firm foothold and prevents slipping and also prevents the foot from being carried in too far. The inside is "half rounded" and prevents any great injury in case a quarter is struck.

No. 15—Half Swedged Cross Firing Shoe.

This is used for the same purpose as No. 14. The "cut-in" toe style is used on bad crossfiring cases. The hoof is left projecting out over the shoe, the sharp edge simply being rounded off to prevent the sharp edge from cutting the quarter. Both these types may be used with or without heel calks, and in some cases where the inside cannot be cut low enough to get the foot in proper shape, it is advisable to omit the inside calk. No crossfiring shoe can be a success unless the foot is properly prepared; it must be cut low along the inside, especially the inside toe.

Automobile Pipe Patching.

There is a certain class of automobile repairs which cannot be rated as anything more than a rough and ready means of overcoming a pressing difficulty. Owing, however, to the way in which a motor car frequently breaks down when out in the country, or at any rate away from the fully elaborate equipment of a properly fitted garage, it is interesting to know of some of the simple methods of more or less temporary repair. The breaking of an exhaust pipe is not, it is true, a very frequent



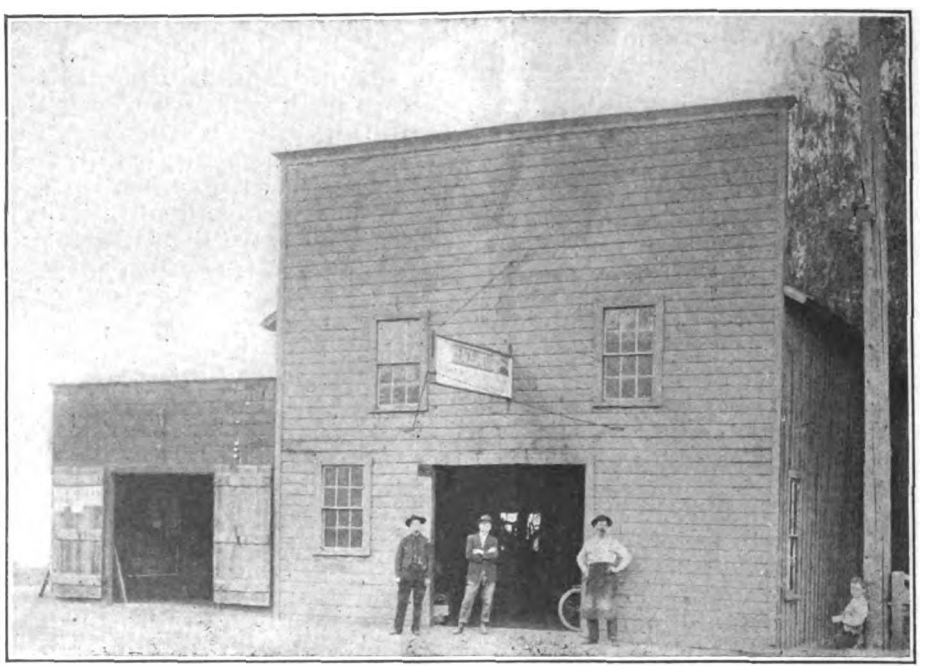
Showing the Patches.

occurrence, but nevertheless it does sometimes happen and the same can be said of a torque rod, this latter frequently breaking, owing to the heavy strain of travelling fast over rough roads, and also when improper and violent use is made of the clutch.

Should a fracture occur the driver can do the job by the following means: A piece of steel bicycle tubing or a piece of brass or gas tubing can be obtained of the same measurement inside as the outside of the fractured pipe or rod. This should then be cut into two semi-circular channels by sawing down the tube lengthwise along the diameter. These two channels can then be fitted over the broken part and held in position by means of two or three clips which can easily be made out of some very thin strip iron. If they are available, some water pipe clips will answer the purpose just as well, the idea being to bind the sleeve thus formed on to the fractured parts. The tube or rod is then as firm as ever possible. This will effect a repair which will last for some time, but such a temporary repair should not be allowed, by reason of its continued satisfactoriness, to become a permanent matter, but a new pipe or rod should be fitted at the earliest possible opportunity.

A California Shop.

From Wm. Graham, California.—I enclose a photograph of my shop. It has three forges, a Champion tire shrinker, blower, band saw, drill press, grind stone, emery grinder, circular saw, and a gas tire heater. The power is supplied by an electric motor, which is very cheap for this locality. Although it is less than two years since I opened this shop, I have built up a fair trade and business seems to be improving. We have a good many discs to sharpen and considerable plough work, but a large part of our work is shoeing and wagon repairing.



Shop of Wm. Graham, California.

THE SUPPLY HOUSE.

Making Out Orders Plainly and the Question of Cash or Credit.

How do you treat your supply house? asks the Canadian Blacksmith.

Do you give them a fair show, or do you abuse them. I venture to say if the supply houses did not take any more care in filling your orders, than some of you fellows do in writing them out, you certainly would do some kicking that would, in comparison, make a mule's look like the last struggles of a dying cat.

For instance, you send an order to a supply house for 1 pair shafts 2¼. Now the first thing that enters the mind of a supply man is: "What kind of shafts does he want?" and he will turn it over in his mind like this—"There are six ways we can fill that order; which will be correct? Does he want Single Bent Express Half Finished; Single Bent Express Shafts Finished; Double Bent Express Shafts Half Finished; Double Bent Express Shafts Finished; Single Bent Cart Shafts; or Double Bent Cart Shafts? Well, he has 'rush' marked in big letters at the top of his order, and he wants a pair of shafts of some kind and wants them in a hurry, and I certainly have not time to write him, for if I do he sure will feel kind of sore at the delay. I think I will just make that order read: Shingle Bent Cart Shafts, as that is most probably what he wants."

Now, supposing that man was you, and it happened that it was Double Bent Express Shafts that you wanted, what would your attitude be? Would you be the only one who could stay in the vicinity for the next few minutes on account of the red hot words that flowed from between your clenched teeth, or would you realize that he had done the best he could, and acted in what he thought was in your best interests, while the real fault lay in yourself in not giving full information. This is just one example of numerous things the supply man comes up against, and many times every day. It might be in your neglecting to give the height of rims or stating whether the horseshoes were to be front or hind.

It only takes a few seconds longer to look up the catalogue and get the proper name or number, and it would many a time save the delay which would probably mean the loss of an order to you.

"How do you feel towards your supply house?"

You should have the most friendly feeling for them, as they certainly have for you. They want you to succeed and make money, and are endeavoring in endless ways to help you. Are you aware that every time you neglect to pay a note or draft this supply house has to go to their bank and put up their own cheque to save you the protest charges. You should appreciate this. Again, this same supply house may be straining their own credit every day so as to make things easier for you, and soon they get to their limit, and their bank gives them so many days to cover up their overdraft, which has been created by helping you. Now, if the supply house neglected covering this overdraft within the specified time, it would mean their credit would be impaired and your accommodation from them would cease. When they are pressing you for funds for this purpose, it is your duty to assist in every way possible. Don't fly off the handle and write them you can't get money. You can, if you make up your mind to. Always bear in mind that they "have to" for you.

It is certainly a great source of satisfaction to see the number of local branches that are adopting the cash system. Let us hear from more of you, it sure is a joyful sound.

STEAM PIPING.

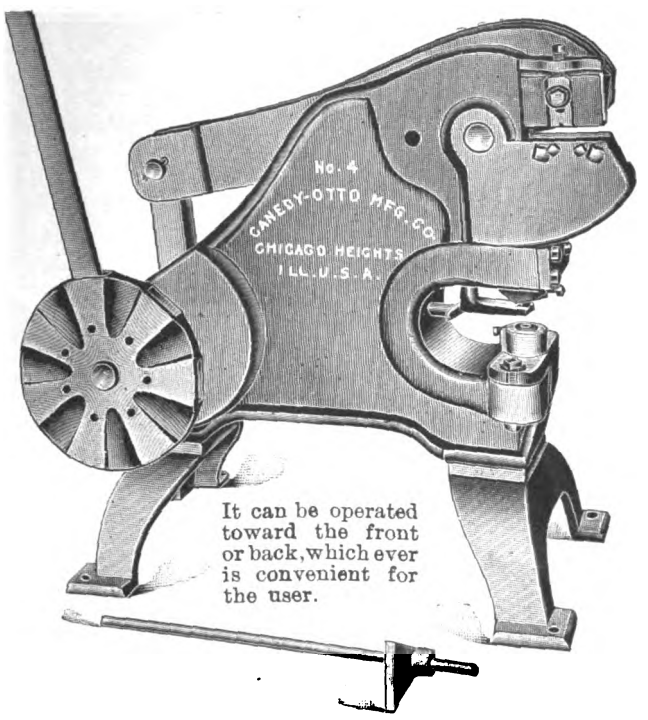
How to Lay It Out to Secure Efficiency and Drainage.

The sole object of a steampipe, says "Power," is to convey steam from one point to another. This fact is sometimes lost sight of, with the result that at the last moment the pipe is put up, usually along a row of building columns regardless of distance or accessibility. The broad principles to be observed in order to enable a pipe line to perform maximum duty are that it shall take as direct a course as practicable between any two points, have bends of as large a radius as possible, slope toward a certain point to provide for drainage, and shall be only large enough to take care of the steam at a fair velocity. Very often circumstances compel to be neglected the first two of these principles, but they should all be considered as a basis for the design of every pipe line.

Adherence to the first principle results in a minimum amount of material required, as well as a minimum amount of labor for erection, and, consequently, a lower initial cost. Low costs for repairs and maintenance will follow, as will also minimum losses due to radiation, etc., all of which naturally tend to keep down the operating costs.

The second principle—namely, the use of long radius bends— gives the steam a less retarded and obstructed path, so that the drop in pressure at the discharge point is not unduly great, and numerous joints, which are always points of weakness in a pipe line and frequently

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ⅝-in. and ¾-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

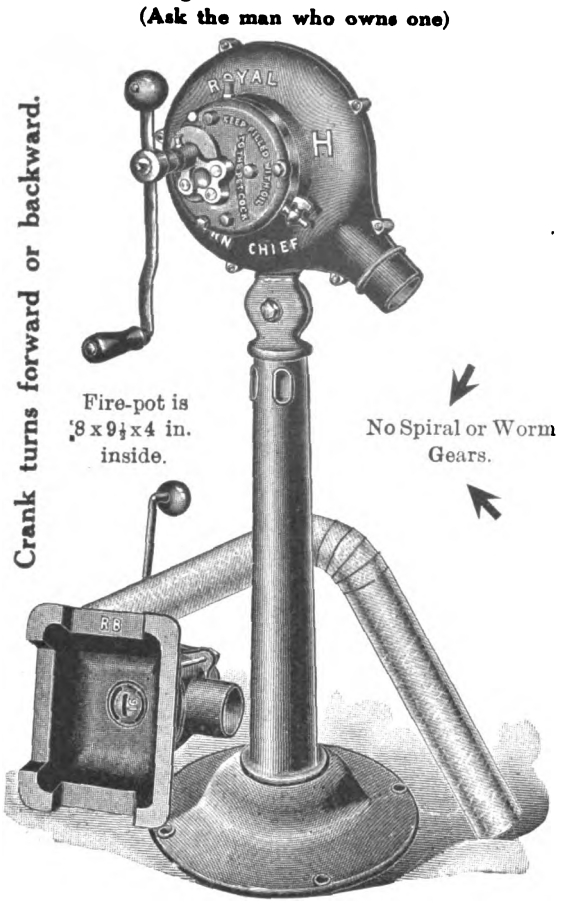
No. 100 Royal

The most popular forge ever made

Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

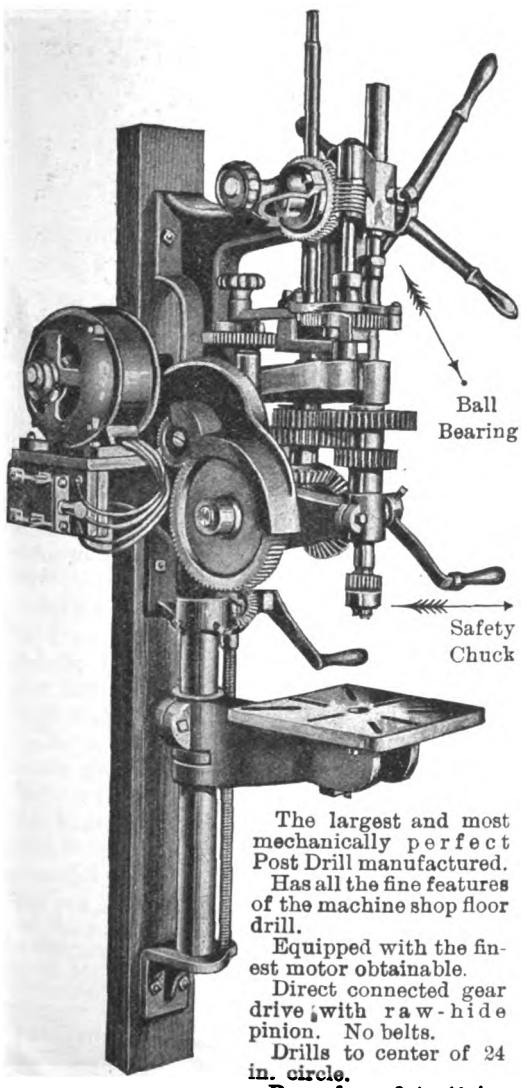
(Ask the man who owns one)



FORGES
BLOWERS

PUNCHES
SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

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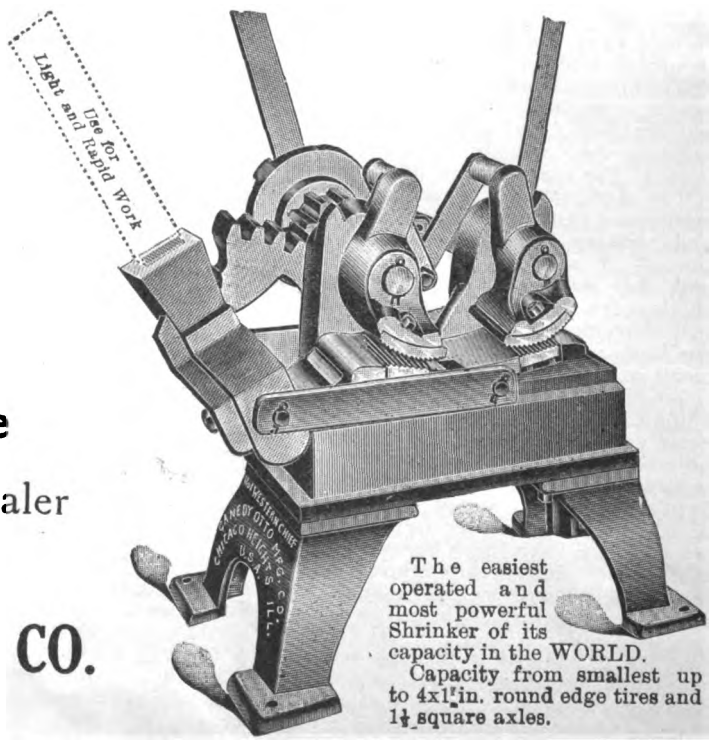
No. 1½ Western Chief

(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1½ in. round edge tires and 1½ square axles.

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afford pockets in which condensation will accumulate, are eliminated.

The question of proper drainage is always an important one, and should never be overlooked. The fruits of neglect in this particular are often a blown-out cylinder head or burst pipe, caused by a slug of water resulting from the accumulation of condensed steam. If, because of local conditions, it is impossible to install a line without low points, provision should always be made for drainage at these points. Water in a steam line usually indicates improper construction or neglect to see that the traps, etc., operate properly, and is a condition that should not be permitted.

In laying out a steam line, error more often occurs on the side of extravagance than economy when the size of the pipe to be put in is considered. This part of a power plant is so costly in comparison with the rest of the equipment, especially when large valves are employed, that every effort should be made to minimize such cost as much as maximum efficiency will allow.

The question of radiation and its consequent losses should also be a potent factor towards this end, for, naturally, the smaller the surface exposed to the surrounding air, the less will be the cooling effect. Advocating small-diameter pipes and high velocities for steam is, to a certain extent, inconsistent with minimum pressure loss; therefore, a compromise should be effected between the loss of heat (assuming of course, that the line is properly covered) and the loss of pressure.

Beyond a certain small loss of pressure, any increase in pipe diameter affords so little reduction in friction, and adds so much to the heat-reduction losses, that the tendency towards the smaller pipe and a greater steam velocity, within limits, is amply jusitified from the operating side, as well as from that of first cost; therefore, the expenditure involved in the installation of a line really larger than necessary is in practically every instance out of all proportion to the small gain in pressure.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

PISTON LUBRICATION.

Oil Introduced By Way of the Carburetor Is Now Successful.

BY E. W. LONGNECKER.

This is a question that is troublesome to many operators. Oilers, lubricators and lubricating devices of divers description and design are to be found in almost as great varieties as there are designs of engines to offer to power users of today. These variously designed oiling devices attest to the fact that the gasoline engine piston has not yet found an ideal or satisfactory plan of lubrication.

However, lubrication of the gasoline engine piston is now more successfully accomplished than was the case in the earlier history of the gas engine. This is no doubt largely due to better cylinders, piston and ring construction, and also to better lubricating oil for this purpose.

We are now using oils for gasoline engine lubrication that earlier in the use of the gas engine would have been regarded as of little service. And now very few gasoline engine builders attempt to finish their rings, pistons and cylinders without surface grinding appliances that will true them to a minute fractional part of an inch.

With increased facilities both in the construction of cylinders and in the manufacture of suitable oils, piston lubrication has improved. But it has as yet reached no standard that can be called a universal success. Operators are yet discussing the various methods and advocating this, that and the other as the only great and true one.

The method we here refer to is one that agreeably surprised us in its efficiency and simplicity but we are not going to recommend it as a cure all in the category of lubricating troubles. It is a method that can be easily tried out and may result in its adoption by some at least of our readers. The lubricating oil is mixed with the gasoline and is introduced with it into the cylinders through the carburetor. The lubricating oil globules are not as finely divided as the gasoline and therefore as the gasoline vapor begins to burn the oil globules are driven outward and cling to the surface of the cylinder walls and form a thin coating or film which serves as lubrication. This method is in use by numerous automobile drivers and not a few stationary gasoline engines are running successfully under its service.

About one quart of lubricating oil to five gallons of gasoline has served a little stationary single cylinder four-cycle engine successfully under its severest test.

AUTOMOBILE INFORMATION.

Good Reading for Buyer or Owner from a Disinterested Expert.

(Continued.)

Universal Joints.

These are an important part and a poor construction will give a great deal of serious trouble, but without naming the different makes, it is almost impossible to give anything like intelligent information, and as this part is one that is never injured except by wear the maker should be compelled to guarantee it for the life of the car, otherwise they acknowledge this to be a weak part of their construction.

Body.

This is simply a matter of personal preference, as it is impossible to state which is best, and the matter of design is simply

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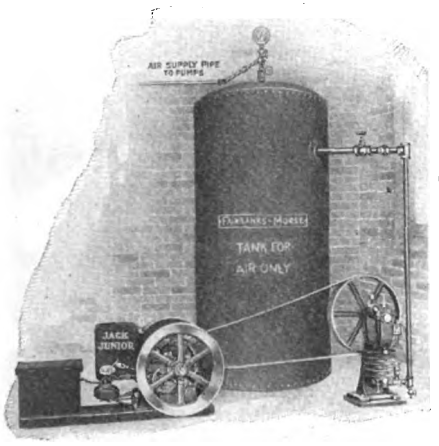
Fairbanks-Morse Domestic Water Systems.

A writer in a current publication speaking of the wide-spread movement to make life on the farm more comfortable and more convenient, expressed the opinion that practically every country home would have its own domestic water system were farmers more fully informed as to the convenience and comparatively low cost of plants. Universal adoption of private water systems, is, of course, some little distance in the future, but the fact remains that thousands of farmers are actually installing these plants. The reason is not hard to find.



Fairbanks-Morse Fresh Water System.

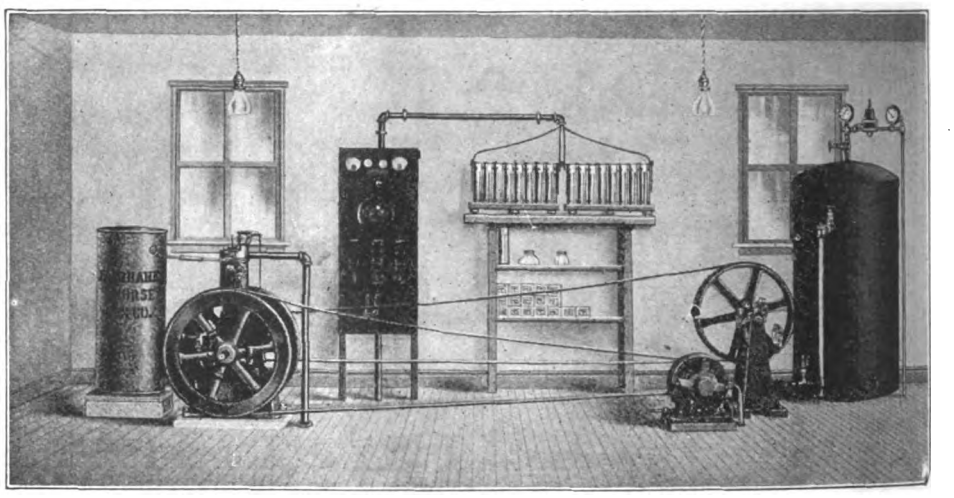
The modern farm house with a pressure water system has all the advantages and sanitary conveniences of the city home. A modern bathroom, kitchen sink, hot water tank, running water in the laundry, dairy and barn are comforts and conveniences of far greater value to the farmer to-day than the comparatively small cost they represent.

To fully appreciate just what the possibilities are for the sale of water systems and the profits to be derived, requires but a little consideration of the subject. Farmers are investing from $150 to $1,500 in water systems right along. Usually when the outlay approaches the later figure it covers a complete water supply and lighting system combined. There will be a number of instances, of course, where the amount invested will run below $150, but $300 may be considered a conservative estimate for the average price paid. On a basis of eighty acres as the size of the average farm, every township would mean approximately 300 prospects. Figuring that but 10 per cent. invested in water systems, the total would reach close to $10,000. Furthermore, since most dealers would cover from six to eight townships, the business actually in sight would total close to $60,000. And this is on the assumption that only one farmer in ten would buy. There is really no question about it; the dealer that is not taking advantage of the demand for water systems is missing one of the best opportunities that has developed in years.

The plant that Fairbanks, Morse & Co. are at present featuring in agricultural advertising is their auto-pneumatic fresh water system. From the standpoint of convenience and flexibility this system is all that could be desired. Water can be delivered from a number of sources irrespective of their relative location, since the pumps are submerged in the water and operated by compressed air. The air tank, compressor and engine can be located wherever most convenient, as compressed air can be piped most any distance without appreciable loss. A pump for each source of water supply and the necessary piping is all the additional equipment required. In the same way, the water can be distributed to any number of points, to bathroom, kitchen, laundry, barn, garden and lawn

A unique Eclipse Wind Mill Plant showing that an elevated tank may be artistic as well as useful.

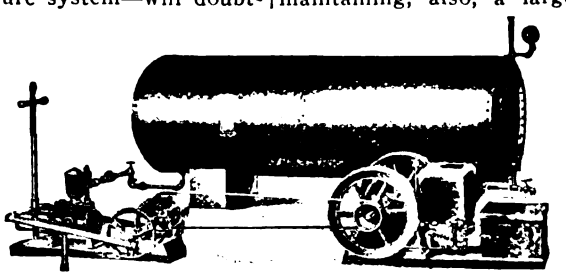
Another system manufactured by this firm is what they term a Suburban Water System. With this, water is pumped by hand or power into an air tight steel pneumatic tank and forced to the taps by means of the air compressed in the same tank. For the same water capacity as the Fresh Water System a larger tank is necessarily required as not more than two-thirds of the space is available for water. With this system one is as a rule restricted to a single source of supply, or must order duplicate plants. Occasionally one can arrange for the one power plant to supply both hard and soft water; an additional tank being all that is required.



Fairbanks-Morse Combined Electric Light and Fresh Water System.

The elevated tower—at one time the only water pressure system—will doubtless continue to be a factor in water system sales for some time to come. The economy feature of a high-grade windmill will long hold with many farmers. Of course the disadvantage of a large amount of water stored will be urged against this method, though in one way this is looked on by some as a redeeming feature; a large capacity tank in case of fire being highly desirable. Then, too, the argument of stale or tepid water for drinking does not necessarily hold as it is usually arranged to have the drinking water supply furinshed independent of the storage tank so that comparatively fresh water is always on hand.

If every water supply problem was alike the dealers' decision regarding what line to handle would not be so vital to his success. Conditions to be met and results to be obtained differ, however, for practically every case. It is this fact that accounts for Fairbanks, Morse & Co. not only manufacturing a varied line, but maintaining, also, a large organization that does the engineering work and selling for the dealer. This organization has been so broadened that no matter where located the dealer has help at hand promptly. The dealer's task therefore, aside from assisting in making the sale, is to look after the details of the installation and see that the work is done in accordance with the plans and instructions furnished by the manufacturer.



Fairbanks-Morse Suburban Water System.

whether you think it is nice or not. The only thing to look to after you have become satisfied with the material and design is to see that it is finished perfectly smooth and is in every respect a first-class carriage job, because the best of finishes go bad soon enough while a poor finish will look like an old car in a very short length of time.

The leather with which it is upholstered should not have an enamel, paint or varnished finish, for any of these will crack, wear off and look bad in a few weeks. Be sure it is either hand buffed or at least machine buffed on the natural leather that has simply been dyed to the desired color. It is well to have a guarantee that curled hair and not some seaweed, tow, excelsior or other substitute has been used for padding.

Equipment.

Every car should have a glass front, top, speedometer, prest-o-light tank, and a complete kit of tools (not toys), also five lamps. Whether these are to be kerosene or electricity is a matter of choice, but I have seen more people go back to kerosene oil after having the electric lights fitted, than those who retained the electric after they found out the amount of trouble they could furnish.

When it comes to tops there is the real cheap top with uncovered bows with no lining except that furnished by the inside of the top material, with the bows all showing and only wrapped with some of the top material with a few straps of the same material to hold it in shape, and then there is the real good top where the bows are covered with patent leather up as far as where they join the top, and then the top has a separate lining of broadcloth and no bows are visible on the inside, and then this good top is supported from back to front with extension arms of metal and is self supporting without the use of front straps, but these are also sometimes added for still further support. Then again the real cheap top depends on the back curtain to attach it to the rear of the body instead of using a metal fixture on both top and back of body with a good strong strap between them to hold the back of the top in place.

In General.

It will be noted that I have considered the gasoline car only and while a car built along the lines mentioned would of a necessity be of rather high price, it is not to be inferred that those of cheaper construction have no place on the market, for it is fully appreciated that there is a demand for low-priced cars, and if the makers would use plain bearings in the wheels, transmissions, engine parts, etc., and then put a good roller bearing in the rear axle construction and give a good set of universal joints and use a bevel gear differential and give a little larger tires, instead of trying to make the public believe that they were giving something for nothing by using cup and cone ball bearings and try to have you believe that they

were annular ball bearings by simply saying that such and such places were equipped with ball bearings, without saying which kind were used, and then using cheap other parts to offset the difference in cost that these troublesome cup and cone ball bearings have created, they would fill the place in the market for which such a car is in demand, but so long as they try to make a cheap car in imitation of the expensive car just so long will the cheap car be the most expensive in the long run, due to the repair and maintenance being excessive.

My objection to the two-cycle motor is that I have yet to see one that has anything like the control of a four-cycle, more especially when running idle or on a down grade, and being of a somewhat mechanical strain of mind this skipping and fluttering of the motor gets on my nerves, but for those that this feature would not have any horrors there is the simplicity of this style of motor that must appeal to them.

WITH EYES HALF CLOSED.

Some readers go through a magazine just as they do through a garden or the woods. Their eyes are shut to a good deal that is interesting and useful and beautiful. It reminds us of the American drummer who is said to have spent "fifteen minutes in the British Museum." Having gone to the British Museum at all he might have spent days and weeks there and learned something, but as it was he saw next to nothing and it cost him more than he got out of it.

So, likewise, the hurried American who spends fifteen minutes reading this magazine sees and learns very little. Even if he reads closely only the reading pages he misses much that is of value to him, for every advertiser has a message for the reader. This message may not always be so clearly expressed, but if he did not have the message he would not advertise.

Look over the advertising pages closely then and see if there is not something in them that is worth your while. Of course no advertiser takes space enough to tell the whole story. He can merely suggest, and cannot begin to exhaust the subject. You will find something new in every issue that you did not know before. It may save you a few dollars or a few hundred dollars; you will know best after you have found out particulars.

The man who thinks it doesn't pay to read the advertisements can hardly be called a good business man.

Prof. Jesse Beery's Free Book.—Prof. Jesse Beery, sometimes styled the King of Horse Trainers and Horse Tamers, Box 360, Pleasant Hill, Ohio, tells in a very interesting book the thrilling story of his eventful career, how he made a success of horse training, and how anybody else can train or tame horses if they follow his system. Prof. Beery wants to send one of these books to every reader of The Blacksmith and Wheelwright. All you have to do is to send a letter or postal card with your name and address and ask for this book and you will get it without charge.

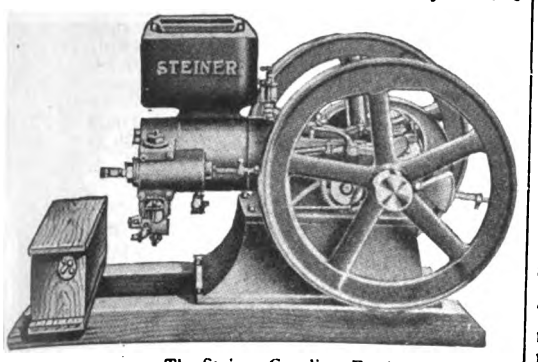
"Absorbine."—Have you ever tried it or have any of your customers ever tried it on their horses? It is a pleasant remedy to use. It does not blister or remove the hair and the horse can be used during treatment. It has been found especially excellent for swollen glands, thoropin, bog spavin, wind puffs, strained joints, shoe boils and other painful enlargements. Send for free booklet and further information to W. F. Young, P. D. F., 55 Temple Street, Springfield, Mass.

Wire Bolt Wrench.—Barney Langlotz of Bangor, Mich., is putting on the market an easy working tire bolt wrench. This tool is made of the best material and it is said will last a lifetime. It will remove burrs from one wheel in 40 seconds. This wrench can be attached to any post drill either hand or power in two seconds. If your jobber cannot supply you write direct to the manufacturer for descriptive circular and particulars.

Luther Dimo-Grit Tool Grinder.—If you want to know more about the Luther Dimo-Grit Tool Grinder send for their 40 page free book, containing a free trial offer to every reader of this paper. Consult the advertisement of this company on another page, wherein will be found illustrated and briefly described various kinds of grinders. It is said that the Dimo-Grit, the new artificial diamond sharpening substance, cuts steel 25 times faster than the grindstone and is ten times more efficient than emory. If it will do all of this no blacksmith can afford to do without one of these grinders. Write at once for particulars to the Luther Grinder Mfg. Company, 1185 Michigan St., Milwaukee, Wis.

Simple and Dependable.

Years of study by the manufacturers of the "Steiner" gasoline engine have enabled its makers, M. Steiner & Co., of Dayton, Ohio, to produce an engine that compares favorably with any on the



The Steiner Gasoline Engine.

market. It is built simply—designed for use by farmers and others not skilled in mechanics or the underlying principles of the internal-combustion engine—and of the best materials the market affords.

It has many features which make it distinctive and which are calculated to cause it to be regarded with favor by all seeking a good general-purpose engine. It has made a reputation for dependability and has given general satisfaction to all users. As a result the demand is growing steadily, but there has been no let-up in the effort to obtain "accuracy," and the same care is taken with design and construction as when the engine was a stranger in the field.

Features of the "Steiner" which have commended themselves are: the interchangeability of all parts; the fact that exhaust valve and cylinder head are either water or air cooled, the engine is equipped with a slip water jacket which makes cleansing of the jacket easy; lap joint rings on the piston, which is of good length to provide ample wearing surface on the cylinder; the excellent materials of which the connection rod and the shafts are constructed. On the latter there is no welding.

Comparisons of the "Steiner" with other engines now on the market are invited, and any information the manufacturers may give to prospective purchasers or to dealers seeking a first-class seller is given cheerfully. An attractive catalog, which is free to all, sets forth the many merits of the "Steiner." It may be had for the asking.

How Do They Do It.—The B. Boob Wheel Company of Cincinnati, Ohio, have an attractive announcement in this issue giving full particulars of their rims, seats, gears, etc., which they are offering at exceptionally low prices. If you want to know how they do it, write at once for their catalog giving full particulars of a lot of other articles besides those mentioned in the advertisement. They are making a special freight prepaid offer which is very attractive.

Johnston's "Krakno."—Not a few of our readers will be interested in the announcement in this issue of the R. F. Johnston Paint Company of Cincinnati, Ohio, briefly describing a preparation manufactured by this company called "Krakno." Three or four coats of this preparation it is said gives a perfect surface and basis for the finishing coats, doing away entirely with filler or roughstuff. It is guaranteed not to crack or craze. With the use of "Krakno" there is no more necessity for burning off old paint on repair work. It is in use in the largest automobile and carriage factories in the country. If any of our readers desire to see testimonials in favor of "Krakno," write to the manufacturers above and they will be promptly sent. This preparation is for sale or ought to be by dealers everywhere, but will be sent by the manufacturers to those of our readers whose dealers do not keep it.

The Wolfe Tire Cooler.—Large numbers of our readers ought to be interested in the announcement in this issue of Matt. L. Wolfe, West Carrollton, Ohio, briefly describing his tire cooler. He says it will cool a tire quickly without burning the wheel and always satisfies the customers. Write to him for full particulars and price. Mention The Blacksmith and Wheelwright.

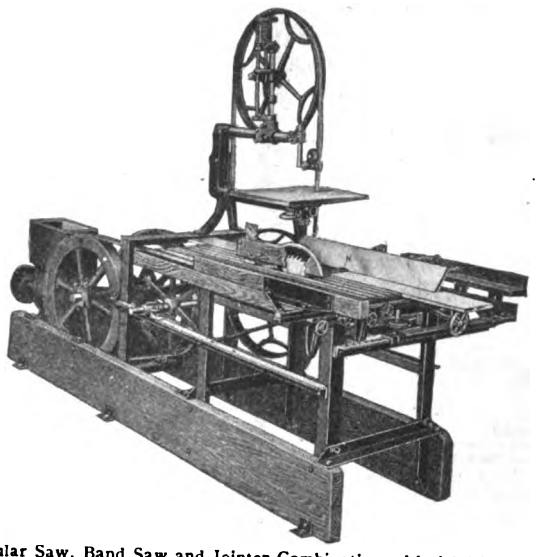
Wheels.—Whether you want to buy one set of wheels or ten thousand sets, you will make no mistake to communicate with the Muncie Wheel Company of Muncie, Ind., whose announcement you will find on another page. This company makes all sizes, kinds and grades at the most attractive prices.

To Every Reader.—The Corona Mfg. Company, 102 Corona Block, Kenton, Ohio, offer on our back cover page to give a 20 days' free trial of their preparation called "Corona Wool Fat." This preparation they say will tackle any old sore and will give good results, and it is as well a great hoof softener. This company wants one agent in each town. If you have not already done so write at once for full particulars and terms and easily make a little money on the side.

A Combination Machine.

The illustration shows a compact and convenient portable outfit, to be taken out on the job, or for shop use. Engine and machine are mounted on the same base, making it easy to move about. This is a combination of the machines most needed on the job or for general repair work. Three men can conveniently work on the machine at the same time, band sawing, boring and either ripping or jointing. There is no bolting or unbolting of parts to be done, which is a waste of valuable time, but all machines stand ready for instant use.

Other useful attachments can be added to this machine, among them felloe boring, spoke tenoning and rim rounding attachments; also their latest innovation, swing cut-off saw on same base privilege of making his own selection. with machine, enabling you to pull the saw across the material instead of pushing the long timbers across the saw.



Parks Portable Circular Saw, Band Saw and Jointer Combination with Addition of Boring Attachment.

The machines are priced without engine or motor, giving the customer the The Parks Ball Bearing Machine Co., Northside Station, Cincinnati, Ohio, have just gotten out a circular which describes this and other portable outfits. In writing mention this journal.

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ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED.

will be inserted under this head at 2 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1. Address

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Publishers of The Blacksmith and Wheelwright
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H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.
We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., Publishers, 71-73 Murray Street, New York City.

WANTED.
WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

CASH FOR YOUR BUSINESS OR REAL ESTATE.
If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

PATENTS.
Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. Davis & Davis, 908-914 G. St., Washington, D. C., and 220 Broadway, New York City.

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Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

WE BRING BUYER AND SELLER TOGETHER.
If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

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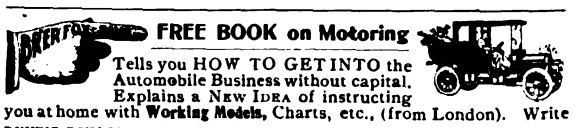
Of pleasure and commercial automobile and other bodies for the trade. No order too large or too small to receive prompt attention. Write for information and get acquainted. GEO. J. MERCER, Automobile Body Designer, American Building, Columbus Circle, New York.

MECHANICS.
Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.



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FOR SALE.
McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

FOR SALE.
Blacksmith and wagon shop located in Lyman County. Doing good business, good reason for selling. Address LOCK BOX 22, Murdo, South Dakota.

FOR SALE.
Blacksmith and wagon shop in Southern Minnesota. Large territory. Work for two men. Reason for selling, disabled. W. L. MAUST, Ostrander, Minn.

FOR SALE.
The best blacksmith and horse-shoeing business in Rock Springs, Wyoming. Work the year round for 4 and 5 to 6 men. There are two shops: A wagon repair-shop 25x50, and a shoeing shop 25x32; four fires in the two shops; rent $40 a month. Better prices here than in any other part of the United States; only one other shop in town; will sell for what the stock and tools are worth. A fine opportunity for the right man. I also have a wagon and buggy business that can be bought in connection with the shops, if wanted. Address for full particulars, L. BENDSEN, Rock Springs, Wyoming.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORKS, St. Cloud, Minn.

FOR SALE.
A fully equipped power blacksmith and repair shop in corn belt district. Plenty of work the year round; a bargain if taken soon. Address Box 488, Secor, Ill.

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Blacksmith shop, four lots and house, engine and stock; only shop in town. Address for particulars, J. BROWN, Box 24, Bridgeport, Wash.

FOR SALE.
Blacksmith and wheelwright business, tools and stock for sale cheap. Address J. W. CHAMBERLIN, Lackawaxen, Pa.

FOR SALE.
One post boring machine; 1 dynamo, 110 volt, 10 amperes; 1 second-hand engine lathe, 12x48 inch; gasoline engines in good working order; 1, 1½, 2 and 5 horse power. Box 49, Marcellus, Mich.

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One of the best paying blacksmith and wagon shops in Southern Minnesota. Rare chance for one or two good men. ELLIS & LUNDAHL, Ellendale, Minn.

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General machine and blacksmith shop, equipped with power blower, drill press, lathe, cold saw, emery wheels, pipe cutting machine. Full set of blacksmith's and machinist's hand tools. Best location, no competition. Best of reasons for selling. Address Lock Box 635, Uhrichsville, Ohio

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Brooks' tire machine, No 4, nearly new Address for particulars and price, A INGRAHAM, Clarksville, N Y.

WANTED.
Traveling salesman for blacksmith and wagon makers' supply trade for New England. Young, married, must reside in Springfield. Permanent employment. Give references. Address Box 1648, Springfield, Mass.

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Well equipped blacksmith's, wood-work, and horse-shoeing shop. All modern conveniences. Everything run by power. For particulars apply to F. C. PHILCOX, Islay, Alta., Canada.

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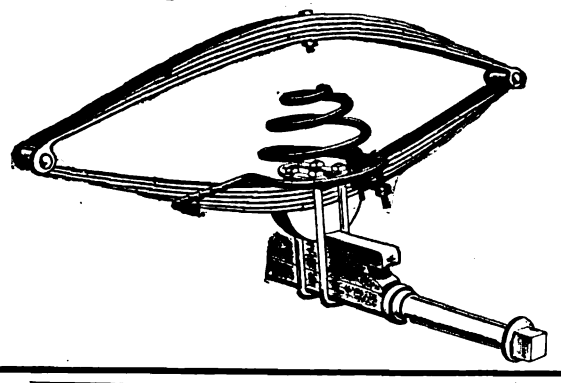
Power blacksmith and paint shop in Illinois corn belt, with or without stock and tools, and poultry business; all will be sold at a bargain; good prices; good pay. Address C. W. ROWLAND, La Place, Ill.

FOR SALE.
Fine new blacksmith's shop, 24x50; part of two lots, 85x100. Also wood-shop, 16x24. All modern power tools, three man shop; plenty of work. Owner leaving country. Address ALLAN WARD, Kimball, South Dakota.

FOR SALE.
Blacksmith shop and dwelling with two acres of land, near school, church and railroad station, in large surrounding farming county. For sale on account of death; price $1,500.00. Address E. R. WILNER, Riverhead, L. I., N. Y.

The Improved Falkenhainer Patent Auxiliary Vehicle Springs.



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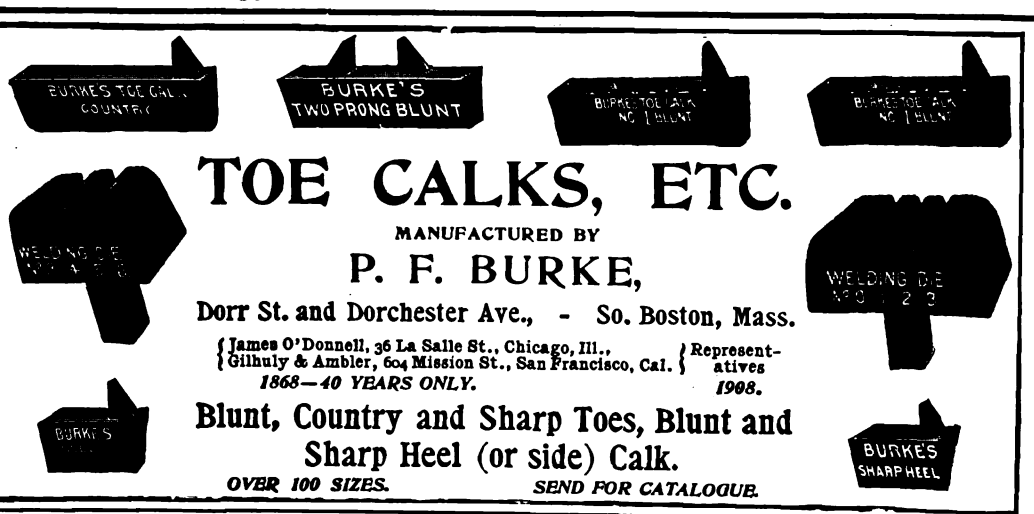

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OVER 100 SIZES. *SEND FOR CATALOGUE.*

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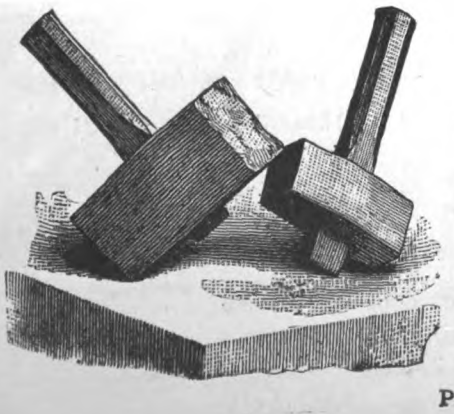

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By O. A. WESTOVER.

The Scientific Steel Worker is a book which every blacksmith needs. It is no humbug or fake. It will be found to be the mechanic's friend. A book of rules, how to work steel and make good tools.

It tells how to weld, forge and anneal, harden and temper all kinds of steel.

It contains many new points and nothing old, and is believed to be worth more than its weight in gold.

The author is a steel worker from A to Z. The book has been sold in every State in the Union. It is strictly up-to-date.

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By EDWARD R. MARKHAM, American Society of Mechanical Engineers, Instructor in Machine Shop Work, Harvard University and Rindge Manual Training School, formerly Superintendent Waltham Watch Tool Co., 225 pp., 325 illus. Cloth binding. The whole subject is here exhaustively treated and profusely illustrated. The information given is of inestimable value to all machine shop men, metal and wood workers, and all whose tasks may occasionally call for the exercise of mechanical skill, ingenuity, and inventiveness in the devising of special means to accomplish special ends. Price.....$1.50

Sent to any address, postage prepaid, on receipt of price.

M. T. RICHARDSON CO., Publishers,
71-73 MURRAY STREET, NEW YORK.

Champion Horse Shoes.—The Champion Horse Shoe Company of Pawtucket, R. I., comes before our readers this month with an announcement of its horse shoes. The managers of this company have 30 years experience in horse shoe manufacturing behind them and that being the case there can be no question as to the quality of the workmanship of the shoes turned out by this new company. Write at once for the best Horse Shoe Pin given away by any manufacturer. It is something entirely different and will please you. Simply mention this advertisement in The Blacksmith and Wheelwright and the pin will be sent to you free of charge. Also write for full particulars concerning the new shoes.

Aprons of Quality.—If you are in need of an apron consult the advertisement in this issue of the California Tanning Company, 712 No. 4th Street, St. Louis, Mo., and read about their "Dandy Muleskin" aprons, also their "Boss" Split Leather Aprons. This company does not pretend to sell the cheapest aprons in the world, but it does sell just as good an apron as it is possible to make, and that is saying a good deal. The cheapest things are not always the best. These aprons are sold or should be by dealers everywhere. The company wants to send a miniature apron free of charge so as to show you the quality and style of their goods, to every reader of this paper, who will take the trouble to write for it.

Subscribe to THE BLACKSMITH AND WHEELWRIGHT. $1.00 per Year.

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

Little Giant Axle Setter and Straightener.—This admirable tool is manufactured by B. B. Noyes & Company of Greenfield, Mass. They would like to send particulars not only concerning this tool, but many others which they manufacture, to any reader interested enough to write for it and mention this journal.

Cray Brothers' Special Gasoline Engine.—In this issue will be found an announcement of Cray Bros., Dept. "B," Cleveland, Ohio, illustrating and briefly describing their special gasoline engine. It is provided with a new patented mixer, no pump, simple, positive igniter, automatic fuel regulation, old reliable fly-ball governor, frost proof and starts easy in winter. All parts are interchangeable. Will burn either gasoline or kerosene. It will be sent on 30 days' free trial besides being absolutely guaranteed. They have a special proposition to make. Write at once.

Look Out for This Swindler.—We desire to warn our readers against a party in the West who is soliciting subscriptions for The Blacksmith and Wheelwright and offering to send a blacksmith's hammer in some cases and sometimes a "Kitchen Set." Very likely he varies the premium to suit the taste of the prospective subscriber.

At any rate he is no solicitor of ours and we have never authorized anybody to offer blacksmiths' hammers or "Kitchen Sets" or anything else as a premium.

This fellow pockets the money that he collects and we never know anything about it until the victim writes us and complains that he has not received the paper.

Don't pay any money to any agent on The Blacksmith and Wheelwright purporting to represent us who offers to give any such premiums as we have described above for the sake of getting a subscriber.

To any old subscriber who secures a new subscriber for us, we give a pocket knife, which has been described in our advertising columns frequently, for so doing, but the new subscriber gets nothing.

If The Blacksmith and Wheelwright is not worth a dollar a year to a blacksmith it is not worth anything.

We are anxious to get on the track of the fraud referred to and if we do it will give us much pleasure to lock him up.

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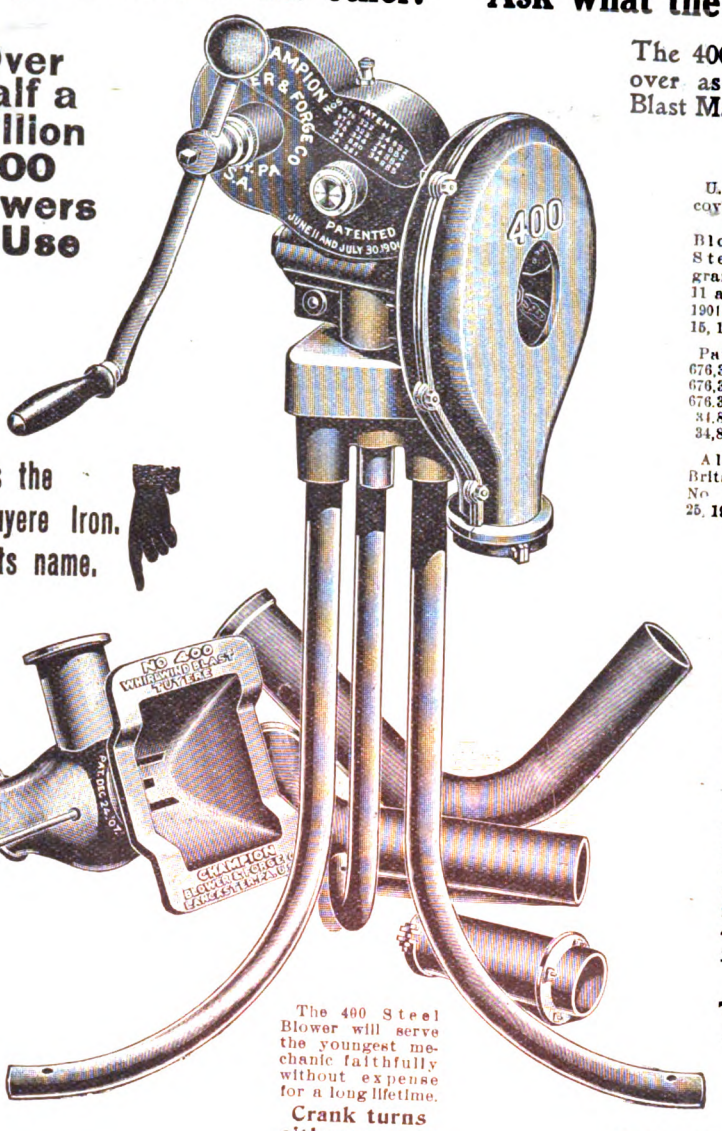
(Continued from page 270.)

Do you want anything? Is your shop for sale, or do you want to buy a shop or hire a man? If so, a "Want" advertisement in THE BLACKSMITH AND WHEELWRIGHT will bring you good results. See terms at head of the "Want" Department on another page.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say

No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

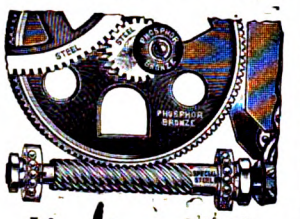
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

Also Great Britain Patent No. 2362, May 25, 1900.

The Blower for Quality, First, Last and Always

THE FAMOUS 400



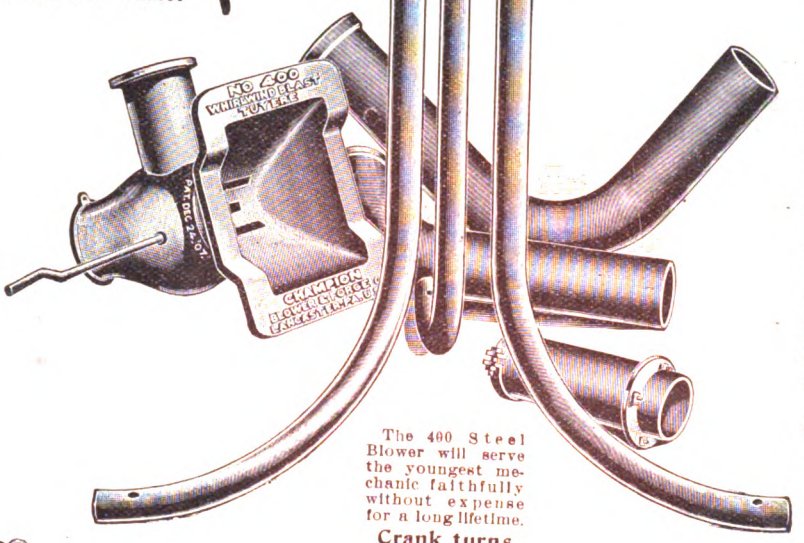
It's the all in Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

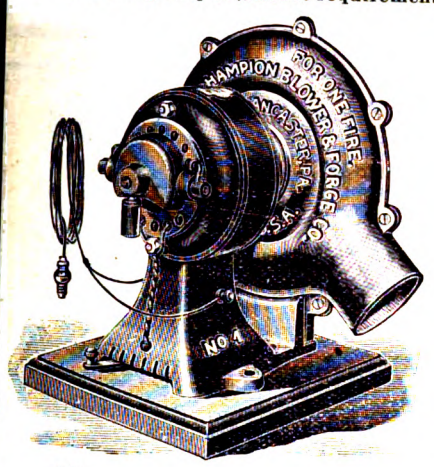
Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

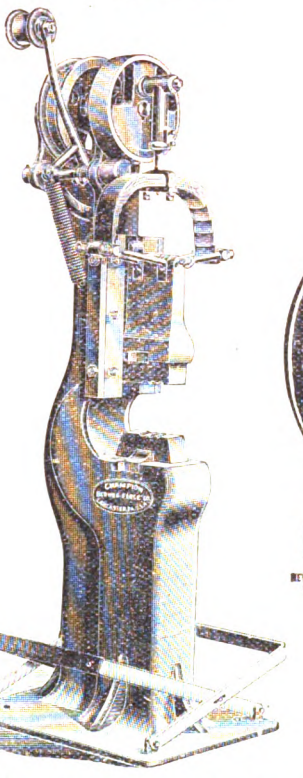
No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.



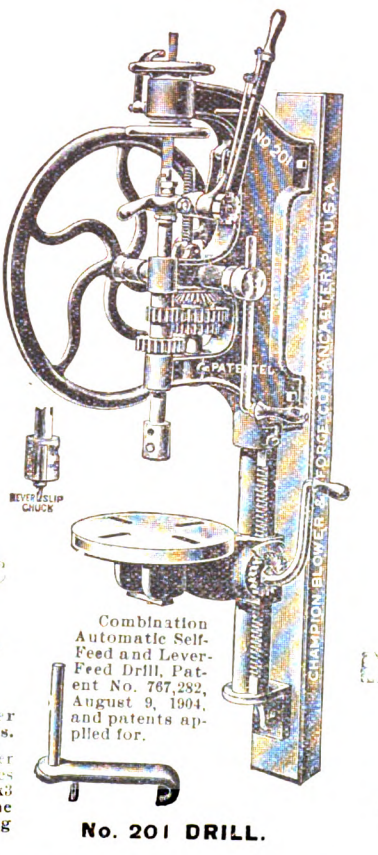
The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.

The Champion Latest Invention!

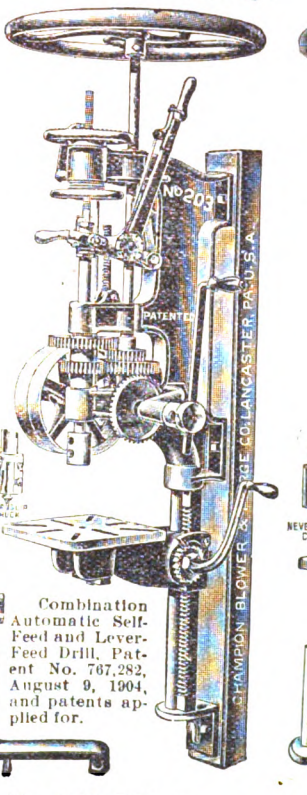
Observe the Double Compound Lever-Feed

On the CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.



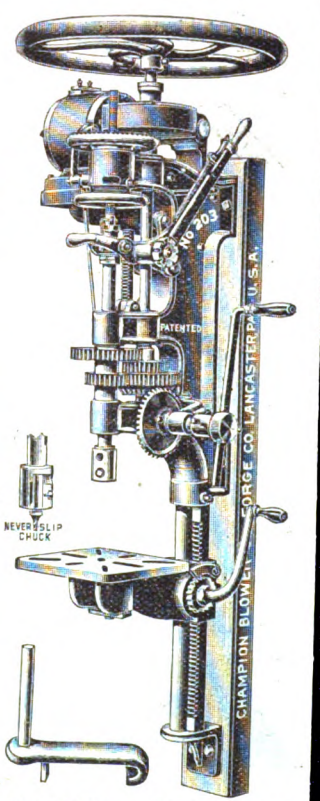
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

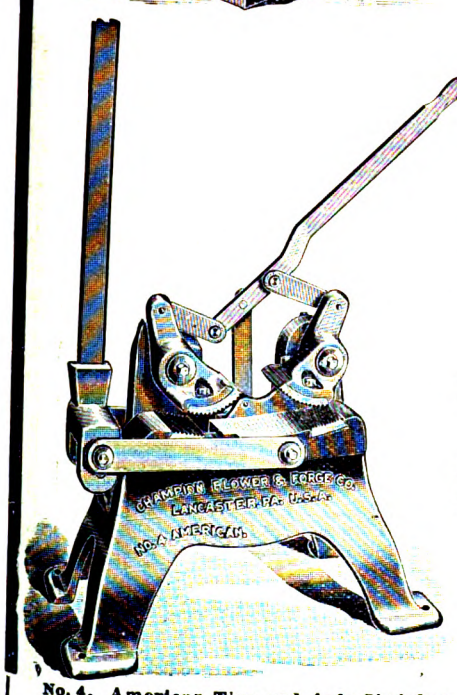
Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.



No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



No. 4. American Tire and Axle Shrinker.

Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

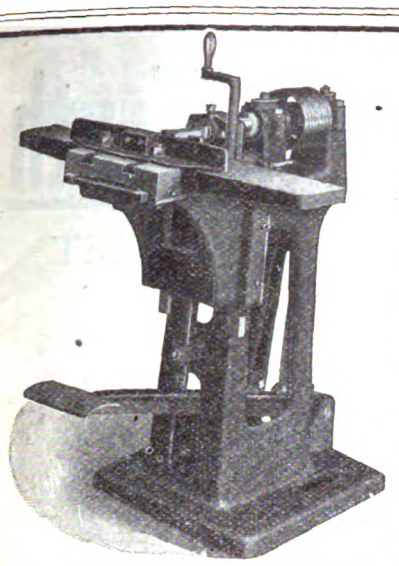
THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.



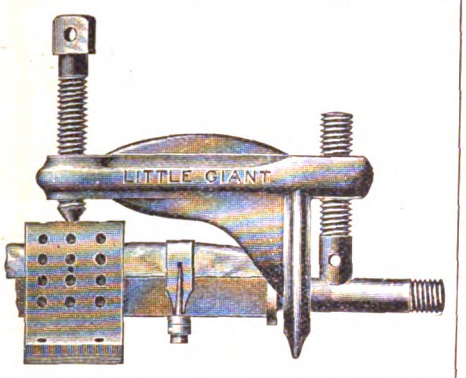
The Mortiser that makes the blacksmith proud of his shop.

Write for Full Details.

J. A. FAY & EGAN CO.,
175-195 West Front Street,
CINCINNATI, O.

Little Giant

Axle Setter and Straightener



Simple, Strong and Practical

Manufactured by

B. B. NOYES & CO.
Greenfield, Mass., U. S. A.
Send for Catalogue

HANDY LAMP
Gasoline Lighting System

A 300 Candle Power Shadowless Light that can be turned up and down like gas and left burning at a mere glimmer and instantly turned up when more light is needed.

Equal for any purpose to a private gas plant entirely under your own control, so simple anyone can operate. Better than gas, kerosene or electricity at half the cost. We have **five** other **distinct** lines of gasoline lamps and hollow wire systems. **Catalog B. & W. tells why. Write for it now** and be our agent.

BRILLIANT GAS LAMP CO.
Department 24. 182 N. State St., Chicago, Ill.

"It don't make a bit of difference what kind of coal I use with this forge," says Mr. Bird, whose picture you see below, "smoke or sulphur fumes never bother us any more. My shop is kept cleaner and healthier. And our welds are cleaner and better."

Buffalo Down Draft Forge
With
Electric Blower

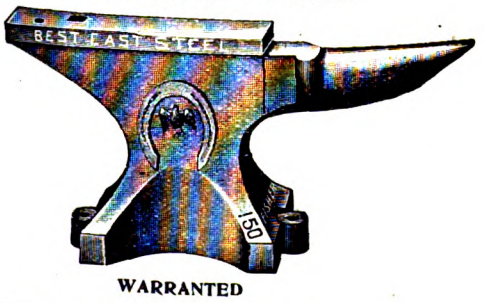
While you are finishing one job the blower is working and getting the iron hot for the next job. No time lost, no effort wasted in turning the blower. The patented "down draft" forges are **only** made by the Buffalo Forge Company. They include a cinder catcher in the hood, and an arrangement for mechanically returning part of the unconsumed gases and smoke to the fire. The result is as said above, and besides, a considerable saving of coal due to the utilization of waste gases. To be brief, **this is the highest class of a forge you can buy at any price,** and it is the choice of the best experts in the land. This forge is also furnished with the Buffalo No. 200 Silent Blower for **hand operation.**

FREE: 76 Page Catalog No. 145-B.
Send for it to-day.

Buffalo Forge Company
Buffalo, N.Y.

"EAGLE" ANVILS

THE "EAGLE" "FISHER" HORSE-SHOER'S ANVIL
150 POUNDS WEIGHT



WARRANTED

Write for Catalogue and Prices, or ask your dealer

FISHER & NORRIS
TRENTON, N. J.

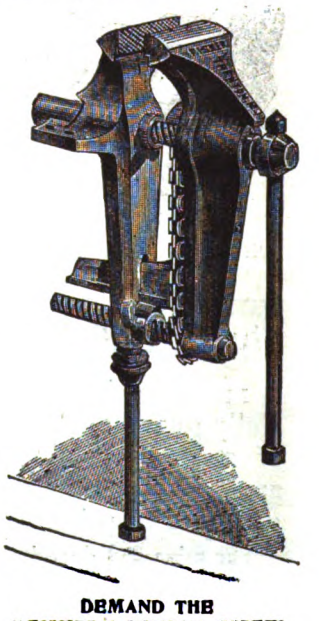
FISHER & NORRIS
MANUFACTURERS OF
The "Fisher Bench Vise"

Established 1843
Same Make Same Name
Satisfaction Always
1912

LEG VISES, ANVILS, Etc.

WOODWORKERS' SPECIAL

MACHINISTS' SWIVEL BASE VISE



DEMAND THE "FISHER" DOUBLE SCREW PARALLEL LEG VISE

THE

BLACKSMITH AND WHEELWRIGHT

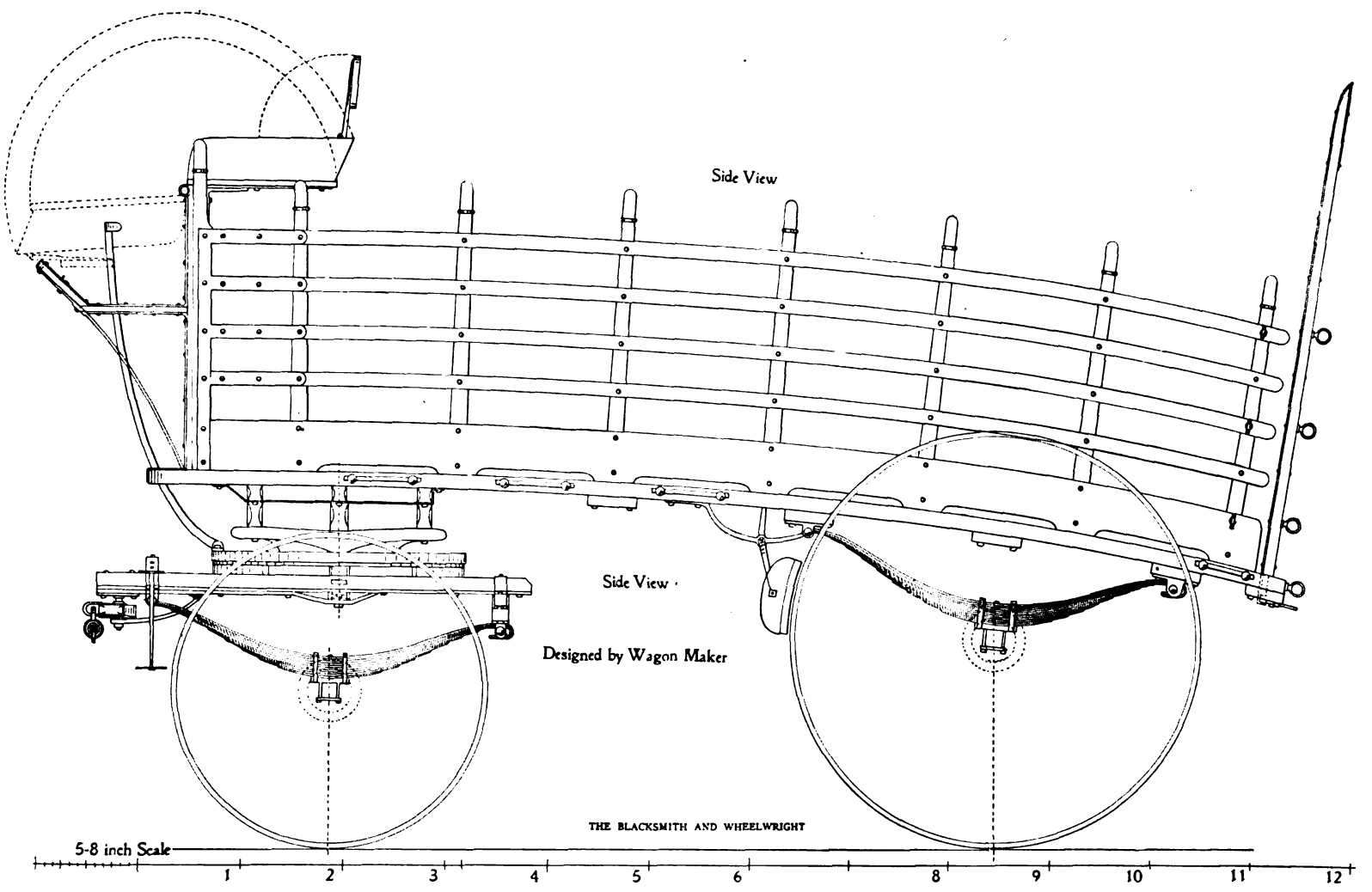
Vol. LXVI. No. 2. NEW YORK, AUGUST, 1912. TERMS: ONE DOLLAR A YEAR

A TWO HORSE DELIVERY TRUCK.

Full Specifications for Building One With a Long and Wide Body and Reversible Seat.

BY WAGON MAKER.

In trucks of this kind which have long and wide bodies, the front wheels are no more than 38 inches, out to out, without tires, and turn under the body. About 5 to 6 inches space is allowed between tire and sill, including the thickness of the sill, making the height of the body from the ground about 45 inches. By curving the sills the rear height which is used on this truck for loading and unloading is reduced 13 inches. The height in front from the ground



to top of the sill is 45 inches, and on the rear end 32 inches. This is convenient to lift heavy loads, and thus curved trucks are greatly preferred.

These trucks are built in light and heavy sizes, weighing from 1,200 to 3,500 pounds, with a carrying capacity from 2,000 to 8,000 pounds. But these figures depend on the quality of material used, the workmanship and how the bodies and gears are ironed. One truck may look as good as another when painted, but as to its wearing qualities there is a wide difference.

In vehicle building the aim should be to reduce the weight as much as possible, and by it reduce the draught. To accomplish this the best possible material must be used as well as expert workmen.

There is a great variety of construction of curved trucks. Some have low and some high stakes, which can be removed when needed, and some have four rows of chains instead of rails. They may have stationary stakes, with 12 to 18 inches wide side boards, two or three rails, with an opening on each side to effect a side entrance for loading or unloading sidewise. They are also built with bodies as wide as 60 inches, out to out, with two different kinds of tracks, 5 feet or 56 inches, center to center. This holds also good with the length, as they are shorter and longer, but 14 feet long is the limit for heavy three horse trucks.

The length of the truck shown on this working draft from the front board to the rear end of the cross bar is 11 feet, which is considered a good length, but is made 12 feet long if drawn by two heavy horses. The width across on the sills is 54 inches, out to out, which is the limit for a 5 feet 2 inch wide track.

Most of these trucks have side springs only, but six spring suspension is far better. The six spring suspensions are heavier, but are more elastic and have more carrying capacity than the side springs.

A vehicle suspended as shown on this draft rides heavier than with six springs, when all other conditions are equal. With the six spring suspension the center of the wheels is from 1 to 1½ inches forward of the king bolt on front gear and by the up-and-down motion it moves the wheels in a forward direction. To improve the motion of the side springs we have drawn the center of the axle 1¼ inches forward, but this cannot be done on the rear springs, where the forward movement of the axle counts more than on the front wheels, because most of the load is carried on the rear end. We simply call attention to this faulty construction and the wagon builders should take note of the defect.

Construction of the Body.

This body has four sills, two on each side and two between. The side sills are 1½x4¼ inches and the two sills between 1½x3 inches. The front cross bar is 1½x3 inches and the rear cross bar 1½x4½ inches. Besides the two end cross bars are three transom bars, and five others, which hold up the bottom boards, support the rear springs, and hold together the four sills. The end cross bars are mortised in the side sills, and the two center sills are mortised into the end cross bars. All sills are made straight and all mortises for the stakes are cut square into the sills. Bolt the five cross bars to all the sills and you will have a stiff straight structure. Have two heavy trestles 54 inches long to support the sills, one across the front the other about one-third from the rear end. Force the rear end down and the front end in position by posts from the frame to the ceiling. The horizontal part in front must be attended to, and the height and position of the rear trestle must be made to suit the amount and required shape. The more curve, the lower the rear trestle must be, but this difference is generally made by placing a piece or pieces on the front trestle. To bend these four sills requires a great deal of strain, and there must of course be something to counteract the strain. The 6 inch wide side pieces when bolted to the stakes with two bolts for each stake will hold the side sills in position, but the center sills have an end plate iron or steel ⅜x1½ inches, fitted to the required curve screwed to one side of the center sills 4 inches apart. The eight side rails four on each side are straight and as most of the strain is taken up by the bolts when bent to shape, they are much stronger than sawed to shape, but if the strain is not all taken up by the side boards, or if the side boards are dispensed with, iron or steel plates ½x1½ inches one for each sill must be used, also ¼x1½ inches on the outside surface of sills. In this case the sills are 4 inches instead of 4¼ inches.

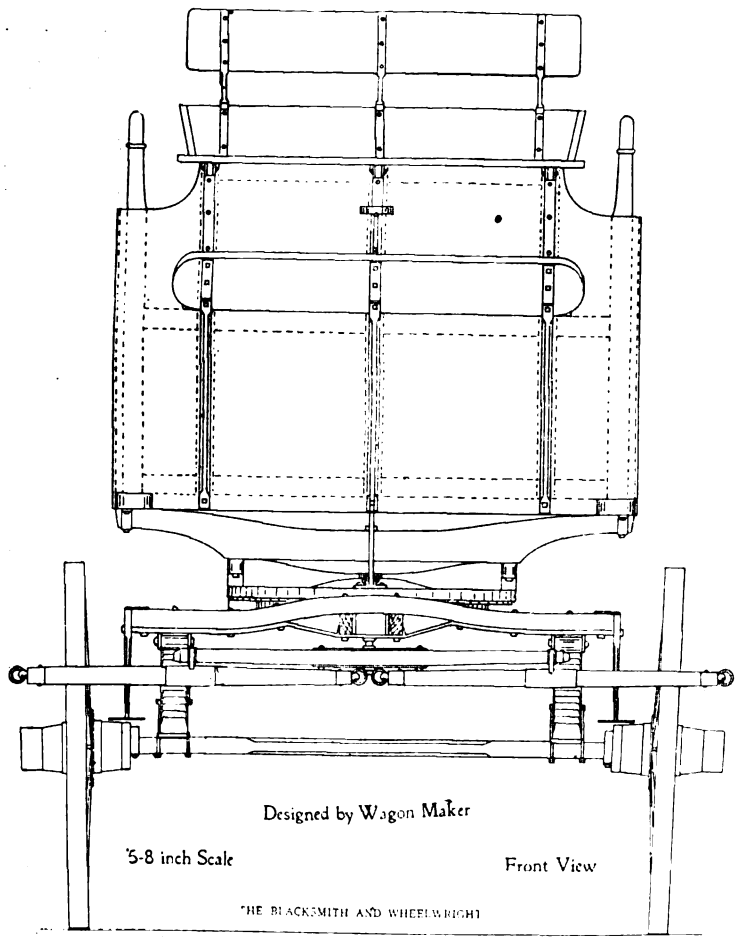
The bottom view shows how the cross bars are bolted to the sills. The bottom boards are ¾ inch and are level with the sills, consequently there is a space between the bottom boards of ¾ inch which is filled up with six pieces, ¾x1½ inches, for each cross bar.

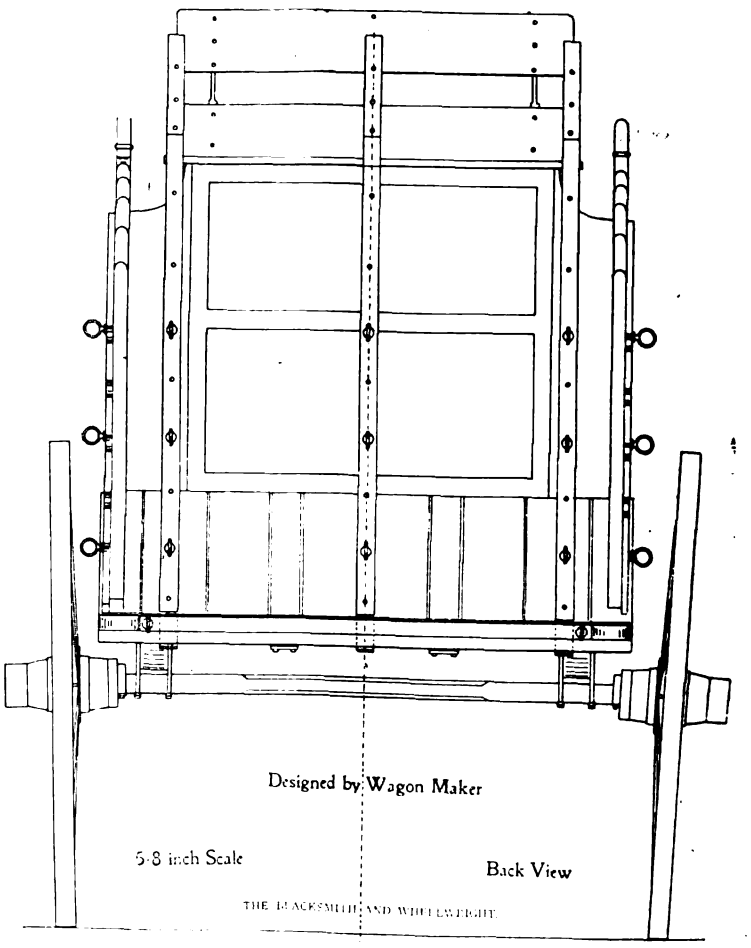
The rear transom bar is notched in ¾ inch so the bottom boards rest on it. The bottom boards are made narrow so that they bend easier. On this draft they are over 6 inches, divided in two parts between each sill, but three boards 4⅜ inches each would be better. The short pieces, ¾x1½ inches, are all screwed on also the bottom board but the screws for the bottom boards must be at least 2 inches long so that they enter the bottom cross bars at least ½ inch.

The three rear stakes as shown are used also for levers, or one for a lever and the other two to roll up barrels, or slide up cases. In that case the rivets as shown are filed smooth and the iron surface is rounded a trifle. As will be seen on the side view directly under the rear cross bar there is a hook and part of the iron is shown by a dotted line. This hook is used to support the stake on the plates shown on the rear cross bar, bolted with two bolts each. These stakes are very handy and are considered one of the latest improvements for loading and unloading barrels or boxes.

The front has five parts as shown by dotted lines; the sizes for the corner posts are 2 inches square and the rest 1½x1¾ inches, and the

three cross bars are the same size. Over this frame are fitted two boards, the lower one ¾x21 inches and the upper one 15 inches, screwed and glued to all the posts and cross bars. To the three inside posts are bolted the three seat hinges, which hold the seat in position when either up to sit on or when turned downward as shown in dotted lines on the side elevation. The cushions on the turn-over seats are fastened to the seat board so that they stay in place when upside down.





Sizes for Body Parts.

Two side sills, 1½x4¼, 11 feet 6 inches long; two center sills, 1½x3, 10 feet 9 inches long; on the front end cross bar 1½x3, 4 feet 3 inches long; one rear end cross bar 1½x4⅝, 4 feet 3 inches long; four cross bars, 1¼x6, 4 feet 6 inches long; one rear end cross bar 1¼x5, 4 feet 6 inches long; six bottom boards ¾x6½, 10 feet 6 inches long. Twenty-four pieces under the bottom boards ¾x1½, 14 inches long.

Two front posts 2x2, 42 inches long; fourteen side posts, 1½x2, 3 feet 1 inch long, tapered a trifle toward the top end; eight side rails, ¾x1⅞, 10 feet 10 inches long; three front inside posts, 1½x1¾, 36 inches long; one board across the front ¾x15, 55 inches long; one board across the front ¾x21, 55 inches long; two curved side boards ¾x6 inches, 10 feet, 10 inches long. Three front cross rails, 1½x1¾, 54 inches long. Seat board, ¾x18, 43 inches long, seat back ¾x6, 43 inches long, two seat side pieces, ¾x6, 21 inches long. Three rear posts 1½x2, 5 feet 3 inches long.

Warner Wheel Dimensions:

Diameter of wheels without tires, 36x48 inches.
Diameter and length of hubs, 7¼x10 inches.
Width of spokes, 2 inches.
Number of spokes, 14 and 16.
Thickness and depth of rims, 2x2⅜ inches.
Width of tread for each wheel, 1⅞ inches.
Size of round edge tires, ⅝x1⅞ inches.

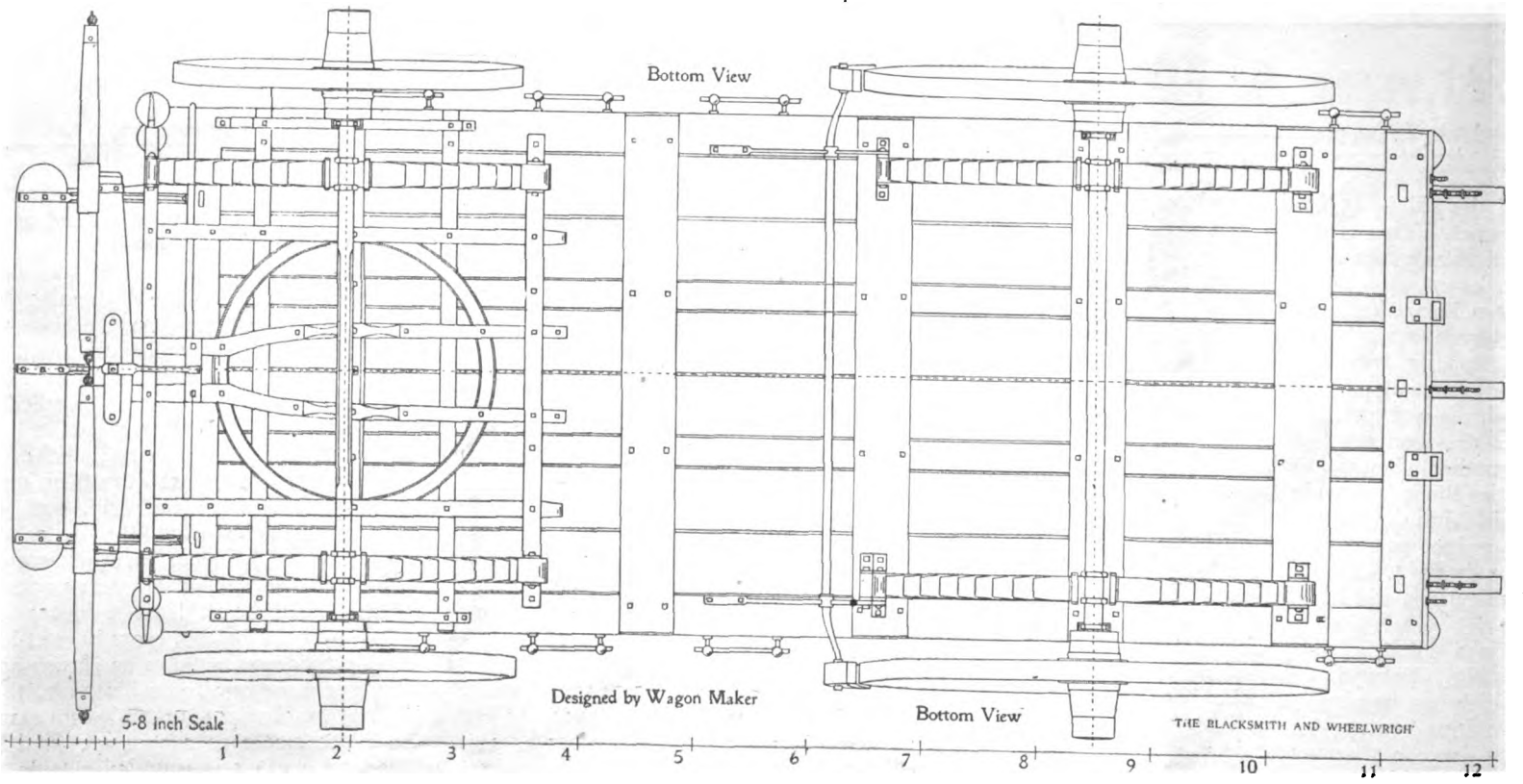
Dimensions for front side springs:

Length over all, 43 inches.
Open over all, 8 inches.
Width of plates, 2½ inches.
Number of plates, 7.
Thickness of main plates, No. 1.
Thickness of other plates, No. 2.
Clipped to axle.

Dimensions for rear side springs:

Length over all, 44 inches.
Open over all, 8½ inches.
Width of plates, 2½ inches.
Number of plates, 9.
Thickness of main plates, No. 1.
Thickness of other plates, No. 2.
Clipped to axle.
Plain wagon axles.
Size, front, 1¾ inches.
Size, back, 2 inches.

Width of truck front and rear, 62 inches out to out.



Kerosene for the Engine Fuel.

Almost any stationary, or approximately constant speed, internal-combustion engine can be run on kerosene without much difficulty. In fact, the only trouble lies in the starting up; for this gasoline has to be relied upon during the first few minutes, or else an external lamp is required to heat up the chamber in which the liquid kerosene is converted into vapor—for the crux of the matter lies in the fact that kerosene will not vaporize at ordinary atmospheric temperatures. Were it otherwise, kerosene would have to be handled with as much care and under as many restrictions as gasoline, and the price would consequently advance far above its present low level. Once an engine is running, the heat from the waste exhaust gases provides a simple means of vaporizing the liquid fuel, and the kerosene will be consumed without any objectionable results in the way of smell, smoke, or deposit—always provided that the engine speed is maintained above a certain figure. Therein lies the difficulty.

At low speed the supply of hot exhaust gas is diminished, the vaporizer cools down, and the kerosene passes through to the engine in a partly liquid state. Then follows incomplete combustion, with consequent smoke and smell and uneven running.

SOME SOLDERING "STUNTS."

What To Use as a Flux and How to Do the Work for Granite Ware.

BY JAMES F. HOBART, M. E.

In the May, 1912, issue of The Blacksmith and Wheelwright, Mr. F. P. Campbell, Ohio, asks for a method of soldering granite ware—"the mottled, streaked ware that is used in kitchens and for cooking and such purposes," he adds by way of explanation. Such ware may be soldered by using chloride of zinc as a flux. This substance is the common "acid" used in tin shops for soldering iron and steel. It may be made up as required, or a small bottle of the solution may be made up and kept for years, being always ready for use when wanted. It should be kept in a well stoppered bottle and away from children and from persons not knowing its poisonous qualities.

The old-time name for chloride of zinc, was "killed spirits of salt," and the tinsmith still calls it "killed acid" to distinguish it from raw acid which is used in soldering galvanized metal and sheet zinc.

Chloride of zinc is easily prepared and no smith shop should be without a bottle of it. The writer would no more think of being without a soldering copper, than without a little bottle of acid to go with the soldering-iron.

To make up some acid, procure a little muriatic (hydrochloric) acid from the druggist. Make him give you "commercial" acid. This costs a few cents per pound while the chemically pure will cost as much per ounce as the commercial does per pound.

A wide mouthed bottle, preferably with a glass stopper, is the best thing for containing the acid. A cork will answer if the bottle is not fitted with a ground-glass stopper. Soak the cork in a little melted paraffin and it will answer about as well as a glass stopper.

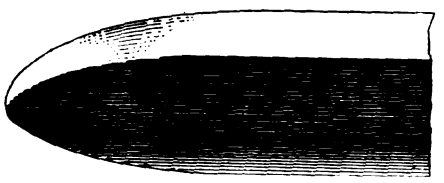


Fig. 1.—Badly Shaped Soldering Iron.

Place the bottle of acid—and take care that it is not more than half full—on the ground, or upon a board, but do not set the bottle on a thick metal surface during the following operation. Drop into the bottle some pieces of zinc, either sheet or cast. An old battery zinc is the very best that can be used for this purpose, although a new zinc is as good as an old one. Pieces of common sheet zinc, such as is placed under stoves, will answer, but that kind of zinc is never as pure as the battery zincs.

Never try to "cut" acid with pieces of galvanized iron. It can be done, by permitting the acid to dissolve off the zinc surface, and then removing the pieces before the acid gets down to the steel plate, but iron in soldering fluid is not desirable, therefore do not try to cut acid with galvanized iron or steel.

The acid will "boil" as soon as it touches the zinc. It is because of this that the bottle is never to be more than one-half full. Great heat is given off during the dissolving of the zinc, and for this reason, the bottle should be set upon wood, sand, or some other poor conductor of heat. The sudden carrying away of heat from the bottom of the bottle, which takes place when the bottle is on a cold piece of thick metal during the zinc dissolving process, is almost sure to break the bottle, sometimes cutting off the bottom as nicely as it could have been done with a diamond.

The acid-cutting should be done out of doors, or in the shop, on account of the fumes which arise during the operation. The acid should be given all the zinc it can dissolve. When it can take no more, the fact may be known by the stopping of the boiling operation, the zinc remaining inert in the acid.

Sometimes, when it is necessary to use the expensive chemically pure acid, boiling does not begin readily upon dropping zinc into the acid. When this happens, a little water added to the acid, will start things a-going. The commercial acid contains among other impurities, all the water necessary to dissolve the acid.

With the acid ready at hand, and a bit of rosin and a piece of sal-ammoniac in the "solder-box," proceed with the granite ware soldering by placing the copper to heat. But first, make sure that the point of the copper is well tinned, and that it is drawn down to a square, well tapered point. Never try to solder with a copper which is not tinned, and which has a stubby, rounded-off point which looks like the end of an old pick-axe! Good soldering can best be done with good tools. Never try to solder with a dull copper any more than you would try to cut steel with a dull cold-chisel or a dull drill.

If the copper is not in good shape, and looks like the "thing" shown by Fig. 1, then never try to solder granite ware until the copper has been put into better shape. If the copper looks as though it has been hammered out "between thunder and a rock," then just put that copper into the forge fire, heat to a low red and forge

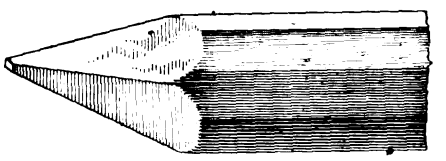


Fig. 2.—Well Shaped Iron

it into shape just as you would a stone-drill or a cold-chisel. The point should be brought down square and sharp, as shown by Fig. 2, then, after forging, brighten the point with a rasp, and coat with solder by rubbing the copper with rosin and then with solder.

There are general ways of tinning a copper. One way is to rub the copper on the floor, or with a file, until it is bright, then rub it in rosin, upon a piece of tin, with a lot of solder. The copper must be quite cool to be tinned in this manner—barely hot enough to melt the solder. If too hot, the copper will cover itself over with oxide and solder cannot be made to adhere. Another way, and one much used by the writer, can perhaps be best described by reproducing an engraving and five paragraphs from a book on soldering by the writer of this article, and now being published by D. Van Nostrand Co., New York. The way in question is called, "The Brick Method of Tinning Coppers" as follows:

For general use the writer prefers the brick method shown by Fig. 3. In this illustration, the copper F, is represented as being moved back and forth in the shallow groove G, G, which has been dug in the surface of brick H. Some rosin, I, I, has been melted into the cavity, which is only one-eighth or one-quarter of an inch deep. Some solder is also melted in with the rosin. A couple of globules are shown at J, J. A very soft brick should be selected for making one of these tinning tools—in fact, the softer the brick the better, and the more the brick crumbles or wears away as the copper is rubbed against it, the better and quicker will the tinning be accomplished.

The theory of this method is that the hot copper, by rubbing upon the brick in the melted rosin, is completely protected from the air, while the gritty substance of the brick quickly polishes the surface of the copper. The rosin protects the surface as it is cleaned, and the solder

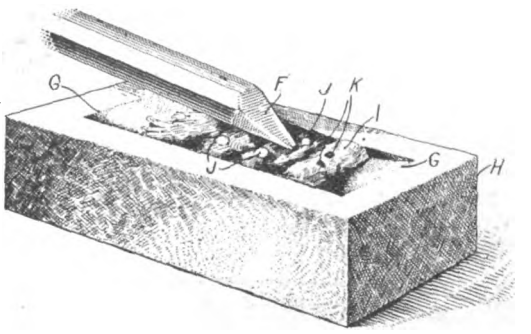


Fig. 3.—Tinning with a Brick.

being present at the time of cleaning and polishing, immediately adheres to the copper surface. In making a tool of this kind, it is not absolutely necessary to cut the channel G, G, which will gradually wear into the brick as coppers are rubbed over it. But it is better to drive a cold chisel across the top of the brick a few times, leaving most of the brick dust in the channel. Melt in a piece of rosin as big as a hen's egg, put in a chunk of solder or the refuse drops scraped from bench or floor and proceed with the tinning.

This method is a combination of about all the other methods, except the sal-ammoniac method and the writer sometimes finds it convenient to add that method also to the brick way of tinning, by scattering in with the rosin a few fragments of sal-ammoniac as shown at K. Some fragments of this substance may be used upon the brick to advantage and, if desired, some powdered sal-ammoniac may be mixed with the rosin, with most satisfactory results.

This method is the quickest way of all for tinning coppers. When the writer is doing soldering of almost any description, in which a copper is used, he likes to have brick H, at hand upon the bench. Whenever the copper, upon being removed from the fire, shows a few spots where the tinning is thin or defective, a few rubs upon the brick will restore the copper to a perfectly tinned condition. When tinning small objects, such as pieces of wire, little clips or bits of steel or iron, the brick is also useful. Dipping first into acid and then into rosin, will, with one or two rubs upon the copper F, put an immediate and perfect coat of solder upon the articles to be tinned.

The other way of tinning a copper, is to take a good heat upon it—almost a red heat, and then rub the point of the copper upon a piece of sal-ammoniac, on which a bit of solder has been dropped. The sal-ammoniac will clean off the surface of the copper, provided the copper is hot enough. But a copper cannot well be tinned in this manner when it is cool enough to tin by the first method. If the copper does not "bite" readily into the sal-ammoniac, dip the point of the copper into the acid, withdrawing the copper instantly. The hot copper will be acted upon instantly by the acid, and a sudden hiss and a cloud of ill-smelling steam tells you that the copper is all ready for another rub upon the solder-covered sal-ammoniac. This time, the solder will spread instantly over the surface of the copper.

Having at last got the copper into shape, place it to heat and prepare the granite ware for

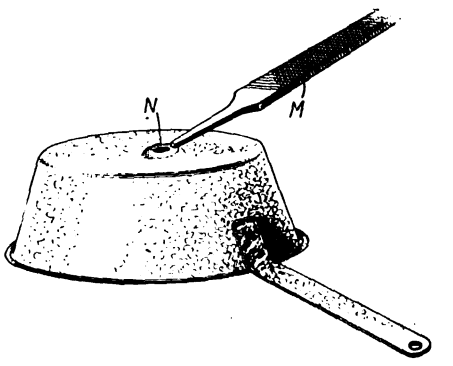


Fig. 4.—Soldering Granite Ware.

soldering. Having located the hole, proceed to remove every vestige of the "granite" glaze from the vicinity of the hole. Fig. 4, shows the operation, which is very simple and consists of scraping off the glaze around the hole, using the sharpened tang of a file for that purpose. The enamel usually comes off hard, but it must be removed, or the soldering cannot be done. When a stubborn bit of enamel is found—one which the tang of the file will not touch, then place the portion to be cleaned, directly upon the end grain of a block of hard wood and with a small punch—a nail-set will answer—tap the enamel lightly, closely around the hole. The steel of the dish will be forced into the wood slightly but enough to bend the metal and break the enamel or glaze upon the sheet metal.

Whenever granite enamel is broken, by bending or by a blow, it scales off at once. This peculiarity is taken advantage of in preparing enamel ware for soldering, and by bending the metal with the small punch, the enamel is forced from the metal close around the hole to be soldered. After this operation, the fragments of remaining enamel may be removed by the file-tang scraper.

Fig. 5, shows how the enamel is broken down around the hole to be soldered by means of the punch P, the granite-ware utensil being placed solidly upon the end-wood block Q. A softer wood may be used in the absence of oak, maple or other hard wood, but the use of soft wood for this purpose is apt to loosen the enamel for a distance around the hole, thereby lessening the life of the vessel to be repaired.

What is desired, is to crimp or bend the steel of the vessel, making a very short bend therein, just enough to break and loosen the enamel, which will flake off after the metal has been sharply bent, underneath the enamel. After treating the enamel on one side, it is well to turn the vessel over, and punch around the hole from the other side. This tends to loosen the enamel more thoroughly on both sides of the

steel, and it also causes the steel to be forced back into normal position, after being driven to one side by the punch. Care must be taken not to strike the punch too heavily. A very light hammer should be used and light blows struck. Hit barely hard enough to loosen the enamel, and if it be not quite loosened, all the better, for the use of the punch on the other side, will complete the work of enamel loosening, and will leave the steel in the middle of the enamel, instead of bent to one side or the other, accordingly as the hammer-blows were too heavy in either direction.

As stated in a previous paragraph, after breaking down the enamel, go carefully over the surface of the steel with the sharpened tang of a file, and do not stop that portion of the work until the steel has been made bright. It is not enough that the steel shows bright in spots. You must scrape each and every bit of the exposed steel surface until there is not a black place to be found upon it—not even with a magnifying glass!

The steel must be made clean and bright whenever you want solder to adhere. That is all there is about it. Therefore, if you give the steel surface a few half-hearted strokes with the file-tang, and then, noting several bright streaks upon the steel surface—if then you stop scraping and call the steel surface clean—you will fail in the soldering, and say: "The directions were no good. That was a bum way of soldering granite ware." But, instead of doing thus, if you will clean every portion of the exposed steel surface, make it bright and free from black scale, then the soldering operation

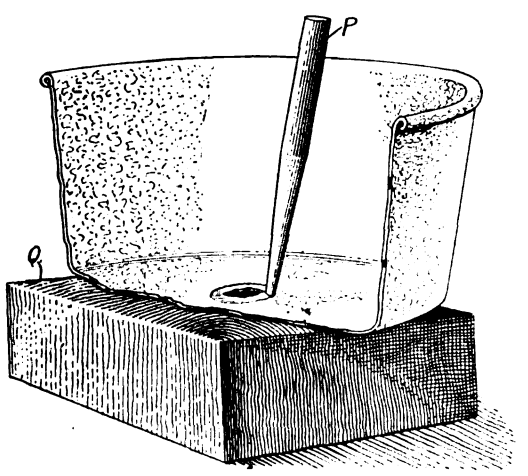


Fig. 5.

will be a success and you will have no fault to find with the rule for doing it.

It is not necessary to clean off a large amount of the enamel surface. If you use the punch carefully, a strip of steel less than one-eighth inch wide is all that need be exposed around [illegible] f the hole to be repaired. Failing to [illegible]e of end-oak, just place the granite [illegible] a piece of lead, and do the punch act upon that instead of the oak. Or, a stick of solder may be used instead of the lead, but it requires a good deal of care to keep the granite ware vessel fair upon the narrow stick of solder. Just a little lack of attention in this direction and the utensil slips one side a bit, then bang! goes the punch, right through the steel of the utensil, and the hole to be mended has suddenly increased its size ten-fold. It is better to hunt up a bit of hard wood, or to provide a generous lead surface upon which to do the punching act.

In a previous paragraph, it was directed to place the copper in heating while the granite surface was being prepared as above described, for soldering.

The copper may be placed as above directed, but look out that it is not left in the fire long enough to become too hot. With the tinning burned off the copper, no good job of soldering can be done until the copper has been tinned again, therefore, always keep one eye on the copper while it is in the fire.

But the man who has mended granite ware before, will go through all the preparatory operations described above in much less time than it has taken to tell about it, and there is abundant time to make a hole ready for soldering while the copper is heating. But, unless you have tried the enamel-removing process several times, you had better leave the copper heating until afterwards or the tinning might suffer

Once sure that the steel is bright and clean on both sides, drop some of the chloride of zinc solution on the brightened steel and immediately melt on a drop of solder, apply the copper, heated only hot enough to melt the solder readily. It is not well to use a copper heated more than will cause the solder to flow well. A higher degree of heat will solder all right, in fact, a hotter copper will do the work easier and quicker than it can be done with the cooler copper, but the excess of heat is not good for the utensil under repairs.

Intense heat must expand both the steel and the enamel, and as the metal and the mineral become larger through expansion, the increased volume must go somewhere. As a result, the heat being applied only to a small spot in the vessel, both the steel and the enamel can expand only sidewise, and this is what happens. A spot bulges out sidewise, making a sharp turn at the line between heat and cold metal, and this surely cracks the enamel, and often scales it off the steel for a considerable distance around the heated point. This is especially the case when intense heat is used in soldering. But where the heat is as low as possible, more time is required to heat the utensil to the melting point of solder, therefore the heat has a better chance to diffuse itself through the surrounding surface of the metal around the hole, therefore, a larger area is heated to a much lower degree, and the elasticity of the enamel is able to take up the lesser expansion, permitting the hole to be mended without scaling off any enamel from the adjoining surfaces.

The writer always mends granite ware on both sides, and takes care to fill up the cavity caused by removing the enamel. The solder is worked in until it is level with the surrounding enamel, and this being done on both sides, there is no objectionable hole left in the enamel, either inside or out.

It must be kept in mind that the solder is by no means made to adhere to the enamel. That is not possible, the solder only makes fast to the surface of the steel which has been cleaned and brightened, therefore, realize the absolute necessity for having the steel surfaces perfectly clean and bright. No other condition of these surfaces will permit the soldering of granite ware.

There is, however, another process whereby the steel surfaces may be cleaned for soldering, without the use of the file-tang scraper described in preceding paragraph. The method in question may be known as the "acid process," but it is not recommended by the writer. It may be used, however, to mend holes which are so located that a scraper cannot be gotten into them. As in the case of a hole inside a tea-kettle spout—the cleaning could be done from the outside, but not from the inside. To clean an inaccessible surface of steel in granite ware, remove the enamel as above described. In this instance, it must be done from the outside. Then apply raw muriatic acid to the steel and wash off with clean water. Apply raw acid again and again, washing and brushing the surface as well as possible until the black skin or coating has been dissolved from the metal.

The above described operations should be performed upon the inside of the kettle spout, not upon the outside which may be readily reached by the scraper. After using the acid method, much care should be given to washing away every trace of the acid, for, just as surely as some acid is left in the hole where the enamel is broken, just so surely will that acid drive itself between the metal and the enamel, causing corrosion which does not let up until every vestige of the acid has combined with the steel. Therefore, it is far better to use the scraper than to use acid for cleaning granite ware enamel, even though the sheets were "pickled" in acid before the enamel was applied when the utensil was made.

Acid after it has been changed to chloride of zinc, is no longer possessed of the corroding qualities of raw muriatic acid, and for this reason, the killed acid used in soldering does not do as much corrosion, when left in the joint, as many people are led to believe. Still, it is just as well to wash off all the excess acid after soldering with that substance.

A nice looking job may be made on granite ware by putting on a slight excess of solder, so it will lie slightly above the surrounding enamel, then scrape or file the solder down level with the enamel and make a true, even surface exactly the shape of the rest of the vessel. Rosin may be used to advantage when soldering with acid, but apply the killed acid first.

PAINT AND VARNISH.

Vehicle Painting Practice—Good Materials Are the Life of the Finish.

BY M. C. HILLICK.

Whether the carriage be painted by the professional painter, or by the car owner, or the handy man of the neighborhood, the need of good paints and varnishes is equally urgent. You cannot possibly get away from the fact that the life of the finished surface depends chiefly upon the quality of the material employed. If you put the varnish on thin or heavy the need of quality is the same in both cases.

The advantage of using a cheap varnish simply because of the price inducement is at best only a temporary one. Such a varnish may shine gloriously for a brief existence, but by reason of inferior composition its brilliancy is short lived and its resources for protection are very soon exhausted. What the carriage owner needs, and, indeed, what he must have to serve his purpose economically, is a varnish of good body, tough in film, fine lustre, rich in flowing and brushing properties, and as reliable as the town clock in drying free from dust and from all the other enemies which doth so easily beset it. Such a varnish is cheap regardless of the price and it is really the only varnish which the car owner can afford to use.

Good colors are equally important. All colors perhaps in large measure look alike in the mixing pot, but when spread out over the surface and placed under the illuminating power of the varnish, there is a wide variety of difference. It is here that quality counts.

The tone and depth of lustre and general richness of the color, to whatever extent it may possess these qualities, here manifest themselves. The cheap, inferior color is invariably lacking in tone and lustre and richness, as it is also lacking in those elements which unite to make it durable. Some cheap colors, of course, look well and make a brave show upon the surface for a little while, but as compared to the strong and durable colors they are deficient in the power to retain their original purity of color and they crack and fade and go to pieces early in life. The surfacing coats over which the color and the varnish coats are placed are in the same good measure required to be trustworthy and durable. Whether such coats consist of white lead and other substances prepared at the shop, or represent materials purchased ready for use, matters little. If they are fine and good, and render durable service, they are the cheapest, ultimately, be the price high or low. And if they are contrary to all this they are dear at any price. It may not be easy for the vehicle owner to always see this, but it will be found true in the last analysis, nevertheless.

In the painting and finishing of the carriage it is the quality of the materials used which makes the work reasonable or extravagant. All sorts of the best obtainable skill may be employed, and the greatest possible care bestowed upon all the processes, but any little streak of inferiority running through the paints and colors, and varnish, cuts the ground from under the whole fabric and great is the fall thereof.

It is fair to urge, therefore, the urgent need, first of good paint and varnish stock in painting and finishing. Personally, we should prefer to have fewer coats in the makeup of the finish, and have them without fault or blemish, than a greater number consisting of cheap, inferior material.

The manner of keeping the paints and colors and varnishes in stock has much to do with their real usefulness when placed upon the surface. Varnishes should always be kept in a dry, moderately warm room, and where only a small quantity is used from time to time it should be bought in one quart cans. When opened and exposed to the air varnish takes up oxygen and thickens in body and loses in flowing properties.

Colors should be kept in clean, cool shelf room. When the contents of the can of color are exposed to the air they should at once be covered over with turpentine and kept away from the dust. All colors and paints should be maintained in a fresh, clean condition. If allowed to get rancid and fatty and "skin over" they quickly deteriorate and lose in quality.

The man who makes good does not sit down and wait.

SHOP WORK.

Elements of Iron Making and Something About the Forge and Tools.

BY A. C. GOUGH.

The description of the first working of iron seems to have been left to tradition, and with it much of the subsequent history lost in antiquity. The museums furnish evidence that the people of the ancient countries made tools, weapons, etc., and sometimes ornamental work of iron; but there is nothing available that gives us the exact conditions under which iron was first reduced from its ore and forged into the desired forms. However, it is probable that iron was first reduced from its ore and its properties discovered by accident; and considering that the primitive man knew something already of copper and the more precious metals he would more readily recognize some of the uses and possibilities of the most important metals.

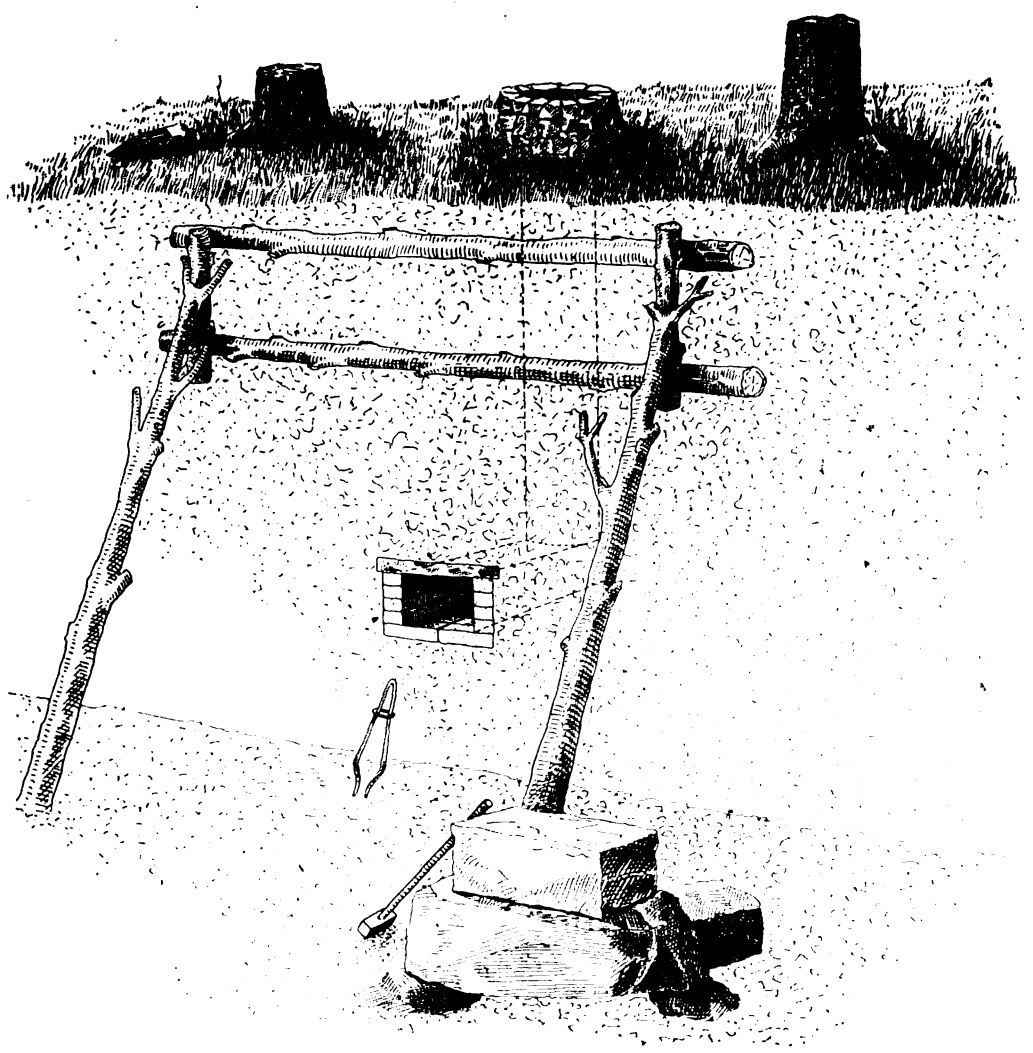


Fig. 1.

The fact that the element iron does not occur in a pure state in nature has rendered it necessary for the workers in iron to acquire a more or less exact knowledge of its physical and chemical properties, along with a knowledge of the properties of other material included in this work. As the same condition must often obtain in the working of iron at the forge as in its production, then for the smith to be master of his trade, it is necessary that he be familiar with the metallurgical properties of his materials. The author has found by experience that methods reduced to primitive, and most simple forms are more easily understood; he is induced by this fact to offer the following simple illustration of the production and working of iron to present the governing principles of the forge. Perhaps a more primitive method than that practiced by the Burmese for reducing iron from its ore and reheating it for forging is not worthy of consideration. The forge, or furnace, used consisted simply of a hole about 10 feet deep, dug in a bank, at a distance of 2 or 3 feet, from its edge; the face of the bank being strengthened by pieces of wood placed crosswise, the lower part of the bank is dug away, and a rectangular opening about 1 foot high and the whole breadth of the furnace, is made, through which the lump of iron and slag are removed at the completion of the reducing of the iron ore, called smelting, (Fig. 1). For smelting, the opening at the base is closed with clay, leaving small openings in it which serve as tuyeres. Lighted wood is then thrown into the furnace, and alternate layers of charcoal and iron ore on it, until the furnace is charged to the top. After the lapse of about 3 hours the slag is removed, through an opening temporarily made for this purpose; this operation is repeated occasionally until no more slag comes away. It requires about 24 hours in this simple furnace to complete the operation. After the ore has been reduced to a spongy mass of wrought iron it is removed from the furnace, through the opening at the bottom (or at the top), and forged by primitive means to a solid mass.

The principles in the above operation are the same as those involved in the methods long used for extracting iron from its ore and preparing it for use: The ore is heated to redness in contact with carbonaceous matter (say charcoal), when the oxygen of the ore will combine with the carbonic oxide produced from the partial oxidation of the carbon, forming carbonic acid gas, which passes off into the atmosphere, and metallic iron, which is set free. The ore always contains some earthy matter, with which the iron, on being reduced will be mixed. In order to separate the iron from this earthy matter, the latter must be rendered fluid, so that the iron on account of its greater specific gravity, may sink through it and collect together. One of the principle constituents of the earthy matter is usually silica (protoxide contains less oxygen than iron scale), and it so happens that protoxide of iron is the very substance which, more readily than any other available, forms a fluid compound with silica at a low temperature, these properties render sand a very good flux for welding wrought iron. During the reduction of the ore by the carbonic oxide, the peroxide (high oxide) is first reduced to magnetic oxide (lower oxide) then to protoxide (lowest oxide) and finally to metallic iron.

It was found in practice, after it had been reduced from its ore, that iron might be carbonized by the further action of carbon. This was done by adding more charcoal in proportion to the ore and directing the blast so that it would not impinge upon the iron. Thus, steely iron and even cast iron were produced in this manner. After means for obtaining a strong blast had been made the blast furnace was gradually increased in size until the limit, beyond which wrought iron could no longer be produced, was reached. At first this occasional cast-iron product was looked upon as worthless; but on account of the comparative ease and cheapness with which cast-iron could be produced from the ore compared with wrought iron, some simple means were naturally sought by which it could be converted into wrought iron. This was soon accomplished in spite of the fact that phosphorous passes into the cast-iron, while wrought iron made in the same furnace was practically free from it; and gradually cast-iron (pig iron) became the sole product of the modern blast furnace. Coke for fuel, blowing machinery, hot blast, better equipment, and finally the modern processes of refining iron and making steel were introduced.

Conditions similar to those which obtain in the blast furnace may exist in the ordinary forge fire. That is, the fire may be oxidizing or reducing—may burn the iron or possibly carbonize it—and it may be effected by phosphorous, sulphur, and other foreign matter, a neutral condition is desired.

At the beginning of the industry and for a long period of time, it seems that only wrought iron was worked. The welding property of wrought iron and the hardening property of iron containing a small per cent. of carbon were not familiar to the early workers. One Glaucos of Chios, one of the old Grecian Isles, is given the credit of being first to weld iron. The Chinese and Hindus claim to have made steel many centuries B. C. Early in the history of working iron the tilt and helve hammers were made and used for forging the large lumps of iron from the furnace into shape for subsequent use. The energy for operating these hammers was usually furnished by water falls. This system was improved and used for a long time; finally with the modern systems of making and refining iron and steel came the large steam hammers and rolling mills which have contributed much toward developing the great Iron Age.

Iron and Steel.

Common wrought iron is nearly pure iron, and the modern method is to make it from cast iron (pig iron) by the "puddling process," which consists chiefly of raising the cast-iron to a high temperature in a reverberatory furnace, when the carbon and other elements are removed by the action of the air (oxygen of the air); and also by the action of the covering on the bottom of the furnace, melted cast-iron and hammer scale, called fettling.

Fig. 2 represents a reverberatory "puddling" furnace, used for making wrought-iron. The sketch shows a section running the length of the furnace through its center. At B is the fireplace; A the hearth, or puddle; and the stack or flue at C.

The flames on their way to the stack are deflected downward, by the roof of the furnace, upon the iron lying on the hearth. The iron is thus under the influence of the flames without being in direct contact with the fire. The fire is then so regulated as to give an oxidizing flame; that is, more air passed through the fire than can be burned, leaving a surplus of oxygen in the flames which are playing over the melted iron on the hearth. The oxygen in the flames, as well as that in the hammer scale, or iron ore, melted with the cast-iron, gradually burns out the carbon of the cast-iron. The melted mass is constantly stirred in order to expose all parts to the influence of the flames.

When making wrought iron, as the carbon is burned out of the iron, the temperature of the furnace is kept below the melting point of wrought iron, but above that of cast-iron; and as the carbon is burned out, the metal stiffens and becomes pasty; and, as the process is completed, the iron is removed from the puddling furnace as soft spongy masses, called blooms, which are subjected to a process of squeezing or hammering, called shingling. These shingled blooms still contain enough heat to enable them to be rolled into rough puddled bars. These puddled bars are of very inferior quality, having less than half the strength of good wrought iron. The puddled bars are cut into pieces, which are piled together into faggots, reheated, and again rolled into bars, which are called merchant bars. This process of piling, reheating, and rerolling may be repeated several times,

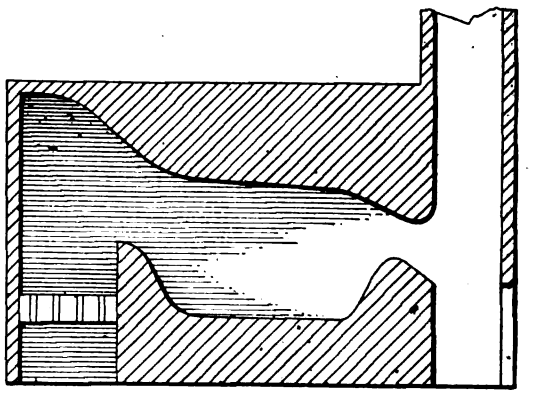


Fig. 2.

depending on the quality required. Best bar iron is made from faggots of merchant bar, while "best best" bar iron is made from faggots of best bar iron. "Best best best" bar iron is made from faggots of "best best" bar iron. This process of piling and rolling gives wrought iron a fibrous structure.

The presence of a small quantity of phosphorous in wrought iron produces coldshortness—brittle when cold. Sulphur causes redshortness—brittle when hot. The first-class wrought iron and steel of today are nearly free from the bad effects of phosphorous, sulphur and oxygen.

Rivet bars are rolled from faggots of selected scrap iron. Heavy forgings are made from slabs which are formed from faggots of selected scrap iron.

The difference between wrought iron and steel is that whereas the former is almost pure iron, the latter is a compound of iron with a small quantity of carbon. Steel is made either by adding carbon to wrought iron, as in the cementation process, or by removing some of the carbon from cast iron, as in the Bessemer and Siemens-Martin processes.

In making steel by the cementation process bars of wrought iron are embedded in powdered charcoal in a fire clay trough, and kept at a high temperature in a furnace for several days. The iron combines with a portion of the carbon and forms blister steel, so named because of the blisters which are formed on the surface of the bars when they are removed from the furnace.

For shear steel the bars of blister steel are broken into pieces about 18 inches long, and tied together in bundles by strong steel wire.

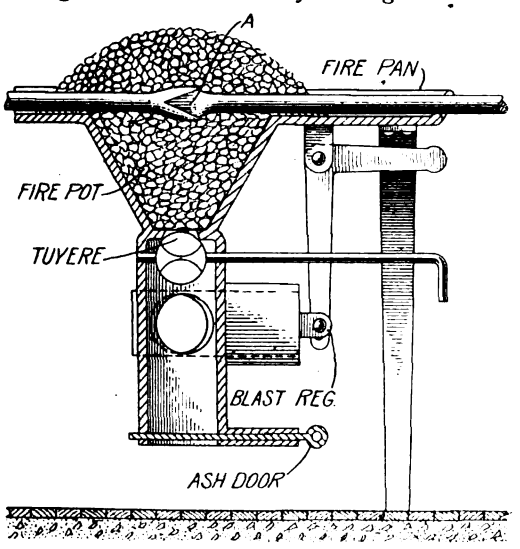


Fig. 3.

These bundles are raised to a welding heat, and then hammered and rolled into bars of shear steel.

Cast steel is produced by melting the broken pieces of blister steel in a closed crucible, which is then cast into ingots. These ingots are rolled into bars, which also have the name of cast steel, but it is more usual to call them tool steel, from the fact that they are chiefly used for making tools.

Laminated steel is made by coiling steel wire around a core and then welding the rings together. It is very elastic and tough and stands a great strain. Used principally for gun barrels.

Bessemer steel is made by pouring melted cast iron into a vessel called a converter, up through which a blast of air is then urged. By this means the carbon, silicon, sulphur, etc., are burned out, and comparatively pure iron remains. To this is added a certain quantity of carbon molten iron and manganese, and it is then cast into ingots.

Siemens-Martin steel is produced by melting cast iron and wrought iron, or cast iron and certain kinds of iron ore together on the hearth of a reverberatory gas furnace and all reverberatory furnaces are of the same principle as the one shown, Fig. 2.

Nearly all steel which is used for construction purposes is made by either the Bessemer or Siemens-Martin process.

Common wrought iron has traces of carbon, sulphur and phosphorous; the fewer the traces the better the iron. Cast iron contains from 2 to 6 per cent. of carbon with certain small percentages of silicon, sulphur, phosphorous and manganese, to suit the purpose for which it is to be used. Steel contains from 1-7 to 2 per cent. of carbon with traces of phosphorous, sulphur and manganese; steel for various purposes having various amounts of carbon. For hammers and other tools used for forging hot metal, the steel should contain from ½ to 1 per cent. of carbon. For cold sets, chisels, drills, dies, axes, knives, etc., 8-10 to 1 per cent. carbon. For lathe and planer tools, large drills and cutters, 1 to 1 2-10 per cent. carbon. Care should be taken in tempering. For small tools, drills and tools to have a very fine cutting edge, use 1 2-10 per cent. to 1 7-10 per cent. carbon. From 9-10 to 1 1-10 per cent. carbon is considered the best tool steel for general work. The steel containing small percentages of carbon is used for machine and structural purposes; steel of this class is made by the Bessemer process.

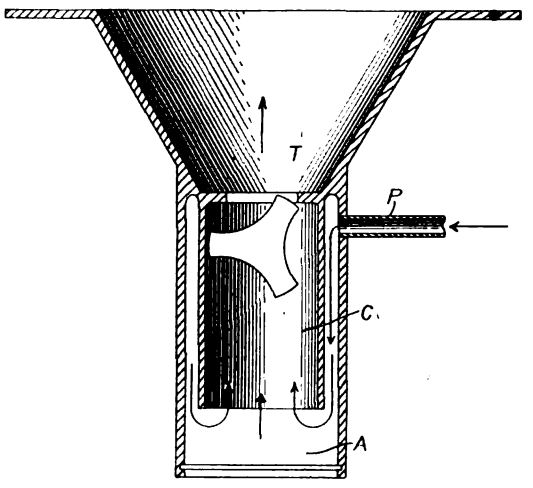


Fig. 4.

Chrome steel, containing a small quantity of chromium has a fine texture and is very hard. It has been used to some extent for armor piercing projectiles. It is not weldable.

Manganese steel produced similar to carbon steel (common steel) by introducing as much as 10 per cent. of manganese into the pure molten iron. This steel is so hard when cold that it is very difficult to work with ordinary tools. It is used for the manufacture of car wheels. It cannot be welded, and is not used for tools as it is too brittle to hold a good cutting edge.

Nickel steel contains from 2 to 4 per cent. of nickel and from 2-10 to 3-10 per cent. of carbon. Such a steel is far stronger and tougher than the corresponding carbon steel; it also has a much higher elastic limit and is less corroded by the action of water. It is used for propeller shafts and parts of machinery that are liable to receive heavy blows. Nickel steel is used largely in automobile and other modern manufacture. It is difficult to weld. When the alloy is more than 3 per cent. nickel it cannot be welded.

Next to carbon steel, tungsten is the most important. The effect of tungsten on steel is to greatly increase its hardness without the necessity for quenching; in fact tungsten steel cannot be hardened further except by the use of oil, and then only with great difficulty, the richer alloys inevitably cracking. Hence the term, self-hardening steel, frequently applied to the steels containing about 5 to 7 per cent. of tungsten. They are manufactured and sold under many names. The great hardness and fair ductility of tungsten steels and the fact that their temper is not drawn when doing rapid turning, as is the case with ordinary steels, render them very useful, especially for tools which are used for turning very hard metal. Special processes, as, for instance, the Taylor-White process of the Bethlehem Steel Company, have been invented for treating these self-hardening steels and rendering them able to hold their temper even when quite hot (600° F.), thus enabling the cutting speed of tools to be greatly increased. Self-hardening steel is rarely ever used for finishing tools, their sphere of usefulness being as roughing tools.

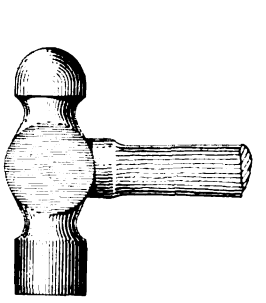


Fig. 5.

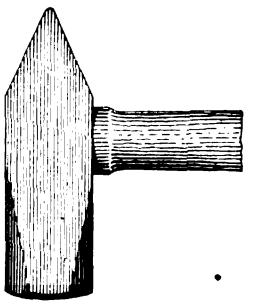


Fig. 6.

Forges.

There are so many kinds and styles of forges that the student and apprentice may conclude that any kind will give good results. This is true, in a measure, but it should not be forgotten that a deep fire, a good tuyere (one which readily shakes out the cinders), and an arrangement to control the blast are absolutely necessary to get the best results. A forge that does not possess these points and is not also conveniently arranged for the work should not be chosen. Fig. 3 shows the principal parts of a common forge.

The blast may be produced by a fan, a rotary blower, an air compressor, and sometimes by a pair of bellows. When air which has been compressed highly is used for the blast it is necessary to use a reducing valve, or to have a specially formed tuyere. Fig. 4 shows a simple design of tuyere suitable for using compressed air for the blast. The air is forced down around the hollow cylinder C into the space A before it can ascend through opening C on its way to the tuyere T. This increases the volume and reduces the pressure of air, giving a steady blast. It may be controlled by a valve connected in air pipe, P.

Whatever method is chosen, to produce the blast, should furnish it sufficiently strong for the purpose which it is to be used, and have means for regulation.

Anvils.

Only anvils of standard quality should be chosen. The face and corners of poor grade anvils soon fail, leaving them unfit for forging. When a standard anvil comes from the factory, the face (from the heel to the horn) is straight; the face across is just a trifle oval; the corners are square, except part of the corner next to the horn (which should be farthest away from the workman) is rounded. This corner is used for starting and making square bends, and for forging shoulders, which should not have sharp corners.

The anvil should be used with care to keep it in good condition; good work cannot be done upon an anvil whose corners are broken off and the face not of the proper shape. The anvil should be firmly placed upon a block, or solid foundation, and held by straps or other means.

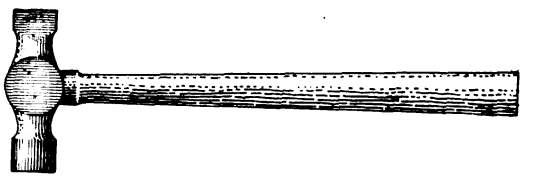


Fig. 7.

Hammers.

The hand hammer should not weigh more than 2½ pounds, and usually not less than one pound; the size and kind depending upon class of work for which it is to be used. The handle is from 14 inches to 18 inches long, elliptically shaped and of size to suit. It should always be perpendicular to the head and wedged firmly in the eye. Near the head, the handle should be thinner. This is necessary to give it a spring to avoid stinging the hand.

There are many classes and styles of hammers, varied to suit the work, the hammers commonly used are: Ball-peen, Fig. 5, cross-peen, Fig. 6, and straight-peen, Fig. 7. A hand sledge, Fig. 8, usually weighs from 8 to 12 pounds. It is used by the helper, raised with both hands up as high, or higher than the shoulder, striking the blow from this point. When forging, the sledge should never be swung, as the blows cannot be delivered fast enough in this manner; but it should be drawn toward the helper as he raises it for the blow, in order that it may not get in the way of the workman using the hand hammer. The handle is from 20 inches to 30 inches long.

A sledge with a long handle may be used for cutting off and heavy swaging. This sledge may be grasped at the end of the handle and swung as a maul, Fig. 9. Small tools will be shown in connection with the exercises.

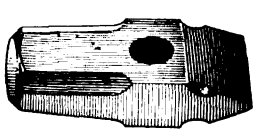


Fig. 8.

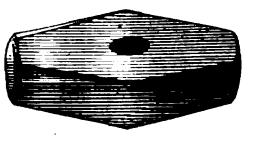


Fig. 9.

Fig. 10 shows the ordinary form of swage block. These blocks have variously shaped grooves and holes cut into them and they are used as a bottom swage and heading tool or for similar work. There are many styles of swage blocks. Some of them are supported upon

strong cast iron stands. Fig. 11 shows a cast-iron mandrel, which is used for bending and rounding.

It is necessary to have many kinds of tongs for holding the variously shaped pieces of material. Special tongs are made to fit special cases; it being frequently required to make a new pair, or alter a pair for the work to be done. Tongs must fit the work else it is not under the control of the workman. A few kinds of the most commonly used tongs are as follows: Flat tongs. The jaws should be fitted to the bars which they are to hold. Many sizes are required. Pick Up Tongs, used for picking up pieces of iron and for holding small pieces while tempering. Bolt Tongs are used for hold-

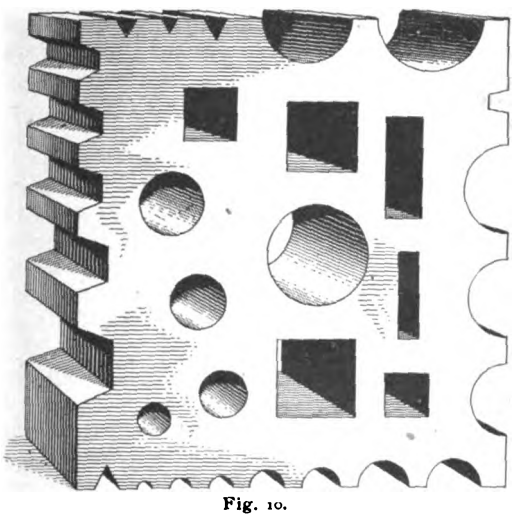


Fig. 10.

ing round iron, having a place for the head of bolts. Gad Tongs, used for holding flat wedge-shaped pieces that have a head or large end. Link Tongs. The chain link is grasped by the point of the jaws, thus giving good control of the work; and at the same time having the tongs as much out of the way as possible. Tongs should be hung upon a rack, in order to have them convenient for use. They should not be left in the fire when it can be avoided; and they should be heated when fitting them to the work.

Vise and Bench Tools.

The vise should be of the standard type of blacksmith's vise, heavy and strong enough for the work required, and firmly fastened to a solidly built bench. It should be set at elbow height. When this vise is used to hold finished work, to protect finished work from being bruised by the steel jaws, there should be a set of copper plates covering the vise jaws.

