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ESTABLISHED 1880

THE BLACKSMITH & WHEELWRIGHT

The Pioneer Journal of its Class

Devoted to the Interests of Blacksmiths, Wheelwrights, and Wagon Builders.

M. T. RICHARDSON CO., Publishers, 71-73 Murray St., New York. Registered in U. S. Patent Office.

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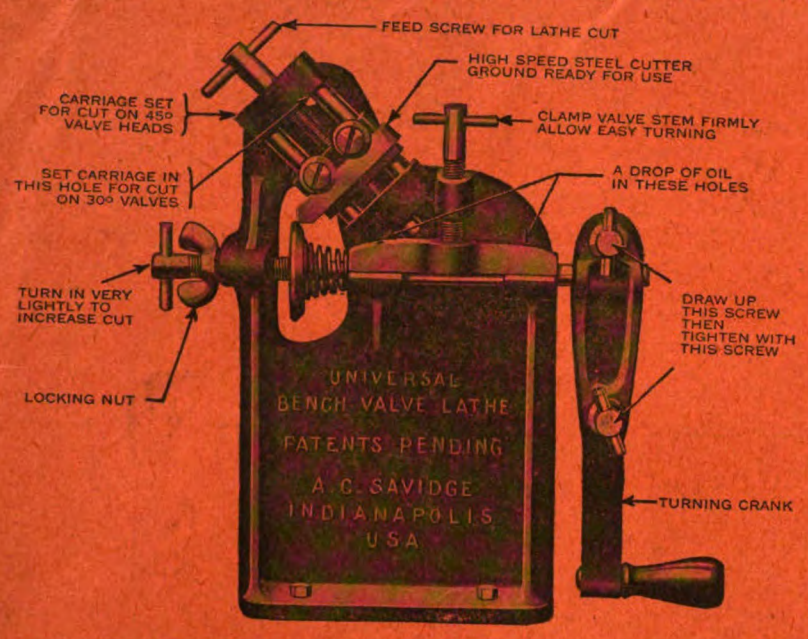

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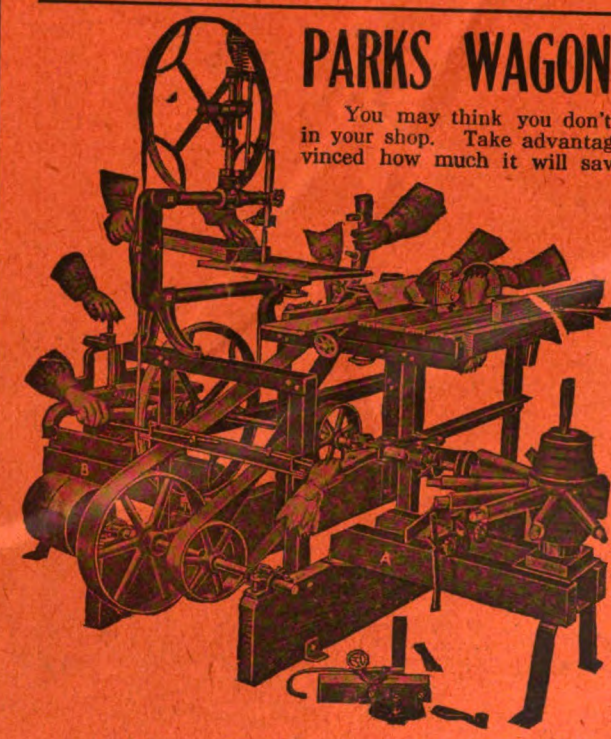

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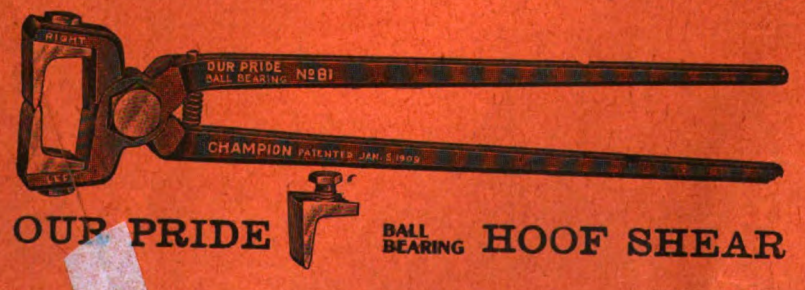

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THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX No. 1. NEW YORK, JANUARY, 1919. TERMS ONE DOLLAR A YEAR

Design, Construction, Operation and Repair of Automobiles and Motor Vehicles

Part XII—Various Types of Bearings Commonly Used; Construction of the Front Axle; Steering Gear Arrangements and Linkages

Now the type of axle makes a great deal of difference to the assembly. Some manufacturers claim that a semi-floating axle is better than a full floating. Other manufacturers who have adopted the latter type disagree, and there are arguments upon both sides.

From another standpoint, however, one is inclined to favor the full floating, or three-quarter floating type for this reason:—In a full floating axle, or a three-quarter floating, the axle itself may be removed from the car without removing the wheels. This means a lot should one of the axles break on the road. It makes a difference also to the differential assembly.

In the three-quarter or full floating type of axle, the differential is supported by bearings at each side, while the differential gears are fitted upon the axle, but the axles are feather-keyed and can be slipped from the axle without removing any pins or disassembling.

In the semi-floating type, however, the axles are pinned to the gears and cannot be removed until the differential is disassembled. This means, then, that the whole rear axle must be taken apart before the shafts can be taken out or the differential repaired in any way.

Full Floating Easy to Repair.

In repairing any part of the axles or the differential in the full floating type of axle, the driving flanges are unbolted from the wheels, the axle slipped out of place, then the differential can be removed through the hand hole at the rear of the assembly.

Since the axles slide into the differential gears, any side play such as is had in turning corners is absorbed by the bearing in the wheels in the full floating or three-quarter floating types, whereas in the semi-floating type of axle, side thrusts must be absorbed inside of the differential.

Types of Bearings.

In an automobile may be found many types of bearings; for different purposes, special types of bearings are necessary. In the connecting rods a babbitt liner is usually used, for the reason that babbitt will melt quickly,

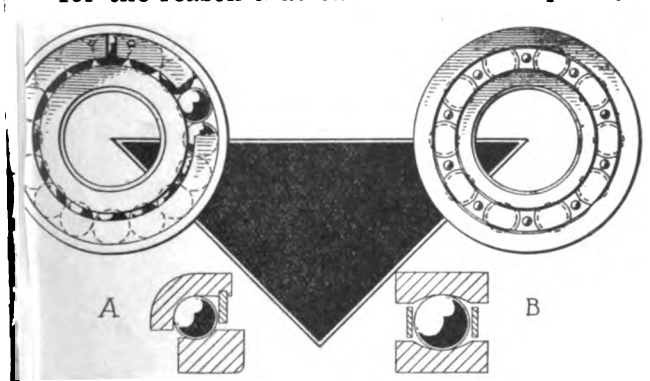


Fig. 51—Two Types of Ball Bearings. A, Cup and Cone; B, Annular Bearing.

if for any reason oil is not furnished it, and with little danger of damaging the crankshaft or crankpins. The same type of bearings is used for main engine bearings, though occasionally roller or ball bearings may be found.

Plain bearings, either of bronze, iron or babbitt are used throughout the engine, on the camshaft, the gears, the valve stems and push rods. When any of these bearings are worn new ones must be put in their places, or if they are of the half circle type, such as are found in the connecting rods, the halves of the circle can be brought nearer together and the metal scraped to fit the shaft. In this series of articles we will only mention this fact, and at a later date explain the operation in detail.

There are two classes of bearings, in addition to the plain bushing or liner type, the ball and the roller types. Doubtless all of us remember the old ball bearing arrangement that we had in our bicycles, those of us who were mechanically inclined usually pulled the things apart on the average of once a week, just for fun. There was an inner race which was termed a cone, and an outer race called the cup, and between them the balls were mounted.

Ball Bearings.

Upon the same principle are made the ball bearings of today. In Figure 51 are shown two kinds of ball bearings. The bearing

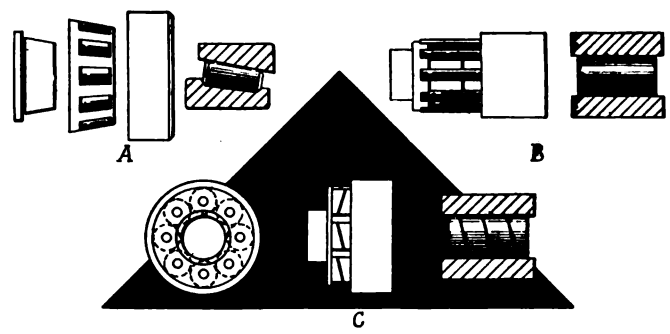


Fig. 52—A, Components of Taper Roller Bearing; B, Solid Type Roller; C, Spring Roller Bearing.

shown at A is similar to the old bicycle bearings, except that the inner race or cone is not beveled quite as much as the older types. One can see by the illustration that this type of bearing can be used where there is a certain amount of thrust, such as upon differentials or in the wheels.

This brings us to the subject of "thrust" and what the word means. Where two bevel gears are meshed, such as in the differential master and pinion gear assembly, the pinion or small gear has a tendency to thrust away from it the master gear. This action results in considerable side friction, and in order to prevent the friction a thrust bearing is provided. As the car sways from side to side the wheels and bearings are strained sideways and so thrust bearings must be provided at this point as well.

If there is no thrust, and if the bearing is in place simply to prevent rotary friction, an annular bearing can be used. We have an instance of such bearings in the gear-set. The bearings upon which the counter shaft and main shaft are mounted are usually annular.

Now let us again refer to the 51st figure. The type of ball bearing shown at A can be used for both annular and thrust purposes, provided the thrust upon the inner race is from the right side, and the thrust upon the outer race is from the left. If we used such a bearing arrangement in the wheels, since the thrust might come from either side, it would be destroyed very quickly, and to protect it from left side thrusts we would apply another bearing of the same type, but turned around to take the thrust from the opposite direction.

The type of ball bearing shown at B is of the annular type only; it cannot be used for thrust purposes and differs from the bearing shown at A in that respect. The small rings at each side of the ball, shown in the cross section, are simply for the purpose of protecting the ball at the sides and keeping the balls from frictioning against each other.

Now manufacturers differ as to the application of bearings, and though it is generally conceded that the ball bearing has many advantages, many engineers are in favor of the roller type, claiming that a roller contact, being of greater length, will give better support to the shaft or the weight. Consequently another type of bearing has come into general use, the roller type.

In Figure 52 are illustrated three kinds of roller bearings. The older or solid roller

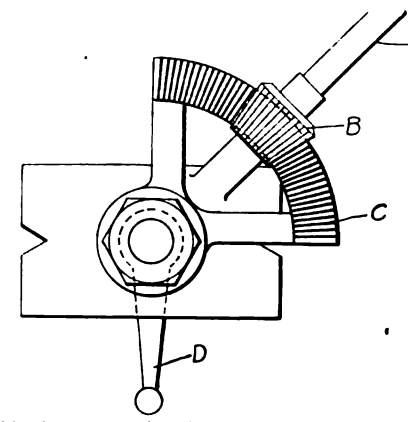


Fig. 53—Gear and Quadrant Type of Steering Gear.

type is shown at B. Like all bearings, it consists of an outer sleeve or race, a set of rollers and an inner race. The rollers are spaced a certain distance apart and kept from contact with each other by a cage-like arrangement in which they are mounted. Like any type of ball or roller bearing, the rollers support the weight of the shaft which passes through their center, and this is a good fact to remember. After the shaft and the inner sleeve are in place the outer sleeve in the housing should just slip over the roller assembly. If there is any side play, or looseness, the roller will wear very fast, or the shaft become damaged.

This type of bearing, as well as the one shown at C, is of the annular type. It will support radial loads, but will not take care of any thrust. If there is any thrust to be taken care of, another bearing is necessary in addition to this. The rolls, being made of steel and solid, are not so resilient as the type shown at C.

The roller bearing illustrated in this figure, in principle, is exactly like B, only the rolls are different. In this case the rolls, instead of being solid, are made of twisted steel. They much resemble a coil spring, except that the coils are very close together. The illustration shows very plainly how the roll is made.

The Taper Roller Bearing.

After much experimenting, engineers finally evolved a type of roller bearing which would not only support radial loads but would take care of the thrust as well. Such a bearing is shown at A in the same figure. Both the outer and the inner races are tapered.

The rolls are held in a cage, and the rolls are likewise tapered.

The bearing shown at A will take a thrust on the inside race from the left, and a thrust on the outside race from the right. As in the case of the cup and cone bearing shown at A in Figure 51, two bearings are necessary if the thrust is to come from two directions.

There is one fact to remember in regard

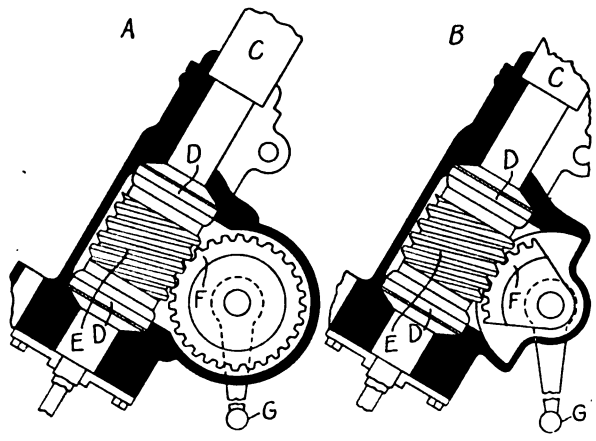


Fig. 54—Worm and Wheel, and Worm and Sector Types of Steering Gears.

to taper roller bearings. While all other bearings should be adjusted tight so that there is little or no play in them, there should be a certain amount of play in the bevel type of roller bearing. If the bearing is assembled in such a way that there is continuous pressure upon the rollers, their destruction will be rapid.