Calipers are used for measuring out side and inside diameters, widths, and thicknesses. Divid-

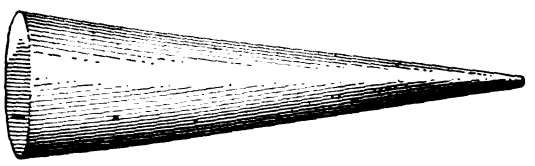


Fig. 11.

ers are used for measuring the distance between two points, and for describing circles. The points are clamped by the thumb screw against the wing, and the finer adjustment is made by the nut. The surface plate is made of cast-iron, and is from 1½ inches to 3 inches thick, other dimension to suit, and it is planed on the top surface,. This is used for laying out and testing work. It is generally placed on a strong bench. For straightening heavy bars and other work a heavy cast-iron slab is also used. A surface gauge is very convenient and accurate for laying out and testing work. Used in connection with the surface plate.

The shop should be provided with lifting jacks, benches and etc., for lifting and supporting the work. An assortment of wrenches, clamps and etc., should be provided.

Tempering Springs.

In tempering springs allow the oil to burn about six minutes before quenching. As the oil can be heated to only a certain temperature, the articles receive a perfectly even heat. If the oil is burned off from the article while it is only smeared with oil, some parts will be heated more than others. If a spring is made of piano wire, it will be greatly stiffened and improved by heating it to an even blue after it is formed The reason for this is that when the wire is coiled the metal is full of strains which the heat removes.

WAGON SELLING.

How the Manufacturer May Give a Bond and Thus Help the Retailer.

"Are you selling wagons fast enough?"

"Let us help you sell them."

These are the words with which a prominent wagon manufacturer addresses the dealers, says the Shop Salesman. It is absolutely essential to the dealer that he sell wagons—this being his purpose in business—and the proposition is equally as vital with the manufacturer. While it is next to impossible for the manufacturer to sell to the public direct, and although competition is making it harder each season for the dealer to dispose of his wagons at a satisfactory profit, by uniting their efforts and working together the manufacturer and the dealer can bring about a decidedly gratifying increase in sales.

Twenty or thirty years ago a few manufacturers considered the troubles of the retail trade. They made the wagons and sold them outright to the dealer, and that ended it. It was up to the retailer to see that they were disposed of to the public. Some brands soon built up a reputation for themselves on their own merits. There was a demand for them, and they sold readily. But there is no reason why a new make of wagon may not be just as good as an old one.

Nowadays neither the manufacturer nor the dealer can afford to figure that every wagon sold will, in the course of time, sell a few more. The trade would find it unprofitable to allow only those wagons which have been put out to act as silent salesmen, backed by the loquacity of their owners, for evolving future business through this medium is so slow that it is not altogether certain. Selling wagons nowadays is as much a matter of aggressive sales tactics as it is of reputation.

Both old and new wagon manufacturers who are successful nowadays are getting business because they are keeping everlastingly at it. 'Way back in the '80's the wagon men did not show special persistency in working up consumers' demand, although concentrated effort along one accepted standard of exploitation was much in vogue. These old-time manufacturers and dealers alike swore that the satisfied customer was their best advertisement.

It used to be that pretty nearly every retail merchant could afford to visit his manufacturer once or twice a year, to inspect the plant and survey the fine points of the output. But in these days of coast-to-coast selling systems, when one line alone is to be found in retail stores from the Atlantic to the Pacific and from the Lakes to the Gulf, it is not to be expected that the Texas agent of an Indiana manufacturer may take a few weeks off in order to dig up factory selling talk for himself.

The modern wagon retailer keeps his line constantly in the limelight. He is enabled to do this because his manufacturer advises him immediately of all new details in construction, selected quality of materials, new designers or workmen, improved plant equipment or other manufacturing data which tend to market a better vehicle. If the manufacturer sells 10,000 more wagons in 1912 than in 1911 he doesn't lose a minute in telling his dealers about it, for they in turn may post this concrete bit of selling talk where it will do the most good, impressing present owners and prospective purchasers with the fact that here is a vehicle which has the unqualified support of 10,000 more actual users than ever before.

The manufacturer's bond is typical of a hit-and-run play. It is the hit which anchors the retailer safely on second, prepared to score the winning run with a sale. To begin with, the dealer aids the manufacturer in preparing a list of all possible users of wagons in his (the retailer's) vicinity. To each of these prospects the manufacturer mails a letter and possibly a catalogue, telling in a concise and authoritative manner the exact advantages of his product. This initial form of approach serves as an entering wedge.

Next, the manufacturer requests all his prospects, culled by dozens of dealers, to fill out blanks designating their choices and requirements in the wagon line. All through the scheme thus far there is nothing binding upon the consumer—but the fact of the matter is that a manufacturer equipped with hundreds of these specified requests is in possession of approximately just so many real sales, which requires but little additional effort to close. The manufacturer has gained the most valuable of all vantage points, the primary hold upon the attention of men who, perhaps, have been postponing wagon purchases for years.

The manufacturer's bond is the final link in the chain. It closely resembles a bank note, being beautifully engraved, and is mailed to every consumer who has shown sufficient interest in wagon buying to specify his needs upon a blank to the manufacturer. The bond is representative of such actual value, aside from its face valuation of $2 when applied to the purchase of any vehicle in the retailer's stock, that nobody would think of throwing it away. Even if it does not lead immediately to a wagon sale, which it does in nine cases out of ten, it is at least good for a look at the line in question and insures through publicity for that vehicle before competitors can get in on the prospective sale.

Such methods as this bring success. They do not always succeed at first, but the manufacturer's bond is one which has had effect in the piano trade, causing a tremendous number of sales during the past few years. The system is undoubtedly far from permanent, but it is good for a long period of stimulated business and thousands of real sales.

New Horseshoe Price Quotations.

The Phoenix Horse Shoe Company of Chicago, has adopted a plan of list prices with a discount to the trade instead of net figures as heretofore. After July 1, the prices of Phoenix horse and mule shoes was changed as follows: Iron shoes, $4.20 per keg, Pittsburgh, steel shoes, $4 per keg, Pittsburgh, with a discount to retailers of 5 per cent. and a discount to jobbers of an additional 5 per cent. These prices are subject to the deduction of an additional 10 cents per keg for carload shipments. There will be the usual extras, which are not subject to discount, and the terms are sixty days net, or 2 per cent. for cash in ten days. In explaining this new departure the company says it has been actuated by a desire to aid dealers in establishing uniform prices to the consumer that will net a fair and reasonable profit by indicating what the consumer's price should be. For many years the prices to dealers for horse shoes as well as other steel and iron products have been based on Pittsburgh, thereby guaranteeing to every dealer that he is getting the same price as other dealers, varying only as to freight from Pittsburgh. It is also pointed out that dealers by observing this plan of using Pittsburgh as the basing point and quoting consumer's list price with the less than carload rate of freight from Pittsburgh added to whatever point the goods are shipped, making a delivered price in every instance to the consumer, it will be found that much annoyance resulting from the irregular prices that have heretofore existed in many localities will be eliminated. This plan, it is believed, will mean that every dealer will quote the same price to the same consumer and the profit to each dealer will vary according to the distance the shoes are delivered from the dealer's stock. It is the company's belief that much of the irregularity of prices quoted by the dealers has been the result of not having a uniform base price which automatically adjusts a fair division of territory.

Drilling Glass.

Glass may be drilled with a small tool by using turpentine as a lubricant, but this has its disadvantages inasmuch as the tool has to be resharpened frequently as well as that the diameter of the hole is apt to be larger at the top than at the bottom, also it is difficult to drill holes of equal size.

Drilling may be accomplished successfully by utilizing a brass tube of the diameter of the desired hole. The end of the pipe is trued up to secure an even bearing upon the glass and a small opening made in the side of the tube through which the abrasive is introduced during the process, this being done so that the tool will not have to be lifted during the work.

In starting the drill a piece of wood is utilized having an opening of the same diameter as the tube and the guide is attached to the work. The drill may be operated by a drill press or hand drill and during the operation the cutting paste may be fed to the tube by an oil can. If a sharp edged hole is desired, a thin piece of glass may be placed over the work and held in position by French copal varnish.

WHEEL ADJUSTMENTS.

Something That Must Frequently Be Done for the Much Used Automobile.

There are certain repairs and adjustments necessary for the automobile which the blacksmith is better fitted than any other mechanic. For although automobile repairs must be accurately done the work is not what may be called light, and it requires plenty of room, and considerable physical strength to take one down or put it together.

Take the case of wear of the wheel bearings, for illustration. Very often there will develop, in the front road wheels of a car, a certain amount of play due to wear, which manifests itself in a slight "wobbling" of the wheels while they are running. If the wheels were jacked up, and then taken hold of by the spokes and worked backwards and forwards the play will be distinctly felt. In cases where the wheels are provided with a plain brass bearing the most probable cause of the play is due to wear on the washers which take the bearing, as will be seen from the polished surface of the rim, round the bearing. The trouble can therefore be cured by taking off the wheel and turning out the washers. These are in most cases about one-eighth inch thick on the bearing part, and about one-quarter inch on the inside part, and this is where the play can be taken up.

In order to carry out this piece of work, the washer should be put in a lathe and turned out sufficiently on the inside part to take up the play. Care, however, must be taken not to take off so much metal from the washer as to make the wheels run tight. It will generally be found that this simple operation will make the wheels run without play; but should it not do so the trouble must then be sought for in the brass bearing itself. If this is worn the only satisfactory way of getting rid of the play is to renew the brass. It should be remembered in getting the wheel on again to use plenty of grease.

Some of these front wheels, however, have in place of the brass bush and washers, a method of fitting consisting of ball bearings and cones. Should the play occur on such wheels the method of procedure is slightly different. The first thing to do is to take off the wheel cap and clean off the grease, and then take out the split pin which secures the nut and cones. The castle nut should be removed and it should then be found that the cone will come out and the wheel should slide off the axle, and the bearings with it. These bearings should then be carefully cleaned, and examined to see if any of them are broken. If they are all right they should be fitted into the wheel again and the latter fixed into position. The adjustable cone should then be screwed up, care being taken to see that the cone is not brought up so tight ts to prevent the wheel from revolving. It may possibly be found that when the cone and the castle nut have been screwed up, there is room for a thin washer between the cone and nut. This should be inserted; for if this is not done it will be found that the slot in the nut and the split pin hole in the axle will not come into proper position. When the adjustment has been made satisfactorily the wheel cap should be filled up with grease and screwed on, and this operation should be repeated until the lubricant can be seen oozing out of the other side of the wheel.

It will probably be found that this treatment will be found effective in taking up the play of the wheels, but should it still be found that play is evident the deduction is that either the bearing or the axle of the wheel is considerably worn and may require to be renewed.

In attending to the back wheels of a motor car it will often be found, on attempting to extract them, that is is a most difficult undertaking to get them off the back axle. A good deal of energy can be wasted in trying to drive them off with a block of wood and a hammer, especially if they are keyed on. It is a very wise investment to buy a wheel extractor for this purpose, as these can be obtained from any accessory firm on application. When ordering it is advisable to state the make of the car for which it is intended, and if possible to send one of the wheel caps. It sometimes happens, however, that it is impossible to order in this way, without incurring a loss of time, and therefore, a method of making an article of home manufacture which will answer the purpose may be useful, although the making of a wheel extractor is rather an expensive job. A spare wheel cap should be taken and a hole drilled in the center of it, one-half inch tapping size, the hole being then tapped. A piece of round steel bar (preferably cast, because of its hardness) should then be taken, tapered slightly at one end, and a square filed upon it at the other. On the main length of the bar a one-half inch screw thread should be cut, and the bar screwed a little way into the cap, the squared end projecting outwards. The wheel cap should then be fixed on to the wheel in the usual way and a spanner used on the squared end of the bar. When this is screwed up tight it will be found that the wheel will slide off easily.

TROUBLE IN A CYLINDER.

How It Was Cured and How One Man Uses an Air Compressor.

A friend of the writer—an engineer of considerable experience in the design, construction and operation of automobiles and other machinery—constructed after designs of his own make, a six-cylinder automobile for himself and family, the design embodying many ideas of his own, and including the best practice of automobile builders. The result fully justified the expectations of the friend and the car is about all that can be desired by any one who wishes an automobile for all around use.

It is nearly two years since the car was built and it has been in commission nearly ever since. The builder has a little machine shop in the back yard of his residence, adjacent to the garage which at present contains two cars, the "six" above noted, and a four-cylinder runabout which is in almost constant use by various members of the family.

The little machine shop contains a couple of stationary gasoline engines, one for driving the two lathes, drill-press, forge blower and emery grinder with which the shop is equipped; the other engine is attached to an air compressor which maintains an abundant supply of air for tire-filling; and this compressor is also made to serve another purpose which much interests the women folk of the family. By means of suitable stop valves, located in the shop adjacent to the engine, the air compressor is at will cut off from the compressed air receiving tank and connected to another tank in the cellar of the residence.

This second tank, which is nothing more or less than a 40 gallon rum barrel, is the receiver for a permanent vacuum cleaning system which is piped throughout the house of nine rooms. Thus the air compressor in the shop is made, by the turning of a couple of valves, to change from an air compressor into an exhauster and maintains a sufficient vacuum in the barrel for all the cleaning that can be done with two or three suction tips working at the same time.

The receiving barrel in the cellar of the residence is connected with the sewer, and is partially filled with water. All dust collected by the cleaning tips is drawn through the water in the barrel, therefore little if any dust ever gets into the air compressor in the shop. Another little 'kink" proves quite convenient, as well as valuable, to wit: A suction pipe is run back into the shop from the barrel in the house cellar, and a suction tip is attached in the shop, where it is found mighty handy for many cleaning operations, not the least of which is that of "doing" the cushions, curtains and other inside "fixings" of the car. A decided innovation in vacuum cleaning is the attaching of a long flat brush instead of the usual collecting tip. The brush has openings between the rows of bristles, and these openings are connected to the vacuum barrel. The result is a dustless brush, and it is a mighty handy thing, I assure you. Dirt, dried mud, etc., may be loosened up by light use of the brush, and, instead of flying all over everything as when a common brush is used, the loosened dust goes "right up the flue" and that's the last of it.

Incidentally, the enamel of the car is preserved by the use of the vacuum brush. Ordinarily, a brush is a mighty poor thing to apply to dry mud dirt-caked surfaces, for the reason that the dirt loosened by the brush is rubbed around upon the surface of the varnish or enamel, actually grinding away the surface thereof. Evidently no automobile varnish can retain a finished surface very long while being scoured with sand and road-dirt.

But with the pneumatic brush, things are entirely different. It is evident that the brush cannot harm the enamel as long as there is no sand between th brush and said enamel. It is also evident that the brush cannot injure the enamel while working upon the outside of a mass of cake-on dirt, because the brush cannot touch the enamel as long as it is scrubbing upon the dirt!

Also, when the dirt is removed just as fast as loosened, how is the brush-rubbing going to injure the enamel surface of the car? And dry cleaning the car has been found a mighty convenient way by the gentleman in question. The condition of the enamel upon the two cars in his garage proves beyond a doubt that vacuum dry brush cleaning is O. K. between the wash periods.

The six-cylinder car referred to above, developed a few peculiarities, as all cars will, and one of the peculiar things, and one which gave the owner much concern, was the behavior of one of the cylinders—the second from the front end of the six. Each cylinder in this engine was cast separate from any of its companion cylinders.

"I do not believe in double or triple cylinders," remarked the owner of the car, "because in case of trouble with one cylinder, I must throw away two or three. And in case of having to procure a new cylinder to take the place of a damaged one, why, with cylinders cast two or three together, my car is out of commission for a month, while I am getting new cylinders from the manufacturer. To be sure, the maker of the car will replace, free of cost, any defective cylinders, but you have to send in the defective parts, wait for them to be received, a verdict rendered, and new parts to be sent out. All this time your car is out of commission. No, sir! Singly cast cylinders for me, all the time. Why, in the case of my car, I am going to take out that cylinder which troubles me. I will just block off the flange after the cylinder has been removed and I can run the car with five cylinders while I am finding out and curing the trouble in the sixth cylinder. You never will convince me that cylinders should be cast two or three together!"

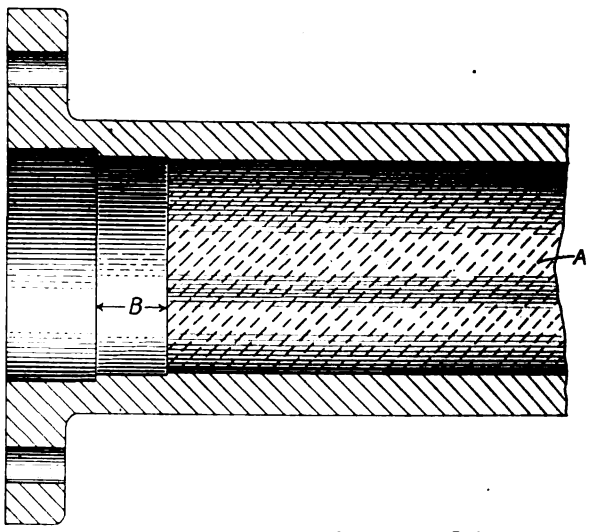


Fig. 1.—Appearance of the Inside of the Cylinder.

With five cylinders working nicely, the sixth cylinder of this car developed an irregularity in its action which the owner was entirely unable to account for. Test after test was made for every possible cause of poor behavior without revealing the cause of the trouble. One of the sons of the automobile owner would get out on the foot board while under way, and open one pet-cock after another, thus testing the compression by listening to the sound of escaping gas through the pet-cocks while explosions were on in each cylinder.

It seemed to the observer that he could detect a slight hissing noise in the cylinder which gave trouble. The sound of the exhaust would at times exhibit no irregularity; again, at other times it would appear quite weak from the one cylinder, changing again to a square exhaust, without a thing being done to the engine.

The owner was positively sure that ignition and the mixture were all that either should be. A high tension magneto, properly conected and well timed, gave perfect ignition in five of the cylinders and the car was usually started with

the magneto in circuit, a quarter turn of the crank ordinarily being sufficient to start the engine.

The spark plug was removed from the weak cylinder and replaced by a plug from one of the other cylinders which had been working well. This did no good. The lame cylinder was removed from the engine and examined closely for leaks with the idea that a small blow-hole might have opened in the wall of the cylinder. But not the slightest defect was found. The lower end of the cylinder was tightly closed, the cylinder placed on end and filled with gasoline and not the slightest trace of leakage could be found. And if there is much of a hole in a cylinder, rest assured that gasoline will find that hole, when the above noted test is made. Any hole which gasoline won't sneak through while under pressure due to a few inches head of that fluid—well, such a hole would have more room on the point of a cambric needle than would a hog in Lake Erie! And that's some room, too! Seemingly, the inside of the cylinder was all right, the rings apparently were well fitting, and the owner of the car put the matter thus:

"Hobart, I have built several automobiles, designed automobiles and auto trucks which are doing good service every day, but I'm beginning to believe that I don't know a thing about automobiles after all!"

That cylinder trouble sure proved a "sticker" to the writer as well as to the owner. The gasoline test was made to prove or disprove a theory advanced by the writer that the trouble was caused by loss of compression through a recently developed blow-hole, but the gasoline test overthrew utterly the blow-hole theory.

The writer has known of instances where leakage developed in cylinders aftew two years of use without a sign of a leak, and then they suddenly went bad. It was found that blow-holes in the iron were broken through by heavy explosions, causing the leakage to suddenly appear. But there were no blow-holes in this cylinder and the trouble bird continued to ride in the car every time it went out. Finally the owner became desperate, yanked out the defective cylinder, connected up the car to run with five cylinders, and took the weak cylinder into the shop, locked the door and set out to fix that cylinder or—"bust."

The cylinder was "chucked" by being bolted to the face plate of the largest lathe, and trued by the counterbore. As the cylinder was revolving slowly in the lathe, with an incandescent lamp suspended just beyond the far end of the cylinder, the owner chanced to glance through the cylinder and the light falling at a certain angle, the cause of the trouble stood revealed!

The cylinder presented the appearance of the

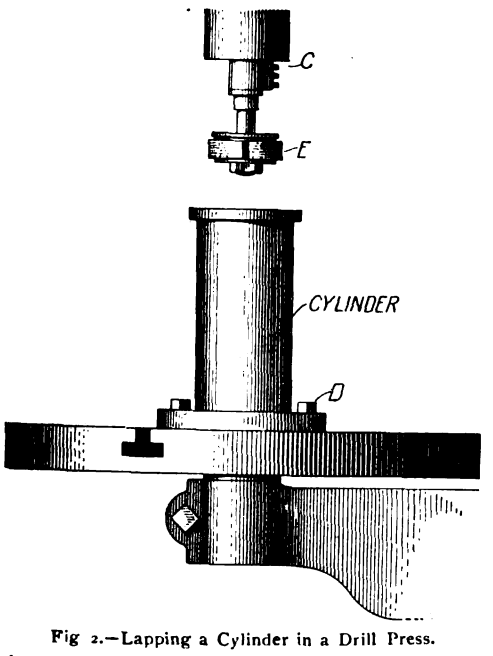


Fig 2.—Lapping a Cylinder in a Drill Press.

portion shown at A, Fig. 1, and as it revolved slowly, there seemed to be a sort of rifling in the cylinder, similar to that in a gun, only not as sharp or as deep, and the rifle marks did not seem to be continuous. Instead, they seemed to pass diagonally, in a disconnected way, through the cylinder. The cause of the trouble was apparent at once, and the owner then recollected that when the cylinders were bored, he had the job done at a local machine shop and that the machinst had trouble in this cylinder, caused by the reamer chattering! And the "chatter marks" are what appear at A. With the inside of the cylinder covered with marks of this kind, it is not to be wondered at, that leakage occurred between cylinder and piston.

The remedy at once suggested itself, and, without removing the cylinder from the face plate of the lathe, the owner set to work to correct the trouble. A cut was started through the cylinder—a very light cut indeed—just enough to go below the chatter marks. The beginning of this cut is shown at B, and it increases the diameter of the cylinder very slightly. It was hoped that the old piston could be made to do duty after reboring the cylinder—new rings to be made of course, but after completing the boring of the cylinder, the owner determined to leave no possible loop-hole for trouble, but made a new piston of a slightly greater diameter than the old one.

It had been the intention of the owner to lap the inside of the cylinder after boring it out, and to lap in the lathe without removing the cylinder from the face plate. But the making of a new piston as well as new rings called for the

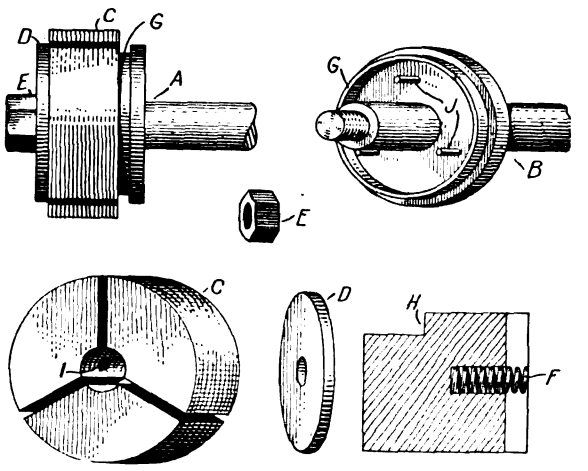


Fig. 3.—Details of Lapping Tool.

use of the lathe, therefore it was determined to lap out the cylinder in the drill-press, the shop affording a most excellent tool of this kind.

Accordingly, the cylinder was chucked upon the table of the drill-press as shown by Fig. 2, a well fitting bar having been placed in the drill spindle as shown at C, and trued carefully. Then the cylinder was trued with the bar which was made to run exact at either end of the cylinder. As may be seen in the engraving, the cylinder was simply bolted to the table of the press, the make of the cylinder permitting this method of chucking. Had this way been found impossible, a special connecting plate would have been made, which could be fastened to both cylinder and drill-press table.

The lap E, which was built upon the lower end of the bar in the drill-press, was then brought down into the cylinder, charged with pulverized glass and water and fed slowly, and evenly through the cylinder from one end to the other and back again, taking care never to stop the lap in the cylinder or to let it run on an instant without being given an even lateral movement.

In this manner, the tool marks were ground away so perfectly that it was impossible to find one in the entire length of the cylinder. As stated, pulverized glass was used, that substance being far preferable to emery for lapping purposes. Emery once applied to an iron or steel surface, is very hard indeed to remove from that surface. In case of moving parts, the emery seems to remain imbedded in the metal and to cut and grind the bearing or other portion of the machine over which the emery-laden metal may pass. But with glass sand, the matter is different. This material seems to grind to pieces and readily wash out of a bearing, particularly when the lapping is done with water instead of oil to hold the abrading material in place during its use in the cylinder.

The lap shown at E, Fig. 2, is illustrated more fully by Fig. 3, and the details there given should enable any mechanic to make one of these simple tools which will be found of great service when cylinders are rough and need a slight cleaning out.

The lap is shown fully assembled at A, Fig. 3, and it closely resembles a piston with one ring. The bar is shown in detail at B, the length of the bar preferably being made as long as the drill press will accommodate. When this is done, the lap may be used for a short piece of work or for a cylinder as long as can be placed in the drilling machine. If desired, the bar may be extended beyond the threaded portion and the extension being fitted into a tight collar in the press table, the lap will be guided both top and bottom as is the case with a boring bar. But the simple lap as shown at A, will usually answer all purposes.

Next, two or three pieces of hard wood are joined into a circle and turned in the lathe to the shape shown at C. A shoulder is turned in one side of each piece, as shown at H, to receive the flange G, which has been left upon the fixed flange at B. This flange and groove in the wood prevent the segments C, from coming out of the flanges while outside the cylinder. These grooves may be dispensed with, but they are a great convenience. Some pins are shown at J, projecting from the fixed flange. These pins are for preventing the wooden laps from turning around while the bar is revolving.

Look at segments C again and a small hole will be found at I. This hole and its purpose may be more easily understood after looking at the enlarged segment shown at F, where a helical spring is shown, protruding from the hole in the segment. It is the purpose of this spring—and of the others in the other segments, to provide a steady outward pressure of the segments against the cylinder. Obviously these springs may be dispensed with and centrifugal force relied upon to give the required pressure between lap and cylinder. In this case, the pressure will be regulated by the speed at which the lap revolves.

But the writer much prefers the spring method of regulating the pressure. With springs of equal length, and holes in the segments of equal depth, the pressure will be the same upon each segment—something not to be sure of when centrifugal force is used to throw out the segments against the cylinder walls.

For a cheap tool, the lap above described has no equal, and it is capable of doing the highest grade of work. A tool costing $1,000 can do no better work than this $5 home-made lap.

Mending Broken Band Saws.

Not long since a reader asked for the best method of mending a broken band saw. As a rule it does not pay to mend them at all, considering present prices, but in case of necessity, the following method of brazing will be found effective: Prepare the ends to be joined by filing across for a space of two teeth, to make a plain scarfed point. Place the saw in the special clamps, with the back edge close against the fence, bind the joint tightly with fine iron wire, and overlay with fine brass wire. Cover the joint with a coating of a creamy paste made by mixing powered borax and clean cold water, and place it in a clear charcoal fire or under a blowpipe until the brass melts, which will be shown by a bluish flame. Then take out, and when cold, file down carefully both sides to the thickness of the rest of the blade. Then reset and sharpen. A good brazed joint will show a straight line of brass across each side of the saw. A good brazing lamp may do the job; but the writer has found a gas blowpipe to be the most satisfactory. This must, of course, be accomplished by a continuous blast bellows.

Repairing Cast Iron Pipe.

A crack in a cast-iron pipe or a gasoline-engine cylinder, caused by freezing, can be repaired in the following manner, if the pressure the part has to withstand is not too great. Procure some sulphate of copper, commonly known as bluestone, and dissolve it in water. Clean the edges of the crack well with a file or sandpaper. Paint the iron with the solution several times until there is a coat of copper on it. The copper surface can be easily soft soldered, which will produce a satisfactory repair in many cases.

To Temper a Chisel.

Heat the chisel to a low heat, so as not to raise the scale, and dip into a brine of salt and water, in quantities of one and ten quarts respectively. Leave heat enough in the tool to allow it being run down to a required hardness, which is designated by the pigeon-blue color. The chisel should be made stout enough to resist a pressure which in using would tend to spring it when put to a test.

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AUGUST, 1912.

PARTIAL CONTENTS.

A GOOD MAXIM.

That wonderful railroad man, the late Edward H. Harriman, who made several hundred million dollars in a very few years, but who possibly killed himself in the operation of making them, practiced one maxim that more than all others contributed to his success. It was this: Attend strictly to business and keep a little in advance of the times.

This maxim is just as important to the blacksmith as to any one else. Rather more so, in fact. For in the case of any business where a large number of workmen are employed, success has been achieved by screwing wages down to the lowest limit. Of course this is a pretty mean way to get rich, and it does not always work. Indeed, sometimes this policy brings ruin. It depends upon circumstances and conditions.

But blacksmiths do not employ much help, comparatively speaking, and working with their men as they do, they usually have a fellow-feeling for and with them. They thus understand that well paid and satisfied workmen are an important business asset. If in addition to this, however, they themselves "attend strictly to business and keep a little in advance of the times," success is assured.

Nothing is more fatal to business than the idea that because anything has been done in a certain way in the past, it must continue to be done that way and that such way is the best way. Every minute that can be saved in doing a certain job is so much added to the profit. Every improvement in a process of doing a job that will insure a better piece of work adds to the volume of business of the future as soon as the customer finds it out.

Don't let the shadow of the past hang on your neck like a millstone. The world is moving forward. It has advanced faster during the lives of many of the older blacksmiths than in hundreds of years before their lives began. Keep up with the procession. "Attend strictly to business and keep a little in advance of the times."

TO HIM THAT HATH.

The truth of the Bible quotation, "To him that hath shall be given, and to him that hath not shall be taken even that which he hath," is often illustrated. It is a phrase of similar meaning to that which states that "the destruction of the poor is their poverty." And to use another old saying of wide currency, "'tis true, 'tis pity; pity 'tis 'tis true."

Take, for illustration, the question of rest. Those who most need it do not get it, and those who need it least get it without difficulty.

Whom do we find at the summer resorts by the seashore and mountains? Very few worn out mothers; few factory girls or hard working mechanics; mighty few indeed blacksmiths or others that toil hard. On the contrary, these summer resorts mostly swarm with those who "toil not neither do they spin," but who are arrayed more expensively "than Solomon in all his glory."

It goes without saying that our readers who are blacksmiths are not given to repining because they do not often get the chance to mingle with the do-nothing butterflies at the summer resorts. They are in pretty good health, as a rule, and are not suffering from insomnia or from loss of appetite.

But they have a right to object to conditions that make for injustice. They have a right to help with all their hearts and all their might to bring about conditions that exactly reverse the Biblical saying. It should be something like this: To him or her that needs a vacation and rest one shall be given, and to him or her that does not need one shall be taken away even that vacation which he or she hath.

WHAT WE MAY EAT.

According to the Good Book, Nebuchadnezzar, king of Babylonia, "was driven from men, and did eat grass as oxen." It is evident he had a pretty hard time of it in that and the exposure, "for his hairs were grown like eagles' feathers and his nails like birds' claws."

But if the "high cost of living" continues—and the cost is high all over the civilized world—we may all be eating grass before long. Already bread is being made of alfalfa, and it is not at all bad in taste, while it is surely healthful and nutritious.

At Los Angeles, Cal., an alfalfa enthusiast recently entertained a company of representative men at a dinner, in which alfalfa had a conspicuous part in every article served. There were soup and meats and a few other vegetables, but the soup and meats were from alfalfa fed cattle; so was the butter, and so was the milk. The bread was baked from alfalfa flour; the cakes were sweetened with alfalfa syrup; the guests had their choice of alfalfa tea, green or black, and alfalfa coffee with the alfalfa cookies. It is said the guests were all delighted with the experiment.

Possibly alfalfa or some similar vegetable may come as a solution of this high cost of living, and if so, let us all be thankful. Sometimes we feel that the vegetarians are pretty nearly right. Not that a vegetarian diet is better than a meat diet, or possibly as good as a mixed diet, but this raising of animals by the million for slaughter, has some features that do not favorably impress the humanely reflective.

At all events, it would be well to draw the line at horse meat. Isn't it enough that the most patient and useful of all animals should render a life of hard and in many cases cruel service, without thereafter cutting up his poor abused body for food?

In addition to alfalfa flour, there are other new kinds being put on the market, such as cotton seed flour, banana flour, bean and pea flour, and barley flour is said to be again on the market. Let people cut down the consumption of meat one-half for a time, and the price will fall one-half. The law of supply and demand is inexorable.

POWER IN THE SHOP.

Do you want to know what is the most expensive thing in your shop? Well, it is the use of muscle. And the very cheapest thing is mechanical power. So when you install a gasoline engine in your shop make it do everything you possibly can. Keep it at work from morning till night. If you do not overload it and keep it properly lubricated, you can't possibly wear it out.

A few years ago many who could make use of them refused to install power in their shops because gasoline engines were not easy to care for, and some of them were not dependable even with the best of care. But this condition no longer exists.

The gasoline engine of today requires no more care than any other machine. If given reasonable attention it is invariably dependable. Just give it fuel, keep it oiled, and see that it is kept clean.

In these days of labor-saving and quick work, it hardly pays to run a shop without mechanical power. Perhaps it would be unwise to advise all who have no power in their shops to either get it or go out of business, but if any do not have it, and they have a competitor who has it, they will find profitable business very difficult indeed.

LET US BE HOPEFUL.

The term "hard times," is perennial. Quite likely it has been so since the dawn of civilization. We have heard it ever since childhood, and one of the first songs the writer ever listened to had for a refrain at the end of every verse: "In these hard times."

Of course, times that are harder than the average are "hard times;" and times that are better than the average are "good times." Hard times on the average can be no worse or of longer duration than good times. Yet fully three-quarters of the time the cry is, "hard times." It is evidently a characteristic of human nature to be pessimistic; to complain more at the bad things of life than to be thankful for the good.

The remark is proverbial: "We need not expect any boom in business during a Presidential election year." But the fact is, we are having it during this Presidential year, whether we expect it or not.

Goods of most kinds are said to be in better demand than usual at this time of the year. Mills and factories are not shutting down as usual in summer for cleaning up, repairs and overhauling. In this city alone, work is about to begin on $300,000,000 worth of subway construction. Our foreign commerce is making a new high record. Despite the early contrary feeling, crops will be large unless something not at present observable hinders.

The Government estimate of the wheat crop is over 2,900,000,000 bushels, or nearly 500,000,-

000 bushels more than last year. The crop of oats will also be record breaking.

Meantime, the shelves of the merchants all over the country are said to be greatly depleted. With good crops the people will be able to buy what they need, and quite likely many things they want but do not need; thus these shelves must be refilled during the early autumn, and this again insures mills and factories running on full time.

Let us then be hopeful. There is reason for it. Nothing can hinder good times save those who without reason cry hard times.

BULK AND DETAIL.

Speaking of maxims, there are a good many that are not true, never were true, and should not be true. We could enumerate many such, but this one occurs to us just now: "Take care of the pennies and the dollars will take care of themselves."

The constant penny watching always takes the eyes from the fleeing dollars. The practice of the most successful business men today is to take care of the dollars and the pennies will take care of themselves. Details are important, but the attention to details that necessitates overlooking the main factors of business is the pursuance of a policy that is well expressed in an old saying that is really true—"penny wise, pound foolish." Details are not important as compared to the bulk; let the details be attended to, but give the main time and the main thought to the bulk.

Smallest Screws in the World.

The smallest screws in the world are made in a watch factory. A writer in Harper's Weekly describes the process of making these screws. He says they are cut from a steel wire by a machine, but as the chips fall from the knife it seems as though the operator were simply cutting up the wire for his own amusement. No screws can be seen, and yet a screw is made at every third operation.

The fourth jewel screw is next to invisible, and to the naked eye it looks like a grain of dust. With a magnifying glass, however, it is seen to be a screw with 260 threads to the inch, and with a very fine glass the threads may be seen quite clearly.

These little screws are four one-thousandths of an inch in diameter. It is estimated that an ordinary thimble would hold 100,000 of them. About a million are made in a month, but no attempt is ever made to count them.

In determining the number, 100 of them are placed on a very delicate balance, and the number of the whole amount is calculated from the weight. All the small parts of the watch are counted in this way, probably fifty out of the 120.

After being cut the screws are hardened and put in frames, about 100 to the frame, heads up. This is done very rapidly, but entirely by the sense of touch instead of by sight, so that a blind man could do it as well as the owner of the sharpest eye. The heads are then polished in an automatic machine.

Carriage and Wagon Axles.

According to Iron-Age Hardwood: The impression of manufacturers generally is that the automobile is causing a marked diminution in the demand for light buggy and heavy carriage axles, such as were formerly used on coupes, hansoms and victorias. The use of wagon axles and axles for trucks, drays and other delivery wagons has steadily increased with one maker, and this is especially true as regards the sale for dump wagon axles. Another manufacturing concern states that it is making more carriage and wagon axles than ever before. This company explains that it co-operates with carriage and wagon makers in getting out specialties which puts them in a position to get more money for their vehicles than if the regular or ordinary axle was used. One axle manufacturer is making a complete line of front and rear automobile axles for commercial trucks, the axles being furnished with hubs, brakes, bearings, sprockets, etc., ready to attach to cars. Prices for carriage and wagon axles are low, but it is thought that with the advancing cost of steel there should be at least a corresponding increase in the price of axles. Large buggy builders have had a very quiet year, due largely to general conditions. Stocks in the hands of jobbers are depleted and a large business is looked for from buggy builders during the Fall months.

Small Repair Shop Methods.

With the rapidly increasing number of motor cars in service, both for pleasure and business purposes, means must be provided for their care and maintenance. There is and always will be a demand for repair shops employing skilled workmen and in this respect it may be stated that the small shop, when properly equipped, may compete successfully with the larger and more established concerns. Many of the latter began operations in a small way with one or two workmen and through diligence and practical methods built up a profitable business.

Many competent workmen, thoroughly familiar with the motor car and its needs, have endeavored to establish a business of their own but although their work was entirely satisfactory to the trade as employees, they have failed to attain success in their new venture because of a lack of executive ability. Four or five skilled mechanics might decide to establish a repair shop, and while capable of undertaking and completing successfully any work, might fail to hold their trade because of a number of reasons, but the most important is lack of system and multiplicity of leaks that cannot be accounted for.

The books show that during the month 500 gallons of gasoline were purchased and that 200 were charged up. The tank reveals but 250 on hand, leaving 50 gallons unaccounted for.

Not only is the workman liable to forget minor charges, but if he is called upon to work on a number of jobs during the day he cannot very well remember the exact amount of time on each unless possessing a wonderfully retentive memory.

Seven Modern Wonders.

Recently the editor of Popular Mechanics secured the vote of nearly one thousand scientists as to what are the seven wonders of the modern world. A ballot was prepared containing 56 subjects of scientific achievement, and blank spaces were left for still other subjects if the voter preferred them. The final poll shows the ten subjects highest on the list. Of course the lowest three should not be counted, there being but seven sought.

Wireless Telegraphy	244
Telephone	185
Aeroplane	167
Radium	165
Antiseptics and Antitoxins	140
Spectrum Analysis	126
X-Ray	111
Panama Canal	100
Anesthesia	94
Synthetic Chemistry	81

It is pretty generally known that the seven wonders of the ancient world were as follows:

Pyramids of Egypt, Pharos of Alexandria, Hanging Gardens of Babylon, Temple of Diana at Ephesus, Statue of Jupiter by Phidias, Mausoleum of Artemisia and the Colossus of Rhodes.

It is of course understood that these ancient wonders that were selected before the Christian era are purely mechanical.

Soldering Aluminum.

Occasionally a reader asks how to solder aluminum or if it can be soldered. Although the success or failure depends more upon the workman and the care with which he does the job, it may be done successfully by following the rules herewith given:

It is probably better to purchase solder than to attempt making it. Zinc can be used but does not form a very strong joint. Tin can also be used, is more nearly the color of aluminum, is stronger than zinc, but is very difficult to work. A small proportion of phosphor tin added to pure tin makes it work more readily and is the basis of most aluminum solder.

The chief difficulty in soldering aluminum is that the heat is dissipated so rapidly that it cools the soldering iron and furthermore aluminum oxidizes instantly upon exposure to the air. This extremely thin film effectually prevents a perfect union being made. If the parts are well heated and melted solder kept hot while the iron is allowed to stand on it, the surface can be scraped beneath the melted solder by the point of the soldering iron, thus preventing to a certain extent the ozidization. In this way the metal can be tinned. When both parts to be brought together are well tinned, the parts can be united with some chance of success, nitrate of silver, resin, or zinc chloride being used as a flux. A soldering tool of nickel gives more satisfactory results than a copper one as the latter alloys with the tin and soon becomes rough.

If the surface is of such a shape that it cannot be readily cleaned by scraping, it can be cleaned by dipping it into a solution of nitric acid in three times its bulk of hot water containing about 5 per cent. of commercial hydrofluoric acid. This causes a slight action on the surface of the metal as shown by bubbles. Rinse the metal after removing from the acid bath and dry in hot sawdust.

The following formula, in the hands of a competent man, can be used to unite aluminum or aluminoid parts:

Tin—10 parts. Cadmium—10 parts. Zinc—10 parts. Lead—1 part.

The parts to be united must be thoroughly cleansed and allowed to stand two to three hours in a strong solution of hypo-sulphate of soda before being operated upon, or cleaned in the acid bath described above.

Cost of Great Works.

Panama Canal (estimated) when complete (not including payment to defunct French Panama Canal Co. and Republic of Colombia), $375,000,000.

Grand Central Terminal, New York, $180,000,000.

Pennsylvania Railroad Terminal, New York, $100,000,000.

Suez Canal, $100,000,000.

New York Interboro Subway (when completed in 1908), $75,000,000.

Manchester (England) ship canal, $75,000,000.

Erie Canal, $52,540,800.

Manhattan Bridge, New York, $26,000,000.

Brooklyn Bridge, $22,400,000.

Williamsburg Bridge, New York, $23,100,000.

Welland Ship Canal, $23,796,353.

Queensboro Bridge, $17,256,000.

St. Gothard Tunnel, $15,000,000.

Simplon Tunnel, $23,232,000.

Harlem River Ship Canal, $2,700,000.

Carriage Builders' Convention.

Bear in mind the date and place of the 40th annual convention of the Carriage Builders' National Convention.

It is to be held in Atlantic City, N. J., during the week beginning Sept. 22. Both the meetings of the association and the exhibition of parts of vehicles and of automobiles will be on Young's million dollar pier. Now a million dollars is not so very much in these 20th century days, but it will build quite a pier by the side of the sea, and September is a good month to be there.

Excursion tickets to Atlantic City at much reduced rates may be procured from most railroads, good for the month of September or for one month from the date of purchase. Quite likely this may be in some cases as low as one-half the regular rate.

Brass Cleaning Paste.

The following makes a good cleaning paste: Rotten stone 6 ozs. oxalic acid 1 oz., equal parts of whale oil and spirits of turpentine sufficient to make a paste.

A general metal polishing paste may be made as follows: The quantity of the parts being by weight: Petroleum jelly (white) 90 parts, kieselguhr 30 parts, refined parafine wax 10 parts, refined chalk, or whiting 10 parts, sodium hypophosphite 8 parts. The jelly and the wax are first melted and the other ingredients stirred in and the entire mass ground. A little citronelle can be added to cover up disagreeable odors and scent the paste.

A polishing powder may be made as follows; the quantities being by weight: Putty powder 14 parts, pipe clay 14 parts, kieselguhr 42 parts, tartaric acid (powdered) 1½ parts.

CORRESPONDENCE

From an Old Mechanic.

From "America," Ohio.—In reading any good trade paper we often find many articles that are really amusing to the old mechanic. Take the subject "hot and cold fitting." Some will advocate hot fitting and others cold. Now of course there are extremes to both. I will wager the cold fitter cannot make a shoe to perfectly fit a level board, let alone a horse's foot. If we get a perfect bearing we must have the shoe hot enough to show the high places of the shoe as well as the foot. We must rasp the charred hoof until the shoe has an even bearing. Then if the shoe fits properly we should not hammer it, as we will change the bearing. A shoe fitted this way will stay on and will not injure a good foot.

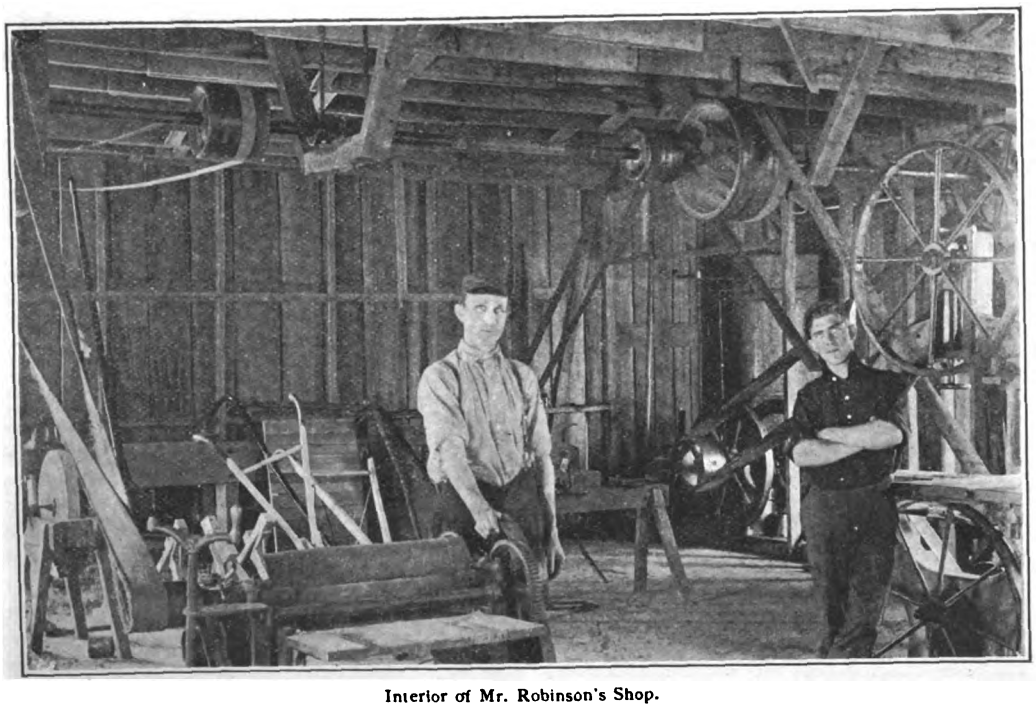
Some talk cold and some hot tire fitting. In my opinion both are right. The cold setting on light wheels will beat the hot two to one, and if the wheel is in good condition as good or better job can be done cold. In fact I know where they cold shrink a hundred sets a day on a hydraulic press. One man welds up 80 sets a day. He gets 13 cents a set for bending, welding and shrinking on wheels. He pays a cub $1.50 and an experienced man $2.00, leaving him nearly $7.00. Now as to heavy tires it is impossible to get them over the wheel cold, even if we could cold shrink them after. Again, we could not make the tire conform to the wheel if it was not hot. We must have it hot so as to pound down the high places. Now this being a fact, why not make the tire the size wanted and set it hot?

I have a Wolfe tire cooler and can easily set 3 sets of 3-inch tires out of one wood fire. By dropping the whole tire and wheel under the water the tire cools so quickly that I can get the last tire before it is cooled. Further, I am not full of smoke and tired out. I am ready for the next job. In fact, if we wish to keep up we must have up-to-date good tools. Power is a necessity and a money maker; two men with a 5 horse engine can easily do as much work as 4 without power. Of course they must have other tools to be driven with the engine. After we get a few power tools we can make lots of other handy devices.

I believe I can come nearer pounding out something interesting than I can write it.

Price Cutting.

From J. G. Robinson, Tennessee.—Business is very good with me. By the way, I will send you a photo of the interior of my wood-shop, which is 28x42 feet. I have a 30-inch band saw, 24x6 plain rip saw, turning lathe for wood, 8 inch, a jointer and spoke machine, 6 h.p. gasoline engine, a rubber tire machine, and a few wood tools.

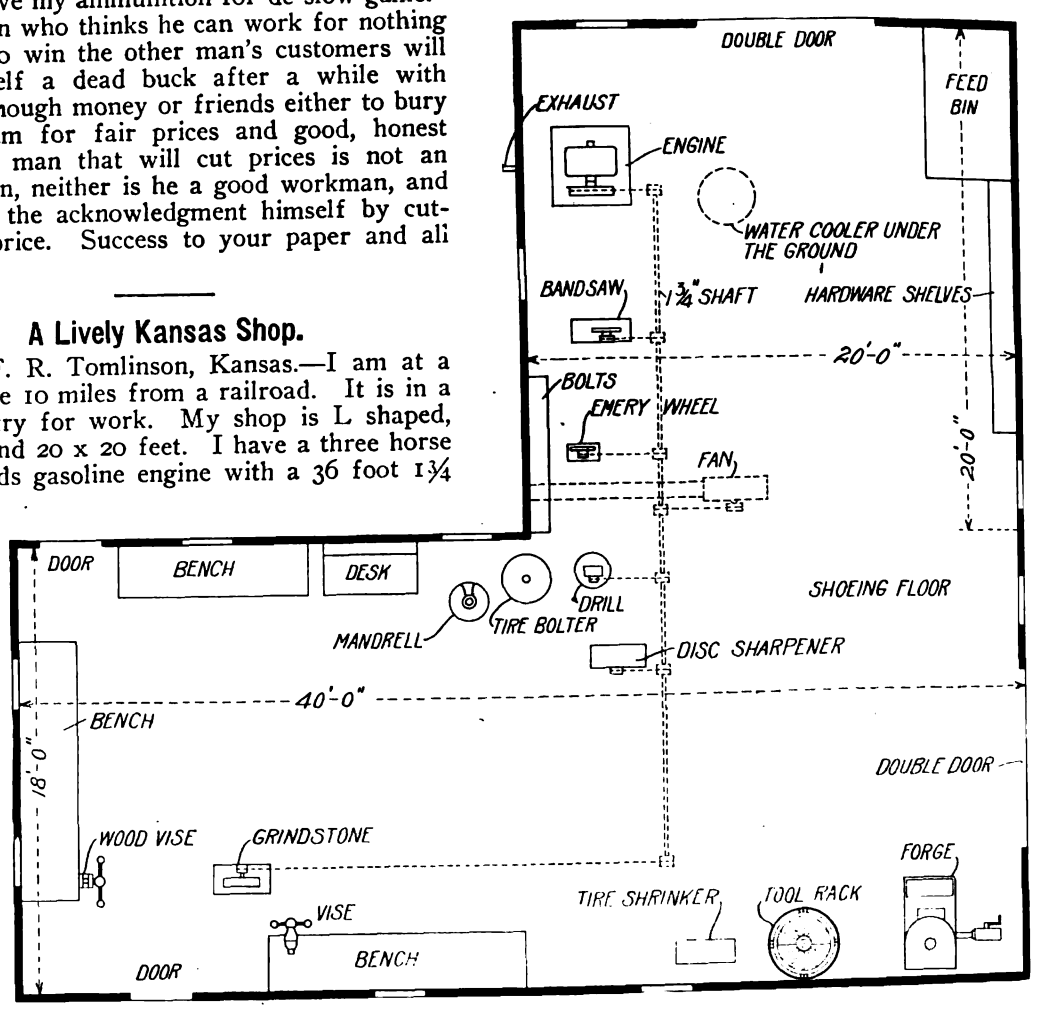


Interior of Mr. Robinson's Shop.

My competitor is of the opinion that I have not a sufficient amount of tools to do my work with, but my neighbors and friends say I have him skinned a block in the quality of work, and if I had a good set of tools like he has there is no telling how much better I could do. I will just say this and leave the craft to judge for themselves. My work was so good that when my competitor came here and set up shop, he had to cut prices to get work. I was shoeing for $1.25 and $1.50. He went to shoeing for $1.00 and $1.25. I was getting $3.00 for shovel plows complete. He sold at $2.60. I was getting from 10 cents to 25 cents for sharpening plows. He went to knocking them at three for 25 cents and all others the same. Such workmen as that remind me of the negro hunter. The negro asked his boss to let him shoot the first deer on their hunt, and they were going along and up jumps a big buck. The boss said to the negro, "Why don't you shoot him?" and the negro said, "Boss, dat deer is going to kill itself, den I'll have my ammunition for de slow game." So the man who thinks he can work for nothing in order to win the other man's customers will find himself a dead buck after a while with scarcely enough money or friends either to bury him. I am for fair prices and good, honest work. A man that will cut prices is not an honest man, neither is he a good workman, and he makes the acknowledgment himself by cutting the price. Success to your paper and all the craft.

A Lively Kansas Shop.

From F. R. Tomlinson, Kansas.—I am at a small place 10 miles from a railroad. It is in a fair country for work. My shop is L shaped, 18 x 40 and 20 x 20 feet. I have a three horse power Olds gasoline engine with a 36 foot 1¼ inch line shaft running my emery wheel, band saw (my own make) disk sharpener, drill, grindstone and fan. I have plenty of work most of the time. My greatest trouble is the credit business. I will send a drawing of the arrangement of the tools and machines in my shop. For the tool rack I used an old binder grain wheel with a tire bolted two inches out from the rim with hexagon nuts between. It has two disks, the top one convex, the side one with holes for punches, pritchels, etc. The other is 8 inches lower on a revolving shaft. Both are on the same revolving shaft. The concave side is up for chisels, etc.



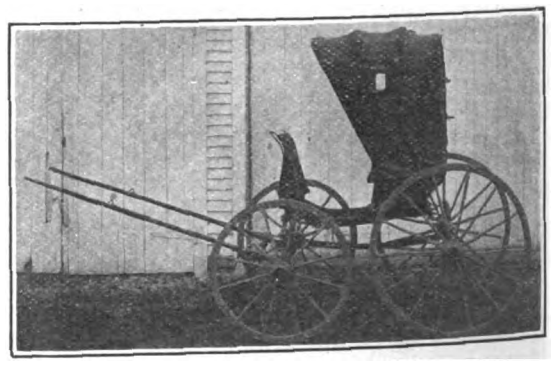
Plan of Mr. Tomlinson's Shop.

General Knox's Carriage.

From Charles Barker, Maine.—A rare relic of revolutionary times, is the carriage once owned by General Henry Knox of Thomaston, Me. It has never left the confines of the town as far as ownership is concerned, and at the present time is in the possession of Selectman Frank B. Hills of Thomaston. While the body is stored in his barn loft, the wheels are doing service upholding the body of an ice wagon, illustrating very nicely the thorough workmanship of former days.

At the close of the Revolutionary War Gen. Knox retired to his magnificent mansion, where he remained until his death in 1806 and perhaps rarely used this vehicle, as it was in splendid condition when the present owner purchased it seventeen years ago. Gen. Knox's administrator inventoried "seven carriages, fifteen horses, several sleighs, harness, etc.," so it is safe to assume that this particular vehicle was in use sparingly.

Gen. Knox was born in Boston of humble parentage, and eventually married an heiress of the Waldo family of Maine. Knox County, Maine, and Knoxville, Tennessee, are named in his honor. He was Washington's chief general and closest friend during the Revolution. He was the first Secretary of War under the Constitution of the United States and under his advice and instructions were built the first six frigates



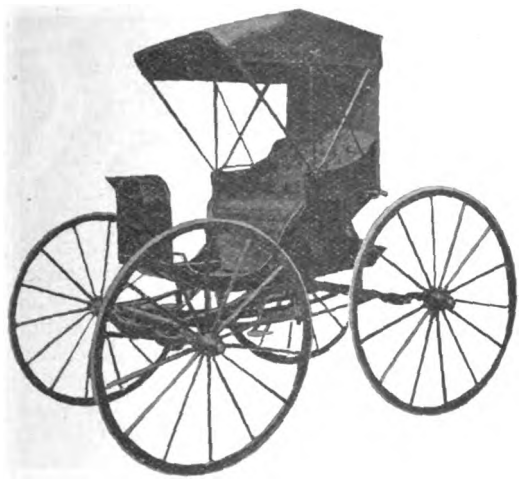
The Knox Carriage.

of the American Navy, namely: Constellation, Chesapeake, President, United States, Congress and Constitution, the latter being the only remaining vessel of the fleet afloat, now moored at the Charlestown, Navy Yard, Boston.

He was the original organizer of the Society of the Cincinnati which still exists. His remains repose in Thomaston, and the inhabitants even now feel proud of his memory as a maker of history both National and local.

The Bangor Buggy.

From Charles Barker, Maine.—Nearly 50 years ago a new idea appeared in the shape of a comfortable easy riding buggy constructed on what was then new lines, originated by W. F. Whiton and many added improvements by B. N. Thoms. It was known as the Bangor Buggy. Although devoid of patents its manufacture seemed restricted to Bangor, Me., where its product held sway as an important industry until the advent of the automobile. Since then its

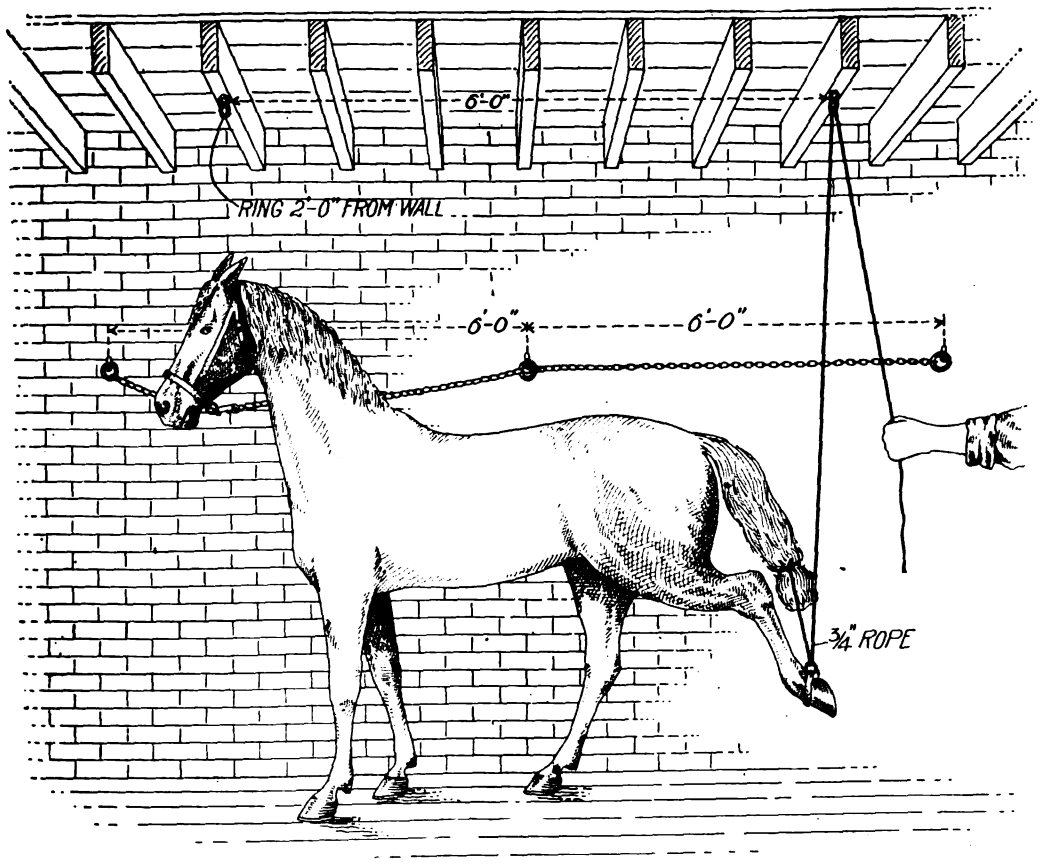


decline has been rapid, and today its manufacture has dwindled to less than half a dozen a year.

The two firms of Thoms and Whiton controlled the output which gave employment to many skilled mechanics who took pride in maintaining the reputation of the "best buggy made." The old firm of W. F. Whiton has long ceased to exist, but H. B. Thoms, who succeeded his father, is still active in business of general repairing and occasionally fills an order for a Bangor buggy.

For a Kicking Horse.

From Robert Donner, Wisconsin.—I enclose a drawing of the way to shoe a badly kicking horse. In using this method, the horse must stand against the wall. When the right foot is lifted, the horse must stand with his left side to the wall. When his left foot is lifted, he must stand with his right side to the wall. The apparatus otherwise seems to be clear enough to be fairly well understood.



Drawing up the Foot.

For Tire Welding.

From L. H. Abernathy, Texas.—I enclose a

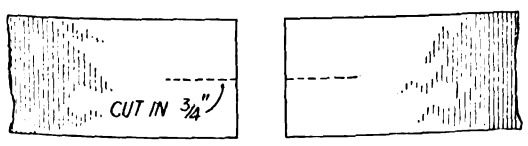


Fig. 1.

sketch illustrating my way of welding a wagon tire, which is called the "devil's toenail." Cut the tire square in two as shown at Fig. 1. Split the tire ¾ of an inch as shown. Scarf both ends and bend one prong downward and the

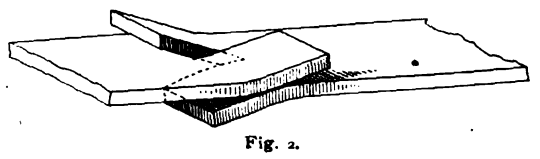


Fig. 2.

other upward as shown at Fig. 2. Then lap together and weld. Hammer down well both flat side and edge. By this plan the tire will stay together before welding.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

For Brittle Hoofs.

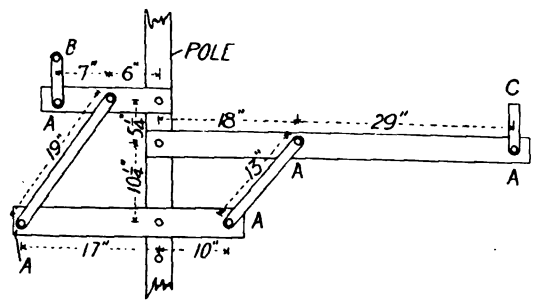
From W. H. B., New York.—Replying to the inquiry of Mr. Hutchinson of Ohio, as to a remedy for brittle hoofs, they are brittle because they lack moisture—just plain water—and this is the reason why the trouble is often most common when the weather is dry in summer. Let the horses run in a wet pasture and they will soon get rid of their brittle hoofs. Or if this is impossible, let them stand in tubs or troughs of water and it will restore their hoofs to their normal condition. Veterinarians agree that grease or any oil is injurious to the hoofs of a horse. They should never be greased, for this closes the pores and prevents the entrance of the moisture which is necessary to their well-being. They need water, and in the case mentioned by Mr. Hutchinson they were probably deprived of it because of the drought.

Shoeing for Interfering.

From George Keene, Minnesota.—I notice different ways, given by the brothers, for shoeing to prevent interfering. Here is my way: Dress the horse's foot down level as near the natural shape as you can. If you make any difference, leave the inside of the foot the higher. If you use machine-made shoes, select shoes not so large that you will have to cut anything away at the heels, the object being to throw the nails near the toe. Weld a piece on the inside of each shoe from the last nail hole to the end of the heel. Make the heel of double thickness, and set the shoe straight on the foot. Do not turn the inside heel under the foot, but leave it well out. Very few horses strike with the heel. The object is to raise the inside of each foot from the ground and throw the pastern joints out, giving room for the feet to pass without striking. Try it, brother smiths. I have tried it for over forty years, and it has never failed me. All there is in it is to make the shoes thick on the inside and thin on the outside. You will see the principle if you put something under your boots on the inside of each foot; it will throw your ankles out.

A Four Horse Evener.

From E. B. Corey, Illinois.—I saw not long ago a plan in your paper for a four horse evener. Of course there are several ways to make them but I send a sketch of a cheap one. The pieces marked A are made of oak. The lever pieces and pieces B and C are made of two-inch band



Sketch of the Evener.

iron. The hammer strap is made of two-inch band iron to catch the four bolts in the pole. The bolts in the pole are 7 x ½ inches, all except the back one, which is 3 x ⅜ inches. Place a set of mower eveners at B and C bolt on the pole, so that the reel will not catch the piece AA at the bottom of the cut, and you are ready for work.

To Spread the Hoof.

From A. E. Cummings, South Dakota.—First open the heels well, but do not cut off any of the rim of the hoof at the heel; pare the toe as low as possible and fit the shoe flush with the foot. Make the shoe slant out from the last nail hole, so that when the horse's weight is on the shoe it will continually spread the hoof. This will be found a much better way than spreading the hoof with the tongs, and will never fail to have the desired effect.

Shoeing for Forging.

From H. E. W., Illinois.—In reply to Mr. Smith's inquiry, I would say, shoe the front foot short. Set the shoe back to cut off as much of the toe as it will bear. Then fit up the hind shoe. Make it a little longer than common. Set out full in front with high toe and low calk. Also set the toe as far forward as possible. The front shoe should always have a low toe and high calk. This is one way to shoe and stop forging.

Seasoning Timber by Electricity.

An Australian inventor has recently patented throughout the world a new process for wood-seasoning which is claimed to have a great number of advantages. The essential feature of his process is forcing the sap out of the wood by the introduction of a powerful current of electricity. Obviously, it greatly quickens the natural process, while windshakes, warping and other troubles, incidental to ordinary seasoning are eliminated. It is claimed that today there are trees in Australian forests that six months hence may be a portion of high class furniture, billiard tables, etc., which according to the usual method would take three years to get properly seasoned.

Potash Method of Case Hardening.

Hardening by potash is of great value to all those who have small machinery in repair. The process, it is claimed, increases the life of wrought iron or machine steel threefold.

The process is to pulverize yellow prussiate of potash, then heat the part of the machine to be hardened to a red heat, being careful not to burn or blister it. Next roll the part in the potash to get a good coating over the surface, and put it back in the furance, and let it heat for a few minutes longer. Then take it out and give it another coating and cool it as quickly as possible, and it will acquire a surface so hard that it cannot be filed.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Bean and Potato Harvesters.

From V. E. Ryel, Colorado.—I would like you or some of the brother craftsmen to send in plans for a plow to harvest beans. It should run through the ground and cut the roots so they can be picked up with a fork and bunched. Also plans for a practical potato digger that will elevate the potatoes back on top of the ground so that the pickers will not have to paw the dirt over.

(Note—Possibly some reader may be able to accommodate Brother Ryel with sketches for the machines as desired together with descriptions, but it is somewhat doubtful. Quite likely, in the case of potato diggers it would be difficult to improve on the models now in use which must be the result of considerable thought and experiment, and as for a plow to harvest beans, it would seem to be a better plan to have a machine to pull up the stalks by the roots than to cut them off. However, "out of the mouths of the multitude there is wisdom.")

Crawling Varnish.

From E. W. Young, Virginia.—Can you tell me when varnishing a carriage why on the last or first coat of varnish it does not flow evenly and smooth. I have some that crawls in spots. Please give the reason.

Reply—Possibly some of our readers, or Mr. Hillick, will be able to give Mr. Young more full information, but it may be stated that the fault which our reader refers to is usually caused by oil. Varnish will not readily assimilate with oil and painters say that it causes trouble when they come in contact.

Tempering Chisels In Oil.

From W. P. Norris, Virginia.—I wish some of the craft would give me a pointer as to how to temper different kinds of chisels in oil and the kind of oil, as I have a job now in a machine shop and I miss the temper sometimes.

The Uses of Old Rope.

Old rope, like old tin cans and other things generally considered as waste, has its special market and uses, and in every seaport the collecting and classifying of old rope is an important business. Rope covered with heavy applications of tar or graphite is even more valuable today for making oakum than lightly tarred material, while hemp rope with the original heavy coating of tar worn off by weathering is often used for bag paper. A small percentage of untarred hemp rope, used in its prime for hoisting and other such purposes, is being converted into cigarette paper in Europe. Scraps and waste from old tarred rope, and also old oakum removed from the seams of ships, are now used for making boards.

Boring Holes in Cork.

The following hints will be found useful when boring holes in cork. In boring through rubber corks, a little household ammonia applied to the bit enables one to make a much smoother hole and one that is nearly the same size at both openings. The common cork, if rolled under the shoe sole, can be punctured easily and a hole can be bored straighter. The boring is made easier by boiling the cork, and this operation insures a hole that will be the desired size and remain the size of the punch or bit used.

A pipe bender can be made by boring a few holes in a piece of oak plank and inserting heavy bolts or short pieces of pipe for pegs, about which the pipe may be bent as desired.

To Keep a Paint Brush Soft.

After finishing a job of painting and not desiring to have a can of oil standing around the house, fill the bristles of the brush with a good supply of paint, carefully wrap it in paper, tie it securely with a string and place the brush on a shelf. The oil in the paint having soaked the inner wrappings of the paper, will preserve the brush in first-class shape for two years.

JOHN BUNYAN'S ANVIL.

Sold as Junk in England But Is Now in Los Angeles, Cal.

A brazier's anvil, upon which it is said John Bunyan worked when he was plying his trade as tinker at Elstow, has been brought to this country by Maurice Beagarie of Los Angeles. It is to be exhibited at the Los Angeles Exposition, where Mr. Beagarie is to reconstruct a replica of the Bunyan cottage. The anvil was discovered in a town in Huntington, twelve miles from Elstow, England.

The anvil is spindle shaped, about 30 inches long, and weighs 40 pounds. It has a circular, table-like top, about 10 inches in diameter, supported on a square, beveled-edge shaft. Below the extended rim at the base is a shaft, blunt ended, which was driven into a heavy block of wood to hold it upright.

On one side of the shaft, in quaint capital letters, rudely cut but quite plain, is the name "J. Bunyan," the "u" being pointed like a "v." The date 1674 follows. On another side appears the name of Bunyan's village, "Helstow," now written without the "H."

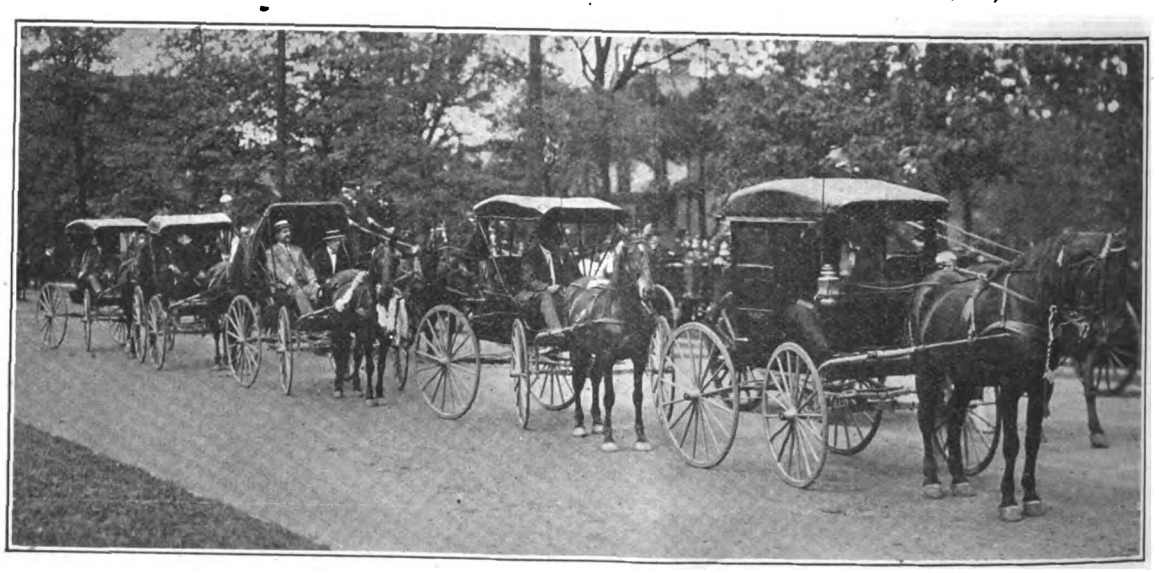
According to Mr. Beagarie, a son of John Beagarie of the firm of Beagarie & Young, dealers in art objects and antiques, who purchased the anvil at a collector's sale at Sotheby's, in London, the anvil was discovered in St. Neots.

William Rowlett of St. Neots, a collector of fossils and antiques, uncovered it while turning over an accumulation of discarded articles in the yard of a dealer in marine stores at that place. He saw at once that it was of value, and purchased it at the then prevailing price for old iron. Tracing its history Mr. Rowlett found that a long time before its discovery it had been brought to the dealer's yard with old iron by one Bob Chasty of St. Neots, who formerly had been in the employ of an ironmonger named Fisher. It is alleged that the anvil had been in Chasty's back yard for a long time before he took it to St. Neots. Before it found its way to Fisher's, Mr. Rowlett found that it had been in the possession of a family of ironmongers named Carrington for several generations.

Bunyan returned from war in 1674, the date marked upon the anvil, and began to pursue his trade. Then followed the years of his religious experience, his ministry at Bedford, and his imprisonment. The anvil, it is said, will be offered to J. P. Morgan.

An Attractive Sight.

Those who imagine that the horse-drawn vehicle is being gradually displaced by the automobile may have their faith slightly shaken by the accompanying illustration, and all lovers of



All Parry Buggies.

that most useful of all animals will be gratified to know that the horse is still chosen by those who like comfortable riding and dependable service. The five top buggies shown were purchased recently from the Parry Mfg. Co. by Mayor Shank for the street department of Indianapolis. They were polished up to the highest degree for the annual parade that is given by that city to show some of the things that its citizens have to be proud of. The Parry Mfg. Co. has a factory for the construction of all sorts of horse-drawn vehicles that covers possibly hundreds of acres of ground; at all events, it is more than a man wants to do to go over it in a single day, and the product includes everything in the line of vehicle accessories that can be thought of. This marvellous business has been honestly achieved by unstinted pains and wonderful values.

Resilvering Mirrors.

Not long ago a reader asked for a method of resilvering mirrors or reflectors. The following instructions, taken from the Western Druggist, seems to be practical and fairly simple:

Every trace of grease or foreign matter must be carefully removed from the glass, the slightest suspicion of grease being fatal to the success of the process. It is recommended to first wash the glass carefully with a solution of ammonia water, followed by the application of a 1 per cent. solution of either hydrochloric or muriatic acid. The glass is then dried, and polished with a clean linen cloth. The silvering solutions are made and applied as follows:

Solution No. 1.—Silver nitrate, 200 gr.; strong ammonia water and distilled water, each sufficient; alcohol, 1 fluid oz. Dissolve the silver nitrate in 6 fluid oz. of distilled water, and add ammonia water gradually until the brown precipitate at first formed is just dissolved. In order to guard against an excess of ammonia, it is always best to add a little solution of silver nitrate (16 gr. to 18 gr. to 1 oz. of distilled water) to the ammoniated silver solution until the solution is permanently turbid again. Then filter the liquid through a double paper filter, turning back until it comes through clear and add distilled water through filter to make 12 fluid oz.; add 1 fluid oz. of alcohol, place in a clean bottle, and shake thoroughly and cork. Keep the liquid in a cool, dark place.

Solution No. 2.—Rochelle salt, chemically pure, 12 gr.; silver nitrate, 16 gr.; distilled water, sufficient; alcohol, 1 fluid oz. Dissolve the Rochelle salt in 8 fluid oz. of distilled water, place in a clean porcelain or porcelain lined evaporating dish, and heat to boiling. When boiling gently add, while constantly stirring with a glass rod, the silver nitrate dissolved in 1 fluid oz. of distilled water, and continue to boil gently until the solution, which will turn brown and then black, turns grey. Then continue boiling for a minute or so longer, and add 3 fluid oz. of distilled water and filter, making up to 12 fluid oz. through the filter with distilled water. Place in a clean bottle, add 1 fluid oz. of alcohol and shake thoroughly, cork tightly, and keep in a cool, dark place.

These solutions should be allowed to stand at least five or six hours before using.

The glass, having previously been cleaned, is now levelled above any suitable support, so that none of the pieces used to level come out to the edge of the glass. It should then be rinsed thoroughly with distilled water, and the water edge of the glass. Then mix equal parts of No. 1 and No. 2 solutions, and pour the mixture on the glass as long as it will hold it. Any air bubbles should be broken down with the glass rod by touching them, and the solution made to cover the glass perfectly out to the edges. Allow to stand for an hour or more, then tip off the solution and rinse with clear water, and be-

fore drying amalgamate with solution of potassium and cyanide mercury made as follows:

Solution No. 3.—Potassium cyanide, 8 gr.; mercury cyanide, 16 gr.; water, sufficient. Dissolve the salts separately in 8 fluid oz. of distilled water, and add to enough distilled water to make 1 gal. Place this in a sprinkler, and sprinkle the silver covering until it begins to change color (lighten to about a lead color), then rinse immediately and thoroughly with water, and stand on end to dry.

When dry examine the face of the mirror to see if the plating is perfect, and if so paint it with asphaltum varnish, using a smooth, soft brush, which will not scratch the plate. The fingers must not touch the silver before it is painted, or it will leave a mark.

The most scrupulous cleanliness must be observed in everything. It is well to make the solutions as wanted. The amount needed can be easily estimated by pouring on the levelled glass all the water it will hold and noting the amount.

BALANCING THE FOOT.

The Relation of Shoes and Shoeing to the Stride of a Trotter.

Winnipegger in Canadian Blacksmith and Woodworker.—It is sometimes a matter of great difficulty to balance and square the action of horses, especially trotters. The requirements are so many and varied that various expedients must be resorted to in securing the benefits of scientific shoeing.

Some horses are long low striders and others high short steppers. Some require heavy and some light shoes, and every style of open bar, flat, concave, rolling and weighted shoes with different lengths of heels and toes are necessary among the rest, for times and occasions to suit the soft or hard tracks, and to regulate and balance the action of different horses.

Much of the success that should attend the acquirement of a pure gait, or the correction of a faulty one, depends upon the discretion exercised in the selection of the right kind of shoe.

When the action of a horse is short, high, and quick, or choppy in front, it will generally be found that the toe of the foot is too short and the heels too high, or that the pasterns and shoulders are upright. This can be remedied in effect by lowering the heels as much as safety will allow, which will bring the foot closer to the ground. In case the front part of the hoof has been rasped or pared too short, the shoe should be extended over and beyond the toe, which will allow a proper extent of ground surface. The weight of the shoe must be determined by the driver or owner as to what is best adapted for the horse to carry with ease, comfort and safety. When the action in front is long and low and stiff-kneed, put the foot in shape as for the perfect foot, with the use of the foot adjusted, of course, as no man can guess at the proper angle to leave a foot and still get them both alike. That is to say, 50 degrees toe and about 13¼ heel; in fact 50 degrees at the toe will in the majority of cases leave the foot a normal shape all around, and the use of the scooped toe rolling motion shoe shown here, will shorten the stride by lessening the extent of the ground tread, at the same time effecting an increase of knee action. A still more efficient aid in these respects will be found in the use of the plain rolling motion shoe without the scoop in the toe, for in proportion to the increase of the roll in the shoe, so will lie the increase of the action in the knee. The roll elevates and hastens the action, imparting a down hill impulse to the step. A common cause of bad action in speed horses is tenderness or soreness in the feet, resulting from improper shoeing. To shape and properly adjust a shoe to meet the varying requirements of a horse's foot, is an art that is not as thoroughly understood as it should be. The writer does not claim to know it all, therefore we must use up-to-date methods and tools to keep up with the march of improvement, for there are still many primitive methods associated with the professional practice. No man is fit to shoe a horse unless he can balance and level a foot scientifically so as to preserve or restore the natural bearings of the joints and hoof, which is, after all, the main thing necessary. The quantity of skill displayed in this respect constitutes the real difference between the skilled and unskilled workman. An ill-fitting shoe is as inconvenient and painful to a horse as a tight boot is to a man or woman, and the comparison more than justifies itself when it is borne in mind that the horse's shoe becomes a fixture not to be discarded at will, whence follows impaired action, distorted hoofs, corn bruises and inflammations of different members, etc. A foot thus shod may be tortured by the cramping of nails at or around the toe, or it may be underpunched and driven upon the sensitive parts. The writer might mention right here, as an example, an experience he had when working as a journeyman years ago. We turned all the shoes used, and the boss of the shop seemed to feel that the shoes turned by himself were just a little better than any other horseshoer could make. This man would fuller or crease his light shoes, especially very deep and far in. He would also slope his fore punch so far outward that the nail had to be bent on the point to keep from pricking the horse, and all shoes made in his shop had to be punched with three holes on the inside and four on the outside. This was a habit that this horseshoer had, in fact it almost became a disease. It should be understood by all horseshoers and horse owners that scooping out the sole and applying light thin shoes will cause on a hard track what is known as foot scald.

Other penalties are inflicted by burning, causing the hoof to become hard and dry; and in destroying the right angle of the foot by having high heels and short toes, or vice versa.

A horse with a low gliding action behind can only move efficiently with light weight shoes, as the labor in such cases devolves mostly on the muscles of the thigh—the hock not opening wide—and much weight on the foot soon becomes fatiguing. The shoes for the hind feet should, therefore, he as light as can safely be worn.

AUTOMOBILE REPAIR.

Work Necessary to Put Old Cars In Running Condition.

Those who intend to get into the automobile repair business will sometimes be called to pass on old cars, or to estimate the amount of work needed to put them in running condition. If the car is not more than 2 or 3 years old this is not a difficult matter providing the car can be disassembled and examined, but the case becomes very much more difficult when one deals with a car 6 or 8 years old. In examining these relics there is much that one cannot see that may be wrong. A road demonstration tells little worth knowing as regards the ability of the engine, since it may be generally assumed that the engine must be overhauled anyway and lack of power might be due to nothing more than poor carburetion or ignition. On the other hand, a road test may tell much about the condition of the cooling system, clutch, transmission-gearset mechanism and rear-axle.

In most cars not more than 2 or 3 years old a thorough overhauling may put them in excellent condition. The crankshaft bearings may require truing up in a lathe or grinding machine. New bushings may be required throughout. The cylinders may need regrinding, which will require new pistons and piston rings. Testing the compression after the engine is warmed up may help to determine whether or not this is necessary, though a leaky valve will give the same effect. It often is probable that only a new set of piston rings will bring back the desired amount of compression. The timing gears of the engine if noisy may require replacement; exhaust valves may have been ground so often that their seats have been deeply sunken into the casting so that a facing off of the valve chambers will be required in order to get a full valve opening. It is possible camshaft bearings and cams may be worn to such an extent that the timing of the motor is materially affected. The cams may not open the valves far enough or as long as present practice shows to be desirable. Hence new cams might be required. The radiator, if of an old pattern, and pretty well choked with alkali incrustations, is best discarded for a new one, while the circulating pump itself may require a replacement, or at least fitted with new bushings.

In some old cars the bolts which secure the engine to the chassis frame may be found loose and worn and either will require tightening or replacement. The rivets of the frame also are apt to be loose and re-riveting necessary to complete an overhauling. Often it is necessary to add some special bracing in addition to reaming out the bolt holes of the steering gear bracket and putting in larger bolts. If the steering gear is braced by the dashboard quite possibly the dashboard is shaky also. Looseness in either the steering column or the dashboard generally results in movements of the spark and throttle control levers which affect the operation of the motor.

STEAM BOILER EXPLOSIONS.

The Glass Gauge and the Danger of Expanding Water.

Here are some sensible remarks on steam boiler explosions from that excellent publication, The Wood Worker. Most of us have heard every since we were boys, that it is not advisable to depend on the glass gauge to show the amount of water in the boiler. It never seemed quite a reasonable claim, and we are glad to have our opinion of it confirmed by the following:

"If a man does not understand how to use a glass gauge, it ecomes a dangerous appliance in his hands; but the same reasoning applies with equal force to the gauge cock. I have relied implicity on glass gauges for the past thirty-four years, and have never been deceived by one of them. The bottom connection of a glass gauge affords means for testing it, which never fails. Every one that I have seen was fitted with a valve or cock of some kind, and when this is opened under normal conditions, hot water rushes out, and when liberated from pressure, some of it flashes into steam. When this cock is closed the water should always return quickly to the glass. If this does not happen, it shows that the connection is partly clogged with sediment, or scale, and needs attention at once. If it goes higher than it did before, it shows plainly that the upper connection is not clear; but this seldom happens unless the valve is closed. The quality of water used in a boiler, and other conditions, determines the frequency of the trials necessary to keep the glass gauge in order, but the same reasoning applies to the gauge cock as above mentioned.

"I have five boilers, all fitted with high and low-water alarms, which are kept in good order. I consider them the best safeguards against low-water troubles that have been invented. This gives me three ways of determining the water level, and, if obliged to dispense with one of them, I would discard the gauge cocks, without hesitation."

The same writer remarks concerning the general subject of steam boiler explosions:

"A boiler may explode when there is plenty of water in it, and in such case the failure always is destructive, throwing parts of the shell, etc., long distances, or sending them through buildings or other obstructions near at hand, with great force, due to the instantaneous expansion of water. The destruction caused in both of these cases shows that the boilers were well supplied with water.

"The idea that some of the tubes were white hot, so that when water was splashed on them a mysterious gas was formed that burst the boilers, is a fairy tale which belongs to a past decade. It was never founded on facts. If water is poured on a hot iron, steam is formed, but no other gas is generated.

"Whenever a boiler explodes it is due to the fact that more pressure was applied than it could stand—only this, and nothing more, and to this rule there is no exception. If water gets so low that some of the tubes become white hot, they will not stand as much pressure as they did when comparatively cool, but the formation of gas has nothing to do with it.

"The idea that low water alone causes boiler explosions is pernicious and dangerous. If a man thoroughly believes it, he will continue to use a boiler until it is too thin to stand an ordinary working pressure; then it will fail and cause much damage—and the more water there is in it, the more damage it will cause."

When you recommend a bargain to a man, be sure that it is a bargain for him as well as for you.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

SPEED OF THE GASOLINE ENGINE.

BY E. W. LONGNECKER.

The speed or velocity of the fly-wheels of the gasoline engine is limited first by centrifugal force. The run velocity should not exceed 5,000 feet per minute, as this is getting hazardously near the danger line where the rim of the wheel is liable to burst by reason of centrifugal force.

Then the speed of the fly-wheels is usually limited by the construction of the valve openings. This refers more particularly to the normal or actual working speed of the wheels.

The normal speed of an engine may be defined as being that velocity or number of revolutions of the fly-wheels per minute as will best enable it to carry its full rated load constantly. For instance, a 10 horse power engine will carry a 10 horse power load with the greatest fuel economy at 250 revolutions per minute. That is, below this speed it will not carry the full load and above this speed it will require more fuel; 250 revolutions per minute therefore may be regarded the normal or most favorable speed of the engine.

The engine may have reserve power and be able to be crowded to 300 revolutions under a 12 horse power load, but since it is rated at only 10 horse power this would be considered an over load which is always regarded as abnormal.

No operator should require his engine to carry an over load continuously. Many a gasoline engine can not be forced beyond its normal speed under its rated load because the builders allowed only sufficient valve area for free successive inhalations and exhaust at a certain speed. Above the normal speed the breathing of the engine becomes choked, and it does not get a full charge at each inhalation. Neither can it succeed in getting rid of its exhaust product completely, and therefore, instead of being able to speed up under its full rated load and thereby delivering more power, it is limited to its normal speed and is not capable of an over load.

The speed of the gasoline engine under a load may therefore be said to be determined largely by valve area and by construction of inlet and exhaust passages.

THE GASOLINE ENGINE.

Points on Its Care and How to Use It Effectively.

The gas engine should give good satisfaction if it is carefully looked after the same as any other piece of machinery. We often wonder why it is that some of our neighbors seem to have better luck than we, why it is that their buildings are in better condition, why they have better machinery and seem to prosper better generally.

It is often found that they are frugal in small things; for instance, after getting through with a plow the share is carefully greased and isn't left out in the rain; the plow not dropped just where the plowing was finished, but is put away carefully in the shed and is ready for use; and the next time it is wanted, it is not weather-beaten, rusty, warped and started to the scrap pile.

Now concerning the gas engine, treat it humanly, don't put it in a place where the rain will beat on it, or the first thaw will drench it with water. The weather may turn cold, and there will be a hard freeze, to say nothing about the dirty mess and the rusty parts.

The writer knows that sometimes there are many jobs which seem to demand our attention all at the same time, and in the hurry we overlook our oil cups, with the result that the bearings seize or the babbitt metal runs. Always make it a point to see that the oil cups are turned off and filled, when you shut down, then they are always ready for use. It soon will become a habit to do this, and to open them in starting. For this reason the writer prefers an engine which has grease cups rather than oil, because the grease will be used as needed and there is not the danger of going away and leaving the lubricators open, which means so much oil wasted, fire risk increased, and the cups run dry.

The cooling water should be adjusted so that the discharge is at a temperature of about 150 degrees F., for the highest efficiency, and in the winter as an extra precaution, would advise drawing all of the water out of the tanks as an insurance against a cracked cylinder. Alcohol is used as an anti-freezing solution, but even if an anti-freezing solution is used, would go to the extra trouble of drawing out the water, especially if alcohol is used, as it will evaporate in time.

What makes one more fluent and forgetful of the doting mother's early training than when the gas engine won't go, or will give only one or two explosions. The vocabulary is exhausted, new words are coined, but nothing doing. It is usually found that the failure to start may be one of the following causes:

First—There is no gasoline in the fuel tank.

Second—No spark, weak battery, loose or broken connections.

Third—Excessive back pressure or clogged exhaust.

Fourth—The firing apparatus not working properly.

Fifth—In the winter when the fuel tank is outside, and it should always be there as a precaution against fire, it may be found that the gasoline is too cold to vaporize and it will be necessary to warm the carburetor by wrapping hot cloths around it; never use an open flame.

Sixth—The mixture may be either too strong or too weak.

The writer believes that the usual failure to start may be attributed to one of the six conditions mentioned above.

Some time ago in one of the answers to engine troubles a cause was cited where the engine would not start because the oil cup leading to the cylinder was not open, and there was no oil seal between the piston and cylinder, consequently no compression; and it was pointed out how general lubrication could be very much improved by the use of fine flake graphite known as No. 2, and that the same could be fed to the cylinders by means of a "bug gun," removing the spark plug and squirting a little graphite into the cylinder through the aperture.

There also has come on to the market a special gravity graphite and oil lubricator which feeds a mixture of graphite and oil direct to the cylinders, thus insuring better lubrication, more power and smoother running.

In this connection it might be well to call attention to the many advantages of flake graphite as a lubricant. A metal surface, no matter how well polished, will always show under a strong microscope many irregularities. It is these irregularities, scraping one over another, and the constant crumbling away which is productive of hot and cut bearings. Flake graphite fills up all these irregularities, building up the low spots and forming over all a thin, tough, veneer-like coating of marvelous smoothness, and if for any reason the lubricant should fail, there is graphite to graphite contact instead of metal to metal, and the parts may be in contact for a long time without danger of their seizing or cutting.

Flake graphite may be put to a number of uses. One can mix up his own grease, using the graphite in the proportions of a teaspoonful to a pint of grease, though best results will be obtained by using flake graphite greases compounded by some reputable manufacturer.

If one has any piping, a very good compound can be made for the joints by making a stiff paste of graphite and oil, and the connection can be broken at any time without straining the tools or spoiling the joint.

Referring back again to the causes of the engine refusing to start, fifty per cent of these will be found to be caused by no gasoline.

The writer knows of a very learned technical man a short time ago who wished to see how his auto had gone through the winter, and was surprised that his engine would only give two or three kicks, then stop. He was advised to examine the gasoline tank, and sure enough it was nearly empty.

It seems as though some men have a hypnotic influence with gasoline engines, and only have to touch them to make them go. A professor who is now at the head of one of our largest Eastern technical schools, tells the story of how he tried to start a gasoline engine which was used to pump water for several cottages. He and his neighbor professors could not make it go. A milkman had observed the proceedings with much interest, and finally told the professor he could start his engine, as he had one like it home, and sure enough he did make her go the first time.

A few "don'ts" are:

Don't tinker with the engine and try to improve running conditions; set the valves, etc., unless you are familiar with its design. Have a good book of instructions, or a repair shop is handy.

Don't take a light to examine the fuel tank or you will lose it.

Don't neglect an unusual rattle or knock. It is a sign of distress, something is wrong; probably connections are loose.

Don't be satisfied because she runs all right. Read your instruction book, study the names of the parts, and be ready in case you have trouble.

Don't use axle grease in the grease cups. Get a good cup grease for this work. It will cost most at first, but will pay in the end.

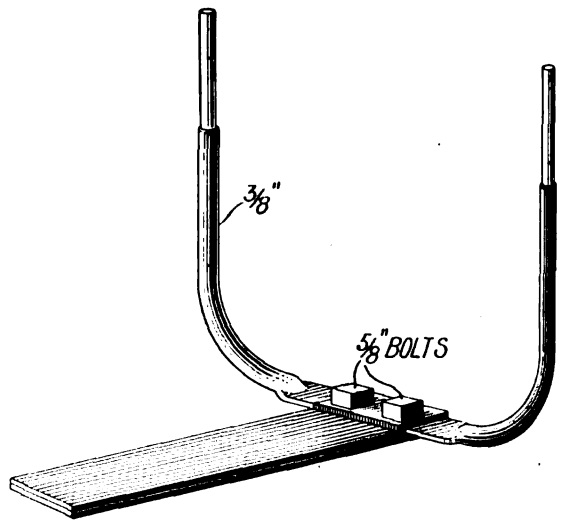
Don't fill the fuel tank without first straining the gasoline through a chamois cloth.

Don't screw a cold spark plug into a hot cylinder. Let the cylinder cool, and coat the threads with a mixture of graphite and oil so that the plug will come out easily when you wish it.

Don't let the small boy hang around; he may lose his fingers.—L. H. Snyder, in Canadian Thresherman.

A Home-Made Head Lamp Bracket.

In some cars which are exclusively used for day running purposes, it is not thought necessary to fit a head lamp and therefore the bracket for this purpose is omitted from the equipment. If, however, it is desirable for a special purpose to take the car out at night, the driver will find himself at a disadvantage, and although in some cases a lamp can be borrowed it is not always possible to obtain a bracket to fit it. Therefore it may be interesting to describe how one smith devises a temporary arrangement which answers and was made at very little cost.



Lamp Bracket.

First of all two pieces of round steel bar were obtained about ⅜ inch thick and long enough to make the stays of the bracket. These were then curved so as to take the lamp. The two top ends were shouldered slightly to hold the lamp, while the other two ends were flattened and drilled so that they would take a ⅝ inch bolt. Two pieces of flat steel a little wider than the dumb iron were taken and these were drilled to correspond with the holes in the pieces of curved bar and the bars were thus affixed to the strips by means of a ⅝ inch bolt and nut. By using a piece of rubber or felt as a packing this carrier was prevented from scratching the varnish on the car. If round dumb irons are used on the car it is necessary to curve the flat pieces of steel so as to fit them properly and the brackets so made will be found to answer for practical purposes quite as well as one of the more expensive arrangements which can be bought for the purpose.

To Clean Brass.

An economical method of cleaning brass is to rub it with a mixture of vinegar and salt, or oxalic acid, then wash with water and polish with Tripoli and sweet oil, or with any good brass polish.

WONDERS OF HEAT.

The Heat of the Sun and What Causes Electric Heat.

The heat of the sun can be focused through a lens made of ice and it will set fire to a bunch of cotton waste, while the ice refuses to melt. A steel bar will expand under the influence of heat and become longer and in its lengthening it will push along a weight of many tons. The same bar of steel can be made barely warm to the touch or it can be brought up through all the degrees of heat until it becomes white hot, until the metal boils like water or decomposes into gases and is diffused into the surrounding atmosphere.

To the layman heat is very mysterious. He knows that a coin rubbed on the carpet will get quite hot, but he does not know why. He knows that fire produces heat and that electricity can be changed into heat, but the subtle processes involved are far beyond his knowledge or understanding.

The ancients used to consider heat as a material or an element which impregnated all substances. Now we know that heat is not a cause, but a result. Heat, like its cousin, light, is caused by motion. It is the rapid to and fro vibration of the molecules of all matter which produces the result we recognize as heat. This is known to science as the "kinetic" theory and it is amply borne out by research and experiment. Kinetic is taken from the Greek word "kienin," meaning "to move."

In plain words, according to this accepted theory, when any material is placed in a temperature of absolute zero, colder yet than liquid air, its molecules are all at rest. As soon as the temperature begins to rise the molecules begin to move in proportion. Take a bar of steel and place it in a room of 60 degrees, and its outward appearance will not change, but the molecules will be flying this way and that, in every conceivable direction, through exceedingly short distances, but these distances are very great in proportion to the ultra-microscopic diameters of the atoms or the molecules.

Whether things are hard or soft, rigid or flexible, brittle or resilient, depends upon heat or temperature. Quicksilver dipped in the intense cold of liquid air rings like steel and the hardest armor-plate steel is as soft as rubber when it is heated white hot. Water becomes hard under the influence of cold, and is called ice. Take ordinary air and lower its temperature sufficiently and it becomes a liquid. At absolute zero all permanent gases would be solidified.

Water and all other liquids consist of a state of temperature where the molecular vibration is sufficient to allow the atoms or molecules to roll one over the other. If they moved any faster the atoms would fly in all directions and the liquid would be decomposed into gases. You prove this when you pour water from a pail. The atoms will leak out of any hole in the bottom or sides of the vessel, or will roll out when you tip it up, but they cannot escape from the top. Gas has to be confined on all sides, because the flying atoms will crowd out of the smallest hole and escape into the free air.

A bar of steel left in the air at 60 degrees, if left there long enough, will be at 60 degrees in every part, even in the center, and the molecular motions within will be those of steel at 60. Now apply heat, a flame for instance, at one end. The molecules of steel will increase their rates of swing and also the distances through which they move to and fro. Soon the end of the bar will be as "hot as the fire," and then a wonderful process will appear—the heat will travel to the other end of the bar. Instead of holding a flame against the end of the steel bar or putting the end in a fire of coals, as in a forge, connect a wire to each end and let these wires run to the poles of a dynamo of low pressure but great volume of current. Turn on the switch; soon the steel will begin to be warm, then hot, then hotter; then it will begin to give out dull red light, then brighten; then white, next still whiter. Soon the bar will sag down, break and fall. But put the bar at first into a corundum tube able to resist terrific heat. The bar will turn into a boiling liquid, and, by suitable means, the whole bar can be made to vaporize into gas.

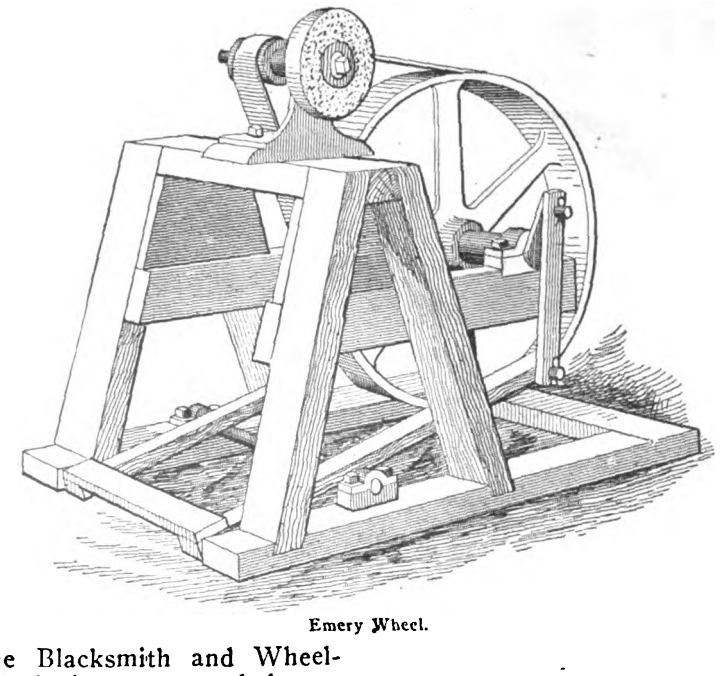
Electric heat is produced by resistance. Flowing along a good conductor, such as copper wire, electricity travels 186,000 miles every second. To change this wonderful energy into heat we must place an obstruction in its path in the form of a bit of resistance metal—some non-conducting alloy such as calorite, which resists the flow of the current. Electricity has to work hard to get by this obstruction, and work always produces heat. The greater the resistance the more heat produced.

Electricity, in working to get through the calorite resistance disk, hidden in the bottom of the electric chafing dish, heats this disk red-hot, and this, in turn, cooks the food.

It is all very simple. Electricity is the only form of energy which can be changed instantly into heat without loss. Therefore, you get all the heat there is when you buy electric heat, and none escapes up the chimney or radiate out into the room.—*General Electric Co. Bulletin.*

Home-Made Emery Wheel.

From William B. Dawson, Iowa.—I notice something about emery wheels in most of the issues of The Blacksmith and Wheelwright. While I don't recommend home-made machines as a rule, yet if you haven't got the cash to buy, why, the home-made one is all you will get. I send you a rough sketch of one I made several years ago and it does the business and works easily. I run it with a treadle as shown and grind all the plows that come to the shop and use it for polishing. I use it often and will not get a factory made one as long as it holds out. The sketch explains itself.



Emery Wheel.

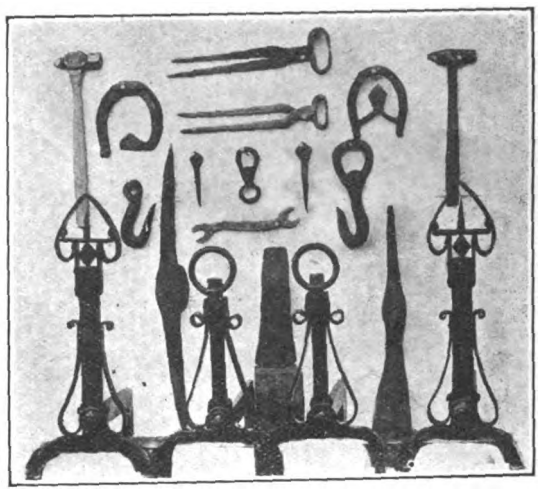
To Remove Rust.

Rust may be removed from iron by immersing the piece for several days, or until the rust has entirely disappeared, in water to which a little sulphuric acid has been added with a piece of zinc firmly attached to the iron so that it makes a good contact. The iron is not attacked as long as the zinc remains in contact with it.

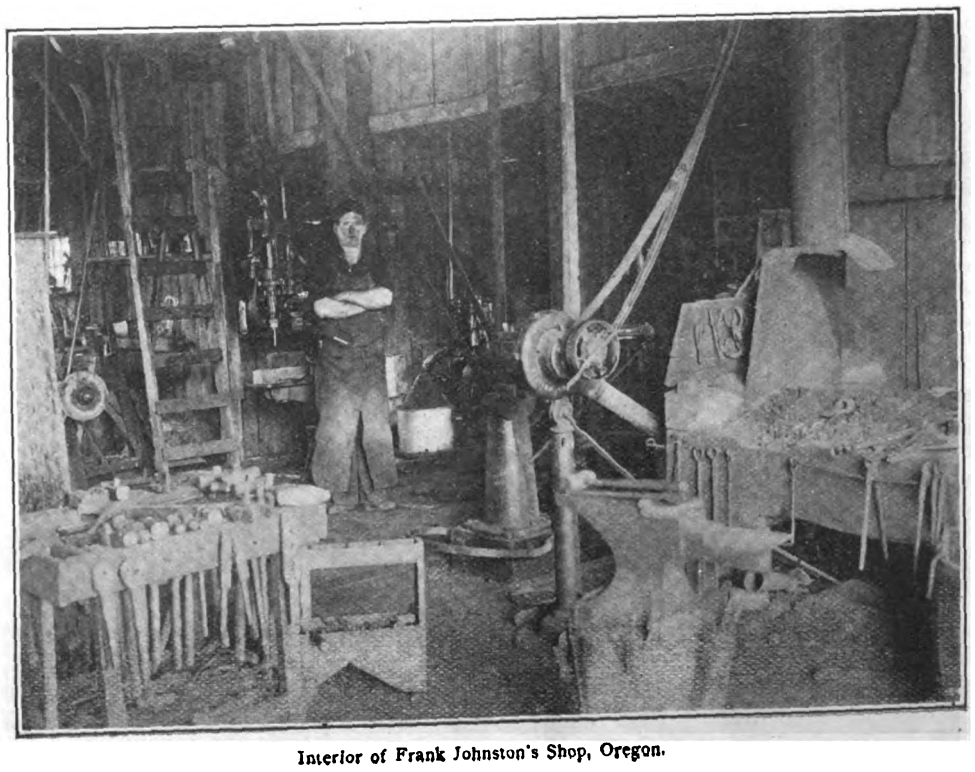
Iron or steel may be cleaned of rust by the use of the following: 100 parts stannic chloride dissolved in 1000 parts water. Add to a solution containing 2 parts tartaric acid dissolved in 1000 parts water. Add to the mixture 20 cubic centimetres indigo solution diluted with 2000 parts of water. Clean the metal parts of all grease, apply the solution to the stained portions for a few seconds, rub clean with a moist cloth, then with a dry cloth, and if desired then use any good metal polish. Old rust may be removed in some cases by rubbing with a paste consisting of equal parts of fine Tripoli and flowers of sulphur thoroughly mixed with olive oil.

Powdered alum in strong vinegar, oil of tartar, or fine emery are also used to remove rust. Kerosene, or turpentine if left on the stained or rusted portions over night will sufficiently soften the rust so that it may be removed by the use of fine emery cloth followed by a polishing powder.

Rust spots on nickel can be treated with grease, and after several days rubbed with a rag saturated with a few drops of hydrochloric acid in ammonia. Parts should be thoroughly rinsed, dried and polished.



Some of the Work done by Frank Johnston, Oregon.



Interior of Frank Johnston's Shop, Oregon.

Oil Furnaces.—Although the gas furnace is more easily regulated, there is perhaps nothing which equals the oil furnace for the heating of tool steel. If it is properly regulated and a pyrometer is attached, there is no danger of oxidization on the surface of material as with a gas furnace.

Water for Hardening.—The ordinary smith is of the opinion that water is water and dirty water is as good as pure water, but tool steel is very sensitive to differences in the bath which is used for hardening purposes. Sometimes a tool will harden perfectly in soft water and will not harden in water which is hard. River water containing impurities will not prove satisfactory as a hardening fluid. If acid or soap or greasy matter are mixed with the water in many cases, the steel will not harden at all. The proper and only bath for tool steel is pure distilled water of the right temperature. Compaints are often made by tool workers that steel will not harden when the fault is that the water bath is not sufficient, or too high temperature, so that instead of hardening it is often annealed. There is no mixture for the hardening bath so good as pure water—the purer the water the more satisfactory the results.

Oil for Hardening.—Cotton-seed oil is the best and most effective for hardening. The supply must be ample, and new must be added from time to time to freshen up the bath. A little sal-ammoniac added to the oil bath will help the cutters to come out of bath with clean surface.

Power of Radium.

At a recent meeting of scientific men in England, Sir William Ramsay made the statement that if the energy of a ton of radium could be accumulated and used, it would suffice to propel a ship of 15,000 tons with engines of 15,000 h.p. at the rate of 15 miles an hour for 30 years. At the present day such a ship would require 1,500,000 tons of coal.

No Lack of Iron Ore.

The report of the International Geological Congress on iron ore gives the total amount of the actual known reserve of the world as 22,408,000,000 tons, of which 12,032,000,000 is in Europe, 9,855,000,000 in America, 260,000,000 in Asia, 136,000,000 in Australia, and 125,000,000 in Africa. Of the 22,408,000,000 tons of iron ore, the proportion of iron is 10,192,000,000 tons, of which 5,154,000,000, or more than half, is available from the 9,855,000,000 tons of iron ore in America.

Brightening Up Paint.

The paint on a buggy soon loses its luster after it has been washed a few times. It may be brightened up, however, by the following method: Wash the buggy perfectly clean; then go over it with a rag moistened with linseed oil. Allow this to dry, then rub it with a soft rag.

Secure a pint of the best carriage varnish and a small can of paint of the same color as the original job. Add enough paint to the varnish to give it color, but not enough to cover up the stripes on the buggy when it is applied. Apply the same as varnish and allow plenty of time for it to dry.

The Big Paint Industry.

No American product can be more highly recommended than paints and varnishes. There are more than 500 paint factories in the United States. The capital invested in paints, at a very conservative estimate, is $100,000,000. The output annually, including white lead in paste form, is not less than 200,000,000 gallons. Estimating this at an average price per gallon of $1.25, the immense total of $250,000,000 is obtained.

At least $1,000,000 is paid out monthly in salaries and wages. Without counting those who sell paint at retail, the number of persons who earn a livelihood by paint making and paint selling cannot be less than 25,000.

It would be interesting, were it possible, to give the number complete of all persons who live by paint in America, from the first stage of color production to the final or journeyman painter's stage of the business. Such a list, taking them at random, would include the miner, the chemist, the crusher, the mixer, the printer, the tinsmith, the carpenter, the salesman, the teamster, the fireman, the machinist, the packer, the lithographer, the stenographer, the advertisement writer, etc.

White Iron Shoes.

Far better than most horseshoe metal used is the white iron shoe; in fact, it is the best practical shoe that the writer knows of. White iron is the high grade cast-iron used for making malleable castings. For shoes it is not annealed, it is so hard that no ordinary drill will touch it. The bolt holes are made by setting cores in the mold. Not every blacksmith can make drills that will drill this iron, but it can be done, and the writer frequently drills broken shoes to save his customers the expense of new ones. Owing to the hardness of this material, no ordinary rock or grit will cut it. It polishes like glass and will glide easily over dirt, railroad track or pavement. Furthermore, it will not freeze down like grey iron, and, if well fitted to a solid runner, will last a life-time, as it wears very slowly. The writer has shod light sleighs with white iron by making the shoes in sections dovetailed together, which avoids breakage, or if broken, the whole shoe does not have to be replaced. The first cost of white iron shoes is about double the cost of steel or grey iron, but they are much cheaper in the long run, and in the localities where these shoes are known, viz., in the neighborhood of malleable iron foundries, the people will use nothing else. If they were more generally known, their use would be more extended than now.

Liquid Polishers.

Kieselguhr 7 pounds, bath brick (powdered) 3 pounds, oil of lemon 2 oz., lemon juice 1 gallon, parafine oil 1 gallon, malt vinegar 4 gallons.

Another liquid polish for metals is as follows: Jewelers' red 25 parts, oil of turpentine 15 parts, oil of stearine 25 parts, animal charcoal 45 parts, alcohol sufficient to make the mass practically liquid. Apply with a stiff brush. After the alcohol has evaporated rub the surface with a dry cloth.

Another formula consists of the following: 16 pounds crude oleic acid, 5 pounds kieselguhr, 4 pounds tasteless mineral oil, 1½ oz. lemon oil. Mix the powders into a paste and gradually thin with the mixed fluids, being careful to prevent formation of lumps. Apply with a rag or waste, and when practically dry rub with another rag or waste.

Safety razor blades can be sharpened by immersing them in a solution of 1 part, by weight, of muriatic acid and 20 parts water for 30 minutes, then removing them and honing each one to a polish.

If a little chalk is rubbed on a file before filing steel, it will keep the chips from sticking in the cuts on the file and scratching the work.

Don't be a tight-wad when your town or your fellow-townsmen need help. Stinginess is bad for your business and it's bad for you.

Camel hair brushes for painters' use should never be allowed to come in contact with water.

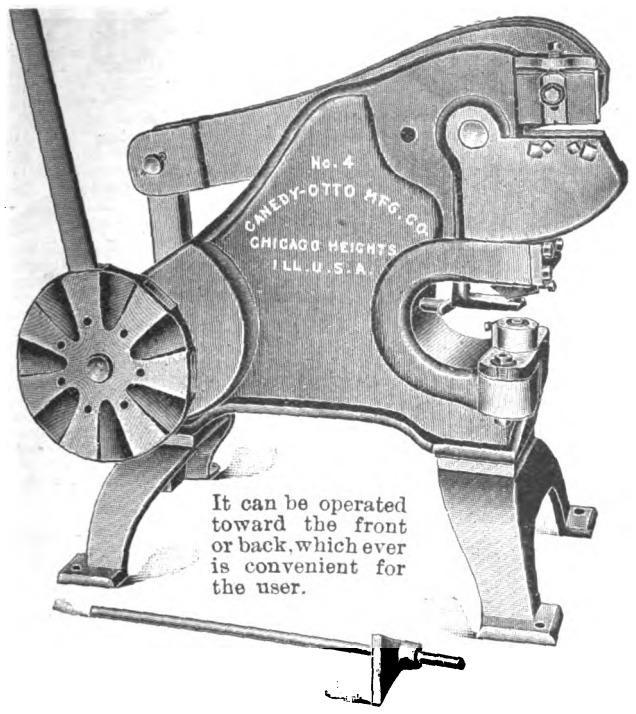
It doesn't pay to be looking for snubs and slights. You invite them by your apprehension.

It is often the case when you pin your faith to some people they will use the pin to stick you.

Your reputation is what folks say you are—your character what you know you are.

Some folks who claim to be sick simply lack durability.

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ⅝-in. and ¾-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

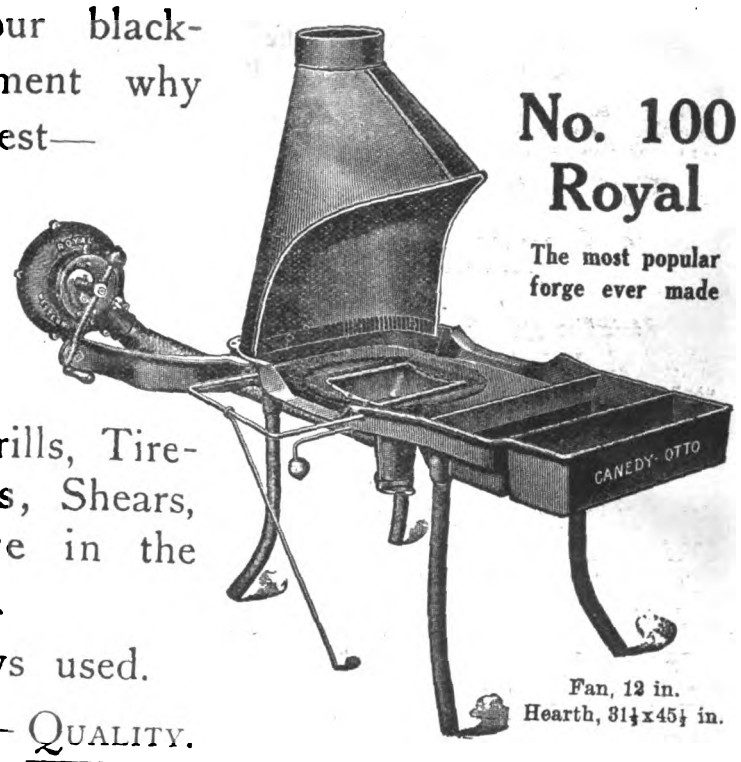
Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

No. 100 Royal

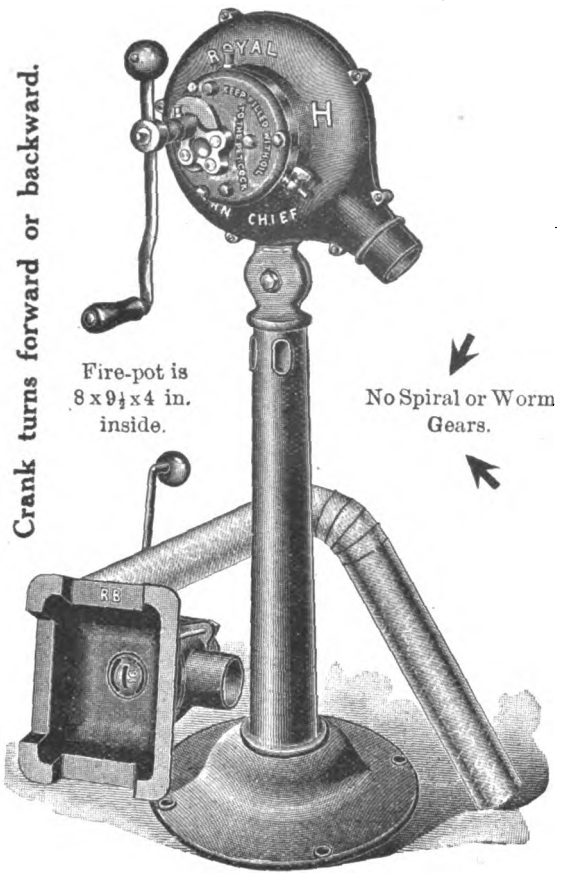
The most popular forge ever made



Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

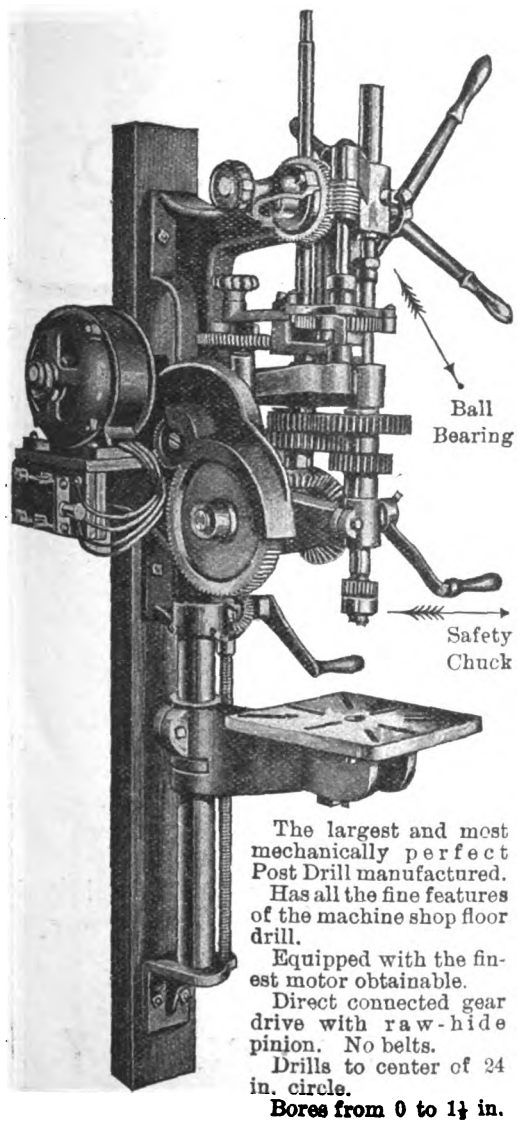
(Ask the man who owns one)



FORGES BLOWERS

PUNCHES SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

DRILLS TIRE-SHRINKERS

Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

Give name of supply dealer or jobber.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

No. 1½ Western Chief

(TIRE and AXLE SHRINKER)

The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1½ in. round edge tires and 1½ square axles.

WANT ADVERTISEMENTS

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED,

will be inserted under this head at 2 cents a word, including the address for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1.00. Address

M. T. RICHARDSON CO., 71-73 Murray St., New York,

PUBLISHERS OF THE BLACKSMITH AND WHEELWRIGHT.

PATENTS FOR INVENTIONS.

H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.

A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.

We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., publishers, 71-73 Murray Street, New York City.

PATENTS.

C. L. PARKER, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

CASH FOR YOUR BUSINESS OR REAL ESTATE.

If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

WE BRING BUYER AND SELLER TOGETHER.

If you wish to buy, or sell or exchange, write us. Blacksmith shops, other business opportunities, and farms throughout the country. Best methods devised for selling and exchanging. Well worth while to send for list. MYERS & MYERS, W. 15, Matthews Building, Milwaukee, Wis.

BROTHER.

Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

MECHANICS.

Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

BLACKSMITHS.

Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

FOR SALE.

Blacksmith and wagon shop in Southern Minnesota. Large territory. Work for two men. Reason for selling, disabled. W. L. MAUST, Ostrander, Minn.

WANTED.

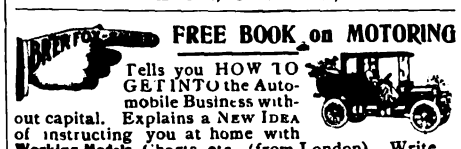
To buy a blacksmith shop in good town or good locality. Address THE AMOS SALES CO., 2402 Johnson St., Greenville, Texas.

PATENTS.

Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. Davis & Davis, 908-914 G. St., Washington, D. C., and 220 Broadway, New York City.

WANTED.

WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.



FREE BOOK on MOTORING

Tells you HOW TO GET INTO the Automobile Business without capital. Explains a NEW IDEA of instructing you at home with Working Models, Charts, etc., (from London). Write

DYKE'S SCHOOL OF MOTORING,
Box 10, Roe Building, ST. LOUIS, MO.

FOR SALE.

McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

FOR SALE.

Blacksmith and wagon shop located in Lyman County. Doing good business, good reason for selling. Address LOCK BOX 22, Murdo, South Dakota.

FOR SALE CHEAP.

A first-class blacksmith shop located in a village of 500 inhabitants in South Central Wisconsin. Fully equipped with tools and machinery including a 12 H.P. Gasoline Engine. Competition light. Am forced to sell or lease at once owing to ill health. Address J. M., care of the Blacksmith & Wheelwright, P. O. Box 654, New York City.

FOR SALE.

Blacksmith shop, four lots and house, engine and stock; only shop in town. Address for particulars, J. BROWN, Box 24, Bridgeport, Wash.

FOR SALE.

Well equipped blacksmith's, wood-work, and horseshoeing shop. All modern conveniences. Everything run by power. For particulars apply to F. C. PHILCOX, Islay, Alta, Canada.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORK, St. Cloud, Minn.

FOR SALE.

Silver No. 3—new taper hub-boring machine, $25.00. All kinds wood machinery, blacksmith shops, farms, any kind of business you want to dispose of. AMOS SALES CO., K2402-2404, Greenville, Texas.

WRITE FOR OUR 80 PAGE BARGAIN SHEET

Some goods below manufacturers' cost. All parts to build cars from high wheel buggies to two ton trucks.

Pressed steel frames	$2.00 and up
4-cylinder motors, new	75.00 and up
Brass headlights ....per pr.	5.00 and up
All brass windshields	7.50 and up
Planetary transmissions	12.00
Complete chassis in parts	200.00
Fore-door bodies	40.00
4-passenger upholstered bodies	40.00

Get our Bargain Sheet. AUTO PARTS CO., 517-19-21-23-25-27-29-31 W. Jackson Blvd., Chicago, Ill.

FOR SALE.

One high grade 8 h.p. horizontal Milwaukee gasoline engine, only $108.00. Fifty other good propositions for the power user. State your requirements before you buy. BADGER MOTOR CO., Milwaukee, Wis.

SPECIAL PRICES.

On rebuilt and used iron and wood working machinery during August. Lathes $55.00, up. Millers' $100.00 up. Write for list of 50 other bargains. Address, BICKNELL MFG. & SUPPLY CO., Jamesville, Wis.

FOR SALE BY FRANK P. CLEVELAND.

Blacksmith and wood working shop in Grundy Co., Iowa.; fully equipped power shop; price including real estate $2,300.

Carriage, wagon, blacksmith and repair shop in Colorado city of about 6,000 population; sales average about $20,000 per year; this is an established money making business; about $17,000 required.

Blacksmith shop, lot and 8-room house in Ontario, Canada, receipts average $3,000 per year; best shop in that section; price $2,500.

Blacksmith shop, 6-room house and one acre lot at a good point in Waupaca Co., Wis.; good opening for practical workman; price $3,200.

Blacksmith shop and 4-room stone house and 3-acre lot in Medina Co., Texas; power shop with full set of tools; price $2,500.

Residence property, carriage, wagon and blacksmith shop in St. Charles, La.; price $4,000.

Blacksmith shop and residence in Whitley Co.; power shop with full set of tools; this is said to be one of the best paying shops in Northern Indiana; price $6,500.

Blacksmith shop, buggy and harness business in Hamilton Co., Ind.; sales average $18,000 per year; invoice about $6,000.

I bring buyers and sellers together, no matter where located. If you want to buy, sell or exchange any kind of business or property, write me. Established 1881. FRANK P. CLEVELAND, 975 Adams Express Bldg., Chicago, Ill.

FOR SALE.

Two-story brick wagon shop, 23x75; five living rooms upstairs; also one barn and a two-story wood drying shed; lot 25x125; with electric power, tools and machinery. Must sell on account of sickness. Address for further particulars, BEN I. GREENEBAUM, 1040 Ft. Dearborn Bldg., Chicago, Ill.

FOR SALE.

Blacksmith shop and tools. Only shop in a growing town. Good business. Large territory. For information address HANS J. JENSEN, Norma, N. Dak.

FOR SALE.

Blacksmith shop. Good trade, plenty of work for two men. Reason for selling, do not know the trade. Address P. O. BOX 227 Roswell, S. D.

PRACTICAL INSTRUCTION IN BLACKSMITHING GIVEN AT THE NEW YORK TRADE SCHOOL.

A six months evening course, three nights a week, commences on September 26th, 1912; tuition fee for the full term, $12; the course includes general blacksmithing and tool making. Write for a catalog. Address NEW YORK TRADE SCHOOL, 1266 First Ave., New York.

FOR SALE.

Blacksmith and horseshoeing tools and stock. Rent of shop cheap, in county seat. Will give reason and full particulars. Address 219½ S. Main, Upper Sandusky, Ohio.

FOR SALE.

My two-room blacksmith and wood working shop, located eighteen miles northeast of Cedar Rapids, at Whittier, Iowa. Whittier is surrounded by a good farming country and has prospects of an interurban railroad soon. Address for further particulars, M. O. STONE, Whittier, Iowa.

BLACKSMITHS MAKE BIG MONEY.

By selling my improved wind-drawing attachments for mowers intended for cutting alfalfa, clover, and other seeds; also peas. They are easy to sell and easy to handle. For further information write CHARLES SCHEFFLER, Tiffany, Colo.

FOR SALE.

Blacksmith shop, 30x34, 2 fires, gasoline engine, steam hammer, emery stand, circular saw; 3 lots, 7-room house, up-to-date; nice grove on place, about 350 trees; plenty of work for two men steadily the year round; prices tip-top, all cash; only shop in town. (I am crippled with hard work and will have to retire.) Have all necessary machinery, good stock of iron, bolts, plough supplies, wood stock, etc. A great chance for somebody who will speak quick. Address for further particulars, A. J. SINKULA, Taylor, N. Dak.

POSITION WANTED.

By an expert wagon maker and carriage painter. Does sign painting. 32 years of age. Strictly sober. Must have steady work. Prefer Washington, Oregon or California. A. F. SODERGREN, 205 E. 1st St., Mitchell, So. Dak.

FOR SALE.

One small power blower, 1 Dole & Deming spoke tenon machine, or will trade for a gasoline motor suitable for a motor buggy. Address B. F. TOWNSEND, Seneca, Kans.

FOR SALE.

Power blacksmith shop and 4-room dwelling, two and half lots. Plenty of work. Only shop in town. ANFIN WALLAN, Colfax, No. Dak.

..**"Pioneer" Shaft Ends.**—Crandal, Stone & Company of Binghamton, N. Y., are manufacturers of the "Pioneer" shaft ends, which have attained great popularity because of their intrinsic merit. These shaft ends may be attached to a broken shaft very quickly and produce the strongest possible joint. When you have shafts to repair be sure and ask your dealer for the "Pioneer" shaft ends. If you cannot get them from your dealer write direct to the manufacturers above and perhaps it would be well to write anyhow and get further particulars.

Butcher Knives for Blacksmiths.—The Woodworth Knife Works makes a specialty of a butcher knife for blacksmiths. These are made from the best crucible steel and tempered by a special oil drawn process. Every one is warranted. All knives are ground, polished and finished with hard wood riveted handles. Every one of our subscribers favorably located can add considerable to his income by communicating with the above company and arranging to sell these knives.

Wood or Steel for Buggies.—Which is the better? It used to be thought that there was nothing better than wood—nothing that would stand as much strain and nothing that would last as long. But facts and tests are better than theory or mere opinion. The following, taken from a letter to the Parry Mfg. Co., Indianapolis, from a Minnesota vehicle dealer, is worth reading:

"We have just had opportunity of finding what material Parry buggies are made of. We sold one of these B-273 jobs a few weeks ago and yesterday our customer had an accident and smashed the gear all to pieces. We have taken the liberty of shipping this job to you at Minneapolis and enclose bill of lading herewith. Under the circumstances, to save time, we thought this the best thing to do because if we had written you first it would mean a loss of several days' time. One remarkable thing about this accident, was that the steel body was not damaged to any great extent. When you receive the job, you will find the seat frame is split on the lower side and a little kink in the right side of the body. We think this is a very good test for the steel bodied job, and we are positive, had this been a wooden body, the body would have been smashed the same as the gear. We do not know what would be the best thing to do with this job and leave it entirely to you to do what is right. We know you will be willing to do the best thing. The writer thinks the job would be a very good advertisement for you to have on your sample floor to demonstrate the superiority of the steel body over the wooden one. There is no question in my mind but that it would mean a whole lot to you in the way of business. If you care to do this, we would like to know what you think would be best; whether to get a new gear or to allow a certain price and replace the job.