In addition to the above types of bearings there is still another, a ball thrust bearing. This latter type of bearing will support no radial load. It is simply designed to work in conjunction with annular ball bearings or annular roller bearings. It is nothing more or less than a series of balls held in a flat plate between two hardened steel washers. In the cheaper cars, thrust is often taken by a washer only, no ball or roller bearings being used. This thrust washer is usually made of different material from the faces against which it works. Bronze and fiber are the two materials usually found. We might expect to find such a thrust washer inside the differential housing between the differential gears and the housing.

The Steering Gear.

No part of the car receives so little attention as the steering gear, yet it is really the most important device on the car. The steering assembly in the modern car consists of a number of parts which are illustrated in Figure 57.

At A is shown the steering wheel; B the steering column; C the steering gear, which embraces all of the steering reduction gearing, or similar devices; D shows the drag link which connects the Pitman arm, H, with the projection on the steering knuckle, G.

Passing through the steering knuckle, G, is a pin termed the "king pin," or sometimes the "king bolt." There is a similar bolt at the opposite end of the axle for the left steering knuckle. Both steering knuckles are connected by a tie-rod, E. This arrangement permits the wheels to turn upon the

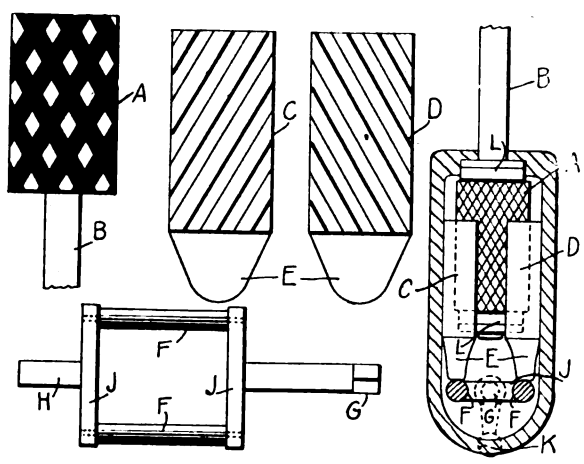


Fig. 55—Parts and Assembled Block and Worm Steering Gear.

wheel spindles without swinging the whole front axle, F, as in a wagon.

At the present time we are concerned particularly with the unit C, termed the steering gear, which transforms the circular motion of the steering wheel, A, into lateral or back and forth motion of the pitman arm, H. In the older types of machines a long lever, extending up to the driver's seat, connected with the tie-rod and permitted the driver to move the wheels in the various directions. However, should one of the wheels strike an obstruction in the road, there was danger that the steering arm would be jerked out of the hands of the driver and the car run wild.

To prevent this, the steering gear C was devised. It is nothing more or less than a means of power reduction. The older type is called the gear and quadrant and is shown in Figure 53. A indicates the steering column upon which is mounted a bevel pinion steering gear, B, which meshes with a quadrant or quarter gear C. As A is turned, through the steering wheel, the quadrant is rocked back and forth, and since the Pitman arm, D, is connected directly with the quadrant forging, the drag-link is moved back and forward as required, steering the car.

One can see that this type of steering gear has its disadvantages. Road shocks are not entirely eliminated. The driver is under a strain at all times to keep the steering wheel steady. To eliminate this backlash, designers produced the worm and sector type of steering mechanism shown in Figure 54 at B.

Worm and Sector Type.

In this diagram C indicates the steering column upon which is mounted the worm E. The worm meshes with the sector, that is, a section of a worm wheel, as shown at F, and this sector carries upon it the Pitman arm

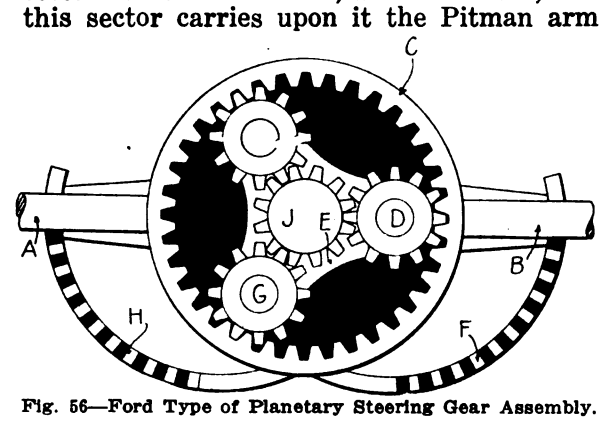


Fig. 56—Ford Type of Planetary Steering Gear Assembly.

G. In this case it is easy enough to turn the steering wheel; the steering wheel turns the worm through the shaft and the sector F is moved back and forth. On both sides of the worm, and illustrated at D, are usually mounted a pair of ball thrust bearings, though in some cases simply a bronze washer is used. Continued use of this type of steering gear naturally would result in a certain amount of wear. The wear comes usually upon the sector F, and as there is no way to prevent this, after a time it will become necessary to replace F.

To obviate this, and to increase the life of the device, engineers evolved the worm and wheel type of steering gear shown at A in the same sketch. In action this device is the same as the one shown at B, except that the full wheel F replaces the quarter wheel or quadrant in the first type. When one-quarter of the gear F becomes worn, the Pitman arm G can be removed, the gear given one-quarter of a turn and the Pitman arm G replaced. This is practically a replacement of the worn portion with a new section, and is one means of adjustment of this gear.

End play in the steering column C can be taken up by screwing down the large nut at the top of the gear assembly. This nut presses against the bearing D and compensates for any lost motion or wear in the bearings. In some types of steering gears this nut may be found at the bottom of the gear. In the higher priced cars a more complicated steering gear is adopted. This gear is termed the "sliding block" type, and consists of the parts shown in figure 55. An assemble sketch is also reproduced in the same figure.

Worm and Block Type.

Upon the steering column B is mounted the double worm A. By a double worm we mean a worm that is cut with both a left and a right-hand thread. Two blocks, C and D, are fitted with teeth, one block has left-hand teeth fitted upon it, the other has right-hand teeth. As the steering column B is turned towards the right, the block D will travel upward on the worm, while the block C will travel downward. Each of these blocks rests against a roller, F, upon the peculiar shaped piece J. At one end of J is mounted the shaft G, and upon it the Pitman arm K.

As the blocks travel upward and downward, J is twisted to the left or to the right and the Pitman arm moved forward or backward, steering the gear. The general method of adjusting this device is similar to that adopted in adjusting the steering gears shown in Figure 54.

The steering gear on the Ford car is of an entirely different type from any of those described. Instead of being located at the lower end of the steering column, it is located directly beneath the steering wheel. The lower end of the steering column is fitted with the Pitman arm and the gear reduction is had by the device illustrated in Figure 56. The housing for the steering column is fastened to the dashboard. This housing, C, is fitted inside with an internal gear. To the upper end of the steering column is fastened the forging E, upon which are mounted three studs, and upon these three studs are mounted, free to move, three small gears, two of which are shown at G and at D. The center gear J is fastened directly to the steering wheel. As this gear is turned, then the small gears, G and D, are revolved. They form small levers which twist the forging E around and so turn the steering column.