"We do not mean to insinuate that this job shows poor workmanship or material, because the split spokes and single tree show that the material is good. You will realize the position we are in and we feel assured that you will do the right thing. Satisfactory adjustment of this deal will mean business to us as well as yourselves. The party we sold this job to is one of our new customers and we want to get this fixed up in a way that will bring the good will of this party and mean business to us.

"You will readily see upon examining the job, that it was struck with some force. The party was driving along slow and a friend of his, with a heavy farm team, hitched to a two-seated platform rig, was driving along about two rods from him and suddenly the heavy team jumped to the side and ran into the buggy from the side, pushing it along several feet and tipping it over. This was purely an accident and happened quicker than one can tell about it.

"You will notice the axles are both sprung, springs bent, dash broken, top twisted and otherwise broken up. Now all we ask you to do is examine this job when it arrives and then write us stating what you think would be best to do in this matter."

The American Government, by Frederick J. Haskin. J. J. Little & Ives Company, Publishers, New York.

This work is something that has long been needed. Although it contains only 388 pages, it is sufficiently comprehensive in fullness and instruction for the average reader. No attempt has been made to give a complete history of the government departments, but more attention is paid to details of their present activities, and the information is dependable and compact. There are some fifteen or twenty appropriate illustrations, and the table of contents shows that it not only includes a chapter devoted to each of the government departments but there are chapters concerning all our more important government institutions. It is well printed and will be found useful for reference and for those who want to be well informed concerning government matters.

Price List of Neverslip Calks, Shoes, Etc.—The Neverslip Mfg. Company of New Brunswick, N. J., has just brought out its horse shoers' price list for the season of 1912-13. Our readers who are using Neverslip calks or contemplate using them the coming season should write at once for this price list. It will be sent, of course, free of charge.

Pioneer Twentieth Century Shafts.—The attention of our readers is directed to the announcement in this issue of the Pioneer Pole and Shaft Company of Piqua, Ohio, manufacturers of the Pioneer Twentieth Century Shafts. An illustration in the advertisement will show the points of superiority of these shafts. The Company has brought out a little booklet entitled "Documentary Evidence," and would like to send one of these booklets and catalog of all the Pioneer products to every reader of this paper. You had better send for it so as to have a copy on hand when it is needed.

Inventions.—Our readers who may be working upon an invention which they would like to have patented should consult the advertisement of W. T. Fitzgerald & Company, 810 "F" Street, Washington, D. C. They have brought out a booklet of 64 pages, giving full particulars as to how to proceed to get a patent together with numerous references. This company was established in 1878.

New Fay-Egan Catalog.—J. A. Fay & Egan Company, manufacturers of "The Lightning Line" of Woodworking Machinery, have just issued a new catalog which is of interest to every owner and user of woodworking tools. This catalog, known as No. 86, is gotten up in a size convenient for handy reference and in its 352 pages are illustrated and described all of the many improvements made in woodworking machines during the past year. It is really a text-book on woodworking machines, and is evidently an expensive proposition to print and circulate. The Fay & Egan Company advise us, however, that they will be glad to send a copy, charges prepaid, to any owner or user of woodworking machinery who will address them on his own or company's letterhead as follows: J. A. Fay & Egan Co., 175-195 West Front Street, Cincinnati, Ohio.

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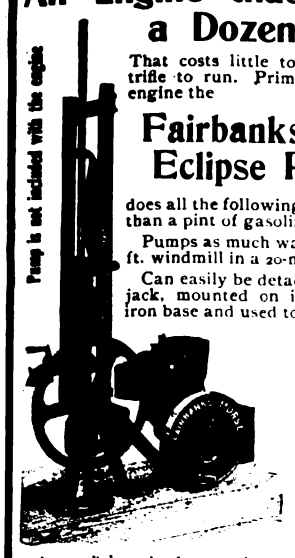
Little Giant Tire Setter.—In this issue the Keokuk Hydraulic Tire Setter Company of 1301 Main St., Keokuk, Iowa, direct attention in their announcement to their warranty. This company warrants each machine to be well made and of good material and to set and reset tires cold of size stated, on wheels 30 inches to 56 inches in diameter. If you are interested write to them for further particulars and price list.

An Engine that Serves a Dozen Needs



That costs little to buy and but a trifle to run. Primarily a pumping engine the

Fairbanks-Morse Eclipse Pumper

does all the following well and on less than a pint of gasoline an hour:

Pumps as much water as a 10 or 12 ft. windmill in a 20-mile wind.

Can easily be detached from pump jack, mounted on inexpensive cast iron base and used to RUN

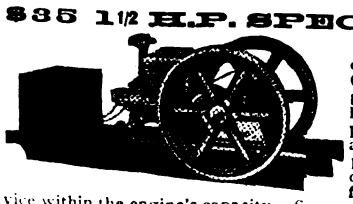
Forge, Lathe
Wood Working Machinery
Water System
Grindstone
Washing Machine
Churn
Cream Separator
Contractor's Trench Pump
Pile Driver
Printing Press
Linotype Machine

A great little engine for your shop and one it will pay you well to handle.

Write for our agency proposition and Catalog No. MT655.

Fairbanks, Morse & Co.
900 So. Wabash Ave., Chicago, Ill.

$35 1½ H.P. SPECIAL



The Steiner Lin of Hopper Cooled Engines are high grade, practical and efficient power producers. Fit for any service within the engine's capacity. Some are cheaper, but none are better. STEINER ENGINES stay sold.

Get in line to-day and write for our Catalog B.
It Will Make Money For You.

M. STEINER & CO., Dayton, Ohio

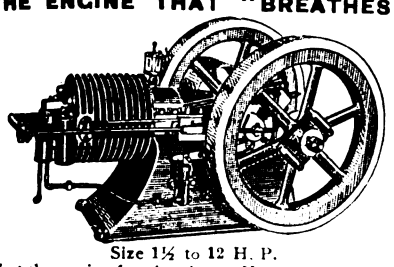
Do you want anything? Is your shop for sale, or do you want to buy a shop or hire a man? If so, a "Want" advertisement in THE BLACKSMITH AND WHEELWRIGHT will bring you good results. See terms at head of the "Want" Department on another page.

Write To-Day

Catalog Free, with full information.

MOTSINGER
Guaranteed Auto-Sparker
(Better than an everlasting battery.) Will generate current for ignition, and electric lights, charging storage batteries, etc. Suitable for all types and sizes of gas and gasoline engines. Let us tell you how to make your own electricity.
MOTSINGER DEVICE MFG. CO.
587 Cherry St., La Fayette, Ind.

THE ENGINE THAT "BREATHES"



Size 1½ to 12 H. P.

Just the engine for the shop. No water tanks, hoppers or Fan complications to bother with. The Gade pays for itself by cutting your fuel bill one-third. Investigate the efficient and economical Gade before you purchase an engine. 5 YEAR GUARANTEE.

Write for Catalog and Descriptive Matter

GADE BROS. MFG. CO., 200 Main St., Iowa Falls, Iowa.

SAMPLE
OF WELDING COMPOUND
FREE

BLACKSMITHS!

Let me send you a trial package free and you will use no other. **Anchor Welding Compound** has no equal for strength. It welds the hardest steel. No hammer needed. Good for both big and little jobs. Try it.

Write to-day and mention The Blacksmith and Wheelwright.

N. D. DOXEY, ELMIRA, N. Y.

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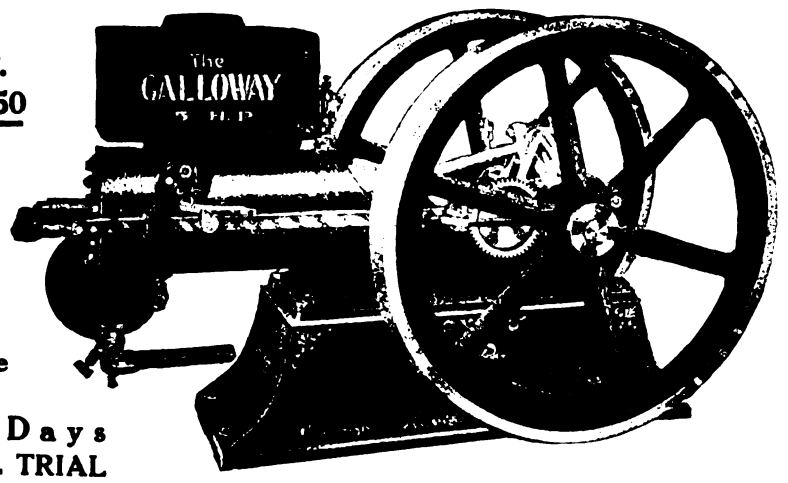
5 H. P.
$119.50



Built For Service

30 Days FREE TRIAL

THE GALLOWAY GASOLINE ENGINE

Owned and Made Exclusively by the William Galloway Co., Waterloo, Iowa

will run your shop at several times its present capacity and enable you to take lots of jobs that you have to turn down now because you have not the capacity.

It will enable you to do work you couldn't do without it.

An absolute necessity for all high grade, careful work.

You can reduce your charges on much of your work and still double your profits.

Only Four Things To Do:—Turn on the switch, turn on the oil, turn on the gasoline, give the fly-wheel a start, and the Galloway will go right along all day without further attention. It's the ideal power for a small shop and it's got the capacity to take care of your growing needs.

The Galloway Engine has been a standard engine for fifteen years. Thousands in every day use in every state and territory.

The Galloway Horse Power is rated by actual brake test. If you try the Galloway Engine you will find it is not over-speeded. Remember, the bore and stroke count and you don't have to drive your engine faster than you ought to drive it to get the rated horse power.

We make this engine in seven sizes up to 28 Horse Power. Three or four styles in every size.

Note my SPECIAL PROPOSITION TO BLACKSMITHS.

I have a plan by which every blacksmith can pay for his own machine. It's good, it's out of the ordinary, and you will be overlooking a big chance if you don't write for my proposition. Ask for my free information on Stationary and Portable Gasoline Engines from 2 to 28 Horse Power. We make the best and we price them at reasonable figures.

Beautiful, sensible CATALOG FREE FOR THE ASKING. Write to-day.

WILLIAM GALLOWAY, President,

THE WILLIAM GALLOWAY COMPANY,

1555 Galloway Station, Waterloo, Iowa.

CRAY BROS SPECIAL Gasoline Engine

This is the highest quality engine built, **regardless of price,** and its important, exclusive features have made it the

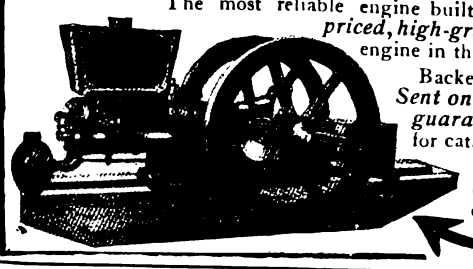
Standard of the World

The speed lever varies the speed at will *while running;* new patented mixer—nopump; simple, positive igniter; automatic fuel regulation; old reliable fly-ball governor; frost proof, starts easy in winter; *all parts interchangeable.*

Highest Quality
Fewest Parts
Speed Lever
Automatic Fuel Regulation
Frost-Proof
Interchangeable Parts
Lowest price.
30 days Free trial.

Burns Either Gasoline or Kerosene

The most reliable engine built and the *lowest priced, high-grade, dependable* engine in the world.



Backed up by 20 years of making good. *Sent on 30 days free trial. Absolutely guaranteed* to be satisfactory. Write for catalog—**we have a proposition that will interest you.**

CRAY BROS., Dept. B, Cleveland, O.

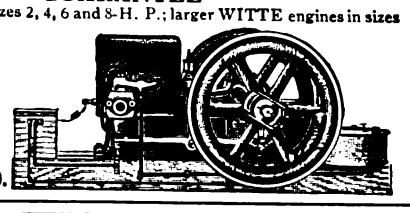
5 YEAR GUARANTEE

ONE CENT AN HOURS WORK ONE CENT!

That is the average cost per horse power hour when doing the work with a WITTE gas, gasoline, distillate and naphtha engine. Why pay 25 to 50 cents per hour for one hired man when for **one cent** the **work** of **several men** can be done better and quicker. You can do the work just when you want to and **ninety-five per cent of the money you are now wasting** then goes into your own pocket. We ship every engine complete with all instructions, nothing is lacking, simply put in fuel and water and it is ready for work. You take no risk for WITTE engines are good engines. They **"stay good."** That is why we can give you a

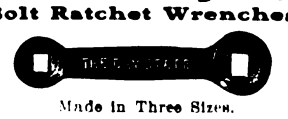
FIVE YEAR GUARANTEE

The WITTE JUNIOR is built in sizes 2, 4, 6 and 8-H. P.; larger WITTE engines in sizes 10 to 40-H. P. Spend **one cent** for a postal card, **state the size engine you need** and let us send you our new free catalog with the best proposition ever made on this "money-saving" engine. A **special inducement** to introduce in new localities.



WITTE IRON WORKS CO.
1606 Oakland Ave., KANSAS CITY, MO.

"BAY STATE"
Double-End Carriage and Tire Bolt Ratchet Wrenches.



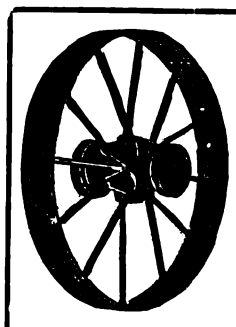
Made in Three Sizes.

No. 1, 6 inches long, has ⅜" and 15/32" openings.
No. 2, 7 " " " ½" " 5/8" "
No. 3, 8 " " " 13/16" " ¾" "

Nos. 2 and 3 take hex. and square nuts.

Send for Circulars.

G. A. CUTTER, Sales Agent, Taunton, Mass.



STEEL WHEELS

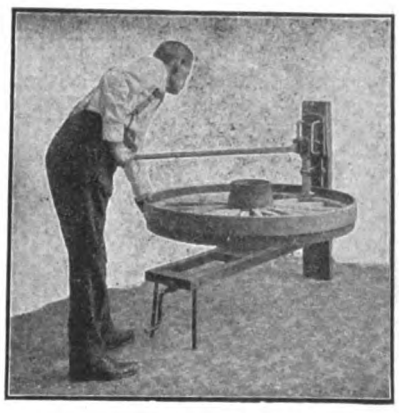
To Fit Any Wagon
Plain or Grooved Tire
Farmer's Handy Wagons
All Standard Types
Special Inducements to Blacksmiths

Write To-day for Agency

EMPIRE MFG. CO., P. O. Box 203, **Quincy, Ill.**

COMMON SENSE TIRE REMOVER

The Best Machine on Earth for Removing Tires.



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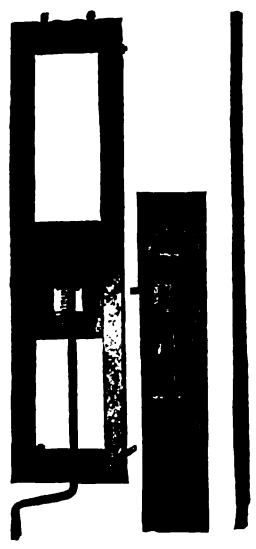


When not in Use

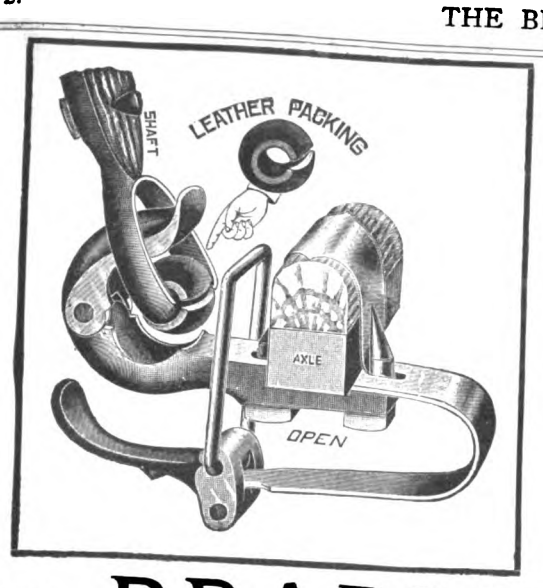
It will remove any tire, large or small. Does it without injury to the wheel. It does its work quicker than it can be done in any other way. It is the easiest worked. The sweep of the lever is always from the hip to the knee. It is strictly a one-man machine. No helper needed. Takes up but little space, and can be placed on shoeing floor, and when not in use platform can be detached and hung on the wall and the lever stood in a corner and the upright used to hitch to.

For sale by the trade. If your dealer does not handle them, send us draft or money order for $20.00 and one will be shipped to you.

People who set tires, write us for circular and give us name of your jobber. Farmers and Teamsters, once they have seen this machine, will not go to a shop that does not use it, as it saves the wheel and they know it.

Jobbers, this is the greatest selling article you have ever seen. Send for sample machine, test it and show it. Every person that sets tires will buy them.

COMMON SENSE TIRE REMOVER CO.
DOWAGIAC, MICH.



THE BRADLEY BALL-BEARING Carriage Coupler

All-Steel, Noiseless, Quick Shifting, Ball Bearing

The ONLY Carriage Shaft Coupler that is furnished with a

One-Piece Moulded Leather Packing

A packing that will outwear any other packing ever made. It fits the ball and socket. It is held in place by a spring steel retaining ring. It may be put on and taken off in a jiffy, and it stays where it is put.

MADE IN FIVE SIZES.

Pony—Buggy—Surrey—Delivery—Express

To fit axles 3-4 inch to 2 1-4 inch

Your Jobber Can Supply You.

C. C. BRADLEY & SON, Syracuse, N. Y.

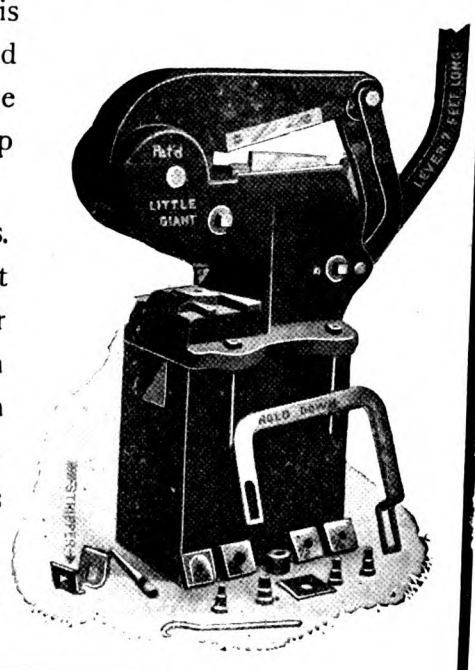
TIME IS MONEY

Any man or machine that can save your time can save you money. That's one of our big claims for our "Little Giant" combined Punch and Shear—it's sure a time-saver.

Don't believe it just because we say so but ask any user and send for our booklet of testimonials.

They are better than a live husky blacksmith helper.

The "Little Giant" is absolutely the best combined Punch and Shear for the blacksmith shop, and no shop is complete without one.



Built in Three sizes. Capacity of No. 1 or largest size, cuts 5/8x2 1/2 inches or 1/4 x 8 inches and 1 inch round. Punches 5/8 inch in 1/2 inch. Weighs 525 pounds.

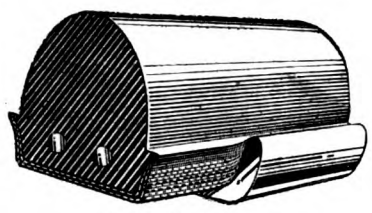
FIVE sets of punches and dies with each machine.

Your Jobber can tell you all about them.

Send for our Catalogue and Prices.

LITTLE GIANT PUNCH & SHEAR CO.
Box 56 **SPARTA, ILL.**

TO THE DEALER Who Is Looking For The Most Profit



"WING" TIRE

See how the patented "Wing" presses against the channel, thus preventing **mud, grit** or **water** from getting in and quickly destroying the tire base. This **tire** remains sound. It won't creep or get loose. Gives utmost wear. Will protect your carriage and greatly lengthen its life. Being of **tough, springy** rubber, it is exceptionally easy-riding.

Do you realize that the dealer who sells Goodyear Carriage Tires, handles America's most popular rubber tires?

Tires used by some 900,000 carriage owners.

Tires adopted by 148 out of the 200 American Carriage Builders.

Tires on which last season's demand increased 24%.

Tires which at the present time are nearly doubling last season's sales.

Tires which have had 13 years in which to prove their worth. And the sales show the result.

Tires which allow the dealer an excellent profit **per set.**

Do other carriage tires offer you these advantages?

Do you know any tire which gives better service?

Which sells so readily?

Which brings you so much both in profit and prestige?

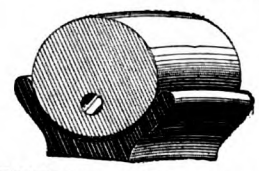
Then why **sell** other tires?

Surely you are not so indifferent to your customers' interests and to your own interest as to sell ordinary tires when you can sell "Goodyears."

Most dealers are selling Goodyear Carriage Tires.

If you are not selling Goodyears now you will be as soon as you investigate them and compare them from every angle with other makes.

Drop us a line **now.** Get the latest Goodyear Carriage Tire Book and Agent's Prices. You might as well be getting the added profit that comes through greater volume in handling Goodyear Carriage Tires.



ECCENTRIC CUSHION TIRE

Our "Eccentric" Cushion Tire is especially designed for lighter vehicles—runabouts, etc. Note the wire hole is **below** the center. This increases the wearing depth of the tire one-half. Saves you that much money. This tire stays firm in channel. The high-grade, resilient rubber used in the "Eccentric" Cavity Cushion Tire makes it remarkably easy-riding.

Always Gives Satisfaction.

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO.

Branches and Agencies in 103 Principal Cities.

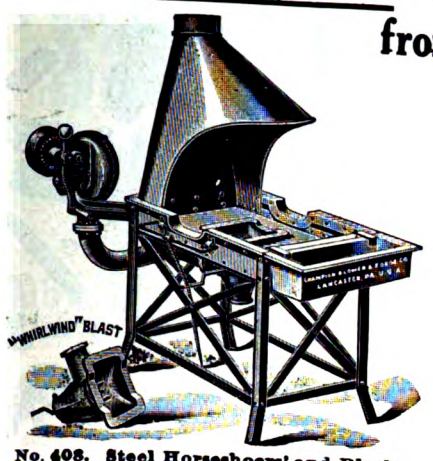
We Make All Kinds of Rubber Tires, Tire Accessories and Repair Outfits.

Main Canadian Office, Toronto, Ont. **Canadian Factory, Bowmanville, Ont.**

GOODYEAR
AKRON, OHIO
Rubber Tires for Carriages

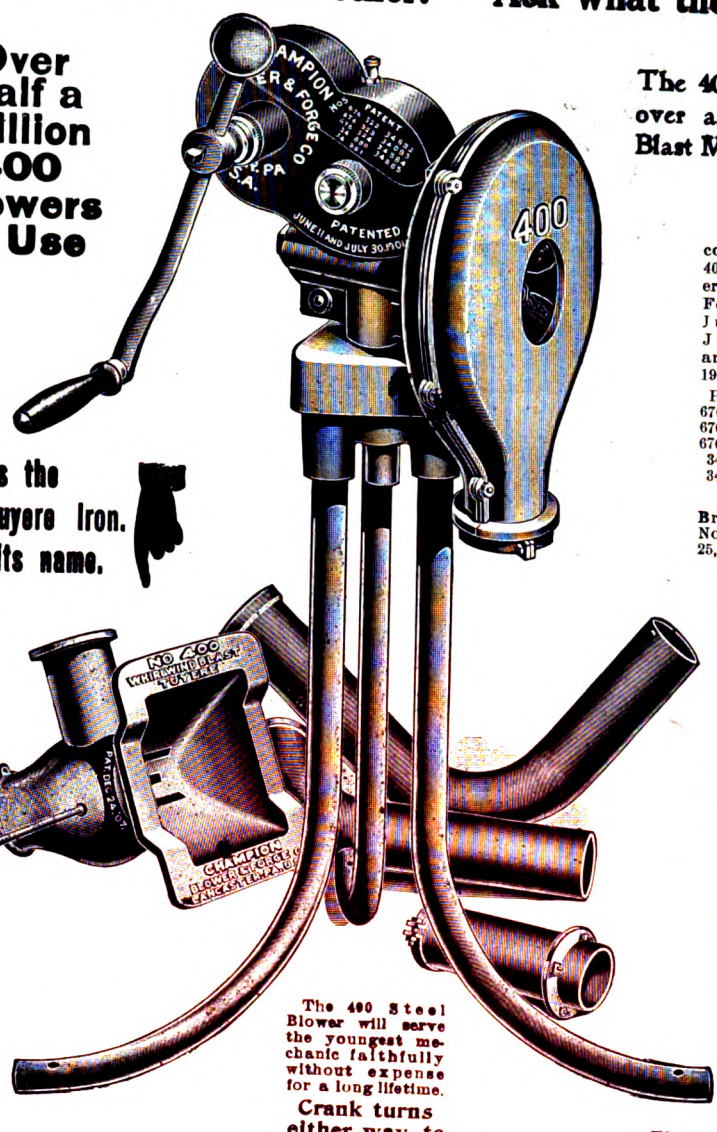
Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 405. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

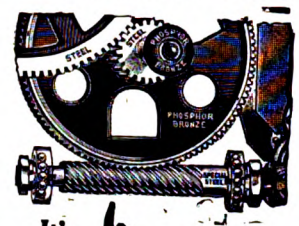
Patent Nos.:

676,322	34,882
676,323	34,883
676,324	34,884
34,880	34,885
34,881	697,629

Also Great Britain Patent No. 9,662, May 25, 1900.

The Blower for Quality, First, Last and Always

THE FAMOUS 400



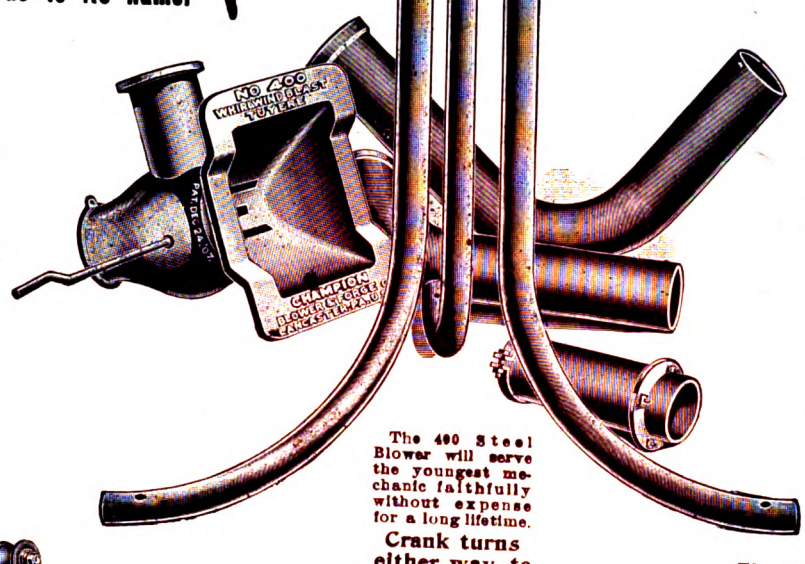
It's all in the Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

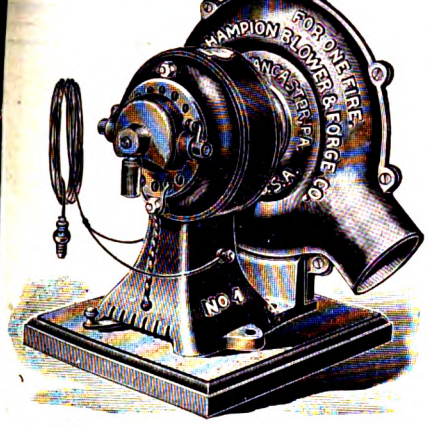
Crank turns either way to produce blast.

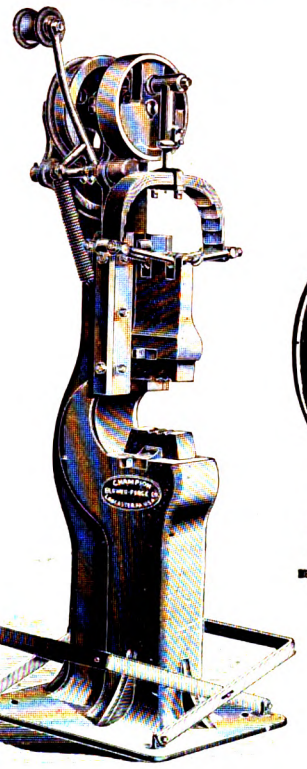
The **Circular Rotary "Whirlwind" Blast** produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements

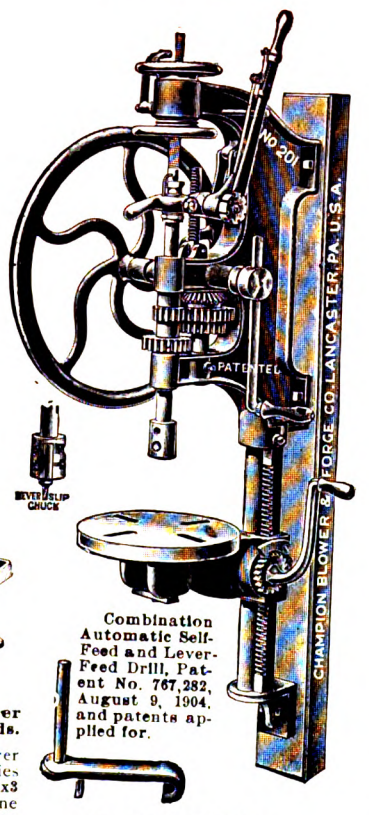




The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

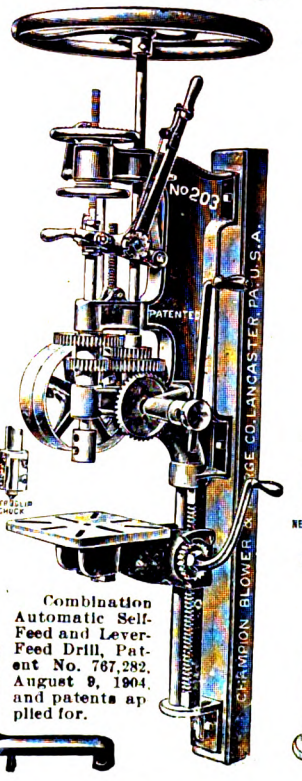
No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.

The CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.

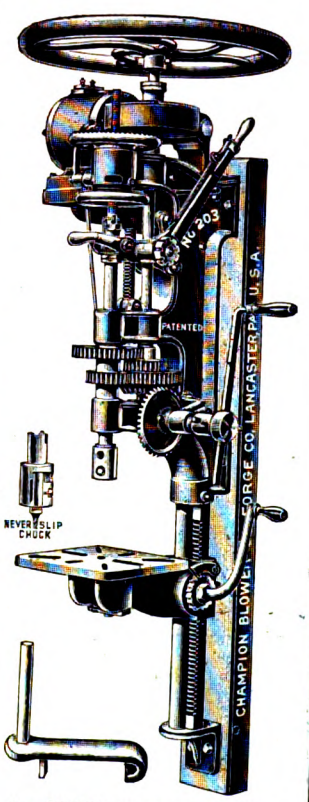


Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.



No. 203 DRILL.

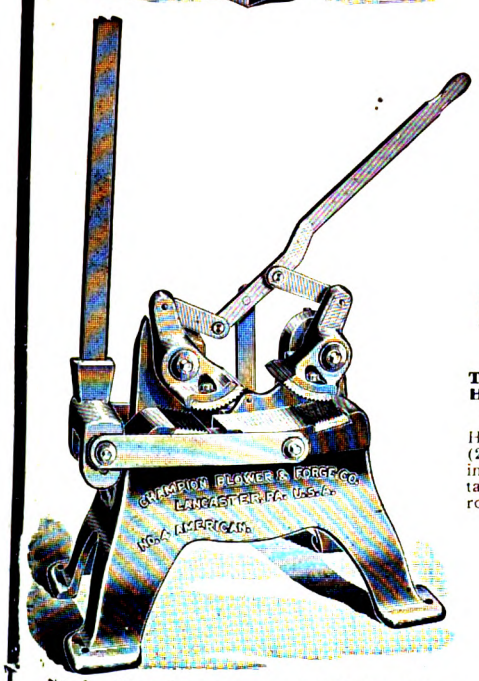
The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



No. 4. American Tire and Axle Shrinker.

Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Power Hammers, Punches, Shears, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

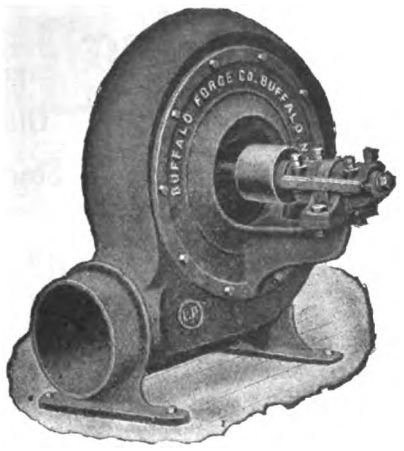
The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

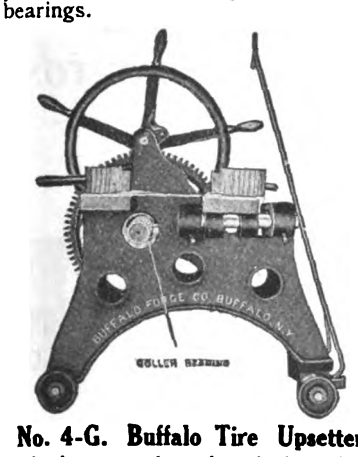
IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

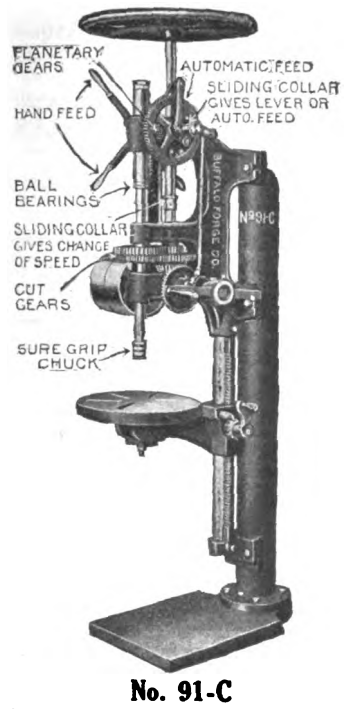
Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.



Buffalo Power Blowers and Exhausters will run for 30 years without other repairs than re babbitting of the oil ring bearings.



No. 4-G. Buffalo Tire Upsetter.
Ask for complete description 121-B.



No. 91-C
The latest drill design, for power, hand or electric drive. The finest blacksmith drill in America. Simple in design and operation.

Power Blowers

Buffalo 200 Silent Blower

14-inch Fan 1911 Model

Gives 22% higher blast pressure than any 12-inch blower. It has **ball bearings** and **helical** high speed cut gears. The fan design represents the latest discoveries in the science of pneumatics. It gives the right proportion of blast volume and pressure to prevent scaling, and does it with the least effort. You will be astonished if you try out the new 14-inch Buffalo side by side with any other blower. Its superiority is absolutely undisputable to any impartial judge. We will leave it to you—ship on 30 days' trial if you want us to. In combination with the new "Vulcan" Tuyere it has the **greatest heating capacity** of any standard forge outfit. **Takes 2-inch iron up to 12 inches long in one heat.**

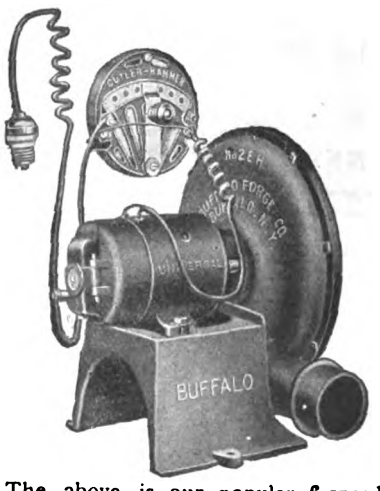
76-Page Catalog Free

Illustrates most up-to-date line of forge and wagon shop tools and machines. Write for Catalog No. 145-B.

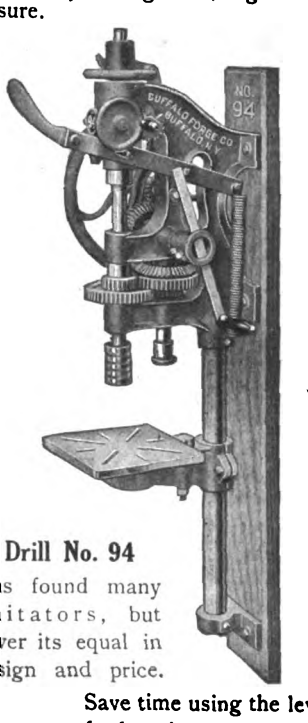
Buffalo Forge Company
Buffalo, N.Y.

No. 650
All Buffalo Forges are now furnished with the new **14-inch** Buffalo 200 Silent Blower and heavy duty tuyere iron, without extra charge. Gives larger welding **capacity than any other forge on the market.**

Electric Blowers

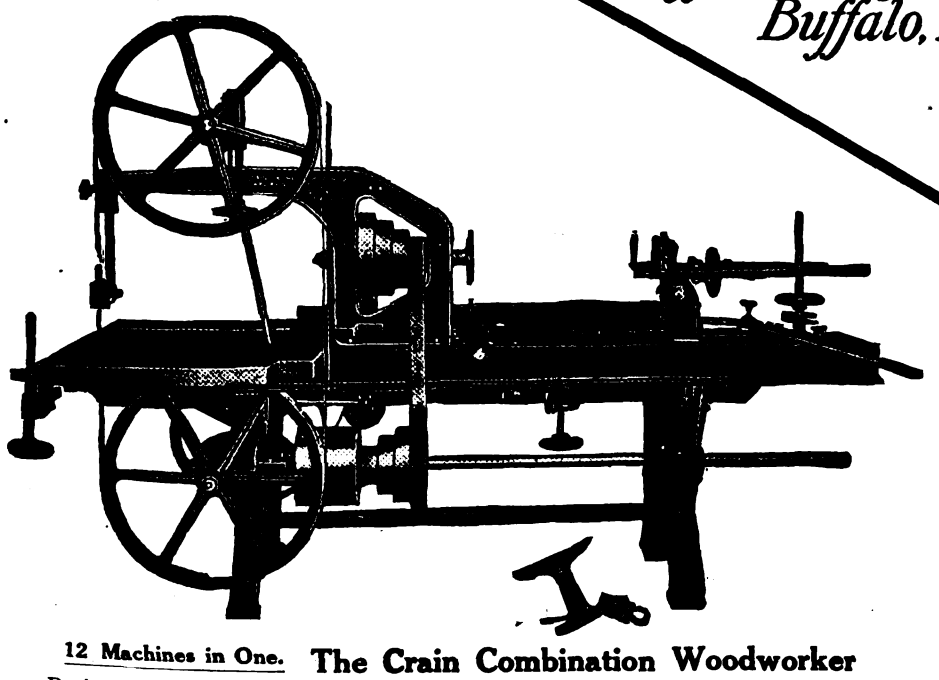


The above is our popular **6-speed** Electric Blower for one fire, with dust-proof motor and hinged doors. Brushes extra large. Runs for two cents a day. Large fan, high blast pressure.



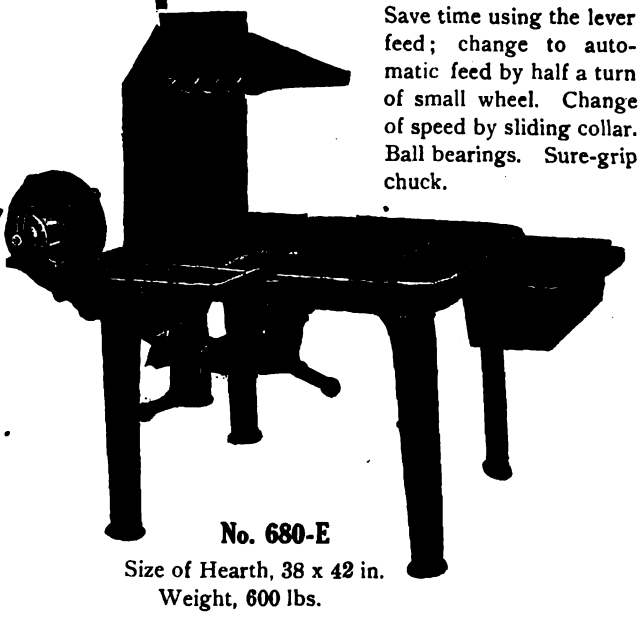
Drill No. 94
Has found many imitators, but never its equal in design and price.

Save time using the lever feed; change to automatic feed by half a turn of small wheel. Change of speed by sliding collar. Ball bearings. Sure-grip chuck.



12 Machines in One. **The Crain Combination Woodworker**

Designed by a wagon maker of 30 years' experience. Made for heavy work, and will perform most of the operations in a wagon and repair shop with a wonderful saving of time. It is at one time a Band Saw, Rip Saw, Cut-off Saw, Planer, Shaper, Sizer, Drill, Lathe, Spoke Tenoner, Spoke Equalizer, Boring Machine. **Ask for full description.**



No. 680-E
Size of Hearth, 38 x 42 in.
Weight, 600 lbs.

The favorite heavy blacksmith forge. Fitted with 14-inch hand blower, or electric blower if you prefer. Has patented "down-draft" hood, which removes smoke and sulphur fumes.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXVI. No. 3. NEW YORK, SEPTEMBER, 1912. TERMS: ONE DOLLAR A YEAR

FURNITURE VANS.

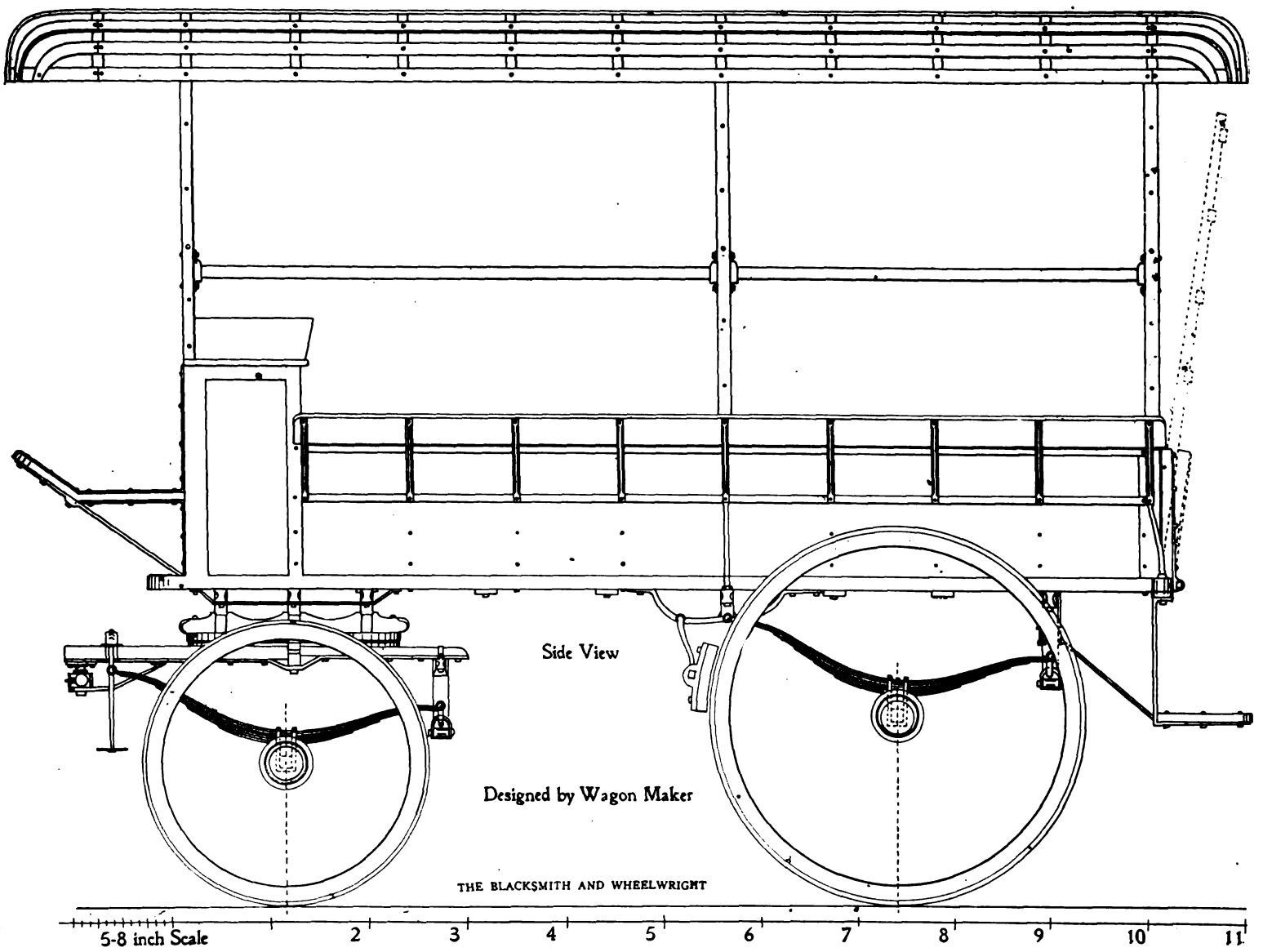
Designs, Drawings, Specifications and Facts of Interest to Builder and User.

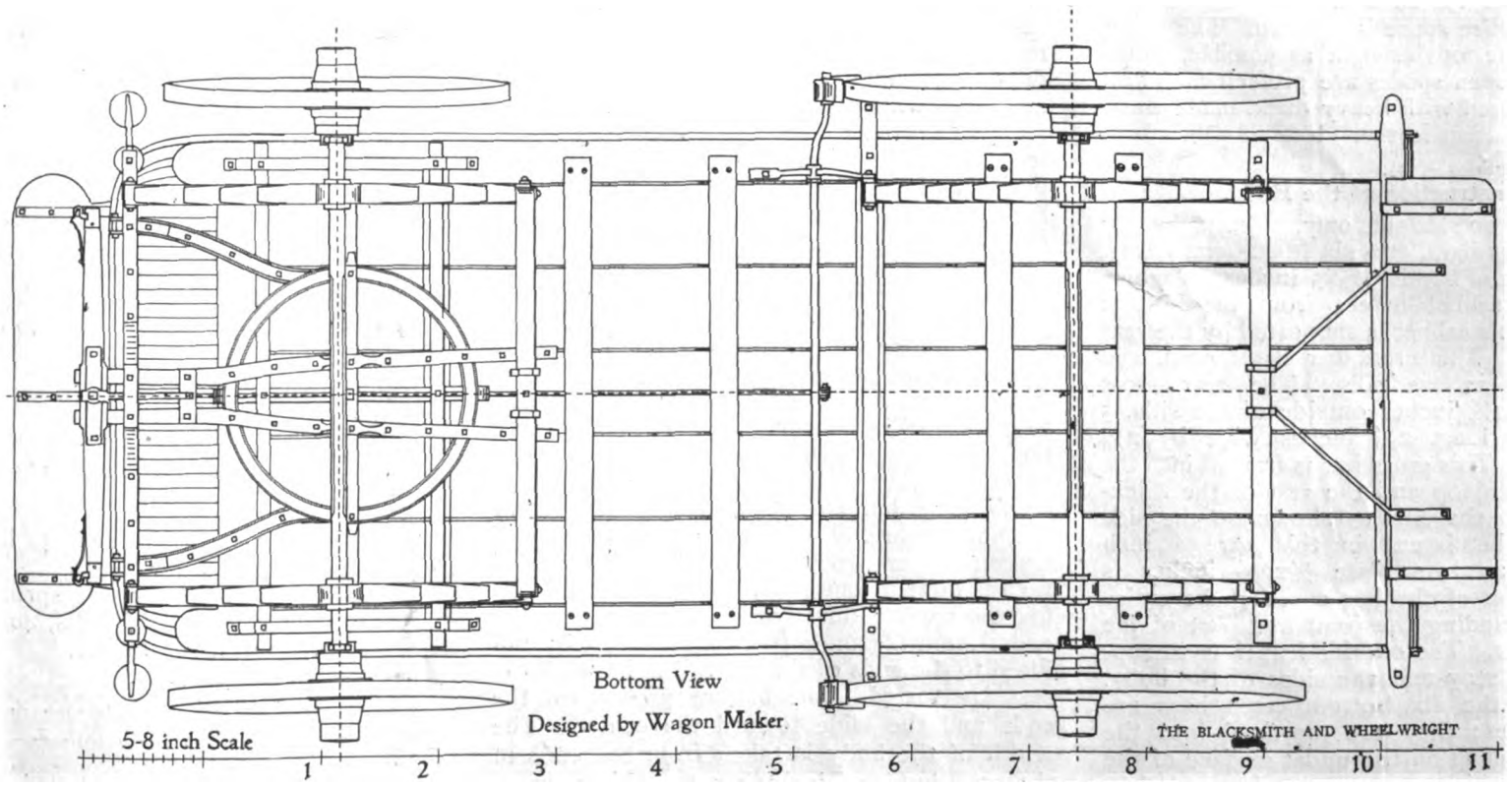
BY WAGON MAKER.

Furniture vans have paneled bodies, 7 feet high and 4 feet 6 inches wide, outside dimensions. Motor vans are from 60 to 66 inches wide, but for a certain class of moving furniture short distances the high grade heavy furniture horse and motor vans are too expensive. A paneled body moving van needs three horses, while a light curtain furniture wagon can be drawn with one horse.

Furniture generally is not heavy but bulky, requiring lots of room, therefore the bodies are built as wide as it is possible for a 62 inch wide track from out to out. The best vehicle for loading furniture is one with a body 52 inches wide, which has side curtains with slanting boards 5 inches outside on each side of the body, making a width across of 62 inches, but by building the body 54 inches wide, and extending the slanting boards 1 inch each side, would make the body 66 inches wide, a very convenient width for carrying bulky furniture.

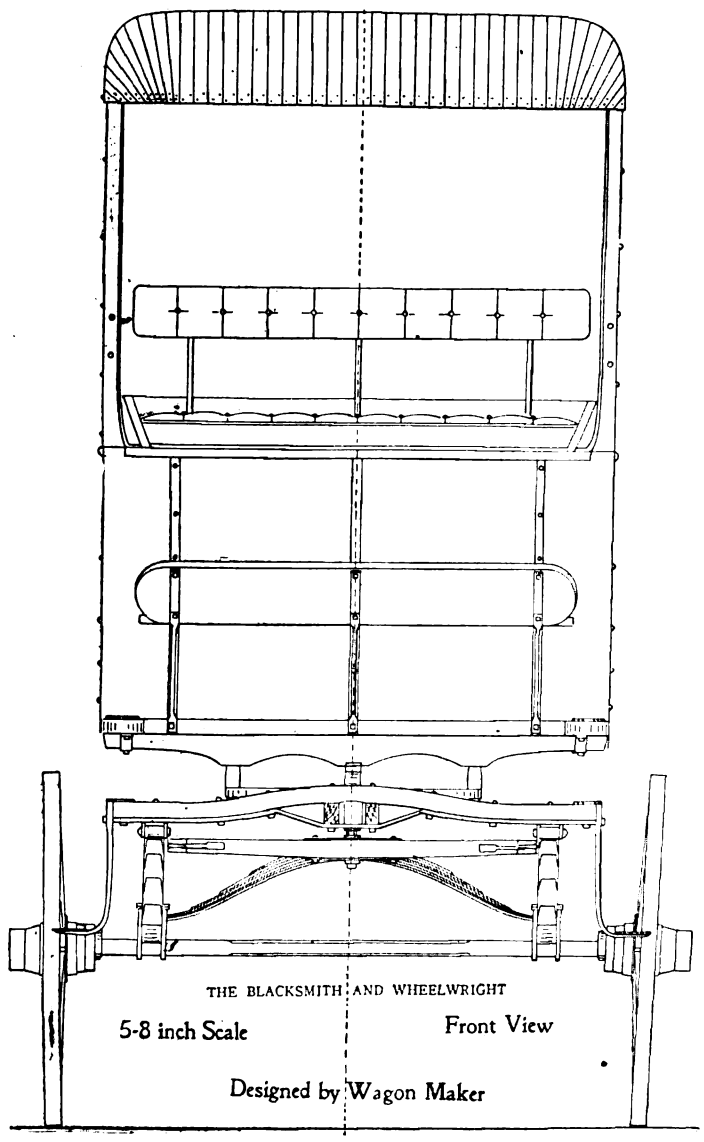
The length of this wagon without the foot board, and with the gate, is 10 feet, 3 inches; entire length of top is 11 feet 9 inches, and the same length from the front of the toe board to the rear end of the foot board. Outside height of body 6 feet; height of body from the ground 39 inches, and width of body 52 inches. The inside loading space is 4 feet 1 inch by 8 feet 10 inches, but besides this space is the adjustable drop-gate, also called the rack, on which are loaded the matresses and bedding and all such articles which are bulky and not heavy. This rack when extended is nearly 5 feet long and a great deal can be loaded on it. The back curtain on account of this rack, is made long enough to reach from the extended top, one foot below the rack when in a horizontal position, and also made wide enough to cover the entire space on each side and fasten to each post; but geuerally three curtains are used, one main back curtain and two side

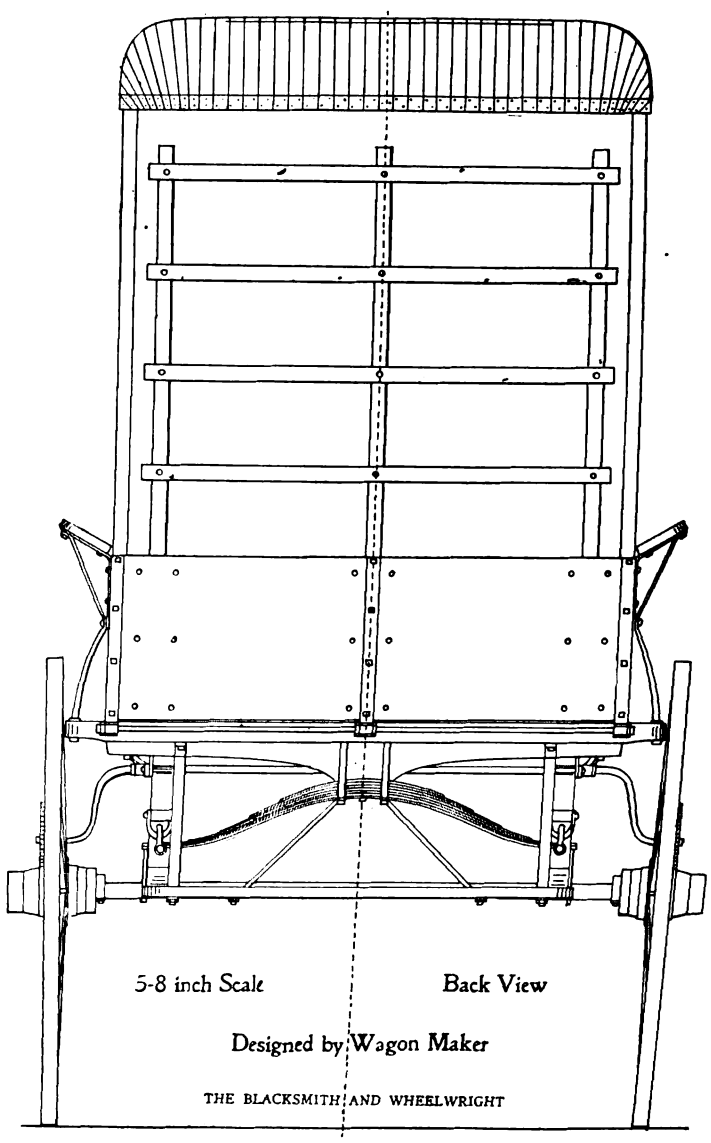




curtains, lapping over the main rear side curtains 12 inches, strapped to each other and also strapped to the post. The rack is seldom extended the full length and then the side curtains are dispensed with. When made without the small side curtains, the main side curtains are cut 18 to 24 inches longer, starting from the centre of the rear post. The same is done in front for the protection of the driver. They are made in two parts lapping over each other 8 inches on the centre post and are not buttoned but strapped. They are long enough to fasten the curtain when 6 inches off the post. This is done in case the furniture is loaded with outside edge of the slanting boards which stretches the curtains outward and therefore the fullness must be ample.

The top is extended front and rear, in the front it is for the protection of the drivers and others in the rear for the protection of the furniture. Such tops are covered with strips from 1½ to 2 inches wide and ¼ to ⅜ inch thick. In some cases the spaces between the slats are from 1¼ to 2 inches open while in others the entire space is covered. The object is to make the tops as light as possible, consequently the open spaces are preferred. These tops are covered with heavy duck, made water tight, or imitation leather cloth of which both are serviceable.





Construction of the Body.

There are two side sills only, 1½x4¼ inches; two end cross bars, and six inside cross bars. The front cross bar is 1½x5 inches, in which the bottom rabbet is cut from the bottom boards and this rabbet is supported by the rear transom bar. This cross bar has tenons, and mortises are in the sills. The rear cross bar extends 4¼ iuches outside of the sills, 5 feet ½ inch long, 2⅜ inches wide by 2⅛ inches thick. This cross bar is framed into the sills level with top and the rest of the thickness is below the sills as shown on the side view. A rabbet is cut in this bar ¾ inch square and an iron plate ⅛x2½ inches is screwed on top of the bar covering the entire cross bar, including the joint and part of the bottom boards. The outside length is to support the iron stay and the sides of the body. The rest of the six bottom cross bars are 1½x2¾ inches; they are mortised into the sills, besides a lap on the under surface of the sills, screwed with two screws, for each lap, on this structure the bottom boards are screwed.

The lower side body boards are grooved ¼ inch into the sills its full thickness; on front and rear end the side body boards are mortised 1 inch long by ⅝ inch thick into the posts, forced down with wire strap bolts on the inside. These lower side body boards are ⅞x10 inches, and the upper side body boards are the same thickness and 6½ inches wide, and its joint covered with a ⅜x¾ molding. The upper molding is the same size, and at the sills the boards are recessed in same amount as the thickness of the rest of the moldings.

The centre posts are 1½x1¾ inches on the side view, let in ¼ inch into the upper and lower side boards and the strap irons on these posts reach from the top rail down to and through the sills and cross bar. The rear end posts are 1⅞ inch thick and 2½ inches on the side view. On these posts the ⅜ inch thick molding is added to the thickness, and above the side boards the ⅜ inch thickness is cut down. The same is done on the side view on which ¾ inch is cut down from 2½ inches, leaving 1¾ inches on the same side as the centre posts. On these posts are strap-bolts 16 inches up from the top of the sills, besides the outside stay and inside iron reaching from the top rail down to the sills, with a foot six inches long resting on the iron plate, with two bolts for each foot to keep the posts in a vertical position without becoming loose in time. The high tops and the swaying from one side to the other if not well secured from the start will loosen them and the entire structure will be too weak to resist the side motion.

The top has two side rails, two bent end bows, and eleven other bows fitted between the end bows to the top rails. It is well when such a body is constructed to find out first what size of bows you can buy if you cannot make them yourself as they decide the rest of the widths. You may procure 50, 52, 54 or 56 bows, but not 55 inch size as they very seldom run in odd numbers. The experienced wagon maker procures the whole lot needed for the body at one time, sorts them and looks for the narrow ones, which are placed at the ends, the wide ones framed horizontally and fitted to the ends of the top rails. Now all the rest are sorted. The narrow go toward the ends and the wide toward the centre. The width of the body is taken from the ends of the top, but not including the thickness of the slats. The bows from out to out represent the width of the body. This body has six posts, three on each side, but no studs because the body sides are ⅞ inch boards, and the strap-bolts to which the boards are bolted hold the boards together besides the triangles which keeps the flare boards in a secure position at the same time. These irons are generally made of cast steel. They are all alike and are as good as the forged and can be obtained at 6 cents a pound. All furniture wagons of this style have removable side rails and they are always padded on top and inside surface.

Dimensions for Warner wheels:

Four wheels its diameter being, 36x48 inches.

Diameter of wood hubs without flanges, 5¼ inches.

Length of hubs, 9½ inches.

Diameter for ends of the hubs to suit iron bands.

Width of spokes, 1⅝ inches.

Number of spokes front and back, 14x16 inches.

Thickness and depth of rims, 1¾x2 inches.

Width of tread, 1⅝ inches.

Thickness and width of round edge tires, ⅝x1⅝ inches.

Four hub bands, width at front, 2½x3-16 inches.

Four hub bands, width at back, 1¼x3-16 inches.

Eight rim plates, for 1¾ inches thick rims.

Forty-four rim plate tire bolts, 5-16x3 inches.

Wagon platform springs:

Two front oil tempered side springs.

Length from centres of bolts, 40 inches.

Open out to out, 7 inches.

Width of plates, 2 inches.

Number of plates, 7

Thickness of main plates No. 2.

Thickness of other plates, Nos. 2, 2, 2, 3, 3, 3, clipped to axle.

Front cross spring:

Same as side springs except 42 inches long and all plates No. 2 steel.

Two rear oil tempered side springs.

Length from centres of bolts, 40 inches.

Open out to out, 7¼ inches.

Number of plates, 7.

Thickness of main plates, No. 2.

All the rest of the plates, No. 2.

Clipped to axle.

Red cross spring:

Same as side springs except 42 inches long, 8 plates and all No. 2 steel.

Wagon platform axles:

Two axles 1⅝ inches diameter at square ends and round spindles. Axle arms require hard cast iron boxes, their length to suit 9½ inch long hubs, set to length for a 5 foot two inch wide track out to out.

Each side of the axle arm has a square space of 10 inches back of collar; the rest is octagon shaped with round cornered shoulders.

Four Farr's common sense sand boxes clipped to axles.

A MECHANICAL POTPOURRI.

Files, Calipers, Blower Bearings, Grease and Grease Cups, Rubber Vulcanizing and Base Ball Covering.

BY JAMES F. HOBART, M. E.

The Blacksmith and Wheelwright "boys" are a mighty lively and interesting bunch, judging from their contributions to the "Correspondence" Columns, but once in a while one of them "throws his hat in the ring" with a statement or two which just makes the writer sit up and take notice with an irresistible wish to "take a shy" at that lid in the circle.

In the July Blacksmith and Wheelwright, there are several statements which the writer wishes to add to, remonstrate with, or approve, as the case may be. The first statement, although not in the correspondence column, is as close thereto as the editor could chase it with his shears and paste-pot and relates to the use of files and the statement is made that a new file should not be used for solder, but should be reserved for brass and similar metals.

That advice is good enough, but it is entirely unnecessary, for new files may, with proper care, be used on solder, lead, copper or aluminum without the least damage to the file except the necessary wear, and very little of that indeed. Ordinarily, the remark that solder should not be touched with a new file, would be applicable for the simple reason that the average man does not have the least idea of how to use a file upon soft metals, but the smith who will use the following suggestions, will have no difficulty in filing solder, lead or copper with brand-new files and at the same time, keeping the files in first-class condition.

The advice given, regarding the lifting of a file from the work during the return stroke is good—as far as it goes, but files are not dulled appreciably by dragging them backward over the work, any more than it dulls a knife to draw it backward over the wood after making a cutting stroke. The trouble caused during the back stroke, especially with a new file, is that the pressure exerted during the backward stroke may break off the sharp edges of the teeth. The minute teeth of a sickle-like character which constitute the tooth-edges of a new file are very frail when exposed to sidewise pressure, although they will stand up to a whole lot of pressure from straight ahead in line with the tooth as in the forward stroke. But there is nothing to support the tooth but its tranverse strength, when the return stroke pressure is exerted, and the transverse strength of hardened tool steel is slight, therefore the tooth points—very minute pieces of steel—break off under the return pressure and the file don't work well very long.

The truth of the above may be demonstrated with a hack-saw in a most convincing manner. Procure a piece of very thin tubing, not more than 1-32 inch thickness of wall, and anywhere from ½ to 2 inches in diameter. Put the best hack-saw you can get, to cutting off a piece of this tube which is to be held in a vice during the cutting operation. If that tube is sawn off in the usual manner, from one to a dozen teeth will be torn out of the saw in spite of all the care that can be taken. It is necessary to move the saw ahead of the cut, all the way around the tube, so that the saw is always cutting with the wall of the tube and not against it. The thin wall drops to the bottom of a saw-tooth, and the pressure against the saw just tears the tooth literally out by the roots, so slight is the strength of the hardened steel tooth when exposed in this manner.

But as regards files when new and cutting soft metals. The trouble is, that the files are coated with oil to prevent their rusting and the soft metal gets caught in the oil, clogs the spaces between the teeth, and as more chips get caught they are forced together and unite—cold-weld, in fact—into a solid wedge of metal which completely fills the spaces between the file teeth and makes it impossible for the file to cut while in that condition. But otherwise, the file is as good as it ever was and soft metals have not harmed it a particle.

The remedy is to remove the packed-in chips from between the file-teeth, and furthermore, to prevent chips from lodging there. Both these things—the prevention and the cure are easy and simple. To remove the soft metal from between the file-teeth, just stand the file on end as shown by Fig. 1, and strike lengthwise of the teeth with the square edge of a bit of moderately soft wood, like whitewood, black walnut or

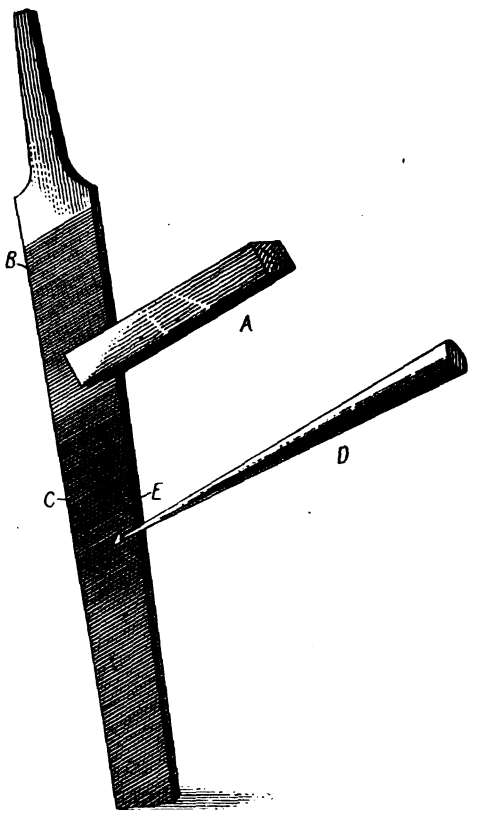


Fig. 1.—Cleaning a File of Soft Metal.

North Carolina pine. The end of the wood must be squarely and smoothly cut to obtain the best results.

In Fig. 1, the piece of wood is shown at A, and its movement must be exactly in line with the teeth, some of which are shown at B, which have been passed over by the bit of wood and are clean, while others, not yet reached, are shown at C, full of metal. A little experience will enable a man to clean a file in this way quicker than I can tell about it.

Occasionally, a bit of metal will resist the action of the wood cleaner, particularly a bit of soft steel or iron. Such an obstinate piece may be picked out with a pointed tool as shown at E, a scratch-awl doing the trick nicely. The use of the wood cleaner above described, together with the regulation file-card which the smith should never be without, will enable him to keep files clean at all times, no matter what metal he is working.

And here are two more valuable tips regarding files. When you take a new file from the box, before it is even touched to metal, file a bit of chalk until the teeth are completely filled with the white substance. This keeps the metal from sticking tight between the teeth, neutralizes the sticky oil on the new file, and permits the metal filings to be brushed out much easier than if no chalk is used. This stunt should be followed with every new file and it helps mightily with old ones as well.

The other point is the preventing of rust between file teeth. Fine files, in particular, are very apt to rust after using, and a rusted file is about as worthless as a cipher with the rim off. Keep all your fine files in a small box which will contain them easily without their teeth rubbing against each other more than is necessary. In the file box, place another and very small box in which a bit of freshly burned lime is kept at all times. As soon as the lime becomes air-slaked, renew it with another fresh lump. While unslaked lime is maintained in the file box, there never will be any rusting of the files, for the lime grabs every bit of moisture which finds its way into the box. A dish of strong sulphuric acid will do the same thing, but acid in an open vessel is apt to cause trouble, therefore, use the freshly slaked lime which is O. K. as long as it is not air-slaked.

The handy calipers described on page 259 of the July issue, like the Irishman's fiddle, "Nades thuning a bit," for these calipers are universally known to the machine blacksmith as "key calipers" for the reason that they are necessary when forging keys or splines for fastening pulleys to shafting. The double caliper is necessary for such forging as the keys must be made to two dimensions—square at one end, and two opposite sides tapered a little at the other end, thus making a blunt wedge. "Feather" keys, which are without taper and are wider than they are thick, also require the double caliper to handle the two dimensions necessary during the forging of the key. Two calipers are used for this purpose when the key calipers are not at hand.

The type shown by Fig. 2, herewith, does not have some of the objections to be found with the calipers shown in the sketch referred to. It will be noted that the central or double point is shortened, thus bringing the points of application of the calipers, much closer together and saving time and trouble in using the tool. Also, the calipers shown by Fig. 1, herewith, are made so that each movable leg has its own rivet. This is a much better arrangement than is shown in the July calipers and the reasons therefor are obvious.

I want to pick a little bone with Mr. D. D. S. also of New York, from whence many good people (including the writer) hail from. This time, it is stated also on page 259 of the July issue, that vulcanite is not made by "baking" raw rubber and other ingredients, but vulcanization is done in a steam bath. Here the writer must "rise to a point of order," for vulcanization, as generally used in connection with rubber, does consist of "baking" rubber or a substitute, with sulphur or other ingredients. It is not necessary to use steam for ordinary vulcanizing, although steam is a very convenient method of applying heat. The only requisite in vulcanizing, as far as heating, "baking" or steaming is concerned, is to apply a stated degree of heat for a given time to the rubber and other "ingredients," and the ingredients are often more in evidence than the rubber, which is completely lacking in some mixtures which are vulcanized and sold as rubber products.

The setting of the blower bearings, as also described in the July number, may be improved a bit by fitting the caps to the bearings so they will pinch or bind the journals pretty tight, and then separate the caps from the bearings by placing slips of paper between the parts of the boxing mentioned above.

In setting up machinery, such slips, either of wood, pasteboard or paper, are universally used and are known as "liners." They enable the cap to be screwed down solid, and they also permit the workman to "know how tightly the bearings grip the journal." The liners may be made thicker or thinner until the journal fits exactly right. Furthermore, when the bearing wears

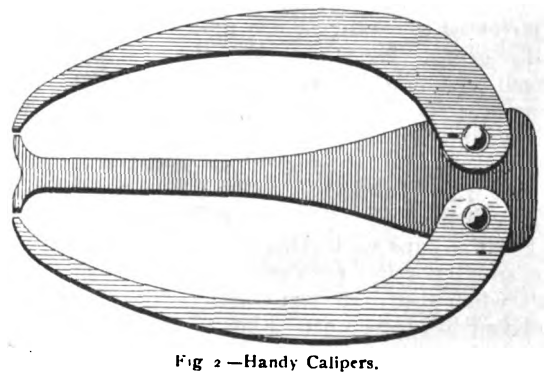


Fig 2.—Handy Calipers.

and the journal rattles a bit, just loosen the caps, take out a thickness of paper, screw the caps home again, and there you are, with well fitting blower bearings in less than a minute. Wooden liners may be reduced in thickness by planing one or more chips off of them, and some machine manufacturers send out their machinery fitted with wooden liners made of several thicknesses of thin wood. Then, when liner reduction is necessary, it is easily done by removing a layer of wood and replacing the remaining portion of the liner.

When a blower bearing is fitted "brass to brass," as the locomotive engineers say, it is a troublesome job to take up lost motion in the blower journals, but with a few thicknesses of paper between cap and bearing, it is the work of only a few seconds.

Just another paragraph or two regarding that blower. The use of large oil cups is advised

when they are used at all, with tallow plastered "on the side" to take care of the journals when the cups run dry. The writer has for a number of years of busy work designing machines of various kinds and has almost entirely discarded the oil-cup, and as for the open oil-hole, I haven't laid down one of those abominations, on a machine for ten years.

On all continuously running journals, ring or chain oiling devices are used whenever possible, and on little journals which are operated intermittently, like those of forge blowers, it is the writer's custom to use compression grease cups whenever it is possible to put them on, and to use little oil-plugs where there must be hand-oiling. These "oil-plugs" are about ⅜ inch in diameter and are driven into open oil-holes which are reamed out to that size. When oil is to be put into a hole, the spout of the can is pressed against the little ball which closes the end of the oil-plug. A little pressure forces the ball out of the way, oil is squirted into the hole, and when the can spout is removed, the ball bobs back into place and closes the oil-hole very effectually against the entrance of dirt or other foreign matter.

The compression grease cups may be obtained in various sizes, from a little one-half ounce affair to one big enough to hold half a pint of grease. These cups have a screw cover which goes away down over the sides of the cup and to feed the grease into the bearing, just give the cover of the cup a quarter-turn, an eighth-turn, or whatever motion may be found necessary to send down the amount of grease required at each oiling of the journal to which the cup may be attached.

There are several kinds of cup grease, each kind being prepared for a certain use under certain conditions and the oil-man will select the proper kind of grease after you tell him just how it must work. He will give the proper kind, for winter and for summer, for light work and for heavy. There is, however, one kind of grease which can always be relied upon to work when other kinds fail under severe conditions, and this kind of grease seems to be a sort of universal "cure-all" for hot bearings and all their attendant ills. I allude to the well-known "Albany Grease," which has stood the test of a quarter of a century's use under all conditions. This grease has the odor of freshly broken peach-pits, and the only thing against it is its comparatively high cost. It may be that this fine lubricant is now in the oil trust, but it was not originally one of their products—in fact, Albany grease was a staple before the oil trust was more than a little kid!

Fill the cups with Albany grease, screw down the small portion required by the blower bearings when you first start the fire in the morning, and you have no more oiling to do all day long. When the cups are empty, you know it instanter, for you can't screw them down any farther, and filling the cups is in order right then and there. This grease is far better than tallow, even for use to "plaster one side" of oil cups. Albany grease melts easier than tallow and has more lubricating power than even than once much used substance.

One fine thing in favor of grease lubrication, is that when the bearing warms up a bit, the grease becomes thin like oil, but unlike oil, the entire contents of the cup cannot run out before needed, and be lost. Instead of that, grease is only forced into the bearing as required, and there being a constant flow of grease through and out of the bearing, it is impossible for dirt or even dust to get into the bearings, no matter how they may be exposed to flying grit.

Someone asked, not long ago, for a way of laying out the cover for a baseball. Now, covering baseballs is a little out of the line of blacksmiths, but a good many of the craft know how to use baseballs, all right, so it won't harm them to know how to lay out a new suit for the sphere after some enterprising batsman has "knocked the cover off!"

First, find the circumference of the ball, which it will be assumed is 9 inches. Divide that into four equal parts, because at certain points on the ball, it will be seen that the two pieces of cover fit around the ball in equal segments. These points must evidently be at C, and E, Fig. 3, and are thus laid down at one-fourth and three-fourths the distance A, B, or 2⅛ inch respectively from the ends of the circumference, A, B.

The radius of the large end of the half-cover, is found to be one-half the distance across the wide end, therefore, the radius is 1⅛ inch. As the narrow part of the cover is half the width of the wide part, then the narrow portion must be 1⅛ inch also, and this is marked on the drawing at D. When in position, the narrow part of one piece of cover comes between the ends of the other part of cover, therefore, each strip must be 8 inches long, and the length thus found is marked between F and G.

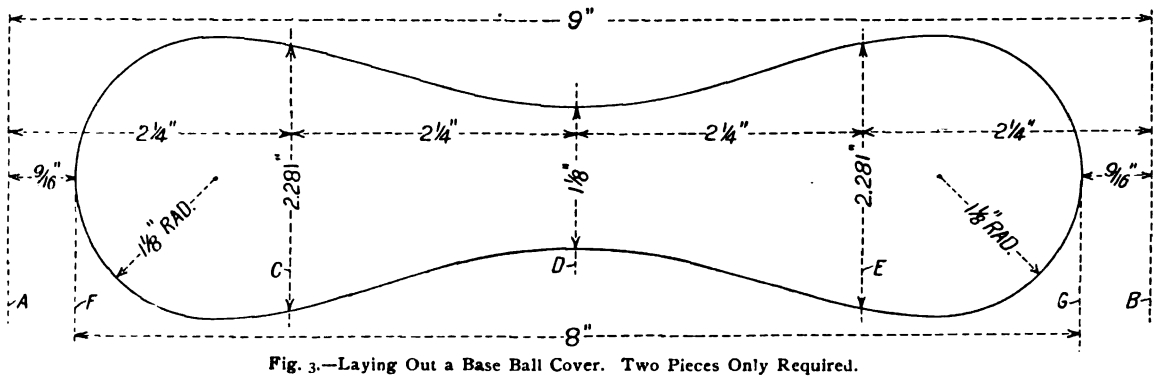


Fig. 3.—Laying Out a Base Ball Cover. Two Pieces Only Required.

We now have two points at D, equal to the width of cover at the narrow point, and if we open a pair of compasses 1⅛ inch and draw a half-circle just touching the line F, and then continue the curve by the eye, from line C to D, repeating the operation at lines G and E, then we will have the shape shown by Fig. 3, and it will be a pretty close approximation to a well-fitting baseball cover.

To be sure, this method is not a scientific one, but it is a "get-there" method which will enable any man or boy to lay out a baseball cover or any similar shape in a very few minutes, and the pattern will be correct enough for all requirements.

CARRIAGE MAKERS' TOOLS.

How to Encourage Apprentices and Secure Interest and Good Work.

The necessity of good tools, says the Australasian Coachbuilder, has been seriously neglected by so many young men in the coachbuilding trade of late years, both masters and journeymen that it is rarely that one finds even a passable kit, and very seldom indeed a good all-round one with which to do a fair range of work.

It is a sad thing that this is so, because of the wasted energy and indifferent work that is the result. The weekly output is so much less, and that which is accomplished so inferior, that it behooves the trade generally to look into the matter and make a move at once towards a much improved condition of things.

It is not only the journeyman that is standing in his own light. The apprentice is kept in the dark, and only gropes through his apprenticeship, and only the exceptionally smart ones ever see the light until they travel about and have the luck to get into good company on good work. But the masters stand to lose most. Take one item only—the difference in the weekly output of a competent and an incompetent, which may safely be put down at 20 per cent.; what is the result? The latter yields very little profit; but the former shows a large profit to say nothing of the quality of the work, promises kept to time, the feeling of certainty that the work will be faithfully carried out, and the friendly circumstances at all times. Multiply this by the number of employees and note the income returned. The difference in the wages is often not more than one shilling per day. It is a good business proposition at two, or even three, shillings.

There seems to be little use of blaming anyone or anything in particular, but it is the result of stupid short-sightedness on the part of employers in their conduct towards the boys. They give them no encouragement; it is nobody's duty to teach them; nobody has time; and in many cases there is no one capable of judiciously handling the lads. Everybody seems to be in a state of semi-perplexity or don't-careness in many coachbuilding shops. Let us suggest then that the masters take an interest in the lads, and the lads take an interest in their work. The boss sees that the boy gets a fair chance at the bench, and is not always doing jobbing; and also that when he has a new job on sees that he is not taken off it till finished. He (the boy) may then do a few days' jobbing, but has the knowledge that he will soon be on the bench again with a new job. Let the boss take an interest in his kit, and advise that the best tools only are worth buying. The lad will soon get into the habit of buying a chisel now and a bit or brace next pay, till he gets quite a decent collection. He will soon be worth far more than his wages, and the boss should seize the opportunity to do the right thing to help him with his kit.

In the beginning of things, a good tool chest gives a boy a pride in his trade. Give him the material for it, and allow him at least some of the time to make it; furnish him with a good design, and let the painter varnish all the inside fittings that are made of fancy timbers, and also do any little decorating desired, such as a monogram, etc. No boy with a good tool chest is likely to be a failure. He will certainly make an effort to put good tools in it, and if he has the tools, he will desire to use them. Undoubtedly, he will be the better man for it.

Saws.

Let us go into the question of keeping a kit in good working order. The saws should be kept well set and sharpened, therefore a good saw set should be bought with the first saw. There are many varieties, but the best is designed to use like a pair of pliers, and will set tenon, panel, and handsaws. The filing may be done in several ways, but from experience I find that the best method is to file straight across and sharpen each tooth consecutively, beginning at the point and working to the handle, and all teeth are sharpened from the one side of the saw. The file is held exactly at right angles, and is run straight across the saw. A good pair of saw claws should be made of hardwood and the saw set between them and well secured in the vice and a small cramp also put on. Then the filing should be done at the spot gripped by the vice, and the saw moved along to get the benefit of the vice grip. When the saw has been sharpened a few times it will require to be faced, i.e., straightened over the teeth. This may be done with a flat file held lengthwise on the teeth points and traveled along the whole length of the saw, seeing at the same time the file is held square with the side of the saw blade. There are many other methods of filing saws, and many different types of teeth; but we are now dealing with elementary work.

It will be a pleasure to answer any question sent in to this journal by boys and young men in the trade.

Planes require to be kept in good trim and always true on the face; the mouth should never be allowed to wear too wide. A mouthpiece can easily be nicely set in, thereby keeping the cutter up to its work. The cutter or plane iron should be carefully ground with a more or less rounded cutting edge, according to the kind of plane or the work that is expected of it. The back iron indicates the shape, and the position of the back iron on the cutter iron will be regulated to the kind of work to be done. If rough work, set it well back; if a fine shaving is wanted, set it close up and see that it fits close at the point, so that shavings cannot work their way in between the two irons. Grind and set the cutting edge to the same shape as the back iron, so that the margin is parallel right across the face of the cutter; also see that the wedge fits nicely; and have the handles good and firm; if they get broken replace them at once.

Chisels should have special care, and should be most carefully used. Never leave them lying about on the bench, but keep them in the rack when not in use. Many nasty accidents have occurred by having them lying about,

and it is impossible to keep them properly sharp by doing so. How often one picks up a chisel to find that one corner is chipped, perhaps both; and what use is a chisel with the corner off? If it is a mortise chisel, it runs to one side and spoils the mortise, and if a paring chisel loses its corner it is useless and time is lost grinding it again.

By the way, in many shops what an awful thing does duty for a grinding stone. Another hint for the boss.

Get the habit of laying a chisel down face up, so that the keen edge does not touch the bench; there is always a certain amount of grit and dust about, and that spoils the edge, and that keenness is rubbed off which is so essential. The chisel is the most delicate tool in the kit, and requires the best of care.

The Brace and Bit.—In bodymaking, where so many screws are used, it is as well to have three braces: one for the shell, to bore for the shank of the screw; one for the countersink; and one for the screwdriver bit. They should be all ratchet braces too, so that they may be used at all times and in any corner where screws are required. The brace should be of small crank and handy size, except the one for the screwdriver, which may be of larger crank, so that it may do a turn for boring big holes with the larger twist bits.

It is well to procure a full range of bits and use them strictly in accordance with the requirements of the screws or bolts to be put in. Practice boring holes true with the face of the job, i.e., at right angles, especially in the case of screws; they can then be safely turned in tight and seldom break.

The oil stone should be a good one, and the face of it kept true. Set it in a good stock with a lid on it. It will be found an advantage to set in the stone on its edge; it will do the work quite as well, and does not work hollow in the centre. Spokeshaves can then be sharpened on it conveniently. Use only good oil; Neatsfoot is the best.

The spokeshave is a difficult tool to keep in trim; the face wears away quickly, and should always be used most at the corners of the cutter; the centre will always wear down quick enough. When replacing the cutter after sharpening it, chalk the pins that fit into the stock; this drives up any oil that may be on them, and your cutter will not slip. As the stock wears, let the cutter down further into it and ease out a little from under the cutter and plane off the face, being careful to retain the correct pitch of the face. By doing that the mouth will always be kept close and the tool work freely.

A lad that looks after his edged tools is not likely to neglect to have good hammers, spanners, drifts, punches, saw files, sandpaper corks, scrapers, try sticks, rules (2ft. and 4ft.), bevels, mitre gouges, draw-knife, cramps, compass, and a host of useful knick-knacks that go to make up a good kit worthy of a good man. That is how good wages and billets are obtained and retained.

School for Carriage Draughtsmen.

This school was founded and has been carried on by the Carriage Builders' National Association during the past thirty-one years. Has its home in the Mechanics Institute, at 20 West Fourty-fourth street in New York City. Its object is to teach men to design vehicles, and to make working drawings and fashion plates of the same, and only those men employed in carriage, wagon or automobile building, or some of the accessory trades, are admitted. Instruction in the day and evening classes is free. The fall term opens on the last Monday in September and closes for the Christmas holidays. Winter term opens on January 3d, and closes on April 8th, 1913.

Instruction will also be given by correspondence to the employees of carriage, wagon and automobile builders and members of the accessory trades, at their homes, by means of the so-called "Chautauqua System." This system consists in giving instruction to out-of-town pupils through the mail, by Lesson Paper, on making free-hand, geometrical, scale and working drawings, each paper calling for responses in the form of hand drawings or written replies, which are afterwards examined and corrected by the Instructor Mr. Andrew F. Johnson. Applicants for admission to the evening class must have a letter of recommendation from his employer and must remit in advance $5, which will cover all fees for instruction during one term. Each pupil will be expected to provide himself with necessary drawing instruments, paper, etc., and to prepay postage on all communications sent to the teacher.

Works of reference and text books will be recommended to pupils who show the need of such help; and, if desired, these, as well as drawing instruments, papers, etc., will be supplied at cost price by the teacher. This department is kept open during the entire year, and pupils may join at any time.

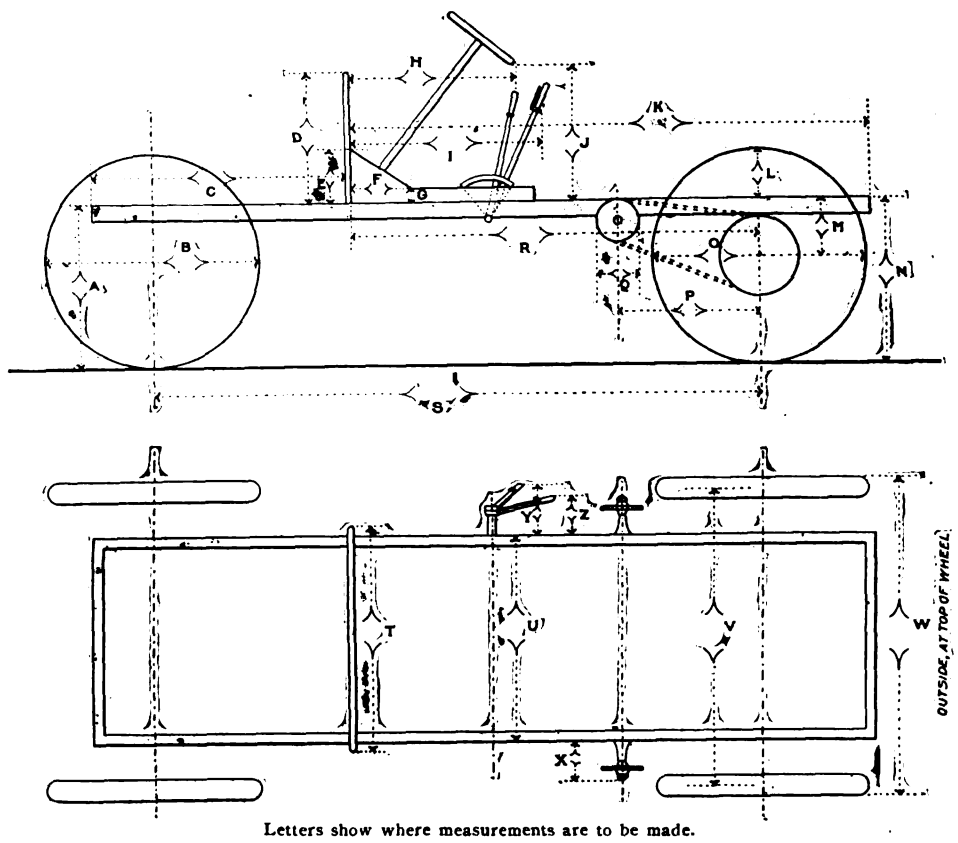
Ninety per cent. of the graduates are holding good positions in the carriage and automobile trade, and the demand for men trained in the School is constantly increasing.

For further information address Andrew F. Johnson, Instructor, 20 West 44th street, New York City.

THE BODY BUILDER.

Directions for Correctly Measuring Dimensions of the Chassis.

From G. J. M., New York.—In these days of strenuous business activities for the repair man when the volume of business depends so largely upon quick deliveries of the finished article to the customer, and incidentally upon the delivery coinciding with the promise to deliver, it is essential to adopt more system in doing the work than has heretofore been thought necessary.



Letters show where measurements are to be made.

The revivifying influence of being up-to-date is always accompanied by the genial spirit that throws open its doors and invites the public to come in and inspect the work. One of the newest things that is meeting with praise from all who have tried the experiment is the issuing of blank forms or diagrams, similar to the one in our illustration. By similar we mean one that is applicable to the needs of your particular business.

The impression that is produced upon your customer is alone worth the initial cost of the printing, because he realizes that you are prepared to do business and are not intending to make your first acquaintance with the automobile business at his expense. The business effect in connection with such a diagram as our illustration is apparent to any one who is used to having method in his work. It is an aid to the memory and it produces an assurance in the mind that nothing has been forgotten. Your customer can be relied upon many times to fill out the measurements, thus saving time and expense to the busy repair man. Another thing, the customer becomes acquainted with the intricacies of the repair man's work, when he fills out the blank and he will understand and appreciate a fair price for the job. The chart or diagram here shown is designed for use when measuring the chassis for the body builder. It is applicable for any and all makes of cars, and when allowing for clearance between the rear wheel and the mud guard or fender allow for the addition of skid chains. This is very important and will avoid any disagreement with your customer later on. The proper clearance between wheels and mud guards is the amount that the springs will deflect under the maximum load.

Carriage Convention Hotel Rates.

The Fortieth Annual Convention and Exhibition of the Carriage Builders' National Association will be held at Atlantic City, N. J., September 23 to 27, 1912, on the Million Dollar Pier. The Pier is strongly built, well lighted, has all conveniences, and is an ideal place for both the business meetings and the exhibition.

Good hotels are so numerous at Atlantic City that only a few of them are mentioned principally because of their convenient location relative to the Million Dollar Pier and the official headquarters of the C. B. N. A., which will be at the Marlborough-Blenheim, the same as last year.

Marlborough-Blenheim — American plan: Without private bath, for one person in single room, $4.00; in double room, $5.00; for two persons in double room, $8.00; in extra large rooms, $9.00. With private bath, for one person in single room, $6.00; in double room, $7.00; for two persons in double room, $10.00; in extra large room, $12.00.

European plan: Without private bath, for one person in single room, $2.00; in double room, $3.00.

St. Charles—Without private bath, for one person in single room, $3.00; in double room, $4.00.

Strand—Without private bath, for one person in single room, $4.00; in double room, $6.00.

Haddon Hall—Without private bath, for one person in single room, $3.50; in double room, $5.00; for two persons in double room, $6.00; in extra large room, $12.00.

Chalfonte—Without private bath, for one person in single room, $3.50; in double room, $4.00; for two persons in double room, $6.00.

Clarendon—Without private bath, for one person in single room, $2.50; in double room, $3.00; for two persons in double room, $5.00; in extra large room, $6.00. With private bath, for two persons in double room, $7.00; in extra large room, $7.50.

Morton—Without private bath, for one person in single room, $2.50; in double room, $3.00; for two persons in double room, $5.00; in extra large room, $6.00. With private bath, for two persons in double room, $7.00; in extra large room, $8.00.

Holmhurst—Without private bath, for one person in single room, $3.00; in double room, $4.00; for two persons in double room, $6.00; in double room, $7.00. With private bath, for one person in double room, $5.00; for two persons in double room, $7.00; in extra large room, $8.00.

WEAR OF PAINT AND VARNISH.

Means at the Command of the Car Painter to Prolong Their Durability.

BY M. C. HILLICK.

The automobile painter should acquaint himself with every medium which may in one way or another contribute to the durability of the paint and varnish applied. In the first place it is essential for him to know that there is no small difference between the wearing properties of different colors. Japan ground colors are naturally brittle colors, and, of course, some are more brittle than others. All such colors are in a sense artificially stimulated, and under this treatment they furnish when kept properly protected by ample coats of varnish very good wearing service.

Black and dark greens are accounted the most brittle of all the Japan ground colors, black itself being particularly so, although through the stimulating process referred to, it has for years ranked as a durable color, and in the painting of electric vehicles and horse-drawn pleasure carriages it is, and is destined to be for years to come, exceedingly popular. Take the case of ivory black for example, as showing the brittle properties or mediums from which it is derived. This black is prepared by carbonizing waste fragments and turnings of ivory. These fragments are exposed to a red heat for some hours in crucibles, great care being exercised to avoid overheating or burning.

By grinding this product in Japan, the brittle quality of the pigment is still further increased, so that it is easy for even the non-technical car owner to understand that without some expert treatment by the painter the color would be rather short lived.

The dark greens used upon automobiles are largely made up from a mixture of black and yellow and therefore carry over much of this same brittle quality. Ultramarine blue, and some of the other beautiful blues, all popular automobile colors, are derived from a mineral or earthern base, and while some of the natural strength and power of these pigments is perhaps destroyed during the process of manufacture the painter, as a rule, is able to so fortify them on the surface as to furnish a very satisfactory service.

Maroon, and not a few of the popular automobile reds, and the beautiful toned lakes, have within them numerous weak and unstable elements, but by a method of preparation and application to the surface, and through the aid of ample varnish protection, they are put upon the surface strong and good and well qualified to satisfy reasonable car owners.

Gray colored cars have proved and are proving popular, and we suspect that there is something besides the color itself that makes the car owner like the various toned grays. Gray is made up from a white lead base the wearing capacity of which goes unquestioned everywhere. Hence the gray color, other things being equal, is practically certain to wear like your grandmother's homespun apron. It is likewise a safe conjecture that any and all of the grays, and creams, and yellows of the paler cast, are surely good wearing pigments if given a fair chance.

In the matter of fortifying the dark, or medium dark, Japan ground colors—giving them a stimulant, in other words—certain rules should be insisted upon whether the car is being home or professionally painted. This stimulant is used in the form of raw linseed oil, the following practice being recommended: For first coat color over surfaces which carry no preparation coat, either on body or chassis, use one part raw linseed oil to four parts turpentine. All colors, let us understand, to which this adjustment of binder is added should stand over night before being recoated. In the event of being crowded for time use one part raw linseed oil to six parts turpentine. The second coat of color should also contain a binder of oil consisting of one part oil to nine parts turpentine.

Another point in using Japan ground colors which the man who paints his own car, and the man who hires the work done, may alike heed to advantage, namely: Let each coat dry properly before putting another over it. Make every tub stand on its own bottom, to put the issue in another way. So far as possible preserve the purity and the original tone and shade of the color by using a bit of the color in all the rubbing coats of varnish excepting the final one. Be very sure, moreover, that the foundation surface, whether new or old, is alive and endowed with strength. A strong and durable foundation is the bone and sinew of the whole paint fabric when it comes to the final analysis.

Finally, to make the "calling and election" sure for the color, keep it generously protected under wearing coats of finishing varnish. This is the sum of the whole matter, and if well attended to the entire paint and varnish fabric is bound to "make good."

An Indifferent Horseshoer.

From the Australian Coach Builder and Wheelwright.—The problem of getting skilled mechanics presents greater difficulties to the employer in the country than it does to the employer in the city. To get over the difficulty some employers have sought the aid of union secretaries, who are ever ready to protest that there are plenty of good men available. A coachbuilder in the country a few months ago was in want of a farrier. He made known his want to the Secretary of the Coachmakers' Union, and the latter sent him a man to fill the position, the employer advancing the railway fare to a town situated about 200 miles from Sydney. When he arrived the new comer was given a horse to shoe, the employer standing by meanwhile to see how he shaped. The smith looked at the horse and then, running his eyes over a number of shoes displayed upon the wall, selected a set which took his fancy. He took one of the shoes from the wall, lifted the horse's hoof, took the cold shoe up in the tongs and placed it on the hoof. As he did so he looked up at his employer, and remarked, with a satisfied air, "Don't you think that will fit, boss?" He was about to proceed to nail the shoes on without clipping or further shaping, when the boss stopped him, and told him he could go. The new smith protested stoutly against such summary treatment, and declared that if he were only given a chance for a few weeks he would do all right. The boss, however, was obdurate, and the new comer had to leave richer only by an offer of 5 shillings. The Secretary of the Union threatened to summon the employer if he did not refund the cost of the man's return fare to Sydney and a week's wages, but nothing came of the threat.

Italian Draft Vehicles.

The illustrations show the rudimentary vehicles that are often seen in Italy, and they are far more crude than were used even in the colonial days of this country. The first is a team seen in Naples, the load a heavy one, and although well balanced, it must be rather hard for the poor ox, the horse and ass being hitched as extra side draft animals. The second picture shows the wine carts of the Roman Campagna. The hood or canopy is to shield the driver from the rays of the hot sun, or the dust when the wind blows across the wide

Italian Buffalo Team.

Wine Carts of the Roman Campagna.

plain through which the Appian way runs. The third picture is a team of buffalo drawing the wagon of the Campagna farmer. In this connection it may be stated that in no civilized country on earth are animals abused as cruelly as in Italy and Spain. After centuries of such

A Neapolitan Draft Team.

use, the beasts of burden all seems to have a wretchedly dejected and wobegone appearance. Largely through the influence of visiting Americans, however, the poor dumb brutes are now being used better by the human brutes.

These pictures were all courteously sent us by Mr. F. E. Saward, editor of the Coal Trade Journal of this city, who has been for some time abroad.

BILLIONS OF NEW WEALTH.

A Remarkable Crop Year and What It Means For Prosperity.

Declaring that more than $9,000,000,000 in new wealth will be produced from the soil this year in the United States against a production of $8,000,000,000 in 1911, George M. Reynolds, president of the Continental and Commercial Bank of Chicago, the biggest commercial bank in the United States, in a statement the other day, declared this year will be one of unprecedented prosperity, taking into consideration that fact that it is a "presidential year." The statement follows:

The soil is richly rewarding the toil of man this year. Reports from our investigators all over the country indicate the following estimated yields of the principal crops:

Wheat, 660,000,000 bushels.
Corn, 2,800,000,000 bushels.
Oats, 1,200,000,000 bushels.
Barley, 200,000,000 bushels.
Cotton, 13,100,000 bales.
Hay, 60,000,000 tons.
Potatoes, 360,000,000 bushels.

Present crop conditions justify an estimate of $9,033,966,000 in new wealth to be produced from the soil this year, against an actual production of $8,417,000,000 in 1911. There is ahead probably 12 months of good, active business with moderate profits.

Business men throughout the country are acting with caution, but their utterances indicate very clearly a greater degree of courage than is usually noticeable in a presidential year, despite the rather mixed political situation and the possibility of reversal of many governmental policies through a change of administration. There is a noticeable disposition to disregard politics and attend strictly to business.

There is no section wherein crops have failed. The production this year in almost all things is above the average.

Not only is labor well employed this year, but there is a noticeable scarcity at nearly all the leading centers, both in skilled and unskilled labor.

Railroads, through enforced curtailment, have not been able to keep their equipment up to the requirements of the present business activity. Hence it would not be surprising if there is considerable congestion during the crop moving period.

This means not only prosperity for the farmer but for the mill employee, and it means unexampled prosperity for the great railroads which have already begun to consider the important matter of supplying the necessary freight cars to move these enormous crops.

The great Pennsylvania Railroad, one of the largest systems in the world, has instructed all of its freight solicitors to urge shippers to assist the railroads in their efforts to prevent any car shortage. The importance of prompt loading and unloading of cars is being impressed upon shippers, who are also being asked to co-operate with the railroads to prevent any congestion of traffic.

The Pennsylvania, in pursuance of its policy in such cases of taking early steps to preclude, if possible, any likelihood of a car shortage on its lines, is advising its patrons to have freight ready for loading when cars are placed on sidings, and is urging them to load all cars as near to capacity as practicable, in order to get the greatest possible service out of each car used.

The prediction by the Pennsylvania of a heavy fall traffic is especially interesting at this time, following, as it does, a statement just issued by W. A. Garrett, Chairman of the Association of Western Railways, in which he makes an appeal to industrial traffic managers and commercial organizations. Mr. Garrett says:

"The time is here for the railways and shippers of the United States to begin active and energetic preparations to prevent a car shortage. The indications are that if they do not begin such preparations at once they will be confronted next October with the worst situation that has existed since October, 1907, just before the panic. No railway man or shipper needs to be told what that situation was. Railway facilities were inadequate to move the business. Yards and terminals were congested, and heavy loss to the railways, the shippers, and the public resulted.

"Conditions that are likely to cause a heavy demand for, and a rapid reduction in the supply of cars, exist. The amount of traffic handled varies greatly during different parts of the year. During about four months, beginning around October 1st, there are apt to be shortages. This is owing chiefly to the fact that that is the season of heaviest crop movement. Now, the crop prospects in the West this year are unusually good. That helps to make the prospect of a car shortage unusually bad.

The idea is pretty general, and equally reasonable, that a wide mill band will cut straighter than a narrow one; and, also, makes more work for the filer to keep it up.

ELECTRIC WELDING.

How Heat For This Purpose Is Generated and Used.

Like many other mechanical processes of comparatively recent development, electric welding seems to be more or less shrouded in mystery, so far as the non-technical public is concerned. As a matter of fact, however, the fundamental principles that govern the use of electricity in joining together metal parts are extremely simple, though the apparatus required for the actual process is rather complex.

Every conductor of electricity offers resistance to the passage of the mysterious fluid; some substances offer more resistance than others. If a current is passed through a conductor that offers considerable resistance, heat will be generated in proportion to the degree of resistance and the strength of the current. The greater the volume of the current the higher the resistance will be for a conductor of a given material and size. Therefore, if a current is passed through a wire that is too small to carry it, the wire will heat. Any conductor can be heated by overloading it. This is the principle that is applied in electric welding. Two pieces of iron or steel are made the terminals of a dynamo which generates a heavy current at very low voltage. When the ends are placed together the current will flow from one to the other, but the resistance at the point of contact will be so great that the metal will rapidly heat and the two pieces fuse together without any necessity for hammering or pressing and without flame, dirt or ashes to interfere with the perfect union. As the resistance is greatest at the point of contact, the heat will be localized there, avoiding unnecessary heating of the rest of the metal and economizing current.

Electricity is applied to the heating of metal in another way that, while somewhat similar to the welding process, is different in most respects. Instead of using the heat generated by the resistance of the metal itself, the heat of the electric arc is made to do the work. The arc process is useful, among other things, for filling holes in steel and other castings. The casting operated upon is made one terminal of the source of current by being connected to the positive wire from the dynamo, while the negative wire terminates in a rod of carbon. The operator, who has to be carefully protected by a headgear with colored glass goggles, and wears heavy gauntlets, touches the carbon on the casting at the point where the filling is to be done, and then draws it away. The current follows the carbon, jumping across the air gap and generating a heat so intense that the metal soon begins to melt at the point where the arcing occurs. As soon as the melting point is reached a rod of iron is held in the hot spot and melted into the hole until the cavity has been filled completely; the filling welds itself to the walls of the cavity and makes a repair that is about 75 per cent. as strong as the solid casting. If the walls of the hole are scaly and incapable of uniting properly with the filling metal, the casting is turned over and the arc applied to the walls of the hole until the impurities are melted away, when the casting is righted and the filling proceeded with.

The operator has to exercise extreme care in protecting his skin from the glare of the arc. Failure to do this will result in a sort of burning wherever the light reaches the skin; the injury is something akin to a sunburn and its consequences are extremely unpleasant, to say the least.

Individual starring is an American characteristic, and it is that which makes people great, but at times it is a little hard on the team-work idea.

It often happens that people think seriously of marriage after they have taken a hand in the game.

A kiss on the forehead denotes reverence, but most girls don't care for that kind of reverence.

A boy doesn't necessarily have to attend an agricultural college to learn how to sow wild oats.

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SEPTEMBER, 1912.

PARTIAL CONTENTS.

TO OUR READERS.

It will be considered a decided favor if our friends will send us contributions in relation to the blacksmith or wheelwright business, or ways they may have for doing work. During the summer months when the evenings are short there is always a falling off in contributions of this kind, and sometimes it is difficult to get matter of the right sort for publication.

For every acceptable article sent us until further notice we will make the writer a present of a watch or a knife, as he may choose. The watch is a stem winder and stem setter, is carefully made, and is guaranteed for one year. The knife is as good a one as we can get made, and is likewise guaranteed in material and workmanship.

Such contributions may be about horseshoeing, wagon making or repairing, the use or care of tools or machines, prices for work, competition, automobile repair, or anything that concerns the business for which this magazine is published.

Many of our readers have ideas of doing work or carrying on a shop which are of decided interest to their brother craftsmen in other localities. In not a single instance will it injure their business to have such ideas published, and if there are a dozen articles of this kind in each issue, each member of the craft will receive in return twelve times as much information as he has given, and in addition a watch or knife as he may choose.

Please write plainly, on one side of the paper, send pencil sketches for illustration whenever necessary to make the subject better understood, and state in your letter which you prefer, the watch or the knife, which will be forwarded immediately if the article is acceptable.

Although we trust our old friends may not overlook this, new readers will, of course, also be welcome.

LET THE MACHINE DO YOUR WORK.

The lack of business success is today due more to doing things "the way I have always done them" than anything else. The blacksmith who is doing things the way he has always done them is not doing them the best or the quickest way any more than is the merchant or the manufacturer, or the doctor or dentist.

There are no better brains today than there ever were. Indeed, we believe there are not as good, if we compare them with the giant intellects of the 18th and 19th centuries. But the thinking man of today has all the experience and evidence of the past to instruct him.

It is thus the world progresses. We can profit by the mistakes of the past as well as by its successes, but we should be careful to not let the past hang about our necks and prevent us from keeping in the van of progress.

There has been a greater change in methods of doing business within the past 100 years than during all the preceding centuries of Christendom. One hundred years ago muscle or brawn was king. Today mechanical power guided by the brain of man, is king. One hundred years ago success in business lay in the expense of physical labor; today it lies in the saving of physical labor.

If any reader is toiling hard from morning until night and getting only a bare living, we urge him earnestly to get the latest tools and machines and save much of this hard work. Let the time thus saved be better employed in working up more business.

It is indeed often difficult to get out of the rut and easy to drive along in the rut. But after the twist or turn has been made success usually follows as sure as the day follows night.

"IT MAKES A DIFFERENCE," ETC.

It is suggestive to note how quickly there is a call in free trade England for a tariff duty on anything that can be made in some other country for less than it can be made there. It merely goes to show that the desire for free trade in England will last only as long as she can manufacture cheaper than other competing countries.

In other words, Great Britain upholds free trade for the benefit of Great Britain, and she will as strongly uphold protection when that is for the benefit of Great Britain. Both protection and free trade are purely selfish movements or policies.

We began making automobiles in this country several years ago and at about the time they began making them in England. As is usually the case, we adopted machine methods sooner and to a far greater extent than they did, and because of the higher cost of hand labor here. The high cost of labor is always a spur to its displacement by the labor-saving machine. In countries like India and China, for instance, where wages are just one step removed from nothing, and the working man is worse off than the slave, because the slave was sure of food and shelter, while their workers are not always sure of it, there is practically no machinery.

Well, as the labor in this country costs more than it does in England, we naturally were the first to adopt machine methods, and having done so we now produce a certain style of a low-priced automobile cheaper than they can do it and these are being imported into that country to the English manufacturer's detriment. So the cry is being raised there: "We must either put a tariff on such cars or adopt the American method of machine production."

This is a practical way to look at the situation and it is the way that the most ardent protectionist of this country does and should look at it. The English free trader is a practical man and if he were living in this country as a naturalized citizen he would be a strong protectionist.

It is easy enough to see why free trade is the policy of Great Britain and why her citizens are free traders; it is easy to see why protection is the policy of the United States but not easy to see why any of her citizens are free traders.

It "makes a difference whose ox has been gored." As long as England can produce more cheaply than in this country, owing to her far lower wage rate, she would like to see this country open up her markets to her manufactures, but when we begin to compete in her home market she cries to have the bars of a tariff to protect her.

SIZE AND WEIGHT OF WHEELS.

The Missouri Agricultural Experiment Station has been making some tests concerning the draft of wagons equipped with wheels of various heights and different widths of tires, but nothing new or unexpected resulted. It was demonstrated that for the same load, wheels of standard height drew lighter than those with lower wheels, and that low wheels cut deeper ruts than high ones. But every wheelwright already knew this. As to the general conclusions, it was stated that the best form of farm wagon is one with axles of equal length, broad tires, and wheels 30 to 36 inches in height in front and 40 to 44 inches behind.

As the wheel is one of the most ancient ideas in mechanics, having been applied to vehicle propulsion hundreds of years before the Christian era, it would seem as if the finality of size, proportions and general construction would have been reached long ago, but this is not the case. Some years ago, when the bicycle was so generally used, the writer of this became much interested in the proper size and proportions of wheels in relation to the power necessary to propel them, and careful and prolonged observation seemed to indicate the following rather interesting facts:

Weight added to the rims of wheels very much increased the power necessary to propel them, while weight added to the centers or hubs had far less effect. Light wheels propel very much easier than heavy ones, and large ones easier than small ones, although it is essential to increase the weight of a wheel much faster in proportion, when increasing the size, in order to maintain the desired relative strength.

To better comprehend this question of the weight of wheels in relation to the necessary power to draw them, let the reader procure for a test, a light horse drawn carriage fully equipped, and likewise the running gear of some heavy wagon—stripped of everything possible save the axles and wheels. Have the two vehicles as near as possible of the same weight. Then test the comparative power necessary to pull each. He will find that the heavy wagon pulls far harder than the light carriage, although each is of identical weight. Or let him make a test of the power necessary

to propel the same vehicle with light wheels and with wheels twice as heavy, and the result will be the application of nearly twice as much power to pull the vehicle with the heavy wheels as with the light ones. But let him put some commodity in the carriage when it has the light weight wheels attached; let it be of the same weight as the difference between the weight of the heavy wheels and the light ones, and he will find that the necessary propulsive power is not greatly increased.

It is, of course, true as the Missouri experiments have demonstrated, that wheels of what may be called moderate height pull easier than low ones, but we should be glad to know whether this would be the case if the surface of the road over which they are drawn were absolutely level. It would also be interesting to know the relation of propulsion to the angle of pulling; how much difference it makes in pulling a given load whether the pulling be horizontal or whether it be upward or downward.

A GOOD DEFINITION.

It is rather singular, if not absolutely amusing, to note the different ideas that are held concerning the qualities that go to make the terms, "gentleman" and "lady." Some are so very strenuous as to the idea that neither wealth nor social position should have any determining influence that they emphasize so-called menial occupations in connection with them, as for instance, "the lady who does our washing," or "the gentleman who works for me."

Now as a matter of fact, neither occupation, education, wealth or poverty, attire, nor even the outward forms of courtesy or politeness, have the slightest connection either for or against the correct meaning of the word, gentleman. In some memoranda found among the papers of Gen. Robert E. Lee after his death were the following jottings: "The manner in which an individual enjoys certain advantages over others, 'is a test of a true gentleman." And he adds, "The power which the strong have over the weak, the magistrate over the citizen, the employer over the employed, the educated over the unlettered, the experienced over the confiding, even the clever over the silly—the forbearing or inoffensive use of all this authority, or a total abstinence from it when the case admits it, will show the gentleman in a plain light." Finally, the memoranda close with this noble expression: 'A true man of honor feels humbled himself when he cannot help humbling others."

Brought right down to the fewest words, the best definition of "a gentleman" is one who has consideration for the rights and feelings of others, and the same application may be made with respect to the word "lady."

FEW LEARNING THE TRADE.

One of our readers in Canada writes that he has all the work he can do and he gets good prices, but that none are learning the trade, and the workmen are all leaving for the west.

There are probably two reasons for this. One is that the dignity of labor has never been at a lower ebb than at present, and this is the principal reason. The scramble for wealth and the respect paid to wealth could scarcely be more unseemly and nauseating than now, but the prevailing tendency is to get it by some quick way—some other way than by honestly working for it. The idea is to get it by shrewdness, by sharp wit, by sagacity, rather than by the old-fashioned honorable way of legitimately earning it.

The second reason for the lack of young apprentices is the fact that the employer does not take the personal interest that he used to do in the lad who learns a trade of him. Disguise it as we may, the employer of young workers or old, who tries to get as much from his help as possible and to give them as little as possible in return, will find that his employees will try to get as much out of him as possible and give him as little as possible in return. There are honorable exceptions, it is true, and both among employers and employed, but the general tendency is as stated, and both parties to the transaction may well make a note of it.

For these things, the well meaning young man and the well meaning employer both have to suffer, but we believe there is no trade that today offers a surer competence or a more substantial dignity and respect than that of the blacksmith. Nor is the labor exhausting or irksome if carried on under modern conditions of machine methods.

THE TRUTH ABOUT MEAT.

The perniciously false statement that one reason for the high cost of meat in this country is due to the fact that the beef trust is disposing of American meat abroad at several cents a pound less than it sells for in this country, is still passing currency for the truth. One newspaper recently made the statement that the packers are selling meat in London at 30 to 40 per cent. less than in New York.

It is impossible to believe that this statement was conceived in ignorance. It was due rather to a recklessly unscrupulous attempt to substantiate a falsehood. There is not the slightest reason why the packers should sell meat cheaper abroad than in this country. They have not enough meat to supply the home consumers. Why sell in Europe at a loss when they can sell all they can get hold of here at a profit?

If the packers are selling meat for so much less abroad than they can get for it at home we advise some wide-awake man in London to purchase all they have to sell and immediately reship it back to this country where he can dispose of it at a good profit. The import duty on beef and mutton is but 1½ cents a pound, and the profits of this re-selling transaction would be extremely remunerative.

But this old story of American producers selling abroad at a less price than at home—a story that is moth eaten with exaggeration and rotten with evil purpose—should be stripped of everything but the facts so that all may be conversant with them. The simple truth is that statistics show we export less than five per cent. of our total manufactures, consuming ourselves more than ninety-five per cent. Now a small portion of this five per cent. of our total production is sold abroad for a less price than at home, and there is no reason why it shouldn't be.

Manufacturers and even jobbers of every country on earth, and this one included, allow export discounts. Not only are such goods disposed of without advertising expense or the maintaining of agency establishments, but no credits are granted and in most cases the exporter gives his check on the delivery of the goods. In addition to this, the selling of goods abroad when done without a loss naturally makes the home market more buoyant. Hence this exportation of less than five per cent. of our home production. It should be borne in mind that these goods, although produced by American labor, are paid for by foreigners and the money remains in this country.

As to the duty of 1½ cents a pound on beef and mutton, it would not matter much one way or another, whether it were left on or taken off. When this rate was fixed there was a wider difference than at present between the prices here and abroad. If it were taken off the consumer would never know it, but it might unsettle present conditions slightly, and perhaps work a slight detriment to our own meat producers or farmers.

CHANGING THE MIND.

Don't be afraid to change your mind. The man who never does so never corrects his mistakes. Some people seem to think it is an indication of mental weakness to hold different opinions today than were held yesterday, but it is rather an indication of mental strength—of learning by observation, by example and by precept.

It is true that vacillation indicates mental weakness, but change of mind is an indication of mental strength. A good many blacksmiths are proud to do business the same way they have always done it, and possibly the same way their fathers did it, and if so a change of mind and a change of method is just what they need.

It is said somewhere in Homer's Iliad, that "the noblest minds are easiest bent." This is true. The dogmatic mind, the mind that is not open to reason or fact, is a weak mind.

The wise man changes his mind just as often as reason and logic and experience tell him that the opinions he holds are wrong. "Prove all things," says St. Paul; "hold fast that which is good."

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All legal questions answered free of charge. Address Communications to Editor "Legal Department," THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Taking Tools for a Debt.

Question.—From T. B. P., Louisiana.—A bought a house and lot and shop from B. A did not have the money. A borrowed it from E. D, E, F, G, H, and I went A's security for $300 of $50 each to E. A took the $300 and gave it to B. B transferred the deed to A. A counted out the $300 cash in hand to B. Now D, E, F, G, H, and I did not take any mortgage on the place or anything else. E is not looking to A for the money. He is looking to D, E, F, G, H, and I. Now it has been a very bad year and A has not got the money to pay the debt with and D, E, F, G, H, and I want to take A's tools for the debt. Now, understand there was no tools in this shop when A bought it. The tools belonged to A and there is no mortgage on them, nor any on the house and shop. D, E, F, G, H, and I just simply went A's security jointly, all signing the same note. A offered to give them the house and shop, but D, E, F, G, H, and I want to take A's tools. Can they do this? And they are treating A pretty bad. If A was just to leave in case of hunting work or another location and leave the tools in this shop, can D, E, F, G, H, and I hold the tools or take them away from A, or would they have any right to break the shop open and take the same over in their possession? According to the laws of this State of Louisiana A will do the right thing if they will let him. A has offered the whole thing for sale to them at a reasonable figure but they won't take it and A wants to know if they can keep his tools. A has a little tool house, lot and shop deeded over to his wife and heirs. D, E, F, G, H, and I have not got a pen's scratch of anything against A.

Answer.—D, E, F, G, H, and I cannot seize A's tools unless A has, by contract or agreement given them express authority so to do. Neither can they break into A's house and take the tools during his absence; and if they do so A can sue them for damages for trespassing on his property, in addition to having them arrested for theft.

Assuming there was no special agreement between A and D, E, F, G, H, and I the only way that the latter can seize A's tools is to obtain a judgment against A, issue execution thereon, and then have the Sheriff seize the tools, sell them, and apply the proceeds thereof towards satisfying the judgment.

Corn Not Wheat.

In last month's issue it was stated that the United States government estimate for the wheat crop for the present year was over 2,900,000,000 bushels. This is obviously an error. These figures represent the corn crop for the year. The wheat crop is usually not more than a quarter of this amount. The error due to the hand writing one thing while the brain was wrapped up in another.

When the great Mississippi is properly harnessed and bridled at Keokuk, Iowa, it will constitute the largest single power plant in the world. More than 300,000 h.p. will be developed, which will be sent out over a spider-web of transmission wires to drive the wheels of industry and to turn night into day over a radius of 150 miles.

Mahogany is in such favor for mill work these days that the oak people are more or less concerned and are talking of a campaign of advertising to boost oak.

If there had never been any lazy men in the world some of our labor saving devices would never have been invented.

The man who paddles his own canoe today stands a good chance to own a steam yacht tomorrow.

Some people don't need to hide their light under a bushel—because it can't even be seen in the open.

CORRESPONDENCE

WELDING FILES.

And Certain Other Topics of Interest to the Craft.

From E. R. Sizer, Idaho.—Some two years ago I advised Brother James F. Hobart to take a trip into the woods and get some old-timer to show him how to weld files, and I am glad to see that he has profited by the advice as in the last issue of The Blacksmith and Wheelwright he says that he can now weld steel, and don't need borax to weld with, either; and as he stated in the issue of April, 1910, that he didn't know how to weld files, I presume that he has taken my advice and is now prepared to give me a few lessons himself. But I wish to correct his statement that I invited him to come out in the woods and "*I* would show him how." If any one will take the trouble to look at the issue of May, 1910, they will see I said "Mr. Hobart might leave his formulas for treating steel 'scientifically' at home and take a trip out into the woods and let some old-timer show him how to weld a couple of old rasps together without burning the steel or weld a piece of steel without burning it."

Mr. Hobart also states that he has been to Idaho but didn't see any woods. Well, he probably knows as much about Idaho as he does about tool steel. One look at Idaho doesn't show a man all of it and one or more men's ideas of tool steel and all the books written to the present time don't settle the question, either. I did tell Mr. Hobart I could probably show him some things on tool steel, and maybe I can enlighten him some as to the woods in Idaho. He didn't see any woods but statistics show that the largest body of white pine timber in the United States is situated in Idaho, and the largest sawmill in the United States, if not in the world, is in Idaho, and only a short distance from where this article is written. It has been proven by careful estimation that there is standing within the borders of our State, 60,000,000,000 feet of saw timber. At the present scale of wages, it will require an expenditure of $480,000,000 of Idaho labor to place this timber on the market and an additional payment for supplies purchased at home of $120,000,000, aggregating the nice little sum of $600,000,000. In the year 1911, as a result of the manufacture of lumber in the State of Idaho, over $5,000,000 were paid to home labor and an expenditure of $1,350,000 incurred for supplied purchased in this State. This much for the woods of Idaho.

It is not my desire to use The Blacksmith and Wheelwright for the purpose of personal disputes between Mr. Hobart and myself, but I wrote the article he refers to in defense of blacksmiths and I want to say right now, I am still on the same side of the fence. As I stated before, I have no doubt but what Mr. Hobart is a first-class mechanic and I have no desire to hold him up for ridicule (as he seems to want to me) but he said if he happened to say the wrong thing, to set him right.

Now I always like to accommodate anybody, and when a man "butts in" and looks for something, I believe in handing it to him. I have never welded any steam boilers in my fire, as it is too small, and I have never made the assertion that a weld was as strong as a piece without a weld. But Brother Hobart strays from the subject, for the discussion was whether tool steel or files can be welded and be any good for tools thereafter. He says that blacksmiths must get out of the rut. Well, I think the good book says, "First pluck the beam out of your own eye before you try to get the mote out of your brother's eye." He refers to the discussion of the American Society of Civil Engineers (transactions of 1893). If Mr. Hobart is going by what was considered the standard in 1893, quoting Hobart, "Why do things a certain way because your grandfather did?" or "Why preach that steel can't be welded because the American Society of Civil Engineers said so in 1893?" I would call Mr. Hobart's attention to the fact that the "world do move" and what was thought the latest thing last year, even, may be proven totally wrong this year by experiments and investigation.

For instance, E. H. Rothert, of the State of Washington, discovered a simple process for the reduction of Titaniferous Magnetic Ores of Iron—an ore heretofore looked upon as useless in the metallurgy of iron and steel—not because it was not rich enough in metallic iron, but, on the contrary, it is known as bearing the highest percentage of iron, more than any other ore of iron. The difficulty arose in the smelting of this ore. Sufficient was known of the high quality of the iron contained in this ore to induce metallurgists to conduct many costly experiments in the hope of finding the key to the secret of extracting the metal from this ore on a commercial basis. The celebrated Norway and Swedish iron is the product of magnetic ore, but their ore does not contain the element titanium that is present in the magnetic ores of America.

It is due to this titanium that the American ore cannot be readily smelted. Titanium, at the high heat generated in the blast furnace, will combine with the nitrogen set free in combustion, and forms a new chemical that enters the slag, making it very heavy, adhering to the walls of the furnace and completely choking it. In the electric furnace the charge would boil violently and rise completely out of the furnace. Neither the blast nor the electric furnace proved a commercial success with these ores.

Mr. Rothert's process of handling these ores is the result of seven years of constant experiment and research. His process is without precedent. He early recognized the fact that the secret of properly handling these ores lay in the method of fluxing them. To this end the last five years of his experiments were devoted. At last he succeeded in discovering a cheap and perfect flux and this perfected his process whereby it is possible to utilize these ores.

So startling are the facts of the quality of the metal produced, cost of operation and estimated profits on the production by this process that they at first glance seem visionary; but they are backed up by the results of actual practical demonstrations. By this process he makes a high quality of steel from titaniferous magnetic iron ore in one smelting operation.

This steel is similar to Armstrong, Bluechip or any of the latest high speed steels, and from tests in our machine shop seems to be superior to any of them in wearing qualities, strength and hardness. Mr. Hobart says, "Take a piece of razor steel or a piece of modern high speed steel and let's see a weld made in either of these." They won't weld, you say? But I say they will weld. To determine who is in the rut read an article on page 987 of the October, 1910, issue of the Iron Age, by Mr. William F. Stanton.

I have experimented with these high speed steels ever since they first came to my notice, which was several years ago, and have been able to weld the high speed steel to machinery steel, as Mr. Stanton says he has, and I am sending a side tool for the lathe which the editor of The Blacksmith and Wheelwright can use as he sees fit, to prove what Stanton says and what I say in regard to welding high speed steel to machinery steel, is possible. It will stand rough usage and cut equal to the original steel before welding. Welding, in my dictionary, is described as follows: Two pieces of iron or steel are heated to the proper degree of heat and by hammering, or by pressure, are united into one piece. So Mr. Hobart cannot claim that this pressure method is not welding. As to razor steel, I will say that I have seen some fine Swedish razors that were hard to equal for holding a good edge, which were made by welding the steel blade, or cutting edge onto an iron back and we have all seen plane bits, wood chisels, hatchets, axes, pocket knives, scythe blades and innumerable other edged tools, with tool steel cutting edge and the balance iron.

As to the files Mr. Hobart shows the results from tests and says "There you have it. If steel from which file wrenches have been made is low enough in carbon to permit welding, annealing will weaken it." If the carbon is high enough to have annealing do any good then, according to Metcalf and Hobart, it can't be welded. So what are you going to do? Well, as for me, I'll do as I have always done, weld 'em, and make good tools, too. Mr. Hobart says files that can be welded are too low carbon to be any good. Well, I will let him settle that with Heller Brothers, the American and Swiss File and Tool Company, Nicholson File Company or Stokes Brothers, all of whose files and rasps I have used and welded and many others besides.

I will say, for Mr. Hobart's information, that I read the major portion of his information on steel years ago, when an apprentice learning the trade, but it may be new to some of the readers. As to tempering, I will not argue as to the value of the various methods, and will say that sometimes I use pure water, at others, a solution; all depending on the nature of the work on hand. There is an old saying "You can lead a horse to water, but you cannot make him drink." Now, I have simply tried to lead Mr. Hobart to the water; he can drink or not, as he sees fit. He seems to have taken a sup or two as he has learned to weld steel since he last wrote, but I want it distinctly understood that I still maintain that if steel can be smelted and rolled into bars in the first place it can also be welded.

I am content to leave the verdict with the readers of The Blacksmith and Wheelwright who are the men that do the welding and know, and while I respect Mr. Hobart's long experience and superior education, I must still stick to what I know—that steel can be welded, all that is required being the proper kind of a fire, the proper care in the heating, the proper flux, and the proper man to do the job.

A Blacksmith and a Teacher.

From Charles Barker, Maine.—The illustration represents a building serving a two fold purpose. Besides being a blacksmith shop, it is also an institution of learning. The proprietor, Volney T. Follett, Rockland, is the blacksmith, also the instructor. The shop is noted as a rendezvous for some of the townsfolk, where many questions and ideas of advanced thought are freely discussed, particularly Socialism. Mr. Follett is a student and thinker,

Toiling and Teaching.

and his spare moments are utilized in the study of social problems. A visit with him impresses one that he knows his subject thoroughly, driving home his arguments as skillfully as he does the nails on a horse's hoof. He has been honored on three different occasions with a stop-over call by New York's famous philanthropist and social worker, J. A. Phelps Stokes. His retiring nature has led him to refuse town offices, frequently tendered him, preferring the anvil and sledge to political distinction.

Complaint of a New Zealand Employer.