Steering Linkage.

Next in importance to the steering gear come the fittings at the steering knuckle. It is very important that this portion of the car be kept in good condition, for should the king-pin break, an accident surely results. Since all of the pressure and shocks of the road go through this pin, the wear at this point is excessive. Every car that comes into your shop should be examined at this point. The front of the car should be jacked from its wheels, and if there is any play in the steering knuckle, new parts should be put into place. Usually the steering knuckle forging is bushed with a bronze sleeve, though in a few expensive cars ball bearings are provided at this point.

We have made comparisons with the bicycle of olden days; let us go back a minute and learn another lesson from it. If you ever tried to reverse the front wheel—that is, turn the forks in the other direction—you know how hard it was to steer the bicycle. As a matter of fact, it was almost impossible to steer the wheel at all if the forks were wrong side foremost.

The same thing is true about the front axle of an automobile. The king-pin slants backward at the top slightly. Very frequently an automobile will be brought into your shop for repairs. The owner will claim

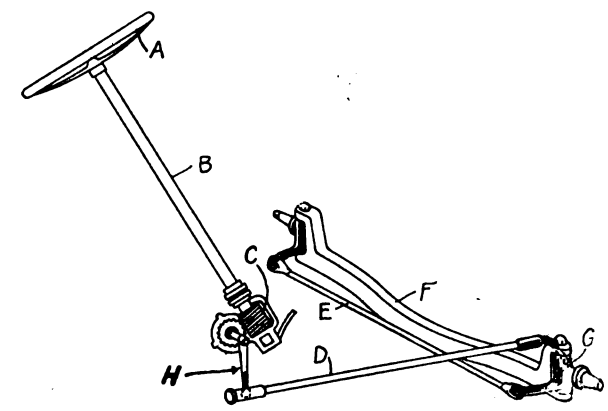


Fig. 57—Showing Parts of the Steering System.

that he has great difficulty in steering it. Always examine the front axle and see that the steering knuckle and king-pin slant backward slightly. The axle may be bent or it may be that the springs have slipped just enough to tip the axle slightly. At any rate, once you know about the trouble, it is easy enough to repair it.

(To be continued.)

Getting the Money You Earn

Next To Knowing How To Do Good Work, Comes the Art of Charging Your Customer a Satisfactory Price

J. F. HOBART, M. E.

The writer recently spent a very instructive hour in a small shop where two men did all the work, shoeing, wagon repairing and "Anything and Everything" which came along which could possibly be accomplished in a blacksmith shop with woodworking facilities.

One day a considerably heavy lot of work was brought in from a neighboring dock where a ship was being repaired. The work

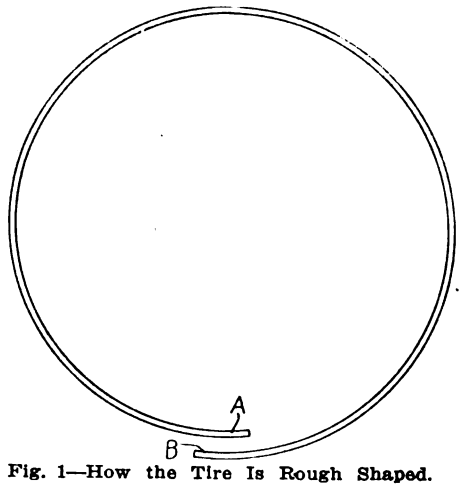


Fig. 1—How the Tire Is Rough Shaped.

was readily accomplished, then came the matter of making a price upon it.

The owner of the shop, after frequent head scratchings, formulated a row of figures which included:

So much for time	$18.50
So much for material	9.45
So much for coal	.75
So much for shop	4.00
Total	$32.70

and there the owner stopped. He could think of nothing further which he should charge for—still the amount did not seem right to him.

Just then one of the two proprietors of a neighboring shop in which were built, almost exclusively, ox and bullock wagons for export to South and Central America, chanced to pass and the smith appealed to this gentleman as to the method of "cost-finding" in relation to the case in hand.

"You are away off," said the wagon manufacturer after the case had been explained to him. "How do you know how much coal you use? How do you know that the charge for 'Use of Shop' is enough, and still not too much? And does that charge include all your 'Overhead?' "

"Overhead?" said the smith, "What is that? I never heard of that charge before! What is it for?"

"Overhead," said the wagon manufacturer, "is what it costs to run your shop, no matter whether you are doing all you can, little or nothing. Into this charge you should figure all the expense for rent, light, heat, insurance, repairs and renewals of machinery, salaries of all the non-productive men in the shop."

"What is non-productive labor anyway? I never heard of a man working and not producing anything; what does that mean?"

"Non-productive labor is that done by the bookkeeper, the collector and the man who takes care of getting new business and all such things. In a small shop, the owner does it all—the shoeing and the collecting, also the bookkeeping, and if he does not allow something for this work, he is not charging his customers as he should and is losing money."

Unproductive Labor.

"In a large shop which is doing a heavy business, there must be one or more men for such work and the labor of these men is called 'unproductive' for the reason that it does not produce anything which can be charged for to the customers. And, there is frequently a very large leak in the profits of a shop just because these unproductive things, which must be had, are not paid for."

"How is it when the shop owner does these things? Then he does not have to hire the unproductive work done, therefore he does not have to pay for it, so he don't have to make any charge for it, does he?"

"Yes, sir! He should make a charge for that work. While the owner or other man is doing unproductive work, he is taking just so much of his time from paying work, therefore the shop owner should surely charge for the time he is busy otherwise than at the anvil.

"And now, here is the way to figure the cost of that job. From the records of the preceding year of business, find the sum expended for labor. Do not let this include the cost of material or 'shop expenses.' Keep these all separate, particularly the shop expenses which, as stated, include all the unproductive time and its cost, the interest on money invested in the business, insurance, taxes and cost of collections and of getting business; in fact, bring into this sum the cost of everything save the labor and the material. And be sure to keep these separate.

"Thus, there are three charges: Labor, Material and 'Overhead.' Now, establish another charge for quantity which may be called 'profit.' This is what is left after all the other charges have been paid from the receipts from the year's business.

"Supposing" a Case.

"Now, if we have no real figures from a shop we will assume some and show how the true cost of any job should be calculated from the cost records of the preceding year's business. We will assume that the cost records show the several figures to have been as follows:

Labor	$10,000
Overhead	5,000
Material	8,000
Profits	3,000
Total business	$26,000

"Nearly $2,000 a month, which is pretty good for a medium sized shop. Now, we may divide the labor by the 'overhead,' or divide the 'overhead' by the labor. It makes very little difference which. In this case it will be 10,000 divided by 5,000 = 2. Or, 5,000 divided by 10,000 = ½, or 50%. Thus, in this shop the 'overhead' is one-half the cost of the labor, or 50% thereof.

"Now, we can find the labor cost of the job we are figuring on, or rather the charging cost from the labor, this figure will be 50% of the cost of the labor, in order to cover the 'overhead' which we have not fully charged off before.

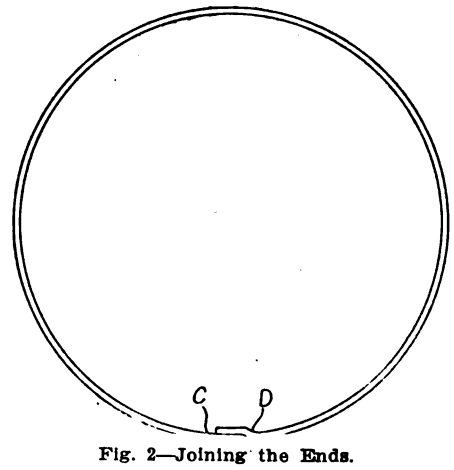


Fig. 2—Joining the Ends.

"Then there is the matter of profit to be considered. The records of last year show that 3,000 divided by 23,000 = 13% very nearly, therefore we are justified in charging 13% profits on everything which goes through our shop. Also, instead of taking 150% of the labor cost of the job, we may take 163% thereof. Or we may figure the cost of the job without profit and then find and add the percentage of profit afterwards. This is perhaps the better way.

"The items on the repair job heretofore mentioned were:

Labor	$18.50
Material	9.45
Profit	13%

"Now, for the 'Overhead' which plus the labor will be 1.50 times 18.50 = $27.75

"We now have these items:

Labor and overhead	$27.75
Material	9.45
Total	$37.20

"But this is not the proper charge to make to the customer. There is no profit in it for

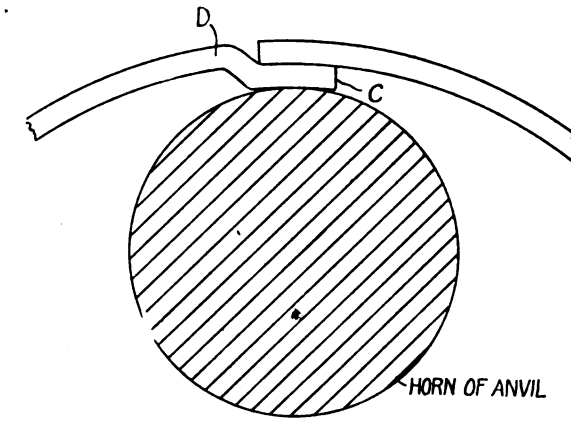


Fig. 3—Welding the Ends.

the shop at that figure, therefore we must add 13% of the profit, making the real and proper charge to the customer to be $37.20 times 1.13 = 42.04. Compare this with the 'so much' charge given in a preceding paragraph, and see what the difference may be:

"Proper" charge	42.04
"So much" charge	$32.76
Difference	$9.28

"And here is where the shop profits often get away. The smith has not charged as much as he should. Little for 'overhead,' nothing for unproductive labor, and perhaps nothing for the interest on the money invested in the shop and tools. See what it means if $9.28 be dropped off of each $42.04 charge! That means that you are losing over 22% of what you should receive, and as the profits are only 13% at the most, there is no profit but a dead loss in running a shop on the 'so much' plan of fixing costs."

Base Charges on Last Year.

Make charges from your last year's records, then you will not go astray. If you are just starting business and have no "last year" to fall back upon, then take the last month's records of charges and business done and fix your prices from that. As the months pass, add the several items of each, and soon you will have a more accurate percentage to work upon than when the first month's figures were used alone. Adopt a method of this kind, Mr. Smith, for cost or price fixing, and there will be more profit in your business and you will stand a better chance than when you guess at what jobs cost!

Tire Making by Hand.

Some of the negro smiths in the South—and many of them are very good smiths indeed—do all the work by hand and have not even a tire bending machine in the shop. They bend up heavy tires on the anvil, the smith holds the cold bar of steel while the helper bangs away with a sledge, the steel being placed over the corner or angle formed by the face of the anvil and the soft pad at the beginning of the anvil horn.

Very little attention is paid to making the tire round. It is bent up haphazard as shown by Fig. 1, usually with one end, A, coming inside of the other end, B, as shown. Then for the welding end A is forced outside of end A, as located in Fig. 2.

Sometimes the body of the tire opposite the ends has to be bent a bit to permit the spring of the two ends to hold them firmly together during the heating operation. But after the ends have been sprung together, as shown in Fig. 2, from the positions A and B, Fig. 1,

then the end C, Fig. 3, is placed flat on the anvil and the tire is hammered flatly at D, until there is somewhat of a crook in the tire at D, close to end C.

Then the ends are pried apart a short distance and some powdered borax sifted in between the ends C and D, after which end C is allowed to go back to the position as shown in Figs. 2 and 3. Then the welding heat is taken and during the hammering necessary to draw down the lap weld the short bend at D is straightened out and the tire rounded up to as nearly a true circle as possible. But the bending of the tire, as shown by Fig. 1, the reversing the position of the two ends, as shown by Fig. 2, are some of the novel points of this method of tire welding.

The other novel features are the making of the short bend as at D, Fig. 2, for the purpose of preventing the ends of the tire from slipping too far over each other, and the placing of the borax exactly between the lapped ends in a manner which prevents the loss of any of it and also obviates the use of too much borax. By preparing tires for welding in this way the negro smith said he had seldom lost a weld. Neither was there any necessity for riveting, splitting or otherwise fastening the ends of the tire.

Getting Men and Keeping Them.

"If I can get a man now, I'll keep him," remarked the owner of a busy shop. "It used to be that we could have the pick of a lot of good men, but nowadays it is best to make sure that the first man you can get hold of will stay with you and you had better offer all the inducements necessary to make a man stay. And even then it is mighty hard to get men enough to do the work that comes along. I am putting in a power hammer and all the other power tools possible so as to do as much work in the shop as possible with the limited man-power that I can secure."

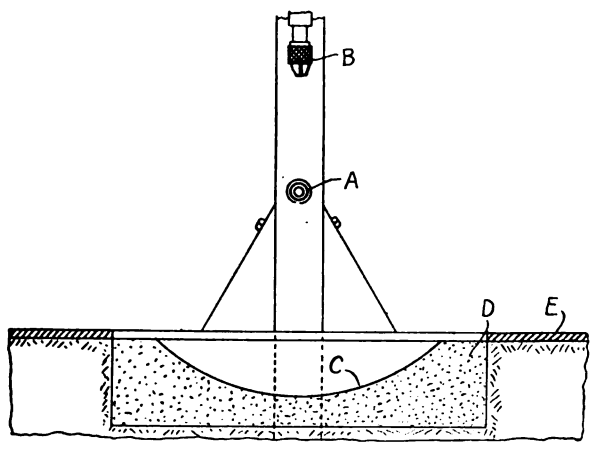


Fig. 4—Hub Boring Arrangement.