From an Employer, New Zealand.—At the time of this writing there is a royal commission touring New Zealand inquiring into the reason for the increased cost of living. The commission may point out many things and "cough" its findings into beautiful language so as to justify its existence. The reasons are so well known, however, that their verdict should be simply put in these words: "As it has been said before so with this we do agree." The labor unions of this country are tyrannizing the employers and stifling progress in the industries all over the dominion.

In most trades apprentices are restricted to one to every three journeymen, but helpers, who are only allowed to perform certain duties, may be engaged at high rates. The employers have property to lose and they must keep to the letter of the arbitration awards, while the employees live up to their means, place no value on the situations they hold, and consider their employers their natural enemies.

New Zealand contains an army of agitators who at the least sound of any trouble rush to the place and take every precaution that an

amicable will be difficult to arrive at. It should be a warning to farmers in America to stand by the factory employer in opposing any socialistic legislation, otherwise they will, like their New Zealand brothers, be some day called upon to pay the piper.

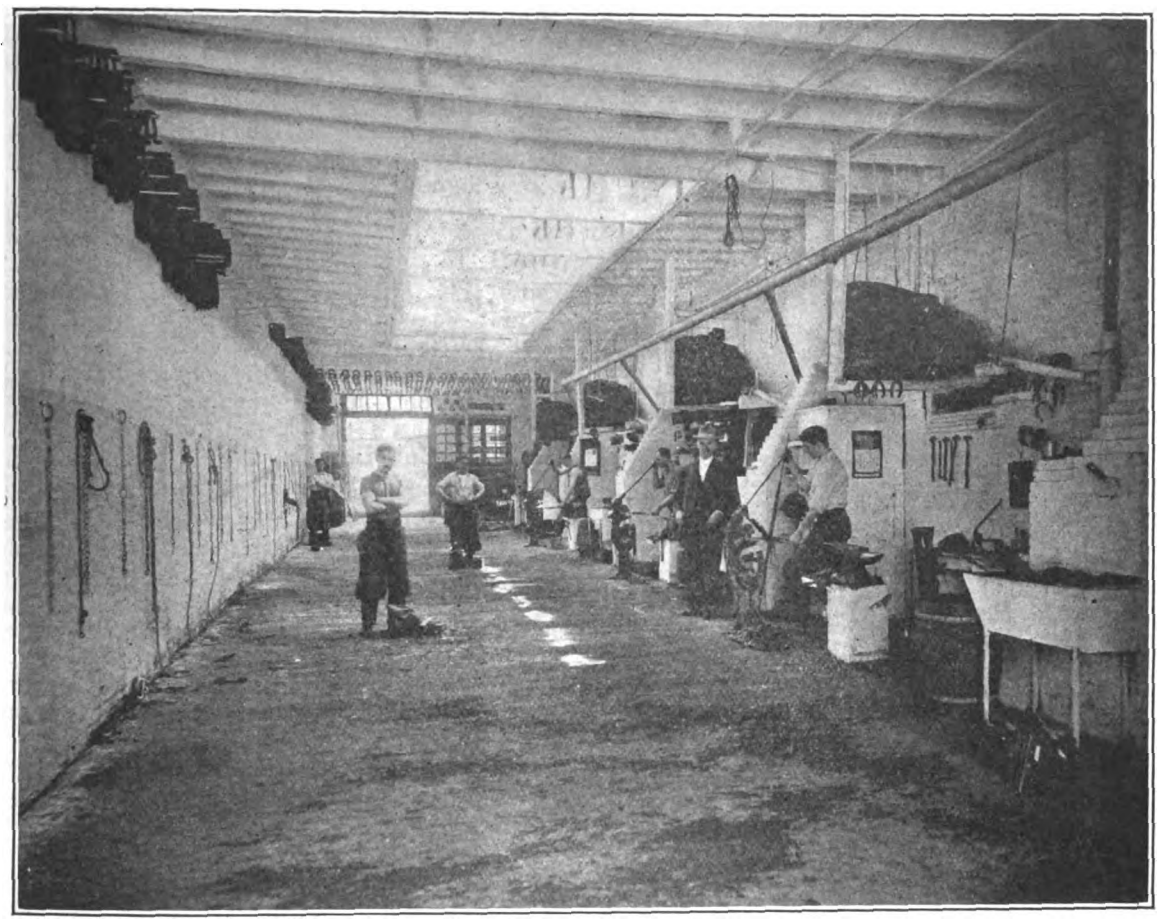
Bois d'Arc.

From S. E. Coffman, Oklahoma.—In reply to your request for information about the wood called bois d'arc, I wish to say it is a yellow wood, very hard and tough. It is used considerably by wagon builders for felloes. The felloes sell here for from $7 to $8 in the rough. This wood when old turns dark and will not stand so much of a blow, but will stand a great strain when in good condition and well put together. It grows scrubby and is often used for fence posts, being similar to the black locust. It does not shrink or spring to amount to much. After being sawed out, I heard of a man who once built a house and used stone until he could get bois d'arc for blocks. A wagon made of this wood and properly put together will last from 40 to 60 years.

I wish the brothers of the craft good pay and a long life.

Uses Three Calking Machines.

From Henry Irwin, Pennsylvania.—I have been interested in the pictures of shops from different places, and I am mailing to you a picture of my horseshoeing shop. Have always been up-to-date with the latest labor saving devices. All of my fires are blown by



Interior of Henry Irwin's Shop.

electricity. After trying out one of the late model, L. S. P. Calking Machines, and then installing two more, of which the picture shows three in operation, it should be evidence to the readers of your valuable paper, what I think of these machines.

Repairing Mower Pitmans.

From James Gibney, Illinois.—Possibly some of your readers who have to repair pitmans for filling the eyes of sickle heads when

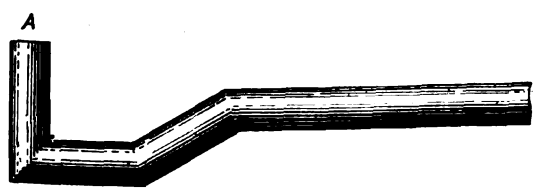


Fig. 1.

worn too small will be interested to know my way of doing it. I heat the hook as shown at A, Fig. 1, and upset it and make it shorter and larger than the hole. I then make a piece on the end of a round bar of machine steel—that is if the pitman itself is of steel—the size of the hock, as shown in Fig. 2. I cut it entirely off as shown at B. Then heat them red

Fig. 2.

and roll each in a cherry heat compound. Of course they are to be heated to a good weld-

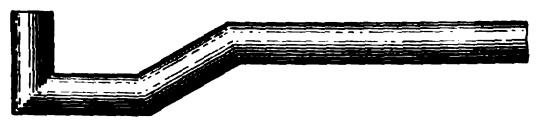


Fig. 3.

ing heat. I then put the pieces together as shown at Fig. 3. Cut off at B and finish so

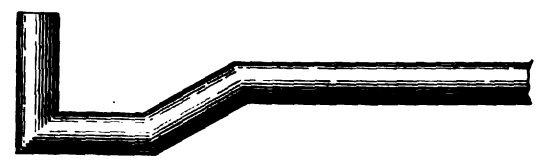


Fig. 4.

it will fit the sickle head. Fig. 4 shows the weld complete. This method can be used whether the pitman is made of iron or of steel.

A Good Grip Wrench.

From James Gibson, New York.—Perhaps some of your readers may have occasion to make an alligator wrench like the one illustrated. To do this take a piece of ⅞ inch gas pipe 16 inches long and weld a plug into one end. Then take a piece of steel of the best

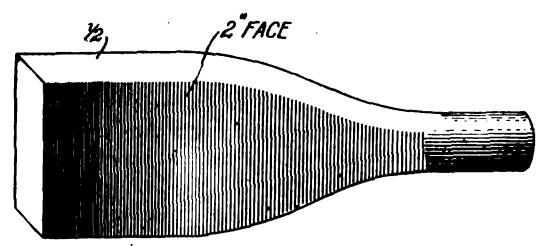


Fig. 1.

quality 6 inches long, ½ by 2 inches wide, and forge it, as shown at Fig. 1. Drive this piece into the open end of the gas pipe and weld it

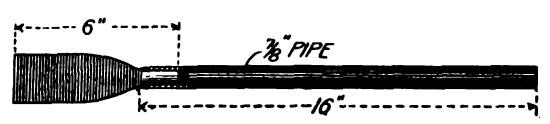


Fig. 2.

there. After welding it will be the same as shown at Fig. 2. Then set it upright in a vise and split it from the end downwards and cut the teeth, as shown at Fig. 3. After this harden and draw the temper to a rather dark blue and you will have a wrench that will stand

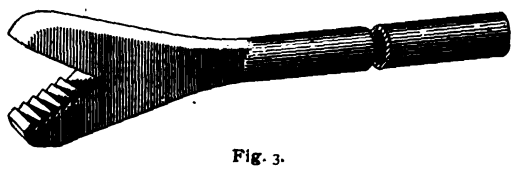


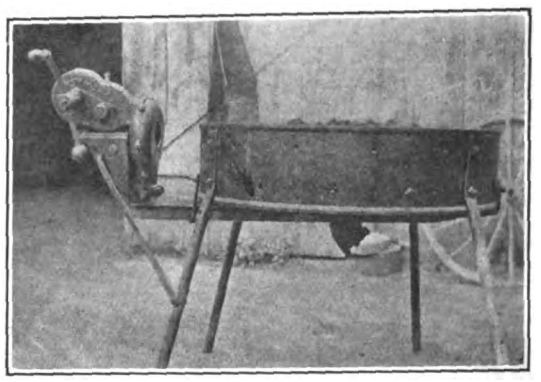
Fig. 3.

hard usage and hold well upon round iron, or anything else.

A Home-made Forge.

From W. T. Lowry, Missouri.—I enclose a snapshot of my home-made forge. If brought out clearly I do not see as there is any need for a description of it. The illustration will plainly show how it is made. I have used this forge nearly two years. It is a dandy. Any crank blower can be attached to it.

Here is a short cut on slacking a buggy tire that is too tight, and has thus given the wheel



Mr. Lowry's Forge.

too much dish. In a case of this sort it is a lot of trouble to take a tire off and stretch it and put it on again. So here is the way I manage things. Have the helper hold the wheel up level with the anvil and then take the hammer and strike the tire at its edge, going all around the wheel, or until the tire is slackened enough to allow the wheel to straighten up properly. Be careful to not knock a short kink in the tire. You will do this if you do not keep it level on the anvil.

Quilting Frame Clamps.

From B. F. Gardner, Pennsylvania.—I presume few blacksmiths are now called upon to make anything in connection with quilting frames. Sometimes, however, I am called

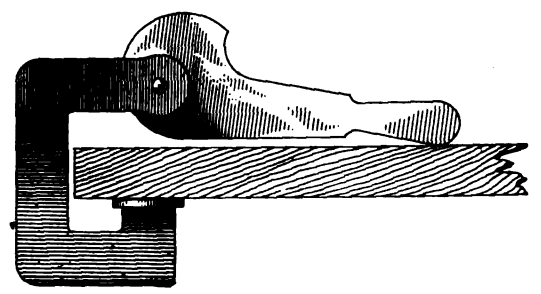


Fig. 1.

upon to make a set of clamps for them. The illustrations will show a new way of making them quickly and properly. Any blacksmith can see from the illustrations what the idea is

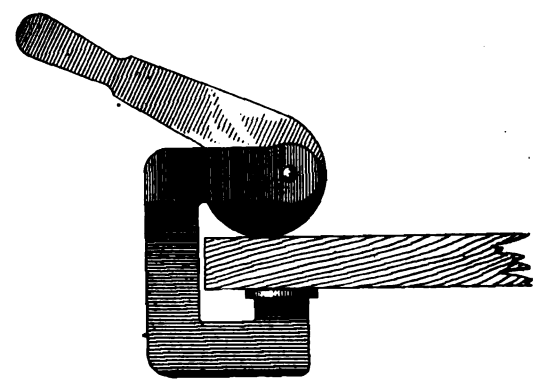
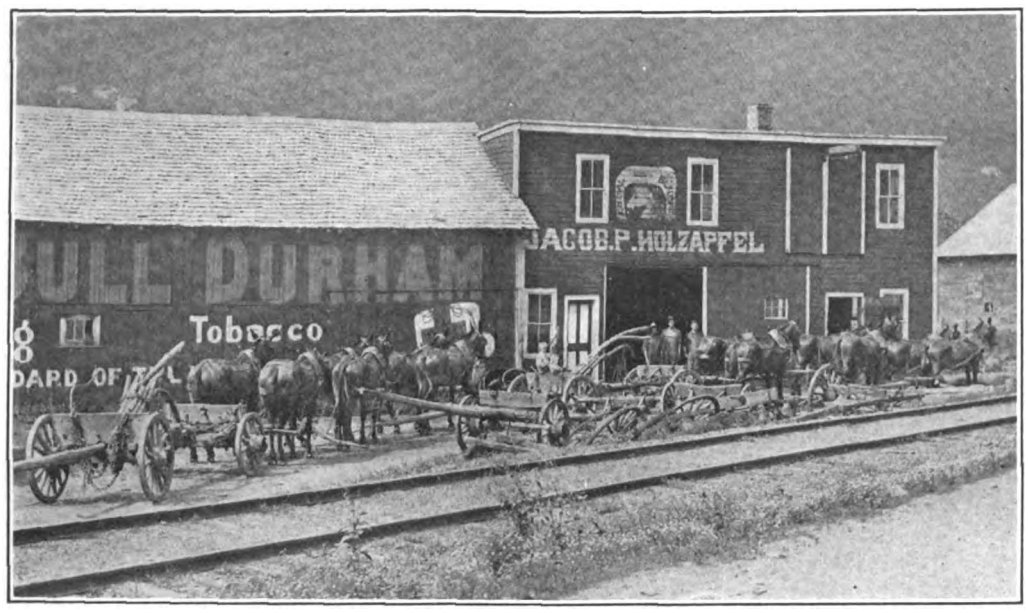


Fig. 2.

and put it into use. Fig. 1 shows the clamp ready to adjust to the frame, which is done by simply pressing down the lever as shown in Fig. 2. The clamps hold the two ends of the frame which are laid across each other.

A Busy Shop.

From Jacob P. Holzapfel, Pennsylvania.—I will enclose photograph of my shop which is 22x40 feet, two stories high, equipped with



Mr. Holzapfel's Shop.

A. C. horsepower gasoline engine, emery wheel, rip saw, band saw, drill press, power blower, and all necessary tools needed in an up-to-date shop. It is the only shop in a good healthy country town of 2,500 inhabitants.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Snow Plows.

From a New Zealand Mechanic.—Could any brother mechanic give any information concerning the best form of plow for clearing the main roads of a heavy fall of snow? This plow is to be worked with horses. Also I would like to have particulars of the different forms of snow plows used on the railways of America, especially those of the rotary type. Drawings are specially requested.

Rounding an Emery Stone.

From Abe Hocker, Indiana.—I wish some one or more of the craft would give me a pointer for the best and most economical way to round up an emery stone that has become unround. I must know quickly, as mine is almost useless, and I hope it can be trued up. The size of the stone is 14x2, and 1.12x2.

For Running a Blower by Power.

From Emile Alexis, Louisiana.—I am using the Champion blower and want to run it by belt power at 60 revolutions per minute; my line shaft runs at 100. I would like to get some brother smith to help me. Give some kind of a drawing, if you please. Kindly state what size pulley is necessary.

Draw for Wagon Tires.

From Coffman Bros., Oklahoma.—We wish to ask of some one that has had experience in that line of work, the proper amount of draw to give the following wagon tires: the hubs are black locust and rims are bois d'arc. The tire is 1⅝x9-16 oval edge.

Who Makes This Clipper?

We have an inquiry for the name and address of the manufacturer of the "I M Davis" Bolt Clipper. Can any reader supply the information?—Ed.

To follow after another is a good idea, if the other is progressive; but the best idea yet is to do things that will lead others into following after you.

Obituary.

Many of our readers will be as pained to learn as we are to announce, the sudden death of Baxter B. Noyes, of Greenfield, Mass., a well-known manufacturer of blacksmith tools and machines, and a man of the highest character. He was killed by the fall of a new staging which he had ascended to give instructions as to what repairs were to be made on a building. His age was 69 years. Mr. Noyes served his apprenticeship in the blacksmith trade, and at the age of 18 established a business of his own as a blacksmith and wheelwright. In 1886 he started his present business in Greenfield, beginning in a modest way and on a small scale, the manufacture of hardware and tools. His business increased steadily and from time to time he increased his plant and the variety of its products. Mr. Noyes was a skilled mechanic and had an inventive turn of mind and had patented many articles which he manufactured for the trade.

Mr. Noyes had the respect of all who knew him and the affection of his intimate associates and friends. A local paper well says of him: "His rugged independence has never failed to refresh the vigor of his thought in those who came in contact with him."

Stock of Band Saws.

The proprietor of a well-known wagon and wheelwright shop says: "Formerly we used to carry a rather slender stock of band saws. The result was that whenever a breakdown occurred there was no other alternative but to mend the broken saw. Our new plan, on the other hand, has been to carry a large stock of saws on hand, say four or five of each size. Now when a breakdown takes place we waste no time whatever with the broken saw, but simply replace it with a new one and go on almost uninterruptedly with our work. We follow this plan right along until the number of our broken saws amount to four or five. Then, instead of tackling the brazing job ourselves right on the premises, we send them out to a regular saw-repairer and let him doctor them up. He understands the business far better than we do; he does a much better job, and the saws come back in fine shape, ready once more for another term of service. In fact, after passing through the hands of this specialist, they seem more durable than before. Of course, the doing of this work by an outsider involves some expense, but this is a mere trifle in comparison with the valuable time lost in doing one's own repairing. It is a stroke of economy to have the work done outside.

There is something wrong with the eyesight of a person who can't see any good in the world.

The world will listen to your troubles if you can tell them in a way to make them laugh.

Sometimes it is a good thing to start a row—if you can feel sure of its stopping place.

Some folks simply make honesty a cloak to cover a naturally mean disposition.

SHOP WORK CONTINUED.

Fuel, Starting and Holding the Fire, Fluxes and Welding for a Simple Example.

BY A. C. GOUGH.

Charcoal is best for working steel, but it is most expensive of the fuels. It is used only when a clean fire (free from sulphur and other impurities) is absolutely necessary. Coke is a good clean fuel and produces a very intense fire. It is used quite extensively in the bottom of the fire for medium and heavy work, and in heating furnaces. Soft coking bituminous coal, that does not contain much sulphur, is principally used. It is the cheapest of fuels and gives good results.

Starting and Holding the Fire.

The usual method is to uncover the tuyere (clean out cinders, if there be any) having fuel heaped around fire pot ready to rake upon the kindling, then set fire to some oily waste or shavings, and lay it upon the tuyere (the burning part downward) rake a small amount of fuel on the kindling and turn the blast on lightly. As the fire grows turn the blast on and add more fuel.

When coal is used, it is necessary to coke some of it before using the fire. When not using the fire, it may be kept alive by putting in a stick of wood, packing the fuel over it after it has begun to burn.

The hollow fire is much hotter than the ordinary open fire, as the roof also radiates heat. This fire is very convenient for heating ends of rods, bolt heads, rivets, links, etc., Whatever the fire is required to heat, it should be kept as near this form as possible; only in heating plates should it be allowed to spread.

Fire Tools.

The following tools should be provided for each forge: A poker, which is a rod of iron about ½ inch in diameter and 20 inches long, with a handle at one end and pointed at the other end; the fire hook, which is similar to the poker, only it has a hook bent on one end (the hook is flattened); the shovel has a sheet iron blade and a long handle; the sprinkler, a funnel-shaped piece of tin with small holes in the bottom fastened to an iron rod for a handle. This is used for cooling parts of a piece of iron and for keeping the fire from spreading, and the ladle for melting soft metals, calcining fluxes, etc.

Proper Condition of the Fire.

The results obtained in welding and forging depend upon the condition of the fire, quality of material, and the care and skill of the workman. A fire to be in good condition for furnishing a heat for welding or forging must be made of good clean fuel, and kept free from cinders and other foreign matter. It should be kept well heaped and the outer part occasionally sprinkled to prevent it spreading. For general work, the best results can be obtained when the blast is coming up through

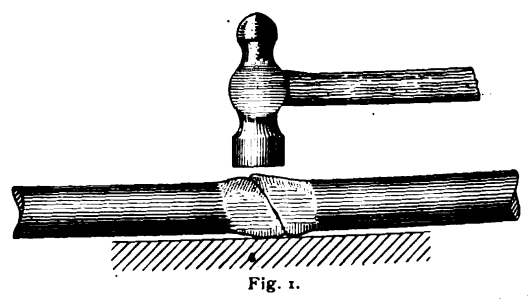


Fig. 1.

the center of the fire and under good control; for as soon as the fire is allowed to spread the workman does not know in which part of the fire to place the work, in order to have it heated at the desired point. For example, in welding two pieces, if the fire is not allowed to spread, we may be assured that the center is the most intense part of the fire, and that this point will reach the welding heat before the other parts. This condition is necessary, otherwise the size of the material will be reduced at one or both ends of the weld. It is bad practice to have the material reduced at the ends of the weld, and it can be avoided most easily by having a compact fire and the blast directed towards that point which should reach the proper heat first. The work should be placed well below the top of the fire. Iron burns when heated to a high temperature in contact with pure oxygen or in the atmosphere. (Steel burns more readily than

wrought iron.) So, if the temperature of the work were raised to a welding heat, it being uncovered and exposed to the atmosphere, it would burn to such an extent that the welding properties of the metal would be impaired. Further, if the work were placed at the bottom of the fire, it may burn even more than in the previous condition. A condition quite as bad as this may exist if cinders (clinkers) are allowed to collect and remain at the bottom of the fire; for cinders contain no free carbon, thus leaving the oxygen free to combine with the metal as well as the fuel above.

If all oxygen of the blast were consumed in combustion, then the gases coming in contact with the metal do not contain any oxygen

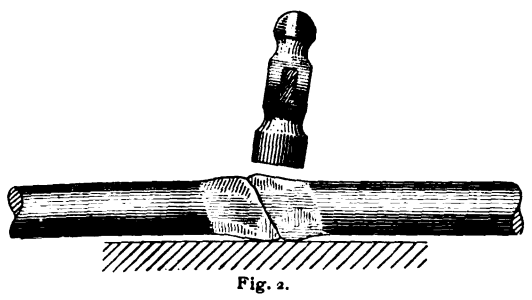


Fig. 2.

that can unite with it. In this case, the iron, or steel, will remain clean. (It must be known that iron, or steel should be free from oxygen, sulphur, etc., to make a good weld.) This is accomplished by having a thick bed of clean fuel for the air to pass through before coming in contact with the metal and by maintaining a blast, so regulated as to supply just enough air and not too much.

Fluxes.

There is another method for protecting the metal from the oxygen of the blast; it is to coat the surface of the metal with some substance that will exclude the air. The substance used for this coating must possess certain qualities in order to answer the purpose. It must, of course, contain no oxygen that would combine with the iron. It must become fluid at a heat below the welding heat of iron and still not become too fluid at the welding heat; for if it became too fluid, it would flow off leaving the iron exposed as before.

The principal purpose of a flux, however, is to dissolve the oxide (scale) forming a fusible slag which will squeeze out under the hammer, leaving clean surfaces for the weld. There is no flux that will protect the metal enough to render a good clean fire unnecessary. The best practice now is to keep the fire in the best condition possible and to use no more flux than necessary.

For welding wrought iron, sharp sand may be used as a flux, for at the temperature of the welding heat it forms with the iron scale a fusible silicate which can be squeezed out under the hammer allowing the clean surfaces to come into absolute contact for the weld. Borax forms a more fusible compound with the scale than does the sand; hence, its extensive use in welding steel. To weld steel easily and successfully it is the custom to use borax or a compound containing a large percent of borax.

A good compound for welding wrought iron and soft steel may be made of equal parts

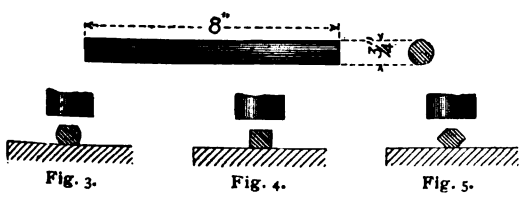


Fig. 3. Fig. 4. Fig. 5.

borax and clean sharp sand, with a small amount of wrought iron or soft steel cuttings added. Cook and pulverize the borax and mix with the sand and cuttings. The compounds formed by the sand, borax and scale are readily fusible at the temperature of the welding heat, forming a protecting coat and fluxing the scale, leaving clean surfaces for the weld. The iron cuttings are advantageous because when introduced between the surfaces to be welded, the temperature of the welding heat may be lowered a trifle and, as they may be chosen of first-class material, the quality of the material at the weld may be improved, especially if the material to be welded were poor in quality. A small amount of black oxide of manganese and carbonate of iron will improve the compound for welding higher carbon steel. The following is a compound for welding high carbon steel and for restoring burnt iron and steel:

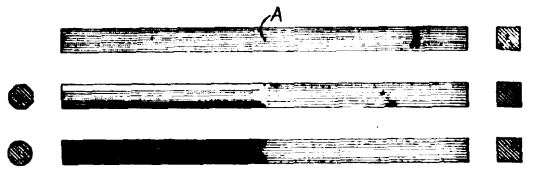
32 parts borax (calcined).
1 part black oxide of manganese.
1 part carbonate of iron.

It is a favorite expression of some metallurgists, that "Manganese is the physic which cures all the ills that iron is heir to." Manganese almost does this; it eliminates the bad effects of sulphur and removes the oxygen from the burnt iron and steel, thus leaving nearly pure iron. It should be understood that iron and steel are practically the same when burnt. To explain the action of this compound (omitting chemical equations), suppose in welding high carbon steel it has accidentally or otherwise become burned so badly that it is full of cracks. Take this burnt steel and in a good fire bring it up to a low welding heat, and apply as much of the compound as will stick to it. At this temperature the oxide of manganese removes the oxygen from the burnt steel (becoming itself a richer oxide). The carbonate of iron in the presence of this oxide of manganese, gives up carbon to the burnt steel, carbonizing (in a way similar to the cementation process of making steel) the burnt steel to an extent depending upon the number of applications of the compound and the position of the steel in the fire. This compound should be kept in stock for the purpose explained, and for use when it is impossible to obtain good conditions in the fire.

Principles of Welding and Forging.

The ability to determine the exact conditions of the work in the fire by its appearance, color, etc., can only be acquired by thorough practice, but if an intelligent and earnest effort be made, there is no apparent reason why it may not be accurately done.

If the end of a bar of iron is heated, it can be made to pass through all the different stages from ordinary temperature to a burning heat. If the heating is done slowly, the



Stages No 1, 2 and 3.

different heats can be observed and noted. When it has been in the fire a short time, the iron will be found to be just hot enough to show its heat in a dark place. This is called black hot. If it be put back into the fire, the heating continued a trifle longer, it will begin to show its heat by the light of the forge or in daylight. This is known as dull red. If it be heated more, it becomes bright red or cherry red, and when heated still more, it begins to throw sparks and it is known as white hot. After this temperature it begins to burn, sparks fly off in great numbers and drops of molten metal fall from it. It has been burnt.

The Welding Heat.

Iron has reached the welding heat when it is white hot and the sparks have just begun to come off. When taking the heat the fire should be in good condition, the work well prepared at the proper position in the fire, and the progress of the heat carefully noted. If the iron upon trial refuses to weld or stick it is probably not hot enough or not clean. When making the next trial, take a little higher heat (remove from the fire when sparks first begin to fly off) keeping the fire in the proper condition and the work at the proper position. If the effort is successful this time, the condition of the fire and of the iron just as it is taken out of the fire should be remembered and followed up again until the same can instantly be recognized at another time. It usually happens, however, that when the iron refuses to stick, the beginner will allow the same to remain in the fire next time until it melts, or by putting it at an improper position in the fire, allow it to burn. At this stage of practice, if the iron becomes burnt, the smith must begin all over again.

Proper Way to Use the Hammer.

There is only one other serious difficulty with the novice in welding wrought iron, and that is in not striking with the hammer at the proper time and place, and in the right way. He often fails to use the hammer correctly and credits the poor results to the supposed bad welding heat. For example, two pieces of iron are to be scarf welded, as shown in the figures below. Usually the novice delivers the first blows in a direction as shown at Fig. 1. This tends to drive the scarfs apart rather than inducing them to stick. Fig. 2 shows proper way of using the hammer to stick the scarfs. After the parts are fairly stuck, the blows, of course, should be delivered in the direction shown at Fig. 1. The principle illustrated is that the first blows should be delivered in a direction to drive the parts to be welded together.

The anvil should be placed most conveniently in regard to the forge, and light work should be placed under the hammer as soon as possible after it is removed from the fire. The time limit for welding and forging heavy work

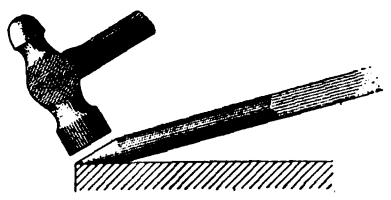


Fig. 6.

is much greater. Work should be turned occasionally in the fire in order to get a good even heat, and when under the hammer for welding (and often in forging) it should also be turned frequently in order to put down every part of the weld. The anvil should be clean and ready to receive the work, and the hammer and other tools within easy reach of the workman.

Though the smith is able to recognize the different heats, he may use a flux when necessary in welding wrought iron, only so much then as will adhere to the iron. The condition of the fire is more important than the flux.

So much for welding wrought iron but more may be said concerning steel. The fire should be in better condition (if possible), the work better prepared for the weld and the progress of the heat noted much oftener than when welding wrought iron. The temperature limits within which higher carbon steels may be welded are not nearly as wide as those of wrought iron, and if allowed to become burnt the useful properties of steel are practically destroyed, except as it may be restored by the manganese or similar compounds.

Various carbon steels may be welded at various temperatures and colors. Very mild steel may be raised to a white heat and it has much the same appearance as wrought iron at this temperature, except it may not be made to look plastic in the ordinary fire and retain its properties. Steel containing no more than 1 per cent. carbon may be raised to a yellow heat, but the higher carbon steel should be welded at a cherry red heat. It is not good practice to attempt to weld steel that contains more than 1¼ per cent. carbon. When welding steel, the novice should observe the color closely, and he may find it an aid while heating to touch the parts to be welded with the point of the poker. They become sticky when the welding heat is reached. The rod tends to stick to them. Should the parts refuse to stick when first placed together under the hammer, but stick after they have become somewhat lower in temperature, care being taken in each instance to direct the blows properly, the

Finished Example.

workman may find it advantageous to take lower welding heats. Should the parts refuse to stick at first, it may require a higher heat, better use of the hammer, more care in placing together the parts or all of these.

Steel welds are never absolutely safe, and they should not be made in parts of machines or structures where their rupture would cause great loss or danger.

Using Flux.

Flux should be applied to steel at a lower heat than it is applied to iron. The steel should first be turned in the fire so as to make an even heat (cherry red); then so much of the flux as will adhere to the surface is applied.

For a simple forging take stock ¾ inch

round x 8 inches long, wrought iron, forged to a bar, one-half of which is ⅝ inch square, the end drawn to a square taper 1½ inches long; the other half of bar being drawn to a ⅝ inch round, the end of which is drawn to a round taper 1½ inches long. Beginning at the end, welding heats should be taken extending over as much as two inches of the stock. When the stock has reached the welding heat, it should be forged with rapid blows of medium force, and while under the hammer (between blows) it should be turned back and forth through an angle of 90 degrees in order to bring it to a square, Fig. 2.

Forging should never be continued after the temperature of the iron has fallen to a dark red heat; except light blows when finishing.

Mark the center A, stage 1, and draw one-half of the bar to an octagon, Fig. 3, and stage 2. Repeat this process making 16 faces and continue the same until one-half of the bar is round. Stage 3. Welding heats are now taken successively and the ends drawn to a square and round taper as shown. Fig. 4 and finished piece. When drawing to a taper the work is always held in a similar position to that shown in Fig. 4.

To clean and smooth, cherry red heats are taken and the whole gone over lightly with the hammer, using the hammer until the bar cools to a black red.

LIGHT HORSES.

Something About the Useful Qualities of the All Around Horse.

At the present day, says Winnipegger in the Canadian Blacksmith and Woodworker, when the horse is so universally employed, and when, as a rule, each description of work is performed by an animal having qualities especially adapted for it, most men claim to be familiar with the general characteristics that distinguish or mark the several types of the horse. Yet few are really qualified to make an accurate discrimination between them, or have the ability to recognize or to judge knowingly the points of a horse when it confronts them. This demands a close study of the useful qualities of a horse in all his spheres of labor, as well as a close knowledge of his vices, defects, and relative soundness in all parts, and implies the possession of ripe experience, extensive observation, and intimate acquaintance with the ideals that guide breeders in the countless shiftings of their work to suit the varying dictates of utility and fashion. These attainments are rare and difficult possessions. Previous, therefore, to making critical examination of the organs and functions of locomotion, in their relation to shoeing, which is intended to be the main theme of these articles, it is best to take a preliminary view of the horse at large, that will, by a natural and easy process, lead to a discussion of the details of the subject.

The ideal type of horse is the blending together of a great many, and this may account for the divergence of opinion respecting it, for it is only ideal in the minds of some. Each sees in part and contributes his observation, and the ideal type becomes evolved. It is in knowing this type that the skill of the judge is displayed.

It is by patient labor that great works are accomplished, and this applies with much force and truth to the many methods of breeding and training young horses today. The trotting and pacing horse is distinctively America's pride and, par excellence, the light roadster of the world. He has been evolved from the thoroughbred and draft horse in a period of less than one hundred years, until now he stands the product of the highest and most perfect development of grace, speed, and nervous animal force. The light horses of America may be said to be included mostly under three heads—the roadster, carriage, and cob, and basing this division on the sphere in which each of those types act, we find the trotter the pure bred prototype of the roadster, the coach breeds of Europe bearing the same relation to the carriage horse of everyday occupation, and the hackney the progenitor of the cob. The qualities that have the highest value in the roadster are, speed, stamina and style. Speed at the trotting gait, and the talent of making a pleasing display. Such a horse must have a free and easy way of going, with a spirited and graceful movement. The typical roadster has a well balanced stride and a high-headed, straight movement that wastes no effort or time. He is neither a light nor a heavy horse, but has the deep chest, round barrel, and long-drawn quarters, chiselled limbs, tense muscles, tense, clean bone, lean tendons and refined appearance observable among the best turf campaigners.

The prominent peculiarities of the carriage horse may be grouped as style, size and substance. The sphere of the carriage horse is different from the roadster, and the type is tall, with muscular, large bony formation and up and outstanding attitude, having the appearance of style and a comparatively slow movement. The cob is the counterpart of the hackney in the common current of horse life, distinguished by the series of beautiful curves that define the outline. The rotundity of the rib and the plump muscular quarters and arched molding of the neck are influential features in producing the appearance. In movement, the spirit, dash and striking muscular action of the knees and hocks impress the beholder with the style it displays and the appearance of graceful effort without corresponding speed. The different types embrace also what might be said here in description of the different forms, and include in a general way the three points of size, symmetry and substance.

The carriage horse should be sixteen hands, the cob fifteen hands two inches, and the roadster has no particular or recognized limits. It is hard to say what degree size adds to the value of the horse. Speed does not seem to be always an associate of size, but as the market runs it would be advisable to give it some consideration in the roadster classes.

DO NOT CUT PRICES.

A Good Reputation Cannot Be Made by Doing Cheap Work or by Reducing Prices.

It is always gratifying to observe price lists for work from our readers in different parts of the country that will give a fair profit and enable the smith to do good work. As has been well said, the chief mischief maker of our modern business is the price cutter. Yet any one can cut prices. It requires no experience, no talent, and no business ability. A great business man has said, "We deal with our friends—our enemies will not trade with us." So you see, business is founded largely on confidence—and confidence is certainly not founded on price cutting. It may require ten years to advertise an article, to build up its market, to establish its price, yet this price can be cut in a single moment by someone or by anyone who has no experience and who knows absolutely nothing about the higher and better methods of selling merchandise.

The truth is—price cutting tends toward dissolution, disintegration, dissatisfaction, dissatisfied customers—and you know the prefix "dis" means disease, and these things just mentioned are all forms of disease. In other words, price cutting brings about a diseased condition of business. If you are in doubt about the truth of this statement, simply go into any town where there is a price cutting war in process, and you will gather some valuable information that will assist you to know what not to do in conducting a store.

The salesman who cannot present facts, merit, quality, and the fine points of an article can always cut the price. The salesman who can present facts, merit, quality and who understands a certain article of merchandise will not cut the price, and for this reason this man is a salesman, because he sells goods on the basis upon which they should be sold. Shaving the price is the argument of the weak, the incompetent, the indifferent and the incapable. Price cutting did not, does not, and cannot, establish the reputation of an article and price cutting has not established the reputation of the great merchants, and manufacturing concerns of the world who have assisted in improving and developing our ideas and standards of business.

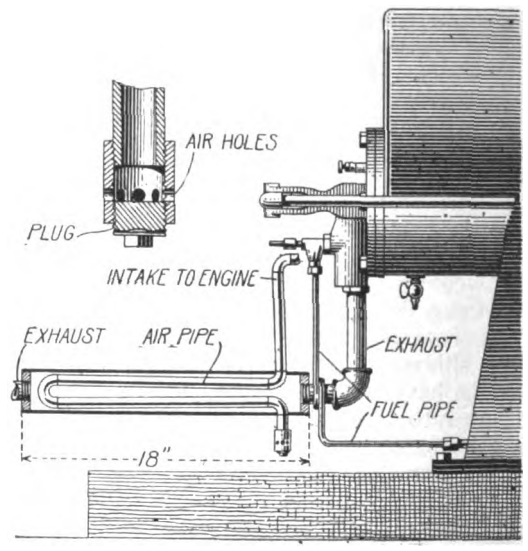
There is no question that certain reductions should be made to eliminate outgrown, dead stock. This is a necessary part of every business, as it cleans out the store, keeps the stock in good shape and makes for general efficiency. Concerns which stand on quality, which understand the finer and higher ideas and method of business do not go into bankruptcy. It is the price cutter, because his trade is superficial, his methods are negative and there is nothing substantial or fundamental back of his trade and behind his clientele. The price cutter makes trouble for his competitors and sends business to the catalog house or to the next town.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Kerosene on a Gasoline Engine.

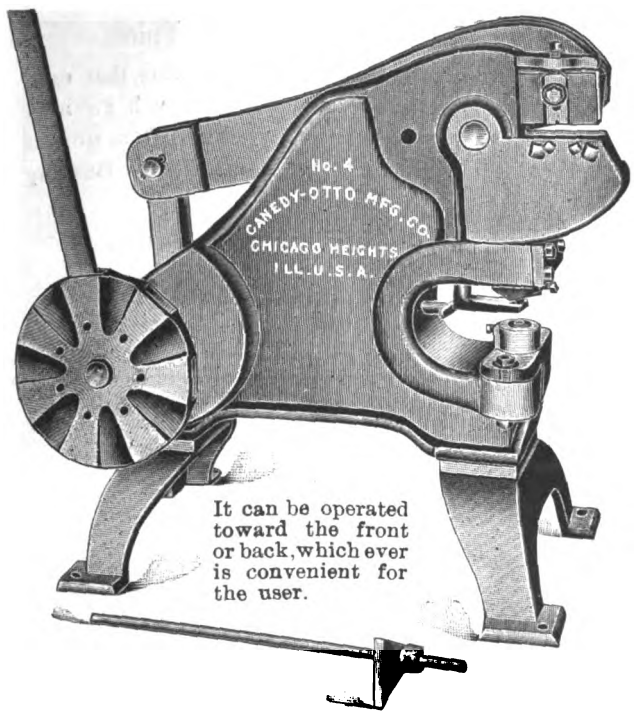
From Gorham Bros., Iowa.—We notice in the July issue that Mr. F. J. Richard of Louisiana wants to change his gasoline engine so he can run on kerosene. We will give him our experience as best we can. We have a 10 h.p. engine that we changed to run on kerosene. There are three things to accomplish or change. First, it is necessary to heat the air at the intake; second, heat the filler; third, take in a spray of water with the fuel. I enclose a drawing and will try to explain how we fixed our engine. To heat the air, we take a piece of pipe about eighteen inches long by twice the size of the exhaust pipe of the engine. Plug the ends and fit in the couplings so as to connect direct to the exhaust pipe. Then we pull the air for the engine through this chamber by means of a small air pipe entering near one end and passing the full length of the chamber and back, and then out on the opposite side at the end as shown in the illustration. Connect coupling with holes drilled in it, and insert the plug to adjust the air when starting. By this method, the air



Changes necessary to use kerosene fuel.

is heated by the hot exhaust and at the same time we got fresh, pure air. To heat the fuel, we wrap the fuel pipe once or twice around the outside of the exhaust pipe. To get the spray of water, run the pipe into the engine hopper, and by using a needle valve, you can regulate the drop into a little funnel opening into the intake pipe near the engine. The object of the funnel enables the operator to see how much water the engine is taking. We used the bottom of a hand oil cup for the funnel. The air pipe can be reduced down to about one-third the size of the intake pipe as used for gasoline. As kerosene is harder to vaporize than gasoline, it is necessary to give the engine more suction at the intake pipe. We find it is advisable to heat both the air and funnel. Of course, we have to start our engine on gasoline and run it a few minutes until the engine gets hot. The spray of water helps to break up the carbon deposit. It also stops the explosion knocks. You will notice, there will be a violent knocking at each explosion, if the water is not used. In starting, it is well to shut off the air partially and let the suction be hard until the engine becomes hot. Then open it up again.

No. 4 Combination Punch and Shear



It can be operated toward the front or back, which ever is convenient for the user.

Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate
Depth of throat 6 inches.
This machine is furnished with ½-in., ⅝-in. and ¾ in punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

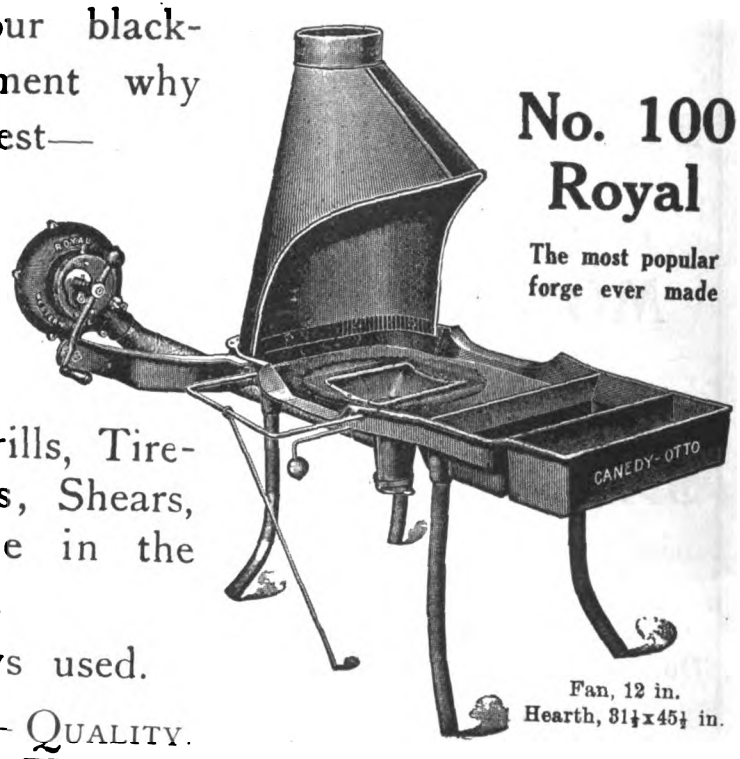
Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

No. 100 Royal

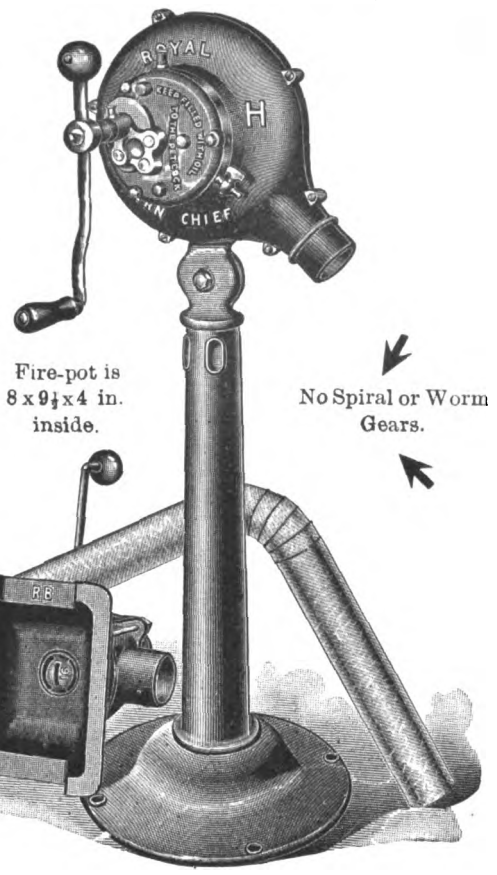
The most popular forge ever made



Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

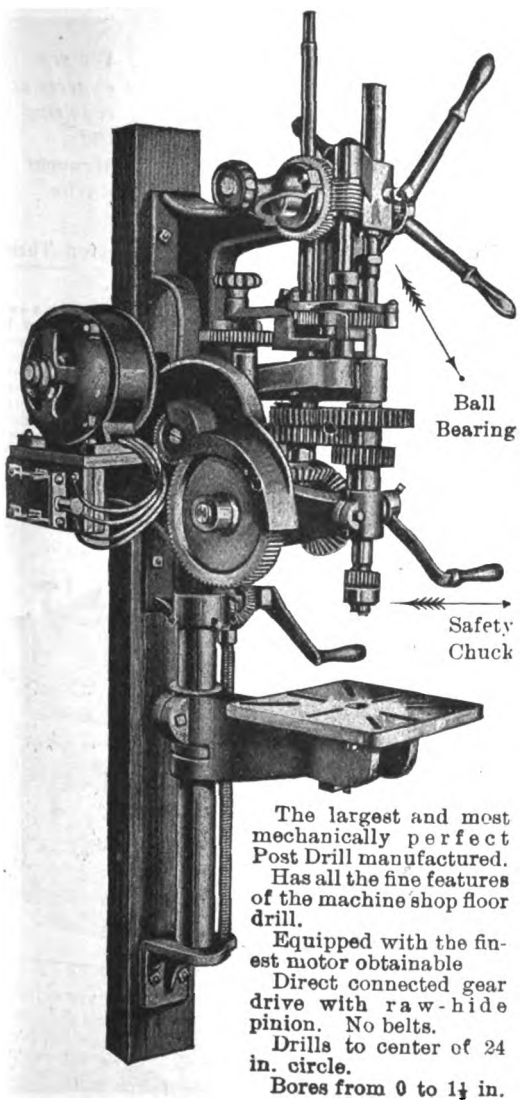
(Ask the man who owns one)



FORGES BLOWERS

PUNCHES SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

DRILLS
TIRE-SHRINKERS

Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

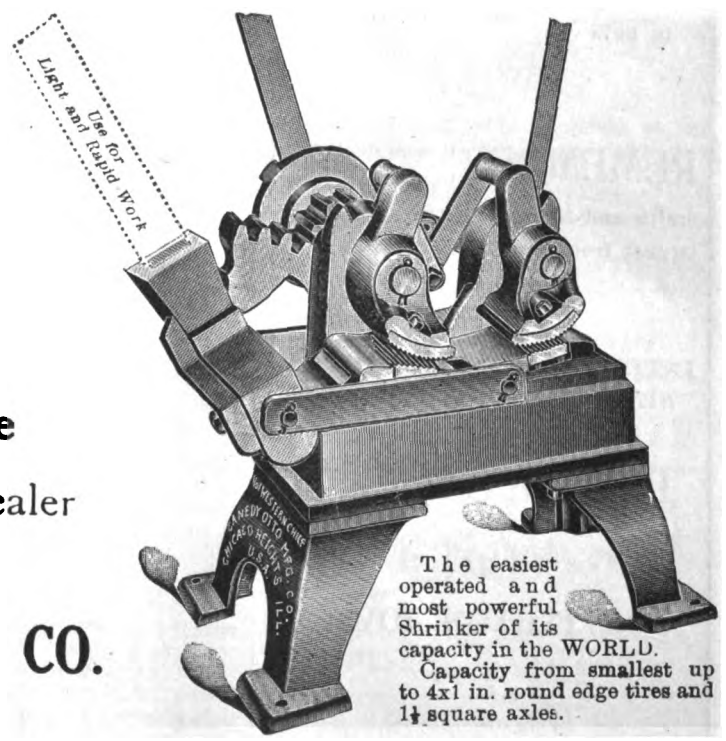
Give name of supply dealer or jobber.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

No. 1½ Western Chief

(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1 in. round edge tires and 1½ square axles.

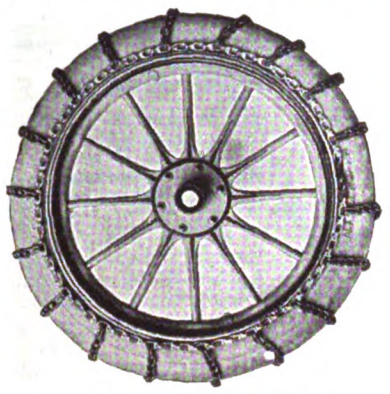
While it is warm enough now, the sleigh season is approaching rapidly and our readers therefore will be interested in the announcement in this issue of the Sherwood Hall Co., Ltd., Grand Rapids, Mich., manufacturers of Valley City Bent Knee Bob Sleighs, sleigh knees, sleigh bells, etc. Write to them for further particulars and mention The Blacksmith and Wheelwright.

Crescent Universal Wood Worker.—In this issue the Crescent Machine Company, 203 Main street, Leetonia, Ohio, have an advertisement illustrating and describing their Crescent Wood Worker. They say it is built better than some of their customers expect such machines to be built. This machine consists of a band saw, jointer, saw table, borer and reversible single shaper. You may have your choice of 26 inch or 32 inch saw; 8 inch, 12 inch or 16 inch jointer. This company has just brought out a new catalogue giving further particulars about its combination machine and other wood working machines which they manufacture. Write for it at once while you are thinking about it and mention The Blacksmith and Wheelwright.

Porter's Tested Bolt Clippers.—We wish to call the special attention of our readers to the striking advertisement which appears in this issue from H. K. Porter, Everett, Mass. The illustration shows tons of small pieces which have been cut off in testing the various bolt clippers manufactured by Mr. Porter, including the "Easy," "New Easy" and "Allen Randall." Most of our readers are already aware that there are no better bolt-clippers made by anybody, anywhere than the above brands, and it is because of their excellence that Mr. Porter has built up such a very large business and gained the enviable position in the trade, which he has held for so many years. If you are interested in bolt clippers get in touch with H. K. Porter. Enough said.

A New Business for Blacksmiths.

Probably nearly all blacksmiths who read this publication are located on some road where many automobiles and automobile trucks pass in the course of a day, and even if these blacksmiths do not undertake regular repairs to automobiles, there is one branch of the business which they can pursue profitably and that is the sale of tire chains to automobile owners, especially in wet weather, when there is trouble with skidding. The Whittaker Chain Tread Co., 10 Pearl street, Boston, Mass.,



Whittaker Chain Tread Co.

manufacture a line of tire chains which is unexceled for pleasure automobiles and business auto trucks. They want our readers to write for their co-operative profit plan for the sale of these chains. They will show you just how to do a lucrative business in this line if you will take the trouble to write them. They also have an interesting catalogue which may be had for the asking. In all correspondence mention this publication.

Lemoine's Hoof Packing.

Many of our readers, perhaps, have never heard of Lemoine's Hoof Packing, but horseshoers who have used it throughout the country pronounce it an exceedingly good article. This packing may be packed under leather and rubber pads, the same as tar, or without leathers you get the same good results. ;It keeps the horse's feet nice and soft and is a standard remedy for thrush and other hoof diseases. When a horse comes in after a long drive and his feet are hot if they are packed with Lemoine's Hoof Packing there is a cooling effect which is especially beneficial, and the horse will not be sore and stiff when

N. Lemoine, Originator of Lemoine's Hoof Packing.

he starts out again. This hoof packing is highly recommended by the most skillful veterinarians. The manufacturer whose portrait is shown in connection with this article has decided to make a very generous offer to our readers. To anyone who will write to him and mention The Blacksmith and Wheelwright he will send absolutely free of charge a liberal sample of his hoof packing so that you can use it for yourself and see just how good it is. Address your communications to N. Lemoine Co., So. Framingham, Mass.

A Famous Trademark.

Wherever vehicles are made or used the celebrated Concord axles are well-known, and it is safe to say that there is no country on the civilized or uncivilized globes where these axles are not in regular use.

Our readers should bear in mind that the original and genuine Concord axles always bear the trademark which is shown herewith. They are manufactured by the Concord Axle Co., of Penacook Station, Concord, N. H. Very few firms in America have been in business so long as this one, as they were established in 1835; which makes a business record of seventy-seven years, and during this entire period their product has

A Famous Trademark.

had an enviable reputation for high quality. If you want to buy Concord axles, and there are none better, look for the trademark. In addition every right hand axle is stamped "D. Arthur Brown & Co., Concord, N. H." Many styles of axle are made by this concern and they will be only too glad to send you a free catalogue on request if you mention The Blacksmith and Wheelwright.

C. B. N. A. OFFICIAL CONVENTION NOTICE

Office of the Secretary and Treasurer, Mount Vernon, N. Y., September 2nd, 1912.

The Carriage Builders National Association extends to the Carriage, Wagon and Sleigh builders of the United States a cordial invitation to attend the Fortieth Annual Convention of their Association at Atlantic City, N. J., September 23-27th of this year.

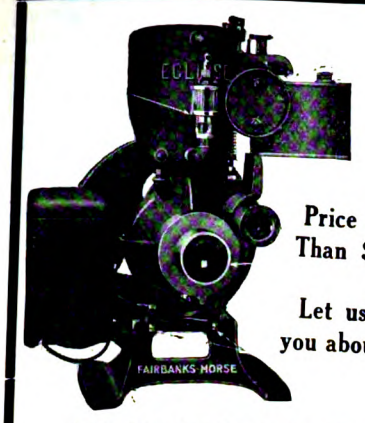
A visit to the Convention and Exhibition of the materials used in construction of your products and in your business, and a few days spent by the Sea in that delightful City cannot help being of benefit to you in every way.

The Association will be happy to see you and you will be welcome whether a member or not. The Convention and Exhibition are free to every Vehicle Builder, as our sole purpose is to benefit all builders of Vehicles.

By direction of the Association,
HENRY C. McLEAR, Secretary.

Do you want anything? Is your shop for sale, or do you want to buy a shop or hire a man? If so, a "Want" advertisement in THE BLACKSMITH AND WHEELWRIGHT will bring you good results. See terms at head of the "Want" Department on another page.

Jessop's "Ark" High Speed Steel.—Many of our readers will, no doubt, notice with interest the half-page announcement in this issue of Wm. Jessop & Sons, Incorporated, 91 John street, New York City, relating to Jessop's "Ark" High Speed Steel which has a record to be proud of. They keep constantly on hand a large stock of carbon tool steel and high speed steel. Write for their catalogue giving much interesting information.



Price Less Than $50.

Let us tell you about it.

You Need a Small Engine
to run your light machinery about the shop and home.

The Eclipse Pumper
will do the work and save you time and labor.

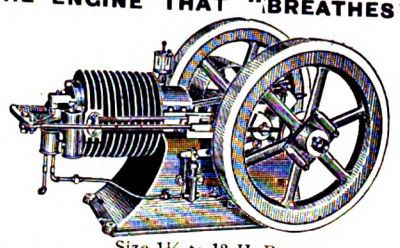
Light	Strong	Reliable
Simple	Durable	Economical

Send for Catalogue No. 655 HV.

Fairbanks, Morse & Co.
900 So. Wabash Ave. Chicago, Ill.

Wagon and Portable Scales, Gasoline Engines, Pumps, Water Systems, Electric Light Plants, Windmills, Feed Grinders.

THE ENGINE THAT "BREATHES"



Size 1½ to 12 H. P.

Just the engine for the shop. No water tanks, hoppers or Fan complications to bother with. The Gade pays for itself by cutting your fuel bill one-third. Investigate the efficient and economical Gade before you purchase an engine. 5 YEAR GUARANTEE.

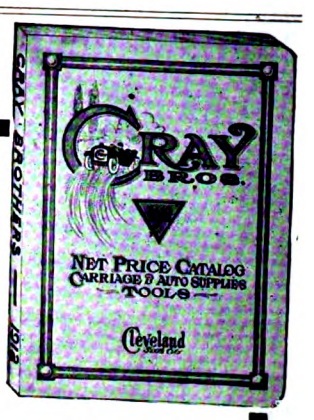
Write for Catalog and Descriptive Matter

GADE BROS. MFG. CO., 200 Main St., Iowa Falls, Iowa.

A Free Book

—FOR—

Blacksmiths and Auto Repair Men



This **Auto Repairers' Guide & Price Maker** is issued in the interest of Automobile repairers, dealers and garage men, blacksmiths, carriage men, etc. **It's free to the trade** and sent to them only.

Think of it, **480 pages of bargains**—about 3000 illustrations—a complete auto repairers' guide and price maker—quotes **lowest wholesale prices** on first quality carriage and wagon hardware, automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops and in fact **everything used on an auto or carriage.**

Write for your copy today, sending business card, letterhead or some other evidence that you are in the trade.

CRAY BROTHERS, CARRIAGE HARDWARE AND AUTO ACCESSORIES
1117 W. 11th Street, Cleveland, Ohio, U. S. A.

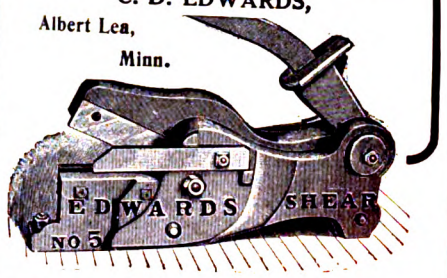
Edwards Shears

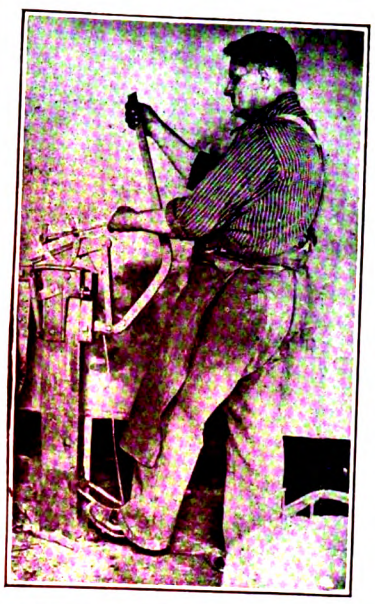
For twenty years the **Two Leading Low Priced Shears** in the U. S., representing the **Greatest Value** for the **Least Money.**

No. 5, weighs 200 lbs., cuts 4x¼ inch soft steel.
No. 10, weighs 430 lbs., cuts 4x¾ inch soft steel.

At their price you should have had one long ago. **Order One** from the first iron man that calls on you. **They All Sell Them.**
Write for descriptive circular and prices.

C. D. EDWARDS,
Albert Lea,
Minn.



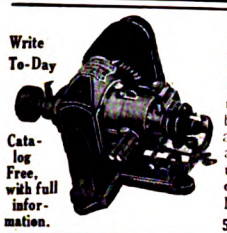


THE J. L. Z. FLAT CALK SHEAR

Saves three-fourths of the time it takes you the old way—and every shoe a success. Set the new toe, ready to weld, same heat—by heating the shoe to good white heat—this can be done every time. Shear can be used as ordinary hot shear when not using the foot treadle. If you install one of these machines you will not be without it for ten times its cost. Castings are of Crucible Cast Steel and Blades of Cast Steel—therefore a tool to last a lifetime. Get interested in this tool and do the work easy and with perfect satisfaction. Your Jobber will get it for you, if not, send $12.00 and same will be shipped you at once.

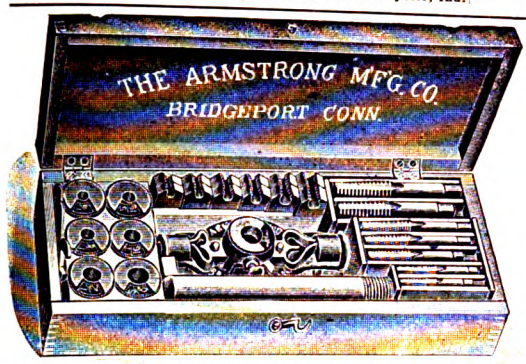
THE J. L. ZANE MFG. CO.
FARMINGTON, IOWA

Write To-Day



Catalog Free, with full information.

MOTSINGER
Guaranteed Auto-Sparker
(Better than an everlasting battery.) Will generate current for ignition, and electric lights, charging storage batteries, etc. Suitable for all types and sizes of gas and gasoline engines. **Let us tell you how to make your own electricity.**
MOTSINGER DEVICE MFG. CO.
588 Cherry St., La Fayette, Ind.



GENUINE ARMSTRONG BOLT DIES

are adjustable to variations in size of **NUTS.**

MANUFACTURED BY
THE ARMSTRONG MFG. CO.,
316 Knowlton St.,
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NEW YORK. CHICAGO.
Catalog mailed on Request.

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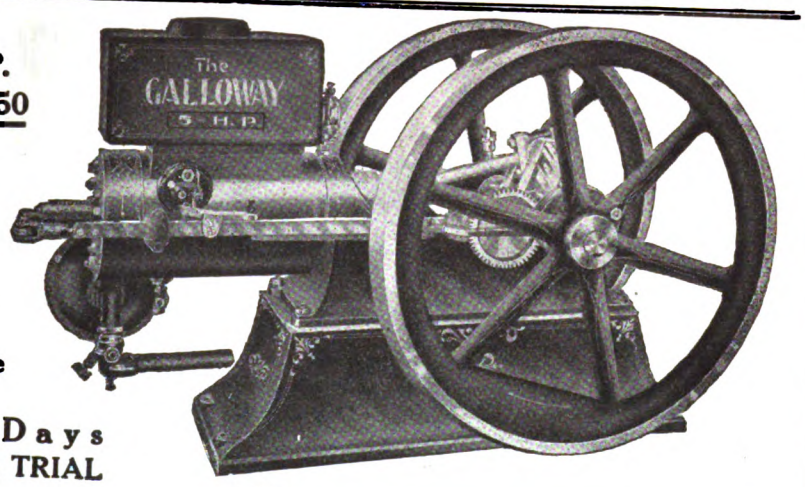
5 H. P.
$119.50



Built For Service

30 Days FREE TRIAL

THE GALLOWAY GASOLINE ENGINE

Owned and Made Exclusively by the William Galloway Co., Waterloo, Iowa

will run your shop at several times its present capacity and enable you to take lots of jobs that you have to turn down now because you have not the capacity.

It will enable you to do work you couldn't do without it.

An absolute necessity for all high grade, careful work.

You can reduce your charges on much of your work and still double your profits.

Only Four Things To Do:—Turn on the switch, turn on the oil, turn on the gasoline, give the fly-wheel a start, and the Galloway will go right along all day without further attention. It's the ideal power for a small shop and it's got the capacity to take care of your growing needs.

The Galloway Engine has been a standard engine for fifteen years. Thousands in every day use in every state and territory.

The Galloway Horse Power is rated by actual brake test. If you try the Galloway Engine you will find it is not over-speeded. Remember, the bore and stroke count and you don't have to drive your engine faster than you ought to drive it to get the rated horse power.

We make this engine in seven sizes up to 28 Horse Power. Three or four styles in every size.

Note my SPECIAL PROPOSITION TO BLACKSMITHS.

I have a plan by which every blacksmith can pay for his own machine. It's good, it's out of the ordinary, and you will be overlooking a big chance if you don't write for my proposition. Ask for my free information on Stationary and Portable Gasoline Engines from 2 to 28 Horse Power. We make the best and we price them at reasonable figures.

Beautiful, sensible CATALOG FREE FOR THE ASKING. Write to-day.

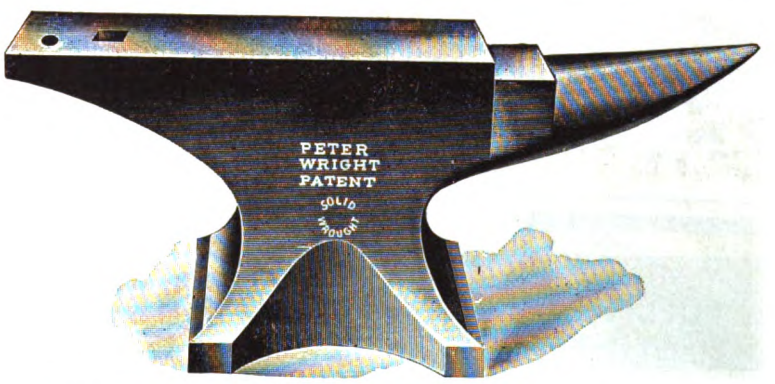
WILLIAM GALLOWAY, President,
THE WILLIAM GALLOWAY COMPANY,
1555 Galloway Station, Waterloo, Iowa.

PETER WRIGHT ANVILS

Genuine Solid Wrought

Horn, face and end all one solid wrought iron forging.

Face steeled with finest quality Sheffield Steel.



"PETER WRIGHT'S, the Anvil that is fully guaranteed."

Carried in stock by all leading dealers in heavy hardware and supplies.

SOLE UNITED STATES AGENTS

WIEBUSCH & HILGER, Ltd.

106-110 Lafayette Street, New York, N. Y.

PACIFIC COAST OFFICES:
San Francisco, Cal.—530 Golden Gate Avenue. Portland, Ore.—329 Ankeny Street

WANT ADVERTISEMENTS

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT,
SHOPS WANTED or SITUATIONS or HELP WANTED,

will be inserted under this head at 2 cents a word, including the address for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1.00. Address

M. T. RICHARDSON CO., 71-73 Murray St., New York,
PUBLISHERS OF THE BLACKSMITH AND WHEELWRIGHT.

PATENTS FOR INVENTIONS.
H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.
We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., publishers, 71-73 Murray Street, New York City.

PATENTS.
C. L. PARKER, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

CASH FOR YOUR BUSINESS OR REAL ESTATE.
If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

BROTHER.
Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

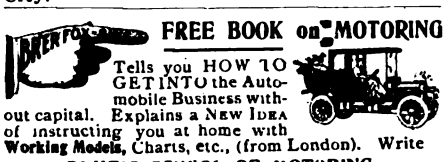
MECHANICS.
Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

BLACKSMITHS.
Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

WANTED.
WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

FOR SALE.
McGovern Power Tire Shrinker also West Power Tire Setter, Moyer Hub Boring Machine, also Monarch Hub Boring Machine. All as good as new at 1-3 the price of new ones. Address 554 Freeman Ave., Cincinnati, O.

PATENTS.
Procured in all countries promptly and properly. Personal attention. Moderate fees. No free searches, advertisements, or other fake catchpenny propositions. Send for circulars. Correspondence solicited. Davis & Davis, 908-914 G. St., Washington, D. C., and 220 Broadway, New York City.



FOR SALE.
Blacksmith and wagon shop located in Lyman County. Doing good business, good reason for selling. Address LOCK BOX 22, Murdo, South Dakota.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORK, St. Cloud, Minn.

FOR SALE.
One high grade 8 h.p. horizontal Milwaukee gasoline engine, only $108.00. Fifty other good propositions for the power user. State your requirements before you buy. BADGER MOTOR CO., Milwaukee, Wis.

FOR SALE.
Blacksmith shop. Good trade, plenty of work for two men. Reason for selling, do not know the trade. Address P. O. BOX 227 Roswell, S. D.

PRACTICAL INSTRUCTION IN BLACKSMITHING GIVEN AT THE NEW YORK TRADE SCHOOL.
A six months evening course, three nights a week, commences on September 26th, 1912; tuition fee for the full term, $12; the course includes general blacksmithing and tool making. Write for a catalog. Address NEW YORK TRADE SCHOOL, 1266 First Ave., New York.

FOR SALE.
Blacksmith shop, 30x34, 2 fires, gasoline engine, steam hammer, emery stand, circular saw; 3 lots, 7-room house, up-to-date; nice grove on place, about 350 trees; plenty of work for two men steadily the year round; prices tip-top, all cash; only shop in town. (I am crippled with hard work and will have to retire.) Have all necessary machinery, good stock of iron, bolts, plough supplies, wood stock, etc. A great chance for somebody who will speak quick. Address for further particulars, A. J. SINKULA, Taylor, N. Dak.

WANTED.
To buy a blacksmith shop in a good town or good locality. AMOS SALES CO., C2402-C2404 Johnson Street, Greenville, Texas.

FOR SALE OR TRADE
Blacksmith shops, dwellings, farms, stores, factories, almost anywhere in the United States, or Canada. Write us. AMOS SALES CO., C2402-C2404 Johnson Street, Greenville, Texas.

100 bargains in machines and tools. Lathes 9 inch to 32 inch, $55 up; millers, $100; drills, $20 up. Reduced prices during clearance sale. Sec. Hd. Mch. Dept. BICKNELL M. & S. CO., Janesville, Wis.

FOR SALE.
Blacksmithing business, tools and stock will be sold cheap if taken at once. Address for further particulars and price, ARTHUR DORR, Capron, Ill.

The only blacksmith and shoeing shop at Brownsville, Vt. Rent $30.00 per month, house, barn, garden. Big business or investment. Cheap. Great opportunity. Address FERRIS HALE, Windsor, Vt.

Cold hammered horse shoes are a success. Punched, heeled and toed ready to drive, only $6.75 per keg. Try a mixed keg. Count the price of toes, coal, borax and shoes and see if you can afford to make a boiler shop out of yourself at such prices. Address J. D. HALL, Orrville, Ohi.

FOR SALE OR RENT.
Blacksmith and wood working shop. Will sell tools and stock at invoice, rent shop. Shop 30x90. Work for two men and helper year around. Snap for some one, 54 miles from Chicago. Two railroads, town of 1200. Stone roads, fine farming country. Established 14 years. For particulars address, O. G. HAYES, Kouts, Ind.

BLACKSMITH SHOP AND TOOLS.
For sale or trade cheap. In good live town, only one other shop in town. For information address G. A. HENRY, La Cygne, Kans.

FOR SALE.
Blacksmith and wagon shop, eight room house and lot. Will sell one or both, and sell cheap on account of poor health. Address for particulars, GEORGE M. HOERNER, Box 13, Maple Rapids, Mich.

FOR SALE.
Blacksmith, wood work, and horseshoeing shop. Built of cement, 24 by 86, 22 windows. Two lots. Equipped with 9 horse power gas engine, trip hammer, disc roller, emery grinder, drill, and all kinds of small tools. The only shop in town; doing good business. Good reason for selling. Address F. J. KALINOSKI, Angus, Neb.

FOR RENT.
Blacksmith, horseshoeing and wood work shop. Plenty of work for two men. Address B. F. SULLIVAN, Chazy, New York.

FOR SALE.
A first-class wagon and repair shop, gasoline power, modern tools, good stock. Reason for selling, disabled. Address JOHN G. WALLENMEYER, Jamestown, Mo.

The Red Tip Profit Sharing Catalogue.—All of our readers who have not already obtained one should write to the Neverslip Manufacturing Company, New Brunswick, N. J., for their profit sharing catalogue, listing over sixteen hundred presents to be exchanged for the Red Tip coupons. This is, of course, an advertising plan to promote the sale of Neverslip Red Tip Calks, but the cost of the presents coming out of the advertising appropriation in no way affects the quality or price of the Red Tip Calks. The range of presents listed in the catalogue embraces almost everything that could be used by the horseshoer, or his family, and in the course of a busy season you can earn by using Red Tip Calks some exceedingly valuable premiums. The Red Tip Calks, as well as the celebrated Neverslip Red Tip Shoes, are extensively advertised throughout the country and nearly every horseshoer will prefer to handle an advertised line, especially when the merit of the line is beyond question. In all correspondence with the Neverslip Manufacturing Co., please mention The Blacksmith and Wheelwright.

There With the Punch.—Butts and Ordway Co., 33 Purchase street, Boston, Mass., in their new advertisement, published in our columns this month, state that they are "there with the punch." This phrase refers to the celebrated B. & O. Easy Single Punch. It is an exceedingly valuable adjunct to any blacksmith's shop. The price of the punch is $16 complete. It is a very valuable tool and will last indefinitely. It is capable of punching a ⅜ hole in ⅜ stock, allowing a hole 3 inches from the edge. It is provided with ¼ inch round punch and dies, but can also be supplied with a set of punches and dies from ⅛ inch up to ¼ inch.

A large variety of tools and appliances for the blacksmith shop is also manufactured by Butts and Ordway Co., and they invite you to send for their complete catalogue, and in doing so do not forget to mention this publication.

Buggy and Automobile Tops.—Those of our readers who may be in need of a top should write to Buob & Scheu, 412 E. Court street, Cincinnati, Ohio, for circular and prices. These people make over 100 styles of vehicle tops.

Broken Anvils.—If your anvil is broken or badly mutilated by hard work you can have it put in good shape, and made as good as new by sending it to the Columbus Anvil and Forging Company, West Frankfort street, Columbus, Ohio. Write to them describing the condition of your anvil and they will be able to give you a fairly good estimate of the cost of repairing it.

Suregrip Calks.—The American Calk Company of Detroit, Mich., have an announcement in this issue of their Suregrip Calks, in which they say that they protect the horseshoers. Write to them for further particulars and mention The Blacksmith and Wheelwright.

WAGON BUILDING

"Build me a wagon that will last forever."

"Sorry, Sir, but 'axle troubles' (due to wear—wear on the spindle, or on the box, or both) make it impossible."

You've often received a specification like that and been obliged to give that answer—haven't you?

The Sheldon "TON-DON"—an axle that will not wear, run hot or break—allows your meeting the requirements of the man who wants a wagon to last forever, **and we have told him so.**

The Sheldon "TON-DON" was originally made for buggies and carriages. Its success was so instantaneous and pronounced that we were deluged with requests for an axle embodying the same principles for use on Delivery, on Business, and on Express Wagons.

Hence, the "TON-DON"–CONCORD EXPRESS.
In EFFICIENCY—The HIGHEST.
In CONSTRUCTION—The SIMPLEST.
In SERVICE—The MOST SATISFACTORY.

The Spindle of the Sheldon Ton-Don Axle

Ordinary axles wear flat on the bottom of the spindle because the bottom side is the point of contact and where the wear of the spindle is concentrated. It takes a spindle of unusual hardness to resist this wear—greater hardness than any ordinary axle affords. The spindle of the "TON-DON" is hardened by a special process, producing a wearing surface of such hardness that a fine file makes no impression on it—yet the center remains soft or "natural."

The Phosphor-Bronze Lined Box

The peculiarity of this box lining is that while somewhat softer than the spindle, there is no perceptible wear after thousands of miles of running, but becomes harder and more wear-resisting with use.

Phosphor-Bronze (of a mixture which increases its toughness, smoothness under friction and wear-resisting qualities) is a metal used for making the propellers of ocean steamships, bearings for locomotives, crank-shaft bearings for automobiles and other fine machinery. Imagine what a metal must be to meet such conditions, and you will grasp the advantages of applying such metal to axle purposes.

THESE AXLES CARRIED IN STOCK BY THE FOLLOWING JOBBERS AND CAN BE OBTAINED AT MANUFACTURERS' PRICES.

Baltimore, Md.....E. Scott Payne Co.	Providence, R. I.....Congdon & Carpenter Co.
Boston, Mass.....E. P. Sanderson Co.	Rochester, N. Y.....Burke Iron & Steel Co.
Buffalo, N. Y.....H. D. Taylor Co.	San Francisco, Cal...Waterhouse & Lester Co.
Chicago, Ill.....E. D. Kimball Co.	Scranton, Pa.....Bittenbender & Co.
Cincinnati, O.....G. B. Schulte Sons Co.	Seattle, Wash.....Gray Bros. Co.
Indianapolis, Ind.....W. J. Holliday & Co.	Springfield, Mass.....Chas. C. Lewis & Co.
Los Angeles, Cal.....Percival Iron Co.	St. Louis, Mo.....Sligo Iron Store Co.
Milwaukee, Wis.....Shadbolt & Boyd Iron Co.	Washington, D. C.....Louis Hartig
Pittsburg, Pa.....McLean & McGinness	Wilmington, Del.....Delaware Hardware Co.
Portland, Oregon.....J. E. Haseltine & Co.	Bridgeport, Conn.....Chapman & Bangs Co.
Ft. Wayne, Ind.....Mossman, Yarnelle & Co.	San Antonio, Texas....Heusinger Hardware Co.
New Orleans, La.....Jos. Schwartz Co.	

SHELDON

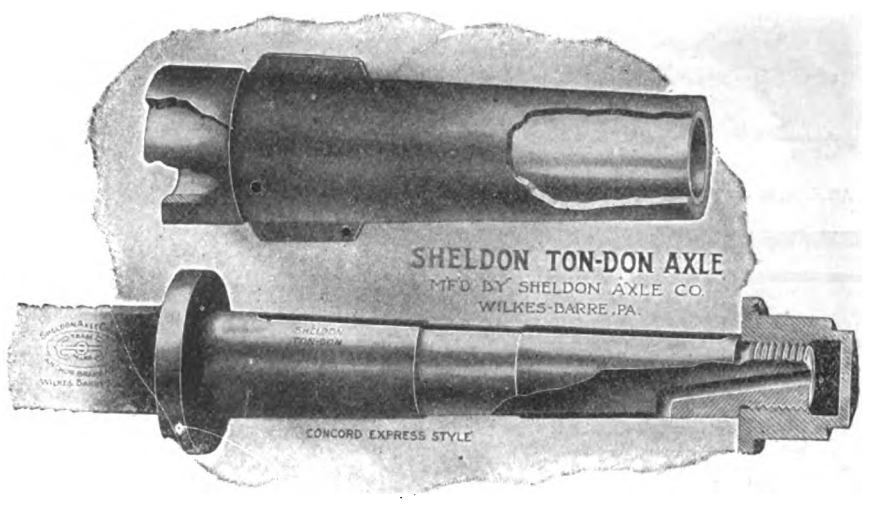
"TON-DON"

CONCORD EXPRESS STYLE

NOT A BALL OR ROLLER BEARING—BUT

ANTI-FRICTION—EVERLASTING—INTERCHANGEABLE

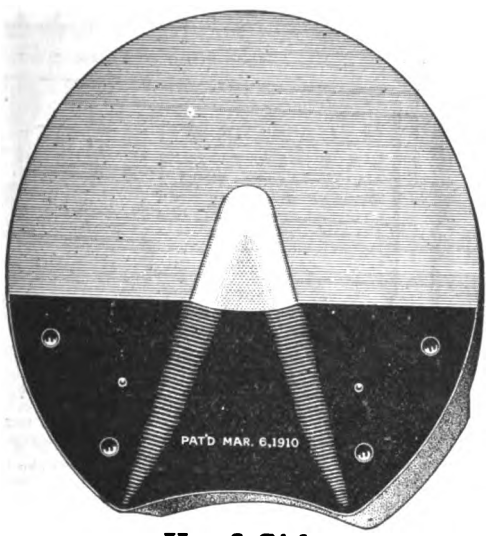
IT WILL NOT CUT, HEAT OR STICK



NOTICE THE PATENTED OILING DEVICE
HAS ALL THE ADVANTAGES OF FRICTION AND ANTI-FRICTION AXLES WITHOUT THEIR DISADVANTAGES
"TON-DON" MEANS KNOWN QUALITY WITHOUT FANCY PRICE
MADE ALSO FOR BUGGIES AND SURRIES

SHELDON AXLE CO.
WILKES-BARRE, PA

LARGEST AXLE FACTORY IN THE WORLD.



Hoof Side

Walpole

Rubber Heels for Horses

A Satisfaction to the Horseshoer as well as the Horse Owner.

Now, Mr. Blacksmith, here is straight talk for you. The next time a sore, tender-footed horse comes limping into your shop, persuade his owner to have a set of Walpole Heels put on the animal.

You know that horse will soon travel off sound and smooth.

Tell his owner that.

Tell him that this will be as much comfort for the man who drives as it is for the horse, and it makes the horse worth more, too.

Tell the owner that when the horse hits a hard pavement or macadamized road, the Walpole Rubber Heels will absorb the shock and protect the horse's whole foot.

Show him the patent spring steel plate that re-inforces the whole heel, and keeps anything from working up into the hoof against bruises and corns.

The Walpole Heel beats the old-fashioned hoof pad because it never gets floppy and useless after getting wet. The spring steel plate prevents that.

Walpole Heels are better than the bar shoe because they can be regulated so as to relieve soreness and tenderness in the horse's foot every time.

Your customers will be better satisfied after they once use Walpoles, and you'll know that you have done the best job you could for horse and owner.

You will hold your trade better if you can get your patrons to use Walpole Heels.

If you have not got them in stock, send to your jobber and get them right away.

Shoe Side

WALPOLE RUBBER CO., 185 Summer St., Boston, Mass.

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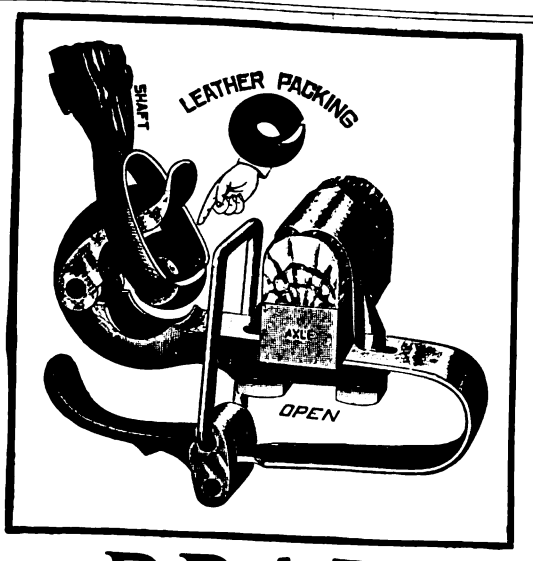


THE BRADLEY BALL-BEARING Carriage Coupler

All-Steel, Noiseless, Quick Shifting, Ball Bearing

The ONLY Carriage Shaft Coupler that is furnished with a

One-Piece Moulded Leather Packing

A packing that will outwear any other packing ever made. It fits the ball and socket. It is held in place by a spring steel retaining ring. It may be put on and taken off in a jiffy, and it stays where it is put.

MADE IN FIVE SIZES.

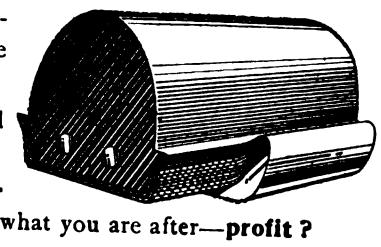
Pony—Buggy—Surrey—Delivery—Express

To fit axles 3-4 inch to 2 1-4 inch

Your Jobber Can Supply You.

C. G. BRADLEY & SON, Syracuse, N. Y.

They Now Outsell All Others



Goodyear "Wing" Tires far, far outsell all other carriage tires, yet the dealer makes the **usual** profit per set.

That fact, alone, Mr. Dealer, should win **you** to Goodyears.

It means **bigger** sales to you and **proportionately** bigger profit. Isn't that what you are after—**profit?**

Nearly 4 million "Wing" tires have been sold.

Three out of every four carriage makers use the "Wing."

More dealers sell "Wings" than any other kind.

Last season the consumer demand on these tires increased 24%. This season's sales will go over 80% over **last** season.

Have you ever sold any product more popular than this?

GOODYEAR

AKRON, OHIO

"Wing" Carriage Tires

have been in use 13 years. Carriage owners have had ample time to compare these tires with others. If there were another carriage tire as good as the "Wing" would not the public have known it long ago?

If you'll only investigate these tires, you, too, will be won by them. And you'll see the extra business they bring dealers.

Tire Book will be sent you on request.

THE GOODYEAR TIRE & RUBBER CO.

AKRON, OHIO

Branches and Agencies in 103 Principal Cities.

We Make All Kinds of Rubber Tires, Tire Accessories and Repair Outfits.

Main Canadian Office, Toronto, Ont. Canadian Factory, Bowmanville, Ont.

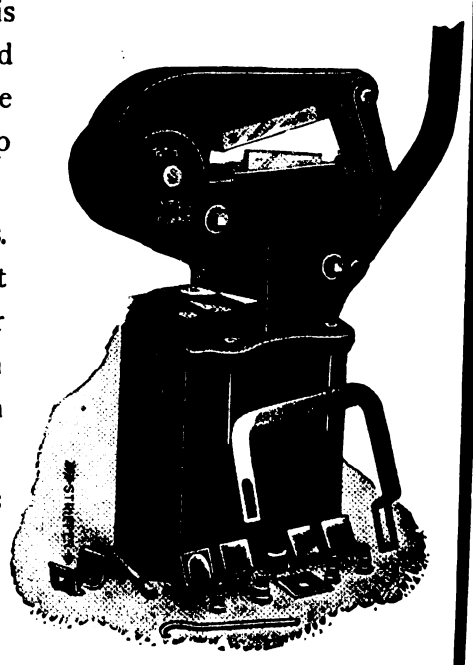
TIME IS MONEY

Any man or machine that can save your time can save you money. That's one of our big claims for our "Little Giant" combined Punch and Shear—it's sure a time-saver.

Don't believe it just because we say so but ask any user and send for our booklet of testimonials.

They are better than a live husky blacksmith helper.

The "Little Giant" is absolutely the best combined Punch and Shear for the blacksmith shop, and no shop is complete without one.



Built in Three sizes. Capacity of No. 1 or largest size, cuts 5/8x2 1/2 inches or 1/4 x 8 inches and 1 inch round. Punches 5/8 inch in 1/2 inch. Weighs 525 pounds.

FIVE sets of punches and dies with each machine.

Your Jobber can tell you all about them.

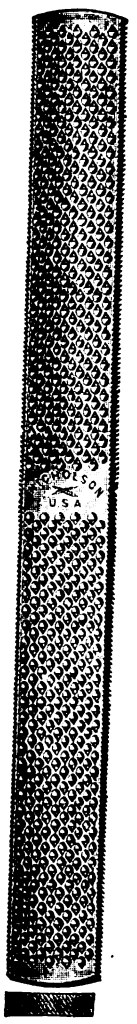
Send for our Catalogue and Prices.

LITTLE GIANT PUNCH & SHEAR CO.
Box 56 **SPARTA, ILL.**

Better Work—Better Service—

YOURS BY USING

NICHOLSON RASPS



NEW 18-inch Slim Horse Rasp.

Attention to Blacksmiths' requirements, and untiring efforts to fill them, have made NICHOLSON Rasps preferred in the best shops.

The arrangement and pitch of the teeth give a cutting and long-wearing quality that is unequaled by *ordinary* rasps.

Look For This Brand. NICHOLSON U.S.A. (Trade-Mark) *It Guarantees Rasp Satisfaction.*

That name guarantees selected steel—annealed, ground and hardened by expert workmen who have made your needs a lifetime study.

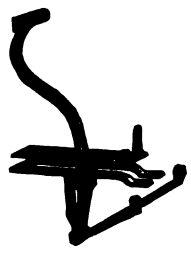
Made in all regular sizes, and in the new 18 inch Slim, which gives the user the advantage of a long stroke, and at the same time a rasp of medium weight.

Sold by all Leading Dealers.

NICHOLSON FILE CO.,
PROVIDENCE, R. I.

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

Showing some Irons used on HOUND GEAR, THREE SPRING EXPRESS WAGONS



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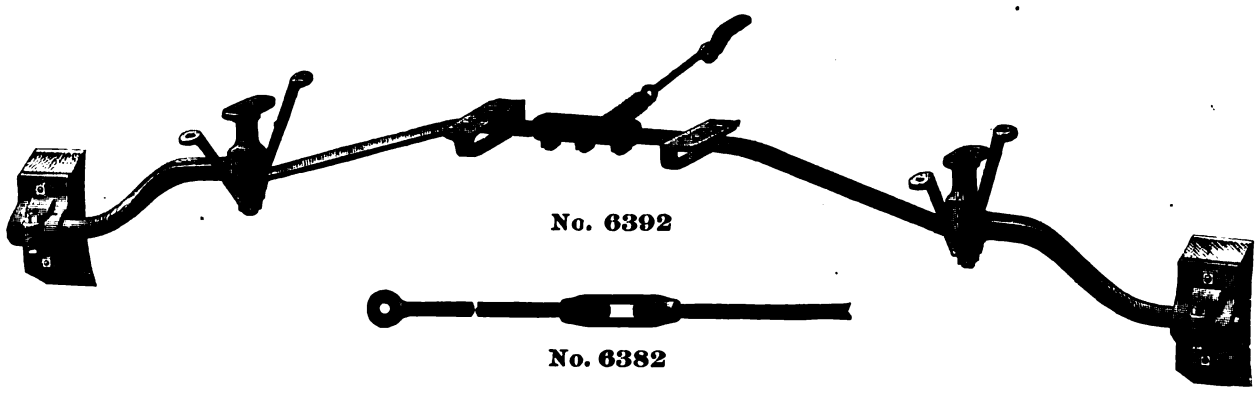

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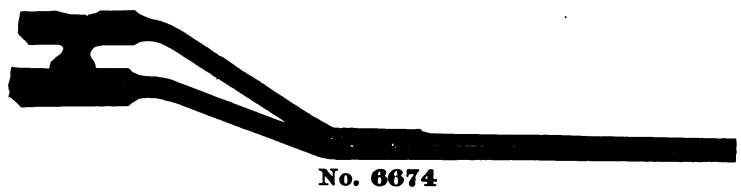

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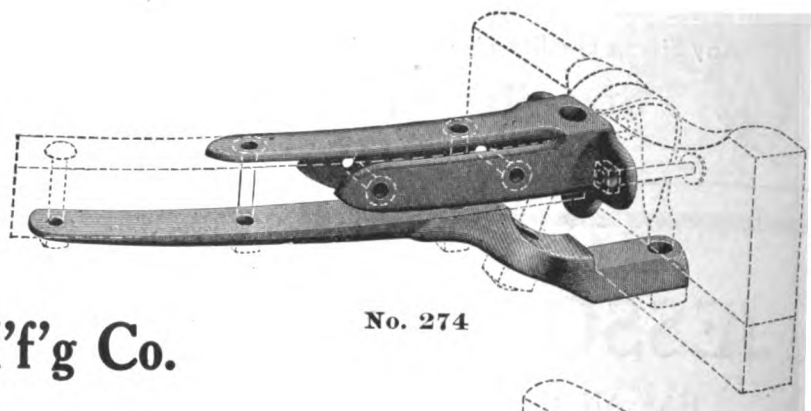

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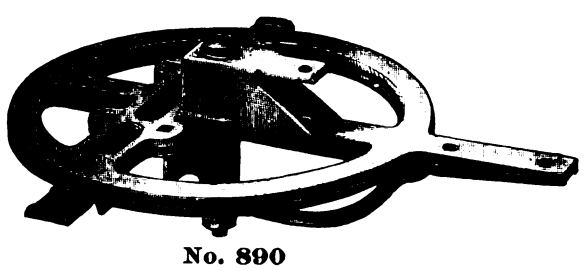

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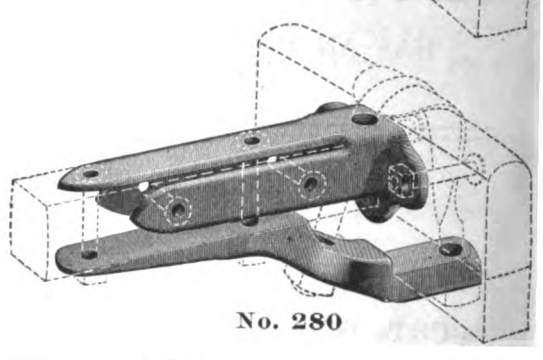

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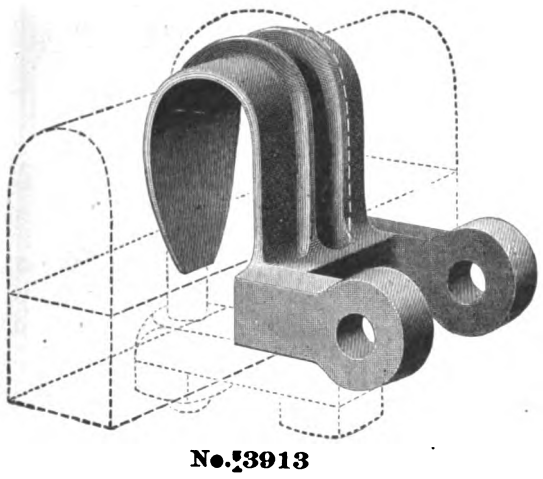

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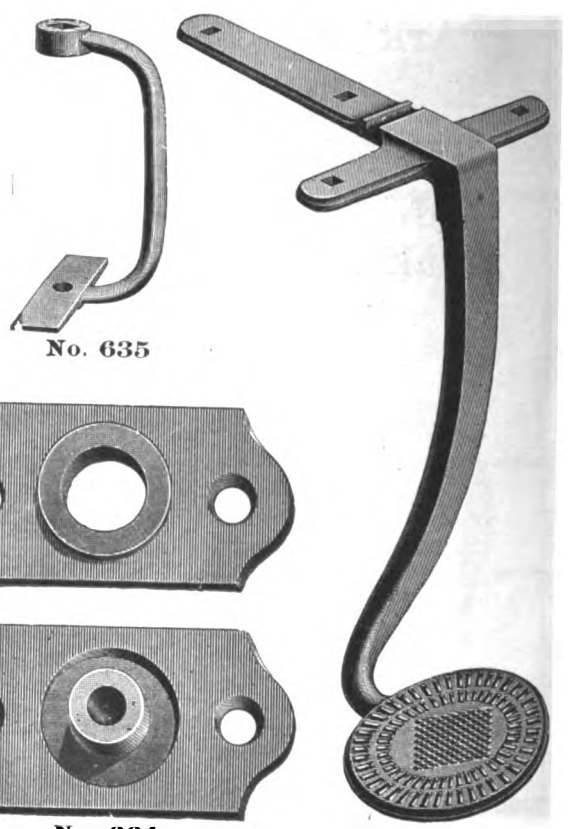

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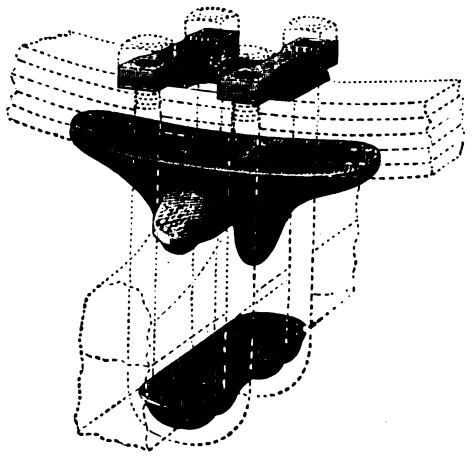

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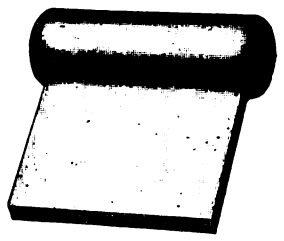

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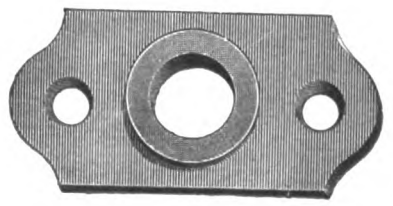

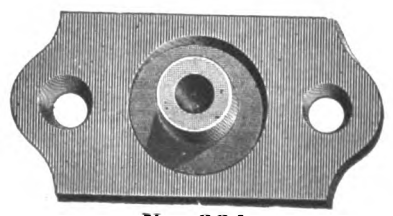

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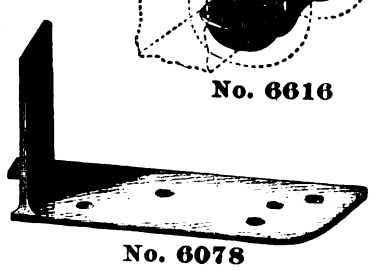

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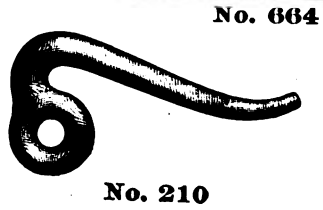

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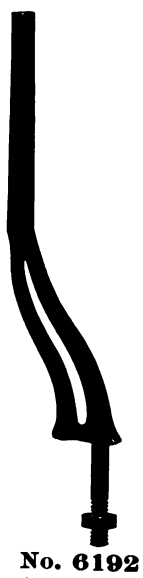

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In pairs R. and L.

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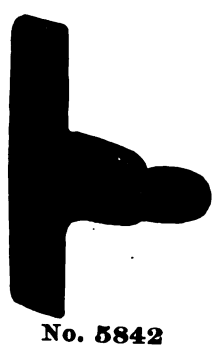

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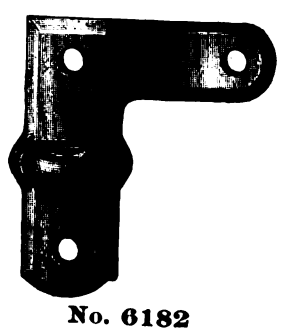

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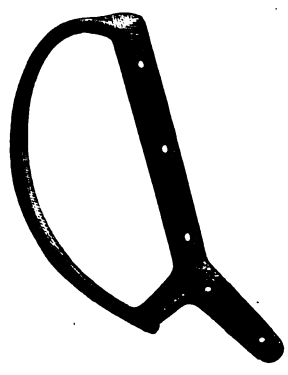

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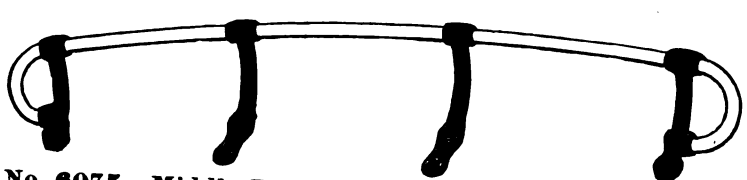
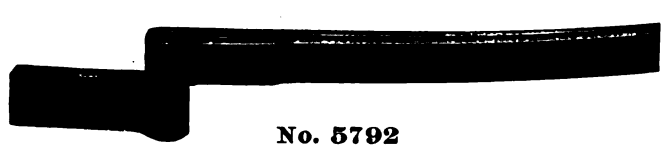


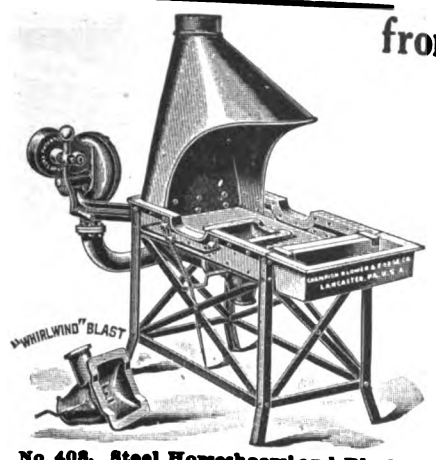
No. 6075. Middle Bracket

No. 6076. End Bracket



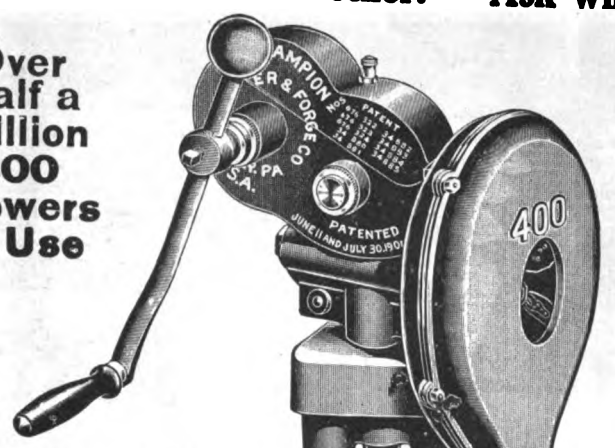
No. 5792

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say



No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

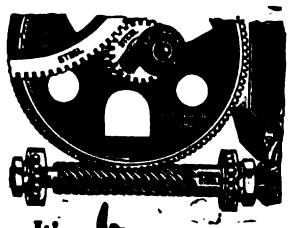
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,322 34,88
676,323 34,88
676,324 34 88
34,880 34,88
34,881 607,62

Also Great Britain Patent No. 9,662, May 25, 1900.

The Blower for Quality, First, Last and Always

THE FAMOUS 400



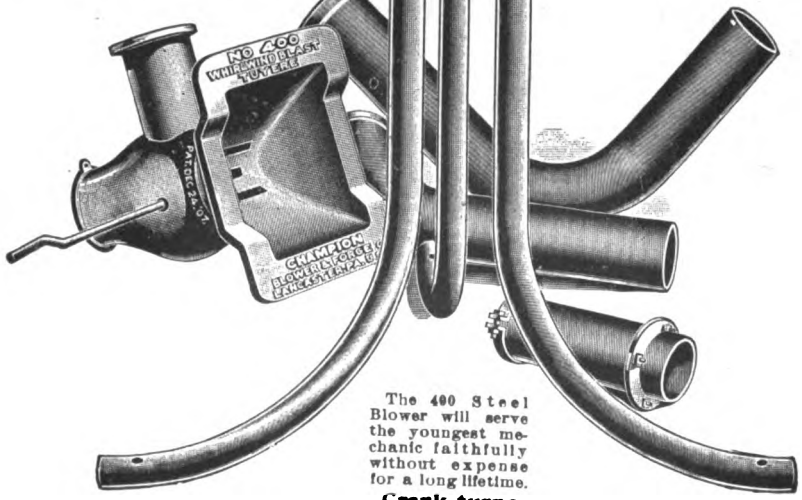
It's the all in Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

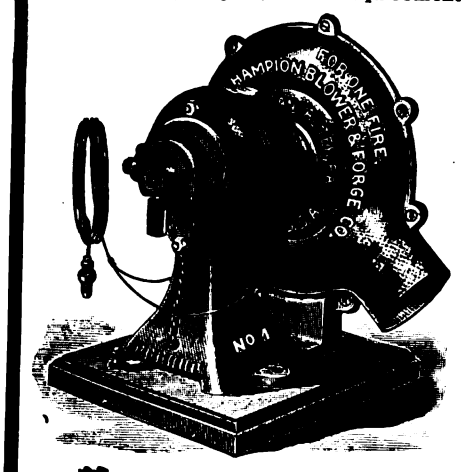
Crank turns either way to produce blast.

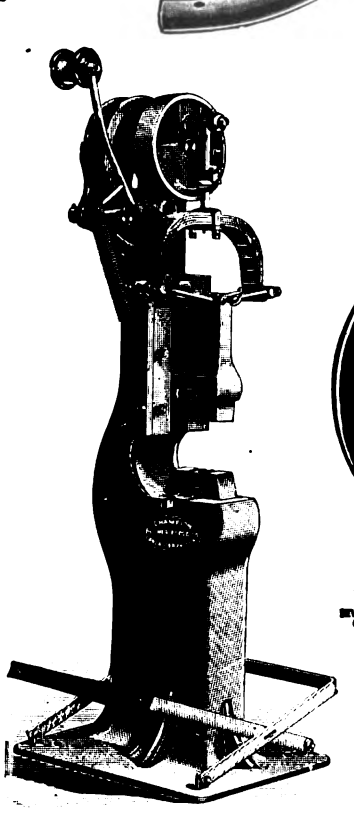
The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

Motor capacity 35% above requirements





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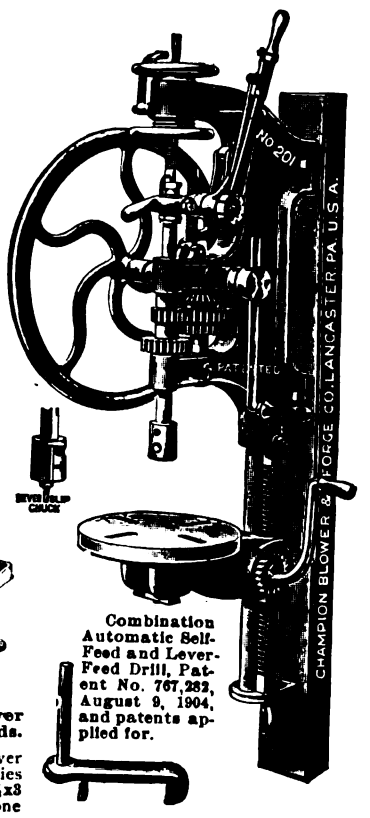
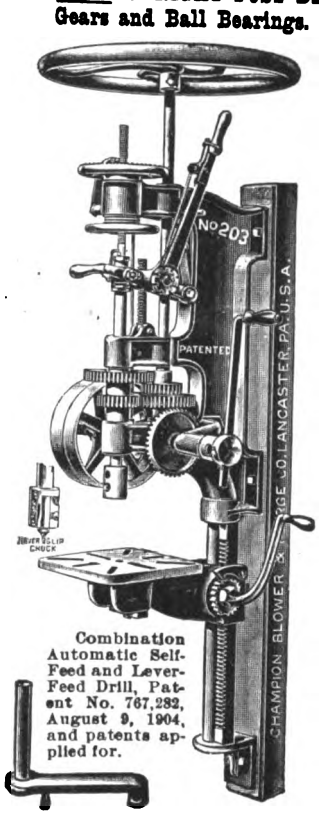
No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



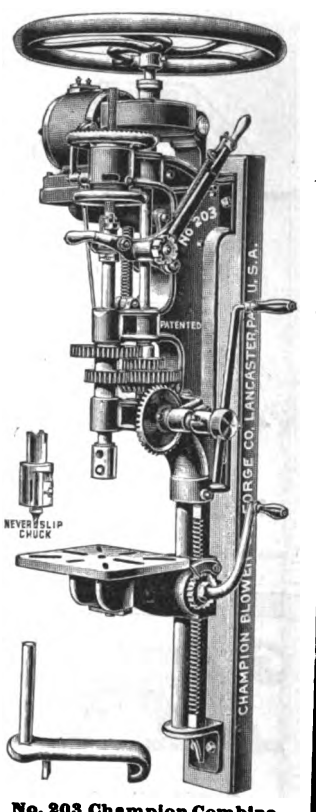
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

The CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.



No. 203 DRILL.

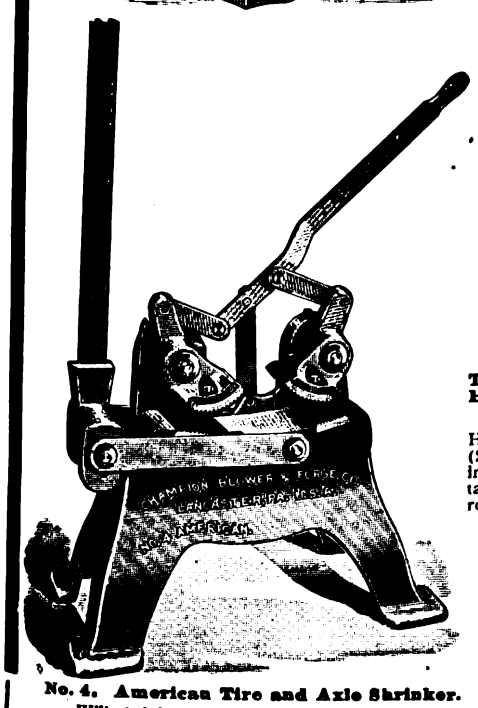
The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



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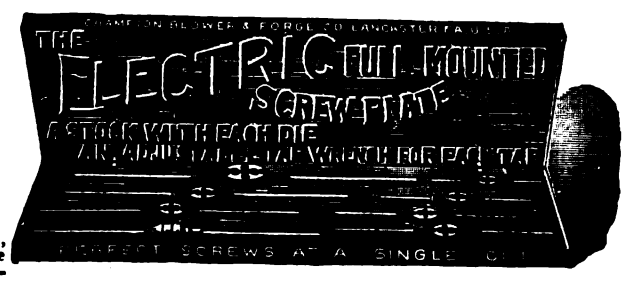
Will shrink up to 4 x 1 inches round edge tire, and axles up to 1⅛ inches.



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Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers. Power Hammers, Punches, Shears, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

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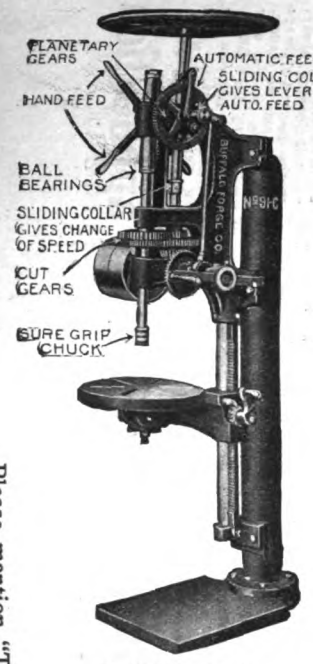
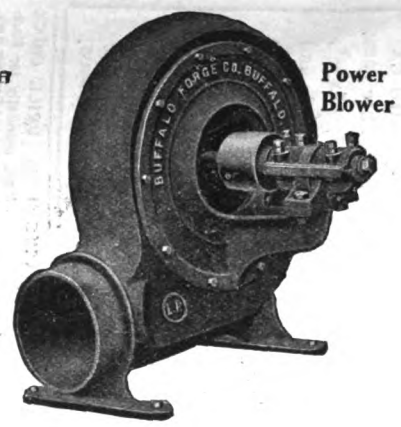


Drill No. 91-C

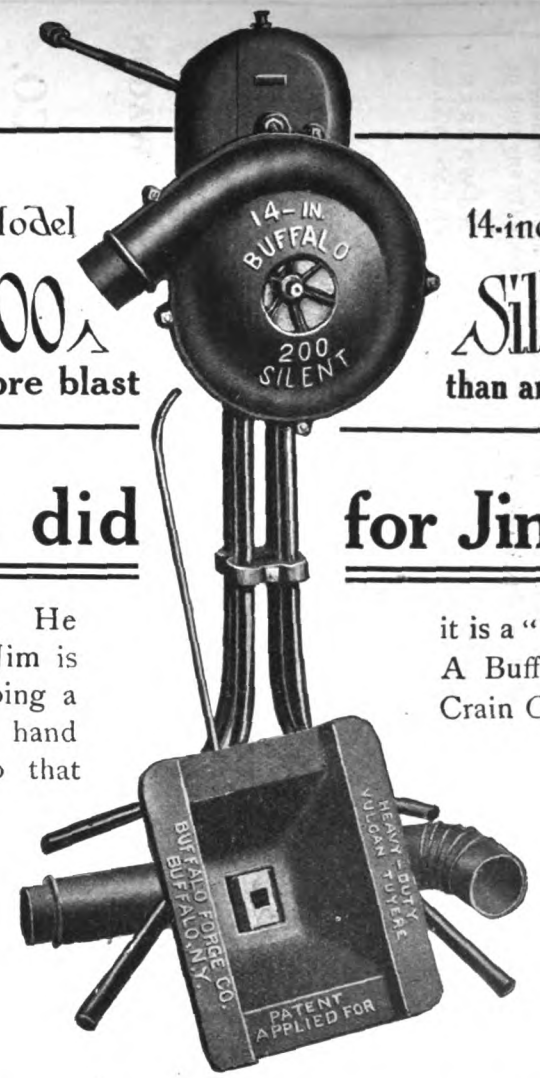


Power Blower

1911 Model

Buffalo 200

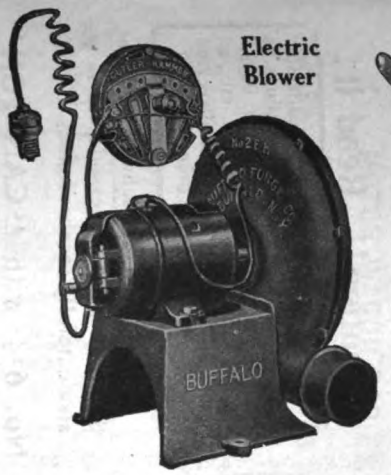
22 per cent. more blast



14-inch Fan

Silent Blower

than any 12-in. blower



Electric Blower

Drill No. 94

The No. 94 Drill design is peerless. Here you have lever feed with quick return, and automatic feed with three speeds. No turning back of feed wheel. Change the speed simply by a sliding collar—one second does it. No changing of crank. Full description in Catalog No. 145-B, free on request.

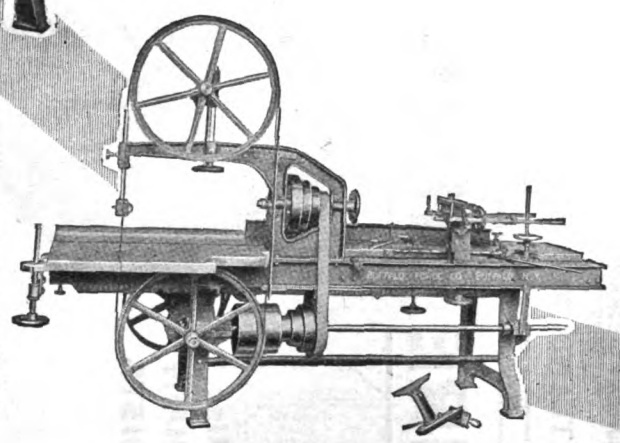
What Buffalo Tools did for Jim Tardy, Tom's Brother

Jim Tardy is in many ways like his brother Tom. He shares Tom's dislike for hard work and long hours. Jim is so blamed lazy he is always looking for a way out of doing a thing. His boss once had a bellows and a Buffalo hand blower, and Jim somehow managed to get next to that blower and keep it. But Jim soon got his eyes on a Buffalo Electric Blower, and talked about it so long that "the old man" thought he simply couldn't do without one. That was the time Jim got fooled, for when the blower came, the boss wanted it for himself.

The amazing thing about Jim is that he manages to keep his job. If you watch him work and keep your eyes open you will find out why. Jim never goes to the drill if he thinks the Buffalo Punch will do the work; it is quicker and easier. When he does go to the drill—it is a "Buffalo" too—he lets the power do all the hard pulling. A Buffalo Shear cuts all the bars and plates for Jim and a Crain Combination Woodworker comes into frequent use for ripping, cross-cutting, planing, boring, jointing, turning, equalizing and turning spokes, etc. The tires are bent on a Buffalo Power Bender and a roller-bearing easy-working Buffalo Tire Setter shrinks them. Jim has got so many "kinks" and short cuts and he if so "daffy" on machinery that he actually accomplishes more with their help than the hard-working chap next to him who never thinks of saving himself. The boss himself admits that he has learned a good many things from Jim in this way.

The Buffalo Combination Punch and Shear No. 6

will punch 5 holes of different sizes and cut round and square and flat bars without a single change of attachments. It is a machine of the greatest capacity and compactness, combined with the lightest weight, the frame being built of our famous "Armor Plate" steel. We make over 24 different designs, for hand and power, but this is a leader in blacksmith and jobbing shops.



The Wonderful Crain Combination Woodworker

is actually 12 machines in one. It is the only machine built especially for the blacksmith and wagon maker. Send for full description.

Buffalo Forge Company
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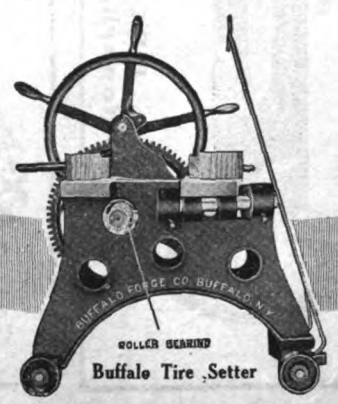
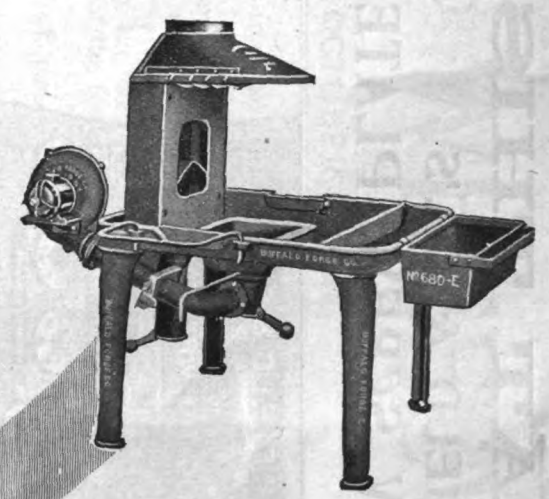
Ask for new 76-page Catalog No. 145-B.



All Standard Buffalo Blacksmith Forges are now equipped with the time-saving **14-inch** No. 200 Silent Blower.



Buffalo Electric Forge

Fitted with smoke and fume removing "Down Draft" hood (patented). The highest class of forge made to-day, and used the world over by those who want absolutely the best. The electric blower is guaranteed to last longer and use less power than any other make.

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THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXVI. No. 4. NEW YORK, OCTOBER, 1912. TERMS: One Dollar a Year

MOTOR WAGON BODIES.

Full Specifications for Making a Variety of Useful Styles.

BY WAGON MAKER.

A motor patrol wagon body:

The length of this body on the sills is 7 feet; length of sheet iron bent dash 20 inches; rear end depth under the seat 15 inches, and front depth under the seat 28 inches. The width of the body on the sills is 50 inches, and outside of the lazy backs is 58 inches. The bent iron dash is narrower than the sills, which can be seen best on bottom view, and is indicated by dotted lines.

Construction of the body: Dress the sills 1⅜x6 inches; all cross bars 1⅜x2¾ inches except the end bars; the front bar is 1⅜x6 inches, curved as shown, and the rear end bar is 2x3⅝ inches. All cross bars have ½x2 inch long tenons, therefore, all must be 42 inches long. At the front end there are no bottom boards at all; under front seat the bottom boards run across, and rear of seat the four bottom boards run lengthwise.

The sides are framed, paneled and molded; the inside posts are 1x2 inches, framed with tenons in sills and also tenons on the upper ends. The upper lengthwise pieces are 1x1½ inches. They are also lapped on both ends as shown on the side view, but mortises are preferred. The opposition to tenons is that the shoulders of the posts run parallel with the panels and therefore may split; but the joints are not supposed to move under the panel. The seats are 13 inches across, ⅞ inches thick, and 6 feet 6 inches long. They rest on the body and lengthwise bars which are 1¼x2 inches, framed into the seat posts front and door posts back. For less expensive work a board is used and the entrance is made from the heel board, but for the better class of work each seat is framed with three pieces, two end and one lengthwise. All are ⅞x3 inches. The tenons are on the long pieces. Into this frame a seat board is fitted, hinged to the frame with four hinges, and in front they rest on the lengthwise bars. If anything is wanted that is stored in the boxes it can be easily and quickly removed. They are also built with doors on rear ends when stretchers are carried, which are made to fold put in, or taken out from rear ends as

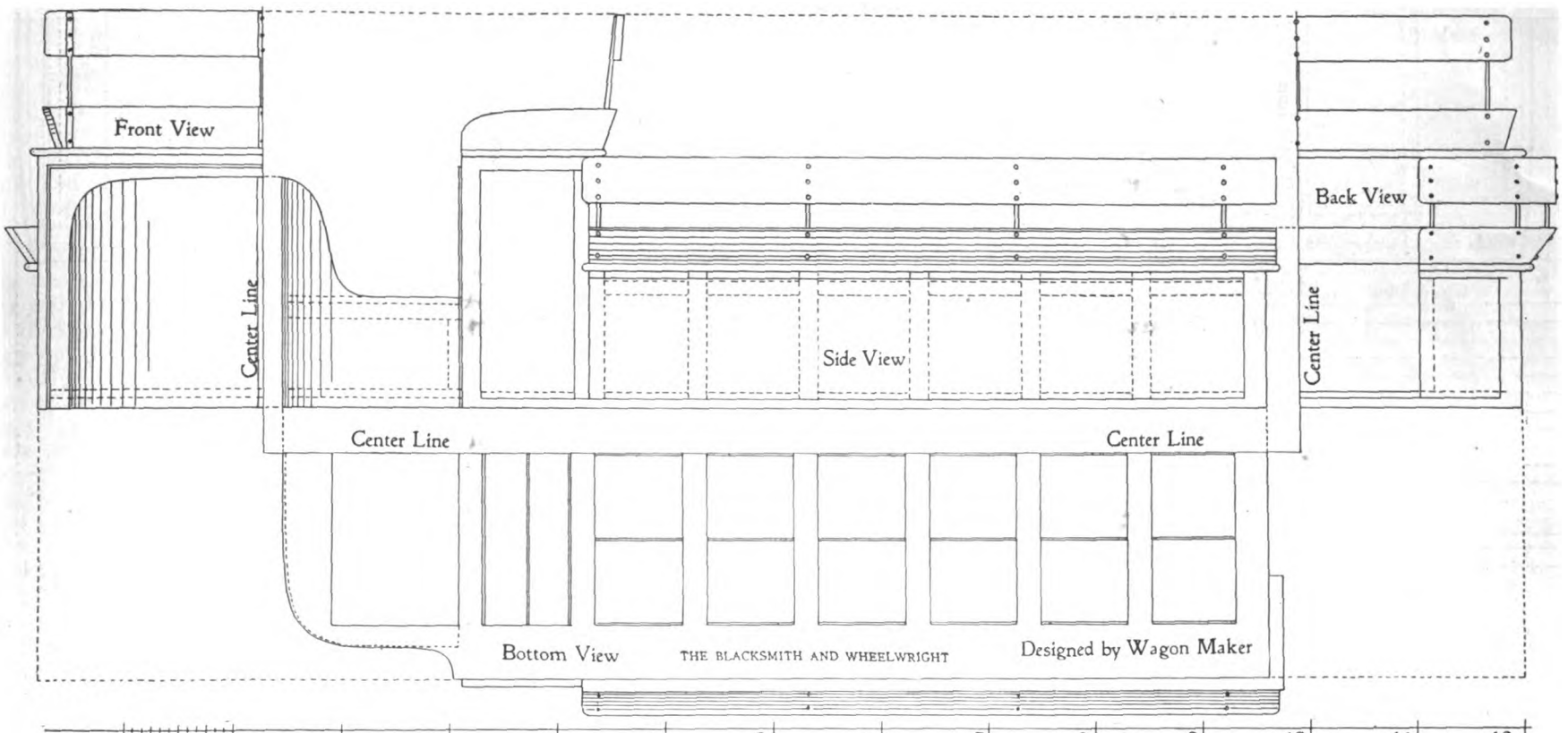

Fig. 1.—A Patrol Motor Wagon Body Without a Top Drawn to five-eighths Inch Scale.

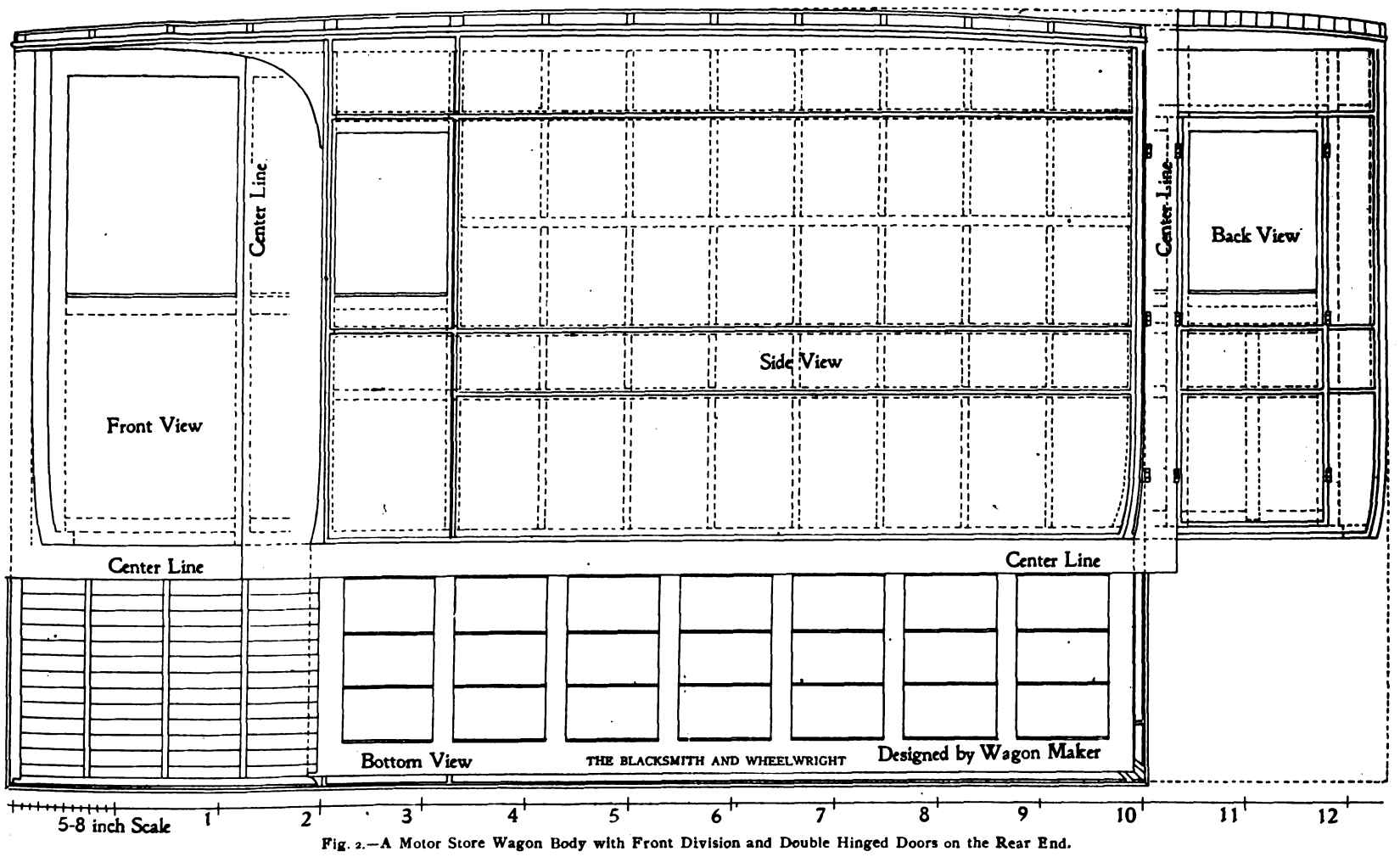

Fig. 2.—A Motor Store Wagon Body with Front Division and Double Hinged Doors on the Rear End.

it is handier than from top of seats. There are always two stretchers carried, one on each side. The side and rear end seat boards are framed similar to a buggy seat. The front surface below the front seat is inclosed with a ¾ inch thick board and joints, covered with small moldings as shown on the front view. The front corner posts are 1⅝x2 inches and the rear seat posts 1⅝x1¾ inches.

A motor store wagon body with front division and double hinged doors on the rear end:

This body, also the one just explained, can be used either for electric or gasoline, also with stationary seat, the same as on the autocar or with extended sills in front when driven by electricity. When used on an autocar chassis on which the seat is stationary outside of the front posts of the body, the stationary windows in front are closed up, but when used for an electric driven vehicle the body is built as designed. There is a shifting front on this body shown on the front view. This front is fitted between the two posts and secured with four locks. When the body is built on an autocar chassis the front is fitted between the front posts; when for an electric the front is fitted in the rear of the lights. Otherwise the construction of the body is the same as on a horse drawn wagon, except the rear doors which is an innovation only recently made. The constructions for the rear doors differ considerably. They are made with one door from 24 to 30 inches wide, or, two doors from post to post. Or, a lower and upper gate, the lower drop and the upper lift. On this draft there are two doors, hinged in the center and on the right side of the body and locked on the left side. At the center the right side door is locked simultaneously top and bottom, worked with a regular door handle and on the left side is a regular door lock, or one as at the center. In fact, wagon doors are better locked top and bottom. The back view will explain the hinge part. On such doors the glass can be made stationary, without and with frames or glass frames made to drop. On a body of this style the side panels can be made in five parts for each side, making four joints of which three are covered with moldings. For the doors on rear end the panels are put across but on the sides up and down, and one single panel can be used from top and bottom.