Post-Drill, Hub Boring Machine.

In one shop where machines were a bit scarce, the smith had rigged up a fine post drill to work as a hub boring machine. He rigged a movable hub—center A, Fig. 4—to which the wheel could be clamped, put a hollow auger in the chuck B in place of a drill and many a wheel had its spokes "hollow-bored" in good shape.

The floor had to be removed in front of the drill, a hole C was dug in the ground to receive the lower portion of large wheels, and the sides of the holes were finished as at D with concrete which came up just to the lower side of the floor E and served to receive the ends of the short pieces of planks with which the floor-hole was closed when the tool was being used as an ordinary drilling machine.

"Hammering the Anvil."

A good many smiths have a useless habit of pounding the anvil. Some of them are content to strike once upon the anvil as a sort of "guide-blow" seemingly in order that the hand might obtain the proper grip upon the hammer and give to the blow the exact direction, before striking the real blow itself. But some smiths do not seem satisfied with a single blow as above noted and the writer has seen some men strike two, three, and in one instance four quick blows upon the anvil before the real blow would be delivered.

The negro smiths are great for "anvil-hammering" and, as one man remarked, who stood beside the writer as he was watching the smith in question: "You might as well try to change the course of the Mississippi River as to change that habit!"

These things are mentioned here that the young smith who is just forming his habits of work may make strenuous endeavor to avoid the "anvil hammering" habit, or, if unfortunately he has already formed that habit, to break it just as soon as possible. Not only does "anvil hammering" take time, but it consumes energy which might far better be directed to something which pays for the energy expended, for anvil hammering don't.

The Rock Drill Blacksmith

Part V—Special Suggestions on Heating, the Depth of Hardening and How To Make a Quenching Trough

Whether we heat the steel once or twice, it is important not to expose it to sulphur fumes. This means that the use of soft coal should ordinarily be avoided, if the steel is to be put into the fire or exposed to the flames. Anthracite coal, coke, charcoal—all these are better. Charcoal is probably the best. But any kind of fuel may be used, if the steel is not exposed to it or its flames. A furnace in which the fire chamber is one compartment and the heating chamber an entirely different compartment is a proper piece of apparatus, provided the flames are not permitted to get into the heating chamber.

Fast heating is to be avoided when reheating. I do not see any great objection to fast heating from the first heat in the two-heat method. The outside will perhaps be quite a bit hotter than the inside, when the bit is taken out, to forge it into shape. The outside may, perhaps, be a full yellow and the inside only a dull orange. But it makes little difference, provided the forging can be easily done. Even if the inside is a black when the forging is complete, that will hardly make any difference. The work is to cool until it is all black anyhow.

Fast heating is apt to be uneven heating; but this is not necessarily so. The heating may be done rapidly and still be managed so as to heat all over the proper region. But on the second heat, when we have before us the duty of restoring the quality of steel, damaged by the forging heat, then we need to be on our guard.

Heat the Work Slowly.

The early part of the heating may be done rapidly; but, as the stopping point is approached, it is advisable to slow down. Or, if there is sharp control of the heating, the smith may hold the heating from going higher the moment the proper point is reached. It is generally safer, I judge, to go slowly as the proper high point is approached rather than attempt a sudden halting of the upward rise. Nevertheless, if the smith can do the halting, the next thing to do is to hold the heat steadily at the high point for a time. It is well to understand the reason for slowing down or halting.

Heat penetrates from the outside. It takes time for heat to travel from point to point. These two facts combine to produce a tendency for the inside always to be cooler than the outside. And this cooler inside is not wanted at the moment when the reheating is stopped. A certain heat is needed to effect the restoration of quality. We propose to stop at this heat.

Now, if the heating is stopped because the outside has gotten hot enough, although the inside is not yet that hot, then the restoration of quality may not have been accomplished at all upon the interior metal. The remedy for big-grained steel has in fact been applied to the outside but not to the center. Consequently, the interior metal will remain in its inferior condition. It didn't get the medicine.

Give the Bit More Heat.

It is possible to avoid heating the outside much higher than the inside by reducing the heating speed sufficiently as the finish is approached. By increasing the temperature very slowly near the end, the heat is given time to travel to the interior. No doubt temperature of the inside core will generally lag behind and will be continually cooler than the outside. But with slow heating, the difference can be kept small. Consequently, at the finish, it will only be necessary to stop the temperature at a slightly higher point than what is required for the restoration of quality. The inside steel will at the same time be at just about the right temperature.

If the heating up is done rapidly and there is in consequence a difference between the temperature inside and out, then the inside will not be restored to its proper quality when the outside is restored. If the heating is stopped to suit the outside, the result to be expected in this case is good steel on the outside and poor steel on the inside.

If the heating is done rapidly, about the only thing that can be done in order to get the result of the restoration of quality inside and outside is to heat the outside high enough to cover a big difference. This is not the best thing for the steel, as it results in a good inside but a somewhat poorer outside. And outside is where the best steel is wanted.

It is possible with proper skill and equipment to halt the temperature rise suddenly. Under these conditions, fast heating is permissible. The halt is made at the proper point, and the heat is held there for a while in order to give the interior its chance of coming up to the point. Ordinarily, though, slow heating at the finish is the thing. Nevertheless, where rapid heating must be done, it is undoubtedly better to heat up the outside high enough to be sure the inside is heated high enough—it is better, doubtless, to do this than to heat just enough to get the outside right and to leave the inside unrestored. There are, perhaps, exceptions; but what has been stated is to be regarded as the better thing for most cases.

The Magnet.

A magnet has been referred to as a very proper instrument to determine the temperatures of restoration and the temperature of hardening. There is no difference for steels used in rock drilling. Restoration and hardening are, for these steels, done at the same heat. The magnet serves to determine it; for when the magnet loses its grip, the temperature is carried a little higher and then halted.

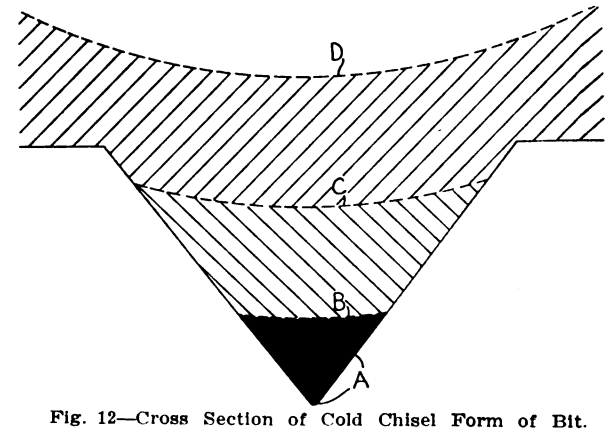


Fig. 12—Cross Section of Cold Chisel Form of Bit.

One may choose to hold this temperature a trifle to give the interior steel a chance to rise all the way to it; but holding the heat will hardly be necessary, provided the last

part of the heating is done quite slowly. In either case, when the heat inside and outside is somewhat higher than that at which the magnet loses its grip, the steel may be put into the quenching bath. It is good steel that is hardened, because the proper restoration has been carried out by the reheating. The magnet is thus wonderfully useful in determining the proper moment for quenching.

In fact, even if we use the one-heat method, the magnet may have some value. As the forging goes on and the steel cools, the metal will approach the moment when the magnet regains its grip. The proper thing is, I judge, to stop forging and to do the hardening before the magnet clings. However, if hammering is still going on, when the magnet shows that it is able to attract the steel, then it is time to stop forging. And it may be a little too late to do the hardening. The bit may be heated, however,

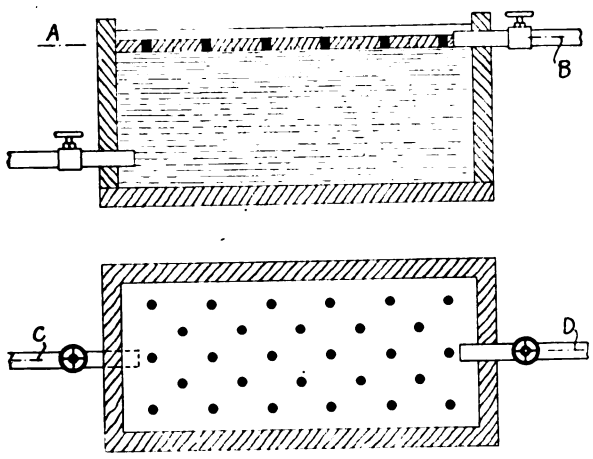


Fig. 13—Section and Plan Views of Quenching Trough.

a trifle and the hardening done thus at a little higher heat. For the one-heat method the magnet serves to give warning.

Quenching Apparatus.

It is of exceedingly great importance that the quenching be done right. Most blacksmiths probably do it wrongly. That is, they probably dip the bit too far or not far enough. The margin between the two is often too small to make it safe to depend upon one's judgment. The blacksmith should remember that it is only the face of a bit and the reaming sides of its wings that do any cutting. They should be hard and should of course be backed up with some stiffness of metal.

Beyond these requirements there is little or no call for hardness. It is toughness instead of hardness that is wanted. In general, hardness is associated with brittleness and not with toughness. If extreme hardness is imparted not only to the points on the bit which come into actual contact with the rock, but also to the metal reaching back of such points for any considerable distance, a good deal of the bit will be involved in brittleness.

Naturally, pieces may be expected to break off. At the cutting points, hardness is absolutely required. Some metal just back of the actual cutting points will also need to be hard to support the cutting points by their stiffness. So, then, both at the cutting points and for a small distance back of them, it is perhaps necessary to put up with brittleness.

This matter is so very important that a little further explanation will be in place. Consider the cutting edge shown in figure 12. It is a cross-section of a cold-chisel form, commonly used for faces of rock drill bits. It is easy to understand that the very edge, A, must be hard. Otherwise the proper cutting action would not take place when the bit is in service. But it is more difficult to answer the question as to how far back the hardness should reach.

Consider the dotted line B. If the hardness is limited to the region between A and B, then it is to be decided whether a soft, but tough, steel extending from B back will properly support the hard region. There are a number of considerations which enter here. When the blow is struck, the edge, A, is severely tested because of its small size.

At the line B there is a broadened backing. Is it broad enough? That will probably depend upon the hardness of the rock, the force of the blow and the sharpness of the angle at the cutting edge. It will also depend upon the steel and the degree of hardness. There may even be other things not mentioned. It will be understood, then, that the question of the proper backing may receive very different answers because of the differences in conditions.

Hardness Differs With Requirements.

At any given mine, where a given steel and a given style of bit are employed, some tests should be made. Under the conditions at one mine, hardness extending to the line B will be sufficient. At another mine, the line C will perhaps be better. And at another mine—representing perhaps the majority—the hardness may be needed back to the line D. That is, it may be necessary, frequently, to harden back to line C or D in order to get sufficient stiffness to back up the cutting edge properly.

At the same time, it will apparently be advisable to halt the hardening and not allow it to go any further back than is absolutely necessary. The reason for this is that it is undesirable to make more of the bit brittle than can be helped.

The reader will now, perhaps, have no difficulty in understanding that there are two things working against each other. First, the hardness should be carried back far enough to furnish a good backing. Second, against this is the requirement not to have the bit brittle. In any case, there will have to be a compromise between these opposing considerations. And what the smith has to do is to make a good compromise and not a bad one.

All this means that the hardening should extend just so far and no further. In one case, what will be best, will be, say, ¼ inch from the cutting edges; in another, ½ inch, and so on. If ¼ inch is the thing, then ⅛ inch one time and ⅜ inch another time are not wanted. The smith is in fact up against getting very close to the ¼ inch.

It surely is not hard to see that the smith should not do the quenching by guesswork. What is needed is some means of getting just the depth of quenching wanted—no more, no less. It so happens that a special but simple quenching tank or trough has been devised, which covers the requirements in fine shape.

A Special Quenching Trough.

What is wanted is a flow of water and some provision to regulate the depth to which the drill bits are immersed. In Figure 13 at the top is shown a longitudinal section of a trough adapted to these purposes. The water enters the trough by a supply near the bottom at one end and passes out through a tube near the top at the other end. Each tube is provided with a regulating cock.

A false bottom is arranged at about the level of the discharge tube. This false bottom is perforated, as shown in lower half of Figure 13. It may be arranged in place by providing cleats for its support, these cleats being nailed to the walls of the trough. To prevent the false bottom from floating, it may be screwed down to the cleats at several points. The precise level of the top of the false bottom is adjusted relatively to the discharge tube in such way that when water is flowing through the trough the depth over the false bottom will be just right for the immersion of the cutting faces of the drill bits.

By giving attention to the proper adjustment of the two cocks, a steady flow at an unchanging level may be secured. If it seems desirable to provide for varying the depth of immersion from time to time, this may be done by setting the cleats somewhat lower than ordinarily devised and then blocking up the false bottom to the precise level desired at the time.

In using this quenching trough, the drill bits are rested with the cutting faces squarely on the false bottom, their shanks reaching vertically upward. A bracket, or the equivalent, should be arranged above the trough to hold the shanks in place.

The false bottom may be made of hard wood to prevent too rapid wear. There should be an abundance of holes in it, in any case, to insure plenty of communication between the shallow layer of water and the considerable body of water underneath. Otherwise, the actual water into which the hot bits are immersed may lose its chilling power too quickly.

There is, apparently, some objection that may reasonably be raised against using wood for the false bottom. This objection relates to the possibility of the sharp edges of the cutting faces sinking down into the wood a little and losing some of the chill, the weight of the shank promoting this. If this happens, in the case of any trough constructed as described, because of the weight of the bit and shank and the form of the cutting face, a remedy may be found by employing brass angle bars for the actual support of the bits.