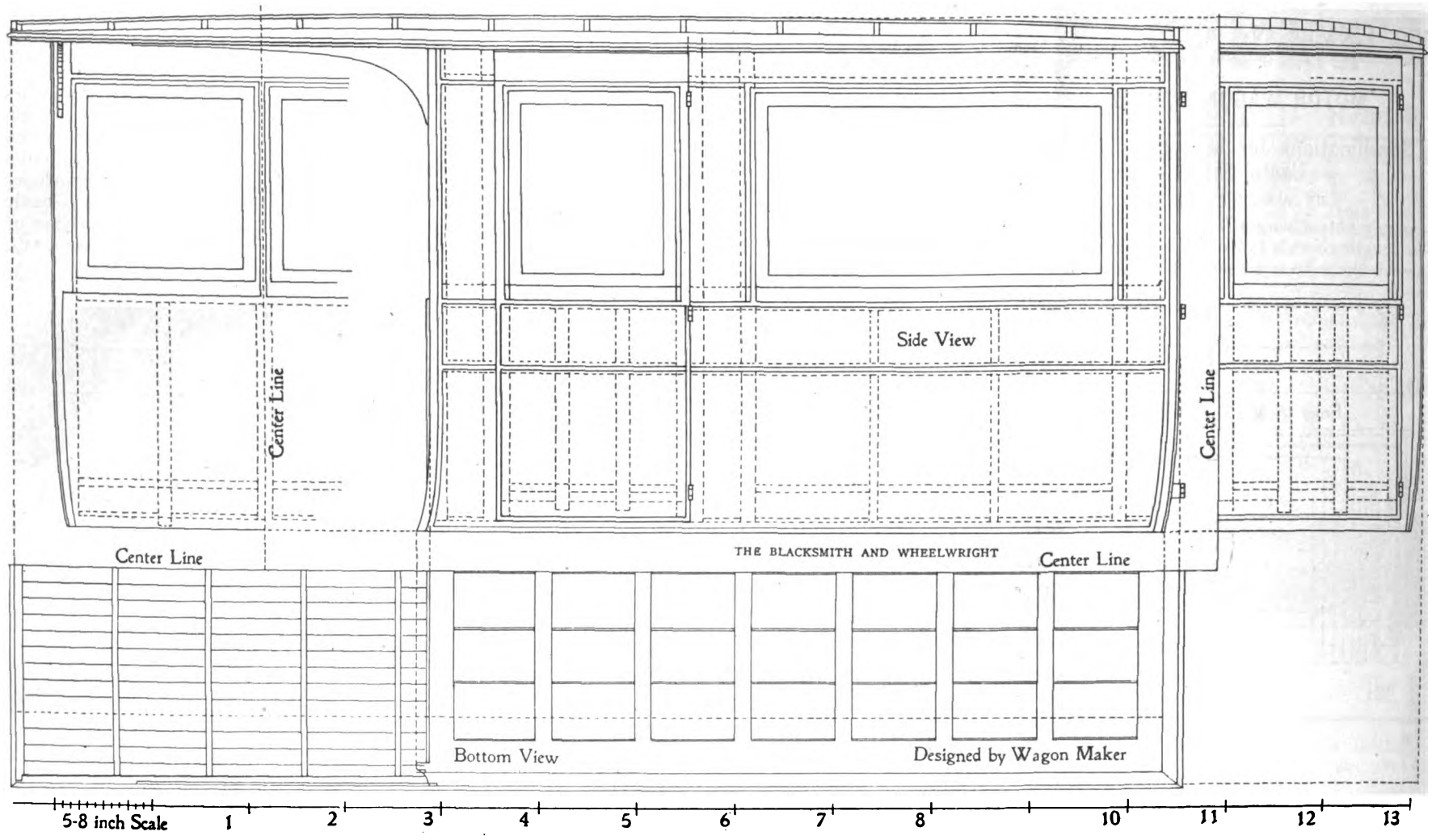

Fig. 3.—A Motor Ambulance Body with Side Doors and Glass Frames to Drop in All the Four Doors.

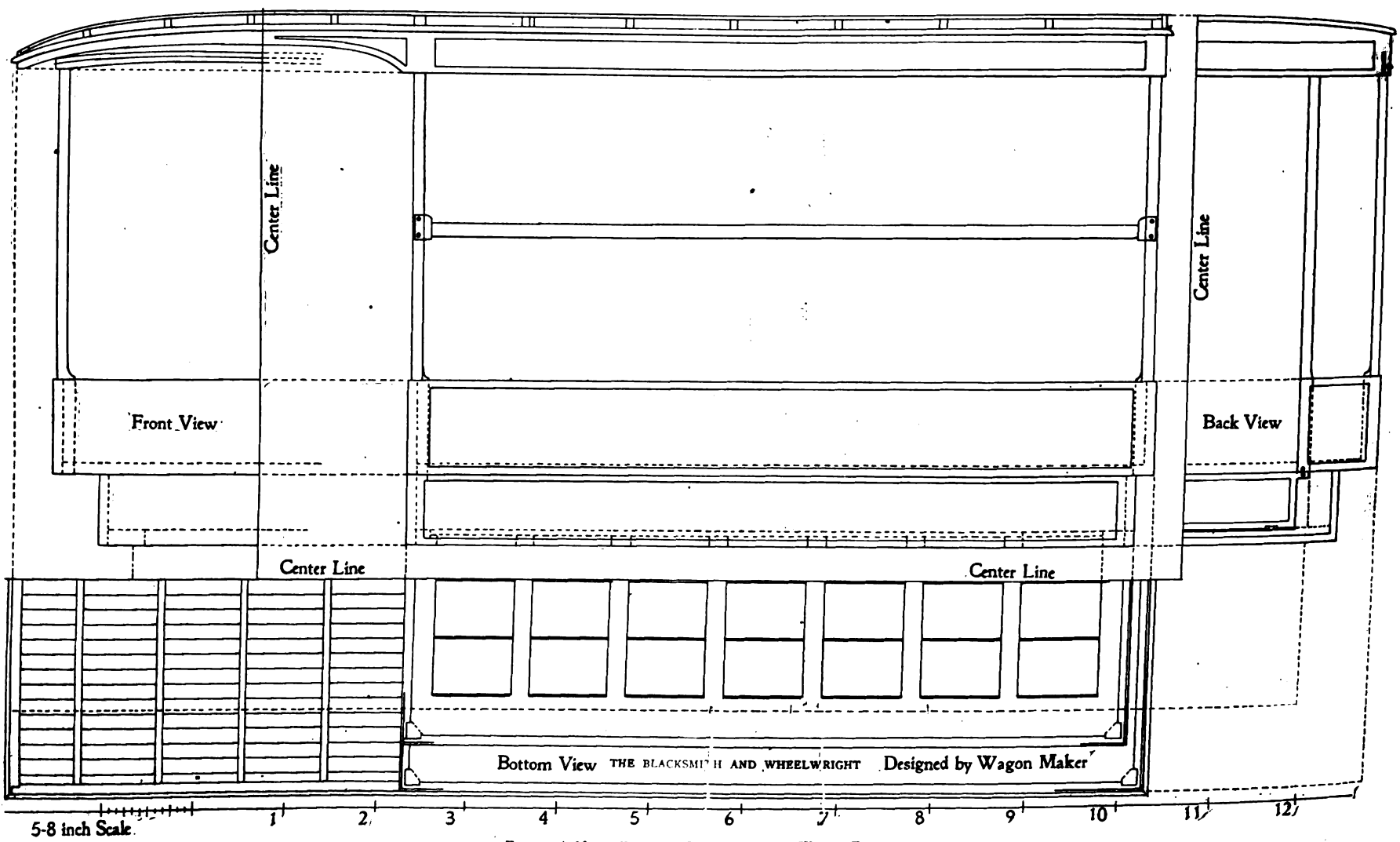

Fig. 4.—A Motor Furniture Interchangeable Wagon Body.

Motor ambulance body with side doors and glass frames to drop in all four doors:

This ambulance body is built for a 33-inch

wide gasoline chassis but can be wider or narrower. The outside length of this body without the hood is 7 feet 7 inches, and length of hood 4 feet 3½ inches, long enough for a storm front or wind shield. The length of the body is divided as follows: From outside front corner post to door joint 8 inches; width of door 24 inches; from rear door joint to window 8 inches; length of window 43 inches and 8 inches again on rear end making 7 feet 7 inches or 91 inches. The width across the top is 52 inches and across the bottom 49½ inches making the amount of turn equal under on each side 1¼ inches. The inside length on the bottom when the rear doors are closed is 7 feet 2 inches, deducting the amount of padding front and rear. The inside width across the bottom is 46 inches which is considered sufficient room for two stretchers, making each stretcher 23 inches.

Construction of the body: Size of sills 1⅜x4 inches; six inside cross bars 1⅜x2 inches. Two end cross bars 2x3 inches and six bottom boards ⅝x7 inches. Or the bottom sides can be made 2 inches thick, the rest as above. The thickness need not be filled up to make it level with the bottom boards which is stronger and better.

On this body are four end posts, eight door posts and eight standing posts. The front end posts have turn under on one side only. The curved part in front is obtained with the panel. The rear end posts have turn under from two sides but both are alike. The sixteen door and standing posts are all the same shape and thickness which is 1½ inches. The inside shape and size is obtained by counting the thickness of molding, the position of glass frame when up and down and thickness of inside cross bars. The most important part is that the glass frame slides up and down without coming in contact with any of the cross bars and inside lining board.

All standing posts are mortised into the sills and on top are lapped to the top rail. All ambulances built at present are lined with panels on the inside, padded a trifle, and covered with pantasote, which can be sponged without injury to the goods. The glass frames are painted and the glass frame lifters are also made of pantasote. The bottom is either covered with sheet copper or linoleum.

Motor furniture interchangeable wagon body: Bodies of this kind are best fitted to gasoline chassis, where the front seat is stationary and outside the front posts. This body is made in two parts, upper and lower. The upper part is lifted when not needed, and when the lower or a light body is better adapted. With the upper part off, three seats can be placed across, three persons for each seat, making nine in all, and two on the stationary seat. Each seat can be made 50 inches across out to out, which gives sufficient room for three persons for each seat. The wide body or upper part is cut directly above the narrow body or lower one and is fastened with flat dowels made stationary with a thumb-screw so it cannot lift when the body is jolted. In front the lower and upper body is closed up to 9 and 12 inches fitted to the posts as shown on the bottom view. The posts are fitted the same on rear end, but is open and a drop gate fitted to a space of 30 inches on lower body. On this end there are two flat dowels, so as to keep it perfectly stationary to lower body. This space on which the upper body rests is 6 inches only, but the two posts and the 7x12-inch boards will prevent the side motion when fastened to the lower body. The 12 inch deep sides, front and back, are all 1 inch thick and are lapped to the posts as shown on the bottom view, well screwed, which are covered with moldings. The joints of all the boards are shown on the bottom view also glued and screwed to sills and cross bars, and all screws covered with moldings with sides 1x9 inches, sills 2x5 inches resting on the chassis, 3,000 pounds can be carried which is needed on such a body, because the upper part does not carry any weight, the stability must be all on the lower body.

A Cheap Hone.

People who hone their own razors will be interested in the statement in one of the magazines that what is known as "cuttlefish paper" makes an ideal material for the rapid honing of razors, surgical instruments, etc. This paper is made for use by dentists for polishing gold fillings, and is coated with an abrasive substance of remarkably fine grain.

CERTAIN WRONG NOTIONS.

Soldering Cast Iron—Acid-Sharpening of Files—Safety Razor Blades.

BY JAMES F. HOBART, M. E.

Once or twice in a while, little items appear in our favorite papers to the effect that cast iron may be soldered in a certain manner, that files may be re-cut with certain acids, that safety razor blades may be sharpened in the same bath with the files. All these things appeal to the reader, who makes up his mind to try them, and, upon doing so, overlooks some important condition, the experiment is a failure and the journal in which the item appeared is blamed all because the man who tried the experiment didn't get quite data enough in the paragraph which he followed.

It is much like the case of the Indian who, upon being told that "feathers made a good bed" obtained three or four feathers, placed them on a rock and went to sleep upon them. In the morning. "Lo" rubbed the kinks out of his bones and said: "Feathers no good bed—white man much heap liar." All because the Indian did not use the feathers right, or he was not told that a barrel of them was necessary. In the same manner, the little paragraphs usually tell just enough to make the information contained therein misleading and perhaps dangerous.

Regarding the soldering of cast iron pipe, automobile cylinders and "sich like" by first rubbing a solution of blue vitriol around the edges of the crack until the iron is coated with a thin layer of copper. Solder certainly will "take" nicely upon the coat of copper thus deposited, and a layer of soft solder can be laid over the crack in that manner. But it is by no means necessary to go to the trouble of coppering the cast iron surface. Cast iron can be soldered very readily with the ordinary "zinc-chloride" solution which is in universal use in most tin and plumbing shops, for use when lead or tin must be soldered to wrought iron or steel.

The solution in question is simply muriatic (hydrochloric) acid in which has been dissolved all the zinc the acid will take up. This solution comes nearer to a universal soldering fluid than any other substance known to the writer. It can be used for soldering almost any metal except galvanized iron or steel, and will work with that, but "raw" acid (without the zinc) is best for galvanized sheets for the very simple reason that the zinc is already there, and when the raw acid is applied, the edges of exposed, un-coated iron or steel are at once covered with chloride of zinc obtained or formed by action of the acid on the zinc coating of the steel.

But in soldering cast iron pipe and cylinders,

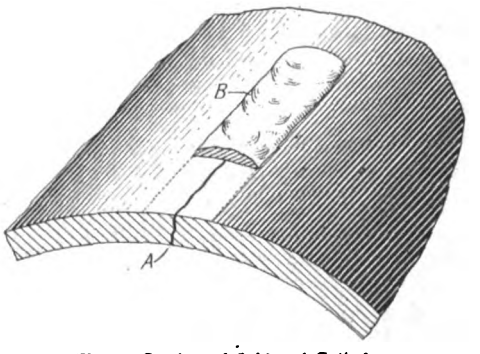

Fig. 1.—Section of Soldered Cylinder.

the "cut acid," or a soldering paste containing zinc chloride in semi-fluid form, deposits a solution of zinc over the surface of the casting to be soldered, just as the copper bath deposited a thin layer of copper. And, as zinc forms a better union with iron or steel than is formed by copper, the "cut acid" method is certainly one lap ahead of the copper solution.

Before we solder any cast iron pipes or cracked automobile cylinders by rubbing on a ridge of soft solder over the edges of the crack, let's see what the soldering will amount to after it is done? It is reasonable to suppose that the pipe or cylinder was cracked because more strain was put into it than the metal it was made of, could withstand. Say the metal is ⅜ inch thick, and we will give cast-iron a tensile strength of about 20,000 pounds to the cubic inch of section. As there are ⅜ of an inch of metal, the strength of that cylinder must be ⅜ of 20,000, or about 7,500 pounds. After the crack is coated with soft solder, laid on ⅛ inch thick, the strength of the repaired joint will be, allowing soft solder a tensile strength of 5,000 pounds, ⅛ of 5,000, or 625 pounds per inch of length.

And what good will be the pipe or cylinder after we have soldered it? It is here that the little information paragraph "fell down," and the smith who repairs an automobile cylinder in that manner will surely say, "Solder no good; paper heap liar." The paragraph did not tell how to reinforce the crack. That's all the trouble, the solder cannot carry the strain to which the work is exposed after being repaired and the mend breaks open agin directly pressure is applied.

Fig. 1, shows the manner in which a pipe or cylinder job would usually be done. The crack at A, has its edges tinned, then solder is run on and finished up as shown at B. The patch of solder is about ⅛ inch thick, and the strength will be found about as described in a preceding paragraph. If, instead of flowing on a mass of solder along the length of the seam, the workman would reinforce the job with two or more

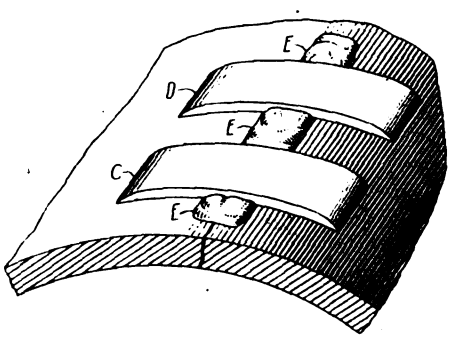

Fig. 2.—Reinforced Soldered Cylinder.

pieces of flat steel, then the repair could be depended upon to stay put for a considerable time at least.

It will be assumed that the cylinder to be repaired is 4 inches in diameter and the crack is 6 inches long. The force of the explosion is to be carried by the reinforcing, and we must first roughly determine about what that force amounts to in pounds. We will assume that the force of the gas at the instant of explosion is 300 pounds per square inch. This means that with a 4-inch cylinder, there is a strain of 4x300, or 1,200 pounds on each and every inch length of cylinder which is exposed to the explosive force. But this force is carried by two walls on opposite sides of the cylinder, therefore each wall, and our repaired one as well, will have to carry only one-half of 1,200 or 600 pounds to each inch of cylinder length. Should there be six inches—and there hardly ever is as much exposed to pressure at the instant of explosion, then our soldered crack must withstand 6x600 or 3,600 pounds.

It has been shown that the strength of solder to withstand being pulled apart is about 5,000 pounds per inch, therefore the reinforcing patches should have a surface of 3,600 divided by 5,000 or .72 square inch, or about .84 inch square, nearly ⅞ inch. But a "factor of safety" must be allowed of at least five, making a surface of .72x5 or 3.6 square inches, or nearly two inches square. To be more exact, therefore, the reinforcing strips should be made either of that width and 4 inches long, or 2 inches wide and 3⅝ inches long and placed crosswise the crack as shown by Fig. 2. But with two patches as shown, each should be 1 inch wide and 3⅝ inches long.

The thickness of the strips must next be considered. Soft steel is good for about 60,000 pounds strain per square inch, and as each strip is to carry the stress of 3 inches running length of cylinder, at 600 pounds per inch, the work to be carried by each strip will be 3x600 or 1,800 pounds. Then the thicknesses of strip required will be 1,800 divided by 60,000, or 0.03 inch. The factor of safety of 5, calls for .03x5 or 0.15 inch, or about 5-32 inch thickness of strip. Then, there needs be only thin solder between the strips as at E, E, E, Fig. 2.

But, in order to possess full strength, these strips must be perfectly soldered to the cylinder. There must be no patches where the solder fails to "take" upon the cast iron. The reason, or at least one reason why it is so hard to solder cast iron, is that in cleaning the surface of the metal, the many minute depressions in the surface are not reached by the filing or scraping, and when acted upon by acid, the minute carbon particles in the iron, although clean, cannot unite with the solder. Therefore, great care is necessary in making such iron surfaces as clean as pos-

sible, and in scratching thoroughly all depressions in the surface before or during the application of solder during the tinning operation, which must always precede the actual soldering of iron or steel.

To tin iron surfaces thoroughly, they must be heated to nearly or quite the melting point of solder, some 300 to 500 degrees, according to the quality of solder used. When this heat must be supplied locally by use of a soldering copper, it can readily be seen that the chances are entirely aginst doing a first-class job. The work should be thoroughly heated, either with a blow-torch or over a fire, before, or during the tinning operation.

Sharpening Files with Acid.

The sharpening of worn files by means of an acid bath is a scheme which bobs up perennially and comes along as sure as football time among the kids—both big and little. It looks mighty good on the face of it, this placing an old file in a jar of acid overnight, to find the teeth all nice and sharp next morning. Even as ordinarily

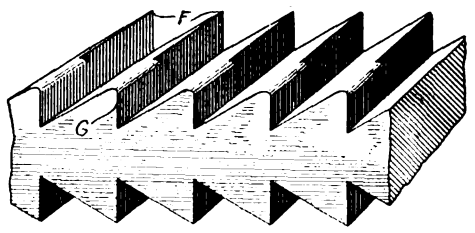

Fig. 3.—File Section Showing Sharp and Dull Teeth.

practiced, the acid treatment does seem to make an old file cut better, but the improvement lasts only a very short time and after a few minutes' use, the file cuts no better than it did before the treatment.

This fact is enough to lead the thinking man to study the matter a bit in the hope of extending the time during which the file cuts better after acid treating. The first thing in order is to see what shape the file is in; next, how its condition may be improved by acid treatment. Fig. 3 shows a section of very coarse file, the teeth being new at F, and badly worn at G. The problem now is, how to expose the teeth of this file to acid action so as to bring all the teeth shown at G, to the condition of those at F. At first sight, this seems utterly impossible, as apparently the placing of the file in acid would cause the entire tooth surface to be eaten away, leaving the tooth in the same shape and condition as before. But there are one or two conditions that prevent such action to a certain extent and render it possible to actually sharpen a file in the acid bath.

When acid is poured upon metal, it begins to unite therewith, turning the metal into oxides of various kinds according to the nature of the acid used. When sulphuric acid is poured upon metal, it "eats" out a shallow groove, deeper in

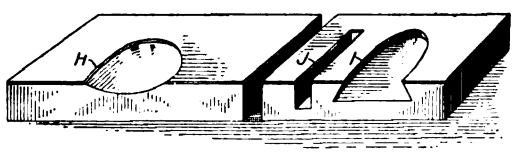

Fig. 4.—Action of Acid Upon Metal.

the middle than at the edges of the drop of acid. This fact is taken advantage of in etching, and especially in the making of "process" engravings for newspaper illustrations. In that kind of etching, the surface of the metal, or portions thereof, are covered with some substance which resists acid.

It will be assumed that the upper side of the plates shown in Fig. 4, is covered with a protective substance as shown by the double line along the top of each plate. A hole in the coating of one plate has been filled with sulphuric acid—oil of vitriol—and upon cutting the plate after long action of the acid, the saucer-shaped cavity shows how that acid ate deep in the middle and shallow at the edges.

At I, is another plate, which has been cut in half after having been exposed to the action of nitric acid. It will be seen that this acid "ate under," instead of cutting a shallow saucer-shaped spot. The "process engravers" take advantage of these two acid actions, by mixing the two kinds together until the mixture will eat down in nearly a perpendicular line as shown at J, Fig. 4.

When this action can be applied to re-cutting dull files, there is some possibility of making them come out of the bath sharper than they went into it. But there is "where the rub comes." We cannot fill between the file teeth so the acid can cut down one portion of each tooth, and leave the other portions. At least we think we can't, so let's see what the possibilities are in that direction. An enlarged view of a portion of a file is given by Fig. 5, and this may help understand what happens in the acid. When a file is immersed in sulphuric acid, the first action is to attack the entire surface of the metal. But in a short time the acid seems to lose some of its strength, especially in the corners beween the teeth. The metal is dissolved, or corroded and the oxides thus formed cling to the metal and prevent fresh acid from getting at the metal. The sulphuric acid is decomposed and unites with the iron of the file, leaving the carbon with the oxide of iron formed by action of the acid. The coating of oxide holds the spent acid against the file, and there is a gradual stopping of action, beginning at the bottom of the teeth and working toward their points.

If the file be left undisturbed, the action will gradually grow less and less until it ceases altogether, or perhaps, continues very slowly indeed, as fresh acid slowly finds its way through the ever increasing coating of iron oxide. But the workman occasionally removes the file from the acid, then returns it for another period of action and this disturbs the soft film of oxide which has developed all over the surface of the teeth, and the passage of the file upward through the liquid, during removal therefrom, washes off the film from the ends of the teeth as shown at Fig. 5, in which half the tooth is shown with oxide and half without. This is for clearness of illustration. Of course in actual work, the entire tooth is covered with oxide.

From the above, it will be seen that it is important to place the files in the acid in a vertical position, keeping them thus, and removing them vertically and gently, quite frequently. At L, is shown a tooth after the acid action has been continued for some time, the hump on the tooth having nearly all disappeared, and the tooth

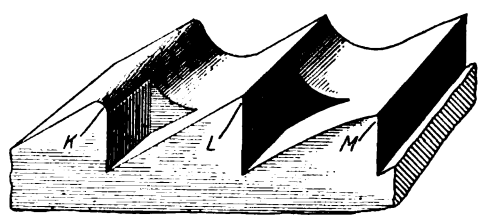

Fig. 5.—File Teeth Enlarged.

seems comparatively sharp. Still, it is a fact, that the angle of the tooth has been changed a little, as shown by comparing line L, with M. This is due to the lowering of the point of the tooth, making it shallower, and if the cutting in acid were repeated times enough, it is evident that there would be no teeth left on the file. This explains why acid-recut files do not seem to stay sharp as long as new files do—the teeth have been shortened and given a different angle. The mixture of acids must be such as experience shows best—probably mostly sulphuric.

Sharpening Safety Razor Blades with Acid.

In view of the above described manner of action when files are placed in an acid bath, will the man who sharpened safety razor blades in a similar manner, kindly step up and explain the acid action which takes place? The writer is "from Missouri," and is ready to be "shown."

A PECULIAR LAW.

You Cannot Break a Contract After You Have Mailed an Acceptance.

There is one phase of contract law arising thousands of times every day in the course of relations between business men, which I have never discussed, and which a recent case reminds me is exceedingly important. I refer to the part which the mails or the telegraphs often play in the making of a contract.

It will be a surprise to every man who has not been advised to this effect by his lawyer, that when a man drops a letter in the mail accepting a business proposition he is in most cases bound by it without regard to the time when the letter reaches the other party to the contract, and even though it never reaches him. This is a somewhat remarkable feature of the law, but rests on a perfectly logical basis, as I shall show.

Let me make the principle plain by the citation of an actual case. A & Co., Philadelphia jobbers, wrote a letter to B, a New York retailer, offering him specific merchandise at a definite price, "answer by return mail." B received the offer in due course and at once sat down and answered it, accepting the offer. An hour after he mailed the letter the market unexpectedly broke, and B telegraphed A & Co. revoking, in advance, the contents of his letter. A & Co. received both wire and letter, the wire of course first, but they nevertheless entered suit against B for damages under the contract which they contended had been made. And the court upheld them, ruling that the contract had become complete the minute B mailed his letter. And under the cases the decision would have been the same even though B's letter had never reached A & Co. at all.

The legal theory on which these decisions rest is that when A & Co. sent their offer by mail they appointed the mails as their agent not only to carry the offer, *but to receive the answer and bring it back.* Therefore when B committed his answer to the mails he practically handed it to A & Co. themselves, because the mails were A & Co.'s agent.

Naturally B's letter must have been properly stamped, otherwise there is no such delivery to A & Co.'s agent as will make the contract binding.

What has been said above is the law in every State but Massachusetts. There B would have had to take the risk of his letter never reaching A & Co. If it was lost, and never reached its destination, there would be no contract.

Behind all this is the legal theory that somewhere in an interchange of letters or telegrams there must be a point where the minds of the parties meet and where a contract is born. If B in the above case is not to be bound until A & Co. actually receive his acceptance, then it would seem as if B ought to receive notice of the receipt of the acceptance, and so on *ad infinitum.*

It is of course obvious that the same principle of law which binds B also binds A & Co. If the market had advanced instead of declined after their offer was mailed, and they had endeavored to withdraw it, the law would not have allowed them to do so if B had already mailed his acceptance. If their notice of withdrawal reached B before he had mailed his acceptance, it would be good and B's subsequent mailing of the acceptance would have had no weight.

If the offer is sent by letter and is accepted by letter, the contract is complete and no subsequent effort to revoke it will avail unless agreed to by both parties. As explained, B could not even have revoked it by a telegram which reached A & Co. before his letter of acceptance.

There are two conditions which practically amount to exceptions to the above. In order to make the mailing of B's letter a completion of the contract, his answering by mail must have been authorized by A. & Co. Not necessarily authorized expressly, but impliedly so at least. If A & Co. send their offer by writing, that is an implied authority to B to use the same means to reply. In other words, the offer was mailed to him and he can mail his answer. In such a case the above principle of law applies. But if A & Co. had *wired* their offer and had stipulated that it was for immediate acceptance, then in all probability an answer by letter would not have served, because the strong intimation from the manner and method of A & Co.'s offer was that answer should be sent by the same method; i. e., by wire.

Anybody can easily avoid this provision of the law, if he wishes to, by stipulating in any business offer that the sender will not be bound unless and until answer *reaches* him by a certain time. If this is incorporated in the offer, there will be no contract if the answer is missent, nor will there be one until the answer reaches its destination.

Another interesting point about this phase of the law is that if B, after he has mailed his letter, can get it back from the post office before it leaves, there is no contract. This seems a little inconsistent, but it is nevertheless the law.

Equipped for Fire Service.

Hundreds of locomotives on the Pennsylvania Railroad are now equipped for service as fire-engines, and during the last four years these engines have assisted at extinguishing 153 fires. In one instance nine of the engines were at a fire within seven minutes.

CARRIAGE BUILDERS' CONVENTION.

The 40th Annual Meeting of the National Association at Atlantic City, N. J.

Reports, Election of New Officers, Addresses, Discussions, Exhibition and Banquet.

The selection of the same place for two recurring conventions of the Carriage Builders' National Association seems to be unusual in these latter years, but in some respects Atlantic City is admirably adapted for occasions of this kind, the summer resort season being practically over, and the hotel accommodations thus being ample, while that unique city by the sea, and the ocean itself, is perhaps more attractive than at any other time during the year.

The Association met in the Hippodrome, September 24, on the Million Dollar Pier, and was called to order by President McCurdy. The Glee Club of Atlantic City rendered two selections, and Hon. William Riddle, the mayor, was introduced and gave an address of welcome which was both interesting and appropriate. He referred to the fact that lots in the city which sold for $125 in 1880 are worth today $125,000, and that less than twenty years ago a piece of property sold there for $500 which is now worth over $2,000,000. Possibly he may have given the key to this marvellous rise in the value of real estate there when he stated further along in his address that one could board in the city for $6 a week, but if he felt inclined to pay more, he could go to places where he would be charged $600 or $700 a week.

At the conclusion of the mayor's address, Mr. Homer McDaniel of Cleveland, made an appropriate response in which he referred to the fact that five men practically control the destinies of Atlantic City, a unique instance of simple municipal government. After another song by the Glee Club, President McCurdy made the opening address in which he outlined something of the work of the Association during the past year, and paid an appropriate tribute to the venerable secretary, Henry C. McLear.

The report of the Executive Committee, in the absence of the chairman, Mr. Lancaster, was read by Mr. Theodore Luth. It referred to the continued prosperity of the technical school and to matters in detail which have had the consideration of the committee in the past year. The report was accepted and Mr. W. H. Roninger, in a felicitous address, placed in nomination as president for the ensuing year Mr. Charles C. Hull of Connersville, Ind. The nomination was seconded by Mr. Sayers. As there were no other nominations for this office it was made unanimous, and the appointment of committees was then made. Invitations from different cities for holding the next convention were next read and they included Atlantic City, Indianapolis, San Francisco, Omaha, Buffalo and Rochester, N. Y. President McCurdy then made an address on

Manufacturing, Economy and Efficiency.

Business success has many meanings, but today I only wish to speak of one and that is, success from the standpoint of profit to our stockholders and ourselves. Naturally, we are making a profit in our plants or we could not stay in business, but the question we are facing today is: "Are we doing business in the way that best conserves our plant and resources?" Have not most of us in the past and are not some of us at the present time, running our plants on a sort of hit-or-miss plan instead of on a systematic and well matured basis?

A great many of us had small beginnings. The 20 by 50 shed has expanded into a factory covering acres. Under these circumstances, the majority of our factories are not laid out ideally, nor are they capable of being so re-arranged as to accomplish the very best results. Consequently, the first question to consider in planning for the future is: "What must I do to make my plant economically efficient?"

Ruskin has said that economy no more means saving than it does spending money; it means the administration of a house, its stewardship, both saving and spending money, time and energy to the best advantage. The cleanest definition of economy, public or private, means the wise management of labor, and it means this in three senses—apply your labor rationally, preserve it, produce carefully and use its products seasonably.

The successful manufacturer must be many sided. He must have the ability to plan as well as execute. He must be as closely in touch with the sales end as with the manufacturing processes. He must be, if I may use the expression, a "practical visionary."

Heretofore we have attempted to solve the problem of adding to our profits by increasing our sales, but competition forces us to realize that increased sales do not necessarily add to our profits in proportion to the increased expense. I believe it is time we realize that we are at a stage in this country which Germany reached several years ago. The German manufacturer's motto is: "How much can we save?" while ours apparently has been: "How much can we do?"

Efficient management provides or should provide several means of getting information. I would say, first, a careful analysis to determine before the work of readjusting is undertaken, exactly what present conditions really are.

Second, recommendations suggesting the best way to obtain greater efficiency and economy.

Third, the employment of the best machines, giving the best possible facilities under the revised plan for bettering conditions in the factory.

Fourth, administration, organization and co-operation.

Fifth, accurate records of the cost in detail of the finished product.

Analysis.—The proper analysis of a plant requires the services of one drilled to see in detail all that exists in a factory by passing through it. We call him an "efficiency engineer." We

C. C. Hull, Connersville, Ind. President-elect.

should engage such an engineer to analyze our plant and he should give us definite statistics in typewritten form, showing what we have to deal with.

Recommendations.—The next move by the engineer should be in the form of recommendations and these recommendations should (provided the building dealt with is not of the most desirable type) embrace two plans. The first to work out the highest efficiency and greatest economy in the old building; the second should show the additional efficiency and economy obtainable by abandoning the old building and erecting an entirely new plant. This comparison will be of great value to the owners of the plant in determining whether they should abandon the old plant or make the rearrangement to fit it, the old one.

Machines.—We are now at a point where we are to deal with a problem that requires heroic treatment if we would reach the goal of greatest efficiency and maximum economy. We have machines that we regard as we do a family horse. The horse grows old and we turn him out on pasture to finish up his few remaining years in peace. To keep the old machine for the good it has done, is the first step toward bankruptcy. I will say that experience has taught that the old machine should be put in the scrap pile at any cost. You must either put it there or it will put you there, and replace it by the machine known to be the fastest in use where quality is not sacrificed.

Organization.—I often wonder why men organize a company and incorporate under the laws of the State in which they live, to do business, and then in business each one apparently goes his own way. There is nothing that will add more strength to an organization than cordial co-operation. It is a well-known fact that every man has his limitation, and it is just as well to know that an organization of men all working to one end practically has no limitations. They can create new units of thought, but the central control rests with the organization. I have never known a business to fail, where the organization all worked in harmony to one common end. There may and should be a dominant head. However, in the organization each man's opinion must be carefully considered and all the good in it adopted. Every man must have individual credit for his personal thoughts and the personal work he accomplishes. This leaves the soil completely fertilized as it were, for a new crop of thoughts.

A great many advantages accrue to an organization of men that are all in touch with each other and in full sympathy with the success of the business, that cannot obtain where cordial organization does not exist. The buyer is in close touch with the superintendent; the superintendent is in close touch with all of the foremen; the foremen are in close touch with all of their men, and all are in close touch with the general manager, and he with the dominant head.

Costs.—Accurate costs either precede or follow organization, and I am not clear as to which should have precedence. I can state, however, without fear of contradiction, that a business, large or small, is walking on dangerous ground when they cannot determine exactly the cost of their product at the end of each week or month. Every manufacturer should absolutely know what his goods are costing him. Guessing should not be tolerated in these days of modern accounting. Accurate records for comparison should be kept from year to year. It is the best barometer you can have, the strongest schoolmaster when you are not right, and the greatest solace when things look doubtful to you.

Mr. McCurdy concluded by going into the question of costs in detail and maintained that a careful cost accounting and common sense make a mighty effective combination.

It was voted to have the address printed and mailed to every member of the Association.

The proceedings of the day ended with the usual reception in the evening at the Marlborough-Blenheim hotel.

Wednesday's session began with the reading of the annual report by Treasurer McLear. It indicated that the Association is in a satisfactory condition so far as the treasury is concerned, it having over $6,000 in banks, while contributions to the technical school footed up $1,716.02.

The Association then listened to an address on "The Need for a Traffic Manager," by Charles T. Bates of Philadelphia. Mr. Bates has been connected with the Pennsylvania Railroad Company for a number of years and his study of the subject of freights proved instructive to manufacturers. He favored concentrated action on the part of the Association to secure the most desirable results in the matter of freight transportation and at the close of his remarks a vote of thanks was extended to him.

The report of the Committee on Good Roads was read by Mr. Taylor, Mr. George A. Brockway of Homer, N. Y., chairman, having been absent. It suggested that it was time to call a halt in highway improvement in some States until such time as a proper plan might be devised by which the money shall not only be honestly but intelligently expended, to the end that every dollar shall secure a dollar's worth of improvement. It favored a national department with a centralized authority for the construction of Federal roads or main arteries connecting capitol centres.

The report of the trustees of the technical school, through Charles J. Richter, chairman, was then presented. Although all the departments of the school are in a flourishing condition and have done extremely well, it was urged that more young men should improve the advantages offered and thus supply the need for designers of all kinds of vehicle bodies.

The report of the Committee on New Members, through Mr. W. H. Roninger, showed that fifty-five had been added to the Association during the past year.

Mr. Lewis Straus, chairman of the Fire Insurance Committee, in submitting his report,

urged that the business man do more for his own protection, and thus secure better risks on the part of insurance companies. He favored the instalment of the sprinkler system and that employees be impressed as to the necessity of removing every possible fire hazard by keeping business places clean.

Following the report of the committee to recommend officers for the ensuing year, the Association next proceeded to the election of a president. As there was but one nominee, the secretary was instructed to cast the ballot for Mr. Charles C. Hull. Mr. Hull on being elected made an appropriate address of thanks.

On motion of Mr. W. H. Roninger, a vote of thanks was extended to the trade press for what it has done in helping to get new members during the past year.

In the evening there was a discussion as to the next place of meeting, the sentiment at that time being rather in favor of Atlantic City. This was followed by an address of Mr. O. B. Bannister upon the subject "What Should a Business Man Do Now?" He referred to the confusion that exists in many lines of trade as to the legal and moral rights of business and to the work of organized labor, urging that business men "listen to the still, small voice of common sense and follow it fearlessly, cheerfully, consistently and calmly."

The subject of securing a larger attendance at the meetings was also discussed. A greater effort was urged to secure a larger attendance but no definite plan was suggested. It was not considered advisable to ask prominent speakers to address the meeting unless the members showed more interest.

Thursday's proceedings began with the presentation of the report of the Committee on the Conservation of the Resources of the Country. It was presented by Mr. C. C. Hull, and it strongly favored the conservation of our forests, because there is a constant reduction year by year of timber supply, especially hard wood which is so essential to the manufacture of vehicles. A message was sent to the National Conservation Congress in Indianapolis pledging the co-operation and support of the Association in the work of the convention, as outlined.

The report of the Committee on Freight and Classification was read by Mr. Theodore Luth. It showed that while attempts have been made on several occasions to increase freights, nothing serious has been accomplished by the railroads, due to the concerted action on the part of shipping interests in which this committee took an active part.

Mr. Charles H. Hassart then addressed the convention on the subject of "Credits and Collections in the Vehicle Business." His address was both breezy and instructive. Among other things he said:

There are five methods in general use by which the vendor endeavors to secure the payment of the balance of purchase money due him. In the order of their importance and value they are as follows: The Instalment Lease, the Conditional Sale, the Judgment Note, the Promissory Note and by Suit at Law on the Book Account.

The instalment lease is a contract for the rental of the carriage. It is very similar to a contract for the lease of real estate. The lessee agrees to pay a certain sum per week or per month for the use of the carriage. A properly drawn instalment lease is generally held to prevent the passage of title as against the lessee and as against the whole world. This effect as to third parties is extremely important. If the lessee attempted to sell the carriage to a third party, even though the latter had no notice of the lease, you could follow it and by process of law retake it. If the carriage were levied upon by the sheriff on an execution issued against the lessee by third parties you could file a claim for the carriage, and in the event of failure of the sheriff to heed your claim you would have an action against him for damages.

The instalment lease has also this advantage. If the lessee defaults in the payments provided for in the agreement, you have several very excellent remedies against him. 1st. You may retake your carriage, peacefully if possible, without any proceeding at law whatever, or if you cannot take it without causing a breach of the peace, you may cause the issuance of a writ commanding the sheriff to take the carriage from the lessee and deliver it into your custody. 2d. If the carriage has been in use for such a long period of time or has received such hard usage that you deem it inadvisable to retake it, under the terms of the lease, you may enter judgment against the lessee for the amount of the unpaid rental. I may further state that if the lessee in an instalment lease should transfer the carriage to a third party in an attempt to pass the title thereto, he would be guilty of the crime of larceny by bailee, which is punishable by fine and imprisonment. All in all, the instalment lease is the best instrument devised for the protection of the manufacturer.

We now come to conditional sales. The distinguishing feature between them and the instalment lease is that the balance of purchase money does not profess to be paid as rental. If you sell a carriage to B under a conditional sale and before he has paid for it he sells it to C, who is an innocent third party, or, in other words, had no notice of the conditional sale, C will take a good title. You may suggest the recording of the conditional sale for the purpose of giving constructive notice to all the world, but such an instrument is not recordable, at least under the recording act of Pennsylvania. This, of course, would not be true had C actual notice of the existence of the conditional sale; but notice in such a case is very difficult of proof. If a creditor of B were to levy upon the carriage it would be sold and the proceeds used to pay B's debt to another. If B were thrown into bankruptcy either voluntary or involuntary, the carriage would form part of the bankrupt's estate and the proceeds divided among B's creditors, of which you would be one, taking pro rata with the rest. All of these things are untrue of the instalment lease. A conditional sale may contain a warrant of attorney for the confession of judgment, but such judgment is open to the same objections as lie against a judgment entered under an instalment lease or a judgment note. The greatest objection to a conditional sale is the ease with which the purchaser can dispose of your carriage, put the money in his pocket and cheat you out of your just deserts.

We now come to judgment notes. When you deliver a carriage to the purchaser upon payment of part of the consideration money in cash and the balance being represented by a judgment note, or in fact, any kind of a note, the transaction is an absolute sale; there is an immediate passage of title or ownership from the seller to the purchaser, just as if the full consideration money had been paid in cash. If the purchaser should default in the payment provided for in the note, your only remedy is to enter judgment under the note and issue execution against his property. You cannot retake the carriage; it has gone out of your hands forever. It is true that the carriage may be one of the articles upon which you would levy, but you would have no more right to that specific carriage than if it had been purchased from another person. Let us see what happens when you attempt to collect the judgment which you have secured. As a general rule the man who is willing to sign a judgment note owns no real estate. If he does, and it stands in his name on the records at the time you enter the judgment you are fairly well secured. If he does not he may anticipate your entry of judgment and sell the carriage to another. This is entirely valid in law in the absence of fraud, which is hard to prove. The carriage is gone, you spend a considerable sum of money in entering judgment and issuing execution thereon, what happens? When the sheriff is about to sell the property of the purchaser (now the defendant in the execution) his wife comes to the front and files a claim of ownership of the goods which have been levied upon. This usually stops the sale; the matter is thrown into court for a jury to decide the ownership of the goods, and in the trial you have as much chance as the proverbial camel has of getting through the eye of a needle.

Let us look at promissory notes. You must institute an ordinary suit at law to recover on the note. It is the same as in the case of an ordinary debt. As I have stated before, anywhere from one to three years may elapse before you secure a judgment, and in the interim the debtor is at liberty to dispose of all his property. In fact, he need not dispose of all, for this note contains no waiver of the benefit of the exemption laws, and in the absence of an express waiver he retains that right. He could, consequently, in Pennsylvania, retain $300 worth of real or personal property without fear of molestation. In a suit on a promissory note the method of procedure is to produce the note in evidence, prove the signature and rest. The burden of proof is then thrown upon the maker, and he is required to produce evidence, sufficient in law, to escape liability. One advantage in suing upon the note is that you are not obliged to produce your books of original entry and prove the debt itself. Another great advantage is this, that while the maker may avail himself of almost any defence as against the original payee of the note, he is practically precluded from any defence whatsoever when the note has been endorsed by an innocent holder for value before maturity, or, in other words, before it became due. There are certain defences of which the maker can avail himself as against the original payee or any subsequent holder, for instance, forgery, but it may be stated as a broad, general proposition, that when a promissory note is endorsed to another for consideration, before maturity, the maker can have no defence. It is the course of a wise man not to maintain suit himself on the note, if he is the payee, but rather to endorse it to another and allow him to sue the maker.

The ordinary suit at law on the book accounts is paradise for the fraudulent debtor. You incur cost in commencing suit; the debtor overdoes himself in swearing to an affidavit of defence which is sufficient in the eyes of the law, and in the absence of which you could secure judgment in a short time. You consume four or five days of your valuable time in sitting about the court room awaiting the trial of your case. Conceding that you ultimately do secure judgment for the full amount of your claim, the defendant in the meantime has transferred his real estate, the defendant claims the benefit of the exemption laws, and if his personal property is worth more than $300 his wife steps in and claims all over and above that sum, and between the two the only right that you have is to pay your attorney a substantial fee for services rendered.

The instalment lease is the only method that furnishes any real degree of protection, but I reiterate that even the lease is not invulnerable to the attacks of a shrewd and wily practitioner of law. Probably after a little more experience we will do as the automobile manufacturers and sell only for cash. Then we will set to music and use as our opening ode the verse of that immortal Persian poet, Omar Khayyam:

"Some for the glories of this world, and some
Sigh for the prophets' Paradise to come.
Ah, take the cash and let the credit go,
Nor heed the rumble of a distant drum."

A delegate moved that a vote of thanks be tendered to Mr. Hassert for his very instructive and interesting lecture. The motion was seconded and unanimously carried.

The president then called for a report of the Committee on the Abuses in the Carriage and Accessory Trades. It was to the effect that whatever may be the situation in this respect it has originated right in the carriage manufacturer's own office and increases or decreases according to trade conditions. No special remedy for this condition was offered.

The report of the Committee on the Press favored further publicity of the proceedings of the conventions and if possible that a complete story of each day's proceedings be supplied to the Associated Press for publication in the daily press of the country.

The selection of officers for the ensuing year was next considered and the rules were suspended to allow the secretary to cast the vote of the Association for those nominated.

After the report on exhibition had been read and suitable references had been made by members to the deaths in the Association during the past year, the next place of meeting was considered, and this called out a good many short addresses and some letters from competing cities. After the matter had been fully discussed, ballots were taken, the first of which showed Atlantic City in the lead with Rochester next. At the third ballot, however, there was a majority in favor of St. Louis and the next convention will be held in that city.

The annual banquet Thursday evening, which is always a popular feature of this convention, was held in the celebrated banquet hall of the Marlborough-Blenheim Hotel. The room in which the banquet occurred is known as Chevy Chase Hall and it is undoubtedly one of the most beautiful banquet rooms in America.

The first address was made by Hon. Robt. H. Bonynge of Denver, Colo., a member of the re-

cent National Monetary Commission. He gave a clear exposition of the defects in our present banking and currency system, and he favored as a remedy substantially the same recommendations made by the commission, or the so-called "Aldrich plan."

Hon. E. F. Kinkead of Jersey City, a Congressman from New Jersey, made an eloquent address, referring to the great material prosperity of this nation and pointing out the duty of every business man to take active part in politics and especially urged attending the primaries where the nominees are practically selected.

Hon. Hal H. Smith, of Detroit, Mich., a member of Congress, made a strong plea for the abolition of commercial graft and for honesty of method and honesty of product in business.

Clinton Rogers Woodruff, an eminent attorney of Philadelphia, Pa., made a particularly happy speech in which he contended that there is no more dishonesty and graft in this age than in any other, but that it is an age in which graft is being exposed. He spoke optimistically of the honesty of the average citizen and with confidence as to the bright future of the American republic.

The last speaker was Rev. W. Warren Giles of Orange, N. J. Notwithstanding his clerical calling, this gentleman has at command a perfect gold mine of humorous anecdotes and he kept the audience convulsed with laughter for 20 minutes, with story after story, and it seemed as if each one was better than that which preceded it.

This made a fitting close to one of the most successful conventions which the C. B. N. A. has ever held. The following is a

List of Exhibitors.

Automatic Axle Co., Lancaster, Pa.
Akron-Selle Co., Gears, Akron, O.
Buser-Poston Tufting Machine Co., Chillicothe, O.
Back-Stay Machine & Leather Co., Union City, Ind.
"Blacksmith & Wheelwright, The," New York.
Bradley & Son, C. C., Shaft Couplings, Syracuse, N. Y.
Brooks & Co., Clarence, Varnish, Newark, N. J.
Cleveland Hardware Co., Cleveland, O.
Cateley & Ettling, Specialties, Cortland, N. Y.
Chase & Co., L. C., Trimmings, Boston, Mass.
Cortland Carriage Goods Co., Cortland, N. Y.
Crandal, Stone & Co., Hardware, Binghamton, N. Y.
Cowles & Co., C., Lamps, New Haven, Conn.
Central Mfg. Co., Bodies, Connersville, Ind.
"Carriage & Wagon Builder," Philadelphia, Pa.
Dayton Malleable Iron Co., Dayton, O.
Ditzler Color Co., Detroit, Mich.
Eadie Vehicle Gear Co., New York City.
Eberhard Mfg. Co., Malleables, Cleveland, O.
Eureka Bending Works, York, Pa.
Eccles & Co., Richard, Forgings, Auburn, N. Y.
Firestone Tire & Rubber Co., Akron, O.
Fabrikoid Works, Artificial Leather, Newburgh, N. Y.
Federal Rubber Co., Tires, Milwaukee, Wis.
Fairfield Rubber Co., Fabrics, Fairfield, Conn.
Gresham Mfg. Co., Bodies, Griffin, Ga.
Gerhab, Jacob, Supplies, Philadelphia, Pa.
Goodyear Tire & Rubber Co., Akron, O.
Herbrand Co., The, Forgings, Fremont, O.
Hoopes Bros. & Darlington, West Chester, Pa.
Howell Hinchman Co., Leather, Middletown, N. Y.
International Rubber Co., Fabrics, N. Y. City.
Indiana Lamp Co., Connersville, Ind.
Illinois Iron & Bolt Co., Carpentersville, Ill.
Kelly-Springfield Tire Co., New York.
Keystone Forging Co., Northumberland, Pa.
Leggett Spring & Axle Co., Pittsburgh, Pa.
Lowe Bros. Co., Paints, Dayton, O.
Laidlaw, Wm. R., Jr., Trimmings, N. Y. City.
Mossman, Yarnelle & Co., Supplies, Ft. Wayne, Ind.
Metal Stamping Co., New York City.
Metropolis Bending Co., Metropolis, Ill.
Masury & Co., Paints, Brooklyn, N. Y.
McKinnon Dash Co., Buffalo, N. Y.
Mifflinburg Body & Gear Co., Mifflinburg, Pa.
Monarch Carriage Goods Co., Cincinnati, O.
National Malleable Castings Co., Cleveland, O.
O'Bannon Corporation, Artificial Leather, New York City.
Owen, W. R., Ball Bearing Fifth Wheel Co., Springfield, Mo.
Peters & Herron Dash Co., Columbus, O.
Phillips-Laffitte Co., Welding Plates, Philadelphia, Pa.
Pioneer Pole & Shaft Co., Piqua, O.
Pierce, F. O., Co., Paint, New York City.
Queen City Forging Co., Cincinnati, O.
Rock Island Battery Co., Cincinnati, O.
Rielly & Son, P., Leather, Newark, N. J.
Rub-On Varnish Co., Buffalo, N. Y.
Rhoades & Co., J. H., Sponger, New York City.
R. E. Rodriguez & Co., Brushes, New York City.
Rose Mfg. Co., Lamps, Philadelphia, Pa.
"Spokesman," The, Cincinnati, O.
Sherwin-Williams Co., Paint, Cleveland, O.
Sheldon Axle Co., Wilkesbarre, Pa.
Scranton Axle & Spring Co., Scranton, Pa.
Standard Varnish Works, New York City.
Smith & Co., Edward, Varnish, New York City.
Schubert Bros. Gear Co., Oneida, N. Y.
Shortsville Wheel Co., Shortsville, N. Y.
Sidney Mfg. Co., Bodies, Sidney, O.
Standard Wheel Co., Terre Haute, Ind.
Tiel & Co., Geo., Trimmings, Philadelphia, Pa.
Union Bow Co., Cleveland, O.
U. S. Tire Co., New York City.
Valentine & Co., Varnish, New York City.
Ware Bros., Pub. "Carriage Monthly," Philadelphia, Pa.
Woll & Son, Peter, Curled Hair, Philadelphia, Pa.
Willey Co., C. A., Colors, New York City.
Western Spring & Axle Co., Cincinnati, O.
Wilcox Mfg. Co., Forgings, Mechanicsburg, Pa.
York Wagon & Gear Co., York, Pa.

A BIG ROAD PROJECT.

Plan to Raise $10,000,000 for a Stone Road Across the Continent.

One of the biggest plans for building a stone road from New York to San Francisco was made known the other day, when it was announced that a movement has been started with the motor car and accessory makers in Detroit and Indianapolis to raise over $10,000,000 from the motor car industry throughout the country to purchase crushed rock for such a roadway. The purchasing and delivering of the rock is the part played by the motor industry. The building of the road will be left to the country and state authorities with whom contracts will be made to complete the work within a certain time and according to certain instructions before the materials are turned over to them.

The plan to raise the $10,000,000 from the motor industry is one of the most practical and rational yet suggested in the good roads field. This sum has to be raised by January 1, 1913, a litle over three months. The plan is to collect from every motor car maker, from every accessory maker, from ever car dealer and from owners. With the manufacturers and dealers the plan is to collect a third of 1 per cent. each year, this amount to be taken from the gross receipts of the company, which will provide a fund much in advance of $10,000,000. Cash or notes will not be collected but donation slips issued, which slips will be turned over to a bond company to hold until the permanent organization which will care for the purchasing and delivering of the material is organized.

The plan originated over a year ago in the fertile mind of Carl G. Fisher, of Indianapolis Speedway fame, and who during the last 12 months has been accumulating data on the cost of road construction, cost of road materials, cost of cement bridges, cost of cement mile posts, etc. During that time he has talked with many manufacturers to find out if they would co-operate in such a scheme. In order that every subscriber to the fund will be protected no construction of any nature will be started untl the entire subscription has been guaranteed, and if for any reason the plan should fail all monies will be returned to those having made payment with interest of 3 per cent. By having the required amount guaranteed by 1913 it will be possible to complete the work by 1915 so that the road may be used by motorists attending the Panama Pacific Exhibition which opens in San Francisco in the spring of 1915.

Instead of getting all of the financial assistance from the manufacturers and dealers the plan includes the incorporation of all car owners in the country. This is possible by two classes of membership, one a $5 class and the other $100 class. There is also talk of a third of a $1,000 class. Radiator emblems of different types will be issued to each member according to his class and special wall or window medals issued to all dealers who contribute a total of 1 per cent. of their gross receipts to the fund.

The plans do not call for any peculiar highway route across the States. At present there are two or more transcontinental highways and the matter of deciding whether either of these or a different one to be selected will be left to a commission of the motoring interest. All monies collected or subscribed for the road will be used in the actual purchase of material, which is to be purchased at a price covering delivery at the railroad siding when needed. Prices for material range from 90 cents to $2 per cubic yard, depending on the distance the material has to be hauled. A conception of the amount of rock required for such a highway can be gained from the fact that a roadway 9 feet wide and with rock 12 inches deep costs $1,750 a mile for material for a short haul. Although by route it is 3,300 miles from ocean to ocean little more than 2,200 miles of transcontinental highway would call for stone construction as there are approximately 900 miles of improved streets in cities, towns and villages on this course. This fact alone, considerably reduces the problem of building such a highway. The fund of $10,000,000 will give approximately $5,000 a mile for road material, and since road material represents from only 30 to 50 per cent. of the cost of building a road it means that instead of a $10,000,000 one across the country there will, in reality, be a $25,000,000 one.

The actual building of the road will be under the State and County authorities to whom the material will be turned over. The States and Counties will sign contracts to build the roads under Government inspection. Mr. Fisher has discovered that some of the best rock roads in northern Indiana and northern Ohio have cost but $1,750 a mile for material. It is natural that in building a stone road in Iowa the material will cost more because of the long haulage. This will amount to not more than $800 a mile for any part of the country.

Many additional plans are being furthered in connection with this transcontinental scheme, one of which is the erection of sign posts, one for each donation of $1,000 secured on the plans outlined. Each post would carry a bronze plate containing the name of the donor. Such posts will cost $12 each.

Still another plan is that of entering into arrangements with the telephone companies whose lines are on the selected highway to secure plugging facilties on the line so that the motorist having a break down between cities can immediately get into telephone communication with his dealer, a repairman or garageman. Such a system as this is at present in operation in England and also in certain sections of southern California.

The possibilities of travel on a transcontinental highway of this nature are unlimited. Supposing 250,000 cars made a return trip over such a highway occupying 40 days. If each car carried four people the daily cost would be $20 or $800 for the round trip. At this same rate there would be an expenditure of $20,000,000 for the 25,000 cars. While this is a broad calculation so far as the number of cars is concerned it will, however, serve to show the value to the towns and cities passed through of such a highway.

Speeding Automobiles.

An automatic speed-detecting device for automobiles which would seem to be worth the attention of municipalities that are determined to suppress speeding is thus described: Three lights are to be provided on each car—white, green, and red. At a speed of eight miles an hour, the white light will show; at fifteen miles, the green; at twenty miles, the red; and at more than twenty miles an hour all the lights will flash a warning that the speed law is being violated.

A High Building.

The Woolworth Building in New York City, the highest building in the world, has been finished, so far as the steel work is concerned. It is 750 feet high, including the tower, which is 366 feet higher than the main part of the building. Altogether there are fifty-five stories in the structure.

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OCTOBER, 1912.

PARTIAL CONTENTS.

AN ALARMING CONDITION.

To learn from statistics that from 1820 to 1912 about 30,000,000 alien immigrants crossed our shores and entered the United States, is decidedly thought compelling.

It is fair to assume that nearly nine-tenths of these immigrants came from Europe, and the first consideration is, what would be the condition of those countries industrially if this safety valve had not been open to let out their surplus workers? Even with this reduced number remaining, the workers in most countries of Europe find their toil such a drug in the market that in every case where they are not backed up by some labor union—thus giving their work a forced or artificial price—they have absolutely no control over the price they must sell it for.

What would be conditions if these 30,000,000 workers had remained at home? What would be the condition in England, in Ireland, in Germany, in Italy? We will answer: Industrial revolution and social cataclysm—something as much worse than anything that has been going on recently in England as a fatally devastating plague is worse than a common cold.

But what has been the effect in this country of this constantly incoming stream of immigrants—a stream, by the way, of about a million souls a year, and a far greater one now that we don't need the immigrants and that they are a national menace, than when we did need them and they were a national benefit? The writer of this sees them almost every day as they come in from the steamers and are tagged and driven off to various manufacturing cities and towns much as one would drive a herd of cattle. It is indeed a melancholy spectacle; sluggish, awkward, doltish creatures they are, as a rule, dull of comprehension, but in the main well-meaning, yet bearing the marks of an industrial servitude one step only higher than human slavery.

Years ago when this incoming human stream was much cleaner and clearer than now—when the immigrants were more intelligent and assimilable—it did not average more than 300,000 or 400,000 a year, but for the past ten years it has averaged about a million a year.

To this recent incoming horde, more than anything else, is due the constantly increasing industrial demoralization now going on in this country. The Industrial Workers of the World, having disorder and lawlessness as a basic principle of action, is an imported organization. At one camp in the west which is a recruiting place for this I. W. W.—so-called—there were 18 different nationalities, and among them, Poles, Greeks, Hindoos, Japanese, Slavs, and others. One of the leaders made a speech there in which he is reported to have said:

"If non-union men come in while we are on strike it is just possible that stones may roll down the mountain side, quite by accident. If tenderfoots come to camp do not repulse them. Welcome them and give them a cup of coffee. There might just possibly be something in that coffee—sugar, of course."

From this organization sprung the foreign term "sabotage," which means practically the destruction of property to frighten employers into coming to their terms.

Now, however much excuse there may be for lawlessness in countries where the people have little or no voice in making the laws, there can certainly be no excuse for it in a country where a majority of the people can make such laws as they please. If they want Socialism or no accumulations of capital—if they want to abolish the wage system—why, all they need do is to hustle around and get votes enough, and they can have it. But the moment they undertake to bring about these things by any other than lawful means they become traitors to self-government and should be dealt with as all traitors must and should be dealt with.

Let it be distinctly understood that we do not absolve greedy and short-sighted capital from being largely responsible for bringing about the present perilous condition. This immigration of the desperate, the ignorant and the criminal, has been encouraged largely by those whose desire was not only to get the cheapest help possible, but to buy that help at absolutely their own terms. They have "sown to the wind"; we hope the harvest of whirlwind will not be of increasing destructive force. Every worker who favors lawlessness to gain his ends, when every real grievance from which he suffers can be abolished by lawful means, should be promptly sent to some Botany Bay where he is no longer a menace to self-government.

But employers who have given cause for the real grievances and wrongs of the workers are likewise culpable, and while their actions may be lawful, they must be held responsible for their full share of the present alarming condition.

THE USES OF TROUBLE.

One of our readers suggests that editors have their trials and annoyances in about the same measure and of about the kind as blacksmiths, and he is right.

Possibly we may have expressed the thought before, but troubles are indispensable to character development—quite likely to soul development. The old saying is a true one: "Sweet are the uses of adversity." Indeed, as one grows older and reflects and observes more, he can but have the positive conviction that whatever is sent us by Providence, or God, or Nature—call it what you will—is for the best.

It seems more than probable that this life is merely a preparatory school to fit us for the existence after what is called death. Thus, whether we be editors or blacksmiths, or engaged in some other calling, the law of life is as Longfellow so well said: "Toiling, rejoicing, sorrowing."

The man who indulges in envy or complaint, or becomes discouraged because of trouble, who seeks to avoid the responsibility of duty, who imagines that he was put here to get as much out of life and to give as little as possible—who, in short is strenuous to save his life, unmindful of his duty to others, will lose it, and he who is willing to lose it to save others will save it. And we need not even go to the New Testament to reach this conclusion.

The truth of it is demonstrated by life's experiences, as is the fact that whatever is the law of Nature is right and for the best.

ROAD BUILDING FOR CONVICTS.

Unquestionably convicts should be employed to build State and county roads. Not that this is a matter of economy alone, although in the single State of Colorado $75,000 was saved by this method in a single year.

The main consideration is that it is essential to the physical and moral health of a convict that he be employed at some kind of bodily labor and this outdoor work is not so monotonous as to be shunned and it need not be so hard as to be a punishment. The hours of work should be short of course, and there even might be a system of rewards for superior effort.

Convict labor on the highways is now being practised in the following States to a greater or less degree: Colorado, Montana, New York, Georgia, Florida, Nevada, North Carolina, Virginia, Tennessee and Michigan. Let the other States get in line. The saving in money is something; the upbuilding of the physical and moral health of the convict is much.

While in a superficial sense the spectacle of a large body of men working out-of-doors in stripes may not be an especially pleasing or elevating one, it likewise has a moral influence quite as effective.

"SYNTHETIC" THINGS.

Just at present a good deal is being said concerning "synthetic" or artificial rubber, and a German doctor is now in this country with a set of automobile rubber tires so produced. To all appearances they are identical with the natural rubber and it is claimed that they have been driven 4,000 miles and are still about as good as new.

Our readers are advised to not put much faith in the commercial success of rubber thus made artificially. Not long ago there were similarly glowing reports of artificial diamonds and other precious stones, but they have not yet come into competition with the genuine. Meantime, some of the more ambitious scientists are trying to produce artificial life and it is claimed they have succeeded. The chances, are, however, that they may not have

first eliminated all the life there was in the material or chemicals upon which experiments were to be made.

Man does some things very well indeed, but there are things that nature does which man can never do and other things nature does that man can imitate after a fashion, but not with commercial success.

ANTI-SLIPPING DEVICES.

A generous member offered through the Society for the Prevention of Cruelty to Animals not long ago a prize of $500 for the best emergency device to put on a horse's hoof to prevent him from slipping. The prize has been awarded to the inventor of the chain and strap overshoe which has been on the market for some time.

Possibly the award may have been merited, but nothing yet devised under the sun will prevent a horse from slipping on a smooth macadam paved street, because no matter how good a calk or holding projection may be fastened to the hoof it will be of little benefit if it has nothing to hold to. It is true that some kinds of material have more friction than others, as for instance rope, or any surface of a loose composition that wears unevenly, but even smooth rubber will slip on a smooth surface. Sharp calks will prevent horses from slipping on snow or ice because the calks cut into it and thus furnish a hold for the foot, but they are not of much use on smooth pavements where the horse is obliged to pull a heavy load. The only device that will prevent a draft horse from slipping on smooth or icy pavements is something of very large surface made of rope, rubber, leather or some other friction material. But of course a surface large enough to give the necessary holding quality would be so large as to be awkward if not absolutely dangerous to the horse.

Rubber hoof pads and rope inserts are the best anti-slipping devices yet invented for smooth city streets. They wear out quickly and are not easily put on or taken off, but nothing has thus far been made that will take their place.

HORSE AND AUTOMOBILE.

There are distinctly two sides to the question of the horse and the automobile. On the one hand, in some localities the automobile has, no doubt, displaced the horse to a very great extent. In Kansas, for illustration, according to the tax commission, 67,000 horses were dropped from the tax rolls of the State between March 1, 1908, and March 1, 1912. They were displaced by 18,000 automobiles. At all events this is the report, although we very much doubt that this number of automobiles can do the work of the larger number of horses. Around Topeka, Kans., alone, there are said to be 70 farm trucks in constant operation. In western Kansas, where there are large farms, traction engines and motor trucks do practically all the farm work, such as plowing, cultivating the fields and hauling the products to the railroad station for shipment.

On the other hand, the Department of Agriculture at Washington has issued a bulletin over the signature of Secretary Wilson, which states, among other interesting information, that since the automobile came into existence the number of horses in the country has increased by a third and the price has more than doubled. This Government bulletin of course is practically correct. Just prior to the time that automobiles were invented, there were something over 18,000,000 horses in the country, but in 1910 the number had increased to over 21,000,000. The price at the earlier period averaged $47 each and the average price in 1910 was $108 each. The same increase is shown in the case of the mule, which has also increased in number and price since 1894 about 50 per cent. Moreover, strange as it may seem, where automobiles are most common the price of horses is the highest. This is the case in Michigan, Ohio, Indiana, Illinois and Wisconsin, which are among the best farming States in the country and where automobiles are in most common use, yet the average price of horses there is $124 each, which is considerably above the average for the entire country.

We have thus given both sides of this question, and although conditions for the horseshoer are not as attractive as they should be, no alarm need be felt, for, while horses would be still higher priced and possibly far more numerous if the automobile had not been invented, there is no sign of their general diminution, much less of their final elimination.

In localities where the depletion of horses is being felt in horseshoeing shops, it is urged that the proprietors make a careful study of the mechanism of the car and get a knowledge of the proper way to repair it. The work is of a kind that they are well fitted to do and someone, of course, must do it. The displacement of the horse will continue to go on in some localities only, but not to the detriment of the blacksmith or horseshoer provided he takes advantage of conditions as they exist.

Most Expensive Wood.

The Scientific American avers that carbole is the most expensive wood in the world. This is a beautiful tree belonging to the mangrove family and is a native of the west coast of Africa. It is common on the island of St. Thomas, and is generally found in low or medium elevated portions. The ideal situation is on the southern slope of the mountains, where in mature state it forms large trees. Individual specimens are found here from 120 to 140 feet high and 47 feet diameter. The wood is highly esteemed and is light chestnut-brown, with dark streaks. It is firm and durable and has the appearance of teak. It is also easily worked, takes a high polish, and when carefully filled and varnished presents a beautiful appearance. The wood is used for high-grade furniture and objects of luxury, such as fancy doors, parquetry and interior finish in fine residences. Attempts have been made to introduce the wood in English and German markets, but have failed on account of its high cost. It brings as much as $3,500 per cubic metre, which means a little over a cubic yard, on the island of St. Thomas.

Safe Speed of Grindstones.

A grindstone 3 ft. in diameter, with a 4 lb. face—that is, 4 in. thick—will weigh nearly 425 lbs., and may be driven with comparative safety at from 2,000 ft. per minute to 2,500 ft. per minute, or from 200 revolutions per minute to 225 revolutions per minute. To reach such speed the stone to be safe must be true in its periphery, and the lower part must not rest in water. This last feature makes the stone heavy at that part, and would produce a shock at each revolution and ultimately produce a fracture or a "stone burst," a very undesirable feature, from the fact that the flying pieces have no respect for anything and no specific direction, but invariably fly at a tangent.

Gives No Milk.

A farmer, says an Irish paper, was asked to buy a bicycle. "What is that?" he asked. "It's a machine to ride about the town on." "And, sure, what might the price of it be?" "Fifteen pounds." "I'd rather see fifteen pounds in a cow." "But what a fool you would look riding 'round the town on the back of a cow!" "Sure, now," replied the Irishman, "not half such a fool as I'd look trying to milk a bicycle!"

CORRESPONDENCE

BORING MACHINE AND WHEEL BENCH.

How to Make a Useful Machine for the Carriage Shop.

From A. C. Gough, M. E., Idaho.—The writer has served other trades and since qualified for some degrees in science; but the recollection is quite vivid of the methods used in the carriage shops where the first years were spent. One of the jobs which often required much time and labor for the pay received was that of filling

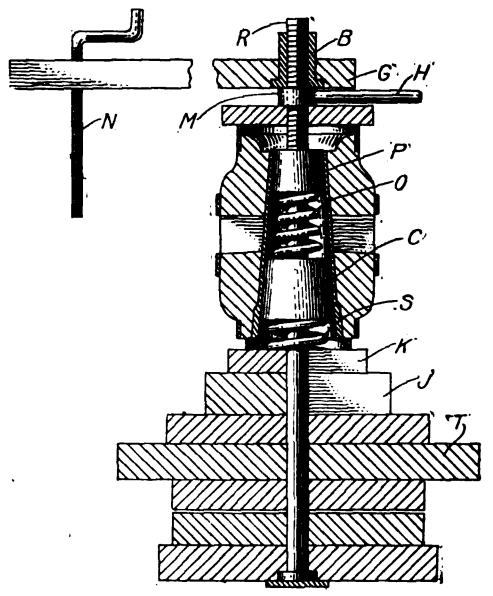


Fig. 1.

wagon or carriage wheels. Fortunately, shop methods continually improve; but at that time, in those particular shops, the operation was about as follows: The bolts, clips, tires and felloes were removed; the spokes were notched about eight inches from the end to provide a place for striking with the hammer, or similar tool used for knocking out the defective spokes. The spokes which were broken off at the hub could not be drawn in this way, and were left until a later time. A strong rod was passed up through the work bench, or a special wheel standard, with a rod passing up through the center and secured to the floor, was provided. A wood cone that sometimes fitted the wheel box was used on the rod (the cone resting upon the bench), the wheel was placed on this and secured. Before the nut was screwed down, a small beam was placed on the rod, being clamped by the nut. This beam was two or three feet long with a number of holes in the outer end through the desired one of which holes a rod or screw was passed. This small rod or screw could be raised or lowered to the position desired for a driving gauge. It is evident, if this beam were resting upon the end hub band that

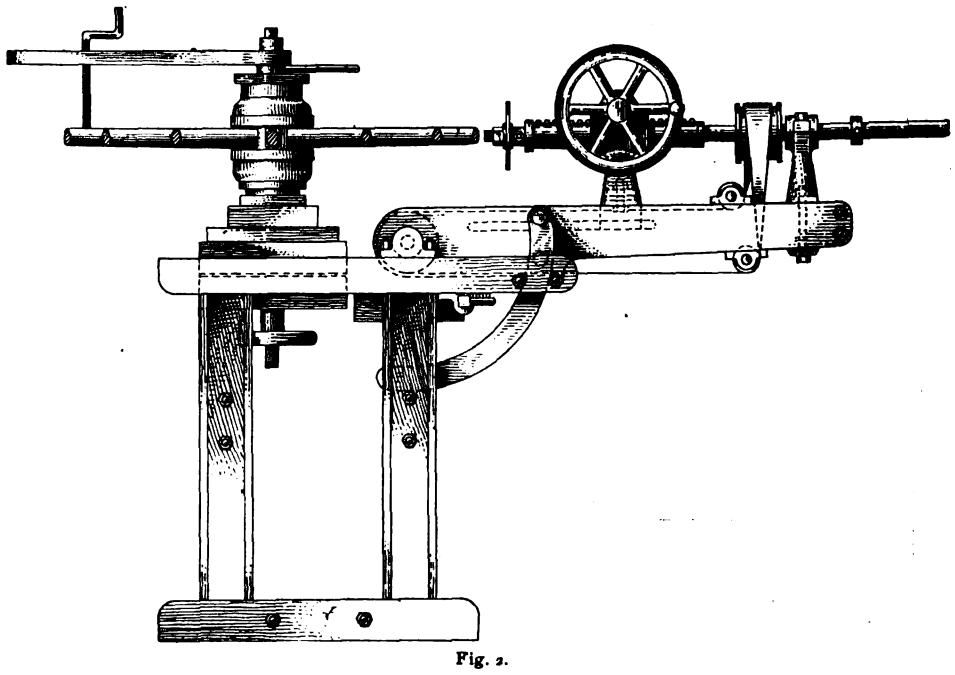


Fig. 2.

the spokes would be set relative to the bend; and not relative to the wheel (or bearing). Sometimes the beam was made with a boss which rested upon the upper end of the wheel box. This was an attempt to set the gauge relative to the bearing in the wheel; but the method is not very accurate; because the bearing surface is small and the end of the wheel box and hub are not always in good condition.

After the spokes were sized and driven they were cut to the desired length, the wheel then being removed from the wheel bench to be secured in the boring machine where the spokes were pointed and tenoned. Upon the completion of this operation the wheel was returned to the wheel bench where the felloes were put on and the wheel finished.

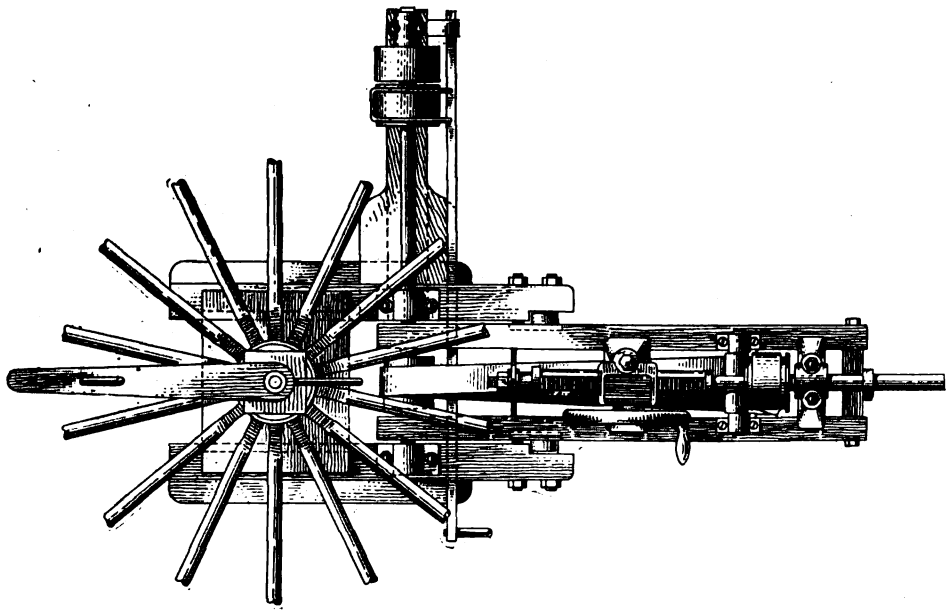


Fig. 3.

Asking to be excused by those who may have developed better methods, the following original method, illustrated by Figs. 1, 2, 3, 4, and 5, is offered with the hope that it may render this work more accurate and more easily done. The method may be described as follows: Slotted pieces of boards, J, K, Fig. 1, of sufficient thickness to support the hub at the proper height, are placed on the rod, resting upon the table T; the spring S, cone C, spring O, and cone P, are placed upon the rod, R, in the order named. The hub is then placed over the cones and secured by the nut, M, which is provided with a handle H. The driving gauge, G, is next placed on the rod, R, resting upon the nut, M, as shown. The gauge G, is provided with an adjustable screw, N; also, with a bushing, B, the latter being made to fit the rod, R, snugly.

The cones hould be made of strong hard wood, the hole being bored to fit the rod, R, snugly, and then placed upon an arbor and turned to desired size. A few pairs of cones with some strong coil springs as shown will be sufficient to fit all sizes of wagon and carriage wheels. (It is necessary to provide a set of smaller sizes for carriage work, which cones should be made of iron). When this work is done fairly well it insures that the rod, R will be at the center of the box throughout the entire length of the latter.

This form of driving gauge, shown by G, N, and B possesses the advantage that it may be easily removed after the spokes are driven, and need not be placed in working position until time to begin the operation of driving the spokes.

To assist in rendering the further operations more easily and accurately performed, the combined boring machine and wheel bench is offered. In the design shown, Figs. 2, 3 and 4, the frame is made largely of wood and the machine may be constructed in almost any general repair shop.

The hub to be filled may be placed in position, upon the table, as already described, the boring machine being in the horizontal position, as shown, Figs. 2 and 3. Should there have remained any broken spokes in the hub, they may be cut off at the hub and partly removed by boring holes in them with the machine and the operation completed by pinching them out with chisels.

After the spokes have been sized and driven, they may be cut off by a small circular saw carried by a special arbor, as illustrated; the collar upon the spindle may be set to secure uniform and proper length. Next, the circular saw being removed, the spoke pointer and tenoner are respectively used, and the felloes put on and finished before it is necessary to remove the wheel. Figs. 4 and 5 show the machine arranged for boring felloes. K, Fig. 5 is a board secured to table, T, perpendicular to, T, L and

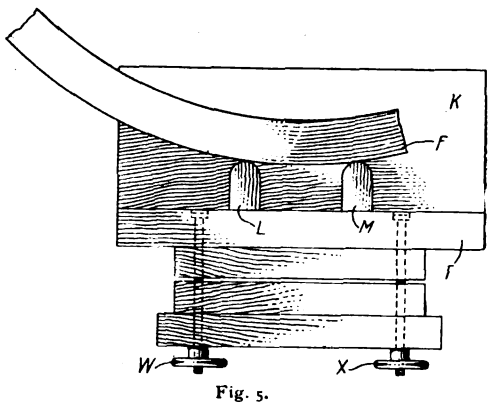


Fig. 5.

M are projections secured to both K and T, upon which the felloe, F, may rest, the felloe, F, being held against the vertical table, K. The table, T, may be adjusted as desired and then clamped in position by the nuts, or hand wheels, W and X.

Those who are familiar with this line of work will readily understand the machine and appreciate the wide range of work which it may perform without detail description.

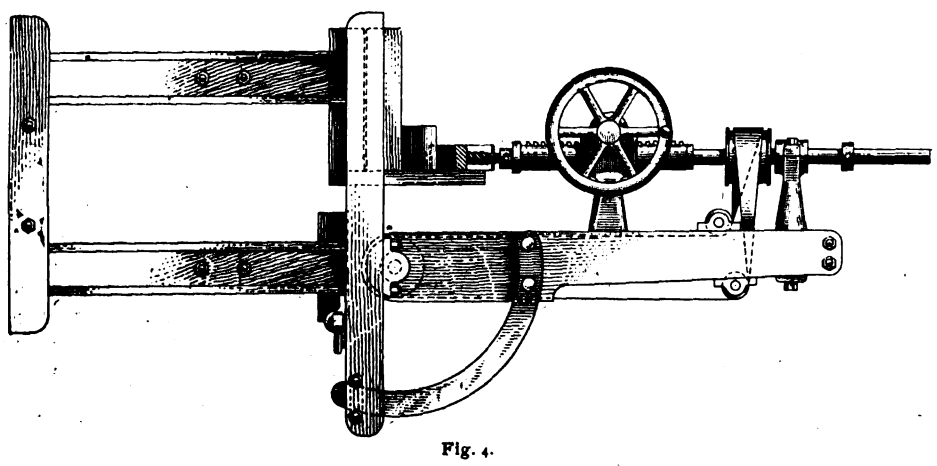


Fig. 4.

Plow and Disc Sharpener.

From A. C. Gough, M. E., Idaho.—When a man has only small plows to sharpen, such as may be drawn by "one mule, way down in Dixie," other methods than a good anvil and hammer might be considered not worth while. But one does not usually have to devote many hours to drawing out the long plow lays, used so largely in the middle West, or the long lays of the road grading machines, in order to be willing to have a large part of this work performed by a power hammer, or other improved means. It was several years ago, while handling a country contract for repairing these road making machines, that the writer conceived the method here illustrated.

As all know who are familiar with this class of work, it is rather difficult to hold a plow lay or scraper under the hammer in just the right way so that this work will not somewhat lose the proper form. Sometimes, when not properly welded or the lay is thin, the lay and bar may be separated by the force of the blows while sharpening. It would be possible, by using a rolling or squeezing process, instead, for drawing out the lays, to avoid the strain caused by the hammer blows. A method similar to that of the roller disc sharpener might be employed. The advantage of the roller disc sharpener, however, is largely due to the fact that no material is wasted as in grinding, and the metal being compressed may have a greater density and hardness; not that the grinding process causes any undue warping or strain.

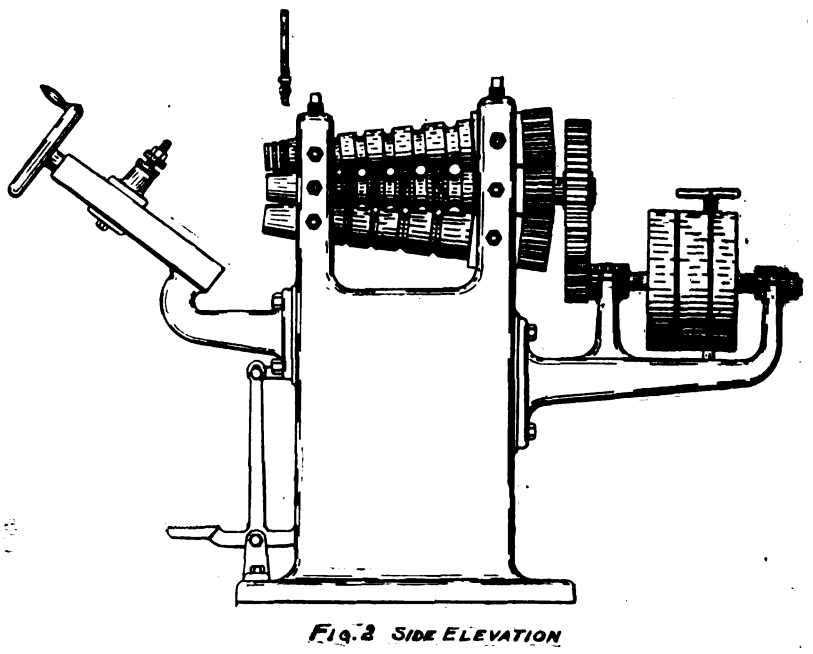


FIG. 2 SIDE ELEVATION

It requires considerable pressure to hold the work between the rolls arranged as in the disc sharpener. This would probably defeat the purpose of such an arrangement for sharpening plow lays; but by using two sets of rolls, the first being corrugated somewhat, it is believed that this defect could be avoided entirely. The corrugations should not be too many, nor too deep; and the corners should be well rounded, in order to avoid a "cold shot" being made when next passing the lay between the smooth rolls. The corrugations are, perhaps, somewhat exaggerated in Fig. 1, in which case R represents the corrugated roll; S, the middle roll; T, the bottom roll; P, a section of a plow lay; B, a form of bearing for the rolls; L, being a slot into which the end of a screw projects which retains the bearing.

Combination tools and machines, as a rule, are not desirable in the well equipped shop; but where it is not necessary to change parts, or to set up the machine for each job, they may be economical and even convenient. It is considered desirable in this connection to include a plow sharpener, disc sharpener and stock rolls in one design. The machine shown, Fig. 2, is designed to run in either direction, or to be reversed instantly, as would be necessary when used for sharpening plows. This is accomplished by having an open and a crossed belt, which are shifted by the foot as indicated—the pulleys and belts being arranged after the method used upon

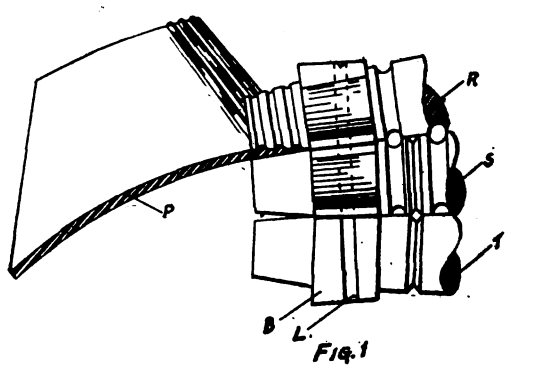


FIG. 1

a planer or gear shaper. It is also necessary to have the rolls reversible in order to use the middle portion for stock rolls. Unfortunately, the taper of the rolls renders them unsuitable for flat or rectangular stock.

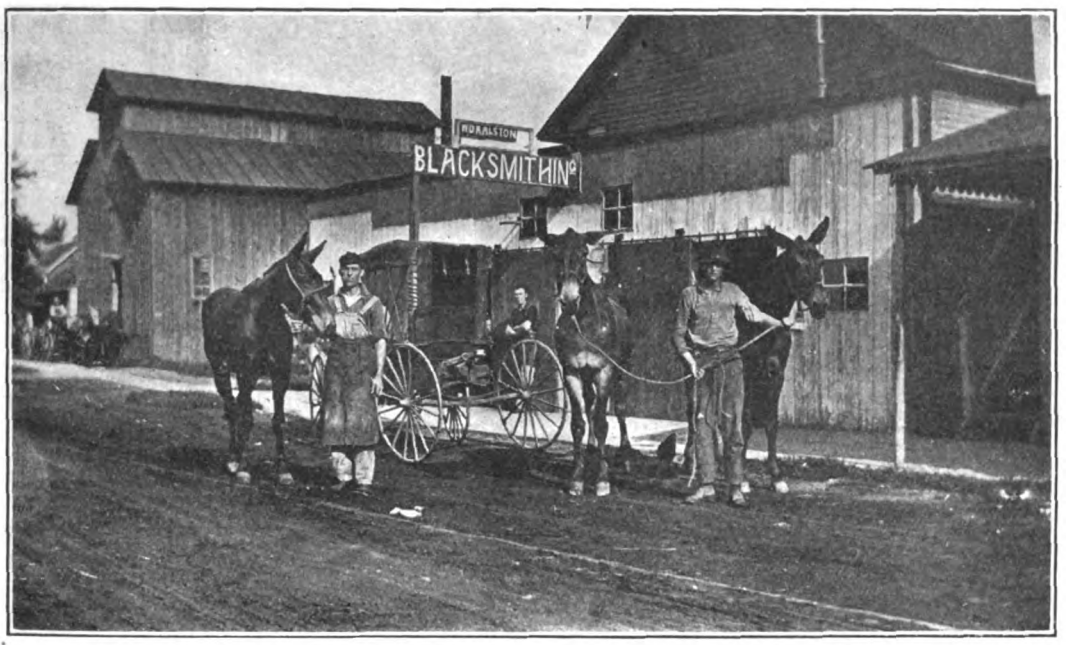
As mentioned before, this machine as a disc sharpener, employs practically the same principle as the standard roller disc sharpener; the disc being secured upon a rotable member in the proper relative position to the two lower rolls. When sharpening plows lays, the edge of the lay is heated over four or five inches, better along the entire length of the lay, and passed between the corrugated and middle roll as far as the heat extends. The foot is then placed upon the other end of the foot attachment to the belt shifter which reverses the machine; the lay is next passed between the lower rolls where this process is completed. The rolls are necessarily not large. On this account they had better be made of steel and hardened. This renders it necessary to cool the rolls when passing a very long heated lay between them, which may be done by having a very small nozzle placed above the rolls and directed downward, as indicated. Ordinarily, a few drops of water would be sufficient, but conditions might be such that each roll would need to be sprinkled with water, in order to keep the temperature of the rolls within the desirable limits.

To build the machine after the design shown here, it would be necessary to include in the equipment, the foundry pattern and machine departments. It is, of course, possible that a design could be rendered which could largely be built in the general repair shop, though the writer has not yet worked it out.

Plenty of Work and Good Prices.

From W. D. Ralston, Iowa.—I am doing a first-class business. Prices are good here. The following are some of the prices I get for work:

Horseshoeing, new, per span	$3.00
Horseshoeing, old	1.80
Buggy tires reset	2.00



Mr. Ralston's Shop.

New buggy tires	5.00
Wagon tires reset	2.50
New wagon tires	12.00
New wagon tongue	2.25
New front wagon hound	3.00
New hind wagon hound	.90
New buggy rims	4.80

The rest of my repair work runs in about the same proportion. I send you a photograph of my shop.

Two Maine Veterans.

From Charles Barker, Maine.—I recently ran across two of your earliest subscribers in Portland, Me. One is a retired blacksmith and the other is a partly retired wheelwright. Each is 74 years of age.

Mr. Matthias Moulton pays a daily visit to his shop "so as to see things are runnin' right and help out a little," which is about the extent of his activity. In 1865 he returned from the war and formed the old wheelwright firm of Talbot & Moulton and has been continuously in the shop ever since, Mr. Jarias Talbot retiring about twenty years ago. Sleighs and heavy wagons were the chief output of the firm, but now general jobbing is about all that is left of a once large business. Mr. Moulton at one time decided to have a blower put in but thought he would wait until the old bellows gave out. He did, and he waited just fifteen years. Another interesting fact is that both the oldest and youngest employees are still with the firm. Samuel Mason was hired in 1865 and hasn't been fired yet. James A. McDonald entered the employ 26 years ago, at the age of twelve, and represents the progressive end of the business today.

Everybody in Portland knows Ben McCusick. He, like his old friend Moulton, returned from the war in '65 and started business as a horseshoer, but what makes him a shining star is the fact that he is a retired blacksmith, the first one I have ever met. He is living quietly on a beautiful estate with his son-in-law, situated in one of Portland's handsome suburbs, utilizing his spare time as boss farmer, head gardener, or whatever service he finds congenial and necessary. His splendid growing crops are a tribute to his activity, while his old-fashioned "posy beds" are delightful to behold, reminding one of the days of the poppies and lillies, marigolds, petunias, hollyhocks, asters and all the old flowers that mother loved to "putter" with. With the exception of a few kinks in the back now and then, Mr. McCusick enjoys good health and in another year looks forward to his golden wedding anniversary. Always a strong Prohibitionist, one of his trials was to keep surrounded with sober helpers.

You may be interested to know that business throughout Maine generally is reported as very satisfactory. In most every shop can be heard the cheerful clang of the anvil and the roar of the blower, surrounded by a set of healthy, powerful and exemplary men.

For Badly Worn Hubs.

From N. Q. Greenler, Kansas.—One way of fixing a spoiled hub that has been ground out by running along time with a loose box may be of interest to the craft. I have taken such, after having been called useless by some, and by making long tapering hard-wood wedges, leaving them thick enough at the large end to wedge up tight, I drive three or four of these down the side of the box after it has been pushed close to the small end. Then I take red lead mixed with linseed oil to a soft paste so it will run around into all the cracks. I should have said that I first stuff something in the mouth of the box to keep the lead from running inside of the box, then I nearly fill the hole around the hub, taking care to put enough in so that it will completely fill by the time it is wedged up. I then drive all the wedges down tight and let it stand over night if possible to led the lead harden.

The Thankful Horse.

From Charles Barker, Maine.—J. H. Nevins, a progressive Bangor blacksmith, advertises his business in this poetic style:

O, dear! O dear! I'm coming. Pray
Help a poor cripple on his way;
I'm weak and sick and lame all o'er,
Just because my feet are sore.
I've been burned and pared into the quick
By stupid blacksmiths who did the trick.

But now a blacksmith has been found
Who is widely known for miles around,
And now I'm well as you can see,
For J. H. Nevins has just shod me.
At last, I've changed my complaining tone;
No more I'll fret, no more I'll groan;
For I've been examined well this day
And I'm glad that Nevins came this way.

For a Church Spire.

From W. F. Stoddard, Pennsylvania.—It is not often that a blacksmith is called upon to make a church spire, but I had one to make and put up, and I send drawings that will show how

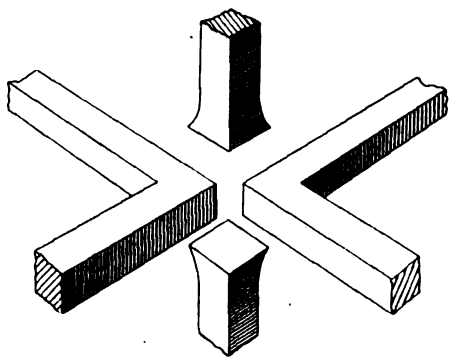


Fig. 1.—The Bars.

I did it. The shaft I make of three-quarter inch square iron. The circles are welded at right angles to each other and are eight inches in diameter. The bars, as shown in Fig. 1, are

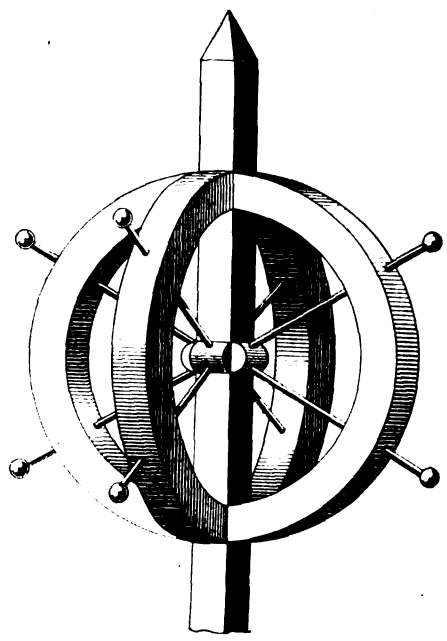


Fig. 2.—The Complete Spire.

made and welded into the center of the circle. The half circles are made of three-eighths inch round iron, and are held on by the bars. There are four of these. Fig. 2 shows the spire complete.

Pouring Liquid from a Can.

From George J. Mercer, New York.—Every mechanical action, however simple it may appear to the onlooker, is capable of being made difficult of accomplishment, provided the person doing the work is not awake to the best means of handling the job.

Take the simple operation of emptying the liquid contents of a can, like the illustration, Fig. 1. This can is the ordinary shape and is

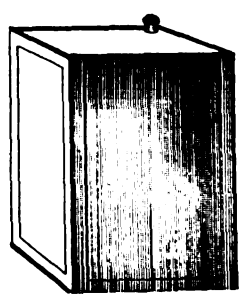


FIG. 1

used daily by many people who never give a thought to the best method of emptying its contents. No doubt the first thought of every one is to place the opening at the bottom lower corner as that is the natural location for any outlet, in the case in hand however, it should be remembered that the can has to be lifted into position so that the contents will run out, and in changing the position, the contents are set

in motion, at the same time they must be controlled until the can is in the right position so that the flow can be directed.

Therefore the position as illustrated in Fig. 2 is best calculated to serve all purposes. The liquid is controlled until the right angle is reached to pour properly, the opening being at the top which will allow the escape of air, and

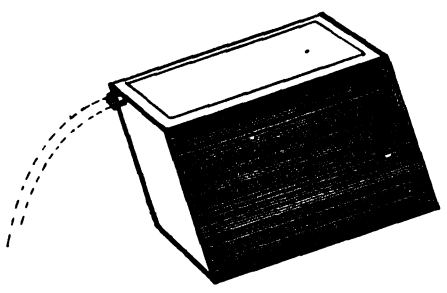


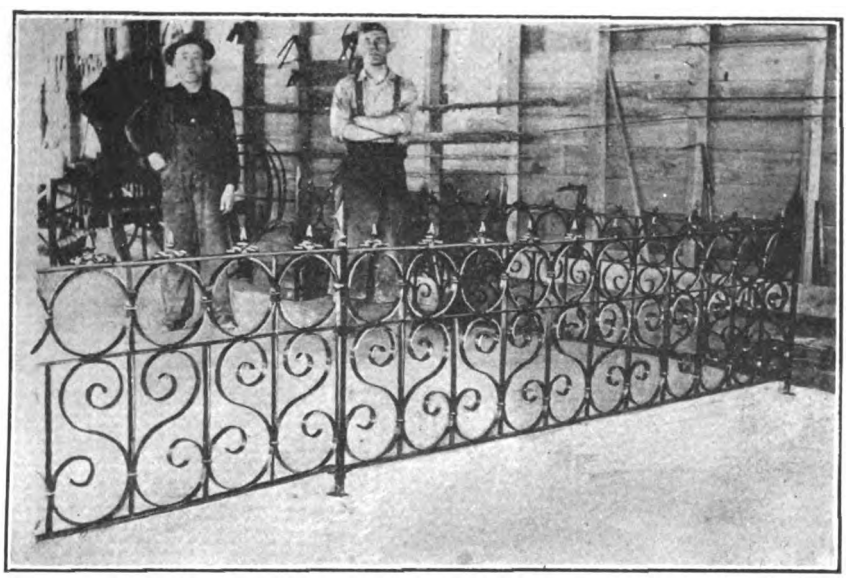
FIG. 2

the action of pouring is accomplished without loss.

This is just one of those simple things that few people think about but it is well worth bearing in mind the next time you open a tank of liquid.

A Fine Piece of Iron Work.

From F. W. Harste, Ohio.—I am sending you a picture of a veranda fence, which is a hand-made job from start to finish. Every inch of it was turned by hand. This has two sides, each 12 feet 6 inches; one front, 17 feet six inches, taking over 500 feet of iron. It stands 30 inches high. It is now on the front veranda of a hotel



Veranda Fence made by Mr. Harste.

and was made by myself and one helper. As you see in the picture, the one with the apron on is myself and the other is the helper, Mr. Frank Osterholt. This only shows one side and part of the front. Taking it from visitors, this is considered one of the finest pieces of work in this part of the country. We also do horseshoeing and other work.

Welding and Tempering.

From J. W. Stearns, Idaho.—Here is a recipe for a welding compound I would like the brother smiths to try: Two ounces of carbonate of iron and one ounce of carbonate of soda to one pound of finely pulverized borax. This is the best thing I have to weld all kinds of steel. To make a good piece of steel, I heat the steel to a bright red, then roll it in the powder and let it remain so for a few minutes, then cool off in water. I repeat this operation twice and when this is done I start to do the piece of work, water-hammering all the time. When I have finished doing this, I have a good piece of steel, which I will guarantee can be used for buggy springs and tools of all kinds.

I have a good thing I use in water to temper with. I take say, a handful of bluestone to four gallons of water. When the water is heated, it converts the copperas into a liquid form, and when the steel is put into it it makes it tough. I have used this on mining drills in this State, and a drill used in the copperas water will cut the hardest of rock.

If Jobbers Charge too Much.

From M. I. Morgan, Kansas.—I saw in one of the trade papers where a blacksmith said that the jobbing houses which sell to blacksmiths charge us more than they do the hardware stores. Now, brother smiths, I know this to be a fact. I advise the craft to wake up and not trade with a house that does this. It will do them good to give them a good calling down.

Cooling Tires After Setting.

From M. L. W., Ohio.—The objections usually made to the setting of tires hot seem a little unreasonable and not in accordance with good workmanship. As often stated, they are the alleged necessity for heavy pounding, the liability of burning the rims of the wheel, and the time it takes to cool the tire. Now none of these objections are valid ones. With an up-to-date tire cooler there is no need whatever of hard pounding, no rim scorching, and the time required for cooling the tire is so short that it should not count, to say nothing of the absence of smoke to injure the eyes or uneven pressure to weaken the wheel.

It does not require as much heat as many suppose to properly expand a tire. The old-time blacksmith who heated his tire to a bright red heat and then deluged the wheel with water to prevent it being burned, did neither a good job nor a quick one. One man can cool more tires with a good tire cooler and cool them better than three men can in the old way.

For Thin and Brittle Hoofs.

From J. R. Bennett, Illinois.—I have a large trade in horseshoeing in spite of the fact that the automobile is used so much in this locality. This being the case, I naturally have all kinds of feet to handle. I will give my method of shoeing a hoof that is thin and brittle. In all bad cases, I find it better to turn my own shoe, crease clear around the toe and punch nail holes near the toe. I use a very high heel and no calks whatever. In such cases as I refer to, I use steel and have the plate the same thickness at the heels as at the toe. I also take special pains to have the foot pared somewhat at the frog which takes part of the pressure off the shoe, and also puts the foot on the ground where nature intended it to be. You were speaking in a recent number about brittle hoofs and I believe, as stated, that old mother earth is the best hoof ointment in the world. I always make the foot level but do not rasp under the clinches nor about them. In smoothing the foot, I never rasp. Crease under a nail so it will show when the foot is finished.

For Interfering Horses.

From G. W. Bigelow, California.—I notice that Brother George Keene of Minnesota, gives a method of shoeing interfering horses. I have shod horses and mules for sixty-four years, and I have stopped hundreds of horses from interfering and have done so by simply reversing his method or doing just the opposite. I have shoes in my shop that were fitted as he says he fits them and have taken them off from horses that have interfered, cutting down three-eighths of an inch of the inside of the foot and then put on a natural shoe and as a result the interfering was prevented. I have made a standing offer to stop a horse from interfering after shoeing him twice or I will take no pay for the work. There are some horses that it is necessary to vary the work somewhat. As for instance, set the shoe on the outside and rasp off a little of the inside of the hoof. I hope the brothers will try this method. I don't find any fault with Brother Keene, let him keep on shoeing his own way if it answers the purpose but I cannot secure results the way he mentions. I extend my best wishes to the craft and to the Blacksmith and Wheelwright.

Rule for Finding the Weight of Iron.

From Reader, New York.—Here is my rule for finding the weight of square iron by measurement: Multiply the area of its ends by three and one-third times the length in feet. For instance, say we have a bar of iron, 2 x 1 inch by 12 feet long. 2 x 1 x 10 x 4=80 pounds. Or take a bar 4 x ¾ inches, 9 feet 4 inches long. We have 4 x ¾ x 10-3 x 28-3=280-3 =93 1-3 pounds in the bar.

This rule has been a great help to me, and you may publish it, as some other smiths may be able to make good use of it.

Pointing Plow Lays.

From A. L. Cooper, Missouri.—As Mr. Cummings of Illinois has given his way of pointing a plow lay I will tell how I point them: I shape my point very much as he does his. Sometimes I buy them ready-made but would rather make them as I can get the heavy part where it is most needed. I then heat the lay and draw it out to the proper shape. Then I place them both in the fire and bring them to a cherry red and I put on some Crescent Compound and bring them to a welding heat. I take them both out and lay the point down on the anvil and set the lay on it, bottom downward, and weld them together. While they are hot I turn the point up over the lay and hammer them down tight. Then I put it in the fire and take another heat on the point and weld it up and shape it up. Then I take another heat further up and weld it all down solid. Then I finish it up along the edge and have a good job without any clamping with tongs. Crescent Compound is the best I ever tried.

Removing Tires.

From A. L. Cooper, Missouri.—Well, brother blacksmith, tire setting is on now and no doubt some of you have had wagon wheels with the tires bolted on and the bolts rusted in the felloes so that you could not drive them out. After removing the nut then you were up against it hard. Now, I will tell you how I do it. I take a mowing machine section and drive it between the felloe and tire with the beveled side next to the felloe, and cut the bolt off, and if I can't get the section out I take another one for each bolt, for we always have plenty of them lying around that we have removed from old sickles. You may think that a section would be a very poor cold chisel, but try one and you will be surprised to see how slick they will cut a ¼ inch bolt off.

For Overreaching Horses.

From James W. Frye, New Hampshire.—I have a different method of shoeing horses which overreach than some which have been given and I find it works well. The front feet I pare at the toes as closely as they will pare without injury to the hoof, then I give the horse a shoe that has a high heel and a very low toe. I set the shoe back on the foot as much as I can without injuring it. I then treat the hind feet just the opposite way. I pare the heel and leave the toe as long as possible. I often set the shoe out over the toes one-half inch in cases where the hoof is in bad condition. I give the toe a good calk and the heel a low one. I have experimented a good deal in the last four years and find this to be the best method of curing the difficulty.

For Overreaching.

From Fred L. Parrott, Missouri.—In regard to shoeing horses that strike their fore feet with their hind feet, I give your readers my method of shoeing such horses, always with good success. I make a heel weight shoe without a bar; it is the same as any shoe, only very light at the toe and heavy at the heel, with the ends rounded up from the bottom. I put no

calks on, and make the shoe as thick as a low calk can raise it up, also a small steel plate at the toe to keep it from wearing too rapidly. The object is to give the horse heel action and make him raise his feet up. A toe weight will give a horse knee action and cause him to reach forward, but what is wanted is heel action to raise his feet up high enough to clear his hind feet.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

A Five-Horse Evener.

From A. Georgenson, North Dakota.—I would like you or some of the readers of The Blacksmith and Wheelwright to send in plans or sketches for a five-horse evener to use on eight-foot cut binders that will take away side draft. Also give plenty of room for the horses so they will not crowd each other.

What Painter Can Tell Him?

From N. Q. Greenler, Kansas.—Can some one give the real cause of checks upon carriage bodies and especially on re-varnished jobs where they are much worse in six months or a year after having been re-varnished. Is the quick hard drying finish better than elastic varnish."

Hardening Plough Lays.

From J. P. Herberg, North Dakota.—I would like to know some way to harden breaker lays so they will be soft in the center.

PRICE LIST.

Adopted by the Winnipeg Branch of the Canadian Association of Horseshoers and Carriage Makers.

It should be stated in connection with the following price list that it is published with the view that it will be interesting to readers in other localities, just as prices charged for work or for commodities or merchandise are considered of interest. In some cases, however, readers have somewhat strenuously objected to the publication of such lists in this magazine, although no reason has been given for such objection. Now we do not wish to devote valuable space to this if our readers do not want it. We would like to hear from some of them upon this matter, and from all who object to the publication of these price lists, and why they object to it.

HORSESHOEING.

Plain Shoeing, new shoes, sizes 0 to 5, inclusive ..... per set	$2.00
Plain Shoeing, new shoes, sizes 6 to 8, inclusive ..... per set	2.40
Fancy Drivers and Carriage Horses new shoes ..... per set	2.50
removing ..... per set	1.50
Shoeing for High Stepping..... per shoe	1.00
Running Plates, plain ..... per set	3.00
Running Plates, brazed toes..... per set	3.50
Running Plates, removing ..... per set	1.50
Track Horses, trotters or pacers... per set	3.00
Track Horses, trotters or pacers, removing ..... per set	1.50
Bar Shoes, new ..... each	1.00
Bar Shoes, new, removing ..... each	.50
Leathers ..... each	.25
Rubber Pads, sizes 0 to 4 (larger ext.) each	1.00
Heavy Draft Stallions, new shoes, per set	4.00
Heavy Draft Stallions, removing, per set	2.00
Never Slip and Giant Grip Shoes... each	1.00
Never Slip Bar Shoes, 4 holes and caulks, each	1.20
Renewing Caulks ..... each	.05

For shoeing vicious horses which have to be roped or put in rack, double price of ordinary shoeing will be charged.

Buggy shafts, from ..... $2.50 to	$3.00
Shaft cross bars	1.75

All iron work extra.

Poles complete, from ..... $12.00 to	15.00
Singletrees and doubletrees, from 1.25 to	3.50
Iron bound	3.50
Neckyokes	3.00

SPOKES AND RIMS.

Spokes, single	$0.75
Spoke, sprung in	$1.00 up
Full Rims	3.00

WHEELS.

Box and Tire Set..... each	$5.75 to $9.50

STEEL TIRES.

Setting, from $1.00 to $2.50; new, from $2.75 to	7.50

TIRE SETTING—RUBBER TIRES.

From ..... $1.50 to	$2.50

SETTING CHANNELS.

From ..... $1.25 to	2.00

WHIFFLETREES.

New Wood ..... $1.00 to	$2.50

HEAVY SLEIGHS.

Benches ..... each	$3.25 to $4.00
Runners	3.50 to 5.00
Rollers	2.00
Short Poles ..... $1.00 to	1.50
Bolsters, front or hind ..... $3.50 to	4.00

SLEIGH SHOES.

Shoes, each ..... $2.25 to	$3.75
Clevises End Screw Pin, from... $0.50 to	$0.75
Clevises, Center Screw Pin	.75
Chain Hooks, each, from	.50 up
Picks, sharpened, 25c., new point.	.25 to .75
Plow Shares, sharp	.40 to .50
Plow Shares, sharp new point....	.75 to 1.00

LUMBER WAGONS.

Reaches	$2.50
Reaches, iron bound	5.00
Reaches, new wood old irons.....	4.00
Bolsters, front	3.50
Bolsters, hind ..... $4.00 to	4.50
Pole Hawn, each	2.00
Rear Hawns, each	3.00
Front Hawns, each	3.50
Sway Bars ..... $2.00 to	2.50
Sand Boards	3.50
Axles ..... $6.50 to	7.50
Bolster Stakes	1.50
Wagon Poles, 4 in.	5.00

PAINTING AUTOMOBILES.

Roadster	$35.00	$45.00	$25.00
Roadster	50.00	65.00	35.00
Touring 4-passenger	50.00	65.00	35.00
Touring 5-passenger	65.00	85.00	45.00
Touring 7-passenger	75.00	95.00	50.00
Coupe	100.00	120.00	75.00
Landaulette	125.00	150.00	85.00
Limousine	150.00	175.00	100.00

Top Dressing, $4.00 extra.

PAINTING BUGGIES.

Touch-up and Varnish	$10.00
Plain Job Painting	12.00
Good Job	15.00
Burn Off and Paint ..... $18.00 to	20.00
Tops, extra	2.00

PAINTING CARRIAGES, ETC.

Cabs, Painting ..... $40.00 to	$50.00
Burn Off and Paint ..... 60.00 to	75.00
Broughams ..... 75.00 to	100.00
Victorias, Painting ..... 40.00 to	50.00
Burn Off and Paint ..... 50.00 to	60.00
Hotel Bus, Paint	60.00
Burn Off and Paint	75.00

PAINTING WAGONS.

Grocery Wagons, open	$15.00
Canvas Top	18.00
Wood Tops ..... $20.00 to	$25.00
Laundry or Bread Wagon, 1 horse, fancy	25.00
2 horse	35.00
Canvas Top Bread Wagon	20.00
Dray Wagons, 1 horse	16.00
Dray Wagons, 2 horse	20.00
Hose Wagons	60.00
Chemical Wagons	50.00
Case Wagons	40.00
Keg Wagons	40.00
Moving Vans, large	40.00
Piano Wagons ..... $20.00 to	25.00
Wholesale Butcher Wagons .... 30.00 to	35.00

PAINTING CUTTERS AND SLEIGHS.

Cutters, Varnishing	$8.00
Cutters, Painting ..... $10.00 to	12.00
Grocery or Light Sleighs	6.00
Grocery with Open Box	12.00
Grocery with Top	16.00

SHAFTS.

Buggy	$2.50
Bike Buggy	3.00
Express	3.00
Shaft Cross Bars	1.75

All Iron Work Extra.

POLES.

Complete ..... $12.00 to	$15.00

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

COMPRESSION.

Its Relation to Effectiveness and the Varying Standards of Pressure.

BY E. W. LONGNECKER.

Compression pressure in the gas engine is by no means always the same. In other words, there is no standard that various manufacturers respect. One certain builder may conclude that his engines do well on 60 pounds to the square inch while another will endeavor to get up to 80 pounds. In fact, not a few engines that come under our notice when new had as low as 40 or 50 pounds' pressure at the highest point of compression.

Then the same engine after running for a time may show less compression pressure than when first started. This may be due to worn valves or piston rings, or it may be the result of some leak around the sparker port or some packed joint that connects with the cylinder. It is well understood by the average gasoline engine operator that the higher the compression pressure, up to near 75 or 80 pounds to the square inch, the more power his engine will deliver from a given quantity of gasoline, therefore, it is ever important that the compression pressure should be well guarded or looked after.

Compression pressure is the pressure within the explosive chamber in the cylinder just at or before the point of explosion of the charge, and it is the result of the piston forcing a cylinder full of explosive mixture of gasoline vapor and air into a space of about one-third or one-quarter of its entire volume. When the piston moves out on its inhalation stroke the inlet valve is open and through it the air rushes to fill the cylinder to the same pressure as the surrounding atmosphere. Consequently, when the valves are all closed and the piston starts in upon its compression stroke, the charge of air and gas within the cylinder is compressed until when the piston has finished its stroke it is crowded into a space, in one end of the cylinder only about one-third or one-quarter that of which it occupied at atmospheric pressure.

Naturally when it is so compressed there is a pressure, say, four times as great as at atmospheric pressure which at sea level is 14.7 pounds to the square inch.

This then is what we understand by compression pressure, and it is this pressure before ignition that aids combustion of the gases and causes a quicker and more powerful expansion by reason of the atoms of the fuel being more closely packed and crowded together than at normal or atmospheric pressure.

Every operator should be always mindful of the compression in his engine and if any leaks appear at valves, piston rings or elsewhere they should be promptly stopped. One can get a pretty fair idea of the compression in an engine by turning the fly wheel over by hand and noting the force it takes to hold it there. If there is a leak the hissing escape may be heard and the rebound pressure will be getting notably less.

Single Tax.

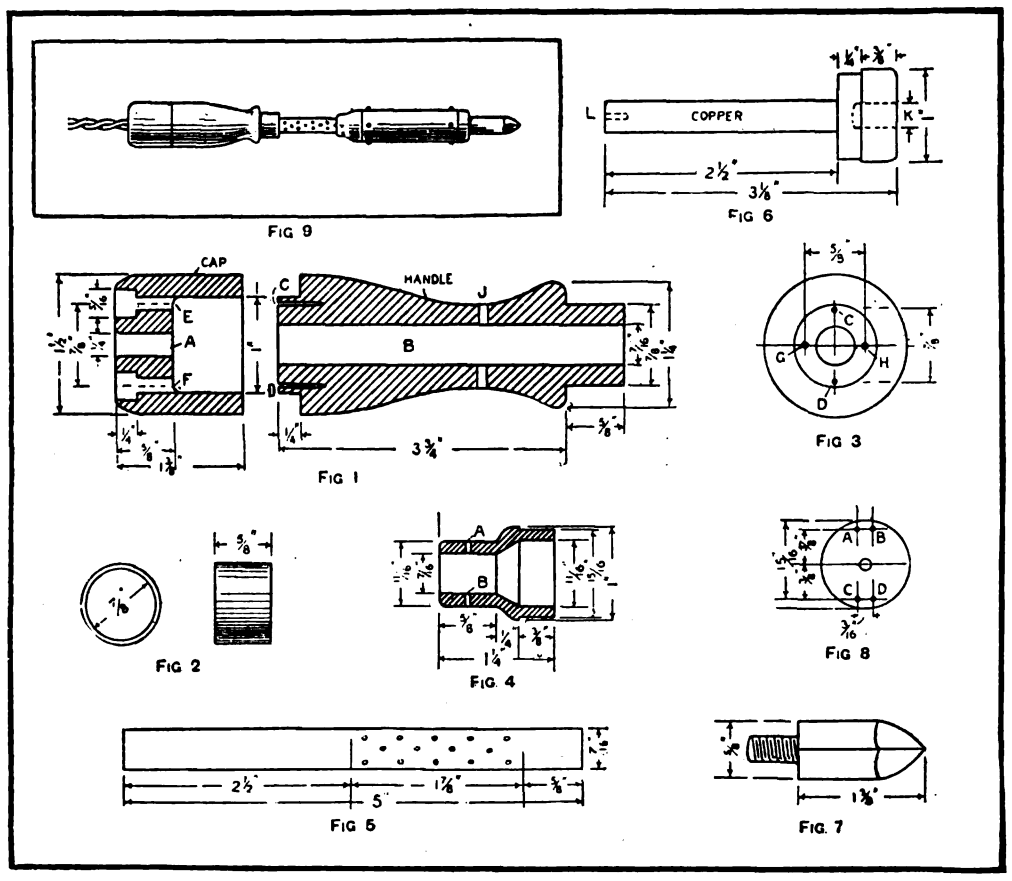
More than a hundred agricultural communities, according to the *Manitoba Free Press,* in the province of Alberta will soon inaugurate the single tax system. Land is to be "assessed at its actual cash value as it would be appraised in payment of a just debt from a solvent debtor, exclusive of the value of any building erected thereon."

AN ELECTRIC SOLDERING IRON.

How to Make One That Will Do Work Easily and Well.

From R. A. McClure in Popular Mechanics. —The electric soldering-bit consists of a piece of copper with a suitable winding placed about it and insulated from it, through which a current of electricity can be passed. The resistance of this winding should be of such a value than an excessive current will not exist in the winding when it is connected to the source of electrical energy. The power, in watts, needed to operate the coil will depend on the voltage of the source of supply of electrical energy and the current in the coil, the three being in the relation indicated by the following formula: watts = voltage × current, or watts = volts × amperes.

Thus, if it is desired to have a coil that will operate on a 110-volt circuit and not take more than 90 watts, its resistance can be calculated by dividing the power in watts by the pressure. The quotient is the current: Current = 90 ÷ 110 = .818 + ampere. Further, the resistance of the coil must be such that the product of the current, in amperes, and the resistance, in ohms, is equal to the voltage of the circuit to which the coil is to be connected, or the resistance is equal to the voltage divided by the current: Resistance = 110 ÷ .818 + = 134+ ohms. The resistance of the wire used in winding the coil should be 134+ ohms, and the wire should be of such size that it will safely carry the required current of .818+ ampere.



An electric soldering-bit that will give very satisfactory results may be constructed as follows: Provide a piece of well-seasoned maple about 10 in. long and about 1¾ in. square. From this piece of maple turn two pieces to the dimensions given in Fig. 1. The main wires leading into the soldering-bit pass into the handle through the hole A, and the outside edge of this hole should be rounded as shown, so as to prevent the wires from being injured by any sharp corners. Before drilling the hole B, procure a piece of iron or steel tubing 5 in. long, having an outside diameter of approximately 7-16 in. The wall of this tube should be about 1-16 in. thick. Now drill the hole B in the handle so that the metal tube will have to be forced into place.

Next make a brass ferrule (Fig. 2), and drive it on the small end of the handle part. If this ferrule is made from sheet brass, its ends should be soldered, or preferably brazed. Probably a short piece of brass tubing of just the right inside diameter and thickness to make the ferrule could be obtained. The two holes C and D are for screws that pass through the holes E and F, and serve to hold the handle and cap together. Two other small holes G and H (Fig. 3) should be drilled in the end of the handle part, to be used in mounting two small binding posts that are to serve as terminals for the winding of the heating coil, and provide an easy means of connecting the ends of the wires that lead into the end of the handle to the winding. The writer used two pieces of brass rod about 1½ in. long, with one end threaded, to take the nuts from the terminals of dry cells, and the other end sharpened and driven into the holes G and H until about ⅜ in. of the threaded end projected. Each of these was then provided with two small washers and two flat nuts. The hole J should not be drilled until the metal tube has been forced into the handle. The handle is now complete and should be smoothed down and given several coats of shellac.

Next obtain a piece of wrought-iron and from it turn a piece to the demensions given in Fig. 4. The narrower opening in this piece should be of such size that it will fit very tightly over the end of the metal tube shown in Fig. 5. Force one end of the tube into the opening in the wrought-iron piece to a distance of ⅝ in. Drill two small holes A and B (Fig. 4) through both the wrought-iron piece and the tube, and put a rivet in each of these holes. The outer end of the holes should be countersunk, and the rivets can then be filed down level with the surface of the wrought-iron piece. The other end of the tube should be driven into the wooden handle to a distance of 2½ in. Now drill the hole J (Fig. 1), and put a metal pin through it. The part of the pin inside the tube should be cut away so as not to obstruct the opening. Then drill a number of 1-16 in. holes in the metal tube as shown in Fig. 5. These holes are for ventilating the iron, and will considerably decrease the amount of heat transmitted to the handle from the heating element.

Obtain a piece of copper of such size that from it can be cut a piece having the dimensions given in Fig. 6, with the core part 11-16 in. in diameter. This piece is to form the core of the heating coil. A hole K about ⅜ in. in diameter should be drilled in the large end of this piece and threaded. Drill a small hole L in the other end, and thread it to take a ⅛ in. machine screw.

Procure a piece of steel tubing 3⅜ in. long and having an inside diameter of 15-16 in. Slip one end of this tube over the piece (Fig. 4), and drill four small holes through it and the wrought-iron piece. Space these holes an equal distance apart round the tube and about 3-16 in. from its ends. All the holes should be threaded and small machine screws provided. Slip the copper core into the other end of the steel tube and drill four holes in this end, and thread them the same as the other end. The tube should fit tightly on the wrought-iron and copper pieces, and the ends should be squarely set against the shoulders when the holes are drilled.

A soldering point can now be made as shown in Fig. 7. The threaded end should be of such a size that it wil fit snugly in the opening K in the piece Fig. 6. The point can, of course, have any desired shape, depending on the work for which the bit is to be used. The point of the bit and the core can be made in one piece, which under ordinary conditions will, perhaps, give the best results.

The bit is now complete with the exception of winding the coil, and, if desired, finishing the metal parts so that they will present a little better appearance. Cut from some heavy sheet mica, about 3-32 in. or ⅛ in. thick, a washer having an outside diameter of 15-16 in. Drill a hole in the centre of this washer, so that the small machine screw that is to fit into the hole L (Fig. 6) will just pass through it. Drill four other holes, A, B, C and D, in the washer, as shown in Fig. 8. Obtain a small metal washer about ⅜ in. in diameter with an opening in it of the same diameter as the opening in the center of the mica washer. Now fasten the mica washer to the end of the copper core with the machine screw, placing the small metal washer between the mica washer and the head of the screw. After the screw has been drawn up tightly, drill a small hole through the metal and mica washers, near the edge and about ⅜ in. into the copper core. Drive a small brass or copper pin into this hole, which will serve to prevent the mica washer from turning round. The object of preventing the mica washer from turning round is to give a solid anchorage for the terminals of the coil and the leads that are to be carried back through the handle. The leads from the coils to the back end of the handle should be insulated with asbestos, as any other kind of insulation will not withstand the heat. These leads should each be about 10 in. long. If No. 28 gauge wire having a resistance of 3.32 ohms per foot is required, 40½ ft. of wire will be required. For a wire having a resistance of 1.89 ohms per foot, 71 ft. will be required.

The coil is wound as follows: Pass the end of one of the asbestos-insulated leads back and forth through two of the small holes in the mica washer that are near each other a number of times, allowing about 1 in. of free wire to protrude through the washer towards the inner part of the spool. Attach one end of the resistance wire firmly to the end of the terminal wire. Then wrap round the copper core a thin sheet of mica, and begin winding on the resistance wire. The spacing between the adjacent turns should be approximately equal to twice the diameter of the wire. Do not run the winding nearer the end of the core than ¼ in. Place a thin sheet of mica between each layer of the winding, and continue the winding until the required length of wire has been used. The outside end can be terminated just as the inner end and the winding is complete.

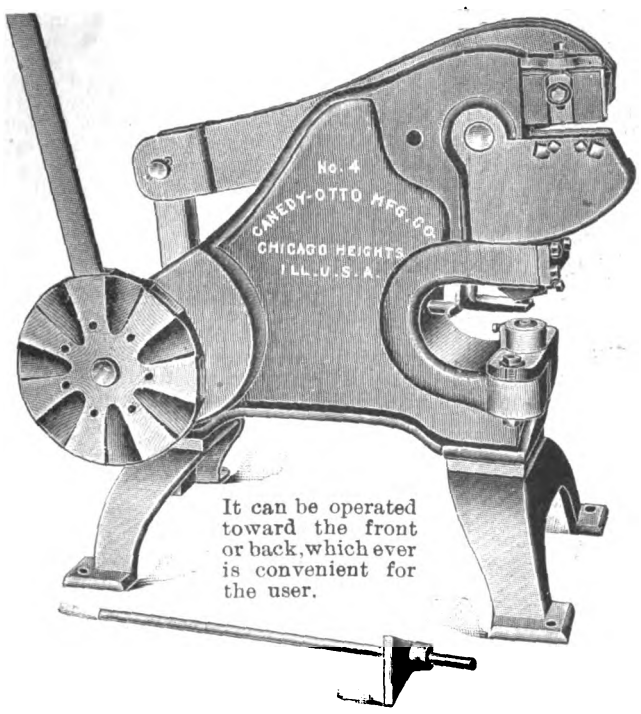
Now place the coil inside the metal tube, pushing the lead back through the handle. Fasten the ends of these leads under the binding posts. Procure a piece of lamp cord and an attachment plug. Atttach the plug to one end of the cord, and pass the other end through the opening A in the handle. Tie a knot in the cord inside the handle, and fasten the ends under the binding posts. Two slender screws, at least 2 in. long, should be provided to fasten the handle and cap together. The now completed bit will appear as shown in Fig. 9.

The Hemp Industry.

A new hemp-breaking machine promises to bring renewed prosperity to certain districts of the South. In slavery days hemp-raising was a great industry; Kentucky, for instance, devoted 30,000 or 40,000 acres to the crop, while latterly scarcely a tenth of this acreage has been employed in this way, for breaking hemp by manual labor is extremely hard work, and the laborers grew scarce. Now the machine is said to have produced excellent results, and a large extension of hemp-raising is looked for.

The rain-making hallucination is apparently, says the *Scientific American*, one of the incurable forms of mental disease. This apropos of a revival of the experiments conducted some years ago in Texas, by which heavy explosions were caused for the purpose of producing rain. In the recent experiment 4,500 pounds of dynamite were exploded in a town in Michigan, and a heavy rain followed—but then it was raining when the experimenters began their work!

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ¾-in. and ¼-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

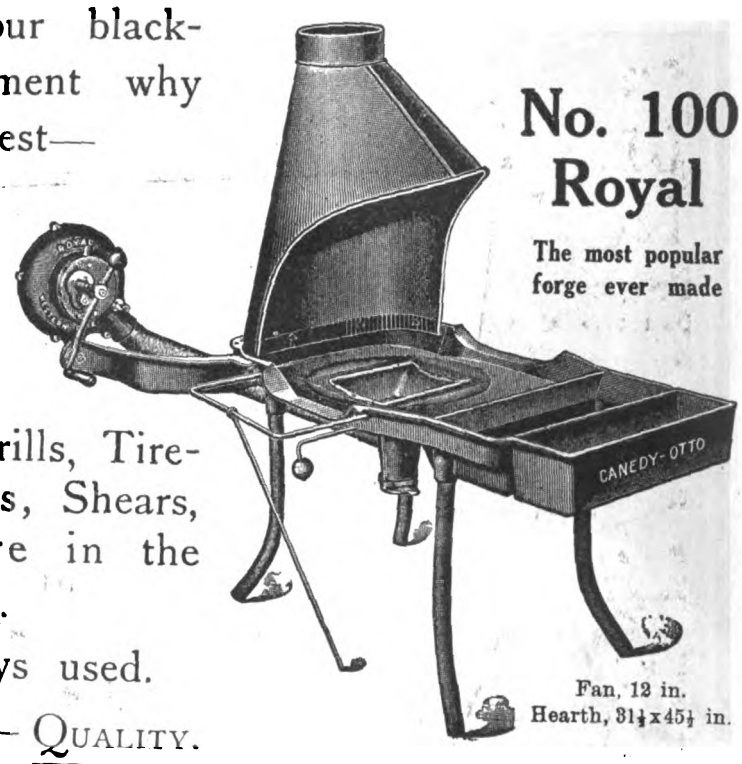
Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

No. 100 Royal

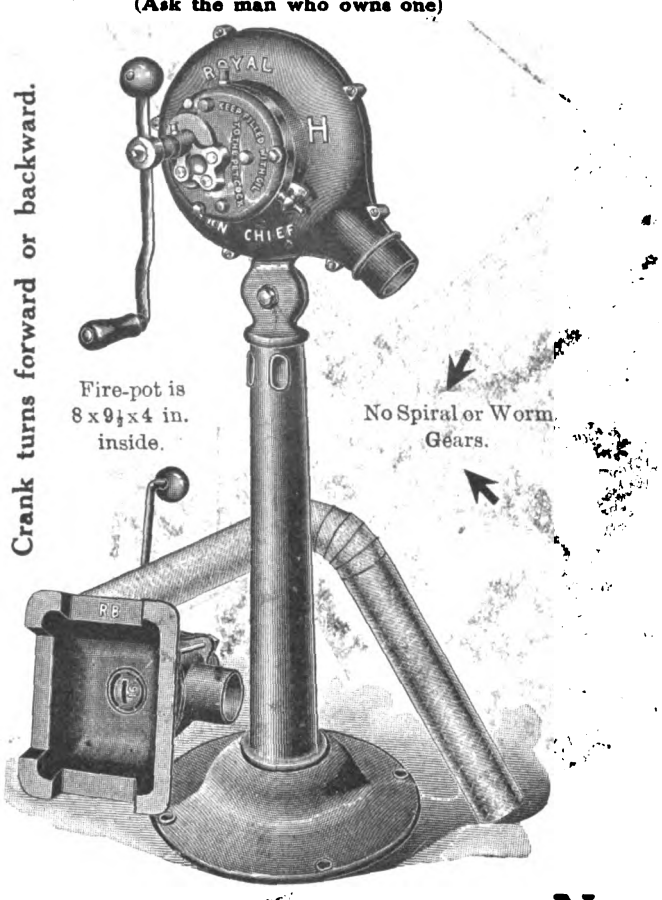
The most popular forge ever made



Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

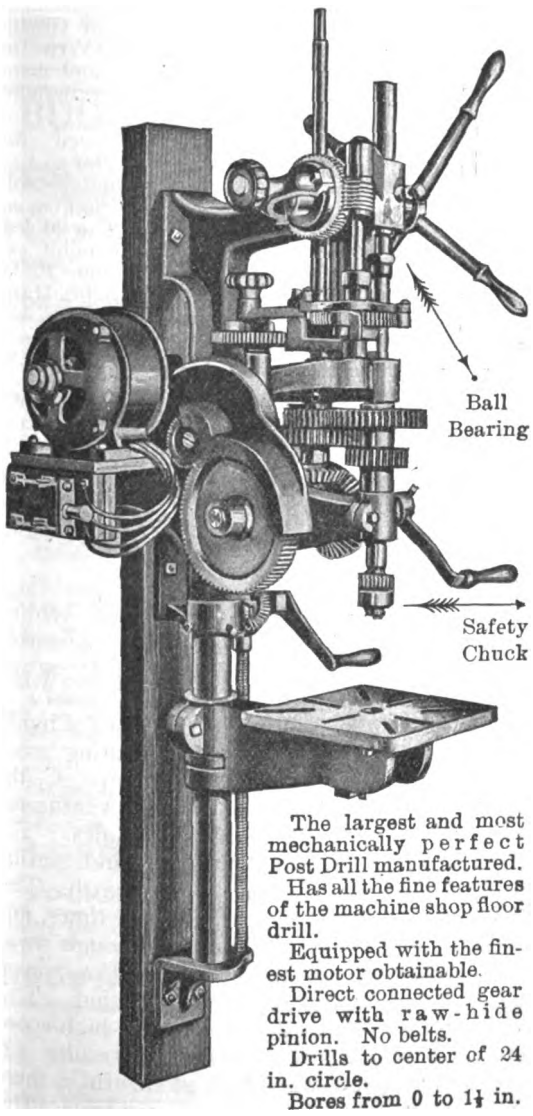
(Ask the man who owns one)



FORGES BLOWERS

PUNCHES SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1¼ in.

DRILLS
TIRE-SHRINKERS

Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

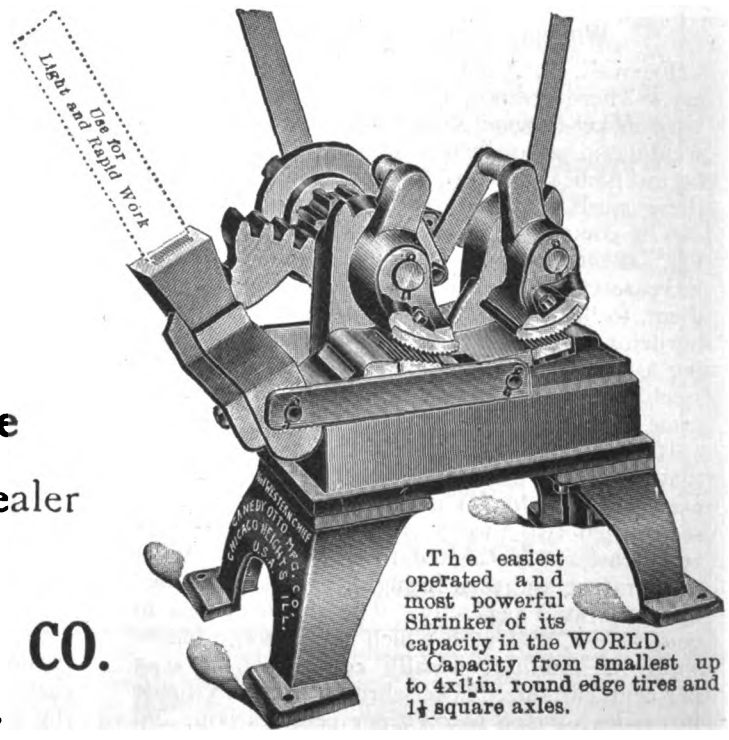
Give name of supply dealer or jobber.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

No. 1½ Western Chief

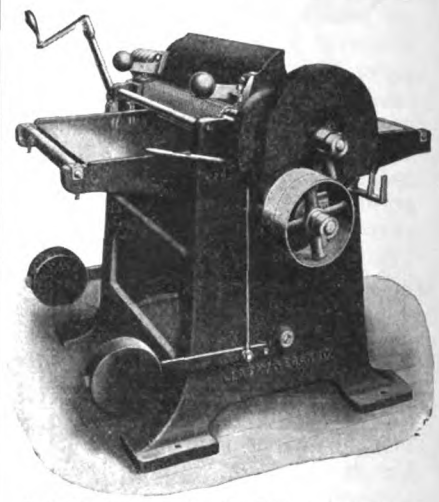
(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1½ in. round edge tires and 1½ square axles.

The Blacksmith's Favorite Surfacer.

J. A. Fay & Egan Company make a complete line of small shop tools for the blacksmith and wheelwright operating his own woodshop, but no one of their machines has been so widely recognized and generally adopted as the No. 2 Centennial Surface Planing Machine, illustrated herewith. This is their most popular tool for this kind of work, and has had an immense sale for years, there now being several thousand of them in use. Of course, the reason for this extraordinary demand is, that it is built just right, is just the right size, does perfect work at a minimum cost, and sells at just the right price. The frame is a single cored casting, and has sufficient weight, and enough floor support to prevent any vibration. The No. 2 may be equipped with circular cylinder with thin, self-hardening steel knives, and setting, jointing and grinding attachments. The feed consists of four solid steel rolls. Especial attention is called to the efficient manner in which all exposed gears have been completely covered by cast iron hoods, eliminating any possible chance for an accident resulting from exposed gears.



J. A. Fay & Egan Co., No. 2 Centennial Surface Planing Machine.

This machine is made to plane material 16, 20, and 24 inches wide, and 6 inches thick, and will do general light work at a very low cost. It takes up small floor space, and does not require much power. Any further information will gladly be given to interested parties upon request. The manufacturers' address is 175-195 West Front street, Cincinnati, Ohio.

"Little Giant" Foot Vise.—It is coming on the time of year when blacksmiths will be interested in foot vises. The "Little Giant" Foot Vise will be found illustrated in the advertisement of B. B. Noyes & Company, of Greenfield, Mass., on another page. Write to them for circulars and prices and mention The Blacksmith and Wheelwright, or buy direct of your dealer.

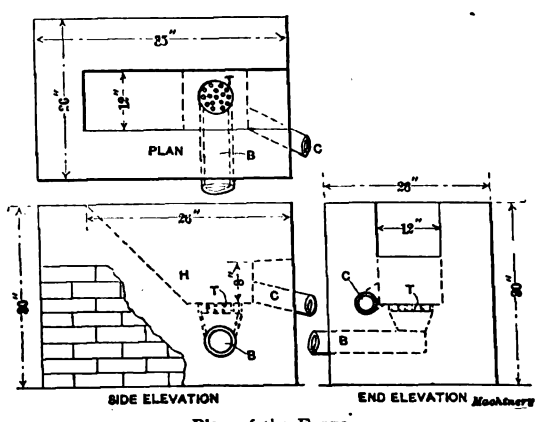
"Absorbine."—Should be used for wind puffs, thorough-pin, big knee, bog spavin, and swellings of all kinds. "Absorbine" is for sale by most druggists at $2.00 a bottle, or will be sent direct upon receipt of price to any point express prepaid, by W. F. Young, P. D. F., 55 Temple street, Springfield, Mass. Mr. Young is having remarkable success with this preparation.

Welding Chrome Nickel Steel.

From E. D. Allen, Pennsylvania, in Machinery.—There are no physical or chemical reasons why nickel-chrome steel should give trouble in welding in an ordinary forge fire. There may be mechanical reasons for having difficulty with these steels, but these are wholly caused, and can be controlled, by the person doing the welding. Broadly speaking, nickel and chromium increase the susceptibility of the steel containing them, to heat treatment, which includes not only hardening and tempering, but forging and welding as well. It seems sufficient to say that these steels weld as readily as any carbon steels of the same "temper."

It is generally recognized by all blacksmiths that the lower the carbon contents of steels, the easier they weld. That this is true is readily seen when two pieces of iron, which are free from carbon, are heated to the proper welding temperature and then brought into contact; they instantly weld perfectly. The carbon steels in general use, and with which the average blacksmith is familiar, usually contain about 0.25 per cent. carbon. Nickel-chrome steels are made in grades of 0.08 to 0.15 per cent. carbon, and 0.16 to 0.25 per cent. carbon, and higher. The grades containing the higher percentages are seldom met with by the blacksmith, as these are generally used for structural purposes, though they too can be welded by carefully heating to slightly lower temperatures than used for carbon steels of the same carbon percentages.

With the lower carbon grades of nickel-chrome steels it can be readily seen from the carbon contents that these should weld without the slightest difficulty. In general, these steels should be heated to 2,300 or 2,400 degrees F., but the heating should be done slowly, because of the denseness of the grain and to insure an even distribution of the heat throughout the piece. The forge fire should be clean and of ample volume to completely surround the steel to be welded. Use care that a good bed of clean fire is kept between the tuyere and the steel. See that the air blast does not strike the latter directly, while heating, as under these conditions the steel will burn before the proper welding temperature is reached. More trouble is caused in welding with dirty coal fires than from any other reason.



Plan of the Forge.

The accompanying illustration shows a modified blacksmith's forge used for heating small pieces for welding; B is the blast pipe, C, the cleaning flue, and T, a small tuyere perforated with a number of one-half inch holes. The hearth H is made eight inches deep and the fire is always kept up to the top of this hearth. This insures a good, clean, clear fire at all times, and keeps the steel to be welded far enough away from the blast to prevent burning. Pea-coke is generally used in a forge of this kind. This forge can also be used for heating high-speed steel for hardening with excellent results. If the directions given are followed carefully, there should be no difficulty whatever experienced in welding nickel-chrome steels.

Good Profits in the Calk Business.—In this issue on the inside front cover, our readers will find an extremely important announcement from the Rowe Calk Company of Hartford, Conn. This company has devised a plan which will render it possible for any horseshoer handling their calks to make an exceptionally good profit and build up a lucrative business along new lines. They want every one of our readers to get full particulars of this new plan, and they also want to send samples which are entirely free of their Golden Rustless Ring Point Calks. Our readers who have handled other makes of calks fully realize the great difficulty caused by the rusting of calks, making it almost impossible to remove old calks from the shoes. The Golden Rustless Ring Point Calk cannot possibly rust and it is a big talking point which will appeal to every user of calks. The Rowe calks are sold only to horseshoers and have been endorsed by the Master Horseshoers' Protective Association for seven years. The manufacturers of these calks have inaugurated a very extensive advertising campaign which will help every horseshoer to sell their product and they also offer a free accident insurance policy to every horseshoer who will purchase a stipulated amount of their calks. The Rowe calks will keep sharp as long as they are worn. If you have never handled these calks it is likely that you have no just appreciation of their merit and if you will cut out the coupon attached to the advertisement of this company and send it in to them promptly, they will give you information to pay you for your trouble in writing. A postal card will do if that is the handiest but do not fail to get in touch with this company, so that you may understand their remarkable selling plan. Address the Rowe Calk Company, Hartford, Conn., and do not forget to mention The Blacksmith and Wheelwright.

Delmas Welding Plates and Powder.—In this issue will be found the advertisement of The Chicago Metal Reduction Company, 20 West Jackson Boulevard, Chicago, Ill., briefly describing their welding plates and powder. This preparation can be obtained from dealers throughout the country, or the manufacturers for $1.00 (which can be remitted in any convenient way), will send a liberal supply.

An Attractive Booth.—Decorated in the Colonial style with a green and white color scheme, The Goodyear Tire & Rubber Company's booth attracted many visitors at the recent convention in Atlantic City, N. J. The bulletin board of the convention at the booth officially announced meetings of the Association, banquets, etc. Free stenographic and telephone service, uniformed porter and post-office added to the convenience of C. B. N. A. members and visitors. Some 15 or 20 representatives of the company were present.

We have received from W. T. FitzGerald & Company, corner 8th and F streets, Washington, D. C., a booklet giving full particulars with respect to taking out patents, together with testimonials from inventors. We understand that a copy of this booklet will be sent free of charge to every reader of The Blacksmith and Wheelwright who will write for it

Champion Tools. — The Champion Tool Company, Department "B," Meadville, Pa., have an announcement in this issue of their No. 12 Electric Sharpening Hammer with an illustration. This hammer is drop forged from the best steel and tempered in plain water, which makes redressing possible. It is finely finished and an excellent tool. This company makes a variety of tools for blacksmiths and will send their catalogue free to any reader of The BBlacksmith and Wheelwright who will take the trouble to write for it.

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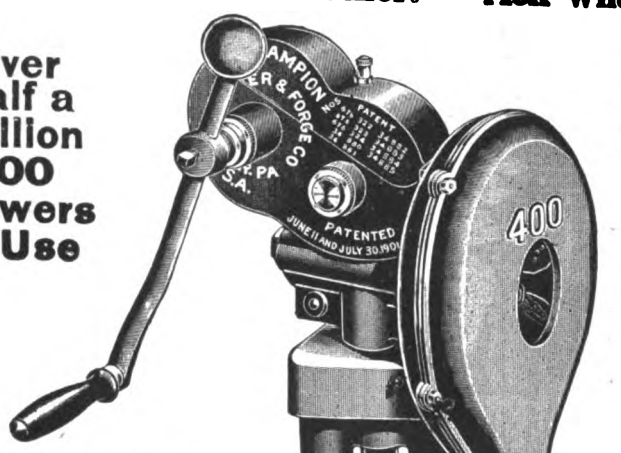
The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say

No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 30 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

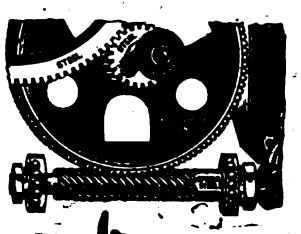
U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

Patent Nos.:
676,822 34,882
676,823 34,883
676,824 34,884
34,880 34,885
34,881 697,629

Also Great Britain Patent No. 9,662, May 25, 1900.

The Blower for Quality, First, Last and Always

THE FAMOUS 400

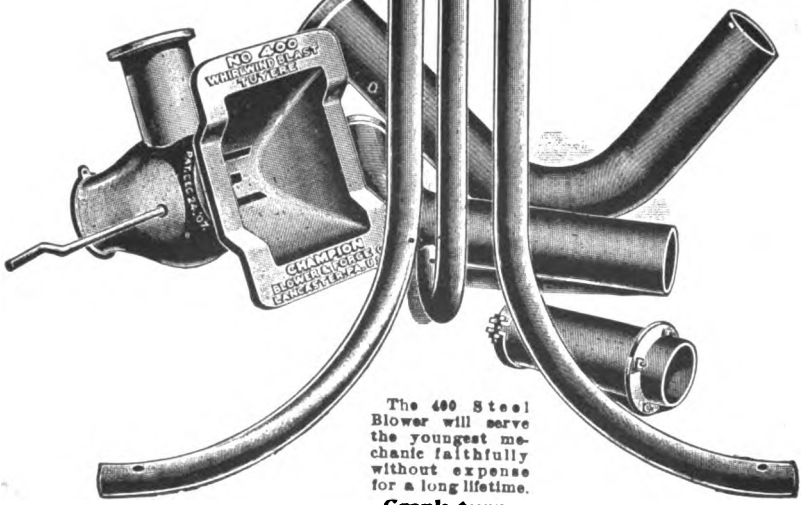


It's all in the Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

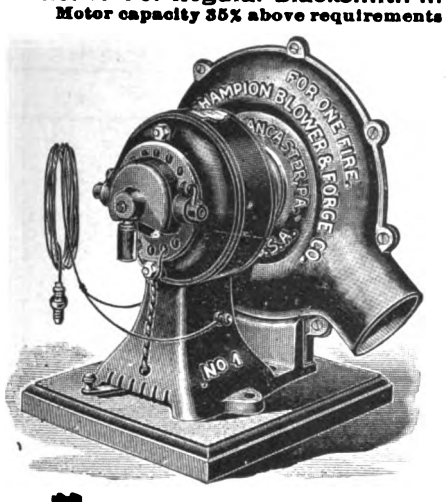
The Circular Rotary "Whirlwind" Blast produced by this Tuyere Iron does not blow the heat and hot air out of the fire and up the chimney. The 400 Blower with this Tuyere Iron enables a mechanic to produce at least two hours more work per day and positively saves in coal alone, once or twice the first cost of the 400 Blower every year it is used.

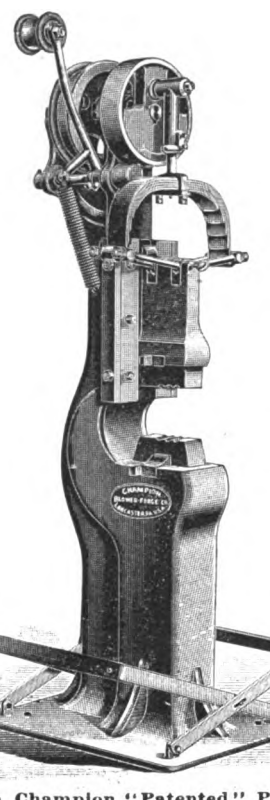
No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

No. 1. For Regular Blacksmith fire

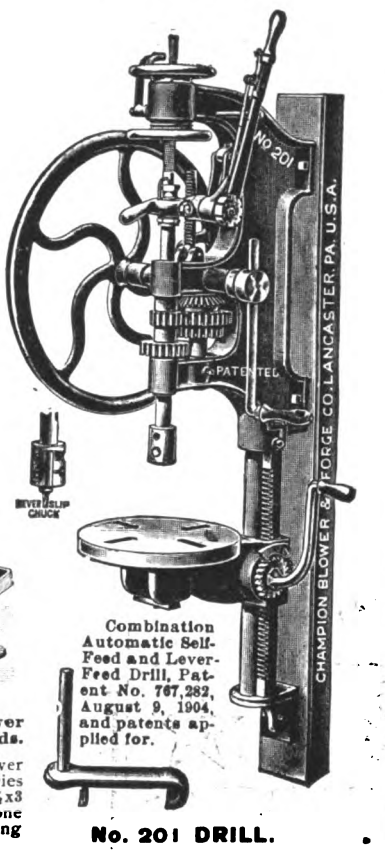
Motor capacity 35% above requirements





The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

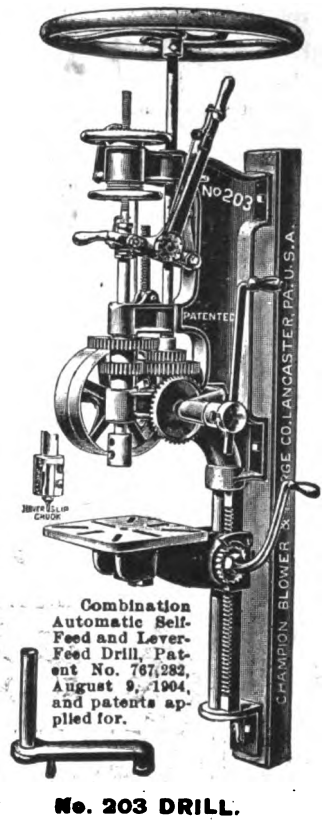
No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.



Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 201 DRILL.

The CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



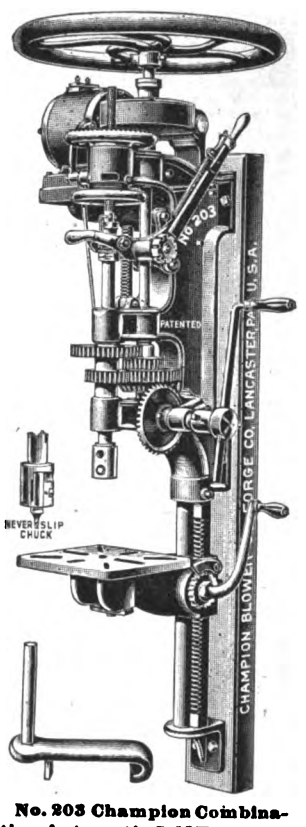
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

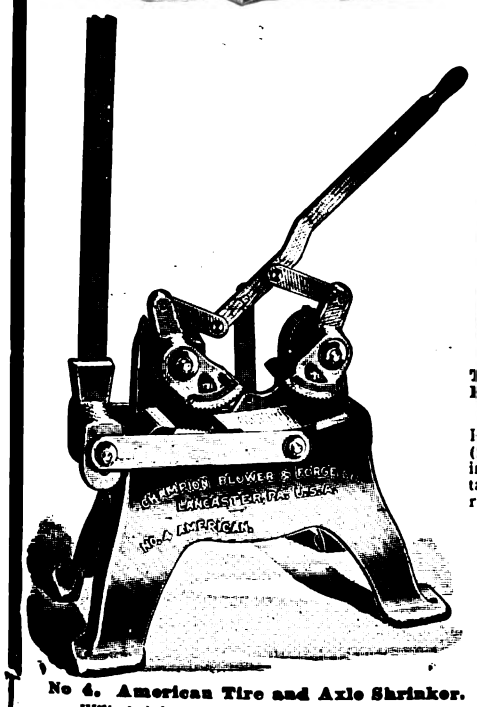
Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

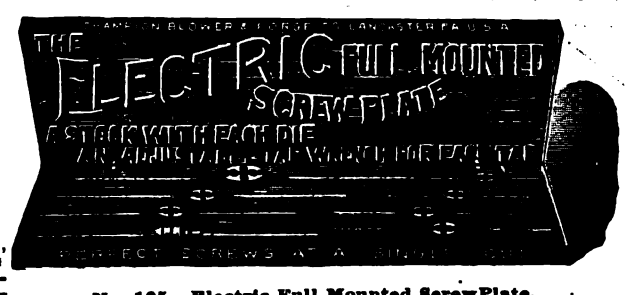


No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



No 4. American Tire and Axle Shrinker. Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.



No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles cutting up to 1½ inches.

Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers, Power Hammers, Punches, Shears, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U.S.A.

Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

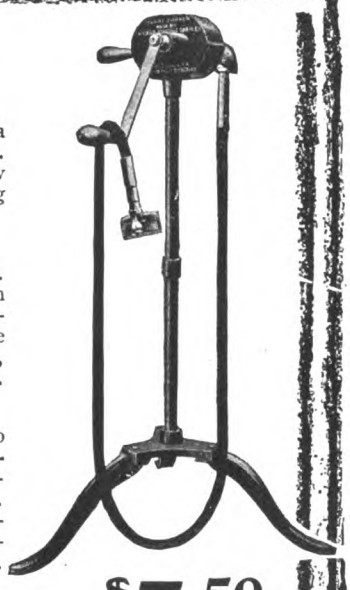
The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

Easy Money For A Blacksmith

A Horse Clipping Outfit for $7.50



Large numbers of blacksmiths add many extra dollars to their yearly profit by clipping horses. **You** can do the same. **You** can add a new branch to your business—a horse clipping branch—at an outlay of only $7.50.

No Dull Seasons

Horses need clipping when you need business. In other words, the horse clipping season is in full swing when the regular business of blacksmiths is getting dull. So, if a Stewart Horse Clipping Machine is part of your equipment, you have a busy season fifty two weeks a year.

A Blacksmith's Business

Horses need clipping just as much as they do shoeing. And clipping horses **is really a blacksmith's business.** Those who don't do it are turning down profits which rightly belong to them. Blacksmiths have more chance of getting the business, of giving satisfaction and **keeping** the business, than anybody else connected with horses.

The Stewart No. 1 Horse Clipping Machine Price **$7.50**

And the investment is so small. The Stewart outfit, costing $7.50, is complete, ready to begin work. The outfit comprises a Stewart No. 1 Ball Bearing Horse Clipping Machine of the latest and most approved type, six feet of highest grade flexible shaft, and the same pattern Stewart One-Nut Tension Knife as is fitted to our highest priced machines.

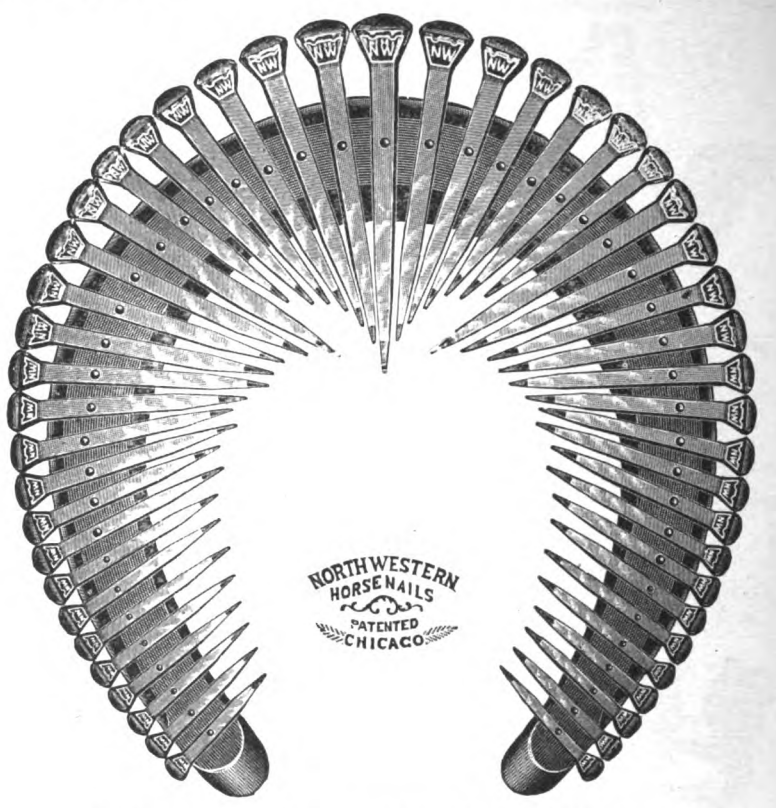
The machine is practically indestructible, all gears are cut from solid steel bar made file hard; they are inclosed in an oil bath. There is practically no friction or wear.

Ease of Operation.—Anyone can operate a Stewart machine. The day of the hand clippers and the "expert" is over. The action of the Stewart is automatic and ordinary laborers can clip horses **faster, easier** and **better** than has ever been known before. No high priced labor, no trouble, simplicity all through.

Start this new branch by sending $2.00 for a Stewart Machine. We ship C. O. D. for balance and we guarantee satisfaction. This extra business is yours—don't delay.

Chicago Flexible Shaft Company
630 LaSalle Avenue, CHICAGO
16 and 18 Reade Street, New York

NORTHWESTERN HORSE NAILS



MADE OF THE BEST SWEDISH IRON

The most perfect in form and finish and will hold a shoe longer than any other nail made.

THE RE-ENFORCED POINT makes it the easiest to drive and the safest to use.

UNION HORSE NAIL COMPANY
Manufacturers
CHICAGO, ILLS.

PARKS WOODWORKER

The First and Original Combination of Circular Saw, Jointer and Band Saw, ever placed on the market.

Reversible Spindle Shaper, Boring and a dozen other valuable attachments can be added.

Each machine is sold separate or can take a Circular Saw and add to it all desired.

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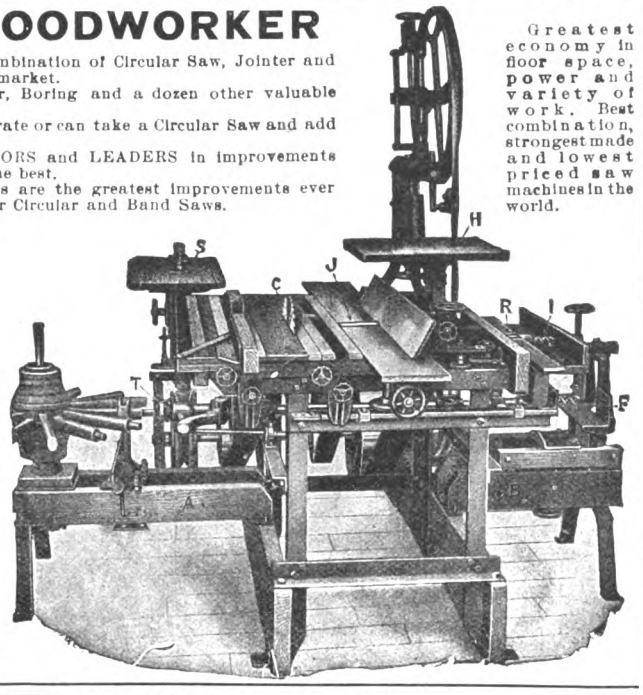

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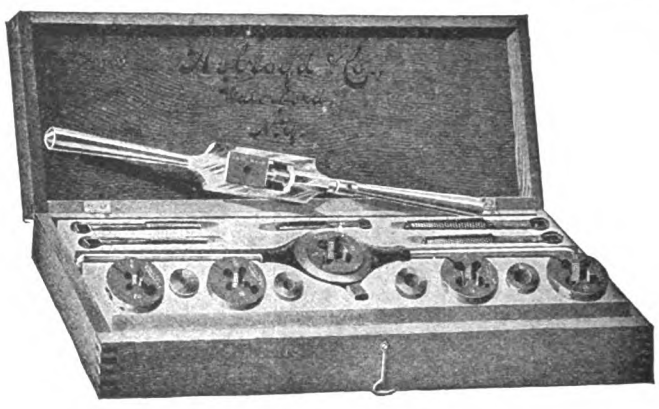

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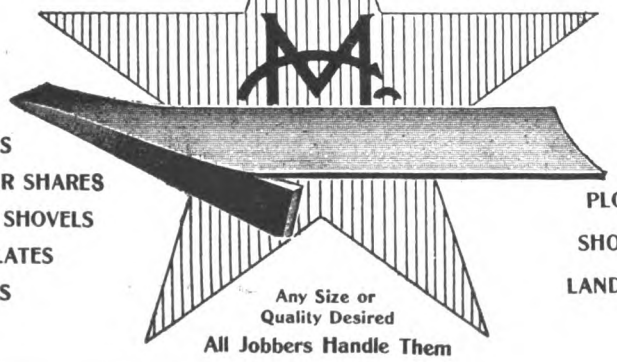

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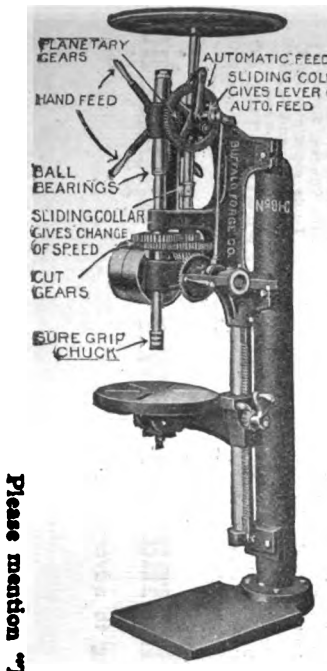
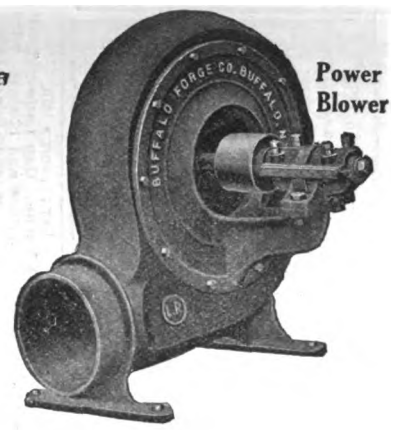


Drill No. 91-C



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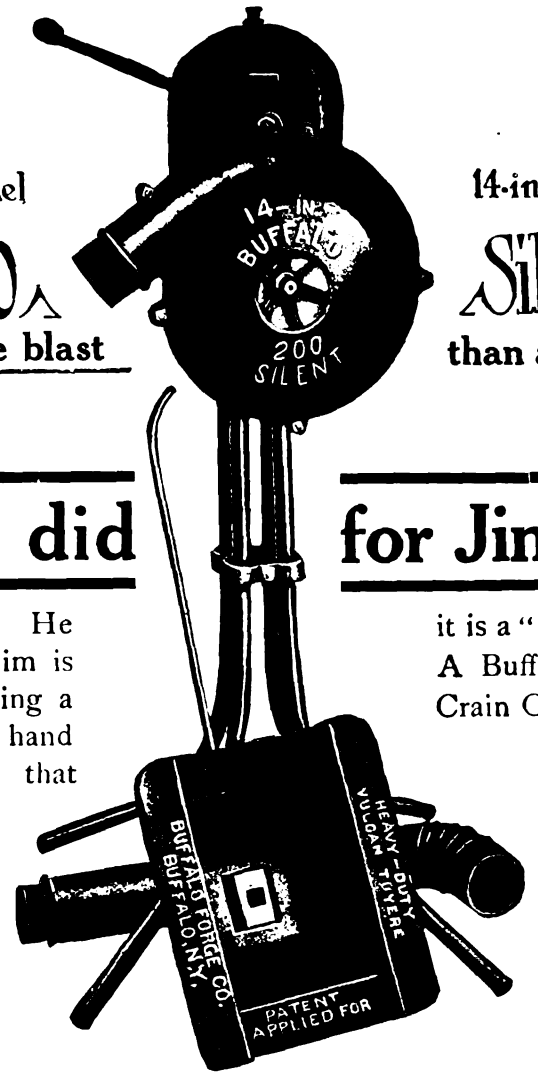
22 per cent. more blast



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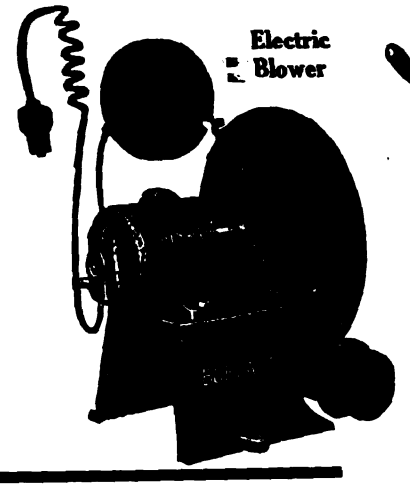
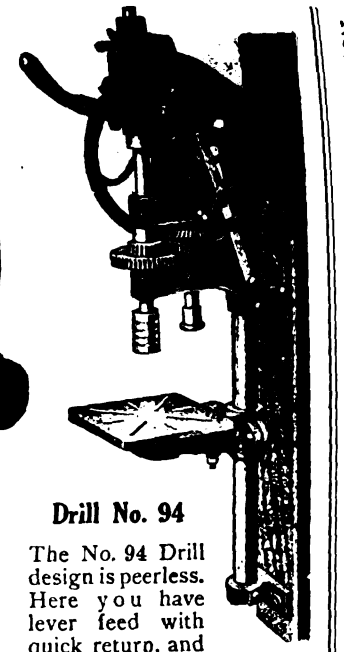


Electric Blower



Drill No. 94

The No. 94 Drill design is peerless. Here you have lever feed with quick return, and automatic feed with three speeds. No turning back of feed wheel. Change the speed simply by a sliding collar—one second does it. No changing of crank. Full description in Catalog No. 145-B, free on request.

What Buffalo Tools did for Jim Tardy, Tom's Brother

Jim Tardy is in many ways like his brother Tom. He shares Tom's dislike for hard work and long hours. Jim is so blamed lazy he is always looking for a way out of doing a thing. His boss once had a bellows and a Buffalo hand blower, and Jim somehow managed to get next to that blower and keep it. But Jim soon got his eyes on a Buffalo Electric Blower, and talked about it so long that "the old man" thought he simply couldn't do without one. That was the time Jim got fooled, for when the blower came, the boss wanted it for himself.

The amazing thing about Jim is that he manages to keep his job. If you watch him work and keep your eyes open you will find out why. Jim never goes to the drill if he thinks the Buffalo Punch will do the work; it is quicker and easier. When he does go to the drill—it is a "Buffalo" too—he lets the power do all the hard pulling. A Buffalo Shear cuts all the bars and plates for Jim and a Crain Combination Woodworker comes into frequent use for ripping, cross-cutting, planing, boring, jointing, turning, equalizing and turning spokes, etc. The tires are bent on a Buffalo Power Bender and a roller-bearing easy-working Buffalo Tire Setter shrinks them. Jim has got so many "kinks" and short cuts and he if so "daffy" on machinery that he actually accomplishes more with their help than the hard-working chap next to him who never thinks of saving himself. The boss himself admits that he has learned a good many things from Jim in this way.

The Buffalo Combination Punch and Shear No. 6

will punch 5 holes of different sizes and cut round and square and flat bars without a single change of attachments. It is a machine of the greatest capacity and compactness, combined with the lightest weight, the frame being built of our famous "Armor Plate" steel. We make over 24 different designs, for hand and power, but this is a leader in blacksmith and jobbing shops.

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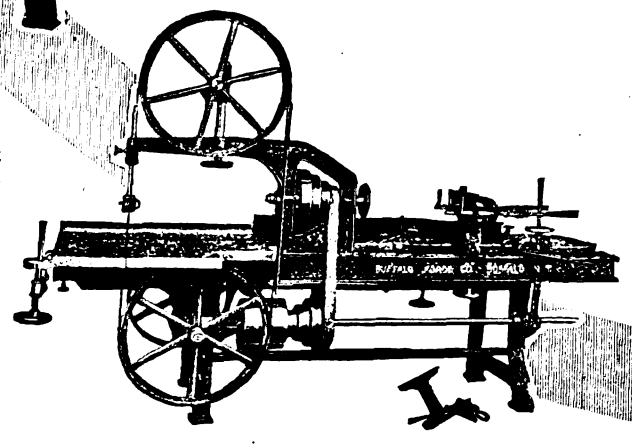
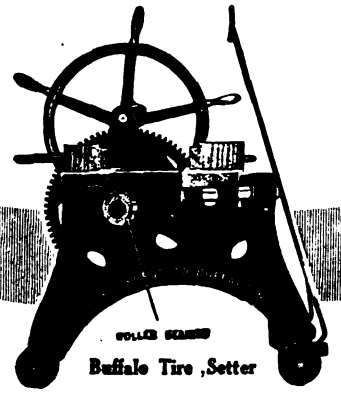
Ask for new 76-page Catalog No. 145-B.

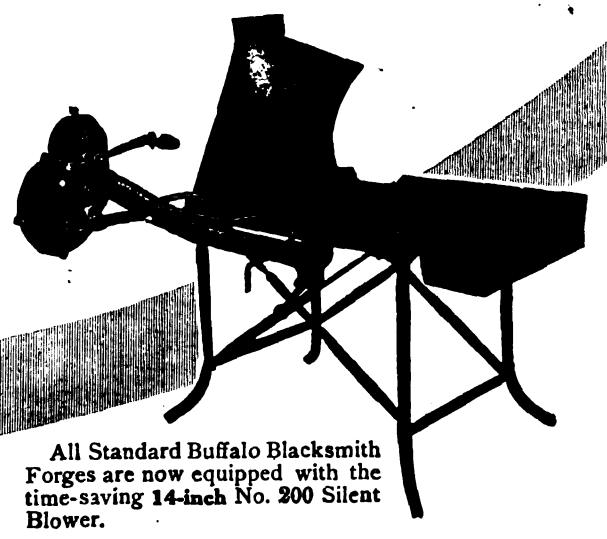


The Wonderful Crain Combination Woodworker

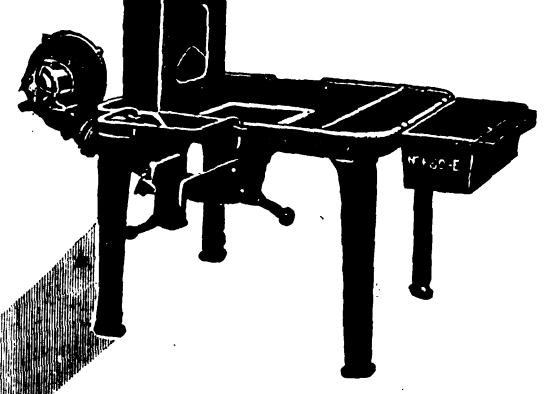
is actually 12 machines in one. It is the only machine built especially for the blacksmith and wagon maker. Send for full description.



Buffalo Tire Setter



All Standard Buffalo Blacksmith Forges are now equipped with the time-saving **14-inch** No. 200 Silent Blower.



Buffalo Electric Forge

Fitted with smoke and fume removing "Down Draft" hood (patented). The highest class of forge made to-day, and used the world over by those who want absolutely the best. The electric blower is guaranteed to last longer and use less power than any other make.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. [illegible] I. No. 5. NEW YORK, NOVEMBER, 1912. TERMS: ONE DOLLAR A YEAR

GENERAL DELIVERY WAGONS.

Working Draft and Full Specifications for Several Styles.

BY WAGON MAKER.

General delivery wagons are built in all kind of styles; low sides and without a top, with top, deep sides and the rest open, and covered with curtains. Others have stationary canvas sides above the 15 inches deep sides or panels instead of curtains. There are also different lengths of bodies and various kinds of suspensions. The style as illustrated is the six-spring suspension and is considered the best of all wagons for general delivery purposes.

The length of this body from post to post on the lower part is seven feet six inches; the heel board is nine inches front of body, and the top rail is thirteen inches front of posts. The width of the body outside is forty-six inches for city use, but outside of cities they are narrower and shorter, depending upon what they are used for.

This body has six posts and fifteen-inch deep sides, and above the sides is open, except on the front part there is a seven-inch deep panel on the side of the seat and a nine-inch deep wire screen. The rear end is closed with a solid board drop gate with three hinges bolted to the gate, or rod screen above the drop gate, which is covered with a roll-up curtain and two small windows which are hinged on top. The rest above the windows is paneled.

Construction of the Body.

There are two main sills 1⅜x4½ inches wide, and about 8 feet long. These two sills are framed together with various cross bars as follows: At the front end is the heel cross bar, which is 1⅛x8 inches and is lapped to the sills. There is one space of 1 inch between the body and the heel bar so that when water falls on the heel board it can run off over the back edge. Some builders give ½ inch only while others give ¾ inch space. Level with the front surface of posts is a cross bar 2¾ inches wide and 2 inches thick. This bar is mortised into the sills with a ⅝ inch thick lap on top. This lap is fitted between the posts. The next are the three transom bars, which are all 1½ inches thick, 4½ inches deep, and must be level with the top surface of the sills so that the bottom boards lay level with the sills. Besides the three bars are four of equal size, 1½x2⅞ inches, mortised into the sills, level top and bottom. The rear end cross bar is 2x4 inches and the sills are mortised into this bar.

To cover the rear end tenon a joint is made as shown on the bottom view. To strengthen this joint, an iron is fitted over the spring bar and bolted to it, lapping toward the front and rear, with two bolts for each end. This strengthens the spring bar sills and cross bar. The spring bar is level with the top of the sills and the bottom boards rest on it the same as on the transom cross bars in front. Besides there is a ⅝x1¼ inch rabbett on the rear end cross bar for the bottom boards to rest in.

The side boards are ¾ or ⅞ inches thick, 14 inches deep, 7 feet 5 inches long. These boards are routered into the front and rear posts from the outside and the joints are covered with ⅛x1⅞ inches band iron, the front riveted and the rear end screwed. The laps on the boards are ½ inch, the rest of the thickness is shoulder. The front end board is mortised into the posts and some of the wagon makers do the same with the side board when the body is moulded. The tenons are made ½x1¼ inches. The shoulder is on the outside with ⅛ inch on the inside. The outside shoulder is let in ⅛ inch into the pillar to hide the joint and the board is set inward the thickness of the moulding.

The two posts at the rear of the seat are notched into the board ¼ inch and all the posts are mortised into the sills. On each front end post is a strap bolt fitted against the posts with nuts on the bottom surface of the sills and up as far as the side screen. There is a corner iron bolted through the posts and top rail and side ends with two screws. The two posts back of the seat have strap irons from the top rail to the sills with nuts below the sills. The same on the rear posts. Besides these there are eight strap bolts, four on each side, all riveted to the side boards with nuts on the bottom surface of the sills. The strap bolts and the holes through the iron and boards must fit well with good solid washers under the nuts, because the boards and sills have to carry the load and if the strap bolts give away from either, the body will not carry the intended load.

The top rail is lapped to the posts, the front cross rail to the top rails and corner irons on the inside. The rear cross rails are mortised into the posts.

The four views will give the woodworker the information as to the detail of the front and rear gear. There is a roller bearing fifth wheel as all such wagons are fitted with them.

These wagons are built in various sizes and generally made light, medium or heavy.

Dimensions for light ones are:

Warner wheels:

Diameter of wheels without tires, 34x46 inches.

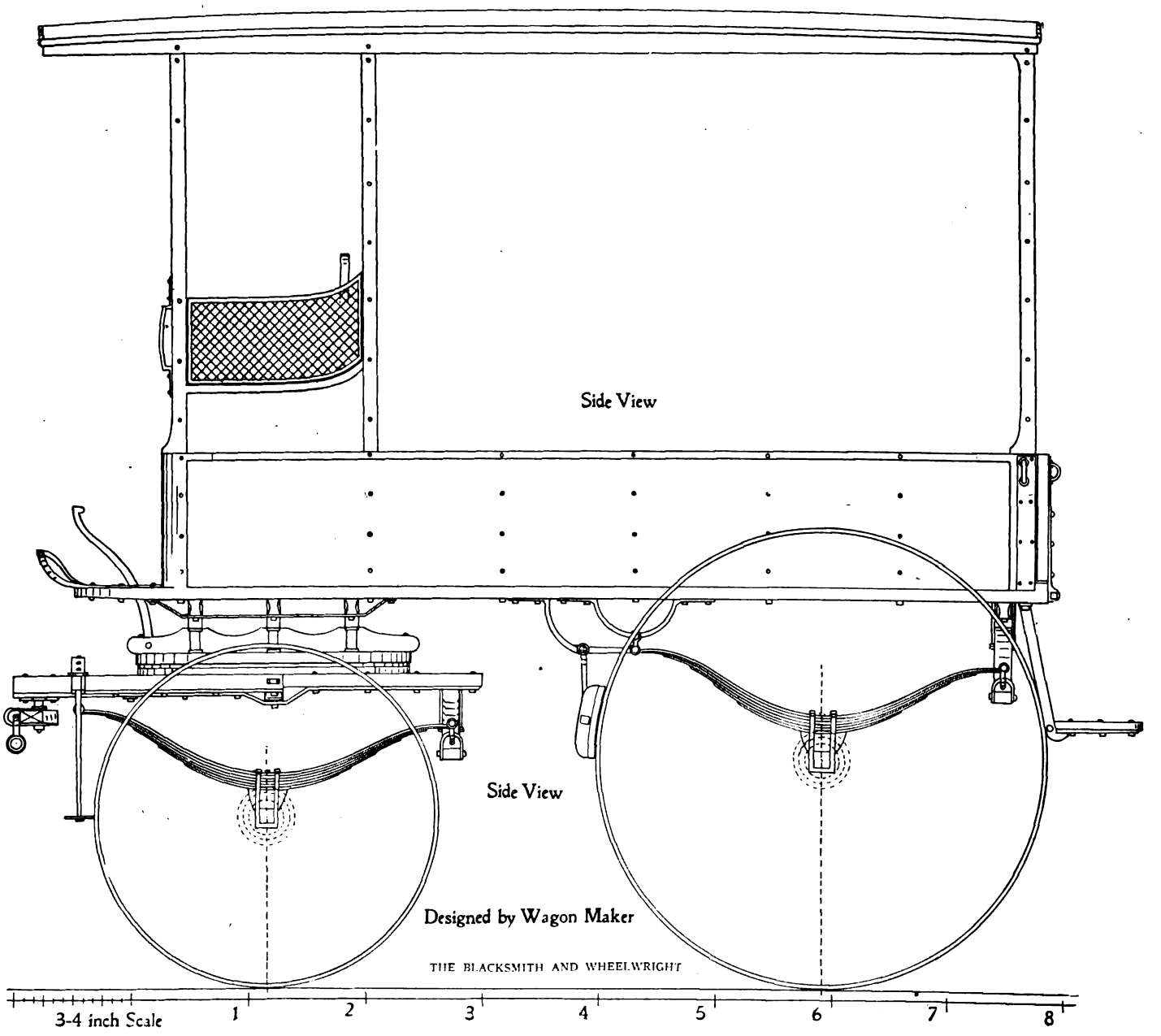
Diameter and length of hubs, 3⅝x7½ inches.

Thread and depth of rims, 1¼x1½ inches.

Number of spokes front and back, 14 and 16.

Width of spokes, 1 5-16 inches.

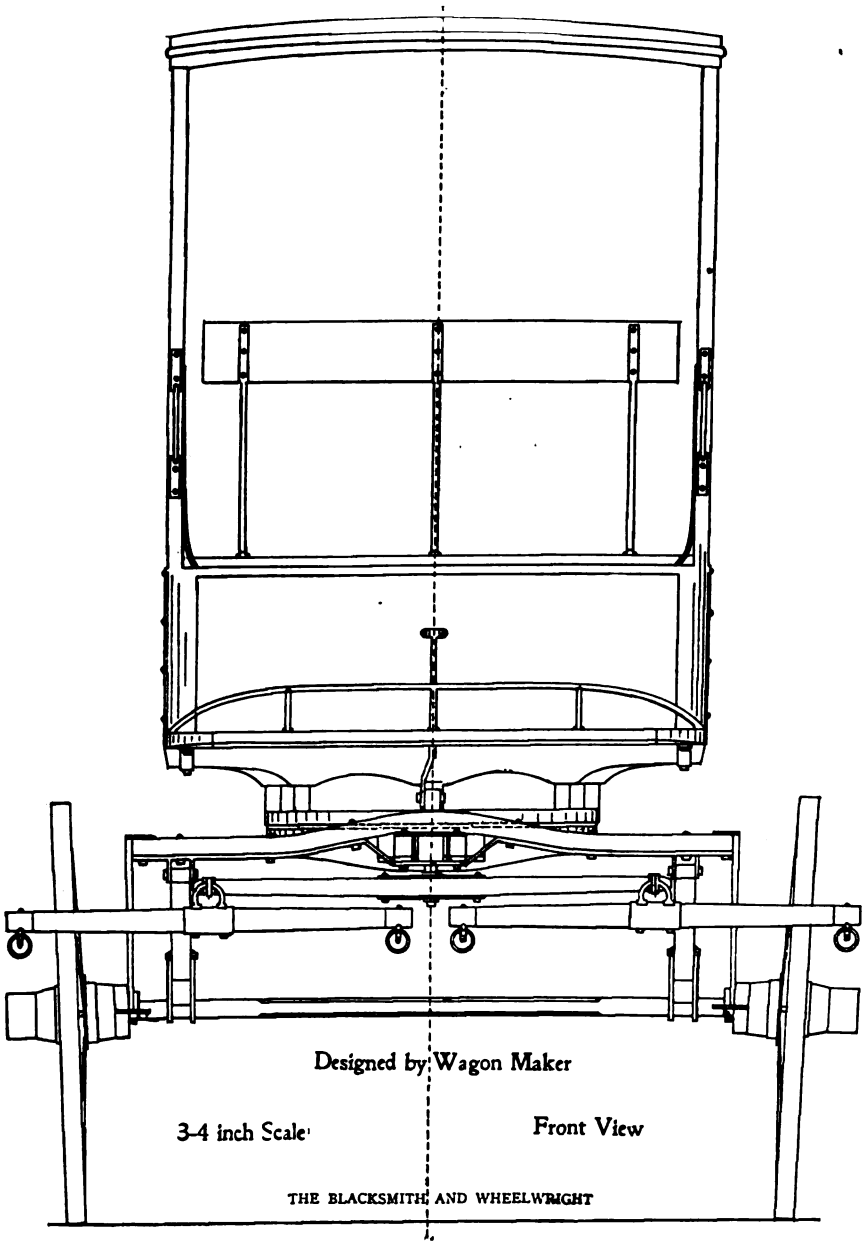
Size of tires with round edges, ¼x1¼ inches.

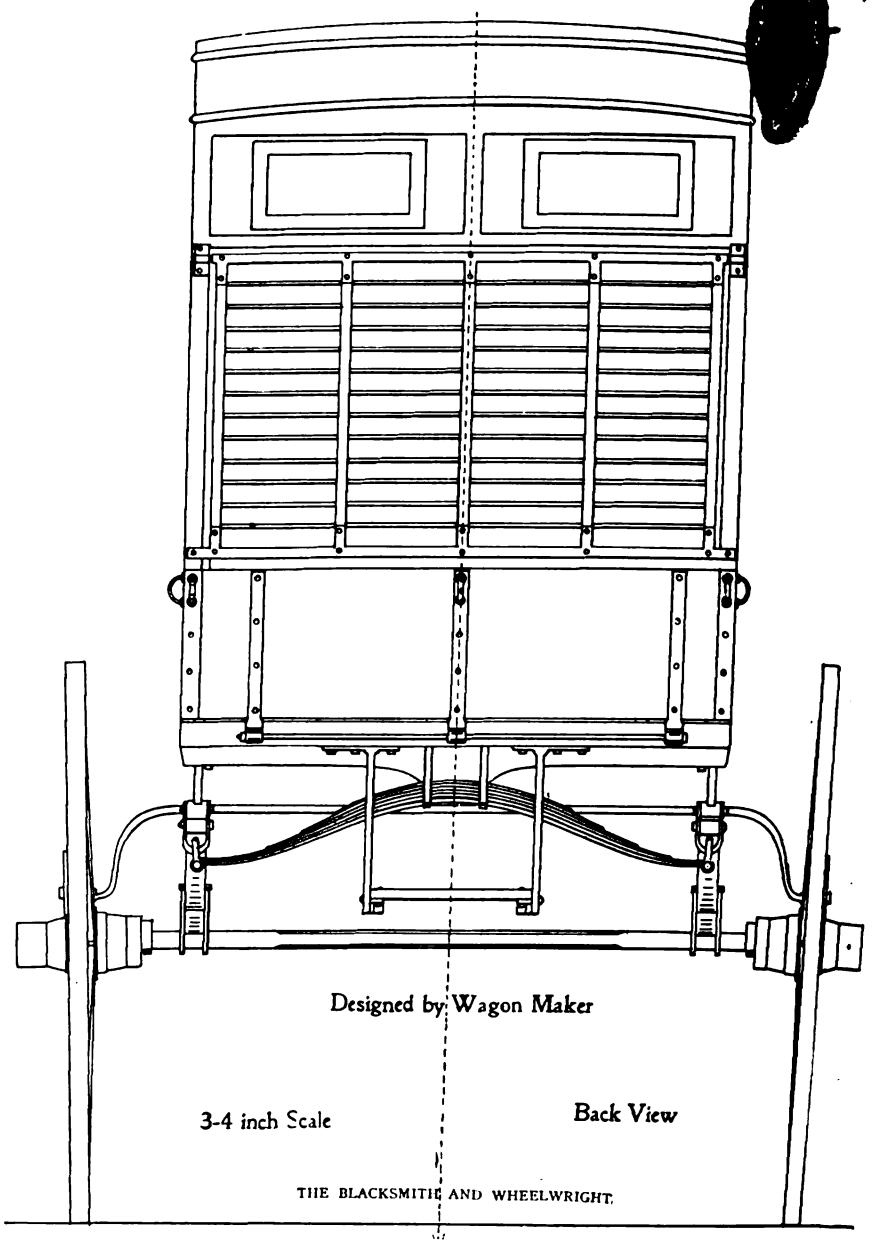


Front and rear side springs:
Length from centers of bolts, 38 inches.
Open from out to out, 7½ inches.
Width of plates, 1⅝ inches.
Number of plates, 4.

Width of track, 62 inches.
Dimensions for a medium size wagon:
Warner wheels:
Diameter of wheels with out tires, 34x46 inches.

Thickness of other plates, No. 3.
Cross springs front and rear:
Length from centers of bolt, 42 inches.
Open out to out, 7½ inches.
Width of plates, 1¾ inches.

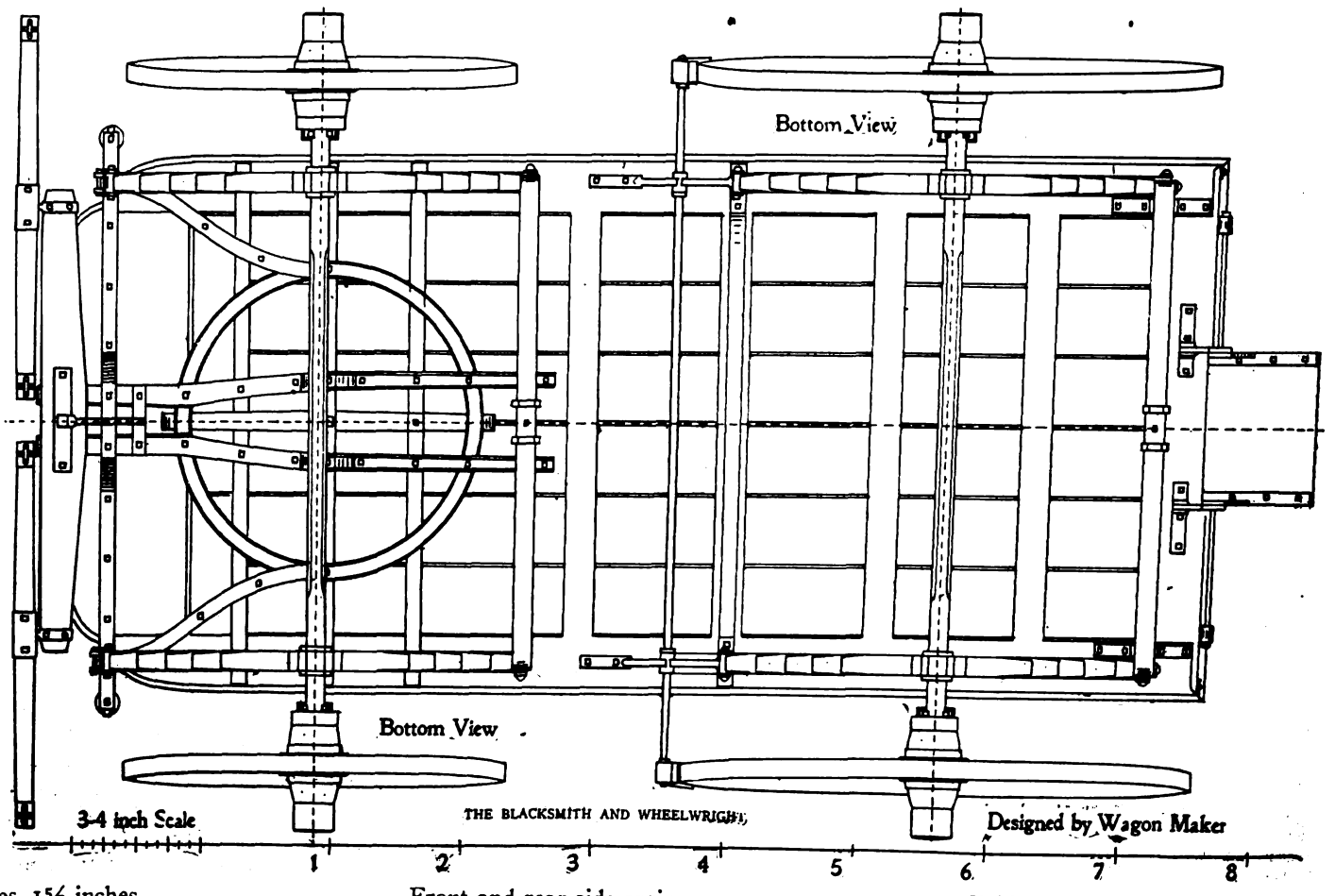




Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Cross springs front and rear:
Length from centers of bolts, 42 inches.
Open out to out, 7½ inches.

Diameter and length of hubs, 3⅞x8 inches.
Thread and depth of rims, 1½x1⅝ inches.
Number of spokes front and back, 14 and 16.
Width of spokes, 1⅜.
Size of round edge tires, 9-32x1 5-16 inches.

Number of plates, 6.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
All springs are dipped:
Size of axles, front and rear, 1⅜ inches.



Width of plates, 1⅝ inches.
Number of plates, 6.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
All springs are clipped.
Size of axles front and rear, 1 5-16 inches.

Front and rear side springs:
Length from centers of bolts, 38 inches.
Open out to out, 7½ inches.
Width of plates, 1¾ inches.
Number of plates, 5.
Thickness of main plates, No. 2.

Width of track, 62 inches.
Dimensions for a full size wagon:
Warner wheels:
Diameter of wheels without tires, 34x46 inches.
Diameter and length of hubs, 9 inches.

Thread and depth of rims, 1 9-16x1¾ inches.
Width of spokes, 1 7-16.
Size of round edge tires, ⅜x1⅜ inches.
Front and rear side springs:
Length from centers of bolts, 38 inches.
Open out to out, 7½ inches.
Width of plates, 1⅞ inches.
Number of plates, 6.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Cross springs front and rear:
Length from centers of bolt, 42 inches.
Width of plates, 1⅞ inches.
Open out to out, 7½ inches.
Number of plates, 6.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
All springs are clipped.
Size of axles, front and rear, 1½ inches.
Width of track, 62 inches.

Another extra heavy wagon is made with 1½ inch spokes, 2 inch 6 and 7 plate springs and 1⅝ inch axles. When cross springs are 38 inches long the same number of plates is used throughout.

KANSAS BLACKSMITHS.

A Big and Active Organization That Is Uplifting to the Trade.

From the Blacksmiths', Horseshoers' and Wagonmakers' Association of Kansas, a most active and enterprising organization which can but be of great advantage to the craft, we have received their annual year book for 1912. It is full of information of interest to its members and to the trade in general. On the first page is a little dedicatory address to George Wilson, Fredonia, Kansas, "who has generously given his aid to everything in interest of our association and the craft at large." This is followed by President Wilson's address, which is worth reprinting, and is as follows:

"In making my advent as president of this association, I feel we should have renewed energies and look forward to the time when we shall be recognized as the foremost organization of mechanics in the State. But I cannot accomplish what is desired without the help of each and every member. Each has his little part to perform. Let each do his full share.

There are several matters of vital importance which I want to mention. First, we sometimes have it thrown up to us that we are in a trust or combine. Sure, it is a combine—of honor. We agree not to do work for less than a living price. This explains it all. Second, we are organized for mutual benefit. Where some have facilities for education in our trades, others have not, hence in coming together at our meetings, we can discuss these methods, thereby gain knowledge from one another which is not otherwise gained.

"We often hear of unions making drastic and stringent rules, that seem to me to be arbitrary, but that is their business. We only have to look after our own. But when a union says the proprietor shall not hire the man he wants, I think it is going one step too far. I am in favor of unions so far as not to interfere with the proprietor's business. I contend that the man who does not belong to a union has the same right to earn his living, at his trade, as anyone else if he is competent. The world owes us all a living.

"Now I wish to touch on the prices of work. Let us figure on the material first, then make the estimate for expense, then add to this the cost for labor. Remember, the time and expense of keeping your tools in order, is part of the expense. Sometimes you are compelled to stop a job to repair some tool; this is lost time. So it is in the whole business in the shop. Every item must be taken into account. Then when your labor is added you can easily account for your production.

"The most our association needs is a live wire on organization. I have undertaken to get a good strong membership first. When that is accomplished we will have no trouble with the matter locally. The surroundings differ in the different localities which can all be worked out with the best of feeling. As it is now, some towns have trouble with price cutting. When that occurs who is the looser, the man who gets a fair living price or the price cutter?

"Any sane man can see, the cutter gives it to the customer. He is the man that lost. Now there is one way, and only one way to remedy this matter. Lay down your jealousies. You can do it. Go to your competitor, get acquainted with him; have a good common sense talk, don't be hard to approach, visit him and you will soon have confidence in him and so will he have in you. Then you can get matters all ironed out. Then you will wonder, why did I not do this sooner. We are all human, we have our ideas, but when the right chord is struck, it's so easy. See if it don't work. I've tried it many a time and never regretted it. I have been very busy for some time getting the name and address of every blacksmith, horeshoer and wagonmaker who was in business in Kansas, up to 1911.

"I am greatly surprised at the number. There are nearly two thousand. It was a tedious task but I have mastered it. I have a nice set of books to show for the work and time spent. I was very fortunate in having a personal friend who was instrumental in my being able to obtain them, for which I am very much indebted and for which I hereby tender my sincere thanks. Our Secretary-Treasurer, Mr. Austin English, has been of able and most valuable assistance in furnishing me data for the pushing of my work and I am now in hopes that by steady perseverance we may realize our fondest expectations.

"I am serious in asking every one of our members to exert himself to get every mechanic to join our association; also to try to get those who have been dropped for non-payment of dues.

"Let us get rid of our petty jealousies. Lay aside the club we held for the other fellow. Let us try this year to make a little something for that rainy day. If we don't begin soon, there will be no use to begin at all. "Make hay while the sun shines" was my theory. Now let us take a hunch! Try it!

"While thinking of some things interesting our Association I cannot forget the relations existing between the jobbing houses and our membership. They are always ready and willing to put forth every effort in their power to assist us. We owe them a debt of gratitude for the interest they have shown us, to make our meetings a success by their exhibits and sending their representatives to our meetings. We have the opportunity to become better acquainted with the houses and keep posted in materials. Take for instance, the blackboard lesson. Some of us were surprised, while others had already posted themselves. It's a sure thing that we are not getting enough for our work and materials, to lay away even a small competency for that rainy day. Think these things over. Then do what other businesses are doing—make a profit. I feel that we should post ourselves by talking to representatives of the jobbing houses. We can learn many new things by doing so. Let's encourage them to follow the pace we have set.

"In reference to organization, I really must acknowledge, we are greatly behind. If you will just think of all the other trades and professions which are organized, you will be surprised. Lawyers, doctors, preachers, school teachers, county officers. I might name hundreds. What do they organize for? I'll tell you. Larger fees and salaries. Am I wrong? No. I'm not too old to learn. I am still a scholar, willing to learn, to study. And now members and friends, in closing, I want to say, I have written my sentiments, as they come to me. This little poem, expresses my sentiment exactly:

I fancy when I go to rest,
Someone will bring to light,
Some kindly word, or goodly act,
Long buried out of sight.
But if it's all the same to you
Just give to me instead
The bouquets while I'm living,
And the knocking when I'm dead.

I'm quite alive and well today,
And while I linger here,
Lend me a helping hand, at times,
Give me a word of cheer.
Just change the game a little bit,
Just kindly swab the decks,
For I will be no judge of flowers,
When I've cashed in my checks.

"With malice toward none, with charity for all, with firmness for the right, let us strive on to finish the work we have undertaken, and bind ourselves closer to the grand principles of human life—live and let live. To do all which may achieve and cherish, a just and lasting peace among ourselves and the public."

The next annual meeting of the Association will be held at Topeka, November 13 and 14. The meeting place will be the Commercial Club rooms or the assembly hall at the National Hotel. The official hotel will be the Glenwood.

The Committee on Arrangement and Entertainment have a nice treat in store for the boys. They will have a sight seeing tour through the big Santa Fe shops, the seven-story Mills Building, the new half million dollar Memorial Hall, the New England Building and the State House, to say nothing about the local carriage and blacksmith shops.

There will be a smoker and exhibit hall of unusual interest. There will be a good show put on at the theater for the members and their wives or sweethearts, free of charge. There will be interesting lectures, papers and talks. The boys of Topeka think there is nothing too good for a blacksmith.

MOVING TRUCKS.

How to Build Them for Carrying Heavy Buildings.

BY JAMES F. HOBART, M. E.

The moving of small buildings upon rolls and runway is necessarily a slow and expensive operation. The rolls quickly go to pieces from the pressure of the load and the constant hammering to "cut" the rolls to the proper direction of travel. To lessen expense and hasten the work, a house-mover in the vicinity of Akron,

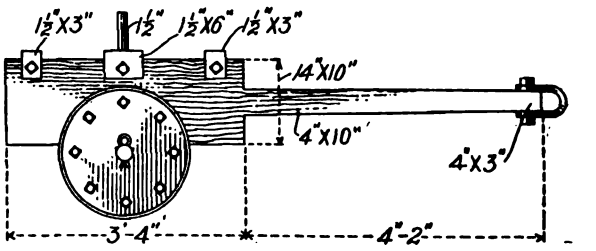


Fig. 1.—A House Truck Rear Wheel Unit.

Ohio, has worked out a sort of heavy truck which seems to serve the purpose most admirably, and which is comparatively inexpensive.

The rigging is partly "store goods" but mostly home made, having been developed by the man who owns and uses it. The "truck" comprises three units, each unit having two wheels, 23 inches in diameter by 11 inch face. One of the rear units is shown by Fig. 1. Fig. 2 shows one of the six wheels more in detail. As may be noted by inspecting Fig. 1, the pair of wheels is mounted upon either side of a massive oak bolster, made from a single piece of timber, 10x14 inches and 7 feet 6 inches long. The axle, which is 3 inches in diameter (cold rolled shafting) is 3 feet long and is just a piece of plain shaft with nothing done to it except the making of a hole at either end to receive linch pins for holding the wheels in place.

There is quite an interesting story connected

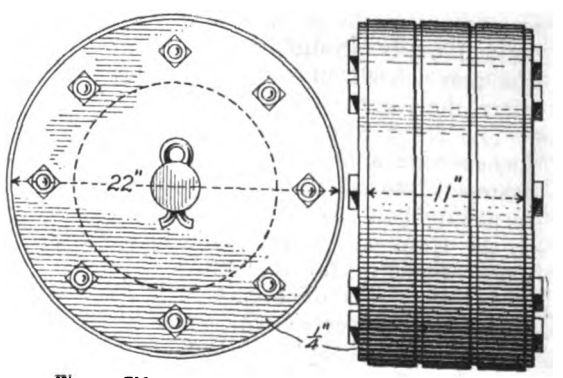


Fig. 2.—Side and Front View of One of the Wheels.

with these wheels which will be told later. Fig. 1 shows a pair of wheels in place upon a bolster which is cut down in depth to resemble a sort of spear or pole, with a clevis at the front end. It is by means of this stout pole that the units are lined up with each other when under a building. The clevis is very handy for attaching tackle when it is necessary to "cut" one of the units a little to make the wheel track with the other truck-wheels. The clevis facilitates the attachment of tackle and serves for attaching rigging for holding the trucks in alignment with each other.

Across the top of each rear unit, is placed three bands—each evidently made from old worn out tires. The end bands are ½ by 3 inches, the middle one is ½x6 inches, with a hole in the middle thereof, through which protrudes the trenching bolt shown in the engraving. This bolt is simply driven tightly into a

hole bored in the bolster. The bolts are 1½ inches in diameter in the rear units and 2 inches in diameter in the front unit. Holes bored in the under side of the timbers which are placed across the truck units, receive the bolts and serve to keep the timbers and trucks in position.

Fig. 2 shows one of the wheels more in detail. The face of each wheel is covered with boiler iron, cut in circular form, about ¼ inch thick, and held in place by 8 bolts entirely through each wheel and through the iron plate on the opposite side. These wheels were originally much smaller, and were built up, as may be described in later paragraphs.

Two of the rear-wheel units are used, as shown by Fig. 5, but Fig. 3 illutsrates the front unit, made much the same as the rear unit, Fig. 1, except that the pole or spear has been cut off, the steel straps have been replaced by a 10-inch plate of boiler steel ⅜ inch thick, which covers entirely the top and ends of the front unit, all the surface, in fact, except the sides and where the axle is attached on the bottom of the bolster. A large trenching bolt, 2 inches in diameter and 10 inches long protrudes from the upper side of the front unit as shown by the engraving.

Instead of the rigid pole or spear which is a part of the rear units, this unit has a pivoted pole arrangement as shown, with lug-straps made of ⅜x3 inch tire-steel through which a heavy wooden pole may be placed in the usual manner. The adjustment of the short pole is vertical only, as shown by inspection of Fig. 3. The steel straps which attach this pole to the bolster, are 3 inches wide, ½ inch thick and about 36 inches long. A split pin, 1½ inches in diameter, holds the steel straps to the bolster.

The manner in which the three units are set

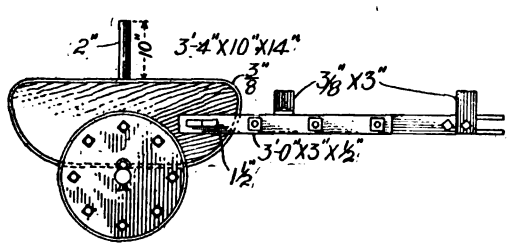


Fig. 3.—Front Wheel Unit.

up for service is rather poorly shown by Fig. 5, but an idea of the manner of arranging the apparatus may be obtained from this engraving. As shown at the right of Fig. 5, the 3 inch plank, shown in detail by Fig. 4, is placed immediately above the front wheel unit where the plank serves the purpose of a fifth wheel, thus enabling the truck to be guided around curves with considerable ease. As the rear units are also pivoted in a similar manner, the truck may be easily worked around very short curves by turning the rear units in a direction opposite that given to the front unit. This enables the truck to turn short corners in a comparatively easy manner, the same as a long ladder truck is guided easily around short corners by moving the rear wheels in a direction opposite to that given the front wheels.

The front wheel plank is 3 inches thick, 14 inches wide and 10 feet long. A steel plate is fastened around the hole through which the trenching bolt passes while a clevis is attached to the front end of the plank in a manner similar to those on the rear units.

A little study of Fig. 5, will show the very ingenious manner in which the three units are arranged. A couple of timbers placed across the tops of the rear units, receive one end of each of the long stringers upon which the building is placed during its journey. A hole bored in the lower side of one of these timbers, receives the small trenching bolt in each rear unit. The second timber shown upon the rear units is for giving greater bearing surface between unit bolsters and stringer-timbers. When the house to be moved is very heavy, and quite wide. A third timber is placed beside the two shown in Fig. 5. When as stated, the house is quite wide, a blocking is also placed between the stringer-timbers, directly upon the cross-timbers.

The longest stringer-timbers used upon these wheels are 40 feet and it is certain that "some house" can be loaded upon such long timbers. The owner told the writer personally that he had moved buildings of such weight that he was obliged to lay down 2-inch oak planks before the city officials would permit him to move the building over the pavement. He further stated that the great weight upon the wheels of the truck caused those 2x10-inch oak planks to be actually crushed into slivers as the wheels passed over the planks, so great was the load upon the truck. As each wheel touches for about three inches along a plank while under a heavy load, the square inches of oak exposed to pressure may easily be estimated.

Some of the engineering hand-books state that it requires from 10,000 to 19,000 pounds per square inch to pull white oak in two, with the grain; that it crushes between 4,500 and 9,500 pounds, breaks crosswise between 130 to 170 when white pine breaks under 100, and that it required 2,500 to 3,500 pounds pressure to

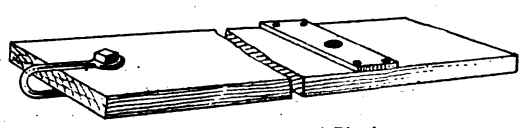


Fig. 4.—Front Wheel Plank.

indent white oak one-twentieth of an inch deep. This is dead pressure, not such as must be sustained when house-moving trucks run loaded over planks laid upon pavements.

As stated in a previous paragraph, the wheels of this truck were orginally "boughten" wheels and only about 15 inches in diameter. They were also supported upon pipe axles, which went bad the first time the truck was heavily loaded. It was very soon realized by the user, that the truck wheels, as originally procured, were far too small and narrow to give satisfactory results. They were only 7 inch face, and as stated, 15 inches in diameter and it was determined to increase both the diameter and face of the wheels, also to use 3-inch cold rolled shafting instead of 2½-inch pipe for the axles. To this end, six new straight boxes, each 3 inches in diameter, by 11 inches long were made up at a nearby machine shop and the wheels were stripped of their boxes and tires, leaving the plain wooden shapes, 15 inches in diameter by 7 inches thick.

It was decided to increase the diameter of the wheels to 23 inches. Accordingly, some 2-inch and some 2½-inch planks were procured, these thicknesses being convenient for building up 11 inches in thickness, also for increasing the old wheel thickness to 11 inches.

To lay out the pattern for the inside lags, a thin board was placed on the bench and two circles or portions of circles drawn upon it as shown by Fig. 6, the circles A B, and A C, being to a radius of 11½ inches and 7½ inches respectively. The striking of the two radial lines, A B and A C, should not be overlooked, for these lines are useful in marking the ends of each bit of plank segment.

Having carefully marked the board, just as carefully cut to the lines and work out the curved piece, making it true and smooth on the edges so a pencil may be used against any portion of the curves while marking out plank segments. A good way to get out one of these patterns is to saw it carefully on the band saw, then finish the edges with an adjustable plane which may be curved to fit almost any circle, either inside or outside. If one of these very handy planes is not available, the trick may be done with a common plane. A little experience will enable a man to carry the plane around a pretty small circle and not loose the chip. But of course this cannot be worked on the inside of the segments, therefore if an adjustable plane cannot be obtained, finish the inner edge with the draw-knife and then rub down with sandpaper wrapped around a piece of wood cut to fit the circle. This will do the trick, but the adjustable plane is quicker and easier. One of these planes should be in each smith's shop in the country. Sometimes this tool is invaluable.

Fig. 7 illustrates the manner in which the small wheels were built up into large ones. Three sizes of lags were used, those 2½ inches thick, shown at A and B; those 2 inches thick, visible at C, all cut from the pattern, shown by Fig. 6. The outside segments are different. They are as hown by D, D, D, etc., 2 inches thick, but instead of being 4 inches wide, they extend from the box E to the outside of the wheel, the grain running radially, so that the entire strength of the wood-grain is to bind together the old and the new portions of the wheel.

The circumference of a wheel 23 inches in diameter being about 72⅛ inches, the segments being from 6 to 10 inches wide, will require nine pieces to fill the circle. The iron box being 4 inches in diameter at the ends, there will be required, segments 9½ inches long, and it will be well if they are cut a bit longer so as to allow plenty of stock for truing up the outside of the wheel before setting the tires.

There are several ways of setting the segments in a job of this kind. The very best way of all is to put the wheel in a lathe, upon a shaft, and true up the old wheel before the new lags are applied. A better job can be made in this way, as both face and sides of the wheel may thus be made true and smooth so the new lags may be glued as well as nailed in place to hold until the tires and side-irons are in place.

When it is not convenient to place the old wheel in a lathe, fasten it upon one of the axles, drive in a piece of iron to serve as a handle and have a man turn the wheel by hand, while you hunt out and mark the high spots by means of the sharpened tang of a file, placed upon a wooden rest, made to approximate the tool rest of a wood-turning lathe. With the narrow tool, cut grooves through the high places, making the grooves a few inches apart across the face of the wheel. Make a groove close to each face, and a couple more grooves between the two outer ones, then stop turning the wheel and with a sharp chisel, carefully remove the wood between the grooves, which must be all of the same depth, or cut down to the same bottom diameter.

A single groove on the side of the wheel, close to the face, will serve as a guide for truing up the side with chisel and plane, and a right good job can be made in this simple manner when no lathe is at hand. The same method may be used for truing up the new wheel after the lags have been put in place.

Having trued up the old wheel, proceed to fit a circle of the 2½-inch lags around the wheel, close to the edge, as at A, Fig. 7. Glue the lags to the old wheel and nail them rmly in place, lag by lag, as they are fitted. Toenail the lags to the old wheel, but do not try to nail the ends of the lags together, or to nail each course of segments to the ones already in place. To do so, will surely lead to some of the nails being driven too far out, so they will be hit by the tool when turning the outside of the wheel after the lags are in place. They are also sure to come in the way of the bit when turning bolt holes.

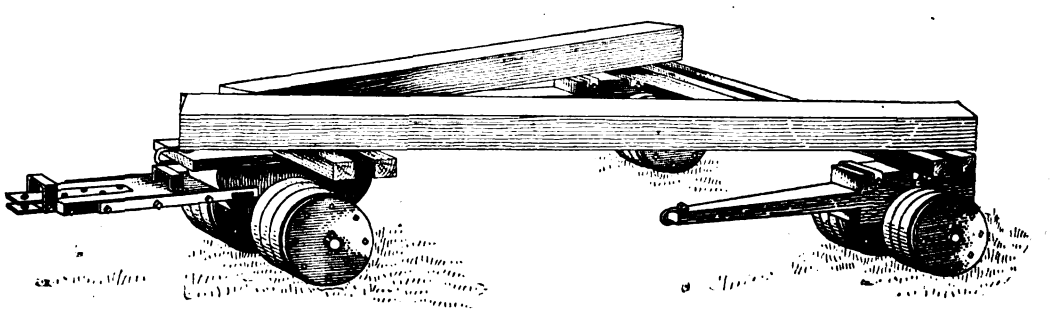


Fig. 5.—Ready for House Moving.

It would seem that if care be used, nails could be placed so they would clear the turning tool, but the writer has never been able to do so, therefore, just leave out nails as suggested. When the lags are all in place, and the wheel has been trued up, proceed to put on the side plates before the tires are set. It will be found quite a job to get the bolt holes true enough to permit the bolts to pass through 11 inches of wood and a steel plate outside of that of either side of the wheel.

To bore these holes, carefully mark the holes through one plate, which is then removed and a single hole bored through the wheel. Start the hole with an ordinary bit, but as soon as it is ¼ inch deep, use a single lip bit, with the worm filed off flat—one of the "ship auger bits,"

which will bore straight regardless of knots, holes, grain or other bit-deflecting things. As soon as the single lip bit takes hold, apply a try-square to the bit and side of the pulley, truing the bit to the square and applying the square in two positions 90 degrees from each other.

It is well to let a man hold the square, and two squares may be used at the same time to

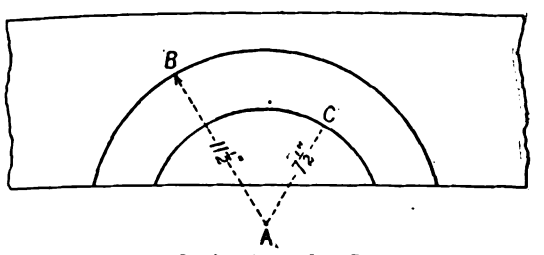


Fig. 6.—Laying Out a Lag Pattern.

advantage, applied 90 degrees apart. As soon as one hole has been bored through the wheel, place the plate on the opposite side of the wheel and chip or rebore that end of the hole as may be necessary to get the first bolt through the wheel and both plates. This being done, mark the holes on either side of the wheel, bore half way from either side, and when the job is well done, the holes will meet fairly. If they don't —well, just make 'em, and take some boring lessons in waste blocks.

In jobs of this kind, it is best to use rods instead of bolts. Cut a thread on either end, use

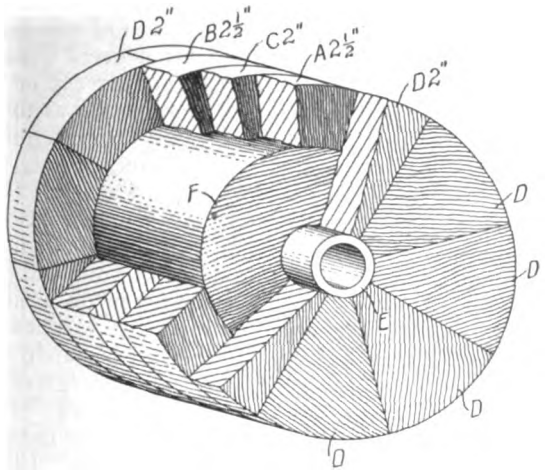


Fig. 7.—Lagging a Solid Wheel.

nuts instead of bolt heads and then the wrench may be used on both sides of the wheel. Don't bore the bolt holes too big. The best job is where—if you can do it—the bolt holes were bored same size as the bolts. But this will require mighty good work.

NATIVE AFRICAN BLACKSMITHS.

Iron Work Which was Once So Skillful Is Now Growing Extinct.

In Africa the stone age was followed directly by the age of iron. Even the Bushmen use iron, but can work it only cold. The reason for the omission of the copper and bronze ages is that in the Dark Continent iron ore in the shape of "meadow" or "swamp" ore, argillaceous ore quarzite, iron sand, etc., is very widely distributed. Everywhere one finds the red iron ore which is typical of Africa with imbedded limonite, and is especially employed in winning iron. This explains very readily the high state of the art of iron-working. The metal made by the Africans is made at a comparatively low temperature, and the product is better liked than the best imported Swedish iron.

But just as with us the experienced smith is disappearing as a hand worker, the African iron industry is doomed irrevocably to extinction.

Almost everywhere along the coast the natives find it more convenient to buy European or American iron cheaply and without any expenditure of labor, although it is not so good as the native material. It will not be long before the native will lay down forever the stone hammer, so often swung with such master skill, and then in the Dark Continent, also, the indigenous manual art will have disappeared—just as in so many other districts. It will be only a short time before the investigator will in vain seek native forges, which have contributed not a little to the development of culture which already offers us many a puzzle.

Iron making in the various parts of Africa differs according to the character of the soil. In some places the ore is separated from the sand as among the Fans in the south of Kameroon; again it is scratched out from a depth of 20 to 30 inches from under the surface of the earth; and still again deep shafts—up to 30 feet and more—will be sunk, so that one can speak in some sense of a mining industry. The ore is separated and then smelted in very primitive but really practical furnaces. The most simple construction is found on the Upper Zambezi and in the Ugogo Mountains: A simple hole in the earth, in which are placed alternate layers of charcoal and ore. Elsewhere—for instance among the Dinkas and Bongos—regular smelting furnaces, about 4 feet 3 inches high, are built of clay. There is no lime for building purposes in Africa. The iron is melted with the help of most remarkable bellows—drums, mostly of clay or wood, in the latter case with fireproof nozzles. Also skin bellows are used and in Madagascar piston blowers, resembling those used in India and the Malay archipelago.

The hammer as a forging tool is made only here and there; usually stones are used, but in both case they are handleless.

Tongs are mostly replaced by a split stick of green wood; on Lake Nyassa two pieces of bark are used; and from these the iron tongs of the Barutses have been developed. In Togo two iron strips are handled much in the same manner as the Chinese chopsticks.

The chisels used in making the barbs or arrows, etc., complete the list of the tools with which the African smith forges weapons and utensils, to say nothing of ornaments, the perfection of which astonishes even Europeans.

In many cases the forged iron articles serve as a circulating medium; for instance in Bagirmi, spear-heads; on the Benue in Kororofa, hoes; among the Dinkas, lance-points, etc.

Very remarkable is the difference in the social position of the smith in various districts. In some he is held in high respect, in others looked on with contempt; in Togo he reaches the pinnacle of honor, as the smith is at the same time priest and fetish man or big magician.

The hammer is considered as having a soul, as it often is on account of the awkwardness of the master it does not work as it should. For this reason sacrifices are offered to it; and at the feasts of the God of the Forge a good meal is set before it.

Were the Africans independent inventors of the art of iron-working? The ancient Egyptians knew, or at least it seems highly probable that they knew, the use of iron, although they received it from the Hamites to the south of them, and did not make it themselves. But although at the time of the arrival of Europeans in Africa iron was already known there, the traditions of the various native tribes go to show that they received the smith's art from other men or from a god—just as the Hebrews from Tubal Cain, the Greeks from Hephistos and the Romans from Vulcan. As the art of forging developed most thoroughly in the north east, it is probable that it came from Southern Asia; and the form of the bellows would seem to confirm the impression as also almost all other elements of African culture, came from Asia, the origin of the smiths' art, also, may be sought there.

CARE FOR THE PAINT.

The Body Finish Especially as It Applies to the Metal Surface of Automobiles.

From M. C. Hillick, Pennsylvania.—The preservation of the finish of the metal body of an automobile is a matter of importance, requiring constant attention while the car is in service. Any fracture of the finish that opens up the film of paint and varnish to the extent of letting the weather and moisture assail the bare surface of the metal, is quite certain to get the entire finish in trouble. Moisture is an arch enemy of the metal surface, and particularly of the steel surface, and this fact is alone sufficient to urge upon everybody concerned the necessity of watching the surface closely for the slightest break in the film of protective material. As soon as this occurs the fracture should be given immediate attention. Coat over the break with a good paint containing enough oil to bind it all hard and fast to the surface. If a deep fracture, after the touch-up pigment has dried securely, bring it up with hard drying putty, sandpaper in due season, coat over with the color to match the regular body color, and slick over with varnish to bring out the finish in good order. This sort of inspection and surface repair work will save the car owner, no small sum in the course of a season or two in addition to giving him a better and neater looking car right along.

The automobile body with the steel surface is under the present practice of painting, and finishing sand blasted previous to coating with paint, which treatment serves to remove all rust and scale. This is the only effective method outside of pickling the metal in dilute muriatic acid in a vat. This latter method, however, is not available for ordinary work. Nevertheless, this one thing is certain in connection with all metal surfaces, namely, rust and scale must be prevented, or removed, if the surface is to endure and serve the purpose for which it was manufactured. The steel surface, if not painted, will deteriorate at the rate of about 3 ounces per square foot, it is said. In the absence of the sand blast, steel wire brushes are used with considerable success. After using the steel brush, wash the affected parts with benzine, and then proceed to coat it and finish as above advised.

The autumn months are a trying season on varnish. Mud and road refuse, harsh rains and sleet, and a combination of other destructive conditions all unite to work swift destruction upon the varnish unless the car user interposes certain saving remedies, such, as, for example, frequent washing with water from which the chill has been taken. Mud should not be left upon the car to dry. During this process of drying the life of the varnish is extracted causing loss of lustre, spotting and various other unfavorable changes in the appearance of the finish.

As long as the high lustre of the varnish is maintained and it responds like a new garment to all the exacting requirements of service, a simple washing with clean water, after use upon the highway, will suffice; but once the varnish begins to lose its high, sharp lustre, and water fails to bring back the brilliancy of youth, then comes the time when the use of a proper renovator is warranted. Of renovators, apparently there is no end, but of those adapted for use upon the fine finish of the automobile there is, after all no plentiful supply. The renovator should be essentially non-drying; it should not produce a film on the finish in a warm room; it should fetch out the dormant life and richness of the varnish. It should, moreover, act as a food for the varnish, giving to it nourishment and life, and new buoyancy, and length of days.

Autumn weather may well suggest to the car owner the need perhaps of a fresh coat of varnish for the surface. If the varnish, during the summer, has worn dry and thin and is giving to the colors and the supporting coats an inadequate measure of protection, then it were economy to put on at least one good, full coat of varnish to hold the surface strong and intact during the winter. It costs money to work up a nice, well-balanced surface of paint and color, and it does not pay to forego the protection of a new coat of varnish when that coat is urgently needed. This is necessary even though it is not expected that the car will be often used during the winter months. The undercoats, and notably the delicate coats of color, need ample varnish protection during the car's days of idleness in the garage. Often a freshly applied coat of varnish in October or November will pay for itself before spring through the protection it affords the color and the undercoats.

A novelty in paper goods that is rapidly coming into general use is the tissue-paper towel, which is designed to take the place of linen towels in public lavatories, railway stations, factories, etc. This furnishes every one with an individual towel, and, as each towel is thrown away after use, any possible communication of disease is prevented.

Since the recent revelations regarding police graft in New York City a policeman has been seen to take a pear from a corner fruit-stand—and pay for it!

COMPRESSION LOSSES.

How Lost Engine Efficiency is Often Caused by Piston Rings.

There is one cause of lost efficiency in an engine that is not always fully realized. This is due to the piston rings. In the early days of the use of the internal combustion engine, very little importance was attached to piston rings, and it was considered sufficient by some makers of engines to turn piston rings in the lathe, cut fairly large gaps in them, and leave the fitting for the engine to do in the course of running. The result was that not only did the engine badly overheat, but the cylinders were

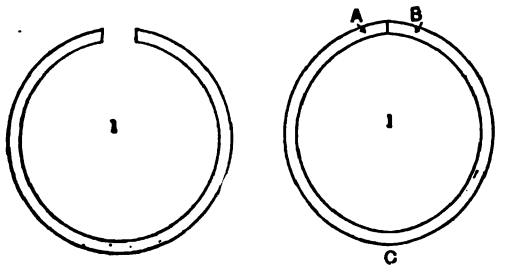


Fig. 1.—Showing a Concentric Ring Split and Closed.

oval in shape, owing to the uneven and excessive pressures that its walls were subjected to by the irregularity of the ring. Fortunately, manufacturers nowadays pay more attention to the design of piston rings. There are, however, many repairers who do not yet appreciate the need of accuracy in this direction, and for the benefit of those who contemplate having new rings fitted to their engines while the latter are being overhauled, some of the advantages and disadvantages of certain methods of manufacture are below pointed out.

It is a generally accepted idea that if a ring be turned concentric inside and out and then split, the outward pressure on the cylinder walls, when the ring is closed and in its place, will not radiate from the center. Now let us see exactly what this means. Looking at Fig.

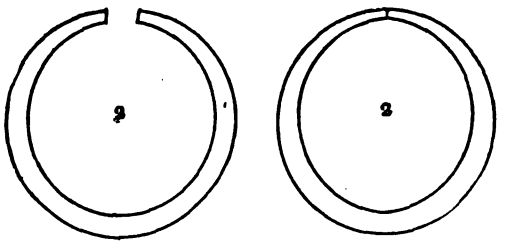


Fig. 2.—Showing an Eccentric Ring Split and Closed.

1, we shall see that if the ring be closed and placed in the cylinder, it will be bearing on the walls on three points only—A, B and C. A piston ring in such a condition is, of course, impracticable for use in an engine, so that the ring is made thicker in the first instance and then turned a true circle after being closed at the gap, thus giving a full bearing surface all round its circumference. Before doing this, however, it is the practice of some manufacturers to turn out the inner periphery of the ring eccentric to the outer, in order to equalize the pressures at all points of the ring, and although this does to some extent have the desired result, yet it is a far from perfect means to an end, and an inspection of Fig. 2, will show that, although the pressures are far more even than

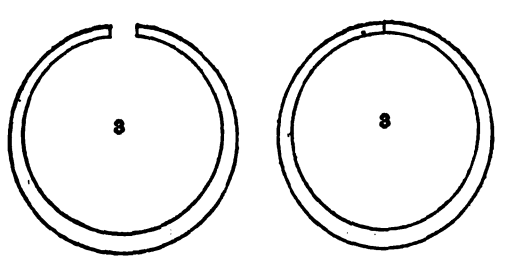


Fig. 3.—An Eccentric Ring Finished to True Circles Inside and Out, After the Ends Have Been Closed.

with a concentric ring, yet imperfect pressures must result to some extent owing to the distorted shape of the inner periphery when the ring is closed. Although rings of this description may allow satisfactory running yet with very little more expense a ring more nearly perfect can be manufactured, and has been adopted by certain firms. That is, a ring turned to a perfectly true circle inside and out while the gap is closed, the outer circle being eccentric to the inner (Fig. 3). It will be seen that in this case, not only are the pressures more even on all parts of the ring, but less pressure is required to make the rings gas tight, consequently there is less wear on the cylinder walls, more even wear and less heat is developed, resulting in higher engine efficiency.

Although a ring machined with a lathe tool can be very perfect if care be used in the turning, yet it is impossible to prevent particles of metal from breaking away from its edges and as its efficiency depends to a large extent upon the absolute truth of its upper edge it is advisable to grind up the ring with a fine grit carborundum wheel. An equally important point is the accuracy of the fit of the ring in the groove, and the practice of fitting rings into groves that are too large for them and that allow of the slightest vertical slackness is strongly disparaged.

Turning now to the question of joining the ring, there are various methods, some of which are shown in Fig. 4. Firstly, that of a diagonal cut across the face of the ring, a method which has been proved to be fairly satisfactory, although a point against it is the possibility of the gaps getting in line, thus allowing of an

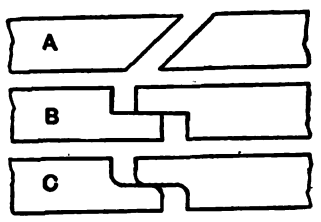


Fig 4.

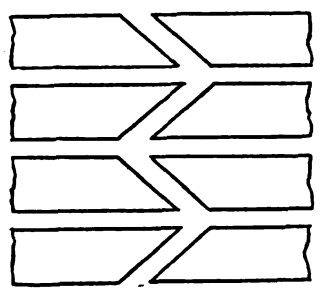


Fig. 5.

easy escape of gas on the compression stroke. There is a tendency for rings of this description to rotate in the opposite direction to that in which their lower diagonals point; it is worth while cutting every other ring in the opposite direction to its neighbor, as shown in the arrangement in Fig. 5.

Another method is to step the rings in the form shown in Fig. 4 (B), a method which may be much improved upon by leaving a radius of metal at the root of the step, as shown in Fig. 4 (C), which will not reduce the strength of the ring at this point so much. Stepped rings should not be made less than a quarter of an inch wide on the face, and should on no account be fitted into an old and much worn or scored cylinder, as the steps will not stand abuse, and will break away. A stepped ring, if made correctly, will give very good results indeed, and is, if anything, slightly better than the plain diagonal cuts, for it has not the great defect of the latter type, which when circumferential wear has occurred provides an open and direct path for the escape of the gas on the compression stroke.

USE OF KEROSENE.

How To Handle and Test It Without Accident or Waste.

Kerosene cannot explode until it is changed into a gas and it cannot be converted into a gas except by being heated. Therefore there is no danger of causing an explosion by kindling a fire with kerosene, provided the firebox is cold. If the firebox is hot, as is sometimes the case when a rapidly burning fire is allowed to go out from lack of fuel, there is danger of the gravest sort in using kerosene for kindling. The hot stove rapidly changes the liquid kerosene into gas, and when the match is applied the accumulation ignites almost instantly, making what we call an explosion. It should be noticed, however, that the explosion is caused not by the kerosene liquid, but by the gas combined with air.

Nor is there any danger in hurrying up a slow fire with a small quantity of kerosene, provided there is a flame. The hot coals vaporize the kerosene rapidly, but the flame ignites the vapor before enough to cause an explosion can accumulate. When a fire is smoldering and has no flame, a piece of burning paper placed on top of the fuel will serve to ignite the gas as soon as it is formed. Many people make the mistake of thinking that the danger lies in pouring the kerosene on the flame, whereas, in reality, the flame is the one thing that makes the explosion impossible. Remember, however, that kerosene should never be poured on a smoldering, flameless fire, nor used where there is a large bed of hot coals even if a flame is present. Many people also believe that there is more danger of an explosion from kerosene when it is poured from a large closed can than from a small open one. This is not true, for the explosion results from the igniting of accumulated gas, as explained above, and the accumulation does not depend upon the size of the vessel from which the kerosene is poured. Nevertheless, it is usually better to use the small open can for this reason.

If the kerosene is poured into an open vessel and then on to the flame, only a definite amount can be used; then when the flame flashes up, as it always does if coals are present, there can be no danger of overturning the can and spilling a large quantity on the clothing or carpet. Needless to say, it is wise while pouring on the oil to stand far enough from the stove so that the flash cannot singe the hair or ignite the clothing.

Only the best qualities of kerosene should be used for illuminating purposes. Oil that has a flashing point lower than 110 degrees Fahrenheit and a burning point lower than 135 or 140 degrees Fahrenheit, is not really safe to use in lamps. These points can easily be determined on the farm in essentially the same manner that the Government inspectors make the test. Place a small quantity of kerosene—say, a fourth of a pint—on a slow stove in a tin cup. Gradually heat it, taking the temperature frequently by means of a chemical thermometer or a metal backed one. When the temperature reaches 100 degrees Fahrenheit, hold a lighted match over the cup. Continue this until the gas given off flashes momentarily and then goes out. Then quickly remove from the stove and take the temperature. This is the flashing point. In the better grades of kerosene the flashing point is at least 120 degrees Fahrenheit, and the laws of most States require it to be 110 or above. The flash is caused by the burning of the vapor formed from the oil, and is entirely harmless. If the temperature is not rising rapidly the flame almost immediately goes out, because gas is not being formed rapidly enough to keep it going.

Continue heating the oil, taking the temperature frequently and trying to ignite the vapor with a lighted match. When the vapor continues to burn, instead of flashing only for a moment, quickly determine the temperature as before. This is the burning point. The burning point should be 130 or 140 degrees Fahrenheit. Most State laws require it to be at least 120. A piece of glass or tin laid over the top of the cup will quickly extinguish the flame by shutting off the supply of oxygen. The experiment is entirely safe, for an explosion is impossible.

All of us know that it is easy to start a wood fire by pouring the kerosene on the wood. Why is it that a coal fire cannot easily be kindled in the same way? Even the kerosene itself is hard to ignite when poured on coal. Why is this? These questions may easily be answered by remembering that kerosene burns only when heated to its burning point.

Many women rub kerosene over their stoves instead of polishing them. It cleans them thoroughly. There is a common saying that rubbing kerosene on a stove before storing it in the spring prevents rusting. This does not prove to be true except when the stove is stored for only a short time. A heavy coat of ordinary stove polish almost always prevents rusting. A coat of kerosene and lubricating oil is also effective. The lubricating oil serves to keep from the metal the moisture that causes rust, while the kerosene makes the lubricating oil thin so that a thinner coat may be applied. After rust has once formed on iron kerosene will, if applied several times, remove it even in the most stubborn cases. Rust may also be cleaned from guns in the same way.

A dustless duster and dustless mop can be made by any housewife. Saturate the cloths to

be used with kerosene. Then hang them out of doors all day; this allows the evaporation of the lighter parts of the oil. The cloths are then ready for use. No more kerosene need be applied for several weeks. The cloths should be well shaken after being used each time to rid them of dust and lint.

THE HORSE PLAGUE.

What Causes It and How It May Be Prevented or Treated.

During the last five months numerous reports have been received by the Bureau of Animal Industry relative to the existence of forage poisoning in various sections of the United States, particularly in Louisiana, West Virginia, Kansas and Nebraska. It has usually occurred when a hot, dry period has been followed by rains, or during wet seasons, especially those which are characterized by frequent rains alternating with hot sunshine, producing a damp, sultry atmosphere. Such conditions are most favorable to the production of molds, and all outbreaks that have been investigated by the bureau have been traced to the eating of unsound or moldy forage or feed, or to the drinking of water from wells or pools containing surface water drained through decomposed and moldy vegetation. The disease has been shown to be also due to eating damaged ensilage, hay, corn, brewers' grains, oats, etc. Horses and mules at pasture may contract the disease when the growth of grass is so profuse that it mats together and the lower part dies and ferments or becomes moldy. No specific organism or virus has yet been found which can be considered as the cause of this disease.

The so-called cerebro-spinal meningitis of horses being an entirely different disease from that which occurs in man, the symptoms, as well as the cause, are distinctly different. In the most rapidly fatal attacks death takes place in from five to forty-eight hours. Such cases begin with violent trembling or stupor and extreme weakness, or with staggering gait, partial or total inability to swallow, with marked delirium, during which the animal, lying flat on its side, becomes violent and knocks and bruises its head. In the second form of the disease the same line of symptoms may be noticed in a milder degree. Difficulty in swallowing, slowness in chewing the food and inability to switch the tail are observed. Breathing becomes heavy and noisy, and delirium may develop with stiffness of the spinal muscles or partial cramp of the neck and jaws. Death occurs in from six to ten days. In the last, or mildest form, the lack of voluntary control of the limbs becomes but slightly marked, the power of swallowing never entirely lost, and the animal has no fever, pain or unconscious movements. In those cases which get well the animal generally begins to improve about the fourth day and goes on to recovery. One attack does not protect against a second attack, as horses and mules have been known to have the disease two or three times.

The first principle in the treatment of this disease consists in a total change of feed and forage. Horses kept in the stable should be fed with sound forage and grain from an uncontaminated source, even if such feed has to be brought from a distance. Horses that have become affected while at pasture should be removed from the field in which they have been running. The animals should be brought to the barn or corral and fed on wholesome and clean feed and forage. The water, unless from an unpolluted source, should likewise be changed.

At present this preventive treatment is the only satisfactory method known for checking the disease, as all medicinal remedies used have been unsatisfactory in the vast majority of cases. The first step is to empty the bowels and remove the poisonous products, but on account of the difficulty in swallowing, an aloes ball or Glaubers' salt is hard to give. In fact, no remedy should be given by the mouth if the throat is paralyzed, as pneumonia is liable to result. Fifteen grains of barium chloride injected into the jugular vein, or two grains of eserin under the skin, if the animal is not too greatly depressed, will usually act promptly. Intestinal disinfectants, such as calomel, salicylic acid, and creolin are also used. If much weakness is shown and the temperature is below normal give aromatic spirits of ammonia, digitalis, alcohol, ether, or camphor. Rectal injections of warm water are good, and warm blankets wrung out of hot water may also be applied to the body. Subsequent treatment should consist of two-grain doses of strychnine twice daily, or a mixture of two drams of tincture nux vomica and one-half ounce of Fowler's solution given at one dose, and repeated three times daily, to combat the effect of the poison upon the nervous system.

BRAZING.

A Few Suggestions of a General Nature to Instruct the Novice.

Brazing or hard soldering should be understood before attempting the work. While the acetylene process is used largely there are numerous little jobs which may be handled by brazing. The beginner is apt to make the error of thinking that the process of brazing is similar to soft soldering, where the heat is applied to the solder itself. In brazing the heat should be run from the work to the solder.

The material required comprises "spelter," and it resembles coarse brass filings. It consists of equal parts of copper and zinc and for different work a harder or softer alloy is employed. Generally speaking, two grades of spelter are used, the harder for iron and steel and the softer for brass and copper. For iron or steel, ordinary brass wire or strips of brass may be used in an emergency. Borax is mostly used as a flux, and it is essential that it should be pure.

The borax should be pounded up small, and some workers calcine it before using, as it prevents its swelling and frothing up, as well as carrying away the spelter when the heat is first applied. Calcining may be done by playing a flame from a blow pipe upon the borax, when it will swell up, and can be rubbed down after it has cooled. Borax treated in this manner is much easier to use.

The borax is then placed in a shallow pan with just enough water to make it adhere together. Some mix the spelter with it, while others have two separate pans, one containing the borax and the other the spelter with a small proportion of borax moistened with water. The latter method is recommended. A spatula is also required, and the tool may be made from a piece of iron wire flattened at the end for applying the spelter and borax to the work.

Insufficient heat is one of the chief causes of a beginner's trouble, for what is required is a surplus of heat, so that the work does not only get hot enough, but heats up quickly, and as little time as possible is allowed for oxide to form. When a blowpipe is employed, a small pointed flame should not be played upon the spelter, with the idea it is going to melt and unite with the work, as this will cause the spelter to oxidize before the body of the work has become red hot, and a sound joint will not be secured under these conditions.

It will be easier for those not having had experience in brazing to use a forge, as with the blowpipe it is somewhat difficult to get the work hot enough before the spelter begins to oxidize. While it is true the spelter is protected to a certain extent by the borax or other brazing compound, if it is made red hot before the rest of the work, it will be difficult to obtain a sound joint. Sometimes it is advantageous to use the blowpipe with the forge, but if the former is utilized alone it should be of large size, so that it will heat the work rapidly. If the forge is employed the fire should be clean; that is, free from smoke and flame. Coke in small pieces is the best fuel for this purpose.

The most important factor in brazing is a sound joint. Many times joints will appear to be sound, but when the superfluous spelter is removed it will be discovered that this is what held the pieces together, and when the extra material is cleaned off, play can be detected as the spelter has not entered the joint. In some work, such as brazing a fitting onto a spindle, it is somewhat difficult to ascertain whether or not a sound joint has been obtained. One part should be held in the vise and the other moved about, and although no play is detected, yet the joint may come apart when subjected to stresses in work. When such work separates it will be found that between the fitting and the spindle there is some spelter which has melted, but not united to the surfaces of the metal, thus forming a kind of packing.

The behavior of the spelter is a good guide as to whether or not the joint is sound. If under the heat, and the spelter forms into balls, it is sufficient indication that the work itself is not hot enough. If the spelter when melted seems only to run over the surface of the work without entering the joint, it is also a sign that something is wrong.

In brazing it is absolutely essential that the surfaces to be united are clean and free from oxide, finger marks, and all other matter except the proper flux, to prevent oxidization of the surfaces when heated. Parts to be brazed should be fitted together closely as melted brass has great penetrating qualities. A good indication of a sound joint is that when the spelter is melted the greater part of it appears to have penetrated the joint. Another test is to watch the brazing carefully as it cools after it is judged to be complete and is removed from the fire. Where the two parts joint they should be the same degree of redness, and if one begins to turn black before the other, it is a sign that the joint is not sound, because if the spelter had melted and united properly with the parts, it would have conveyed the heat from one to the other so that they would have cooled together. It should be remembered that the work to be brazed should not be exposed to heat before it has been covered with borax or some similar flux so as to prevent oxidization. This is why it is recommended that those not familiar with brazing have a supply of borax without spelter to apply to the work in the preliminary stage of heating, otherwise a quantity of partly fused spelter is apt to collect on the work, and this is somewhat troublesome to remove.

When a piece of work has been brazed, it is best to let it get cold and not attempt to remove the superfluous spelter while it is hot, as by so doing an inexperienced workman may disturb and spoil what otherwise would be a sound joint.

Copper and brass require more care in brazing than iron or steel, as the melting points of the two former metals are not far from that of the spelter. In the case of cast brass, which is perhaps one of the most difficult substances to braze, owing to its low melting point, care should be taken to use a suitable spelter, one that runs easily.

Legal Department

All legal questions answered free of charge. Address Communications to Editor "Legal Department." THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Law of Inheritance.

From J. E. F., New Jersey.—If a woman marries a widower and they have no children and no property, and he leaves her and they don't live together for twenty years, or more, and in that time the wife accumulates property, both personal and real, and she dies, can her husband or his children by his first wife fall heir to any of her property?

Second question.—If a woman marries a widower and he has property and he dies, can she hold any of his property as her own, or only an interest as long as she lives, and then does it go to his children by his first wife?

These questions to apply under the laws of the State of New Jersey.

Answer to first question.—Assuming, of course, that the wife left no will, the husband would have an estate of curtesy in the real property belonging to his wife at the time of her death. Curtesy means, that he has the use and income of the real estate during his life and at his death the real property reverts to the heirs of the wife. In the case of the real property, the husband's children by his first wife would not inherit from their father's second wife. As regards the personal property, the husband would be entitled to it all and this, irrespective of whether there were children by the marriage or not.

Answer to second question.—The husband's children by his first wife take all the real estate, subject to the wife's dower. Dower is a life interest in one-third of the real estate. As regards the personal property, one-third goes to the widow and the balance of two-thirds is divided equally among the children of the husband.

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NOVEMBER, 1912.

PARTIAL CONTENTS.

WORSE THAN MONOPOLY.

It is not only a tendency to monopolize trade and control prices that some of the trusts are guilty of, but what is, perhaps, fully as important, they permit the quality of their goods to deteriorate. Take the matter of wire fencing for instance. All this fencing is made of Bessemer steel, which begins to rust almost as quickly as it gets into use and in a comparatively short time goes to pieces and new fencing is required.

If there is any way to prevent this wire fencing from rusting, the manufacturers either have not discovered it or else they are not interested. Of course, the faster the wire rusts out the better for their trade. There is no comparison between the steel wire fencing of today and the iron wire fencing of a few years ago. The writer this summer happened to spend a period in the Catskills and noticed a section of iron wire fencing along one of the streets of the place where he boarded. This street was lined with sugar maples, probably fifty years old, and when the iron fencing was put up some of it was fastened upon these sugar maples instead of posts. In one case, a sugar maple had grown over the wire to such an extent that the growth of wood, after the wire was put up, was at least an inch and a half. This iron fencing had probably been up twenty years at least and as far as could be seen was as good as new. There wasn't a sign of rust upon it.

Steel wire nails and steel cut nails do not begin to compare with the iron nails of a few years ago. The writer had his barn shingled seven or eight years ago and inside of five years the shingles commenced to blow off. In some cases five nail holes were counted in shingles and all of these nails had rusted off.

At the present time no iron nails are made, and there is apparently no process by which the steel nails can be made to outlast the life of an ordinary shingle, or if there is such a process, it is not employed by the manufacturer of nails.

The problem of rust is one of great economic importance. British investigators estimate that one railway system of England and Scotland loses 18 tons in weight every day, due to the effect of rust. The only remedy found thus far for this loss is to keep the surfaces constantly painted. In the case of the big Brooklyn bridge a staff of men is steadily employed, starting at one side and by the time they have reached the other, it must be repainted. The same practice prevails in the case of the colossal Forth bridge in Scotland, the cost of painting running up to $10,000 annually.

But experiments have demonstrated that pure iron in the presence of pure oxygen does not rust. It appears that it is necessary for the production of rust that some acid, notably carbonic acid, shall be present. When iron is subjected to the action of water containing traces of acid, and in the presence of atmospheric oxygen, it always rusts.

There is a big field for some manufacturer who can invent a process of making rustless steel nails, or if not permanently rustless, at least as desirable as iron nails.

HUMAN BROTHERHOOD.

This is being written just at the eve of the national election. Knowing that our readers are of all sorts of political belief, we wish to say that those who may be pleased with the result will find their hopes of improved conditions somewhat checked as time goes on, and those who are equally disappointed will likewise find that things will go on fairly well. That which does more than anything else for a nation is bounteous crops, and these seem to be especially gratifying.

We may differ upon economic and political matters, but all must admit that the great need is for man to really feel that the condition of his brother man is a matter of real concern to himself. When this glorious propensity becomes dominating, there will not be very much rancorous political feeling.

But there has never been a time when this feeling of human brotherhood has shown itself in so many ways. Men are dreaming of it; not with assurance that they may live to see the full fruit of its existence, but with a joy that they are able to aid its coming to those who shall live after them.

The time is coming when every man shall labor and all shall have enough; when there shall be no premature death owing to ignorance or the inability to secure a remedy; when the harvests shall be so abundant owing to improved agriculture that none shall want food; when the engines of destruction shall be so powerful that war will be impossible; when, in short, the kingdom of heaven shall come on earth. When we all really feel for the welfare of "the other fellow" and are indifferent to our own, that condition will come with the force of a mighty flood.

A FAIR CHANCE.

A good many of us have an idea that we do not have a fair chance in this world. We feel that owing to a lack of opportunity, or of education, or because we did not get the right start, or for some reason not due to our own weakness or to a lack of effort, we have not succeeded as we should have done.

But speaking of the handicaps in life, the best thing the editor of this magazine has read during the past month, or for that matter for several months, was written by one who is so utterly handicapped both mentally and physically, and so far from this beautiful earth we live upon that she may as well reside upon another planet. Now, what we mean by "best" is an article of the most vital quality, the best literary style, the noblest sentiment, and the most perfect in construction. In making this statement, it should be understood that the editor who writes this is an almost constant reader of the "browsing" sort. He reads three or four newspapers every day, tries to get a pretty good idea of what is going on in the magazines and reviews of the better class, and finds time to read or re-read some of the permanent literature of the past.

Yet, with all this wide range of reading, the very best article he has recently seen was written by a young woman who is forever shut into silent dumb darkness. We refer to Helen Keller—blind, deaf and dumb from her birth. Yet, handicapped as she is, a recent article written by her for one of the magazines is expressed more clearly, more concisely, and contains far nobler and more unselfish thoughts than anything that has recently appeared from those who have all their faculties and who have reason to feel that they have been in no wise handicapped in life, either physically or mentally.

Anything of this sort is certainly an inspiration to those who sometimes get discouraged. And what makes the article more inspiring is the sentiment expressed so well by Miss Keller, that nothing better can be done to help the blind and the deaf than by doing something to help humanity in general. Her heart beats for the poor and the oppressed, and she seems to forget her own handicap in her yearning to do something for the betterment of the world in general.

Here we have a young woman practically shut out of the world, who can express herself better than most writers who have had the highest advantages of observation, education and of practice in speaking and writing, and whose qualities of mind and heart are of the most admirable and unselfish character.

Of course, we know that the young woman's physical misfortune of being shut in and shut out may have a certain advantage in keeping her mind clear of the things of life that really amount to nothing, but it is simply a miracle that she knows so much and can express herself so well.

Who has any right to speak of not having had a fair chance when taking into consideration this marvellous young woman?

THE NEW SOURCE OF POWER.

The use of the tides of the ocean for mechanical power has been frequently referred to in this paper because the project seems feasible and of vast consequences in an economic sense. It appears that the idea is to be tried in Prussia, the North sea being the force to be harnessed. The plan is to construct a series of dams and to develop electricity.

The area confined by these dams will be divided by still another dam or wall into two enormous reservoirs, in one of which the water will be at high-tide level, and in the other at low-tide level. These reservoirs cover an area of about 2,500 and 3,750 acres, respectively. A flow of water will be at all times maintained between the sea and one or the other of the dams.

It is by this flow of water that the turbines will be driven.

At high tide the level of the sea will be higher than that in the low-water reservoir, this difference in height varying between 2 and 10 feet, which is calculated to produce in the neighborhood of 5,000 horsepower. The equalization of the difference in level between the sea and low-water basin will take a period of about eight hours. While the tide is receding, the gates between the high-level reservoir and the sea will be opened, and the flow of water from this reservoir back into the sea will drive the turbines for six hours.

In the meantime the gates between the low-water reservoir and the sea will have remained open so that at low ebb, when the gates are again closed, its water will again be at ebb level. Similarly, the high-water reservoir will be refilled during the rising of the tide. A special arrangement of gates will regulate the flow to the turbines in such a manner that they will always be driven in the same direction. The flow between the sea and the reservoirs takes place under the central dam, where the gates and the turbines are located.

The plan is simple enough and we do not see why it is not practical. There are in this country scores of places where the tides could thus be utilized, and the plan, which is already well under way in Prussia, will be watched with interest. With our coal beds being constantly reduced, and the oil fields not holding their own, something new as a source of light, heat and power must be found in the course of the next 50 years, and the power of the tides seem to be thus far the most promising as a substitute.

TO NEW READERS.

We have stated a good many times that the contents of this magazine belong to its readers, and they are not only requested to ask questions upon matters relating to their business but upon other subjects in which they are interested. With a large number of friendly and loyal subscribers, we have found in the past that few questions are asked concerning purely practical trade or mechanical matters which some one cannot answer, and we ourselves are always glad to give such information as we are able upon these or other subjects.

Of course, all this goes without saying, and the fact is perfectly familiar to our old readers. But new ones are constantly being added, while the old ones, alas, are passing on to the great beyond, and it is these new friends to which this invitation is especially directed.

Probably few publications exist where the readers continue so constantly without change. Yet even in its most constant state the law of life is continual change. Today is not yesterday. As Browning says, "Nothing but thy soul and God stand sure." So we want to impress our new readers with the fact they are invited to ask questions even though it may be somewhat hackneyed to our old ones.

DOES THE WORK OF FIFTY-TWO PERSONS.

The other day the writer of this saw a remarkable machine at work. It filled a paper bag with a certain well-known culinary powder, folded the top of the bag neatly, made a pasteboard box in which to hold the bag of powder, placed the bag of powder and a small circular in the box, closed and sealed the box with paste, and dropped it into a large wooden case. It did this at the rate of some 26 or 28 boxes a minute.

A notable feature of this machine was that there is not a spring or a part actuated by friction about it, every motion and part thus being positive. In other words, what this machine does once it is sure to do continuously and without variation.

Just how long it would take one pair of hands to do this work, the writer made no inquiry, but it is safe to say it could not be thus done in less than two or three minutes, and even then not with absolute accuracy as to the amount of the powder. But estimating that one young woman could make, fill, close and seal one box in two minutes or 30 boxes an hour, she could accomplish 300 boxes in a day of 10 hours' work. Yet this machine could fill 15,600 boxes in ten hours, or do the work of at least 52 young women.

As this particular kind of culinary powder is used to the extent of 200,000 boxes a day, it can readily be seen what the machine saves in manual labor. Moreover, it requires no feeding; nothing is necessary save that the boxes be taken from the case as fast as it is filled, and that the huge bag of powder suspended from the overhead wall be kept full.

At the same place was seen a machine at work filling bottles with liquid, pasting the label on the bottle, putting in the cork, and dropping them into a receptacle.

Truly this is the age of machinery, but in passing it may be stated that in some instances the marvellous efficiency of the machine has defeated the very ends that were sought. Take the case of the manufacturer of a certain kind of woodworking machinery, for illustration. With successive improvements it finally became so efficient that a very few machines do all the work in that especial line there is to be done. The result is that the firm in consideration now has few orders for the machine and has nearly put itself out of business.

All this is a phase of modern productive evolution that is worth careful study.

THE BUSINESS BAROMETER.

When the demand for goods of any kind, or for agricultural products, or for labor, exceeds the supply, business is always good. When the supply of any or all of these exceeds the demand, business is always dull.

The foregoing is axiomatic; it is the business barometer. When there are more goods of any kind for sale than there are buyers, more agricultural products than can be sold, or more labor than can be employed, business is always dull.

But it should be remembered that we can't have demand that equals or exceeds supply and still have low prices.

Those who are complaining about the "high cost of living" should think of the foregoing once in a while, lest they get into the unreasonable state of wanting to "have their cake and eat it too," something that is impossible.

Horse Power Required.

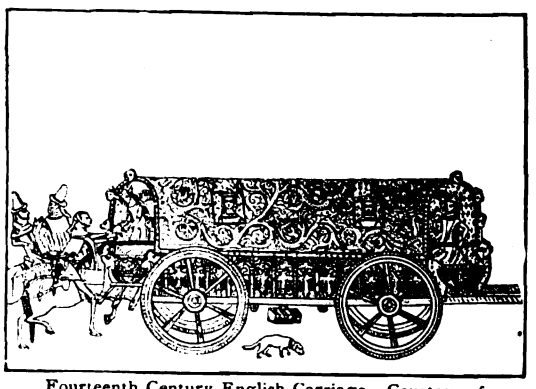
The following estimate of the horse power required to drive different machines will be found of use to blacksmiths, wheelwrights, and machinists, who have power in their shops or who contemplate putting it in. While the estimates may not be absolute in every case they are as near as can be found by careful experiments:

Machine	H. P.
Small screw-cutting lathe, 13½in. swing (back geared)	0.41
Small screw-cutting lathe, 12in. swing (back geared)	0.330
Screw-cutting lathe, 17½in. (back geared)	0.867
Screw-cutting lathe, 20in. (back geared)	0.47
Screw-cutting lathe, 26in. (back geared)	0.462
Large facing and turning lathe, 80in. faceplate, will swing 108in. (treble geared)	0.53
Large facing lathe, will swing 68in. (treble geared)	0.91
Small shaper (stroke 4in., work can traverse 11in.)	0.16
Small shaper (capacity 9½in. stroke x 22in. traverse)	0.24
Shaper (15in. stroke)	0.63
Large shaper (capacity 29in. stroke x 91in. traverse)	1.14
Crank planer (capacity 23in. x 27in. x 28½in. stroke)	0.24
Planer (capacity 36in. x 36in. x 11ft.)	0.84
Large planer (capacity 76in. x 76in. x 57ft.)	1.47
Small drill press	0.62
Upright slot drilling machine (will drill slot 2½in. diameter)	0.41
Medium drill press	1.33
Large drill press	1.24
Radial drill (6ft. swing)	0.53
Radial drill (8½ft. swing)	0.67
Radial drill press	1.08
Slotter (8in. stroke)	0.28
Slotter (9½in. stroke)	0.44
Slotter (15in. stroke)	0.95
Universal milling machine (Brown & Sharpe No. 1) without overhanging arm	0.28
Milling machine (13in. cutter-head, 12 cutters)	0.66
Small-head traversing milling machine (cutter-head 11in. diameter, 16 cutters)	0.18
Gear cutter (will cut 20in. diameter)	0.28
Horizontal boring machine for iron (22½in. swing)	0.93
Large plate shears (knives 28in. long, 3in. stroke)	7.12
Large punch press (over-reach 28in., 3in. stroke, 1½in. stock can be punched)	4.41
Small punch and shear combined (knives 7½in. long, 1½in. stroke)	0.79
Circular saw for hot iron (30½in. diameter of saw)	4.12
Plate bending rolls (diameter of rolls 13in., length 9½ft.)	2.70
Wood planer, 13½in. (rotary knives, 2 horizontal and 2 vertical knives)	4.24
Wood planer, 24in. (rotary knives)	3.03
Wood planer, 17½in. (rotary knives)	4.63
Wood planer, 28in. (rotary knives)	5.00
Wood planer, 28in.	3.20
Wood planer and matcher (capacity 14½in. x 4¾in.)	6.91
Circular saw for wood (23in. diameter of saw)	3.23
Circular saw for wood (35in. diameter of saw)	5.64
Band saw for wood (34in. band wheel)	0.96
Wood-mortising and boring machine	0.49
Horizontal wood-boring and mortising machine (drill 4in. diameter, mortise 8½ in. deep x 11½in. long)	3.68
Tenon and mortising machine	2.73
Edge moulder and shaper (vertical spindle)	2.00
Wood-moulding machine (capacity 7½ x 2½; horizontal spindle)	2.45
Grindstone for tools, 31in. diameter, 6in. face velocity 680ft. per minute)	1.55
Grindstone for stock, 42in. diameter, 12in. face velocity 1,680ft. per minute)	3.11
Emery wheel, 11½in. diameter x ¼in. (saw grinder)	0.56

CARRIAGES AND COACHES.

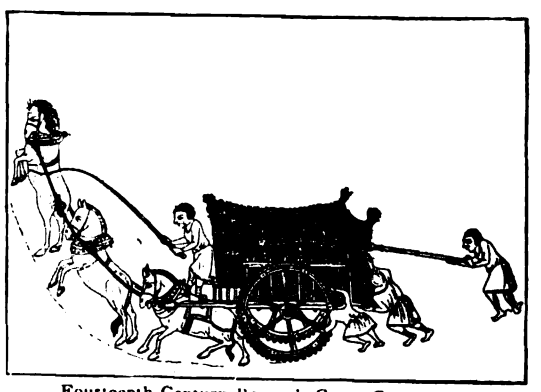
Their History and Evolution Told Most Graphically and Instructively.

The J. B. Lippincott Company, Philadelphia, Pa., have just issued by far the most comprehensive and readable book existing on the history and evolution of carriages and coaches. The author is Ralph Straus, an Englishman, and although he affirms at the outset that he is not a coach builder and that he has never looked



Fourteenth Century English Carriage. Courtesy of J. B. Lippincott Co.

at a carriage with any particular emotion, he surely knows how to write a book about carriages that combines interest and instruction, and one that should be read as well by those who have no particular interest in carriages as by carriage manufacturers. The style of the book is extremely attractive, with here and there, a delightful touch of humor. It goes along in a narrative form with just enough of fact and incident to keep the average reader's interest, who although he may not comprehend it, is all the time imbibing a good deal of fact and even of history. The work begins with a sketch of the primitive vehicle. This by the way, was quite likely a sledge. On a sledge—"stoneboat," we used to call it on the farm—heavy loads could, after a fashion, be dragged over the ground, but it was soon learned such loads could be rolled more easily than dragged. Then came



Fourteenth Century Reaper's Cart. Courtesy of J. B. Lippincott Co.

wheels which were simply thick logs cut from a tree trunk upon which the load was placed. The next step quite likely was to cut a hole through the center of the log to give greater facility in turning it. Following this it may be two rough wheels were joined by a beam. Then followed a wheel made of a rim and cross pieces, something like spokes, and some sort of a rude hub. Then came the Egyptian and Roman carriage or chariot, and so on through a process of evolution and usefulness down to the present time.

Chapter the second is entitled "The Age of Litters." These, of course, have not much connection with the wheeled vehicle, but they are carriages nevertheless. The coach was introduced about 1450 and even at this early period some pretensions toward comfort were attempted. There were no springs but cushions

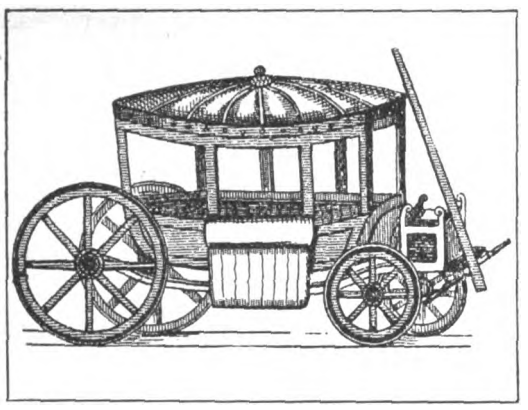
were employed to minimize the joltings, and protection was afforded against bad weather by using a top.

Singularly enough there was a good deal of prejudice against carriages even as late as the fifteenth century. In 1564 Pope Pius IV exhorted his cardinals and bishops to leave the new fangled machines to women, and royalty of those days ordered their vassals and servants, and even their kinsman, not to dare give themselves up to indolence as was the case if they rode in a coach. It is interesting to note that the once famous Bishop Hall thus spoke bitterly of the sin of coach riding:

"Is't not a shame to see each homely groome
Sit perched in an idle chariot roome
That were not meete some panel to bestride
Sursingled to a galled hackney's hide?
Nor can it nought our gallant's praises reap,
Unless it be done in staring cheap
In a sin-guilty coach, not closely pent,
Jogging along the harder pavement."

The opposition to coach riding was on the grounds of luxury and display, but like a great many other prejudices this finally wore itself out and everybody used a carriage, such as it was, who could afford it. But the coach had a rival along about 1580 in the Sedan chairs which at one time were quite popular, although they never proved a very formidable substitute for horse driven carriages.

It appears that the seventeenth century saw great changes in vehicle design, and owing to the courtesy of the publishers we are permitted to give illustrations from the book showing carriages used in the time of Charles I and Charles



Coach in the time of Charles I. Courtesy of J. B. Lippincott Co.

II, as well as before and after. Some of the carriages of those days were rather magnificent and ornate, but they would not today be called artistic.

Chapter the sixth in this interesting work is given to the carriages of the early Georgians. They were far more ornate and striking than anything that preceded them and quite likely something had been added to them for the comfort of the occupants, for the springs, the upholstery and the general construction were greatly improved upon at about this time.

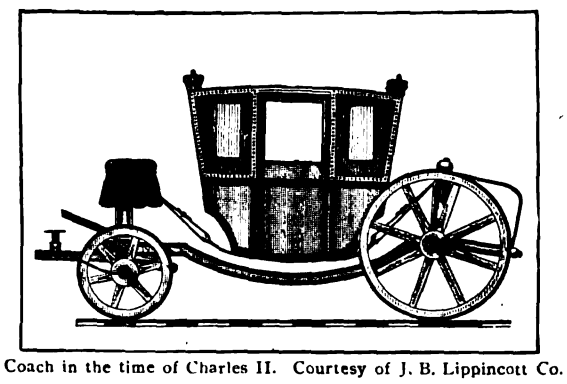
The writer devotes one chapter to the interesting subject of "The War of the Wheels" with some curious quotations as to the absurd objections which were raised to carriages and carriage riding, even at as late a date as 1770. The period for a good many years following 1800 saw quite a transition in carriage building, and much interesting information is given of vehicle development, both in this country and in Europe. Then follows quite a detailed review of the various vehicle inventions, and finally a chapter in relation to modern carriages.

Our readers will be pleased to read some extracts from this unusually interesting work, although there is difficulty in knowing where to begin and where to end. Possibly something by the garrulous Pepys will be read with interest for he assuredly had a knack of knowing what posterity would like to read. It appears that Pepys purchased a coach which he considered "very genteel and sober," and having bought it he then found a house to keep it in and horses to drive in it, but we will allow the author and Mr. Pepys, to tell the story from here on:

"28th November, 1668.—All the morning at office, where, while I was sitting, one comes and tells me that my coach is come. So I was forced to go out, and to Sir Richard Ford's, where I spoke to him, and he is very willing to have it brought in and stand there: and so I ordered it, to my great content, it being mighty pretty, only the horses do not please me, and, therefore, resolve to make better."

"29th November.—This morning my coachman's clothes come home and I like the livery mightily. * * * Sir W. Warren * * * tells me, as soon as he saw my coach yesterday, he wished that the owner might not contract envy by it; but I told him it was now manifestly for my profit to keep a coach, and that, after employments like mine for eight years, it were hard if I could not be thought to be justly able to do that."

"30th November.—My wife after dinner, went abroad the first time in her coach, calling on Roger Pepys, and visiting Mrs. Creed, and



Coach in the time of Charles II. Courtesy of J. B. Lippincott Co.

my cozen Turner. Thus ended this month, with very good intent, but most expenseful to my purse on things of pleasure, having furnished my wife's closet and the best chamber, and a coach and horses, that ever I knew in the world; and I am put into the greatest condition of outward state that ever I was in, or hoped ever to be, or desired; and this at a time when we do daily expect great changes in this office; and by all reports we must, all of us, turn out."

"2nd December.—Abroad with my wife, the first time that ever I rode in my own coach, which do make my heart rejoice, and praise God, and pray him to bless it to me and continue it."

"3rd December.—* * * and so home, it being mighty pleasure to go alone with my poor wife, in a coach of our own, to a play, and makes us appear mighty great, I think, in the world; at least, greater than ever I could, or my friends for me, have once expected; or, I think, than ever any of my family ever yet lived, in my memory, by my cozen Pepys in Salisbury Court."

"4th December.—I carried my wife * * * to Smithfield, where they sit in the coach, while Mr. Pickering, who meets me at Smithfield, and I, and W. Hewer and a friend of his, a jockey, did go about to see several pairs of horses, for my coach; but it was late, and we agreed on none, but left it to another time: but here I do see instances of a piece of craft and cunning that I never dreamed of, concerning the buying and choosing of horses."

There were plenty of horses to be had, it seems, but either Mr. Pepys did not like them or he was afraid of being cheated. "Up and down," he is recording a week or so later, "all the afternoon about horses, and did see the knaveries and tricks of jockeys. At last, however, we concluded upon giving £50 for a fine pair of black horses we saw this day se'nnight; and to set Mr. Pickering down near his house, whom I am much beholden to, for his care herein, and he hath admired skill, I perceive, in this business, and so home." So the horses were changed, and for a while Mr. Pepys was obliged to revert to the despised hackney, his "coachman being this day about breaking of my horses to the coach, they having never yet drawn." Towards the end of the month the new horses were ready, and their master made his first ride behind them on a visit to the Temple, though later in the day he was again using the old pair, "not daring yet to use the others too much, but only to enter them." Then, before the new year, came the first mishap.

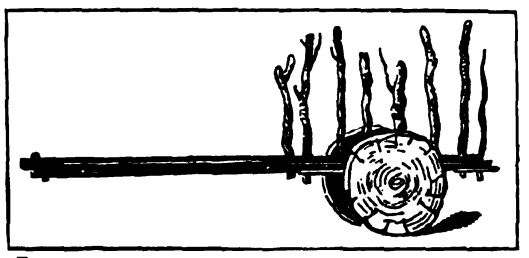
"Up, and vexed a little to be forced to pay 40s. for a glass of my coach, which broke the other day, nobody knows how, within the door, while it was down; but I do doubt that I did break it myself with my knees."

At the beginning of February another misfortune is recorded:—

"Just at Holborn Circuit the bolt broke, that holds the forewheels to the perch, and so the horses went away with them, and left the coachman and us; but being near our coachmaker's and we staying in a little ironmonger's shop, we were presently supplied with another."

Accidents of this kind were continually happening. Glasses smashed, bolts broke, and, what seems incredible, doors were lost! Even so late as 1710, a reward of 30s. was offered for a lost door. "Lost," runs this remarkable advertisement, "the side door of a Chariot, painted Coffee Colour, with a Round Cipher in the Pannel, Lin'd with White Cloath embos'd with Red, having a Glass in one Frame, and White Canvas in another, with Red Strings to the Frames."

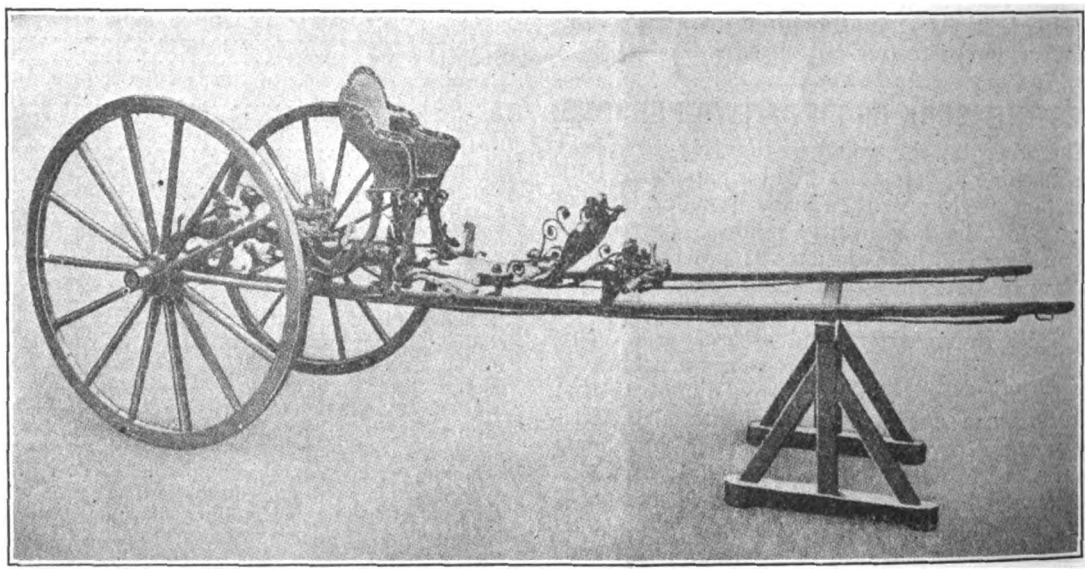
To return to Pepys. In a month or two another matter connected with his coach was occu-



Type of a Primitive Cart. Courtesy of J. B. Lippincott Co.

pying his attention. There were some people who did not think that a man in the comparatively humble position of Secretary to the Admiralty had any right to possess a coach, even though, in its owner's estimation, it might be "genteel and sober."

"To the Park," he is recording in April, "my wife and I; and here Sir W. Coventry did first see me and my wife in a coach of our own; and so did also this night the Duke of York, who did eye my wife mightily. But I begin to doubt that my being so much seen in my coach at this time, may be observed to my prejudice, but I must venture it now."



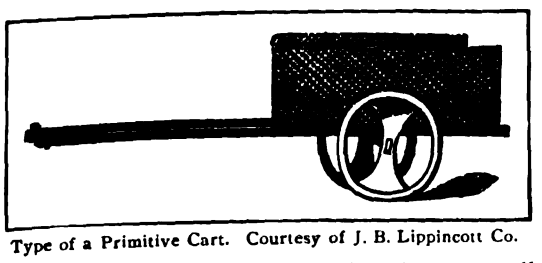
Early Italian Gig. Courtesy of J. B. Lippincott Co.

This was no idle fear, for in a while there was printed an ill-written and scurrilous pamphlet called Plane Truth, or Closet Discourse betwixt Pepys and Hewer, in which the following passage occurs:—

"There is one thing more you must be mightily sorry for with all speed. Your presumption in your coach in which you daily ride as if you had been son and heir to the great Emperor Neptune, or as if you had been infallibly to

have succeeded him in his government of the Ocean, all which was presumption in the highest degree. First, you had upon the forepart of your chariot, tempestuous waves and wrecks of ships; on your left hand, forts and great guns, and ships a-fighting; on your right hand was a fair harbour and galleys riding, with their flags and pennants spread, kindly saluting each other, just like P[epys] and H[ewer—his chief clerk]."

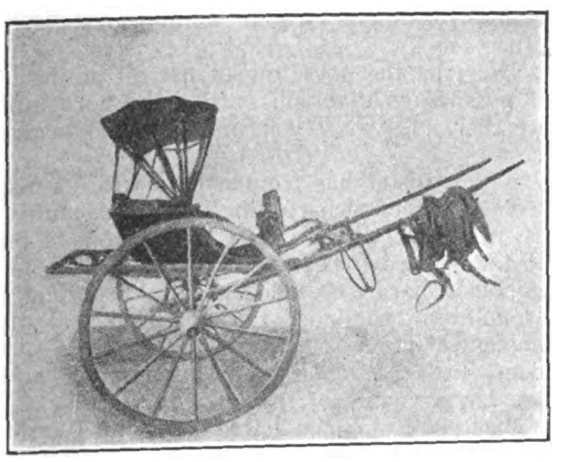
How far Pepys's carriage was decorated is



Type of a Primitive Cart. Courtesy of J. B. Lippincott Co.

not known, though this description does not tally in the least with Pepys's own. In any case, he took no notice of such attacks, and so far from making his coach less conspicuous, arranged to have it newly painted and varnished."

"Carriages and Coaches" is well illustrated



Early American Shay. Courtesy of J. B. Lippincott Co.

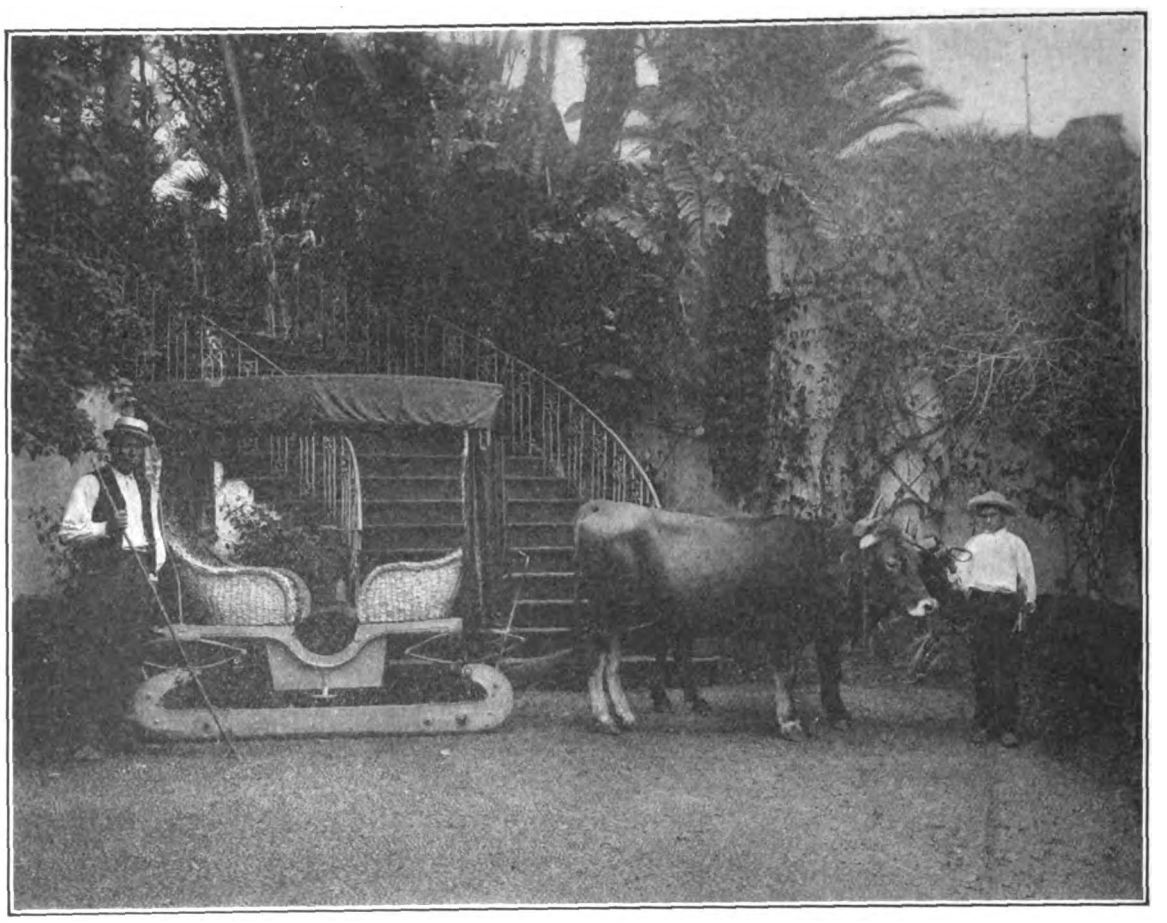
with half-tones and line cuts, many of which have not appeared before in print. These illustrations include types of primitive and characteristic carriages all along down the centuries until the modern American buggy is reached. The book is well printed on good paper and sells for $4.50 net.

A Shop in Bavaria.

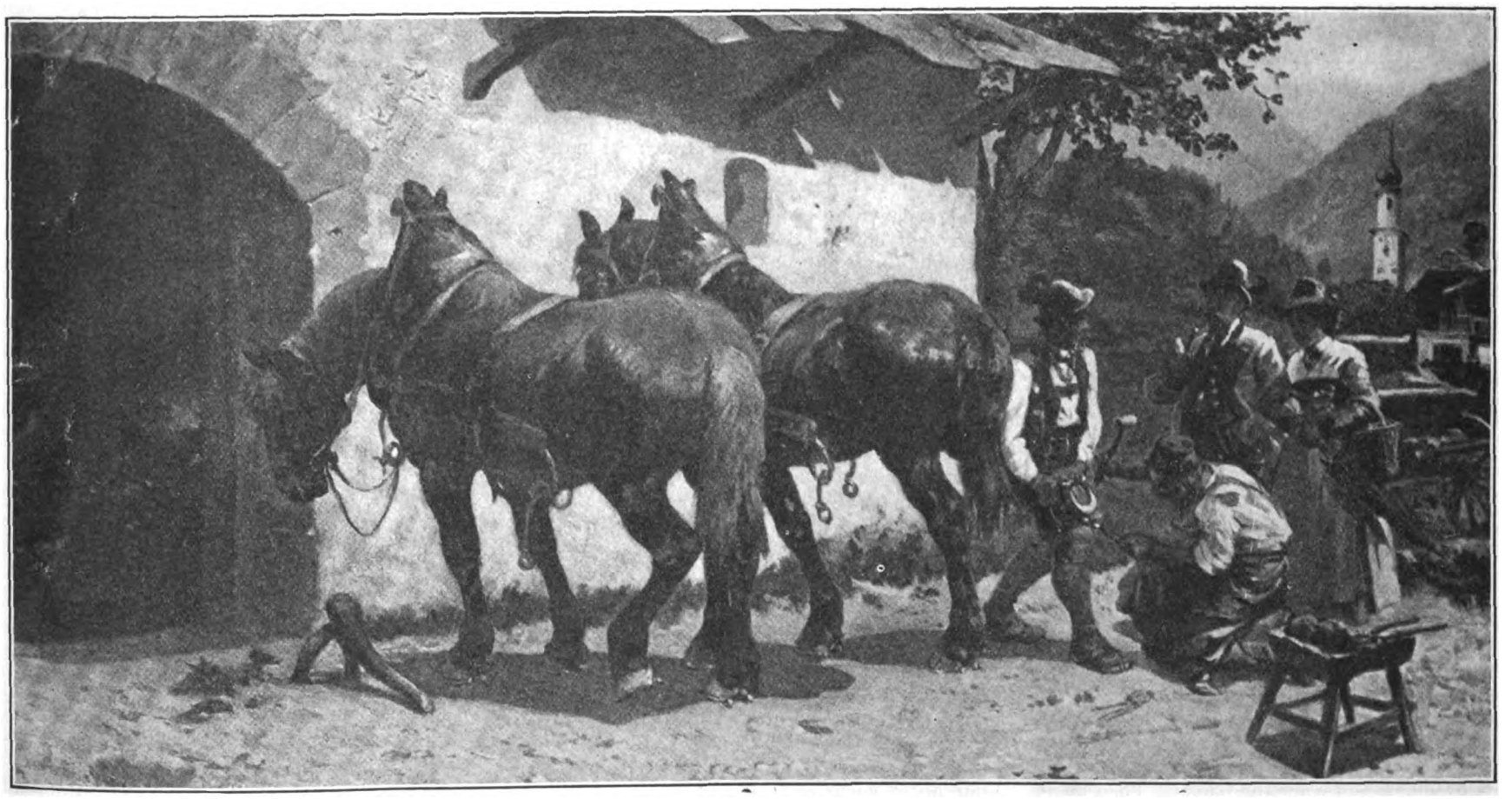
The illustration will be interesting to many of our readers, because it gives a characteristic blacksmith's shop in the Bavarian Highlands. Possibly the horseshoer there may not have the up-to-date tools and machines that are found in the United States but horses in that country are shod with care and a study is made of the best method, from which there is no deviation in the interest of haste or low price. It is noticeable that although the shop is not especially attractive, it is certainly fireproof and should not cost much insurance. The horses noticeably are powerful. The whole picture was taken from life, possibly idealized somewhat by the artist. One man holds the horse's foot, another nails on the shoe, and a significant fact concerning the two spectators, is that the man has one hand in his pocket while the other holds his pipe, while his good wife carries the basket and the umbrella—the "lord of creation" and the burden bearer.

A Fashionable Turn-Out.

In some parts of the Madeira Islands the streets and highways are covered with small, smooth cobble-stones. The carriages there, as seen in the illustration, are thus provided with runners rather than wheels. The illustration shows a carriage of the better class. Probably it is drawn up before the residence of some well-to-do citizen and is awaiting "my lady" who will soon come down the stairs to take a ride. Of course, the speed of this team is slow but time in those islands is not considered so valuable as in many cooler climates.



Carriage, Coachman and Footman.



Cheap as Dirt.

One necessity of life, at least, does not, in New York State, add to the increased cost of living. While the output of salt in New York last year was the largest on record with the exception of that of 1910, the price reached a new minimum—an average of only 21.7 cents a barrel.

Useful Mechanical Rules.

To find the area of a triangle, multiply the base by one-half the perpendicular height.

To find the area of a trapezoid, add the two parallel sides together and multiply the sum by half the perpendicular distance between them.

To find the area of a regular octagon, multiply the square of the diameter of the inscribed circle by the decimal .828.

To find the area of a regular hexagon, multiply the square of the diameter of the inscribed circle by the decimal .866.

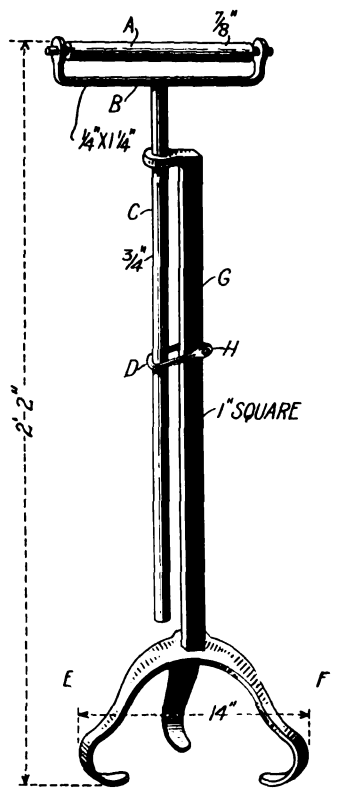
To find the area of the section of a flat bar, or the area of a rectangle, multiply the width by the thickness.

To find the number of cubic inches in any bar, multiply the area of its section in inches by its length in inches.

CORRESPONDENCE

For Heavy Work.

From A. L. Stuart, Tennessee.—For the benefit of the brothers I will describe a tool or machine I have in the shop that stays wherever it is placed and never gets tired or complains. My shop is far back in the country and in a town of about 400 inhabitants. I have one fire built near the wall of the shop and use a Portable Buffalo Hand Blower. I use a portable

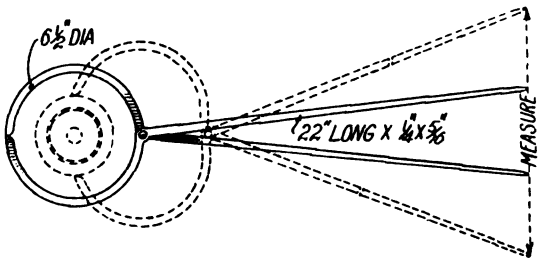


For Handling Heavy Material.

forge and set it in the middle of the floor and in handling the shaft, which weighed over 700 pounds and was broken about three feet from the end, I used two blocks and tackles. The illustration will perhaps be readily understood from the following description. A is of seven-eighths round iron journaled on each end, and acts as a roller. B is one-fourth by one and one-fourth iron, with hole in each end for the roller A. C is three-fourths round iron and D is a clevis. From E to F is fourteen inches. G is one inch square; at H is a recess for the clevis to work in. By lifting on A it can be raised to any height, and it will remain at any desired height by the action of the clevis D. This little helper can be used to hold the ends of iron bars while cutting off on the anvil, or to hold the end of an axle while it is being heated. A to E is 26 inches, but when A is raised to its full height the distance is 48 inches.

A Handy Device.

From J. W. Winford, Texas.—I have been using the ideas of the brother blacksmiths for some time and wish to do something in return, so am sending a sketch of a tool of my own



For Measuring Hub Bars

that does its work perfectly. It is a handy tool for wagon makers, measuring hub bands without the use of a string, and there is no scale to figure out. Open the jaws out until the circle ends to where you want the bands. Then measure from tip to tip of the handles and you have the exact size of your band. The sketch seems to make the matter clear, but if any one does not understand it, I shall be glad to give further information.

An S Wrench.

From J. O. Hess, Missouri.—Most smiths seem to think an S wrench is simply an S wrench. But there is a difference and an important difference, as every mechanic that has worked around machinery, and other close places, has found out. I will not say anything about the actual forging, as that has been more or less well described in your esteemed journal.

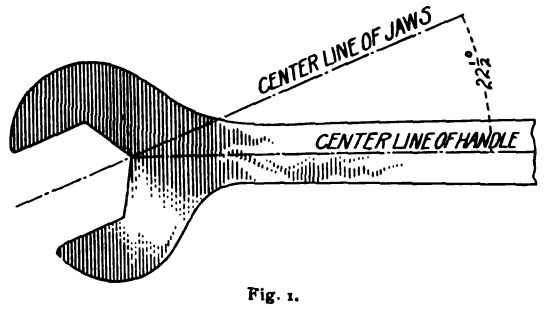


Fig. 1.

It is of the final adjustment I will speak. In Fig. 1 you have a shape that the writer has found to be good all around, with it a square nut may be turned in a space of 45 degrees by turning your wrench over at every move. A hexagon nut may be turned in a space of 26 degrees. In Fig. 2, is shown the position of the wrench at starting and at the end of the first move. Then turn the wrench upside down, and put it over the nut. The position of the second move

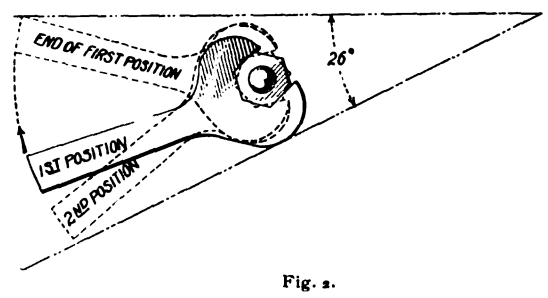


Fig. 2.

is seen by the dotted line on the right. In making this wrench, have a center line through the jaws of the wrench. Then lay off another line at an angle of 22½ degrees for the center of the handle, as in Fig. 1. To judge from some of the wrenches I have seen, the smith must have thought the bends were simply an ornament, or line of beauty.

How Prices Are Cut.

From J. H. Shaffer, Kentucky.—If the blacksmiths would stop cutting prices and get together they would be much better off. But no, the farmer or merchant will come in and say: "What will you do" this or that job for, and you will tell him you will do it for a fair price, and he will say: "I will see you later." He goes out to the next blacksmith and asks him about the same job. He will perhaps be told that he can't say just what it will cost, but he will do it as cheap as anybody will. Then he will be told that the first smith said he would do it for $2, but that is too much. Finally the second smith agrees to do the job for $1.50. Then when the farmer gets the job he promises to pay for it when he sells his corn, or tobacco, or hogs, and by the time the smith gets his pay for a job which he did for less than it was worth, he will find that he would have done better to let some one do the job who could afford to work for nothing. Price cut and doing work on credit, are each bad enough, but when they are combined, they are sure to bring poverty and business destruction. Let all smiths in the same locality get together and fix prices right. If any one can give a reason why a smith should undergo the expense of tools, machines, and a shop, and still work for less than average day wages, I would like to have it.

Good Advice as to Shoeing.

From J. C. Frambes, Ohio.—We have a very hilly and stony country causing much shoeing and carriage repairing; also causing more or less trouble with the horse as to lameness. We have some of the finest breed, both draft and roadsters, that are in the United States, and the imported draft and the best Kentucky roadster that can be found, so you see we have to study our horse when he comes to be shod, study not his gait only, but his troubles in general, caused from our rough country. We cannot use gravel on our pikes because of the hills. Take our farm horses, which are most all draft; we have much trouble with them in the summer months losing shoes while in pasture, caused from the dew softening the horn of the foot and improper fitting and driving the shoe. I find so many smiths are so careless in fitting that when driving the nails they must drive them drawing, and when the dew gets in its work, the nails will tear out pieces of the horn and let the shoe come off. So you see the cause of the trouble seems to be both improper fitting and the dew.

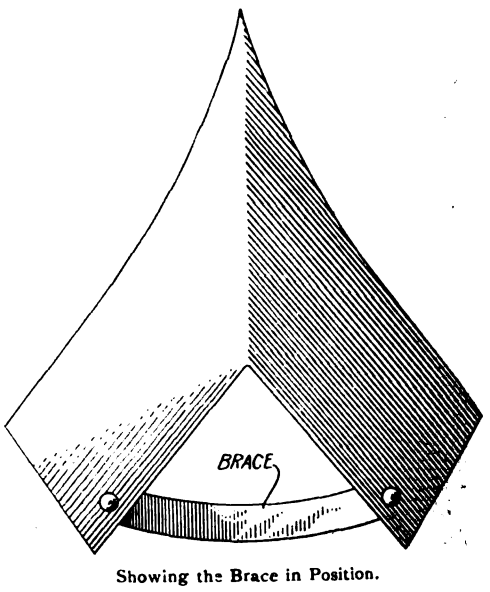
Now my experience has taught me that the fitting must be to the foot, and not as the owners would like to have the foot—a round foot made out of an oval—but as nature has provided. I take the foot and leave it as it is. I am very particular to fit the shoe to the foot and next to prepare the bottom of the foot for the shoe thus: Pare the foot as much as I can, not too short to injure the animal; then rasp the outside edge of the horn lightly, that is, so as to make a very light bearing, if any, on the outside edge of the shoe, say for a quarter of an inch. Then drive the nails so there will not be any draw outward on the horn of the foot. Now if you understand me, those of the craft who have had trouble in this line and will follow this idea, you will save money for your customers and draw custom from other smiths also, as I have custom coming past several other shops.

Don't let the horse owner use oil on the foot if possible as that will harden the horn in dry weather and cause you more trouble than the dew.

The roadster has trouble here with us that I have not seen debated in The Blacksmith and Wheelwright which I will touch upon. I refer to the bruised foot caused by stepping on stones or other hard substances. You may find the trouble in toe, side, frog or heel and often enough bruise to cause pus to form. We have considerable trouble in that line. When the trouble is in the sole near the toe or side, I use a steel plate to cover the whole foot. I am very careful in fitting the shoe, also preparing the foot, so give the sole as much cup as possible, then lay the shoe on the steel plate, mark and cut it to the neat size of the shoe. Punch or drill the nail holes, then nail to the foot. If frog or heel you will have to cup or turn the plate at the heel to protect either. I generally use a piece of an old cross cut saw blade for this purpose. I have had horses come to me with this trouble that could hardly walk. Shoe them this way and from two to twelve hours they could drive them and the animal showed but very little lameness. I hope the members of the craft who read this will understand the idea and receive some good from it.

Sharpening Plowshares.

From J. W. Prime, Kentucky.—In sharpening a plowshare, never put it on the fire unless you put a brace across at the heels, as shown in the illustration. Then it is better to put the



Showing the Brace in Position.

share in the fire bottom down and begin to sharpen at the heels. This looks like going backwards to do the work but it is the correct way, nevertheless. If you begin at the point and sharpen both sides you may be obliged to go back and heat all the point again and this takes time. So you should begin at the heels and sharpen up to the throat on both sides. Then you will have the point and throat to sharpen and when they are sharp it is completely done. This same rule applies to sharpening

corn plow shovels, in most cases. The illustration, however, refers to the sharpening of a lister plowshare.

Drilling Holes.

From William Berrier, Illinois.—Some time ago a reader asked for the best method of drilling vertical holes in plates or irons that were not on a horizontal plane. My method of doing a job of this kind is shown in the illustrations.

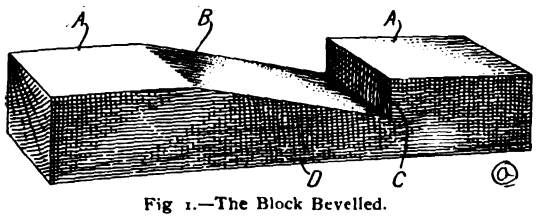


Fig 1.—The Block Bevelled.

The first step is to find out what angle the plate or iron to be bored, bears to the horizontal. After this has been learned, take a piece of hard wood of the right size and on the side lay out the desired bevel, cutting it out as shown in Fig. 1. A A is the top surface of block; D is the side view of the same; B the bevel as cut out, on which to place the plate when boring;

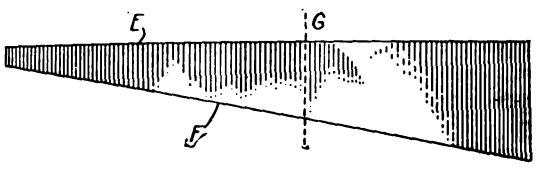


Fig. 2.—The Plane.

C the shoulder against which the iron rests to prevent slipping under the drill. If the plate is the same as shown in Fig. 2, E is the plane surface, F the beveled surface. Place F on the block, and drill from E, the dotted line G representing the drill. If the plane is as shown in Fig. 3, H is the plate; dotted line K the drill

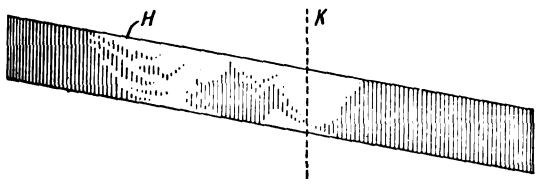
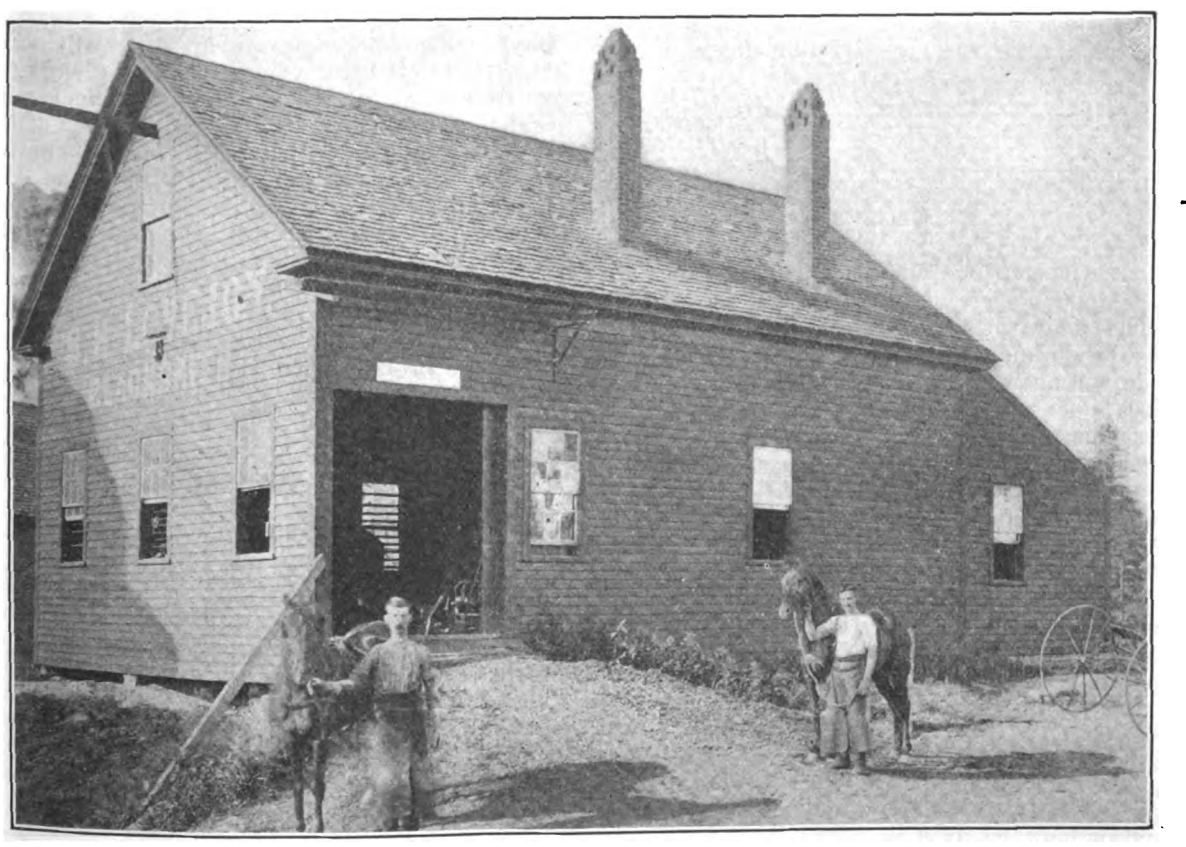


Fig. 3.—The Plate.

place on the block, and have center marks well set to prevent slipping of the drill. Start with a very small drill to prevent sliding, and if a large hole is required, increase the sizes gradually until the proper size is reached. Let the drill revolve slowly at the beginning.

Genial and Popular.

From Charles Barker, Maine.—If there is any lover of horse races in the State of Maine, or any blacksmith for miles around, who does not know Stephen Lovejoy, of Auburn, or as he is more popularly called "Steve," he has missed the acquaintance of an unusually competent blacksmith and a fun-making comedian. Mr. Lovejoy has been endowed by nature with an abnormal amount of humor and this is combined with a voice that needs no megaphone on the grand-stand at any of the horse-trots with which he is connected. His geniality has often convulsed the grand-stand and caused an otherwise dull period between heats to pass away pleasantly. He is, moreover, the oldest blacksmith in his city, having occupied his present shop for thirty-six years, and outside of his outings at the various cattle fairs and races, has reported for duty every morning. Mr. Lovejoy owes his success largely to his almost unconscious fondness for a joke, and his cheerful laugh is certainly an excellent business asset. If he has any special hobby it is certainly speedy horses. He has raced many of these and some of them have made extremely fast records. He can be often seen in the early morning, just after daylight, behind a promising colt, rehearsing paces through the silent and broad thoroughfares of the town. In the picture shown Mr. Lovejoy stands at the left.



Mr. Lovejoy's Shop.

ANSWERS TO CORRESPONDENTS

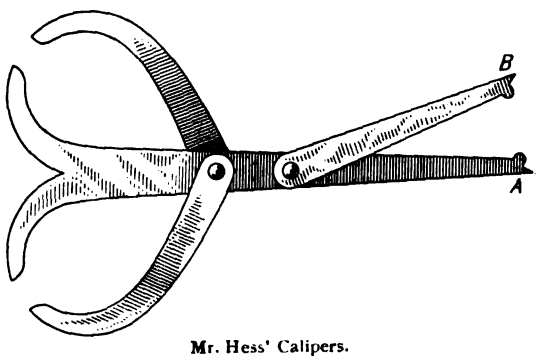
Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

Logging Dogs.

From Walter Shriner, Oregon.—Some time since, I saw a sketch in your magazine on making logging dogs. I wish to give a better way of making them as the illustration shown would not work very well on a heavy pull as they have no pull in the log and are likewise hard to get out of the log. The length of the same is governed by the size of the timber. I do not upset the end at all but cut the end on a long angle and bend leaving the end three and one-half inches long and I flatten down the outside. I leave the point a little wider than the rest of the steel as it cuts the wood wider when driven in the log and it is not so hard to get out of the log. Before you start to do any forging take your square and let out the draft of your dog on the side of your anvil. Then take a chisel and cut along the mark. You will find your draft by marking a right angle on your anvil. Then measure three and one-half inches from the face of the anvil. Then measure one and one-quarter inches towards the eye of your dog. Then draw your line and cut with a chisel. The length of the points will vary somewhat but that does not change the draw of the dog. I have used and made a good many of them and know when one is made right.

More About Calipers.

From J. O. Hess, Missouri.—I was much amused at the way Brother E. R. Sizer of Idaho took J. F. Hobart to task about the woods in his State and welding files. Certainly files can be welded and good edged tools made of them. But a good grade of tool steel is more reliable and cheaper in the end. We make use of a good many rasps in jointing plow lays, but we do not think we have done anything wonderful. Now Brother Sizer ought not to jump on Brother Hobart this way for he is a most useful man, for does he not tell us about welding a steamship boiler, 10 feet in diameter I think it was,



Mr. Hess' Calipers.

in one paper, and in the next he tells us how to patch sauce pans? I think, however, that Brother Hobart has got in a little rut with his key calipers. After criticizing a caliper in the July issue, he gives us an illustration of his key calipers. Now to begin with a key has three dimensions, besides the length, width and thickness at the head and at the point. How does he get his third dimension with his clipper? Nor can he caliper very large work, such as shafting with it, for the shaft will strike the straight part of his caliper. Enclosed I send you a sketch of a good all round caliper, the drawing being one-half actual size. It will take three measurements and will caliper shafting 4½ inches diameter, and caliper tubes, pulley bores and other inside measurements. I made the first pair in 1891 and later I added the two points as at A and B. They answer for transferring measurements and scribing circles. In fact, it will take the place of a pair of dividers of the same capacity.

Now the rivet that bothers Brother Hobart in this caliper where it goes through the body is square and fitted in tight so either leg can be moved without moving the other leg a particle. They have been found so popular, that I have made some for other smiths.

Shoeing Unruly Horses.

From Melvin McCloud, Canada.—I have recently seen articles in The Blacksmith and Wheelwright about shoeing unruly horses, but in most cases it seems to me the arrangements have been unnecessarily severe, especially where the horse was more nervous than ugly. I will explain the method I use. A A, Fig. 1, are the

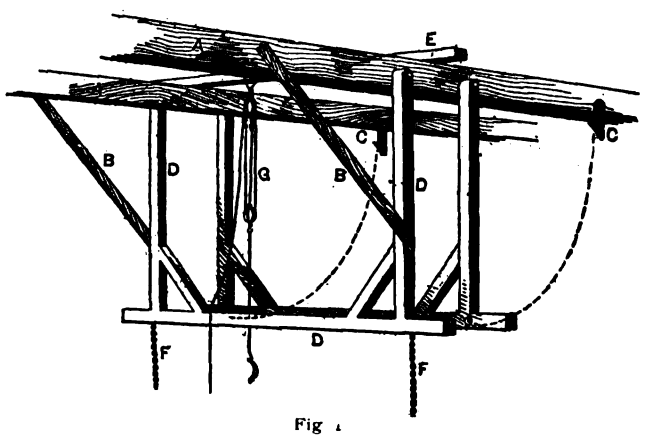


Fig 1

upper joists in my shop to which the device is attached. D D are two pieces bolted to the joists as shown. One of these parts is braced as shown at B B. The other part is hooked up on hooks C C, when not in use. When you get a horse that is hard to manage, stand him alongside of the part that is braced. Now let down the part that is hooked up, and fasten the chains, F F across, one in front and the other behind him, and tie him so that he can move neither backward nor forward. Then with the pulleys G you can pull up his foot as shown in Fig. 2, and hold it where you want it. By moving the pulleys forward to his fore feet you can use the device for the front shoes. The upper pulley should have a clutch to hold the rope at any

place. It will be noticed that the side pieces are high enough from the floor or ground to give a person plenty of room to work under, and there are no posts or other obstructions in the

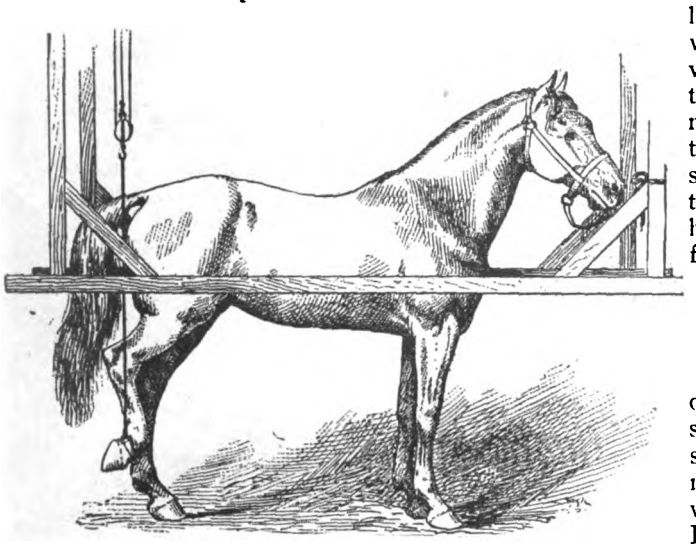
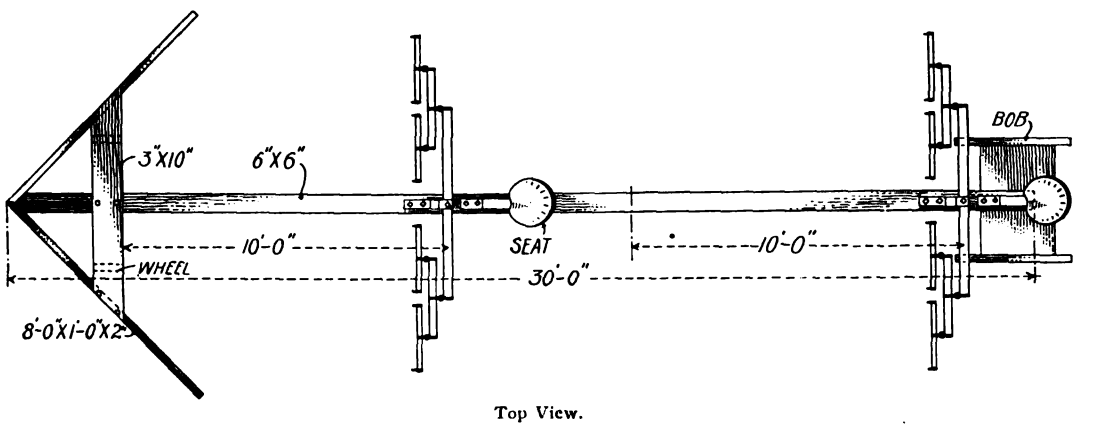


Fig. 2.

way. I hope I have succeeded in making the arrangement plain.

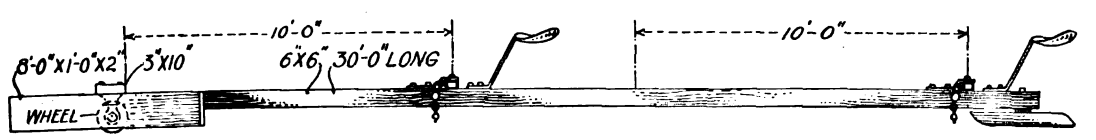
An Eight Horse Snow Plow.

From Albert Wolff, Nebraska.—I notice in your September issue that a New Zealand subscriber wishes a snow plow. I will send a drawing of one that was used here successfully last winter. To a beam of hard wood 6x6 inches



Top View.

30 feet long, attach at the one end as shown two planks 2x12 inches, 8 feet long, and measure to the center of each, and put a cross piece 3x10 inches bolted flat on the beam, and fasten securely on each end. This must be long enough to give each sweep the width the road shall be opened. At each end of this cross piece a wheel or runner should be fastened to carry it the right distance from the ground. Wheels are better, as runners will be more apt to run on top of the snow. The sweep may be made higher if the snow is much deeper. At the ex-



Side View.

treme end of the 6x6 beam attach a bob sleigh; that is, only one bob. This must be so it can turn either way, and the eveners for the horses must be firmly attached. Behind each evener there must be a seat for the driver. With this plow and eight good horses you can go right along and any team can pull a load behind you.

Running a Blower by Power.

From U. G. Neale, Connecticut.—I will try to give Brother Emile Alexis my way of running my Champion blower by power. It is, however, rather difficult to give this information as he does not say how his line shaft is situated in relation to his machine. I run a counter shaft parallel with my blower crank shaft and use a grooved pulley for a half-inch rope belt spliced with a long splice so it will run nice and smooth. My pulley is about 10 or 12 inches in diameter and runs the counter shaft about 100 revolutions per minute. I made the end of the counter shaft, which is directly over my blower, so that I could raise it to tighten the belt and lower it to stop the blower. In this way the raising of the counter-shaft does not throw it out of line enough to make any difference with the way it runs. By using a guide where the rope runs on to the pulleys, I have no trouble with the belt coming off. I can turn my blower from five to one hundred revolutions per minute and get just the size fire I want. Of course, I use a lever fixed in a convenient place to handle, and out of the way of the crank when I am using the crank. I have notches to hook the handle in to tighten the belt to any degree I wish. Not knowing just the situation of his forge and blower it is hard to tell just what he needs but I hope this will help him and if so I will be glad to furnish other information some future time.

Welding Steel.

From Earl Chesney, Minnesota.—As there is quite a discussion in this paper about welding steel, I will give my ideas. I have welded hard spring steel and had it hold, too. If there is nickel or anything like that in the steel I can't weld it, but if the carbon content is not too high I can weld hard steel files and such. I welded an eight-foot shaft of steel which a blacksmith said couldn't be welded and the shaft was used hard, too. I have welded Newhouse trap springs so they would work and they are the best of steel. With a good fire and care hard steel should be welded and can be. If the steel is too hard or has some composition in it I braze it. The way I do this, I take the two pieces and carefully join by a scarfe. I put a piece of brass on the top side and bind the brass on to the joint. Then put it in the forge, "brass up" and heat until the brass melts, having first put borax on it. Sometimes I put a piece of zinc beside the brass. I use this for brazing gun barrel lugs.

For Over-Reaching and Interfering.

From A. A. Anderson, Georgia.—Through The Blacksmith and Wheelwright I notice a good many horse-shoers write concerning shoeing for over-reaching and striking. Now I find that different horses need different shoes. Often what will stop one horse from interfering will not stop another. I find that for one sort of interfering a shoe with a heavy, thick weight on the inside and a light, thin weight on the outside will answer, but that in other instances this does not seem to effect a cure. For overreaching I use a shoe as heavy as possible in front with a flat rolled toe. Use a shoe that is long behind with high calks. If the horse is to be used on country roads, have the calk sharp. After reading the foregoing, if any brother should think he has any better pointers, I will gladly adopt the same, and I shall also be willing to give any other pointers that have come from my knowledge and experience, if they are required.

A Good File.

The color of the file should be a dull, silvery gray, free from spots or mottling, except at the end or tang, where it is tempered. Files should be kept in a rack by themselves, and should not be thrown in a drawer among other tools, and if a file or two be carried on the car, they should be wrapped separately in paper or cloth to prevent injury.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Steel Stamps for Marking.

From A. K. Olsen, Wisconsin.—Will some one please tell me where I can get a good steel stamp for marking tools, and the price of each letter?

I also wish to have the brother blacksmiths and wheelwrights inform me if it is the proper way to take the dish out of new wheels by placing the wheel on the floor and putting the felloe under an iron peg in the side of the wall, and then jump full heft on the opposite side of the wheel to spring it back in place. Please write in full explaining this subject, as I do not believe in the method.

Who Can Tell Him?

From Chas. D. Snyder, Pennsylvania.—Will you please explain how to make a motor frog, to dove-tail them in making in two pieces, and how much to cut out of the top and bottom of the rail, to make a three-inch spread from the point back a foot, and from outside rail to outside rail.

Rusty Grindstones.

From A. L. Friswell, Pennsylvania.—Will some experienced smith tell me through your paper what he does with a grindstone when it becomes so filled or covered with rust that it will not grind hard steel? I have a stone that is in this condition, and I would like to know whether it is better to try and remedy it or throw it away.

A Hub Boring Machine.

From R. A. Southard, Vermont.—I would like to ask if some of the readers of The Blacksmith and Wheelwright will tell me how to make a hub boring machine?

Cylinder Packing Rings.

From E. S. Harris, Canada.—Will some one please advise me where I can purchase 5-inch copper asbestos cylinder packing rings?

A Good Combination.

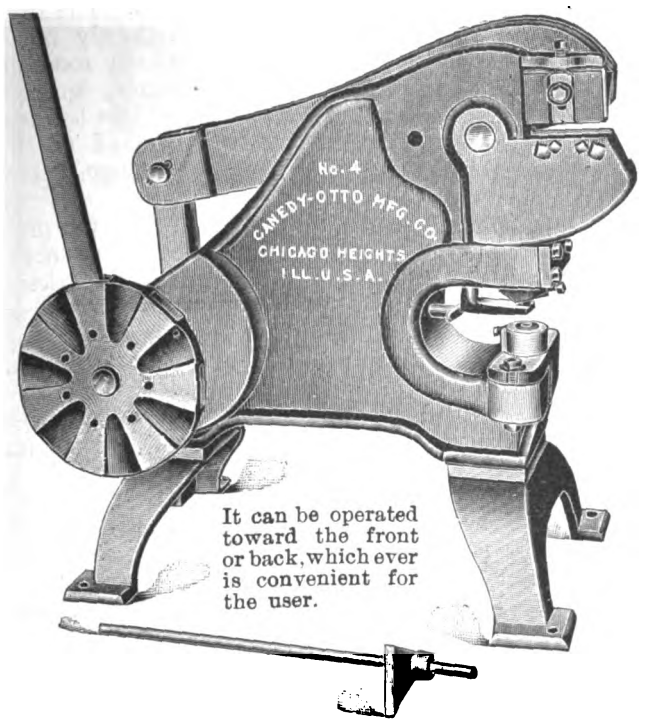
From R. G. Wold, Okalhoma.—I have been an attentive and silent reader of The Blacksmith and Wheelwright for nearly a year. I have gained many new ideas especially valuable to me as I am a beginner at the work. I am a school teacher and general blacksmith and like blacksmithing much the better of the two. Many people here make fun of me for taking up blacksmithing but I believe an educated smith will stand a better show than one who is not. Considering the pace at which our old world is moving it is necessary for a man to know something besides pounding iron if he is to be a successful smith. I am especially interested in automobile repairing and I stand with the brothers, who believe that it should be a part of blacksmiths' business. The only thing a smith needs to do to get this work is to be really able to show people that he can and does know how to do it.

Cost of Keeping Horses.

The cost of keeping the average farm horse in the State of Minnesota is approximately $85 a year, says a contributor to Farm Journal. This includes such items as feed, shelter, labor in caring for the horse, depreciation in value, shoeing and all other expenses. It is also estimated that the length of time which each horse works during the day is a little less than four hours, for a yearly average, excluding Sundays and holidays.

Tacked up in an Arkansas saw mill is a sawmaker's card, on which is printed an old saw running: "I used to think I knew it all, but now I must confess the more I really know I know, I know I know the less."

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ¾-in. and ¼-in. punches and dies, also a lever bar.

When choosing your blacksmith shop equipment why not get the best—

CANEDY-OTTO

It costs no more.

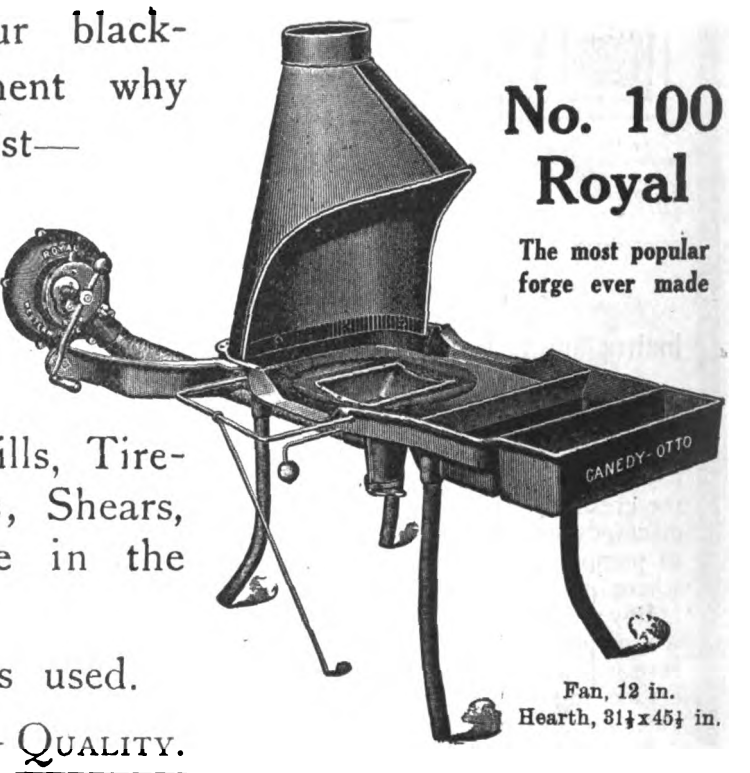
Manufacturers of the finest line of Forges, Blowers, Drills, Tire-Shrinkers, Punches, Shears, produced anywhere in the WORLD.

Once tried, always used.

There's a reason — QUALITY.

No. 100 Royal

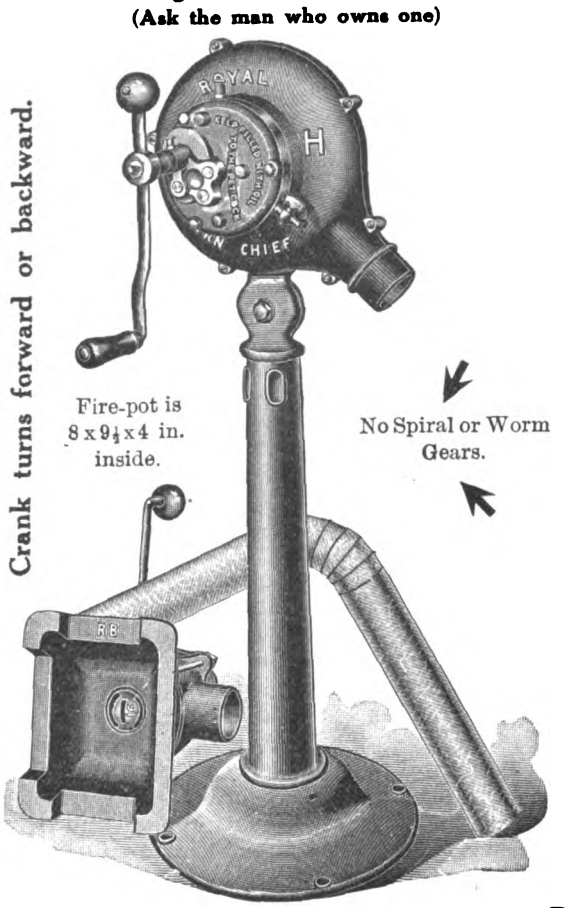
The most popular forge ever made



Fan, 12 in.
Hearth, 31½x45½ in.

Royal Blower

(Ask the man who owns one)



Crank turns forward or backward.

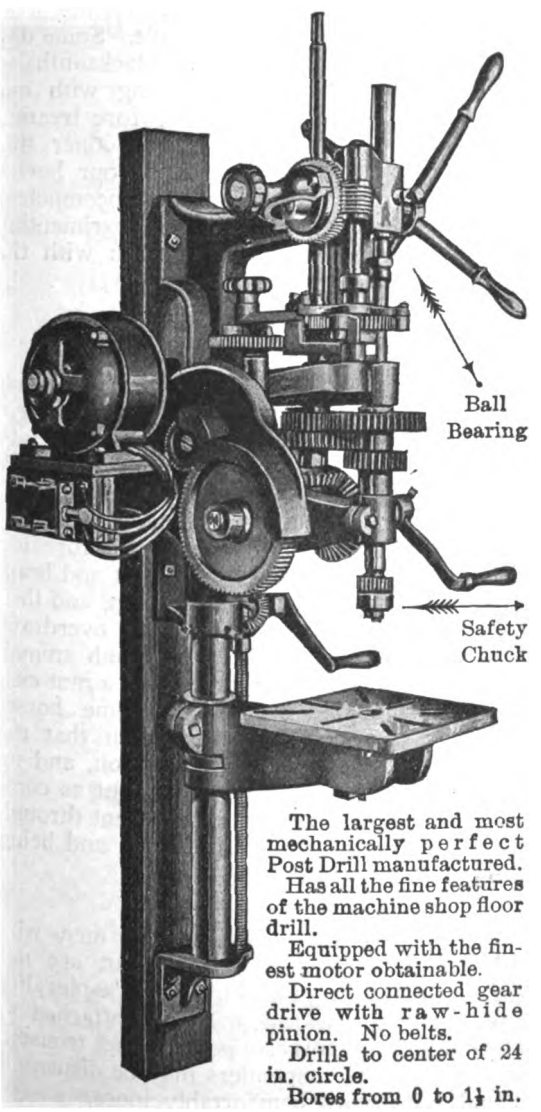
Fire-pot is 8x9½x4 in. inside.

No Spiral or Worm Gears.

FORGES BLOWERS

PUNCHES SHEARS

No. 16 Electric Drill



The largest and most mechanically perfect Post Drill manufactured.
Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

DRILLS TIRE-SHRINKERS

Over 200 different styles of TOOLS. We can suit every need.

Send for Catalogue

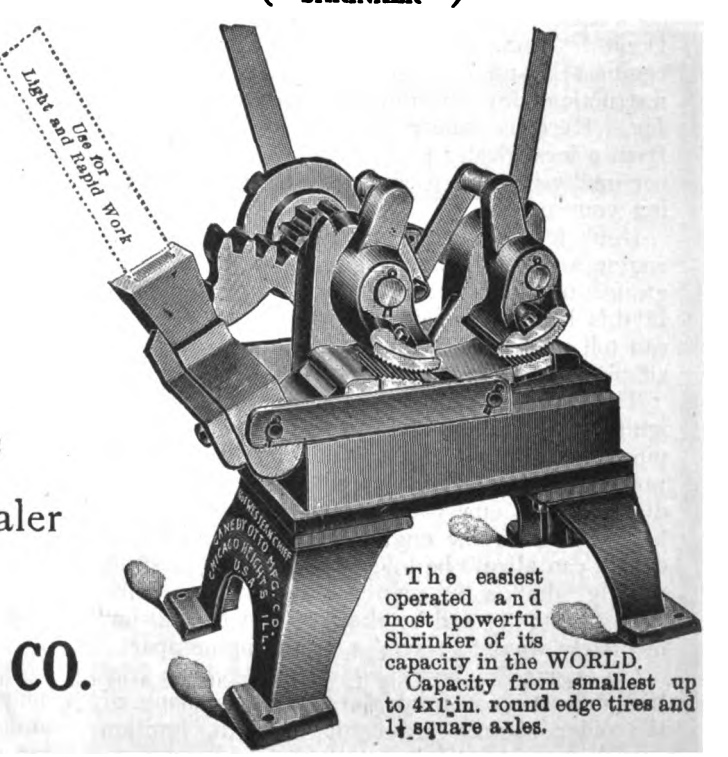
Give name of supply dealer or jobber.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILL.

No. 1½ Western Chief

(TIRE and AXLE SHRINKER)



The easiest operated and most powerful Shrinker of its capacity in the WORLD.
Capacity from smallest up to 4x1½ in. round edge tires and 1½ square axles.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

BUYING A GAS ENGINE.

Instruction as to Size, Installation, Care and Running.

Decide on the maximum amount of power you must have. Remember if your engine is to be used on the farm that in addition to running the cream separator, churning, running washing machines, corn sheller, etc., you will often want to pump water, saw wood and do other work where one or two extra H. P. comes in handy.

Buy your engine through a reputable dealer whose place of business is near you. Such a man will take a personal interest in having your engine run well and you can, if necessary, get parts quickly.

It does not pay to buy your engines from a comparatively unknown concern a long distance from you. Such people as a rule make their customers pay for their experiments, repair parts cost high, and take a long time to get and they have no personal interest in whether or not you succeed in using the engine properly.

Gasoline as fuel gives the best service for a small engine, but kerosene and other heavy oils are rapidly coming into favor for the larger sizes. An experienced engine salesman will tell you which is the best fuel for your purpose and which will cost you the least.

If you want to drive machinery that takes 10 h.p. get a 12 or 15 horse engine. Don't load your engine up to the limit and expect it to do good work.

Use good fuel and the very best oil obtainable. It really pays to use a good oil even if it costs twice as much as the cheaper kind. In the first place it will go further and secondly, it keeps the engine from wearing out.

Insist on your engine having a built-in slow speed engine timed magneto with visible timing feature. This machine eliminates all batteries, coil, and switch, and furnishes the current for sparking the engine as long as the engine runs.

These slow speed alternating current magnetos are the same as used on automobiles only the more simple and reliable make-and-break igniters are used on the engines instead of the spark plug as used on the automobile.

As the magnetos have no belt or friction wheel and require no speed governor, they should not be confused with the cheap little sparking dynamos used for this purpose.

Ignition troubles are by far the largest proportion of troubles that beset the engine user. The built-in engine timed magneto eliminates these and really costs no more than a set of high grade closed circuit batteries with the necessary coil and switch.

After getting the engine, read the instruction book carefully before trying to operate same. Don't let some one who has another make of engine tell you how to start and run yours as instructions for different kinds of engines differ. Here is where purchasing your engine from a local dealer pays, as the local dealer can personally instruct you in setting up and operating your engine.

Don't let so-called experts monkey with your engine and especially if it has one of the high grade timed alternating current magnetos on it. If this has the visible timing feature, any one can tell whether the timing is correct or not by simply looking at it.

The troubles with engines are usually dirty igniter points, stopped up gasoline or water pipes, lack of oil, or the valves are out of adjustment. Any of these troubles are easily remedied by any one with common sense without having to take the engine apart. An imitation expert can always be told by pretending to know exactly what is the matter with the gas engine almost instantly and by the fact that he will immediately want to tear the entire engine apart.

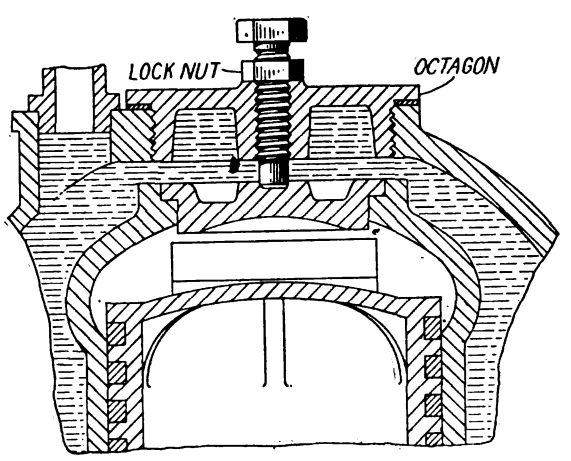
On engines having a battery or the cheap friction driven ignition sparkers, such as many of the older engines are equipped with, ignition troubles are plentiful and these require an expert for their location and remedy, but with the more modern magneto equipped engines these troubles are eliminated and in fact the only thing that can go wrong is the timing as the magneto revolves in time with the engine unless a gear should slip in some way. Now a magneto should be selected in which provision is made for checking against this slipping, without the necessity of opening the magneto. The choice of an engine equipped with a magneto of this character will result in good reliable service.

If the engine is to be used in one place, bolt it down to a good foundation. Don't bolt it to a lot of loose timbers set on a dirt floor.

Get a good storage tank for the liquid fuel and put it preferably under ground. Read instructions sent with the engine and see that the tank isn't buried so deep that the engine fuel pump won't draw.

Leaky Compression.

At the suction stroke of an internal combustion engine a vacuum is created in the combustion chamber, so that if there is a leak between the combustion chamber and the water jacket, water will be sucked into the combustion chamber and its presence will be sufficient to affect the mixture. During the compression stroke, since the mixture within the cylinder is compressed to from 40 to 80 pounds per square inch, depending upon the design of the motor, it will be forced through the flaw into the water jacket of the motor. During the power stroke, considering the average motor,



How to Make the Top to the Cylinder Tight.

allowing that the piston rings are tight, and that there is no leak from any other quarter that falls to the usual expectation, since the pressure during inflammation runs up to nearly 300 pounds per square inch, power will be lost at an enormous rate. During the scavenging stroke the products of combustion are gotten rid of, and if there is any water in the cylinder as the result of a leak from the water jacket, it will go out in the train of the products of combustion in the form of steam. Unfortunately, a very trifling leak between the water jacket and the combustion chamber will shut down the motor. The illustration shows the top of the cylinder with a cover at the extremity over the combustion chamber, and a second cover over the water jacket. The outer cover screws into the wall of the water jacket and is made tight by pressing against a copper-faced asbestos gasket. A stud is threaded through the outer cover, and the end of the stud engages a cavity in the combustion chamber cover, so that when the stud is screwed in it presses against the combustion chamber cover, and, by means of a copper-faced asbestos gasket around the seat formed out of the dome of the cylinder, the cover is set down tight. A defect in the gasket, or failure to set up on the stud, will result in a leak, and disastrously affect the good performance of the motor. This illustration shows but one of the many plans that are in vogue in motor designing, but the principle of maintaining tightness of the combustion space within the cylinder, so that there will be no leakage to or from the water jacket, is clearly brought out, and the automobilist who has a mysterious form of trouble with his motor should examine into this phase of the operating problem and find out whether or not the covers are tight.

When you think you are too old to learn, it simply means that you are getting too stubborn and contrary, for there is no age limit to learning new things.

Gas Engine Ignition.

On gas engines, a friction driven dynamo is often furnished in place of batteries. The friction wheel of this bears against the fly wheel rim. Machines of this type eliminate some of the well-known troubles due to battery ignition, but the friction drive mechanisms must be carefully watched. See that the face of the fly wheel on which the friction wheel bears, is free from grease and dirt.

Oil the dynamo regularly. If not, the pressure on the friction wheel will cause uneven running, the dynamo will stick, and the friction wheel will have a flat spot worn in it.

Remember to drive the dynamo fast enough to generate sufficient current. See instructions sent with dynamo. Most machines require over 1,500 R. P. M. At this high speed, frequent lubrication is absolutely necessary. Do not forget it.

Slow speed engine timed built-in magnetos are superior to the friction drive machines because they form a part of the engine, seldom run faster than the engine, and are gear driven, thereby eliminating the friction drive troubles completely.

Magneto equipped engines are exclusively used in automobile, aeroplane, and motor boat engines, and hold all world's records for speed, endurance, and economy. Until recently magnetos were not used on stationary engines on account of their cost, but now the leading engine makers are furnishing magneto equipped engines because wide-awake buyers will accept nothing else. Magnetos having a visible method of timing should be specified.

Injury to the Horse.

From Dr. F. H. Rowley in Our Dumb Animals.—It may seem an exaggeration to speak of the average blacksmith as the natural enemy of the horse, but, consciously or unconsciously, multitudes of these men are. Nothing is truer than "no feet, no horse." Almost all the horses' lameness comes from ignorant, indifferent blacksmiths whose chief aim is to get their pay for such work as they do. One marvels that the State has never allowed a man to work on so wonderful a mechanism as a horse's foot, where so much of his value lies, without a scientific knowledge of that finely and delicately constructed piece of anatomy. The owner of the horse, out of mercy to his faithful servant, should at least see to it that the foot is kept perfectly level (a matter of the highest importance), that red-hot shoes are not burned into place, that bars are not cut away, that the pressure of the iron is kept from the sole. Some day we shall make it as necessary for blacksmiths to pass an examination before dealing with our horses' feet as for veterinarians before treating them for their various ills. The sooner this comes, the better for thousands of our horses that can enter no protest against incompetent blacksmiths who might better be experimenting in making watch-springs rather than with the living mechanism of a horse's foot.

The Cruel Check Rein.

It is strange that the overhead check rein has not run its course and been given up long ago, observes the Weekly Call of Troy, Ill. A horse will travel easier, last longer and look better when given his head. If checked at all it should be with only a moderate side check.

The present fashion is to clip the fore top close to the skull so the animal's eyes and brain have no protection from light and heat, and then pull up his face to the sun with an overdraw. This is rank abuse of a helpless dumb animal, and is entirely uncalled for save by ignorant custom and fashionable stupidity. Some horse-breakers draw a colt's head so high that the torturing checks get all of its attention, and its education, when handled thus, is about as complete as that of the young man who went through college by entering at the front door and being kicked out at the rear.

A new patent that will interest men who would like to discard suspenders but are not partial to tight belts is a shirt with "a plurality of lapels" which are designed to be attached to the trousers for their support. The trousers being thus held up, suspenders may be dispensed with and belts worn comfortably loose.

WANT ADVERTISEMENTS

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED,

will be inserted under this head at 2 cents a word, including the address for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1.00. Address

M. T. RICHARDSON CO., 71-73 Murray St., New York,

PUBLISHERS OF THE BLACKSMITH AND WHEELWRIGHT.

PATENTS FOR INVENTIONS.

H. W. T. Jenner, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.

A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.

We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blacksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., publishers, 71-73 Murray Street, New York City.

PATENTS.

C. L. PARKER, attorney-at-law and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

CASH FOR YOUR BUSINESS OR REAL ESTATE.

If you want to sell, send me a full description and price. Confidential. Established 1881. I bring buyer and seller together. If you want to buy, sell or exchange any kind of business or real estate, anywhere at any price, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Illinois.

BROTHER.

Accidentally have discovered root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

MECHANICS.

Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

BLACKSMITHS.

Be up-to-date mechanics. Help bring our craft up where it belongs. Do jobs that others cannot and get the big money. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

WANTED.

WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORK, St. Cloud, Minn.

FOR SALE.

Blacksmith shop. Good trade, plenty of work for two men. Reason for selling, do not know the trade. Address P. O. BOX 227 Roswell, S. D.

FOR SALE.

McGovern and West power tire shrinker, Moyer and Defiance hub boring machine. All as good as new at one-third the price of new ones. Address, 554 Freeman Ave., Cincinnati, Ohio.

FOR SALE.

Barcus shoeing rack, good as new, is for sale cheap. Address, M. LARSEN, Voorhies, Iowa.

WANTED.

Single man capable of doing shoeing and general repairing. Will pay $50.00 a month, with board and wash the year round. No boozer. Address N. J. ALMETER, Mazeppa, Minn.

SELL YOUR SHOP, FACTORY OR BUSINESS FOR CASH.

Blacksmith Shops, Stores, Farms, Factories, Dwellings, Machinery of all kinds, we sell anything anywhere in United States or Canada. Write us. AMOS SALES CO., C2402-C2404 Johnson Street, Greenville, Texas.

FOR SALE.

Band saw, rip saw, shapers, stickers, spoke tennoner, planers, engine lathes, millers, 8 to 75 h.p. plain and Corliss Engines; marine engines. BICKNELL CO., Janesville, Wis.

FOR SALE.

One No. 2 Brooks Tire Setter. Good as new. Will sell cheap. Address BYNES BUGGY WORKS, Gibson, Ga.

FOR SALE.

One of the best paying power blacksmith, wagon and shoeing shops in Colorado. Work for three men. Good prices. We will gladly show you if interested. Health reason for selling. Address G. W. C., care of Blacksmith & Wheelwright, P. O. Box 654, New York City.

FOR SALE.

Blacksmith and Machine Shop. Building 32 by 50. Equipped with power. Good location. Also house and barn. Address for particulars E. W. EIDSON, Sligo, Colo.

FOR SALE.

General blacksmith shop, 24x80, with stock and tools; good up-to-date power tools; work for 2 or 3 men year around; farm implement shop and feed mill in connection. C. H. HANSON, Manchester, Minn.

FOR SALE OR RENT.

A blacksmith shop including a paint shop and implement buildings. A good chance for a good steady man. Write for full particulars and price to H. HEIBERTSHAUSEN, Sulphur Springs, Ohio.

FOR SALE.

Blacksmith's shop in country. Excellent location. No opposition. With tools (extra good set) and stock. Also one hundred and sixty acres homestead relinquishment. Will sell both for $2600.00. Write for particulars and terms. H. N. LINEBARGER, Tiffany, Colo.

FOR SALE.

Blacksmith Business, stock and tools, only shop in good town, good trade, reason for selling rheumatism, inquiries promptly answered. W. L. MILLER, Concord, Nebraska.

Harvey Bolster Springs.—These are a great saving and comfort on a farm wagon. Those of our readers who are buying farm wagons or building them should communciate with the Harvey Spring Company, Box 101, Racine, Wis., and get their catalogue describing the bolster springs, as well as a variety of other springs which they manufacture.

Carriage and Wagon Hardware.—The Eberhard Mfg. Company of Cleveland, Ohio, have a full page announcement in this issue illustrating a few of their great variety of styles of carriage and wagon hardware. Their goods are for sale by jobbers and supply houses all over the country. You want to keep their trademark in mind, which is "E" in a circle. Every article they manufacture bears this trademark and it stands as a guarantee for quality. When you want any carriage or wagon hardware ask for the "E" in a circle brand.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., OF THE BLACKSMITH AND WHEELWRIGHT.

Published Monthly, at 71 Murray Street, New York City.

Required by the Act of August 24, 1912.

Editor—A. A. Hill, 559 West 183d Street, New York City.
Managing Editor—No other editor except Mr. Hill.
Business Manager—M. T. Richardson, Ridgewood, N. J.
Publishers—M. T. Richardson Co., 71 Murray Street, New York City.
Stockholders—M. T. Richardson, Ridgewood, N. J.; W. F. Etherington, 156 Fifth Avenue, New York City; Mrs. A. Louise Girardeau, Monticello, Fla.; Mrs. Mildred Ulmer, Monticello, Fla.; Mrs. Harriet L. Johnston, Rochelle Heights, New Rochelle, N. Y.

Known bondholders, mortgagees and other security holders, holding 1 per cent or more of total amount of bonds, mortgages or other securities: No bondholders, mortgagees or other security holders.

M. T. RICHARDSON COMPANY,
M. T. RICHARDSON, President.

Sworn to and subscribed before me this 1st day of October, 1912.
[L. S.] (Signed) W. H. ROSE.
Notary Public, No. 68.
(My commission expires March 31st, 1913.)

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

Toe and Heel Calks.—The American Horse Shoe Company of Phillipsburg, N. J., have a new announcement in this issue relative to their toe and heel calks, both blunt and sharp, also their horse and mule shoes. The trade mark of this company is the letter "A" in a circle. When buying our readers are requested to look for the trade mark which is stenciled in red on all kegs and boxes. Their calks and shoes are for sale by supply houses everywhere. This company has recently brought out a new catalogue and our readers are urged to send for one at once mentioning The Blacksmith and Wheelwright. There will be no charge for it.

The Rochester Helve Hammer.—Hardly a reader of this paper will fail to notice the attractive full page advertisement in this issue addressed to blacksmiths of the Rochester Helve Hammer, manufactured by E. A. Grenelle, Secretary of the West Tire Setter Company, Rochester, N. Y. An illustration of this hammer is shown in the advertisement and points of advantage are given. He wants every reader who is thinking of buying a hammer to write to him and tell him just what you want your hammer to do then he will be able to tell you what you want with respect to dies. He wants to have you write at once, for he says materials are advancing and prices are likely to advance.

Champion Horse Shoe.—The Champion Horseshoe Company of Pawtucket, R. I., have recently brought out a handsome catalogue giving illustrations of the various styles of horseshoes which they make. One of these catalogues will be sent to any reader who will take the trouble to write for it, mentioning The Blacksmith and Wheelwright. It will be seen, by consulting their advertisement on another page, that they invite our readers to send for a free sample. The people behind this company have had thirty years' experience in horseshoe manufacturing, and of course, understand the business thoroughly. Their shoes ought to be sold by dealers everywhere. If your dealer does not keep them, write direct to the company for a sample and when you write ask them to send you a "Horseshoe Pin" which they are giving away as a souvenir. Every reader can have one if he will write for it.

The King Roller Bearing Fifth Wheel.

The illustration will give the reader an excellent idea of the appearance of this device. This is standard equipment in many large wagon factories and it is especially adapted for use in the blacksmith and repair shop. The wheel requires no oil. It is always clean. The bolts never loosen on the gear. They absolutely stop the whipping of the pole. Every wagon user who has one of these fifth wheels is delighted with it and many blacksmiths can make excellent profits

The King Roller Bearing Fifth Wheel.

by handling this wheel. In fact, there is a profit of $5.00 in the sale of every wheel. It is impossible to describe the wheel fully in this article, and readers are urged to write for descriptive circulars, prices, etc., to The King Fifth Wheel Co., 5027-5031 Beaumont Ave., Philadelphia, Pa., and in all correspondence mention The Blacksmith and Wheelwright.

A Handsome Catalogue.—The Parry Mfg. Company of Indianapolis, Ind., has recently brought out the handsomest catalogue of buggies and other vehicles which has come to our desk for many a long day. It comprises 124 pages, with literally hundreds of illustrations of the various styles of buggies, surreys and other vehicles manufactured by this company. This catalogue is too expensive to be sent out indiscriminately but we understand that the Parry Mfg. Company want agents to sell their products in all parts of the country. A blacksmith or wheelwright in many cases is just the man to act as agent for the sale of vehicles. He comes in contact with large numbers of owners of vehicles all the time in making repairs and shoeing horses. We presume that any reader who manifests a disposition to take an agency would be favored with one of these catalogues. We sometimes think blacksmiths do not recognize the opportunities that are presented to them for making some easy money on the side. A handsome commission for the sale of a buggy is much easier made than to hammer it out on the anvil. Write to the Parry Mfg. Co. at once for particulars and their proposition and mention The Blacksmith and Wheelwright.

A Profit-Sharing Plan for Horseshoers.

The Neverslip Mfg. Co., of New Brunswick, N. J., manufacturers of the celebrated "Red Tip" calks, have a profit-sharing plan which ought to interest everyone of our readers. Aside from the quality of their product, which is almost too well known to need explanation here, this profit sharing plan is a great inducement to do business with this old and reliable concern. They issue a Profit-Sharing Catalogue listing over 1600 presents to be exchanged for the "Red Tip" coupons. The cost of the presents comes out of the advertising appropriation and in no way affects the quality or price of the "Red Tip" calks. It is simply a stimulating incentive to the horseshoer to make larger sales of "Red Tip" calks, and the list of premiums is extremely attractive, including almost everything of utility and adornment for the American home. If you have not already obtained a copy of the Profit Sharing Catalogue, above referred to, do not fail to write for it immediately. It will be mailed to you promptly, post paid, if you mention The Blacksmith and Wheelwright.

The Red Tip Emergency Shoe.

We illustrate herewith a new device to prevent horses from slipping on icy roads or pavements. The device in question is called the Red Tip Emergency Shoe, which is absolutely warranted to prevent horses from slipping under the most trying conditions of Winter traveling. This shoe can be put on, or taken off in five minutes. It is made of drop forged steel of the best quality. It is

The "Red Tip" Emergency Shoe. Sole Agents, Neverslip Mfg. Co., New Brunswick.

practically unbreakable and will last for years. Many horseshoers could undoubtedly carry this shoe in stock as a side line and reap a handsome profit by its sale. This shoe will not break and cannot drop off, and if a man starts out on a long drive in the morning and by night, in the Winter and the roads should become icy, if he has a set of these shoes in his wagon his horses are protected from danger. The Red Tip Emergency Horse Shoe is sold only by the Neverslip Mfg. Co., New Brunswick, N. J., and interested readers are urged to write them for full particulars, prices and discounts, and in doing so are requested to mention The Blacksmith and Wheelwright.

Business Growth.—The Greenfield Tap & Die Corporation, a holding company that controls the stock of the Wiley & Russell Mfg. Co. and Wells Brothers Company, on October 1, acquired the entire stock of the A. J. Smart Mfg. Co. The A. J. Smart Mfg. Co., was organized six years ago and promptly established a name for the manufacture of the highest class of taps, dies and screw plates. The company will be continued as a separate organization and conditions are extremely favorable for the continuation of its very rapid growth. The new officers are: President, F. O. Wells; vice-president, Rollin S. Bascom; treasurer and clerk, F. H. Payne; directors, the above, Wm. M. Pratt and J. W. Stevens.

CLASSIFIED BUYERS' GUIDE

Index to Advertisers

(Continued on page 429)

(Continued from page 428)

Perfection Disc Sharpener.—Readers interested in disc sharpeners should consult the announcement in this issue of E. E. Combs, manufacturer of the Perfection Disc Sharpener, Evansville, Wis. This device is all made of iron. It will sharpen a disc on the harrow; sharpen a cut-a-way disc; will sharpen a nine disc section or any size disc or plow disc up to thirty-two inches. This tool is for sale by leading supply houses everywhere. If your dealer does not keep it write direct to Mr. Combs for descriptive circular giving further particulars and price.

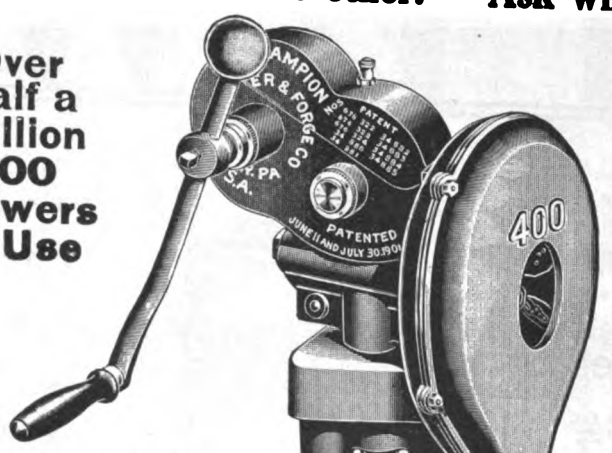
Easy Money.—The Chicago Flexible Shaft Company, 630 LaSalle Avenue, Chicago, Ill., has an announcement in this issue headed "Easy Money" for a blacksmith. It relates to their horse clipping outfit. The clipping of horses becomes more and more popular every year. People have found that their horses enjoy better health, and travel and work better every way when they are clipped than when permitted to carry heavy coats of hair. Almost every blacksmith can make a little money easily with a horse clipping outfit. But consult the advertisement of this company and write for further particulars.

In this issue will be found the announcement of G. & C. Merriam & Company of Springfield, Mass., publishers of Webster's New International Dictionary. This is the latest work in the dictionary line and has been corrected right down to date. We understand it contains 400,000 words and 2700 pages, together with 6,000 illustrations. Our readers who may be in need of a dictionary will do well to buy this New International Webster.

The Incomparable 400 Blower the one great Heirloom that will be handed down from one generation to the other. Ask what the Owners say

No. 408. Steel Horseshoers' and Blacksmiths' Forge with Half Hood. Hearth 50 x 36 in. Fan 12 in. in diameter.

Over Half a Million 400 Blowers in Use



The 400 unanimously acknowledged the world over as the Blower that revolutionized Hand Blast Making

Made with Adjustable Ball Bearings Only

U. S. Patents covering the 400 Steel Blower and Steel Forges granted June 11 and July 30, 1901, and April 15, 1902.

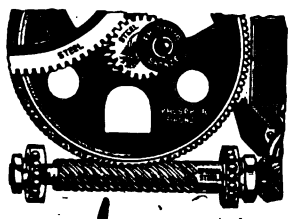
Patent Nos.:

676,322	34,882
676,323	34,883
676,324	34,884
34,880	34,885
34,881	607,629

Also Great Britain Patent No. 9,662, May 25, 1900.

The Blower for Quality, First, Last and Always

THE FAMOUS 400



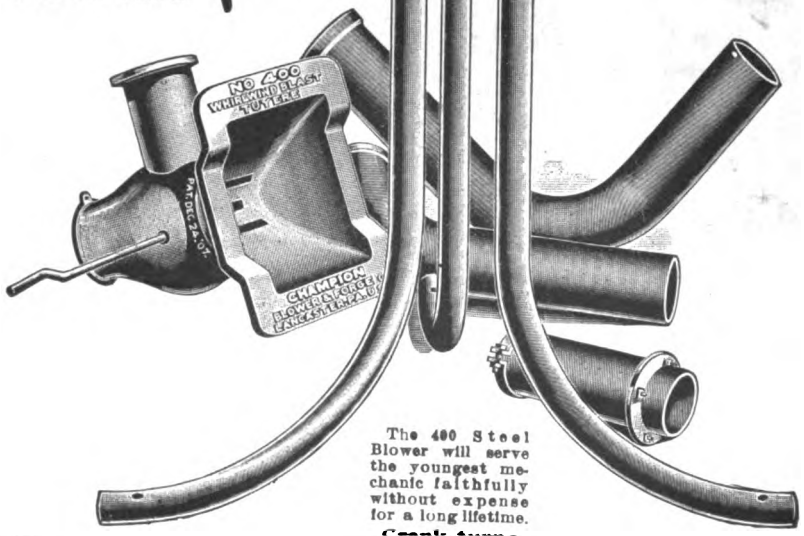
It's all in the Spiral

The No. 400 Champion "WHIRLWIND" Blast Anti-Clinker Heavy Nest Tuyere Iron is now furnished with all 400 Blowers

Without Extra Cost

No. 433. Cast Iron Blacksmiths' Forge with Half Hood and Sloop Bottom Coal Box. Hearth 32 x 45 in. Fan 12 in. in diameter.

Don't miss the "Whirlwind" Tuyere Iron. It is true to its name.



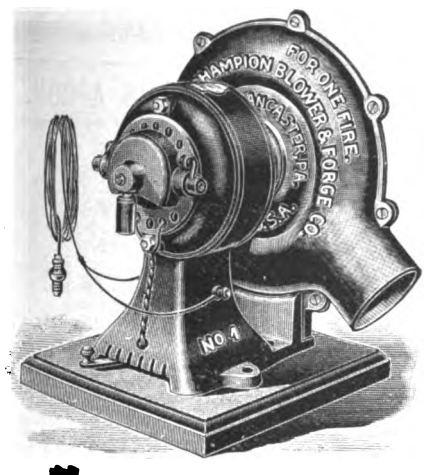
The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way to produce blast.

CHAMPION ONE-FIRE VARIABLE SPEED ELECTRIC BLACKSMITH BLOWER

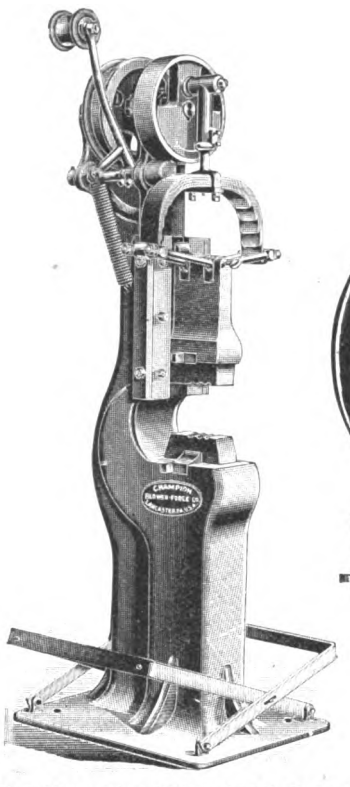
No. 1. For Regular Blacksmith fire

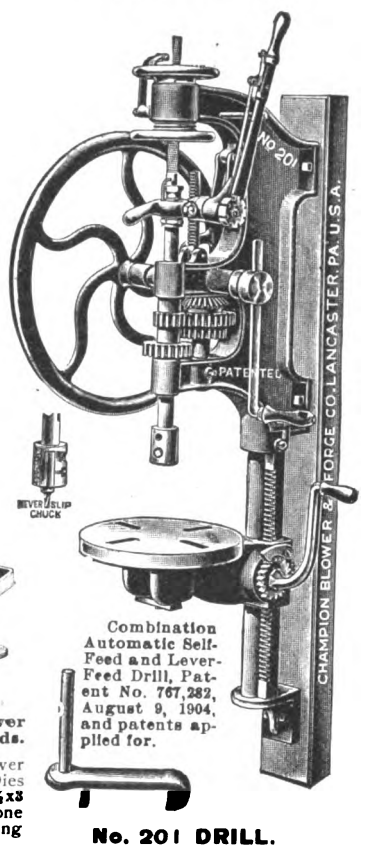
Motor capacity 35% above requirements



The Champion "Patented" Power Hammer. Weight of Ram 65 pounds.

No. 1. Champion "Patented" Power Hammer with one regular set of Dies (2½x6½ inches), with plain surface (2½x3 inches), and two plain grooves and one tapering groove across one end for forging round iron, straight and tapering.

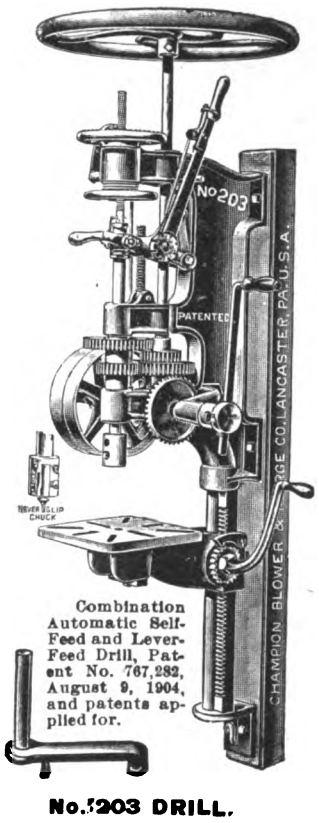




Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

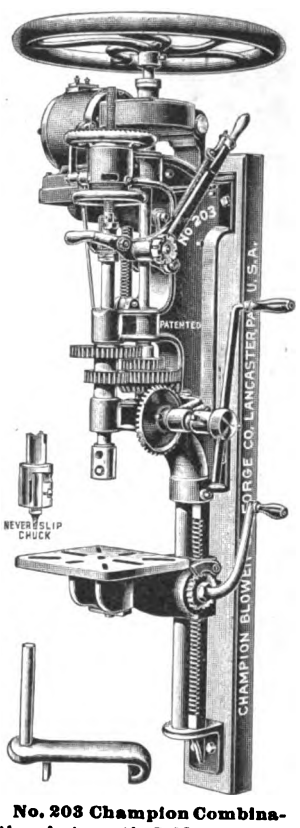
No. 201 DRILL.

The CHAMPION "PATENTED" AUTOMATIC SELF-FEED AND DOUBLE COMPOUND LEVER-FEED UPRIGHT POST DRILLS. Made with Cut Gears and Ball Bearings.



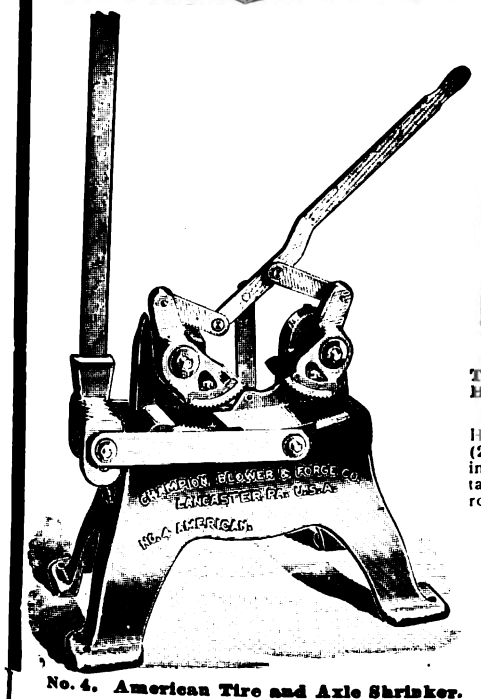
Combination Automatic Self-Feed and Lever-Feed Drill, Patent No. 767,282, August 9, 1904, and patents applied for.

No. 203 DRILL.



No. 203 Champion Combination Automatic Self-Feed and Double Compound Lever-Feed ELECTRICALLY DRIVEN Upright Post Drill.

This Drill has the motor direct connected to the upright back gear shaft, which represents what we consider a perfect up-to-date Electric Drill and one that is worthy of most careful consideration from the up-to-date mechanic. It represents simplicity, durability, and no loss of power.



No. 4. American Tire and Axle Shrinker.

Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

No. 105. Electric Full Mounted Screw Plate. Screw Plates in four styles, cutting up to 1½ inches.

"Our New Catalogue can be had free upon application, showing the very latest and greatest inventions in the blacksmith line in the world on Blowers, Forges, Drilling Machines, Tire Benders and Shrinkers. Power Hammers, Punches, Shears, Screw Plates, Power Blowers, etc. It will pay you to see our catalogue. Write for it.

Remember

There is no TURNING BACK of the FEED Screw NUT WITH EITHER FEED.

The Double Compound Lever-Feed produces 80% more pressure or drills holes 80% larger, with the same labor, than any other Lever-Feed Drill

The DOUBLE COMPOUND LEVER-FEED

Saves 200 Per Cent

IN TIME AND LABOR in drilling holes, reaming, countersinking, etc., and makes the drill a first-class Wood Boring Machine.

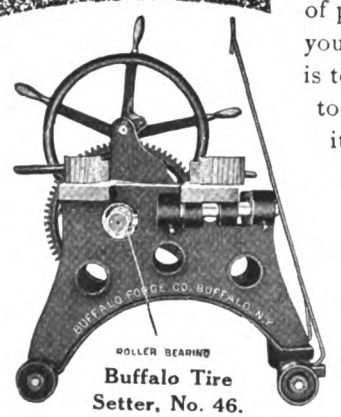
THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U. S. A.

Sole Agents for Great Britain and Ireland, PFEIL & CO., Clerkenwell, London.

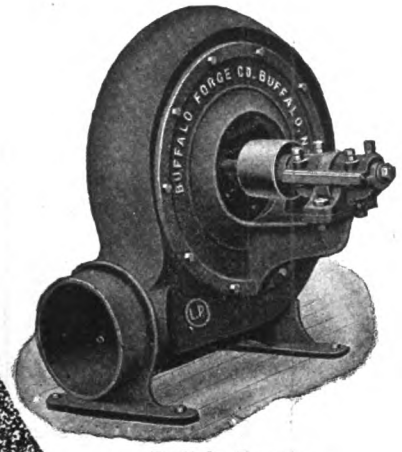
Be good to your Business this Christmas.

Christmas, above all other times, is a time for being good to those dependent on us and for showing an appreciation of those on whom we depend. A Christmas present need not be an expense, but can easily be turned into a continuous source of profit. Like a farmer depends on the soil, so you and your family depend on your **shop**—your business,—as the source of all good things in life. What fertilizer is to the farm, good tools are to your shop. When you fertilize your shop with tools of the right kind, **you, your entire family and your customers** profit by it. A Buffalo Tool as a Christmas Present to your **Business,** is the wisest present you can think of, for it is the means of providing more presents, more clothes, and more good things next year, the year after, and for many years to come.

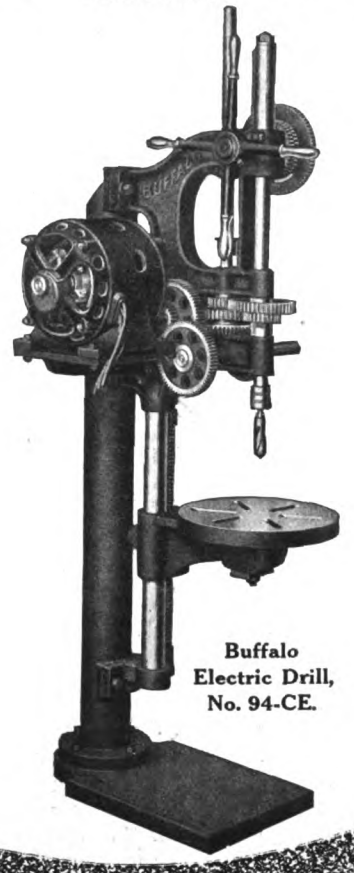
Read the timely suggestions below.



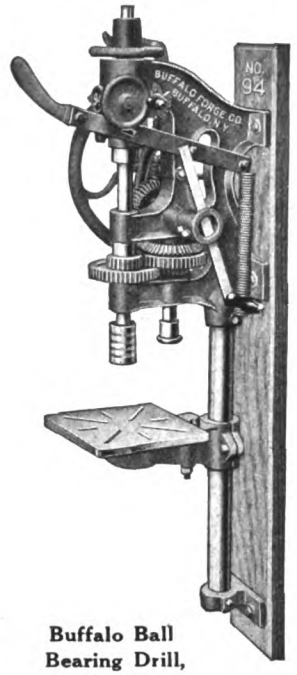
Buffalo Tire Setter, No. 46.



Buffalo Power Blower.

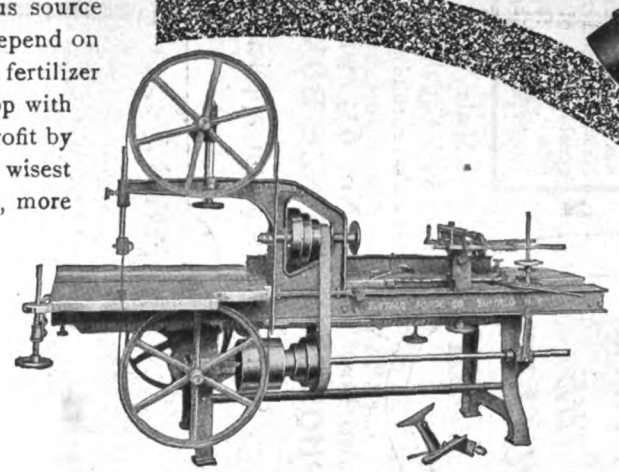


Buffalo Electric Drill, No. 94-CE.



Buffalo Ball Bearing Drill, No. 94.

Buffalo Down Draft Forge, No. 660. Hand or Electric.
Removes Smoke and Fumes.



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Twelve Machines in One.

Buffalo No. 200 Silent Blower.

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Ask us for **net prices now** on any tool in which you may be interested. First of all, is your blower everything it could be? Do you know that the **14-inch** Buffalo 200 Silent Blower is now preferred by all smiths who do a certain amount of implement and wagon repairing? Even horseshoers find it a great advantage, as it gives **22% higher blast pressure and runs as easily as any 12-inch** blower.

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Buffalo Forge Company
BUFFALO, N. Y.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXVI. No. 6. NEW YORK, DECEMBER, 1912. TERMS: One Dollar a Year

A UTILITY WAGON.

Working Draft of a Good Vehicle for General Business Use.

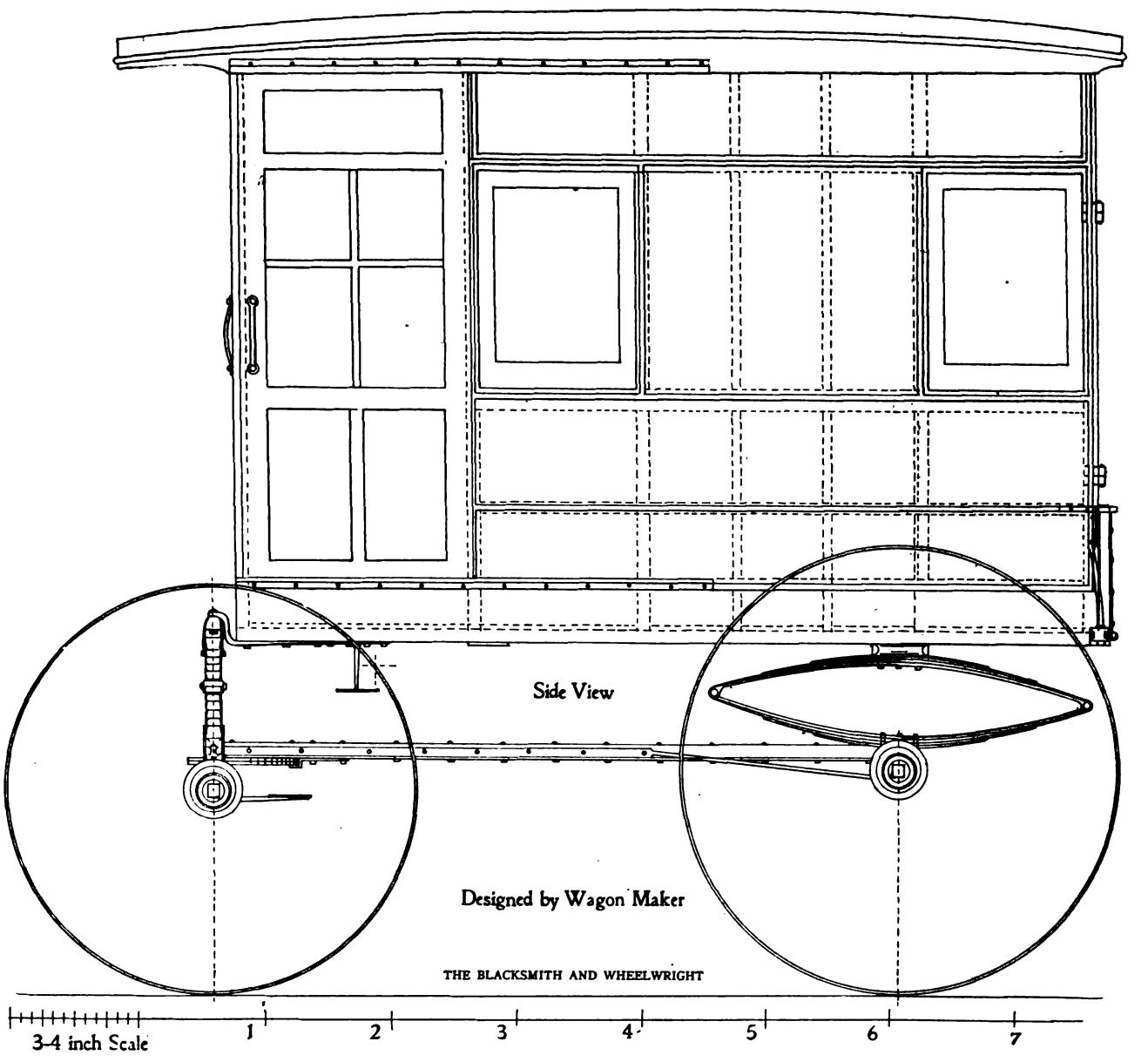
BY WAGON MAKER.

The combination of neat and attractive appearance, durability, lightness, and continuous service for years in connection with a most reasonable price for the best possible built work, is what taxes the ingenuity of most wagon makers. The wagon illustrated on this working draft is a regular utility wagon, which can be used by butchers, grocers, bakers, farmers and gardeners. The protection from rain and cold is one of the most necessary requirements. For this reason the sliding doors on the front and the glass frames to drop or to be raised under the top add to the comfort of the driver and give protection from the weather. Another advantage is that the wagon can be turned into and used to carry passengers. For all such wagons one seat is made stationary or to shift. The shifting seat is generally preferred, because it can be shifted out of the way when the wagon is loaded with goods of certain sizes. Two such seats are added when used for a family outing.

The side windows are generally made stationary, but at a trifling additional expense they can be made to drop. To do this on such wagons with the least expense is to screw glass frame guides directly on the pillars against which the glass frame rests placing the guides two inches further up the rail on which the glass frame rests. It does not look as well as those covered with a ⅜ inch thick board, but it is inexpensive and serves the purpose.

The rear end has a regular wagon drop gate and a wire screen above, which is made to shift; that is the screen has four solid forged staples welded to the screen frame with screw holes in it to screw it fast to the posts. While the above is practicable it is unhandy to fasten or unfasten when needed. The best way is as illustrated on the back view. There are two screens hinged to corner posts which join in the middle and are closed with a hinged or turn lever. Such screws when not needed can be lifted out of the sockets and are, therefore, easily and quickly removed or replaced. On all such wagons with screens, they have a leather or rubber curtain fastened to the rear upper cross-bar, while the top is extended rearward to protect the curtain. When the curtains are down they are buttoned to the posts and drop gate.

Generally the side doors are made to slide from the inside which is an advantage, being out of sight when open, but a disadvantage as to keeping out the rain. The outside construction can be made nearly waterproof, while when fitted to the inside the rain is liable to beat in and especially from the sides of the doors. When glass frames are made to drop or to lift the water is liable to enter, but this can be prevented with glass frame fasteners, as four for each window keep the water out effectually.



Dimensions of the Body.

The length of this body is 7 feet outside of posts; extension over front posts 10½ inches, extension over rear posts 3 inches, entire length of top 8 feet 1½ inches. Width of door between posts 27 inches, size of opening for glass 17x20½ inches. This space is divided into four parts for each door. The lower spaces are 8x14 inches, while the upper ones are 8x9 inches. The opening for the two side glasses on each side are 15x20½ inches without the glass frames.

The width of body outside is 40½ inches, but this width changes according to the needed space inside the body, and it is built as narrow as 36 inches outside. The inside space across on this body is 37½ inches.

The height of body from the bottom surface of the sill to the outside edge of the top rail is 58 inches, and the extreme height 60 inches, which gives 2 inches curve across the body. The depth of the top rail at the center is 4 inches and at the corner posts 2 inches, making 2 inches curve lengthwise the body outside of corner posts.

Construction of the Body.

The size of sills is 1⅜x3 inches; the front and cross bar is 2x3 inches mortised into the sills and tenons are on the cross bar. The rear end cross bar is 1⅞x1⅞ inches with tenons on sills and mortised through the cross bar. This bar is 49 inches long, extending on each side of body 4 inches.

Besides the end bars are five inside cross bars, 1⅜x2½ inches on which the bottom boards rest, which are ⅝x6½ inches. The rear cross bar is 1⅞ inches deep only and bottom boards are ⅛ inch above the cross bar, but this difference is made up with ⅛x2¼ inch hand iron to keep the cross bar from wearing on the top surface from loading and unloading. All bottom board joints should have an opening of about 3-16 inch on each joint.

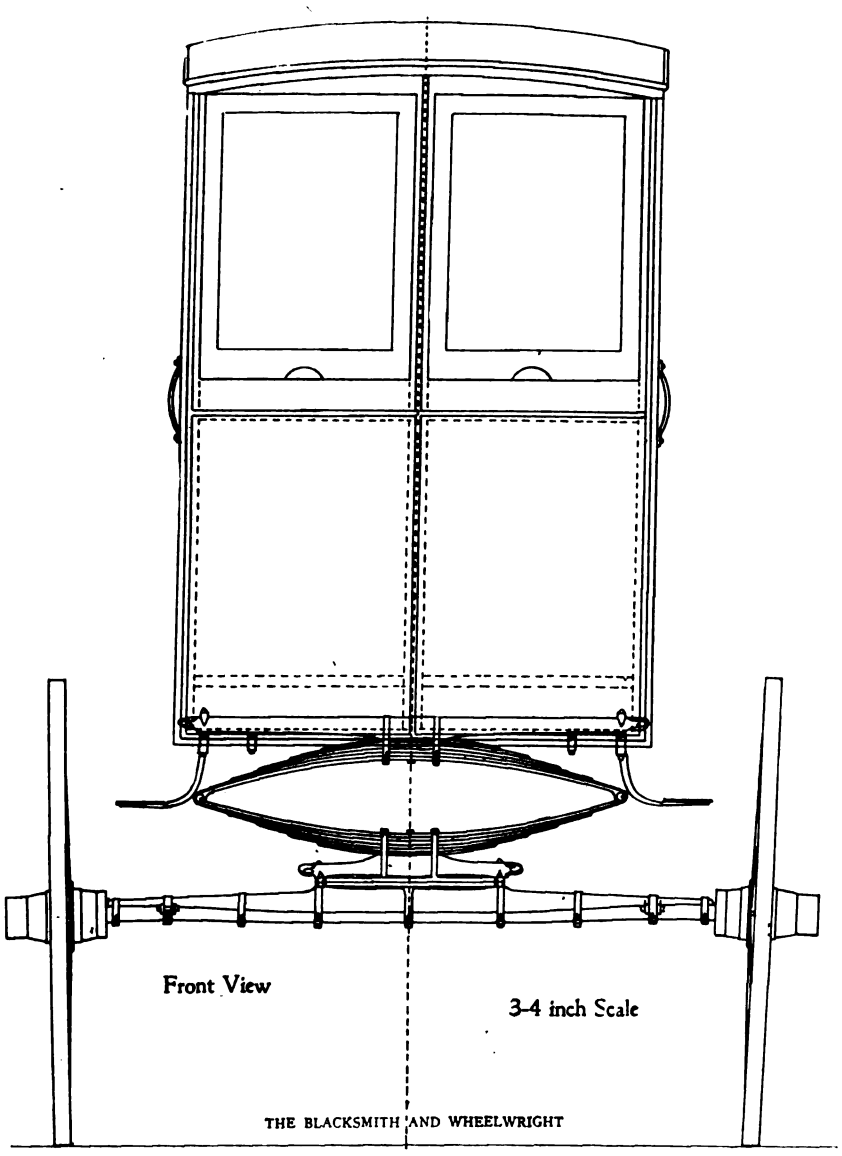
The front corner posts on the side views are 1¼ inches and 1⅜ inches on front views, without the mouldings. The rear corner posts are 1⅜ inches on the side views and 1½ inches on the rear views. The six inside posts including the door posts, three on each side, are 1⅜ inches square, while the four small posts, two on each side, are ⅞ inch square.

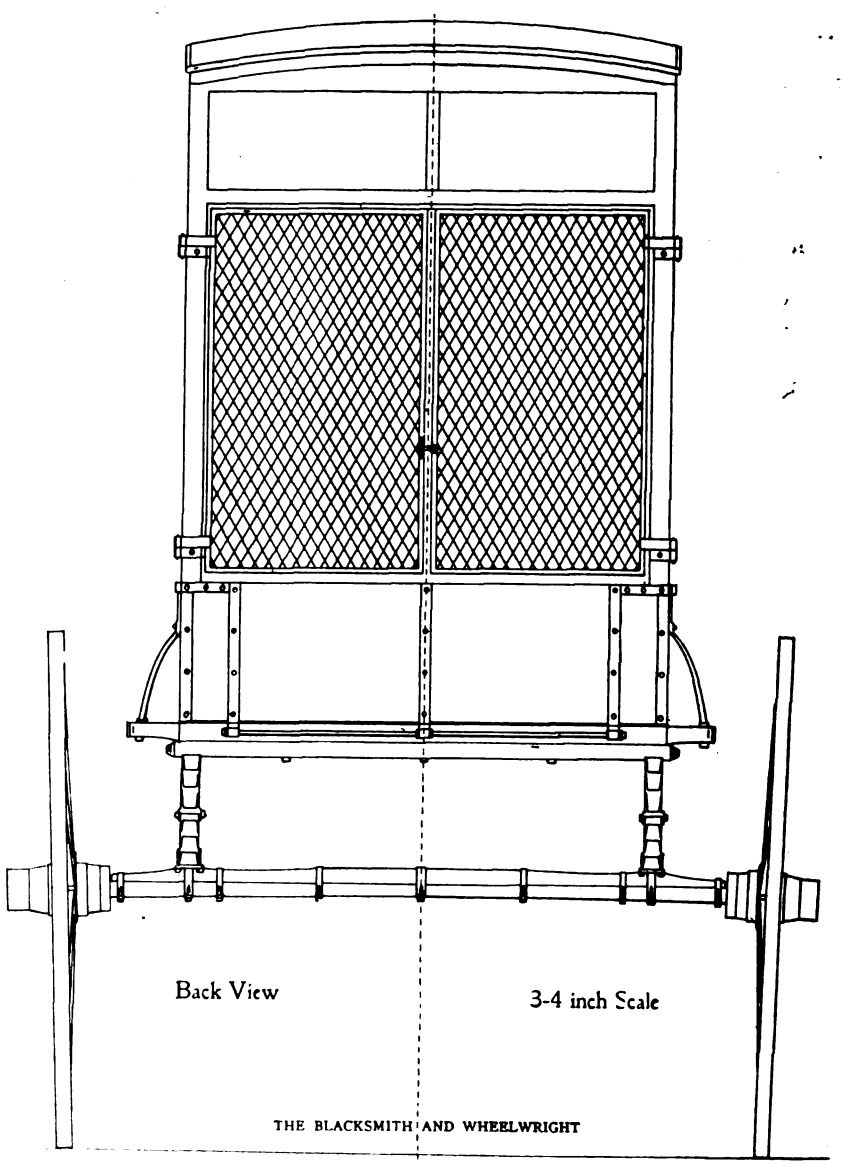
On the sides of the body are ten rails, five on each side. The top rails are 1⅛x4 inches at center and curved toward each end. The glass frame rails are all 1⅛ inches thick; the upper one 1½ and lower one 2 inches wide. The four lower rails, two on each side, are ⅝x1½ inches. The sizes for front rails are the same. The top rails are framed level with the outside surface of the molding, and the panels are grooved in.

The side surfaces are covered with ⅜ inch thick poplar panels with a jamb under each molding. The thickness of the panels are routered into the posts, as on this body are the two front posts the rear door posts and the rear corner posts.

The doors are framed as usual, with tenons and mortises. All are ¾ or ⅞ inch thick; top, botton and side pieces 2½ inches wide, and center cross piece 2 inches wide.

The rails on each side are made partly of wood and iron.

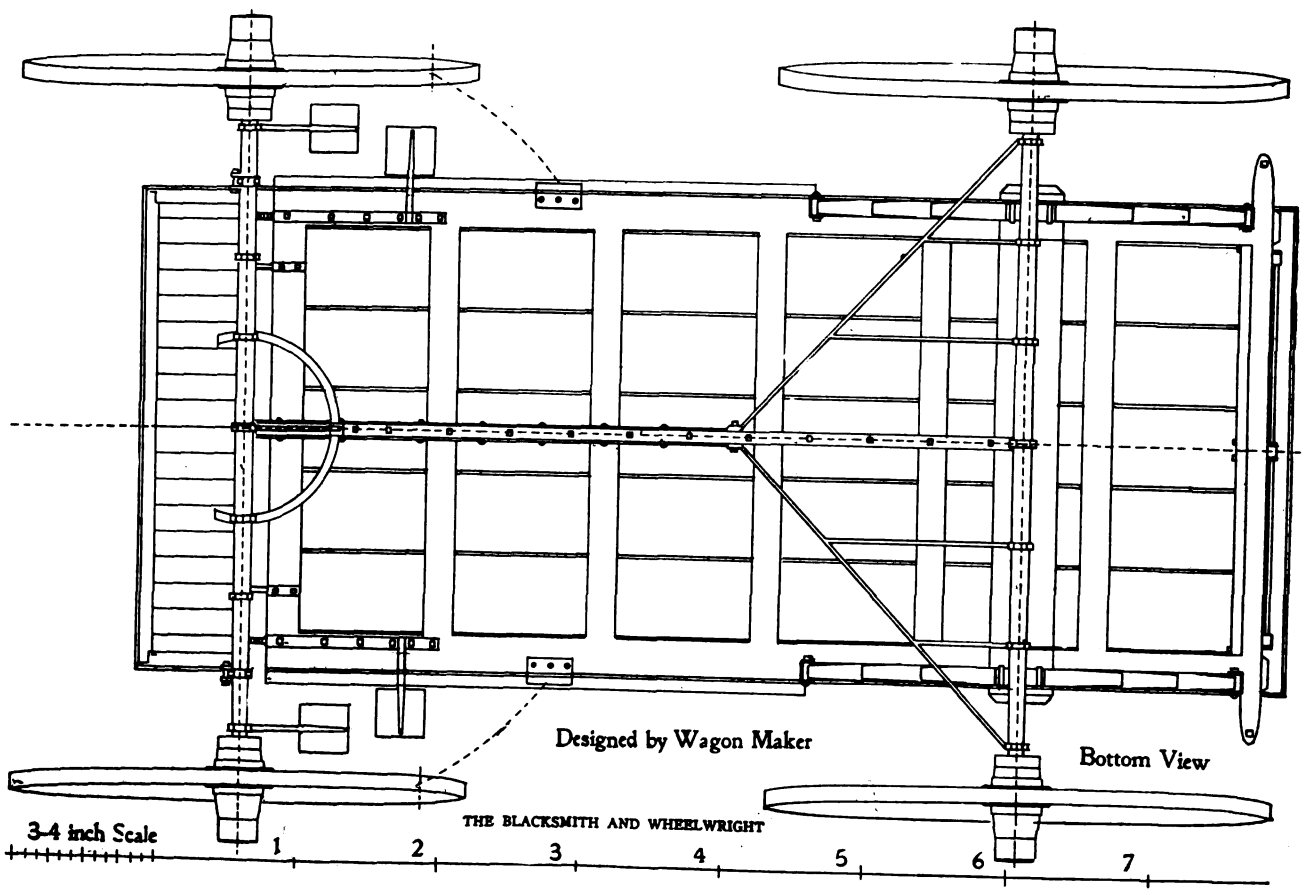




The bodies are either suspended on two or three springs with one or two reaches, or they are built with two light reaches while the heavier one is with one reach only.

Dimensions for Wheels, Springs and Axles for a Light Wagon:

Sarven Wheels.
Outside diameter without tires, 38x42 inches.
Diameter of hubs, 3⅜x7 inches.
Size of spokes, 1¼ inches.
Number of spokes, 16 and 16.
Thickness and depth of rims, 1 5-16x1⅜ in.



The top curves are ⅞ inch square covered with 2, 3 or 3½ inch strips, either close together or with space between.

The finish inside depends upon the purpose for which the vehicle is used, and differs widely when used by bakers or butchers.

There is also a great difference when used by country grocers.

Thickness and width of tires, 3-16x1 3-16 in.

Front Spring Dimensions:
Length from centers of bolts, 36 inches.
Open out to out, 10 inches.
Width of plates, 1 7-16 inches.
Number of plates, 5.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Clipped top and bottom.

Rear Spring Dimensions:
Length from centers of bolts, 36 inches.
Open out to out, 9½ inches.
Width of plates, 1⅜ inches.
Number of plates, 4.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Clipped, bottom, bolted top.

Fantail Axles Front and Rear:
Size of axle arms and square ends, 1 3-16 in.
Size at center, 1x1 7-16 inches.
Width of track, center to center, 60 inches.

Dimensions for Wheels, Springs and Axles for a Heavier Wagon:

Sarven Wheels.
Outside diameter without tires, 38x42 inches.
Diameter of hubs, 3¾x7 inches.
Size of spokes, 1 5-16 inches.
Number of spokes, 16 and 16.

Thickness and depth of rims, 1⅜x1 7-16 in.
Thickness and width of tires, ¼x1¼ inches.
Front Spring Dimensions:
Length from centers of bolts, 36 inches.
Open out to out, 10½ inches.
Width of plates, 1⅝ inches.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Clipped bottom, bolted top.
Rear Spring Dimensions:
Length from centers of bolts, 36 inches.
Open out to out, 10 inches.
Width of plates, 1½ inches.
Number of plates, 5.
Thickness of main plates, No. 2.
Thickness of other plates, No. 3.
Clipped bottom, bolted top.
Fain Tail Axles Front and Rear:
Size of axle arms and square ends, 1¼ inches.
Size at center, 1 1-16x1⅝ inches.
Width of track, center to center, 60 inches.

OUT OF THE ORDINARY.

Door Opening—Testing the Power—Tinning and Re-tinning—Money-Making Matters.

BY JAMES F. HOBART, M. E.

Sometimes it proves exceedingly convenient to be able to open and close the shop doors from a distance; that is, from one or more places in the shop, twenty or thirty feet distant from the doors. This is very handy when you wish to let a restive horse go out, and it saves lots of steps in opening doors in the regular course of business.

One smith told the writer after trying the device for a few months, that it was a first-class article to have in operation when a man tried to walk out without paying his bill. A device of this kind may be cheaply and easily constructed, all the material necessary being some sash cord, a couple of pulley sheaves, a few pieces of board, some screws, nails, and perhaps a little blacksmith work which, of course, may be supplied as needed.

Sliding doors adapt themselves easily to this method of operation, but swinging doors can be arranged with little trouble to work by means of a cord. For the single sliding door, simply attach a sash cord to either end of the door in the direction which will close or open the door as the proper cord is pulled. Then arrange the pulleys to lead the cord to such parts of the shop as it may be desired to open the doors from.

The writer has found that the best place to run a door opening cord is overhead, just about as high as a man can reach; then the rope will be out of the way and can be easily gotten at when necessary.

If plain sheaves are used without any housing, be sure to mount them between wide pieces of board or metal, in such a manner that it is impossible for the cord to slip off the wheel. The cord may be carried to any part of the shop, upstairs or down cellar, in any direction or at any angle found necessary or desirable.

The usual method followed by the writer is to run the cords close together as soon as possible then carry them both to such points as may be required. Afterwards carry both cords upstairs over two single pulleys or one double pulley, then drop the cord directly into the cellar or lower story of shop and attach an ordinary sash-weight to each cord. The weights may be eight, ten or twelve pounds each, or a piece of old iron may be used instead, but the sash weights are very convenient and form fine handles to lay hold of when operating the doors. When it is not necessary to carry the cord up or down stairs, then the sash weights may be hung just above the shop floor and form the last operating place for working the door, for the operating is done by pulling up one or the other of the cords.

The sash weights serve merely to keep the cords taut, and prevent their kinking or flopping off the pulleys. As the sash weights are of equal weight they do not add any resistance to opening or closing the door, and the friction of the cord and its stiffness will hold the doors pretty securely at any point where they may be left. Endless variations may be made to the method of operation. One smith carried the cord the entire length of the shop and back again close to the ceiling, and then at convenient points, he attached wooden levers to the cord much like those used in factories for belt shifters. This chap did not use two cords and two weights but used an endless cord, and carried it over a weighted sheave, heavy enough to open the door. Then he only needed a single lever attached to a single cord. Moving the lever in one direction opened the door, moving the lever in the opposite direction caused the door to close. This can be done without the lever but the writer prefers the double cord, for then in case a door works stiff or gets caught in snow or mud it can easily be pulled backwards or forwards until it consents to close. In case of the single cord, another short cord and a weight are attached directly to the door in addition to the long cord through the shop.

The writer has used this method of cord operation many years for stopping and starting machinery, particularly for operating the gate of a waterwheel. It can also be attached to the throttle valve of an engine or the rheostat of a motor, but the writer has not yet figured out a practical way to start a gasoline engine with either the single or double cord apparatus.

Test the Blower Blast.

In some instances it is very convenient to test the air pressure delivered by a blower, particularly when one wishes to melt a little zinc, copper, or other metal in the forge fire. It also proves very handy when working high speed steel, as by means of the gauge about to be described an even blast may be maintained by the man at the bellows or crank.

The principle of this gauge as shown by Fig. 1 is a U-shaped tube partly filled with water. When air pressure is admitted to one end of the tube the water is forced down in one leg and up in the other leg of the tube a distance depending upon the force of the blast. Small air pressures are usually designated in inches of water.

The water is shown at K and L standing an equal height in the tube, but when air pressure is introduced at G, water K, is forced downward and L is forced upwards a certain distance. They may be read directly upon this scale J. When the water surface L rises over one of the spaces on scale C, the air pressure is equal to one inch of water. Column K having gone downwards one-half inch and column L having gone up one half inch, there is one inch difference between them, and to balance the pressure requires a blast equal to a column of water one inch high.

For this reason the scale J is divided into one-half inches but the reading will be directly in inches of water. A gauge of this description is easily and cheaply made in the shop. Procure the base board A, which may be four or five inches wide, and from ten inches to two feet long according to the tubes available. Chamfer the corners of the board as shown by the sketch, and be as elaborate as you please in this detail. With a little care you can make an instrument which will look exceedingly well in shop or office. A couple of screw holes at BB, serve to fasten the gauge in place vertically, on the wall or timber.

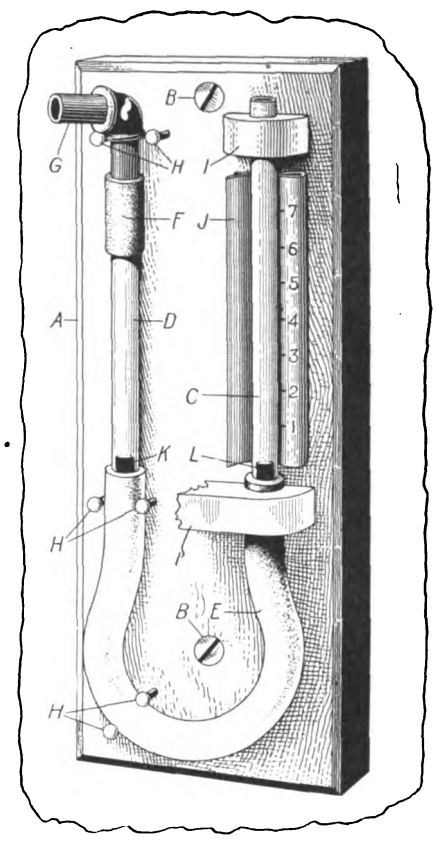
The tubes may be purchased at any drug store, but the writer usually presses into service a couple of water line glasses from the nearest hardware store or boiler room. One of these tubes is shown at C the other at D. One is shown shorter than the other in the illustration but this makes no difference. Tubes of the same length may be used, or indeed the tube D may be omitted altogether and a pipe or rubber tubing used in its stead. Still it makes a more satisfactory gauge to have two tubes, as then the actual difference between the water levels may be seen at all times. With only one tube, the water level is visible only at L. A piece of rubber tubing E is slipped over the lower ends of the tubes and another piece of tube may be used at F, to join tube D with the pipe G used to bring air from the blower.

Common gas pipe may be used for this purpose or tin tube may be soldered up at the pleasure of the maker. The only requirement is that whatever tube is used it must be air-tight. A piece of lead pipe forms a convenient connection and is easily handled and put into place. The connecting tube may be larger or smaller than the glass tubes.

Next, lay the board flat upon the bench, assemble the glass and rubber tubes as shown, then drive some nails—common wire nails will answer—as shown at H H. Do not try to make the nails fit tightly to the tube; just drive them loosely as shown. Then mix up some plaster of paris, drop it over the nails and tube as shown at I I. The plaster has been omitted at H in order to show how the nails are put in.

After the plaster has been dropped in place and allowed to set for a few minutes it may be whittled into shape with a pocket knife and made as fancy as the smith chooses to carve it. Better put a couple of matches under the tube C, one at either end, before the plaster is applied. The matches are simply to space the tube a short distance from the board A, at either end of the tube, in order that the scale J may be slipped into place underneath tube C. To make this scale, take a stiff piece of cardboard, tin or brass if it can be had, bend as shown in the sketch, mark the scale in half inch spaces beginning at the bottom, then slip the scale J underneath the tube C. The scale should be bent in such shape that it will slip easily into place, but yet remain where put when the gauge stands in a vertical position. Simply attach the gauge vertically to the wall; connect the tube G with the blower, either directly or by means of a hole drilled in delivery pipe, or this tube may be connected to any convenient pipe or pressure pipe leading to the forge.

Everything being ready, pour some water in the tube C until the water appears at L and K. Place the adjustable scale J just level with the top of the water column at L. A word of caution is necessary here. The tube should be of such length that however high the water gets in the tube D, it will not go below the end of the



tube D, otherwise there may be an inaccurate reading given in tube C. The gauge might read correctly, should the water column drop from D, into rubber tube F, but it is best to use a couple of twelve inch boiler water line glasses, then there will never be danger of error from difference in area of tubes.

The adjustable scale J makes it unnecessary to fill the tube with water to a certain point. Such an operation always proves tedious in the extreme, and by being able to adjust the scale vertically the gauge is much easier to set up and there is no effect by evaporation of water from the tube, which cannot be remedied by shifting scale J. If desired, the water may be colored red, blue or green, should it be necessary to make it visible at a distance.

This gauge is invaluable for testing the exhaust shavings system used in wood working shops. Only in that case, the water would rise in the tube D and go down in the tube C, and it would then be only necesary to turn scale J upside down, provided the tubes were of sufficient length to allow that operation.

The writer has also seen one of these gauges play an exceedingly interesting part in discussions which sometimes occur in the blacksmiths' shop. Whenever a visitor began to exhibit his ability as a Congressman the smith would yell at his assistant and say "Bill bring out the water gauge and test this guy; sure he's got air on his lungs." The hint was usually sufficient, and the "hot air" effusion subsided.

Tinning and Retinning.

Whenever a smith is led to look around for other sources of revenue, either from dull times or from ability to handle a larger amount of business, he may, perhaps, find something to in-

terest him in tinning and galvanizing. Either or both of these operations may be carried on profitably in a small way. The outfit is very inexpensive and usually may be rigged up by the smith for an outlay of only a few dollars. The tinning of iron and steel surfaces is one of the best known methods of finishing metals to prevent corrosion.

Well tinned articles do not rust. Pieces of machinery if exposed to wet if tinned will resist action of the weather and will also present an exceedingly finished appearance. There is also a considerable source of revenue in retinning household articles, spoons, pans, cans and such other utensils which become disreputable in appearance when the original tin coating has vanished. It is very easy to replace the tin coating and the operation will prove exceedingly profitable, should a smith have time or inclination to attend to such affairs.

To tin small articles, there will be required a kettle wherein the tin may be melted. The only requirement is that the kettle be large enough to permit the articles to be entirely submerged. For commercial purposes a rectangular cast iron box is the best melting tank. Cast iron does not burn out as quickly as wrought iron or steel. Such a tank ten inches across and a couple of feet long will handle a great deal of tinning work.

It may be permanently mounted over a small grate, or it may be placed over a forge which is not in use. Successful tinning depends upon two principal operations. First the cleaning of the surface.

Cleaning the Surface.

Acid may be used for this purpose, but if the smith intends to tin much cast or malleable iron it will pay him to invest a little in a tumbling barrel. A beer keg makes a good one, mounted upon the end of a shaft inclined to forty-five degrees and fitted to revolve a few revolutions per minute. Place the articles in the barrel, together with gravel and water and run them until the scale and rust has been knocked off; then empty out the gravel, replace with sand and water and give them another tumble. If exceedingly fine work is required replace the sand with some much finer, then in turn replace the fine sand and water with dry leather scraps. This will impart a fine finish to the metal surface, and the better the finish the brighter will be the resulting coat of tin.

However, the article may be cleaned with acid. Common sulphuric acid and water will dissolve the scale and rust, but it will not make the surface bright and clean as will the tumbling operation. If the acid method is used, before the articles go into the solution, place them in a hot solution of potash, sal-soda or soda ash, in fact any strong alkali which will dissolve any grease that may be on the articles. The alkali solution had best be boiling. When the articles come from the solution they should be washed free from alkali, scrubbed with a scratch brush if necessary, then immersed in the acid until every portion of the surface is bright and clean. Next place them in plenty of pure water and keep them there until ready to dip into the tin bath.

Tinning is best done by means of two baths, one for a rough first coat, the second for a smooth finishing coat. The smith may do the whole thing with one kettle by simply doing the work for the first coat, then changing the contents of the kettle slightly for the finishing coat.

The tin should be heated to about five hundred degrees and just before the articles are immersed therein they should be dipped in muriatic acid and water, which operation, by the way, must never be omitted. Next dip them in muriatic of zinc, which is the soldering fluid commonly used, and easily made by dissolving in muriatic acid all the zinc the acid will take up.

Let the articles go into the tin, wet with the zinc solution and remain entirely submerged long enough to become thoroughly heated. It is best to attach the articles to pieces of wire or place them in wire baskets for immersion.

Some dross or slag will collect on top of the zinc in the kettle; also some of the flux, which is formed from the muriatic of zinc. Allow this to remain in the kettle and protect the tin from the air, only when too much collects, some of it must be skimmed off. When withdrawing the tin articles from the kettle, brush the slag to one side leaving a bright space of metal through which the articles are withdrawn without touchingthe slag or flux, which might adhere to them and form undesirable spots on the surface. In commercial tinning where two kettles are used the work is placed directly from the first kettle to the second kettle or finishing kettle. The smith with a single kettle, may lay the pieces to one side, keep them for weeks, if necessary, until he is ready to furnish them.

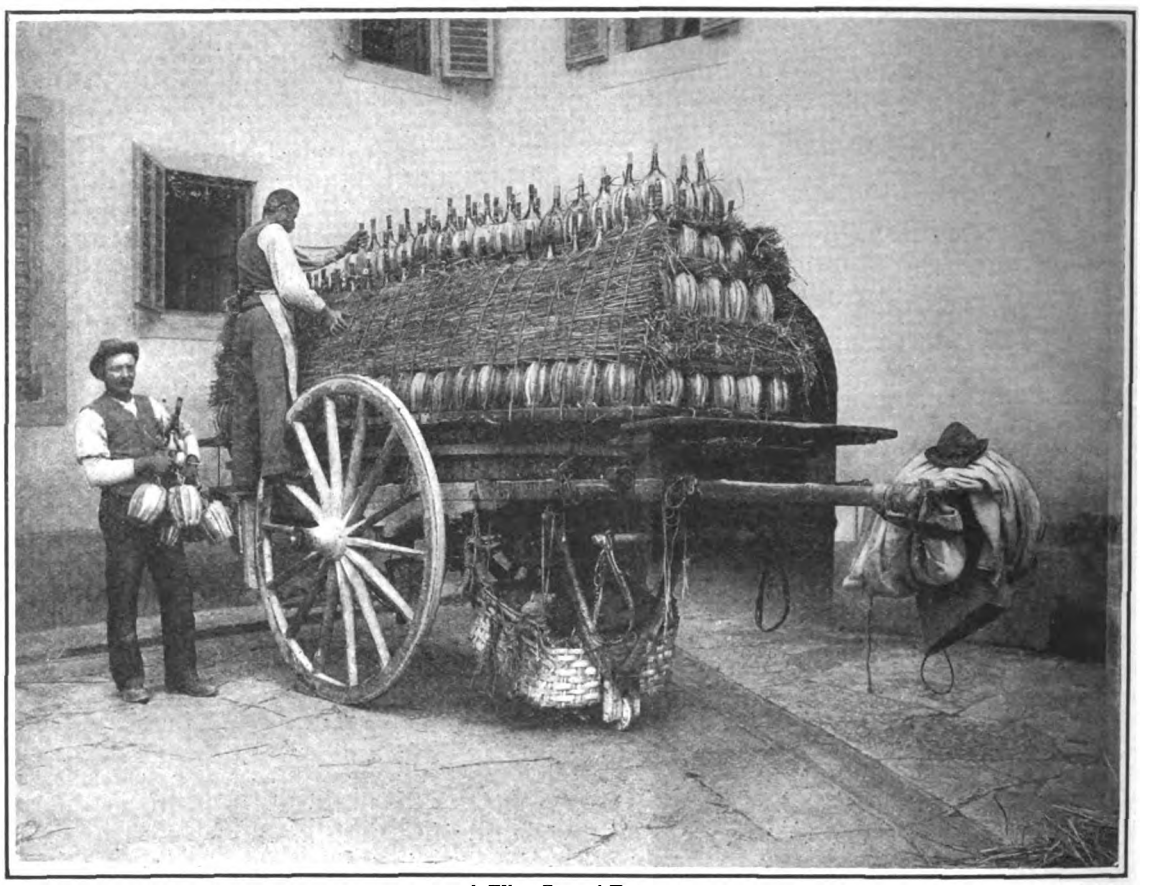
The Finishing Coat of Tin.

To prepare the article for a finishing coat, carefully remove from the kettle, every vestige of slag, flux or other impurity, leaving the surface of the tin perfectly clean. But the tin will not stay in that condition as described, therefore place some tallow or palm oil on the tin and see that the temperature of the fire is not hot enough to cause the oil to take fire. Here is where the ticklish part of the whole business comes in. The heat under the finishing kettle must be just right, so that the tallow will not catch fire or the tin will not get "ropy." A little practice will help the smith to determine the proper temperature.

The finishing coat is then formed by immersing the article fully underneath the tin, which by the way should be always covered by about one-fourth inch of tallow or palm oil as stated. Then carefully remove the articles one at a time and withdraw them very slowly and evenly from the tin. By this means all melted tin flows slowly downward as the article emerges leaving a smooth, brilliant coating of tin over the entire surface. Nothing further needs to be done except to remove the oil which may be done with gasoline or by rubbing in dry sawdust.

An Italian Wine Growers' Cart.

The illustration shows the loading of a wine cart with chianti in Tuscany, Italy. Possibly



A Wine Cart of Tuscany.

the bottles are to be taken to Florence and then shipped to this country. Italy is far behind this country in its vehicles of all kinds, as it is also in its agricultural implements. But recently, owing largely to the thinning out of the population of that country by emigration to the United States, the general welfare has been much improved, and the farmer, the laborer, and the shopkeeper are more prosperous. Soon they will be able to use better vehicles and more up-to-date methods of farming. Take the case of wine growing, for illustration; until recently, the vine was grown simultaneously with the olive, grain, etc. Now the wine producer has begun to assist nature, and the vine is no longer permitted to mingle in the general vegetation. Thus the world moves.

An English firm has brought out a new luminous varnish for automobiles, which is said to render a car, without being fitted with lamps, visible for a long distance on a dark night.

A teacher, says the "Christian Register," asked a class of children what a skeleton was; and a little boy replied, "It's bones with the people rubbed off."

VARNISHES.

Brilliancy and Lustre and the Effect of Heat and Aging.

An English work on varnishes gives the following points on brilliancy and lustre:

"Brilliancy and lustre depend on the nature of the resin. The greater the ratio of resin to oil the greater is the brilliancy and lustre of the varnish. As a matter of fact the brilliancy of a varnish is a property dependent on its index of refraction. As the index of refraction of a resin is greater than that of linseed oil, the more resin there is in a varnish the more lustrous it is. Hence the reason why spirit varnishes after drying are more lustrous than oil varnishes. Each unit per cent. of oil in the dried coating of an oil varnish diminishes its lustre pro rata. On the other hand, even if it increases the lustre proportionately, each unit per cent. of resin in varnish after a certain amount diminishes its durability pro rata. A compromise has therefore to be made according to the object in view in designing a varnish for any given purpose. Where brilliancy is a desideratum the resin must not be less than 1-3 to 1-4 by weight of the dried coat. But where brilliancy leaves off durability is only beginning, and varnishes in which the resin only form 1-4 of the dried coat are used where great elasticity is demanded. In the case of a piano varnish, for instance, durability is to a certain extent sacrificed to lustre, and the percentage of resin to oil preponderates in such a varnish. The harder the resin the greater the brilliancy. A Manilla varnish made with the same number of gallons of linseed per 100 lb. of Manilla is less lustrous than one made in the same ratio of oil to resin from Zanzibar copal. It is asserted that the index of refraction of a varnish is greater than that calculated from its compostion, but this may be due to a turpentine residuum left out of the calculation. Be this as it may, the skill and care with which a varnish is made are factors which cannot be lost sight of in any investigation into the cause of the brilliancy of varnish.

"Durability and resistance will vary with the proportion of linseed oil and the elasticity of its oxidation product. Varnishes should embody the brilliancy of the resins and the elasticity of the drying oils."

Experiments are described on the improvement of varnish by heat and also by aging, and much information is given relative to the constituents of carriage varnishes and similar materials. Numerous experiments are described and their results given, and we quote four of these, which may be taken as fair specimens of the whole.

Experiment IV.—That too much driers in varnish render it opaque and unfit for delicate colors. One day I varnished two panels got

up and glazed with a very rich crimson lake. No. 1 was varnished with body varnish made entirely from African copal without any driers whatever either in the clarified oil or boiling; No. 2 was varnished with "body" of the same gum, age and proportion, but with a small quantity of dried sugar of lead and dried white copperas. The panel No. 1 dried in nine hours and remained tacky for five hours more; the panel No. 2 dried in seven hours without tack. In a day after both panels were flatted down and varnished and repeated until each panel had four coats of varnish. The varnish was eight months old and each dried in the same space of time. I hung both up for a month and then polished them and examined them with a microscope, when the panel No. 1 appeared quite clear in color, solid and brilliant like plate glass, but No. 2 had changed a little in color, inclining to purple, and in the varnish were almost imperceptible opaque points. I kept these two panels for two years afterwards; when I examined them, there appeared no decay in No. 1, but in No. 2 the driers were perceptible on the surface with the naked eye.

Experiment V.—That moist driers boiled in varnish cause it to run in pinholes. To eight gallons of very fine African copal during the boiling I introduced 1-2 lb. of undried sugar of lead. After the varnish had stood to settle for eight months, I varnished with a pale patent yellow panel; it floated very well, set and looked well for hours, when it began to dry off in small pinholes completely over the surface, some of the holes as large as the head of a pin. It dried off in seven hours without any tack.

Experiment VI.—That the greater the quantity of driers and acid the larger the pinholes. I emptied six gallons out of the jar containing the last-named varnish, then I varnished another panel out of the two gallons remaining in the jug; the panels dried in the same time, but went off not only into pinholes but large blotches all over.

Experiment VII.—That particles either of oil or cold turpentine in the varnish will create pinholes and blemishes. To one gallon of body varnish nine months old, which had been tried and found to be excellent, I introduced 1-4 ounce of water and 1-4 ounce of linseed oil. I heated and mixed all together and poured it into a jar and let it stand for three months, when I varnished two panels, one yellow, the other light green. Four hours after, when I examined them, they were about half dry and beginning to run into pinholes and round empty holes. I examined them with a microscope and found a particle of oil hanging to the lower edge of every circle and the small particles of water had evaporated; the surface appeared as if dotted with the points of so many bristles.

The Old Fire Chief.

Not long ago a fire horse was brought in from the farm, a horse thirty-six years old, that had not had a harness on his back for eleven years. This horse used to pull the chief's wagon. He had the faculty of getting under the shafts quicker than ever any horse did that stood on four feet. He never made a mistake, never a false move. By the time the driver was in the wagon the horse was ready to go, and when he went he went on the high speed. So, behold the old horse brought in from the country, witnessing again the frills and frivols of the city.

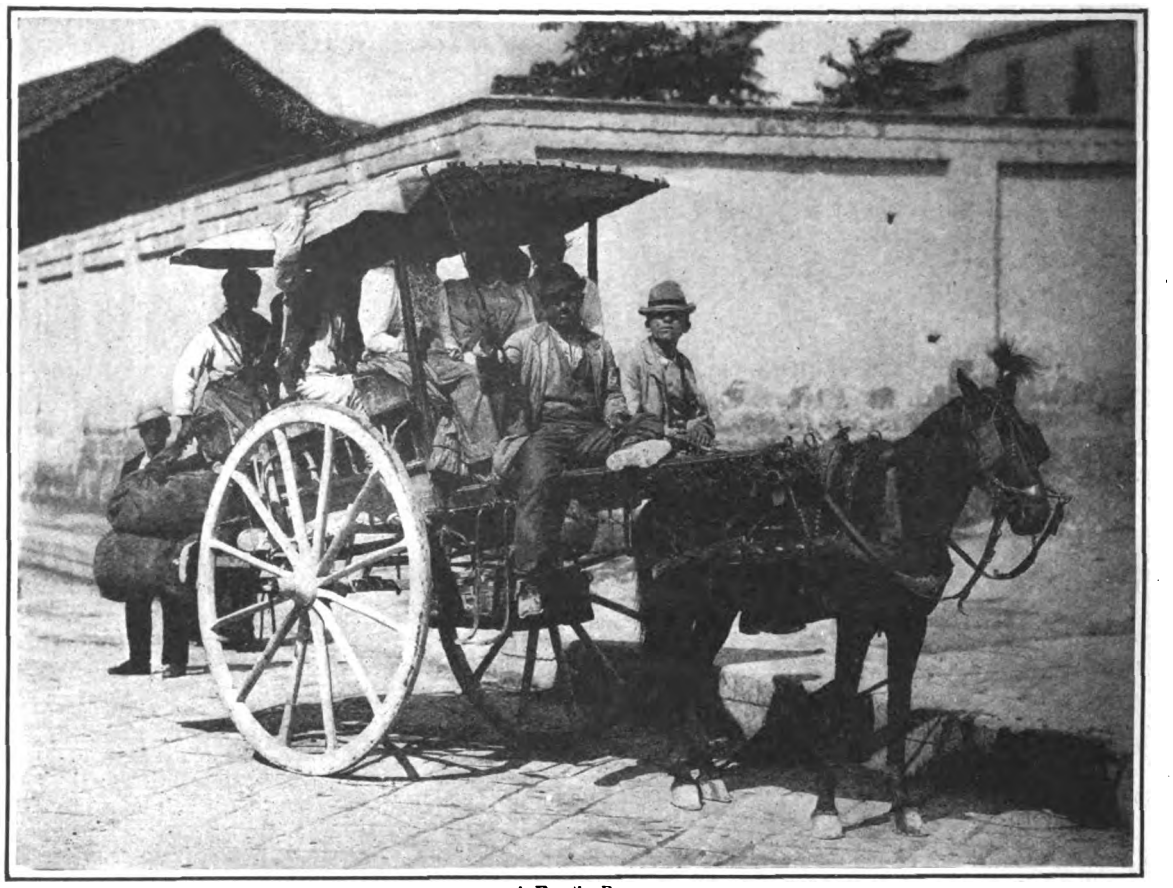
The horse was barefooted, his mane, tail and fetlocks grown out long and shaggy. The fire laddies went to work cleaning him up with loving caress. The old red wagon of the chief was brought out. The shafts were lifted in the air with the harness hanging. The horse was standing, loose, two hundred feet away.

At a signal the gong was sounded, and like a flash of light the old veteran leaped for the shafts. A fireman snapped the harness into place. The old fire chief watched the whole performance, intending to spring into the wagon, provided the horse had not forgotten his cue.

The horse knew how to do it, but, alas, the venerable chief, now grown gray, merely stumbled and tumbled forward, threw his arms around the old horse's neck, burst into tears, and cried like a baby.

Horses on the Farm.

Of the twenty-seven millions of horses in the United States, twenty-three millions are on American farms. That seems certain. Present day methods of soil tillage to return a profit must be thorough; to be thorough, modern machinery must be employed; to handle modern machinery with ease and grace, horses of weight and ample draft power must be employed, and such will always be the case. The packing interests of Chicago, employ thousands of heavy drafters and except on long hauls on well kept streets they can do their hauling from thirty to forty per cent. cheaper with horses than with auto trucks. There are in use in the Union Stock Yards at Chicago many wagons which have been in daily use, hauling heavy loads, for upwards of twelve years, which have never been in the shop for repairs. The average period of usefulness on the pavements of a good pair of drafters is ten years; on the farm, fifteen or more years. The life of the auto truck will hardly exceed four to five years and the operating expense is high. With the farmer in the east, breeding drafters should be made a part of the regular business, and each year two or more cared for. The fact that large numbers of heavy horses are annually shipped from Chicago markets to the farmers of the east is not in keeping with intelligent farming methods on the part of the purchaser.



A Family Party.

Raising a pair of draft colts each year should be made supplemental to the principal interests of the farm, and when these colts reach a marketable age the price realized from their sale at $500 to $600 will represent "velvet." While the auto truck has its place in the economy of city life the drafter will also be a long time in being relegated to oblivion, but as a means of producing better returns from the field and as an adjunct to better farming methods, the heavier horse is destined to a higher degree of appreciation from the farmer who has attempted to operate his farm machinery with horses weighing around 1000 pounds.

How to Clean Tools.

To keep tools clean and bright, rub a little mercurial ointment over them, which will form a moisture resisting coating. Mercurial ointment is also known as blue butter. It is somewhat poisonous.

Another good mixture to keep tools from rusting is made by taking six parts of lard and one part of rosin. Heat these together slowly till the rosin is all melted. The mixture is then taken out into the open air for fear of fire, and benzine added in about the proportion of one pint of benzine to half a pint of lard-rosin mixture. When cool, the mixture can be rubbed lightly over the bright steel articles. Tools thus treated will resist the corrosive action of even salt water.—*Exchange.*

Now Drag the Roads.

In not too cold localities, now is a good time to drag the roads before the ground freezes. Dirt roads are likely to be considerably cut up by traffic when soft from the late fall rains, and a sudden freeze over night may fix a condition of solid roughness until thawing out time in the spring.

The split-log drag or its equivalent can be used with most efficiency just before the roads freeze up in the fall. If the road commissioners cannot or will not do this, it will richly pay the individual farmer to at least fix up the stretches of highway bordering his farm or leading from his home to his trading point.

Dirt roads that freeze up smoothly can be used even by automobiles except when blockaded by snow, but if they freeze up rough, cut up by heavy traffic, they will stay rough until spring and cannot be used with comfort by a vehicle. No time and energy is so well spent as in operating a split-log drag on the public highway, and at no season of the year does this count for so much as in late autumn.

Out for a "Joy Ride."

This photograph shows a family of Neapolitans out for a ride. Considering the size of the horse, the size of the load and the apparent riding qualities of the cart, most of us would prefer to walk. Not so the "sunny Italian." He is proud to be the possessor of such a team, and he has no more feeling for a dumb brute than he has for a stone.

Keeping Metals From Rusting.

To keep metals from rusting rub them off perfectly clean and paint them over with the following mixture: Dissolve half an ounce of camphor in a pound of lard, or in that proportion, according to the quantity used, and before it cools enough to be hard, mix in enough black lead to give the whole the color of iron. This should be well and thoroughly applied all over the metal, being careful not to omit any spots, and let it remain over night. The next day rub off clean with rags. If kept dry by the weather, metal treated in this way will keep perfectly free from rust all winter. Olmstead's varnish is made by melting two ounces of resin in one pound of fresh, sweet lard, melting the resin first and then adding the lard, and then mixing thoroughly. This is applied to the metal, which should be warm, if possible, and perfectly cleaned, and afterward rubbed off. This has been well proved and tested for many years, and it is all that it has been recommended to be. It is particularly well suited for iron surfaces which a slight rust is apt to injure very seriously.

SHOES AND SHOEING.

A Few Suggestions Concerning Hoof Paring and the Weight of Shoes.

From an Old Horseshoer.—The custom of paring the hoof of the horse until it yields to the pressure of the thumb is a barbarous one. Fortunately for those who recommend it, its evil effects are not immediately apparent; a horse with his soles of his feet denuded of their horn, may not manifest any great suffering, and even go sound on a level pavement; though, if he chances to put his foot on a pebble or sharp stone, his pain may be so acute as to cause him to fall.

If we closely examine the upper surface of the sole of a hoof that has been separated from its contents, we will find it perforated everywhere by myriads of minute apertures, which look as if they had been formed by the point of a fine needle. If we also look at the vascular parts of the foot that have been in contact with this horny surface, it will be observed that they are closely studded with exceedingly fine, yet somewhat long filaments, as thickly set as the pile of rich velvet. These are the "papillæ," which enter the horny cavities, and, fitting into them like so many fingers into a glove, constitute the secretory apparatus of the frog as well as the sole. Each of these filaments forms a horn tube or fibre, and passes to a certain depth in the protecting canal, whose wall it builds. When injected with some colored preparation, one of them makes a beautiful microscopical object, appearing as a long tapering network of blood-vessels surrounding one or two parent trunks, and communicating with each other in the most wonderful manner. These filaments are also organs of tact, each containing a sensitive nerve destined to endow the foot with the attributes of a tactile organ.

This disposition will enable us to realize, to some extent, the amount of injury done by too much paring. The horn thrown out for their defense and support being removed by the paring, and perhaps the ends of these papillæ cut through, the meagre pellicle remaining rapidly shrivels up, the containing cavity of each vascular tuft as quickly contracts on the vessels and nerves, which, in their turn, diminish in volume, disappear, or become morbidly sensitive through this squeezing influence. The feet of a horse so treated are always hot, the soles look dry and stony, and become unnaturally concave. The animal goes "tender" after each shoeing, and cannot step with anything like ease. Until the new material has been formed, each "papilla" experiences the same amount of inconvenience and suffering that the human foot does in a new tight boot. This tenderness is usually ascribed to the nails, and other causes; and the horse in the stable rests one foot after another, as if he suffered uneasiness or pain.

The process of deterioration is comparatively slow, however, and the culprits who cause this mischief evade their responsibility. Their utmost skill, however, is racked to protect artificially the parts they have robbed and are gradually destroying. Shoes are carefully kept from contact with the sole—for that would infallibly cause lameness—are put on the mutilated feet, and even leather soles and bolsters of tow steeped in pine-tar are stuck between the foot and shoe, with the intention of shielding the surface that has been, through ignorance, rendered morbidly sensitive and defective. What is called the excessive growth, was intended to protect the lower surface of the foot from wounds and bruises, to maintain the elasticity of the young horn beneath, and to aid the crust in sustaining the weight and strain, at the same time strengthening the latter at its point of union, and preventing its being broken or worn away too readily.

These remarks, which we can scarcely too much insist upon noticing, apply with equal force to all kinds of horses. Indeed, they are perhaps more applicable to the case of race-horses and saddle horses than to any other class. With these animals, it is of the utmost importance that the feet, especially the fore ones, be accurately leveled on both sides so as to obviate the risk of sprains and dislocations during rapid and energetic movements, particularly lateral twists of the lower joints. By leaving the sole, bars, and frog intact, the foot is not only strengthened, but muscular fatigue is wonderfully diminished, especially in traversing heavy ground. When the sole has been thinned and hollowed out into a cup-like shape, the foot readily penetrates to a greater depth than if it were flat, and is also more difficult to withdraw, because there is a larger extent of surface in contact with the tenacious soil. In proportion to the width of cover in the shoe, and the space between it and the sole, there is still a greater amount of adhesion, and consequent loss of speed and power, as well as diminution of stability.

For the reason before given, the frog should remain untouched by the knife, unless it be to remove some flakes which are all but detached; though this should always be done with care. It is scarcely necessary to say that the destructive operation of opening the heels should not be attempted. The bars and frogs may be scraped out by some blunt instrument, merely to free them from soil or gravel that may have lodged at the bottom.

This is all the preparation any kind of foot usually requires for the shoe, and may be summed up in a few words: Levelling the crust in conformity with the direction of the limb and foot, and removing as much of its margin as will restore it to its normal length, rounding its outer edge at the same time, and leaving the sole, frog, bars, and heels in all their natural integrity. Such is the treatment of the hoofs of the horses under the care of a good horseshoer, and so strong are they—such massive solid blocks of horn do they appear, that should a shoe by some rare chance be lost on a journey, there is no danger whatever in marching a horse for ten, twenty, or even thirty miles without another.

With hoofs of this description, the kind of shoe employed is of secondary importance. I need not say that it should vary with the requirements of the animal; i. e., with the services demanded from him. For instance, we would not shoe a race-horse like one for draught, or a saddle horse like one for carriage-work; the shoes must be varied more or less in form and weight, to quite different purposes and degrees of wear. It will be understood that no fixed shape, size, or weight can be determined for all horses. It may be laid down as a rule, however, that the properties of a good shoe, no matter for what service, must be lightness and durability —opposite qualities which require skill to combine, but which are nevertheless of some moment, more particularly with horses required to move quickly, and for long periods, over paved roads.

One of the great evils that has accompanied horseshoeing for many centuries, in addition, and in immediate relation, to the mutilation of the hoof, has been the excessive weight of the shoes attached to the feet. The most primitive specimens of shoes were only a narrow band of iron, plane on both faces, and were, in all probability, fastened on uncut hoofs. With the introduction of paring, more iron was necessary to cover the parts made tender and sensitive, and the lateral expansion theory perpetuated, if it did not exaggerate, the mischief. Not only is a wide surface of metal urgently required to shield the greater part of the sole, but it is regarded by only too many men, who ought to know better, that in addition to width, shoes should also possess a good thickness, to protect the foot from jar. The absurdity of this plea does not need demonstration; it may be sufficient to remark that the flexible horn is the best modifier of concussion, and that as the thickness of metal increases, so does the jar.

But this supposed jar is the least of the ills attending the use of heavy shoes. The difference in the muscular fatigue of a limb, after carrying at its extremity for a long distance a clumsy mass of iron, weighing, perhaps, two pounds, and afterwards another of one or one and a half pounds, is astonishing. A well-known horseman, when discussing this subject a short time ago, says, speaking of heavy draft horses: "If, at the termination of a day's work, we calculate the weight represented by the mass of heavy shoes that a horse is condemned to carry at each step, we will arrive at a formidable array of figures, and in this way be able to estimate the amount of force uselessly expended by the animal, in raising the shoes that are fastened to his feet. Suppose that the weight of a shoe is one pound; it is not excessive to admit that a horse trots at the rate of one step every second, or sixty steps a minute. In a minute, then, the limb of a horse whose foot carries one pound makes an effort necessary to raise a weight of 60 pounds. For the four limbs, this weight in a minute is represented by 240 pounds; for the four feet during an hour the weight is 14,400 pounds, and for six hours, 86,400 pounds. But the movement communicated to these 86,400 pounds represents an expenditure of power without any useful result; and a degree of fatigue, proportioned to the effort necessary for its manifestation. This calculation is most simple and readily understood. It is to be noted, nevertheless, the weights tabulated are situated at the extremities of the limbs, and that the arms of the levers on which the muscles act to raise them, being infinitely shorter than those of the physiological resistance to which these weights are added, the intensity of their action ought, therefore, to be singularly increased. Otherwise, the figures speak for themselves, and tell us that the diminution in the weight of horseshoes is not an accessory consideration, so far as the useful application of the horse's strength goes.

It will be seen that this question of weight at the lower end of the limb is a serious one; the power moving it acting at the upper extremities, and having but short leverage. We can readily imagine what a difference in power must be required to move a pound at the forearm or knee, and at the lower surface of the foot, and how much the lightening of a shoe by one or two ounces must affect the motion of the limb.

In shoeing, this important consideration has been somewhat overlooked; and yet we cannot forget that it has a great influence on the wear of the muscles, tendons, ligaments, and joints. It is the fashion to say that a horse always travels better in his old shoes, and to attribute this to the fact he is not pinched in them. Ascribing something to this circumstance, though if the horse's hoofs had not been mutilated by the knife and rasp, he would probably, or rather ought not to feel pinched, we must also take into account that a good portion of the superfluous and fatiguing weight has been got rid of by wear.

It is worth noting the changes that take place on the ground-face of a heavy shoe on the foot of a saddle horse during a long day's journey. How in the morning we have the indications of muscular freshness and activity—the agile step and due flexure of the articulations, putting their impress on a certain part of the metal; towards mid-day a change of bearing and point of friction testifying to muscular fatigue and heavier attrition; and in the afternoon, unmistakable symptoms of dragging the feet and leg-weariness.

So that in hygienic shoeing, we have a perfect right to insist that not a grain of iron more than is absolutely necessary to protect the hoof from undue wear, or serve a useful purpose, be applied to the foot. Every particle beyond this is not only unnecessary, but injurious. Nature, in constructing the animal-machine, and endowing it with powers to sustain the ordinary requirements of organization, and even certain extraordinary demands, could scarcely have been expected to provide the large additional amount of energy necessary to swing backwards and forwards several ounces, or even pounds, attached to the extremity of each limb at every step.

Lightness and durability can only be attained by employing the best material. If the sole of the foot is not mutilated, it does not require to be covered by the shoe, as nature has furnished an infinitely better protection. Wide-surfaced shoes can, therefore, be at once dispensd with, and a narrow rim, made from the very toughest and best iron, and adpted for traveling on slippery roads, while aiding foot and limb, and sufficient to sustain wear for four or five weeks, is all that is required. Here, again, the skillful artisan is needed, and science steps in to aid him. We have seen that the sole was destined, particularly at its junction with the shell, to sustain weight, if not cut away by the drawing-knife. We also know that it is advantageous to the whole foot and limb to give the sole as wide and general a bearing as possible; so that the one part may relieve the other—the sole coming to the aid of the crust, and the frog interposing to share the strain imposed upon both, as well as to relieve the strain on the posterior parts of the foot, flexor tendon, and limb, and keep a firm grasp of the ground by its resilient and adhesive properties.

From what has been said, it will be understood that in speaking of a light shoe, a narrow and thin plate of iron was meant. The narrowness of the metal insures a good foothold—in

this respect imitating the shell—while its thinness brings the sole, frog, and bars in closer approximation to the ground.

It is a most difficult matter to devise a shoe that will meet every requirement. The heavy draught-horse, doomed to bring into play every muscle while endeavoring to move and drag along an enormous load, must have his feet differently shod to the race-horse, in which speed is the chief requisite. Taking into account the different character of the hoof, it is none the less true that the same holds good in all with regard to the sole and frog sustaining weight, though in the slow-moving animal it is of less importance, perhaps, than in the lighter and more fleet ones. The massive draught-horse requires toe-and-heel projections on the ground-surface of the shoes to aid his pulling though his hoofs none the less require the observance of those consecutive principles which have been so strongly insisted upon, but which are so seldom applied. To give the greatest amount of strength and foothold to the shoes of the heavy draught-horse, with the least amount of weight, should always be kept in view. But with this animal the preservation of the shell is the principal object; and to effect this, the sole and frog ought, if possible, to be preserved intact.

The form of the shoe should, in outline, resemble the shape of the ground surface of the hoof. It has been decided that its upper or sole surface must be flat from the outer to the inner margin. For horses other than those of heavy draught, its width will of course vary; but it must be an advantage to have it narrow as is compatible, in relation to its thickness.

AUTOMOBILE REPAIR WORK.

How to Handle Parts When Supplied Direct to Owners.

From G. D. Crain, Jr., Kentucky.—An interesting question as to the handling of material used in automobile, as well as other vehicle, repair jobs and accounting for it is frequently discussed, and the wide variety of methods used by dealers suggests that not everybody is satisfied in his own mind as to the proper plan of handling a transaction of this kind. The system used by a leading dealer in one of the large cities of the Middle West may be of interest.

In addition to conducting a repair shop and garage, this dealer also has a store for the sale of tires, lamps and sundries, as well as bicycles and other allied lines. All of his repair parts are carried to the credit of the store. This is an important feature, since it results in prices on parts being figured on the basis of the overhead expense at the store, and not of the shop. The distinction is that the store overhead is certain to be greater than that for the shop, principally on account of the larger rental involved.

It should be mentioned here that this dealer, like other members of the trade who have studied the question and arrived at logical conclusions, is convinced that in determining the cost of doing business, the dealer should consider each department separately; for while they are all part of the same organization, the expenses of operation are different, and consequently the overhead expense varies. Since this is the most important element entering into the selling price of an article, or a job, not including the original cost or the labor expense, it is certain that putting it on the right basis is the first step in the direction of getting a price which will show a profit to the dealer and at the same time be reasonable from the standpoint of the consumer.

Thus, in the case under consideration, repair parts and all other material are part of the store's stock of merchandise, and are treated accordingly. When material is required by a workman, he transmits the information to the foreman, who sends a boy employed for this purpose to the store-room. A salesman delivers the goods to the boy, making out a sales-slip in duplicate. The original goes with the material, and is attached to the shop-card showing the labor and material used in each job. The copy goes to the bookkkeeper, along with other sales records, and is used in figuring the cost to the consumer, in connection with the hours of labor put in and other factors which determine the cost of the work.

There is a complete check on every item which is used, for the reason that the foreman's report of each job shows material consumed in it, and each piece of material must be accounted for by sales-slips. If there is a slip which has not its counterpart in the records of the shop proper, an error is disclosed which is looked into, with the result that it is usually learned that the material was used without being properly entered up in the shop. This goes to show that unless a system is provided in which there is a definite check on the use of material, it is easily possible for repair parts and other goods carried in stock to be used up in repair work without the necessary charges against the job being made.

There is no chance of material being sent to the shop without being shown on the sales-slip, for there are iron-bound rules providing that no material is to be issued except by a salesman. Even the foreman of the repair shop must get material in this way, and the owner of the shop has made it plain that infraction of the rule will be followed by dismissal. The result is that nothing leaves its place unless a proper record for the use of the office and for the guidance of the shop foreman is made.

This description may suggest that a lot of time is lost in getting material from the store into the shop. This, however, is not the case. The repair shop is on the second floor of the building, and stock used in repair work is carried on that floor as well as the lower part of the building. The boy who is used to bring material to the repair shop is given a list of the parts needed sufficiently in advance of use to enable him to have the material ready before it is actually needed. The application of the workman and the exact part or piece needed, so that when the sales-slip is made out, all of these facts are shown and the entry made accordingly.

A prime advantage of the system from the standpoint of the owner is that it results in eliminating the necessity of employing one man for stockroom purposes. In some shops, not particularly large ones, either, a stockroom man does nothing except issue material and parts on requisition, and make the proper records. The expense of this work is considerable, in the aggregate, and since the stockman is not a producing employee, his wages must be figured on the cost of every job that goes through the shop. On the other hand, according to the system outlined, any salesman can issue material or parts, and the cost of this work is nil, as far as the shop itself is concerned, for it is figured into the overhead expense of the store.

It is also to be noted in this connection that since repair parts and material used in shop work of all kinds are carried as to the credit of the merchandise account, and not as part of the investment in the shop, the latter is given a first-class opportunity to pay expenses. Its investment consists of tools and equipment only, and its chief expense is for labor and power. If it can't make ends meet on that basis, then obviously it is not likely to make money under any conditions.

On the other hand, the dealer who finds himself just breaking even on his shop operation—and many an automobile repair shop is doing a good deal worse than that—can console himself, if he is using the plan indicated above, with the reflection that he is making a dealer's profit on material used in repair work, even if he is not getting anything out of his expenditures for equipment and labor. And that is a point worth thinking about.

The same considerations apply to the sale of parts and material to owners direct. In some cases motor car owners with a practical turn of mind, or those who are so located that repair shops are inaccessible, desire to purchase parts and do their own work. Some dealers discourage this, preferring to have an opportunity to add charges for labor and thus swell the receipts of the repair shop. This is a shortsighted policy, however, for a cleancut profit can always be made on a sale of goods, while the margin on a repair job is a doubtful quantity at best. Dealers who sell to the general public as well as to their own shops are convinced that they would be better off, as a matter of dollars and cents, if their business was handled entirely on this basis; but as a matter of practice, of course, service to customers, as well as other considerations, demands that the dealer be in a position to take care of repair work.

The plumbers used to think that there was no use giving out material unless a bill for labor accompanied it; but they have changed their policy since hardware stores and other merchants began selling items which were formerly regarded as the special perquisites of the plumber. Though the automobile repair man is not in danger of having his material field invaded by competitors, he too will find it good policy to sell all the merchandise he can, no matter whether he handles the actual repairs or not.

AUTOMOBILE RUNNING GEARS.

How to Paint Them Harmoniously and as a Protection.

From M. C. Hillick, Pennsylvania.—No small space has been occupied in the columns of various trade papers relative to the upkeep and appearance of the automobile, but somehow for the most part the subject of maintaining the chassis seems to have been quite overlooked. A fine appearing car body and a slovenly looking chassis harmonize no better than a man clothed in fine raiment and wearing mud bespattered boots. Harmony, after all, is one of the things that strongly help in the makeup and outfitting of the car, and without this virtue a great many features about the car would be at sixes and sevens.

The chassis many times are given a light going over with some sort of a dressing or varnish reviver, and let go at that, while the body of the car gets a fresh coat of varnish, and everything above the chassis is touched up and made to look like new. This, to say the least, is hardly fair treatment for a part of the car that is made to suffer from the worst possible sort of road and weather service. In washing the car the chassis invariably gets the worst of the bargain. Grease and dirt baked and dried on to a condition almost non-removable fetch these parts during the cleaning process down to a point where but very little, if any, protection is afforded them. Especially is this the case when it becomes necessary to use strong detergents to start the grease and dirt accumulations. Alkalies of various kinds are used, even to the application of sal-soda, caustic soda, etc., all of which lay hold upon the finish with a biting tongue, with the result, as above stated, that a new creation of color must be put on. And, really, this is the cheaper way of bringing the chassis to a condition comparable to that of the body when extreme conditions necessitate the use of the powerful acting detergents.

It is not unlikely, in many cases, that by applying at frequent intervals some good, reliable renovator, or reviving medium, the finish on the chassis or running parts could be maintained in nicer condition, and for a very much longer period of service, than is too often the case under the present arrangement.

When the car is brought to the shop for repainting and finishing, the chassis should have at the outset special inspection in order that these parts of the car may be made to compare favorably with the body and the other parts above the chassis.

In the event of chipped and flaking parts of the surface of the chassis, all such defects should receive a "touch up" with a good lead paint containing some of the regular parts color. Then where necessary putty these defects, and in case the surface looks parched and worn and barely able to hold intact, apply a coat of lead paint containing for every five parts turpentine one part raw linseed oil. Let this pigment cure out and harden thoroughly, after which sandpaper with fine sandpaper, clean up, and apply a coat of the desired color. Should the chassis show even a worse condition than this, the parts will need two coats of the surfacing lead; the puttying in this case being done upon the first coat of lead paint.

Lay these coats of pigment on as smoothly as possible, in order to lessen to the minimum the labor of sandpapering and also to obviate the necessity of working the bulk of the pigment off as a means of getting the desired smoothness of surface.

Should parts of the chassis show a surface shattered and fractured, and quite upset in general reduce the consistency of some of the hard putty by cutting it down with turpentine, and then with a stiff piece of harness leather draw putty over these badly defective parts. The main consideration is to get a good, solid body of pigment in place, above which to bring out through the aid of the color, varnish color, and clean varnish coats, a full, rich finish, well rounded throughout, and fortified against the hard service sure to beset the chassis. Finally, as a means of contributing to the more excellent appearance of the car's running parts, use a high class line of colors and varnishes—quite as good in fact, as are used upon the body of the car.

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COMMUNICATIONS.

☞ Communications on subjects appropriate for our columns solicited from all quarters. We want practical information. If you know something that will benefit our readers, we shall be glad to have you write it out and send it to us for publication. All communications of this nature should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York.

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Subscribers who desire the address of their paper changed will please send the old as well as the new address.

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Entered as second-class mail matter at the Post Office in New York City.

SPECIAL NOTICE.—When subscribers fail to receive THE BLACKSMITH AND WHEELWRIGHT regularly, we shall take it as a favor if they will notify us to that effect.

Subscribers who wish to know when their subscriptions expire should consult the address tag on the wrapper of each copy mailed to them.

The Blacksmith and Wheelwright in New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in New Zealand for obtaining new subscriptions.

☞ **When you change your place of residence always write to us and give your new address.**

DECEMBER, 1912.

PARTIAL CONTENTS.

READ THE ADVERTISEMENTS.

It may be unnecessary to suggest to our readers that they may find it to their advantage to look over the advertisements in The Blacksmith and Wheelwright every month.

It frequently happens that bargains are being offered in material which large numbers of our readers could use to advantage.

Then there are new tools coming up all the time and new machines which make work easier for the blacksmith. In point of fact, the advertising department of our paper is probably of as much importance to our readers as any other portion of it.

Of course, every reader knows that it would be impossible to make a paper like The Blacksmith and Wheelwright at the low subscription price we get if it were not for the advertisements. The subscription rates of all publications would be much higher than they are now if it were not for the advertisements which they carry. In writing to advertisers, we want to ask our readers to kindly mention always that the advertisement was seen in The Blacksmith and Wheelwright.

A GREAT UNDERTAKING.

As our readers are quite likely aware, the parcels post service is to be established by the post-office department, January 1, 1913. To suitably prepare for this is an enormous undertaking, and judging from present conditions the service may not be in smooth running order at the outset.

Congress provided the Postmaster-General with only $750,000 to inaugurate this gigantic system of parcels delivery, and this has already been pretty well expended. Those who ought to know something of the work and the outfit to carry it on, say the appropriation should have been about ten times as much as was devoted to it. Although but a mere bagatelle of the entire cost of installing the system, it will require more than 35,000 sets of special weighing scales, about 130,000 maps and as many rate books, and hundreds of thousands of special stamps.

The laws says: "Hereafter fourth-class mail matter shall embrace all other matter, including farm and factory products, not now embraced by law in either the first, second or third class, not exceeding eleven pounds in weight, not greater in size than seventy-two inches in length or girth combined, nor in form or kind likely to injure the person of any postal employe or damage the mail equipment or other mail matter and not of a character perishable within a period reasonably required for transportation and delivery."

It is in the detailed interpretation of the statute that the Postmaster-General is engaged. Apparently the farmer can send eggs, butter, honey or other farm produce, and possibly live animals, if not too large or dangerous, for all we know. The merchant and manufacturer, presumably, will be allowed to ship any article not over large or bulky and not dangerous. But it is within the discretion of the Postmaster-General, for instance, to prescribe how articles shall be packed and how presented for shipment.

The postal authorities ask the public to remember this fact—only fourth-class mail matter can be shipped in the parcels post. The law remains as formerly as to first, second and third class mail. Books and printed matter cannot be accepted at the parcels post rate. Why such discrimination was made is beyond comprehension. It would seem as if there were no good reason for it.

Postmasters will be permitted to employ local delivery wagons to assist the regular wagons of the department in collecting and delivering.

Just what effect this parcels post system will have upon country merchants, catalogue houses, upon small manufacturers or upon the cost of living, is difficult to more than approximately determine. It is likely to make business changes little short of revolutionary, but that it will contribute to the general welfare no one seems to question, and this, after all should be the only aim of all legislation.

REPAIR OF AUTOMOBILES.

It undoubtedly costs more to keep an automobile in repair and running order than the horse and horse-drawn vehicle. Thus to whatever extent the horse has been displaced there is more work rather than less in proportion for the smith.

It is no uncommon thing for the owner of a car to have a bill of from $100 to $300 for its repair, but the chances are that if he took it to the average novice repair man who has "picked up" such work and who knows little about iron and steel and what can or cannot be done with them, that he has paid altogether too much and that the work is unsatisfactory.

Now one who is not a mechanic may be able to know when his carburetor has a grain of sand in it, he may easily learn that a spark plug needs fixing, he may see at once that a valve is not seating properly. So also it is not difficult to become a good chauffeur and to fully understand automobile mechanism. But to put a car in shape after the trouble becomes known is quite another matter and something that no one can do who is not a practical and an experienced working mechanic.

There is no mystery whatever about an internal combustion motor. Everything about it is as systematic and orderly as a law of nature, and the same condition exists concerning the ignition system, the carburetor, the transmission, the magneto, the battery, or the cooling and lubricating systems. But a man may have all this information at his very fingers' ends and yet not be able to repair a car, no matter if he has all the tools and machines that were ever made.

Even the taking down or the putting together of the parts of a car—the knowing how tight to turn a nut, the strength of material, and how much play should be allowed on a given bearing—is something that requires more than observation.

Most car owners find it necessary to have their cars given a complete overhauling once a year if they are used the year round, and if they are laid up during the winter they need overhauling every other year. For the average type of a 30 h.p. car, the cost of this is about $50, figuring on 66 hours work at a labor charge of 75 cents an hour. If any extra parts are necessary, as is often the case, or should the bearings be badly worn, the cost is much more. Now this is work for a blacksmith, not for a chauffeur, a watchmaker, an engineer, or for some one who has just gone into the automobile business because nothing else seemed to be more attractive. It is work for some one who has had experience in handling and working iron and steel—who can properly use a hammer, a sledge, a wrench, a forge,—and who has room in his shop to lay the parts of a car out so they may be re-assembled properly and expeditiously.

The repair of automobiles then is essentially the proper work for the blacksmith. He can do it better than any other mechanic. Becoming familiar with the mechanism of a car is comparatively simple, even though it may seem otherwise at the first glance. A thorough examination, a book giving information as to its construction and operation, and a little close attention, are all that is needed.

If any reader needs such a book of instruction—not a book of alleged repair information, for no book can teach the smith how to do this—we will gladly send him one at the publisher's price. Such books vary in price according to their comprehensiveness, number of pages, illustrations, etc., and in every case the price seems high, probably owing to the fact that it is not expected that they can ever be widely sold. But we can send a really good book of the kind which sells by the publisher for $2.50, and one giving rudimentary information, for $1 or $1.50. The best book on the subject we know of, however, sells for $2.50, and it will pay smiths who have or expect to have anything to do with the repair or construction of an automobile to get a copy of it.

But in any event, we want to urge the smith to prepare himself for this work. It is a shame to see it go elsewhere. The smith can do it and he will do it as soon as he convinces the car owner that he understands the mechanism of the car.

THE REWARD OF ENTERPRISE.

Some time ago the writer of this heard an officer of a certain enterprise make a vigorous protest against a contemplated improvement that involved some expense. He closed his plea with the remark that it was about all the company could do to pay expenses under the conditions then existing, and he did not see how an increased expenditure could be met.

The official of the company referred to has

the reputation of being shrewd and able, but conservative in a business way; nevertheless, the improvement which he opposed was finally adopted by his associates. The conclusion reached was that it would attract more than enough business to offset the added expense.

This postulate proved correct, a moribund enterprise was given new life and it soon paid a good profit. Had the step referred to not been taken, it is doubtful that the enterprise would now be in existence.

A good business rule to follow is to let "well enough alone." But when a business languishes from lack of support, it is often wiser to increase expenses in order to serve patrons better than it is to curtail them in order to effect a saving.

Most blacksmiths confine their entire efforts to doing good work. This is indeed essential; in fact it is the most important of all business principles. But there are many situations and conditions where doing of good work alone is not enough to insure a profitable and thriving business. Good work must also be done quickly, and if done quickly it can also be done at a lower price but with a better profit than if done by the old hand and slow method.

We cannot recall a single line of work, business or profession that can be made a success today if carried on according to the method prevailing 25 years ago, and in many cases, any enterprise or business practicing the method of even ten years ago would be doomed to failure. Broadly speaking, we do not believe that the blacksmith or wheelwright business is any exception to this almost invariable rule.

Possibly quite a large number of our readers may feel that they at present get all the business in their own legitimate territory: that their trade finds little fault with either the price charged or the time consumed in doing the work that comes to them. Now, if this be the case; if they are getting all the trade, making a fair profit and satisfying their patrons, then it is wise to "let well enough alone." But such cases are rare, and whenever they exist they are liable to invite competition of the price cutting kind.

But with the up-to-date shop and machine methods of doing work, competition need not be feared, nor will it be invited.

In case of existing competition, the remedy is not to curtail, but to adopt the improved machine and power methods. This invariably leads to turning out work more quickly and at the same time doing it at a better profit at a given price. It likewise leads to more work and a better patronage.

In nine cases out of ten, the thought is a mistake that business will not warrant the necessary tools and power to accomplish such methods. Nothing is so potent to attract new business as facilities to do it promptly and at machine power prices, these last often being lower than the old hand work prices, although giving a far better profit.

An actual illustration is a case in point. One of our Nebraska readers had been running along for years without power in his shop, his idea being that he did not have work enough to warrant installing an engine. Finally a neighbor wanted to dispose of a second-hand one, but he at first refused to purchase it because he thought he had no use for anything of the sort. As the price fixed was low, however, he finally bought it with misgivings and installed it in his shop. It attracted the attention of his customers and finally a farmer asked him why he did not put in a feed cutter. He did so, and soon he cut the feed for so many farmers that he was obliged to install four more feed cutters. Then some one came to him with the request that he put in a shingle mill. This having been done, his work increased and broadened in scope until he had the engine running constantly.

Power in the shop makes work, and it enables the smith to do his work at a lower price and yet make a far better profit than if done by the old slow hand way.

A RECENT RAILWAY RULE.

In relation to the recent order of some of the railroads forbidding their employees to indulge in intoxicating drinks whether "on or off duty," a merchant tells a New York newspaper reporter the following story: "My father made the same rule in his business many years ago. When I left school and went to work for him I knew of the existence of the 'temperance rule,' as it was called, and thought it a perfectly good one. I had not been a total abstainer, but was always temperate, and one evening at a social gathering, at which my father was present, I joined the men in a drink. My father heard of it, and next day I was discharged. 'It would be death to discipline if you remained,' my father said. I made a trip, came back and was re-engaged, and have never since that time taken a drink."

Of course many claim that this railway order to abstain from something that is likely to warp their judgment or dim their vision is an interference with their individual liberty, and so it is. But what then? Our individual liberty is restrained in many ways and at every hand. We can scarcely enter a public place of any kind but what we are subject to a restraint of our individual liberty. But it will be probably claimed that this order is "an unwarranted" interference with our liberty. Well, whenever we think our liberty is being restrained unwarrantably, the best course to pursue is withdraw from all relations or connections with the restraining power; or not being able to do this, accept the situation cheerfully.

There is only one course to pursue in our business or social relations, and that is to either conform to every rule that is made or sever all relations with things that interfere with our doing as we like.

Height of the Anvil.

Some blacksmiths do not consider the height of their anvil in relation to their own height. Where the blacksmith is working on an anvil that is too high he is unable to strike a good hard blow, while on the other hand a tall man working at a low anvil ends up by making himself round-shouldered.

A good rule to go by is to have the anvil just at such a height that the smith may readily touch the anvil face with his knuckles when clasping the hammer handle and standing in an upright position.

Stopping Runaway Horses.

An improved gate for stopping runaways has saved over a hundred horses from serious injury since it has been installed on the Williamsburg Bridge in New York City. This gate, instead of being, like the old one, simply a barrier across the roadway, brings the runaway horse into a V-shaped chute, in which the vehicle that he draws becomes wedged. The animal is thus stopped before he can strike the apex of the gate, and so escapes injury.

Cost of Poor Roads.

Since 1900, 726,000 acres of tillable land in New York State have been withdrawn from cultivation, says a pronouncement by the Automobile Trade League. The League makes this statement to emphasize the necessity of good roads to the farmer as well as the automobile user. Better highways will make the land profitable again by bringing the farmer close to his market, is the argument.

Better Keep a Cow.

The dairy cow owes a salute to the "Country Gentleman" for the fine compliment paid her by that journal in saying that "civilization and the dairy cow are closely associated." As a food producer, says the "Country Gentleman," the cow returns eighteen pounds for every hundred pounds of feed given her, while her nearest competitor, the hog, returns only fifteen pounds, and the hen, with all her cackling, gives her owner but a scant ten pounds of food in return for his investment of a hundred.

Amid the general chorus of grumbling at the high price of meat there is one dissenting note—that of the "Ladies' Home Journal," which in its current number says, "We rejoice at the high prices of meat, and fervently say, 'May they soar higher and yet higher!'" Americans eat too much meat, the "Journal" thinks, and high prices will lessen the consumption.

The largest amount ever collected from a single estate under the inheritance tax law of New York State was recently paid by the heirs of John Jacob Astor—$3,150,000. The total estate amounted to about $77,000,000, and of this the principal heir, Vincent Astor, receives $67,000,000.

SOME COMMON WONDERS.

Everyday Things That All Should Consider and Know.

We read with astonishment the accounts of the latest marvels of science—radium and polonium. These things, being new and unusual, rouse our wonder. Yet the commonest everyday things which are constantly about us have wonders equally great to unfold.

Ordinary table salt consists of two things. One is a metal called sodium. This metal is light in weight and silvery white in color. When thrown upon hot water it takes fire. The other is a gas called chlorine. This gas is heavy, greenish-yellow in color, and has a strong, suffocating odor. It is a deadly poison.

Just think of it! When this metal and this gas are made to combine they form common salt—a necessity of life!

That same gas, chlorine, unites with quicksilver. What do you suppose is formed? Calomel—calomel, which can be given to babies!

These same substances, quicksilver and chlorine, if joined in another proportion, form corrosive sublimate—a deadly poison!

Can there be anything more astounding than the fact that calomel and corrosive sublimate consist of exactly the same things, only in different proportions?

There is a gas called hydrogen. It is the lightest substance known. It burns with a blue flame and slightly explosive effect.

There is another gas called oxygen. It is sixteen times as heavy as hydrogen. It is the substance which makes everything burn.

These united give—what do you suppose? Water! Think of that! Two gases, both of which burn, form a liquid which destroys all fire.

When you burn coal you burn diamonds. When you are writing with a graphite pencil (commonly misnamed a lead pencil) you are writing with a diamond. When a black-face comedian makes up with burnt cork, he is smearing diamond dust on his face.

Can there be anything more wonderful than this? The diamond, the hardest substance known, and the soft, black soot in your chimney are exactly the same thing! And these two have precisely the same chemical composition that coal, charcoal, graphite and boneblack have. Think of the same substance being used for jewelry, to cut glass, to burn, to write with, to purify water, and to decolorize molasses!

Truly the commonest of things present marvels easily equal to those furnished by radium or polonium. The wonders are there, if we will but open our eyes to see them.

Have you ever asked yourself such questions as these:

Why does a match burn when I strike it? Why does gas keep on burning after I have taken the match away? Why does iron rust? Why does my body always have about the same temperature? These things all have the same cause. What is it?

Hardening Soft Iron.

To harden soft iron wet it with water and scatter over its surface powdered yellow prussiate of potash. Then heat to a cherry red heat, which causes the potash to melt and coat the surface of the soft iron. Then immerse quickly in cold water and repeat the operation. A white heat must not be used, as this would not harden but oxidize the iron. Care must be used not to use red prussiate of potash instead of the yellow. It will not answer.

Asphalt Varnish For Sheet Metals.

A bright asphalt varnish for sheet metals is made by boiling cold tar until it shows a disposition to become hard, when it gets cool. This can be found out by rubbing a little on a piece of metal. Twenty per cent. of lump asphalt is then to be added to the tar and stirred in until the lumps are melted. Then it is allowed to cool and can be kept for use.

Bronze For Gun Barrels.

A good receipt for bronzing gun barrels is: Aqua fortis and sweet spirits of nitre, each half an ounce; sulphate of copper, 2 ounces; water, 30 ounces; tincture of muriate of iron, 1 ounce. Mix and apply.

Correspondence

A Device for a Bell.

From John Graham, Illinois.—Perhaps some of your readers would be glad to know how I make a device to ring a bell when anyone opens a door. This one has been in use and has never failed. I have also made others for store-keepers who live in the rear of their stores and

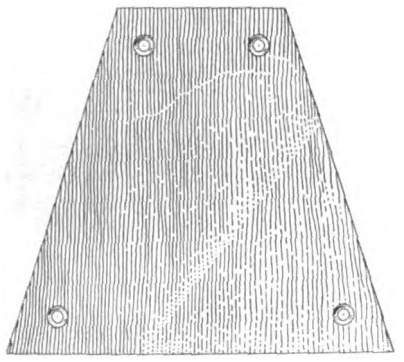


Fig. 1.

it always gives good satisfaction. After the device is constructed the bell can be attached by a wire extending from it to the door with a light coil spring on the end, as shown in the illustration. Fig. 1 represents a small board to which the device is fastened. Fig. 2, showing

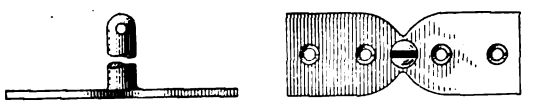


Fig. 2.

two views of the lever holder, is made of ¾ inch round iron, split at each end, and the flange at one end fastened with screws to the board. Fig. 3 is the lever and it is made of iron 6 inches long and about 3-16 by ¾ inches in size. With the four small holes shown it connects with

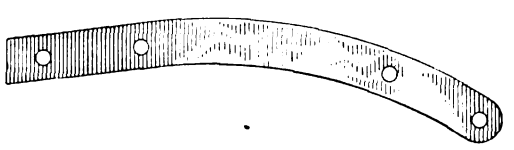


Fig. 3.

Fig. 2 by using a small rivet. This must fit loose as when the door opens the lever pulls the bell. Fig. 4 shows the hinge which must be attached to the lever. It is made of a piece of ½ inch round iron. The rivet should fit loose. Fig. 5

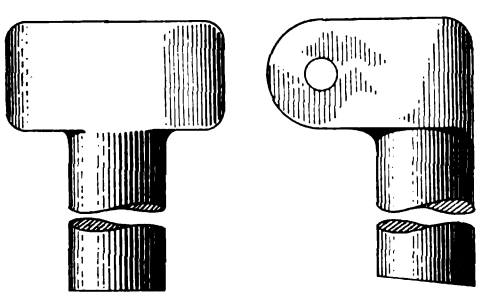


Fig. 4.

shows the lever and hinge and when attached catches the top of the door as it opens. When the door closes it yields, thus allowing the door to pass. Then by its weight it drops perpendicularly and is ready to operate again. Fig. 6 shows

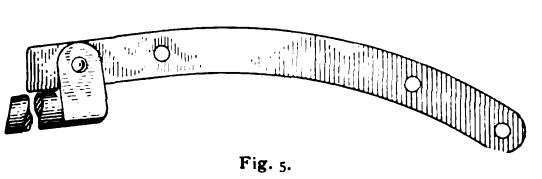


Fig. 5.

the complete device. At the point S is placed a small, brass wire spring, with sufficient tension to throw the lever which is shown at Fig. 3 back in position when the door is opened.

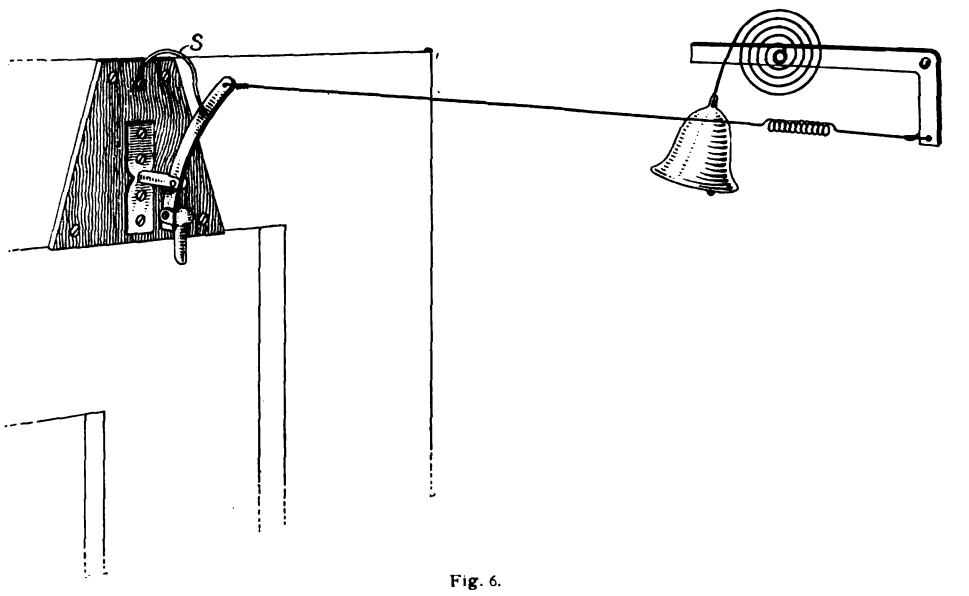


Fig. 6.

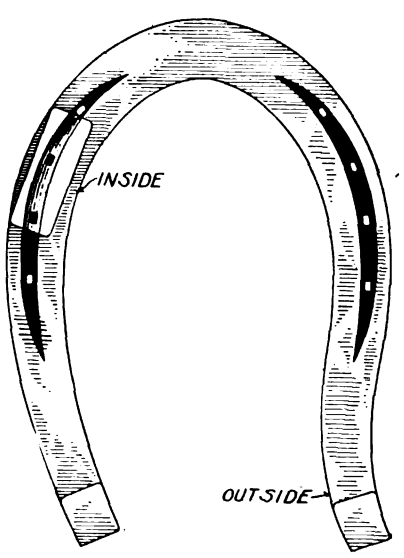
A Grindstone Jack.

From C. Adams, Kentucky.—To do away with an extra man for turning my grindstone and to enable the grinder to do better work I use what I call a grinding jack. It consists of an open framework of iron or wood, according to the convenience of the person making it, one end of which runs to a point and the other end of which is provided with a handpiece of convenient size for grasping when in use. In size the jack should be about a foot longer than the frame of the grindstone. The clamp or tool-holder consists of a piece of iron, the two ends of which are bent at right angles to the middle part, and are threaded and provided with thumb-nuts or finger-taps. By means of this tool-holder a chisel, plane-bit, or other article, may be held at any desired angle against the stone with one hand, while the other is employed in turning the stone. In operating, the grindstone is placed near a wall or post, and the pointed end of the jack is placed against the wall or post, as the case may be, at a point a few inches above the top of the stone, its exact location depending somewhat upon the angle at which the tool is to be ground. I might inclose you a sketch of the article, but I consider my ability as a draftsman altogether insufficient for representing this truly convenient article.

Prices in Southern Wisconsin.

From George H. McNeil, Wisconsin.—I have a price list on all kinds of work hanging up in my shop, and I do not cut the list for anyone. My prices are as follows:

Setting shoes up to No. 5	each	$0.20
Setting shoes No. 5 and up	each	.25
Setting and toeing up to No. 5	each	.25
Setting and toeing above No. 5	each	.30
New shoe up to No. 5	each	.40
New shoe above No. 5	each	.50



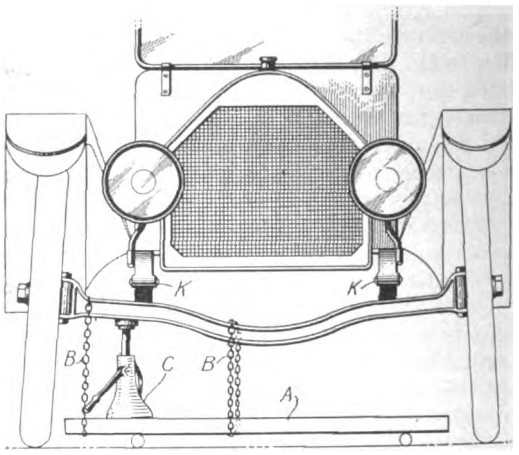
Shoe for an Interfering Horse.

New shoes 7 or 8	a set	2.50
Bar shoe up to No. 5	each	.75
Bar shoe above No. 5	each	1.00
Neverslip up to No. 5	a set	2.50
Neverslip above No. 5	a set	3.00
Shoe with Neverslip calk up to No. 5	each	1.00
Shoe with Neverslip calk above No. 5	each	1.25
Sharpening plough		.35
Sharpening and pointing plough		.75
14 inch new plough lay		3.50
16 inch new plough lay		4.00
Setting tire, buggy, 1 inch to 1¼ inch	a set	2.00
Setting tire, wagon	a set	2.50
Setting truck tire	a set	3.00
Setting one truck tire		1.00
Setting one wagon tire		.75
Setting one buggy tire		.60

For an interfering horse I use a shoe like the illustration. It will not stop every horse, but the majority of them. I fit this shoe right around to the inside of the foot and place the toe below the inside first nail, and swing the outside heel out, fitting the inside heel right around to the foot.

Straightening an Axle.

From J. N. Bagley, Nebraska.—A few days ago I had an automobile come to the shop with the wheels in the position as shown in the drawing. I straightened the axle without removing anything from the car in the following way:



The Sprung Axle.

I raised the car with blocks and placed a square iron bar A, under the axle; on top of this a jack C, and on either side of the spring K, a chain B.

By tightening the chains I gradualy pulled the wheel to its place. After it was pulled a trifle farther than I wanted it, to allow for the spring, I removed the device and placed it at the spring on the other side and repeated the operation. In this way the axle was as good as new and not even the paint was scratched.

For a Slipping Clutch.

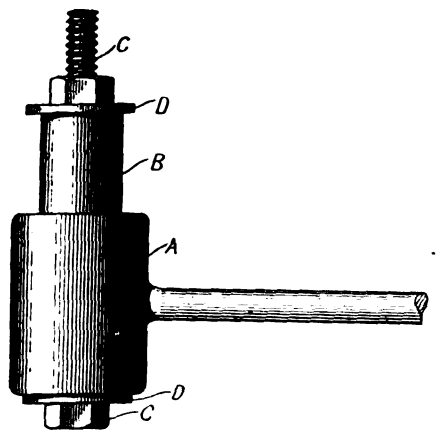
From J. N. Bagley, Nebraska.—A short time ago I was called upon to work upon a slipping automobile multiple disc clutch, and when I took the clutch apart I found the disc worn so they would not hold. One half, or every other one, was brass, while the other half was steel. I took the brass plates and chucked them in the lathe and with a single knurl in the tool post I knurled the face of the disc on both sides. I put the clutch together and it worked as well as when new. But it must not be taken that the new ones should not be ordered, as when the discs were worn the second time they would be entirely too thin for the operation.

For the slipping leather covered clutch I have very good success with the slacked carbide taken from the light generator.

Replacing the Bronze Bushings.

From J. N. Bagley, Nebraska.—I had four automobile connecting rods to replace with new bushings and when I came to place the new

ones I found them very tight, and as they could not be driven with a hammer I made a device as shown in the drawing to force them to place. In the first place I procured a bolt large enough to nearly fill the hole in the bushing, and this I threaded nearly the entire length. I then started the bushing as shown at B, and placed bolt C,



New Bushings.

through the rod with washers D D, on the ends. Now by screwing the nut down, the bushing was forced into the crank as well as if done with an expensive hydraulic machine.

ANSWERS TO CORRESPONDENTS

Under this head will be found each month replies to questions asked in previous issues. Our readers will appreciate the importance to inquirers of furnishing the desired information as promptly as possible.

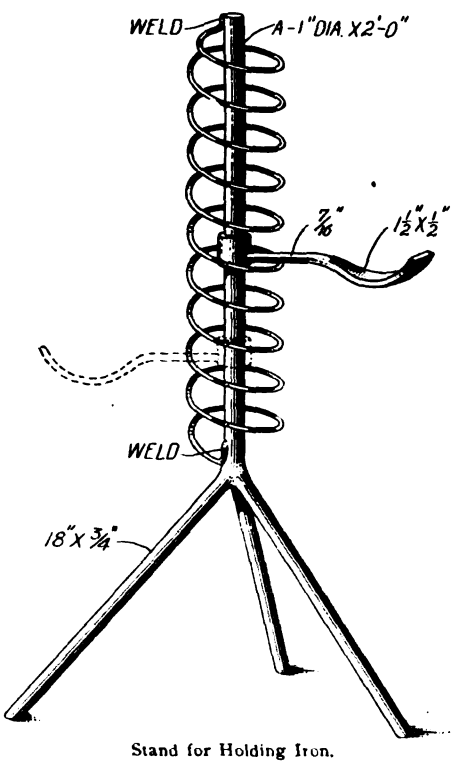
More About Piston Rings.

From H. L. Chapman, Michigan.—I have just read your article showing how compression losses are caused by piston rings. I have designed and built several engines and have considered the matter of rings pretty thoroughly. I build an engine having very high compression and your method of turning the rings, as described, is certainly very good, but in regard to the joint where the ends of the ring meet, I do not agree with the statement made and will try and explain why. But first every ring on an engine piston should be pinned by a pin which is a loose fit and which will prevent the rings turning so the opening in the rings cannot come in line. I would prefer to have the rings at least one-sixth of the circumference of the piston from each other, not so much because they will allow the gas to blow through if close together, but because if separated a considerable distance they will cause the cylinder wear to be more equal and the cylinder will not wear so much out of round and will not need re-boring as soon. The laps should always be on the lower side of the cylinder in a small horizontal engine, as the oil works down and is slightly heavier at the bottom of the cylinder on account of the action of the heat and the oil tends to shut any little leak.

Now in cutting the rings in the "step" form and looking at the lap from the outside, it would seem that the step would be best, as the passage of the gas would not have a free opening on the surface of the ring. But it will be remembered that the ring acts as a kind of check valve, the pressure of the gas pressing it against the edge of the groove towards the outer end of the cylinders. It makes a joint all around except at the point of the lap. But at that point, there is an opening on both sides of the ring, and as the ring must be cut at the thin point, the thickness does not fill the groove to the bottom, but there is usually a space under the lap that is half the thickness of the rings. The gas that enters the space as shown in your illustration simply passes under the ring and out at the bottom, as there is absolutely nothing to prevent. With a new ring the space may be about 1-64 inch, but it will wear to ⅛ or ¼ inch and many times more than that before it is essential to have new rings. Now with the diagonal cut ring, the opening at the very edge increases just the same as with the step cut ring, so in that there is no advantage whatever. But there is another advantage in the diagonal cut ring in that a pin can easily be set in the center of the ring groove and the ring ends fitted by either a square notch, or a round one, to fit around the ring to hold it in place and still not weaken the point of the ring, causing it to break off. Many cut a notch in the side of the ring and fit a pin with a part of it in the groove and the balance in the piston, but they have to use a large pin in order to drill the holes in the edge of the groove for the pin, and this leaves the edge wedge shaped and many times causes the ring to wedge on the pin and break, specially when taking the rings out for any purpose.

For Holding Iron.

From P. Kean, Australia.—I send you a sketch of a stand for holding long pieces of iron, axles, etc., while you weld them. Any required height can be had by twisting the arm around, thus raising or lowering it as may be desired. The mid-



Stand for Holding Iron.

dle bar A, is 1 inch round iron. The three legs are ¾ inch, and the bar that is twisted round the middle bar is 7-16 inch.

Let the Owner Hold the Horse.

From A. E. Bachman, Pennsylvania.—Circumstances have changed so much since the war that the number of horseshoers is rapidly diminishing. Before the war every country smith shop had one or two apprentices, but how is it now? It is something new to find an apprentice in a country smith shop. Our young men find better and easier employment elsewhere. A good many of our young men who are inclined to work at iron or steel go to the large cities and find ready work in machine shops where they can make good wages and have regular work. The few who are serving as apprentices go to the cities after they have served their time.

Those of us older ones who are yet working at shoeing will all soon be on the retired list. The writer is one of that number. He has been at shoeing since 1859. He was in the war of the Rebellion as a cavalryman and followed shoeing there for a couple of years. There he was shoeing under a boss who was a race-horse shoer before the war, consequently he learned fancy shoeing. To shoe well broken horses in cities is not as hard work as to shoe unbroken overgrown western colts which have had no training, no manners, and are about as awkward as they possibly can be.

Some horse owners side with their horses and say "Don't hurt them." They would sooner see the smith used like a football player than to make their horses behave themselves. This is discouraging. Some side with the smith and say "Just you let him go and I will teach him manners." Then they give him a good threshing and training, and make him stand. This is encouraging.

To shoe these bad horses is what our young men escape and learn other professions. There are many farmers in our country who fatten these western horses and as soon as they have one fat he is sold and another lean lot is bought, thus giving the country smith a constant warfare with these corn-fattened colts. This looks as if the shoers would be so scarce before long that the horse owner will have to take his horse a great distance to a shoeing shop. In European countries the horse owner must hold the foot himself. That saves the smith from all these strains. He only needs to do the work. The practice would save us here.

Of Decided Interest.

From William S. Furnace, Texas.—I am a reader of The Blacksmith and Wheelwright and would like every blacksmith to send for publication his opinions and ideas regarding work and prices. Our paper is just what we make it. Now let all of us try to see what we can do to make it interesting and valuable to the craft. I have only been a reader for a short time but would like to hear from all the brothers. If one hundred readers give each an idea or a thought or a fact in relation to our work, each will get in return ninety-nine times more than he gave.

Wrench for Tire Bolts.

From A. K. Olsen, Wisconsin.—I have used a wrench, that is fine for taking off tire bolt nuts, which I will describe to you. It is made like a common socket wrench, with a shank long enough to reach across the wheel fitted for a bit stock on the other end. Place the wheel on a wood horse about the height of your waist line. Then place the wrench across the wheel, and take the nuts off the opposite side. It is the best wrench I have ever used where the bolts are not loose in the felloe.

QUESTIONS FOR OUR READERS

You are invited to ask questions freely on all points pertaining to your work. Our subscribers who have solved successfully the problems which confront you will take pleasure in imparting the results of their experience for the benefit of their fellow-craftsmen.

Shoeing Information.

From W. S. Furnace, Texas.—Brother blacksmiths, I would like to know your ways of shoeing crippled-footed horses, such as a wire cut foot or a quarter-crack, or toe crack or drop sole. What do you do for this? I will tell you what I do for a wire cut foot. I make a bar shoe with the frog pressure. I use tar and a pad and I get good results from it. The way I stop quarter crack or toe crack is to grow them out. I take a piece of sharpened iron about ¼ inch wide, and at the edge of the coronary band, just over the crack, I burn in about 3-16 inch deep, and I get good results from this. It will stop the crack, and as soon as the crack grows off it is gone. No more crack. Now some brother try this and you will find it good.

Now I will give my method of treating a horse's foot which has a drop sole and thrush. For the thrush I pare the sole down as it should be, for you know it's soft and white, and it grows faster than the wall of the foot which is hard. To hold the shoe, I sometimes even cut the sole to the quick. Then I place my shoe and take a solution of tallow, wax, linseed oil and turpentine, mixed together, and heat until I cannot put my finger in without being burned. Then I put the horse's foot in up to the coronary band the vessel containing the hot solution and let it stay about a minute and he will never go lame from the low paring. This will start the growth of the wall and kill the disease in the sole of the foot. It will also work on the thrush in the same way.

A Spring Query.

From L. S. Ferree, South Dakota.—While The Blacksmith and Wheelwright is always read with interest, and many good pointers are to be found in it, there has not been anything offered that I know of in regard to building and welding automobile springs. While a good many smiths do not repair automobiles, this work certainly comes in the smith's line, consequently let us find out and learn what we can about them, and be prepared to handle this work.

I for one would like to learn the composition and the making of spring steel. Is spring steel

a self-tempering steel, or has it no temper? In welding springs does the heat in any way injure them? That is, will they stand after being heated, or will it make them weak in any way? In taking a spring apart, as soon as the center bolt is removed the spring will spring apart; that is, the leaves no longer lie up snug to one another. As all springs seem to do this, I would like to know how far apart each leaf should stand from another before being drawn together by the bolt, and what is the object in them being this way?

In welding them, I would like some brother or brothers to give to the best of their knowledge, the correct and best way, including the scarfing, heats, and the sticking of them, together with the finishing up of them. I would like to learn the process of building auto springs, from the spring steel bar, until they are placed on the market complete for sale. I will appreciate any information on this subject, and believe it will be of interest to others as well.

Tire Heating Furnace.

From Joseph Scrivan, New Jersey.—I would like to ask your advice concerning a furnace for heating tires. What would be the best and cheapest way, and how to build it? I would prefer a furnace to burn wood if it can be built to give satisfaction.

Removing Old Paint.

From H. P. R., Iowa.—Will some brother of the craft explain his method of removing old paint and varnish from vehicles and autos, and how to proceed to paint and polish same to get best results? Also striping.

AN OFFICIAL FARRIER.

It Is Claimed That In Lowell, Mass., He Saved Expense.

Commissioner Barrett of the Lowell, Mass., fire department, has a statement to make with regard to the "official farrier," whose appointment has caused some criticism because he is not a veterinary surgeon.

He says that Thomas F. Saunders, the present incumbent, joined the Lowell fire department in September, 1895, and became a permanent fireman December 15, 1909. He was, therefore, in the employ of the department as a regular fireman before the government came into existence at all.

In June of this year, Commissioner Barrett, believing that the shoeing of department horses was costing a good deal more than it should, and knowing that before he joined the department Mr. Saunders had been an expert blacksmith, added to his other duties the duty of overseeing the horse-shoeing of all the animals used by the department. He was, however, still retained as a regular fireman to be called upon at alarms—and in consideration of his extra work the commissioner raised his compensation to $3.25 a day, from the date of his appointment last June.

The commissioner submits the following table of figures for the work of shoeing horses in the years 1911 and 1912.

SHOEING.

	1911	1912
January	$247.66	$202.19
February	219.96	125.25
March	169.68	148.94
April	169.61	172.40
May	142.11	121.40
June	166.50	112.15
July	193.83	80.15
August	153.28	81.15
September	152.65	93.95
	$1615.28	$1137.58

From the above it will be seen that since Mr. Saunders became official farrier, the city has saved money.

"The fact is," said the commissioner, "the horses were being shod when there was no earthly need of it, and the city was paying the bills. Moreover the charges made for each job were exorbitant. Today we do not ever pay more than $2.50 for a set of shoes—more than the commercial rate, to be sure, but our horses are emergency cases and have to be attended to immediately, whatever other work may be in hand. We ought to pay more than we should if we waited our turn."

PAINTING VARIOUS SURFACES.

The Correct Treatment for Cement, Brick, Wood, Iron and Steel.

Half the troubles that come to the users of paint may be traced to lack of or improper preparation of the surface. There is nothing to be gained by painting any given material in a haphazard way and letting it take its chance, and frequently the presence of a coat of paint applied in desperation may not only be useless, but prevent subsequent adequate preparation.

The skill of the painter is shown in the preparation of the surface; it must also be in evidence in determining the composition of each coat of paint for every surface encountered. No greater mistake can be made than using paint made up in exactly the same way, or composed of identical ingredients for every conceivable surface.

A cement surface may be ideal or not for painting, according to the length of time it has been done. If oil paint is applied, there must be no suspicion of moisture in the cement, otherwise the free lime present will attack the oil in the paint and convert it into a kind of soap, which will never dry, but instead tail down the wall in streaks.

Portland cement requires at least six months in which to dry before it can safely be coated with an oil paint, and even then before any paint is applied the surface should be washed down with equal parts by weight of zinc sulphate and water, and allowed several days before painting. A wash over with ordinary vinegar is often sufficient preparation.

Frequently it is necessary to color cement before it has had time to dry, in which case recourse should be had to one of the well-known water paints on the market. Such a paint being pervious and practically free from oil, will not retard the drying of the wall, while it will be a foundation for subsequent oil paint.

Where cement is dry beyond question, and it is desired to coat it with oil paint, the paint may be mixed as follows: Priming, white-lead, red-lead, half linseed oil, and half turpentine; second coat, slightly less oil and omitting the red-lead; third coat, more oil; in the fourth coat, where the paint is desired with a high gloss without varnishing, boiled oil may be substituted for raw oil. Once, however, a cement wall is dry it may be painted and varnished or enameled.

A new plaster wall is not a fit ground for oil paint, for reasons almost identical with those given for cement. In the opinion of many it is best left uncoated for several months, though bare walls are not conducive to quick letting of new houses. There are washable water paints which have the makers' guarantee, provided only those colors fast to lime are selected; and if these are not used the walls are best left bare until thoroughly dry. Where it is intended finally to paper the walls, the water paint will not be a hindrance, as all that will be necessary is a wash down with either cold or warm water. Where an ordinary size distemper is used the walls should be washed bare before either papering or painting.

Plastered walls when thoroughly matured may be painted in the same way as cement. The priming coat must not contain less than half oil, as the object is to stop suction as quickly as possible. Glue size is resorted to sometimes where work is cut very fine, but this practice is to be condemned.

Repairs in a plastered wall that is to be oil painted are best done with Keene's cement, painting the patch directly the cement is set. Sirapite is also good, while Alabastine is ideal.

Brickwork is often painted along passages or on the exterior of houses to keep out the rain. Provided the mortar is good there is much to be said in favor of painting brickwork, while the effect may be improved by peppering or sprinkling the last coat with sand. Finish the wall a good full oil coat the color of the bricks, and while wet sprinkle with white floor sand until the paint will take no more. Strike the joints afterwards with sharp white or black paint.

Before painting, brickwork should be scrubbed with wire brushes to remove any lime film or dust that may have been set free from the mortar. Petrifying liquid makes a good first coat on brickwork; add a little stiff Duresco for the second coat, afterwards use oil paint.

Stone may be painted in the ordinary way; but if stained and covered with fungus, must first be cleaned with wire brushes or washed down. Instead of using oil paint, petrifying liquid with the addition of a small quantity of water paint.

Slate if clean presents a good surface for painting, and may be finished in oil or be flatted and varnished.

If the surface of sheet-zinc is quite clean there is no particular necessity to do anything to the metal before painting. It is usually desirable, however, to prepare the surface. Take spirits of salt full strength, and drop strips of zinc into the acid until effervescence ceases. Dilute for use by adding an equal amount of water. Rub the acid on to the zinc with an old mop, a piece of rag tied to the end of a stick. Leave the acid on for several hours, then wash with weak vinegar. Another solution is 2 ounces of sal-ammoniac to 1 gallon of water, 2 ounces of nitrate of copper, 2 ounces of chloride of copper, and 1 ounce of strong spirits of salts. Apply as in the previous instance. The first will not greatly affect the appearance of the zinc, while the last will turn the surface black. Leave until the following day before painting. When painting, have the first coat so as to dry nearly flat; afterwards the paint may be oil gloss, enamel, or varnish, the coats being built up as for wood.

Wrought ironwork, such as fences and gates, should be painted as soon as possible after leaving the workman's hands. The great point is to ensure that the iron is clean, dry, and free from scale. There is no better priming than red-lead and linseed oil, unless it be orange lead, which partakes of the same nature, but is a lighter and bulkier pigment. On the priming coat white-lead, zinc oxide, or any pigment may follow.

Ironwork already painted and requiring renovation should be scrubbed with wire brushes, and have all loose paint removed before any attempt is made at repainting. The surface must be free from moisture if the paint is to last for a reasonable length of time.

Steel is not generally painted, but if clean may be coated first with sharp color—that is, paint having very little oil in its composition.

Aluminum paint is frequently used on radiators and other ironwork. This may be applied direct; but it will be found advantageous to give a priming coat of white or grey paint made to dry flat.

Lead gutters and soilpipes do not require painting to preserve them. Paint, however, is sometimes applied for the sake of uniformity of color on a building where ordinary oil paint is employed.

Corrugated iron is an unsatisfactory surface for painting. A good water paint may be used as an under-coat, following with lead or zinc in oil. Generally on the bare surface zinc oxide will be found preferable to white-lead, while the following coats may be composed of either or both pigments.

Tin is best coated with paint made from varnish and turpentine, in the proportion of one of the former to four of the latter for the first coat, gradually increasing the varnish in the following coats, until the final may be four of varnish to one of turpentine. Frequently, however, the flat paint may be varnished instead of finishing with glossy paint.

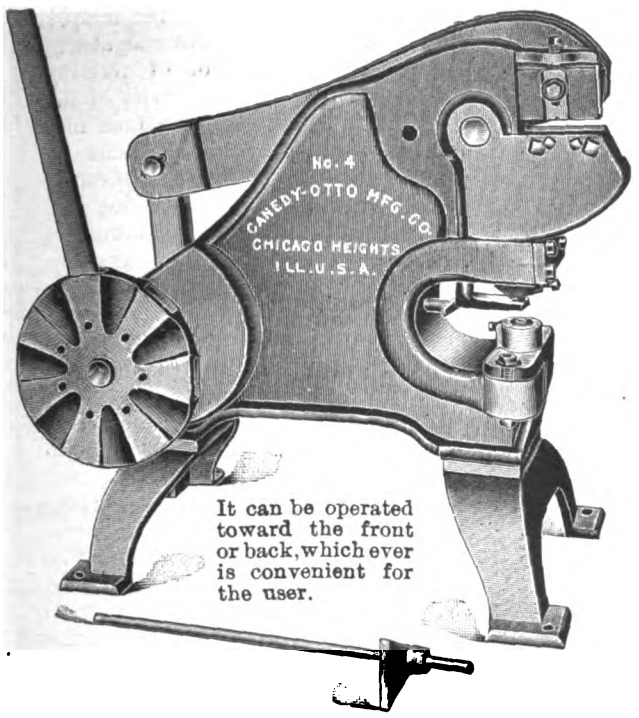
Wood full of turpentine, such as pitchpine, is difficult to deal with, as the gum in the wood quickly begins to exude, or, at least, induces blistering. Opinions may vary as to the best method of treating such a surface. A coat of teak preparation as used by boatbuilders may be used for priming, the paint following having but little oil in its composition. Several coats of a good water paint direct on the bare wood, finishing with a paint made with oil and turpentine or varnish and turpentine, will often produce a satisfactory result.

Have you Got One?

Any one who has an unused thirteen-cent United States postage stamp printed on blue paper would do well to hold on to it rather than to use it on a letter or package. A stamp dealer who has heretofore sold these stamps to collectors for $62.50 each announces that after November 1 the price will be $75. Four thousand of these stamps were originally printed, but less than a hundred are known to exist at present.

The steel exports of the United States, Mr. O. P. Austin, assistant chief of the Bureau of Foreign and Domestic Commerce, announces, now amount to the enormous total of a million dollars a day.

No. 4 Combination Punch and Shear



Will shear ½x4-in. flat bars.
Will shear 1-in. round bars.
Will punch ½-in. hole in ½-in. plate.
Depth of throat 6 inches.
This machine is furnished with ½-in., ⅝-in. and ¾-in. punches and dies, also a lever bar.

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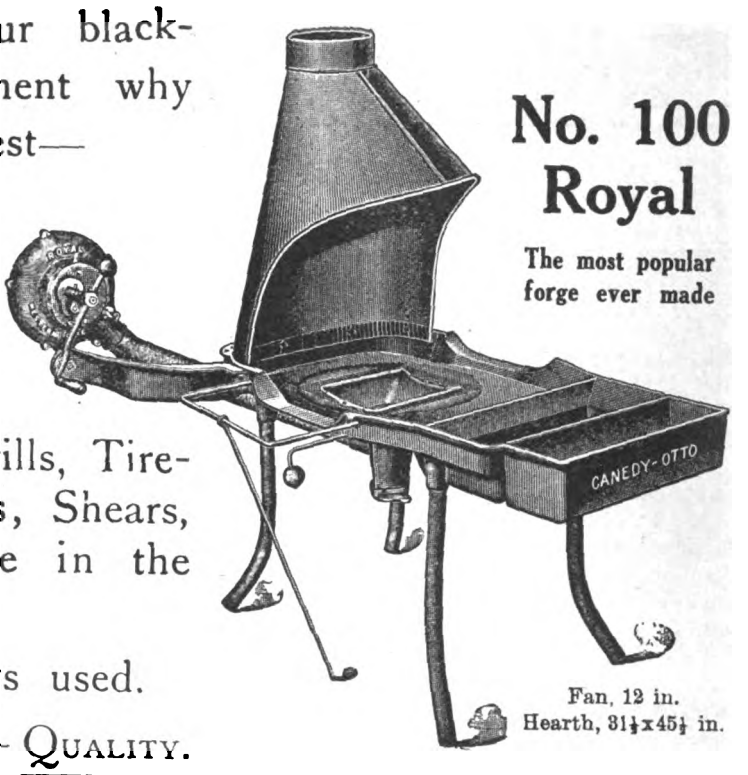
There's a reason — QUALITY.

No. 100 Royal

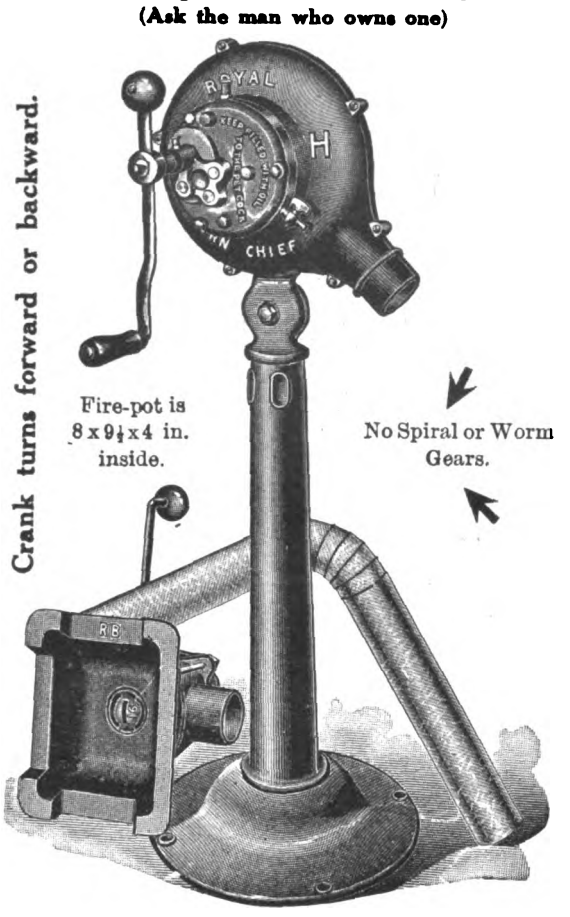
The most popular forge ever made



Fan, 12 in.
Hearth, 31½x45½ in.

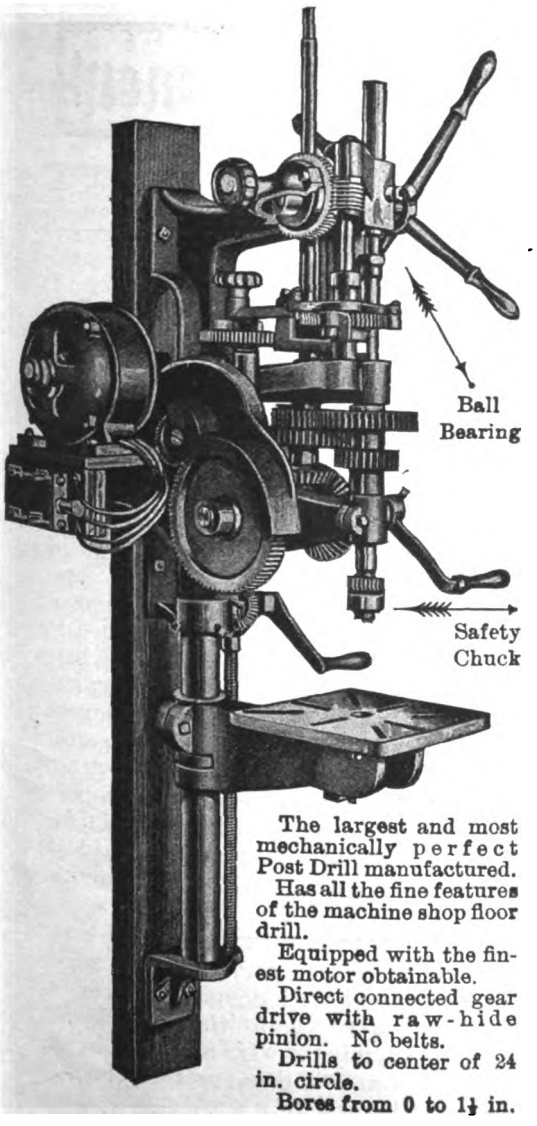
Royal Blower

(Ask the man who owns one)



FORGES
BLOWERS

No. 16 Electric Drill



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Has all the fine features of the machine shop floor drill.
Equipped with the finest motor obtainable.
Direct connected gear drive with raw-hide pinion. No belts.
Drills to center of 24 in. circle.
Bores from 0 to 1½ in.

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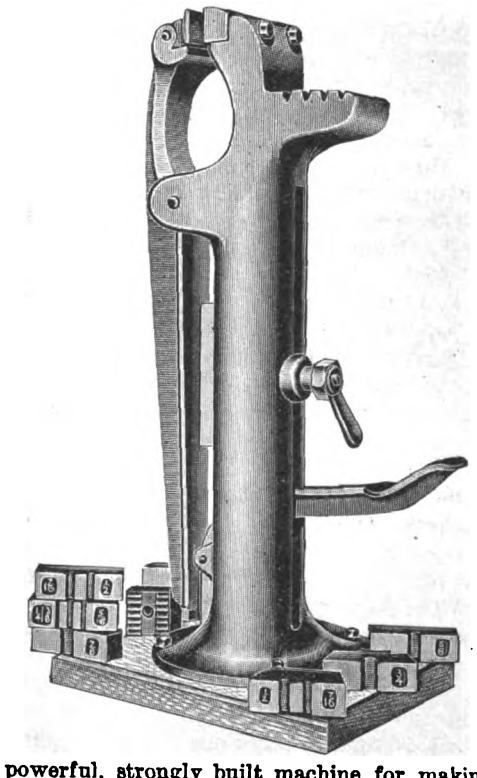

A powerful, strongly built machine for making bolt heads, forming calks, shaping tools, and everything where a first-class quickly operated vise is needed.
Furnished with or without dies of the following sizes: ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾.
The best of material and workmanship used throughout.

POWER

In this department an expert will reply to any questions our readers may propound as the result of their experience, or inspired by a desire to become acquainted with the value of power in the shop. All inquiries should be addressed to the Editor of THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

THE GAS ENGINE.

Why It "Goes" Explained In Simple and Easily Understood Terms.

Among the 25,000 dealers and the 7,000,000 gas engines users in this country, how many really know what makes the engine "go."

The gas engine is the most simple power producing device imaginable. If properly understood, it is one of the easiest to keep in good working order. If abused by so-called "experts," who have not studied its principles of design and operation, a perfectly good engine which only requires a little cleaning out, or two or three turns of an adjusting screw, is often irretrievably ruined.

The main parts of the gas engine are the cylinder. piston, and fly wheel. The piston and cylinder form a sort of pump. The piston rod is usually connected by a crank to a pair of rather heavy fly wheels. When the engine is turned, the piston moves in and out of the cylinder just like the piston in an ordinary water pump.

Now there are two valves opening into the cylinder, one termed the "inlet" and the other the "exhaust." These are so geared that on the outward stroke of the piston (equivalent to the upward stroke of a well pump), the inlet is opened and a mixture of gasoline, oil, or some other suitable fuel with air, is drawn into the cylinder. This fuel and the air are mixed in a device known as the "carburetor" which next to the "ignition" is responsible for most of the engine troubles.

The cylinder is now full of the gaseous vapor which is, of course, highly explosive. The momentum of the fly wheel now forces the piston back against this mixture, and the inlet valve being closed, the mixture is compressed. When compressed to the fullest extent, an electric spark is produced in the mixture which is exploded, this driving the piston outwards with great force. This force turns the crank and the fly wheel, the latter smoothing out the impulses and making the engine run steady.

When the piston is driven out by the explosion, the outlet or exhaust valve is opened at the bottom of the stroke, and when the piston moves up into the cylinder again, it drives out the burnt gases that remain in the cylinder. This causes the puffing sound of the exhaust. After the cylinder is thus cleared of the burnt gases a fresh charge is taken in as just described, and so on, as long as the engine runs.

The apparatus used for producing the spark which causes the explosion in the cylinder is often termed the "ignition" and this causes by far the majority of gas engine troubles. Up to the last year or two nearly all engines had batteries for furnishing the spark, and as these become exhausted sooner or later, the spark often failed and the engine would not run. This defect led to the development of the built-in engine timed magneto, which is a device geared to the engine and forming part of same. This furnishes a plentiful supply of current as long as the engine runs and requires no attention or renewal. The best type of magneto has means for checking the timing by simply looking at same, no careful measurements or expert adjustments being necessary.

These magnetos should not be confused with small dynamos driven by a belt or a friction wheel bearing against the face of the engine fly wheel, as such dynamos often cause trouble on account of the high speed at which they must be run. The built-in magneto is universally used on automobiles.

Those who are wise will carefully study the instructions sent with their engines. These instructions are simple and any one can understand them. Study why and how your engine "goes," so that in case of anything going wrong, you can locate the trouble as it is seldom necessary to tear the engine apart to make repairs. Those about to buy an engine should specify that it should have a "built-in" type of magneto having visible timing, a good carburetor, well made bearings, and a strong guarantee as to material and workmanship.

Care of Gas Engine Batteries.

Gas engine users who want the best battery ignition, do not use only 5 batteries in series as is commonly done, but use what is known as the "series multiple' arrangment in which four groups, 5 in a group are used. When 20 cells are so arranged, their life is 8 times that of 5 cells. But even with this arrangement, the battery will give trouble sometimes, as regardless of the number or kind of batteries used, or their arrangement, batteries become exhausted with age, even if not in use.

It will be well to remember that a battery will not give a uniform spark all day. In the morning, when the engine is first started, the spark may be entirely satisfactory. In the afternoon, after the engine has run several hours, and the batteries begin to weaken, the spark weakens, and the engine begins to miss. This means that the batteries are getting weaker. Do not attempt to remedy this trouble by adjusting the engine igniter, but give the batteries the attention they demand.

Rough treatment tends to shorten the life of batteries. Handle them gently. Do not remove the pasteboard covers.

Excessive heat shortens the life of batteries; cold makes them inoperative until thawed out.

Don't keep batteries in a hot place. Don't lay them on sides, but always stand on end. Don't buy so many that you will have to keep them on hand for months. Get new fresh cells as needed.

Slow speed engine timed built-in magnetos are an up-to-date device for the gas engine. They are independent of heat and cold. As the magneto forms part of the engine, it will run anywhere and give a good spark as long as the engine runs. The "built-in" type of magneto should always be specified on engines to be used for portable and farm work, as they are entirely independent of the many conditions which so seriously affect battery ignition. Magneto ignition is always uniform, as it depends upon the engine power and not chemicals, for its generation. The best magnetos have means for visibly timing them, so that any one can readily determine if the engine is properly in time.

TEMPERING A HAMMER.

An English Mechanic Gives His Method for Both Face and Head.

To temper a smith's or fitter's hammer properly is one of the jobs which many an otherwise good forge-hand either never acquires or foolishly forgets, so I think, says "Lesoir" in the *English Mechanic,* that a note here for the pocket-log of the man who wants to know and retain will not be out of place.

First assure yourself the steel is good: next, in the making, take care not to overheat or to hammer when black-red. Assuming this to have been attended to, the next point is to slowly heat the hammer-head to a fairly rich red, and dump into red-hot ashes placed in a pit scraped in the hearth as near as convenient to the fire, and cover up tightly and soundly with fine hearth-ash dust, and allow to remain till cold—say, all night. Dress up. Now make a hollow fire by the simple expedient of allowing a chunk of wood to burn out in the center of a heaped fire, so as to form an arched cave with an opening towards the front of the hearth. Into this insert your now annealed and finished hammer-head, holding it on a stiff rod flattened at end to loosely fit the edge, and with blast at half-cock let the heat soak well in. While this is proceeding, fill the water trough to within 3 inches of the brim, flinging into it a handful or two of cheap salt, if it is procurable. When the work is at a rich red heat remove, and by letting the rod rest on the edge of the trough allow the pene end to dip into the water, taking care not to allow the eye part to be touched by the bubbles thrown up. As the pene end contains much less material than the face, it will be cooled almost sufficiently for tempering purposes before the heat of face shows signs of lessening. When this part has been sufficiently long submerged, and only practice and size of job can determine this, twist the supporting-rod so as to bring the face end into the water, always taking care to keep the eye above surface. During this part of the cooling keep a strict watch on the temper color of the pene part, which now begins to creep up, and should it show signs of arriving too quickly it is arrested by a quick twist of the rod on the trough edge, bringing the face momentarily out of the water and the pene in. Usually, however, when the face has had sufficient first-dip, the pene is ready for cooling out, while the truly business end of the hammer is closely observed for the correct temper color, and as soon as this arrives twist rod again so as to immerse that end. When the face temper is right, all that is necessary is to continue to rotate the supporting-rod slowly, dipping "heads and tails" alternately till the eye has arrived at a safe heat for cooling—i. e., when it is black-hot. This method of tempering hammer-heads with good steel correctly handled cannot fail, as care is taken to keep the eye-walls soft, and the hot-rod end, which fits in the eye during the operation, allows of sufficient heat being retained in the job itself to run the temper-color to the ends. Though long in the telling, the job is simple in execution, and may be logged as under:—

Tempering Hammer-Heads.—Take good tool-steel, do not overheat nor work when black-hot, anneal and finish, heat slowly on rod placed in eye, lay rod on water-trough edge and by revolving same cool ends alternately, commencing at pene, never allowing eye parts into water till black-hot, when cooling-out can take place.

The Height of Breeching.

Discussing the arguments for and against the breeching, Nimrod says: "Many coachmen dislike them as cumbersome to their horses, particularly in hot weather, and say further that however useful they may be in holding back when necessary, they give them the trick of 'sitting upon them' as they term it, whenever an opportunity occurs and not getting away from the coach when wanted to do so." Now, if the breeching is so placed that the horse can sit upon it, he is better without it as it is then far below its proper position, and instead of assisting him causes trouble by taking his legs from under him when holding back. The proper height for a breeching is the height of the hame pulls from the ground, carried round the rump, and with a breeching in this position the horse can hold back with perfect ease, and retain the full use of his hind legs. Besides the collar is kept off the neck and any strain on the hame strap is avoided.

Legal Department

All legal questions answered free of charge. Address Communications to Editor "Legal Department," THE BLACKSMITH AND WHEELWRIGHT, P. O. Box 654, New York City.

Cannot Attach.

Question.—Kindly let me know, through your paper, if I can attach a load of hay belonging to one of my customers which he is moving out of the county? This customer owes me a repair bill and will not pay it. I live in Sullivan County. He lives in Lycoming County. Both counties are in this State. He hauls hay past my place and takes it out of the county. Can I attach a load of this hay for my bill, or not? If I can, how shall I proceed?—J. W. RUSSELL, Pa.

Answer.—Upon the statement of facts presented, it is our opinion that no attachment would lie. The proper course to be pursued in this case is for you to consult a local attorney, sue your debtor and obtain a judgment against him. After you have obtained a judgment against him you can then levy, not only against any load of hay, but also against any other property your debtor may have. This course, if pursued, would be much less expensive than obtaining an attachment against any particular load of hay, and will prove more efficient in obtaining your money.

An ingenious housekeeper tells an exchange that an easy way to knead dough is to run it through a meat-chopper, with which nearly all households are supplied. "If a stiff biscuit dough is run through this three or four times," she says, "it is well worked."

License for the Blacksmith.

From the Canadian Blacksmith.—There is nothing more true than the saying "No feet, no horse." The horseshoer should be the last man to be the enemy of the horse, yet, alas, a good few blacksmiths actually are enemies of the equine race. The vast majority of horses' lameness comes from indifferent shoeing, and no man who lays claim to the title of a horseshoer should be ignorant regarding the shoeing and foot treatment of a horse. The wonderful and delicate mechanism in the hoof of a horse should never be touched by any other than a skilled and experienced workman. Men who do not possess the necessary qualifications, who have shod horses, and by bad work made them lame, give the owners of horses, and mankind generally, an opportunity to condemn, and to hold in derision, the members of a craft that should be composed of none but experienced mechanics.

We have often thought that it would be an excellent scheme if the Government instituted examination centers and held proper practical and theoretical examinations, the blacksmith having to pass these tests before getting a diploma, which would entitle him to shoe horses in each particular province of the Dominion of Canada. This would eliminate the unfit and would greatly increase the status and qualifications of the craft as a whole.

The owner of a horse may not know that the foot is not perfectly level, or that burning a red-hot shoe into place is not horseshoeing; or he may not know that bars are not cut away, or that the iron is pressing on the sole and not on the hoof of his horse. Horses are too valuable a commodity to be ruined by incompetence or by ignorance, and we trust that there are very few horse owners who can blame the blacksmiths of Western Canada for spoiling their property. The provinces require a man to possess a certificate of capability before they let him open the steamcock of a donkey engine, a job that a child could do were it strong enough; then it seems strange that a man who has the much more delicate work of fitting shoes upon the hoofs of a valuable horse should not also have to possess some credential of his ability to handle the horse in a thoroughly scientific and capable manner.

Enameling Cast Iron.

A new process for enameling cast-iron objects, in which the principle is adopted that the enamel will take better on white than on gray iron, as the latter contains a quantity of free carbon (graphite). Sulphur is used in casting which will unite and form sulphuret of carbon, and the iron is covered with a skin of white iron where exposed to the action of the sulphur. Ready-made objects are painted over with sulphuric acid of 60 degrees Fahr., and then heated, by which means the acid in the pores acts on the graphite in a similar manner.

Mending Iron Pots and Pans.

To mend iron pots and pans, partially melt two parts of sulphur and add one part of fine black lead. Mix well, pour on a stone, cool and break in pieces. Use like solder with an iron.

Another method: Mix finest sifted lime with some white of an egg till a thin kind of paste is formed; then add some iron filings. Apply this to the fracture and the vessel will be found nearly as sound as ever.

WANT ADVERTISEMENTS

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED,

will be inserted under this head at 2 cents a word, including the address for each insertion, payable in advance; but no advertisement will be accepted for less than 50 cents, however small.

Remittances may be made in postage stamps where the amount to be sent is less than $1 00. Address

M. T. RICHARDSON CO., 71-73 Murray St., New York,
PUBLISHERS OF THE BLACKSMITH AND WHEELWRIGHT.

PATENTS FOR INVENTIONS.
H. W. T. Jenner, patent attorney and mechanical expert, 608 F. St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trade-marks registered.

WANTED.
A blacksmith in each county of the United States to solicit subscriptions for The Blacksmith and Wheelwright; experienced mechanics who may be unable to work at their trade from ill-health or from being partially disabled by some accident can make a good living. For further particulars address M. T. RICHARDSON CO., 71-73 Murray Street, New York.

CHANCE TO MAKE SOME MONEY.
We want agents in all parts of the country to sell our books on horseshoeing, carriage building, carriage painting, etc. There are hundreds of mechanics (blacksmiths and wheelwrights) in different parts of the country unable, by reason of impaired health or age, to work at their trade, who could take hold of these books and make a good living out of them. A blocksmith can talk up a book on blacksmithing better, of course, than a man who knows nothing about the business. Write at once for terms and full particulars to M. T. RICHARDSON CO., publishers, 71-73 Murray Street, New York City.

PATENTS.
C. L. PARKER, attorney-at-law, and solicitor of patents. American and foreign patents secured promptly. Handbook for inventors sent free upon request. 926 G street, Washington, D. C.

BLACKSMITH.
Here is your opportunity to be an expert blacksmith without help. As life is short, get Toy's Modern Methods of doing hard jobs easy, forging and welding all kinds of steel solid. Also tempering all tools to a standard by colored charts. This is real plain information, not theory, all for $1.00. Send for free samples first. W. M. TOY, Sidney, Ohio.

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Accidentally have discovered a root that will cure both tobacco habit and indigestion. Gladly send particulars. No drugs. G. S. STOKES, Mohawk, Fla.

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Send for a circular describing "Mechanics' Companions," a tri-square, a centering square, a caliper, rule and protractor. Address J. O. HESS, Oran, Mo.

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WANTED—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber tired wheels, poles and shafts as a side line. Why don't you try it? THE BOOB WHEEL CO., Cincinnati, Ohio.

Auto Cylinders rebored. Pistons and rings fitted $8.00 to $12.00 per cylinder. Gear cutting in nickel, steel, brass, fiber, etc. Crank shafts, connecting rods, cases and axles reproduced like original. Send old or broken parts to go by. McCADDEN MACHINE WORKS, St. Cloud, Minn.

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We offer one fine 8 H. P. stationary Milwaukee gasoline engine for only $115.00. Have also 50 other sizes and styles. State your power requirements before you buy. We can save you money. BADGER MOTOR COMPANY, Milwaukee, Wis.

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I bring buyer and seller together. No matter where located, if you want to buy or sell, address FRANK P. CLEVELAND, 975 Adams Express Building, Chicago, Ill.

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Young man with several years' experience in general shop. Capable of doing floor work. Steady employment. Address M. J. O'CONNOR, Garber, Iowa.

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Shop and lot for sale cheap in prosperous country town. Good location for good horseshoer and blacksmith. Write for particulars to CHAS. ROBERTSON, Plum City, Wis.

FOR SALE.
General blacksmith shop, tools, material. Two lots. Four-roomed house. Only shop in town. Going on a farm. Address for particulars and price. A. S. VERRELL, Memphis, Nebraska.

FOR SALE.
Blacksmith Business, stock and tools, only shop in good town, good trade, reason for selling rheumatism, inquiries promptly answered. W. L. MILLER, Concord, Nebraska.

FOR SALE.
McGovern and West power tire shrinker, Moyer and Defiance hub boring machine. All as good as new at one-third the price of new ones. Address, 554 Freeman Ave., Cincinnati, Ohio.

Please mention "The Blacksmith and Wheelwright" when writing to advertisers.

FOR SALE.

General blacksmith's shop. Stock, tools, dwelling and land. Good proposition for right man. For particulars address R. C. SCHAUER, Cost, Texas.

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Blacksmith Shops, Stores, Farms, Factories, Dwellings, Machinery of all kinds, we sell anything anywhere in United States or Canada. Write us. AMOS SALES CO., C2402-C2404 Johnson Street, Greenville, Texas.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., OF THE BLACKSMITH AND WHEELWRIGHT.

Published Monthly, at 71 Murray Street, New York City.

Required by the Act of August 24, 1912.

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M. T. RICHARDSON COMPANY,
M. T. RICHARDSON, President.

Sworn to and subscribed before me this 1st day of October, 1912.

[L. s.] (S.gned) W. H. ROSE,
Notary Public, No. 68.
(My commission expires March 31st, 1913.)

Good Profits in Handling Vehicles.—We believe it will be to the advantage of every reader of this paper to read the advertisement of the Parry Mfg. Company of Indianapolis, Ind., on another page. Every blacksmith comes in contact with more or less people using vehicles of various kinds, and many of them want to buy new ones. The blacksmith in many cases is the logical man to handle vehicles and he should consider the question of doing so. It is much easier to make a profit in selling a vehicle than to hammer it out on an anvil. There are no more famous line of vehicles perhaps in this country than those of the Parry Mfg. Company, and they are prepared to make a specially favorable proposition to our readers who will take the trouble to write to them for terms. Do not forget to mention The Blacksmith and Wheelwright, and ask for their big 1913 catalogue in which you will probably find certain vehicles described which you can, no doubt, sell to advantage.

"Wurster's" Old Reliable Solid Collar Axles.—These are made by F. W. Wurster & Co., 375 Kent Ave., Brooklyn, N. Y., who are also manufacturers of every description of fine axles. Their axles are for sale by dealers everywhere. They will always give satisfaction.

The Armstrong Gasoline Engine.—Our readers who may be in need of a gasoline engine will perhaps find it to their advantage to consult the advertisement on another page of the Armstrong Mfg. Co., of Waterloo, Iowa. This company has been in existence since 1867 and their engine is built for hard service, any size from 2 to 20 H.P. They pride themselves on sending out good, solid work, carefully and properly finished. They build an engine that is guaranteed to last. Write them at once for their pamphlet entitled "Armstrong Facts" and mention this paper.

Benedict's Horse Educator.—This "Educator" trains the colt or vicious horse to yield to the most exacting requirements without causing the slightest pain, and should therefore be of interest to every man who shoes horses. The manufacturers, The Benedict Mfg. Company, Farley, Iowa, have cut out the middleman's profit and are selling direct to the horse shoers, thereby giving you the benefit of their lowest possible prices. Write to the company at once for descriptive circular and prices and mention The Blacksmith and Wheelwright.

Brace Chuck.—The I. C. Imboden Mfg. Company, Cleona, Pa., is manufacturing a Brace Chuck which will fit any brace and hold anything from one-half inch down. It is guaranteed and thousands of them are in use all over the country. Write for further particulars or order from their advertisement which will be found in this issue.

Get Free Stick Pin.—The United States Horse Shoe Company, Erie, Pa., has an attractive half page advertisement in this issue, briefly describing the shoes manufactured by this company and also the Williams Pattern Horse Shoes which this company controls. They have brought out an interesting illustrated catalog and would like to place one in the hand of every reader of The Blacksmith and Wheelwright using horse shoes. In sending for this catalog, if you will mention The Blacksmith and Wheelwright, they will send you a handsome souvenir stick pin without cost. You had better write at once before you forget about it.

CLASSIFIED BUYERS' GUIDE

Index to Advertisers.

(Continued on page 465)

"Absorbine."—We understand that H. G. McMillan, proprietor of the Lakewood Farm, Cedar Rapids, Iowa, has been using "Absorbine" on his horses with splendid results for a good many years. He says it is one of the best remedies he has ever used to reduce any kind of a bunch or bruise on the ankle, stifle or hock. "Absorbine" penetrates to the seat of the trouble promptly and effectually, without blistering or removing the hair.. The horse does not require to be laid up when it is used. It is for sale by druggists at $2 a bottle or will be sent, expressage prepaid, by the proprietor, W. F. Young, P.D.F., 66 Monmouth Street, Springfield, Mass.

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"Build me a wagon that will last forever."

"Sorry, Sir, but 'axle troubles' (due to wear—wear on the spindle, or on the box, or both) make it impossible."

You've often received a specification like that and been obliged to give that answer—haven't you?

The Sheldon "TON-DON"—an axle that will not wear, run hot or break—allows your meeting the requirements of the man who wants a wagon to last forever, **and we have told him so.**

The Sheldon "TON-DON" was originally made for buggies and carriages. Its success was so instantaneous and pronounced that we were deluged with requests for an axle embodying the same principles for use on Delivery, on Business, and on Express Wagons.

Hence, the "TON-DON"-CONCORD EXPRESS.
In EFFICIENCY—The HIGHEST.
In CONSTRUCTION—The SIMPLEST.
In SERVICE—The MOST SATISFACTORY.

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Ordinary axles wear flat on the bottom of the spindle because the bottom side is the point of contact and where the wear of the spindle is concentrated. It takes a spindle of unusual hardness to resist this wear—greater hardness than any ordinary axle affords. The spindle of the "TON-DON" is hardened by a special process, producing a wearing surface of such hardness that a fine file makes no impression on it—yet the center remains soft or "natural."

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The peculiarity of this box lining is that while somewhat softer than the spindle, there is no perceptible wear after thousands of miles of running, but becomes harder and more wear-resisting with use.

Phosphor-Bronze (of a mixture which increases its toughness, smoothness under friction and wear-resisting qualities) is a metal used for making the propellers of ocean steamships, bearings for locomotives, crank-shaft bearings for automobiles and other fine machinery. Imagine what a metal must be to meet such conditions, and you will grasp the advantages of applying such metal to axle purposes.

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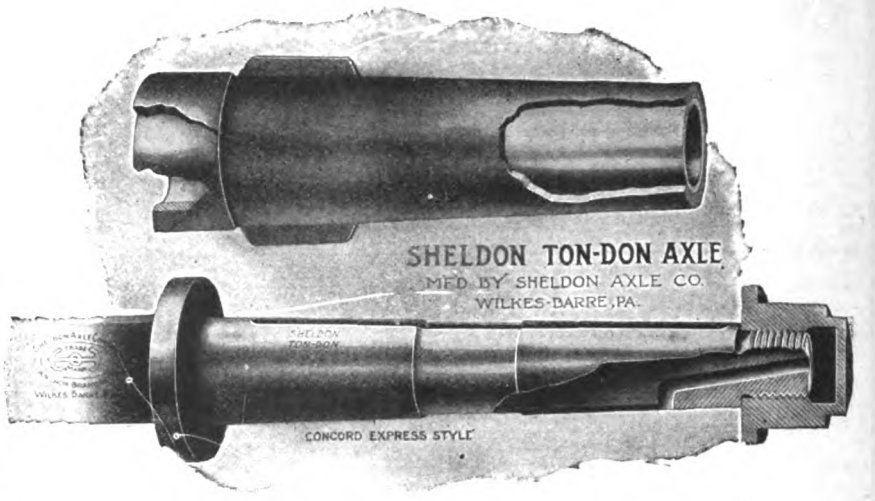
NOT A BALL OR ROLLER BEARING—BUT

ANTI-FRICTION—EVERLASTING—INTERCHANGEABLE

IT WILL NOT CUT, HEAT OR STICK



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Any man or machine that can save your time can save you money. That's one of our big claims for our "Little Giant" combined Punch and Shear—it's sure a time-saver.

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They are better than a live husky blacksmith helper.

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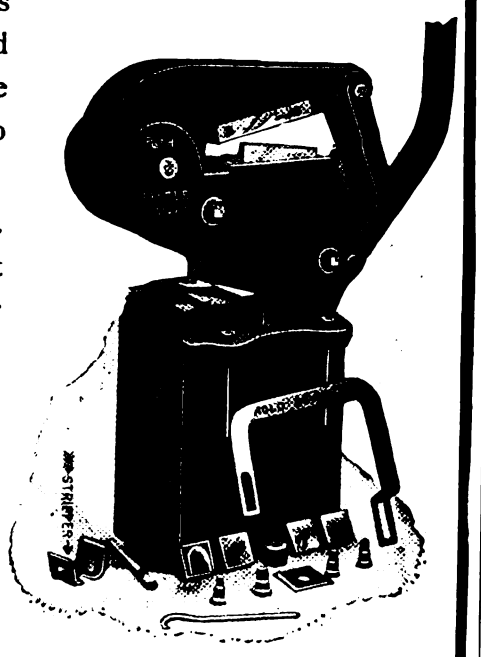

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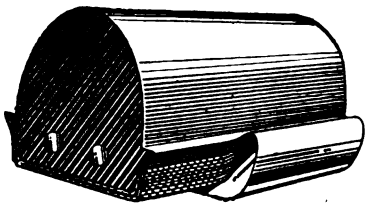

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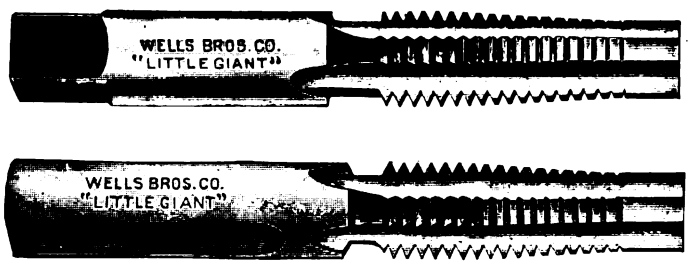

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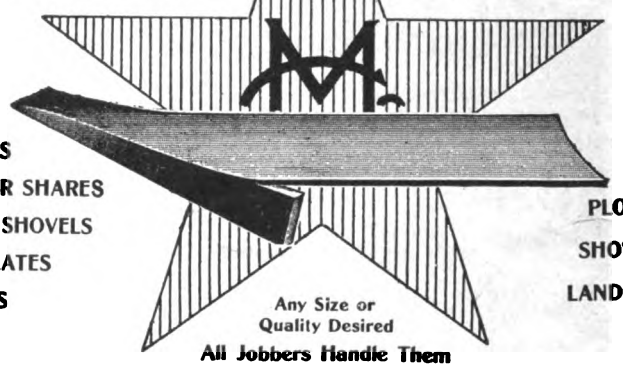

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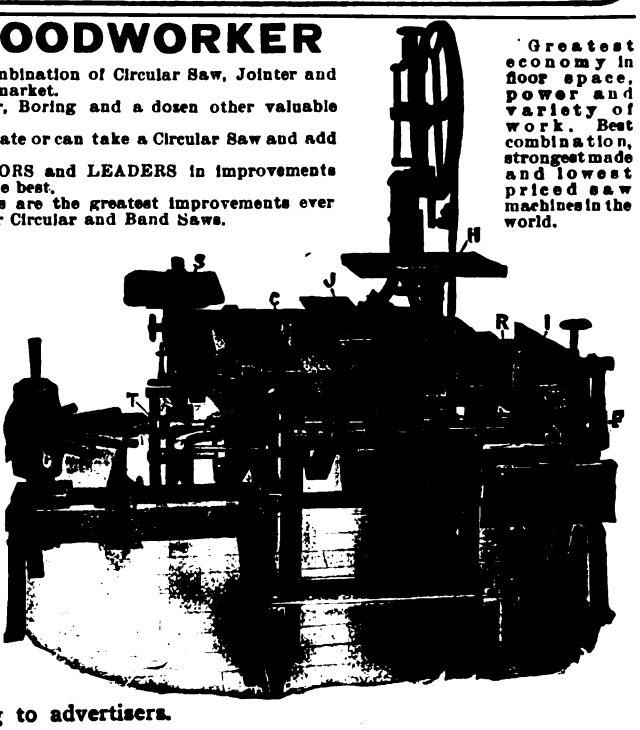

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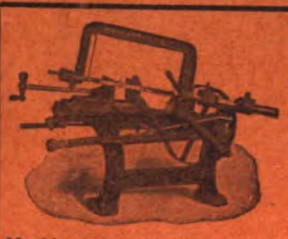

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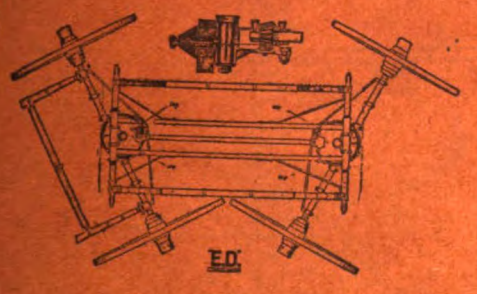

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