Cleats Locked in Place.

The false wooden bottom may still be used and the angle bars arranged on it. Figure 14 at A shows how they may be placed. Cleats may be set in and secured in place to hold the angle bars in proper position. The cleats may be removably held in position by the circular wedges or buttons shown in Figure 14 at B.

Such a wedge consists of a circular piece of hard wood or of brass or of some other suitable material. It is arranged to turn on a pivot located away from the center. There are two notches shown. By tapping one of the notches a light blow or two with the hammer, the wedge is pressed down on the cleat; by tapping the other notch similarly, the wedge is loosened. The angle bars may be bought in the form desired, when it will only be necessary to cut them to proper lengths. In case of difficulty in buying the

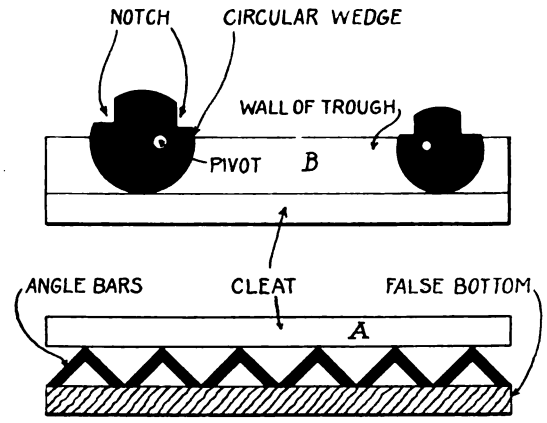


Fig. 14—How the Cleats Are Held.

angle-bar material ready formed, the several pieces may be made from sheet brass.

The object in using brass in preference to steel is two-fold. Brass is comparatively soft and will accordingly have less effect on the edges of the bits. Then it resists the corrosive action of the water. It may, perhaps, be found advisable to round the sharp corners of the angle bars. This may very well depend largely upon the softness of the brass employed. The edges of the bars which rest on the false bottom are to be notched at intervals so as to facilitate the passage of the quenching water.

(To be continued.)

THE HORSES' REVENGE.

In this office we keep fairly close track of automobile accidents, and naturally we hear of hundreds of accidents where horses have been run into by automobiles. Perhaps some of the horses object to this treatment.

They object to being displaced by automobiles, and a short time ago a clipping came into the office which was very peculiar in its way. A horse ran into an automobile! The automobile was badly wrecked and the wagon smashed into a mass of wood and iron. The report did not say what the machine was. We know of but one machine which can be beaten by a horse in speed. You can draw your own conclusions.

Getting Winter Business

If You Wait Long Enough Beneath an Apple Tree the Fruit May Fall Into Your Hands, But You'll Get It Much Quicker If You Climb Up aud Pick It.

BY F. L. PHILLIPS

"How long since you decided to go into the junk business?" asked the old-timer of the village blacksmith, as he unhitched his horse from the lumber wagon, which he had brought in for repairs. "What are you doing, making a collection of relics, or is it just another evidence of your craziness?"

"Nope, just a proof that you don't use common sense or know what you are talking about," retorted the smith. "I wouldn't let you into the secret unless I was looking for business, but as long as you're here, I might as well see if I can't pry a few extra cents out of you and pound some sense into your block.

"This junk, as you call it, is just a collection of farm implements from five miles around. Sunday, you remember, was a nice, sunny day; everyone was feeling pretty good and ready to celebrate, 'cause peace had been declared. I got out my tin Lizzie and took a trip into the country. Visited all the people I knew and quite a few I didn't know.

"I dropped in to see old man Sims, the fellow out near the cross-roads, that made such a pile on potatoes last spring. He's just rolling in money. Folks say that he has yellowbacks hidden in every corner of the house. Out in his yard he had a spring harrow; that one in that corner there, four teeth missing; a nearly new cultivator with one wheel twisted out of shape; and an old cultivator that had seen better days.

"Just picked up a bargain for you, said I. An almost new cultivator that's just what you need. I'll sell it to you for $10. Did he bite? Say! he pulled out his roll and peeled off two fives so quick that I couldn't see his hands move.

"Wait just a minute, said I; you haven't heard me out yet. I'm not in business for fun, you know. What are you going to do with all this broken down junk here?

" 'Well, I dunno,' he said; 'guess I'll have to see about getting it fixed up when I get a chance. Some of it's about ready for the junk pile anyway. That new cultivator there set me back a heap of money. Now it's busted, or I wouldn't buy one from you. Wheel's all smashed up, cost more'n she's worth to fix her up. What sort of cultivator are you aiming to sell me?'

"Same as that one, said I, but wheels are a little heavier: reinforced with an extra band of iron. In fact that's just the cultivator I'm trying to sell you. Do you get me?"

"It took me about ten minutes to make him see the point. I wanted to have him pay me $10 for fixing up the bent wheel and putting a band around it, and before I left I had sold him all of his own junk in the same way. I calculate to get about two days' work out of him. I made him haul the machines down here yesterday, and when I get the chance I'll put in a few hours on them.

"He's got no kick coming, either. He expected to buy a new set of machines for next year and let that old junk lie around in the yard until it rusted to pieces. As it is, he gets the old machines all fixed as good as new, I get the work, and he saves a pile of money.

"Next I stopped in to see old man Bones—the fellow that gave the patriotic speech in the town hall on election day. I started out by asking him how long since he had decided to help out the kaiser. He tried to sick old Tige on to me, but Tige knows me too well and only barked. It took me half an hour to smooth him down; then I told him what I meant.

"All this summer he has been using a gasoline engine to pump water for the stock, using Uncle Sam's gasoline and burning up his money. You remember he was one of the first to buy one of those new-fangled wind-mills: the tin kind, and it seems last winter, in a big blow, the thing got itself all twisted up. It wouldn't turn back again, so he bought an engine. I dickered with him to let me fix up the old wind-mill. Showed him how much gasoline he could save and how patriotic it would be. If the wind failed, he could use the engine, and when it was windy he could use the wind-mill. He finally let me pull off the fan blades and take out some of the braces. I'll fix it up for five dollars and charge him twenty. It's worth that to him, and he's satisfied.

"You'd be surprised at the amount of work I've picked up for this winter: and you'd be surprised at the friends I've made by giving them the suggestion. They didn't realize how much money they had lying round in dead tools until I began to show them.

"There's an old saying that 'The garbage pails of the poor are always full,' and the fellow who thought it up sure was a bright man. The poor people are usually the ones who throw away or waste the most—the rich know how to hold on to what they got. You call them 'tight wads,' but they're only economical. You know, that's just the way it is with farmers.

"You let me drive past a farm-yard and I'll tell you in three shakes of a lamb's tail whether the farmer is prospering or not. You show me a farm-yard full of rusty farm machinery and broken down lumber wagons, and I'll go inside the house and find a farmer who is telling about how much money the poor farmer is losing to-day.

"You find a farmer plowing with a ten-year-old plow, and I'll bet he will be whistling and jingling some spare coin in his pocket while his wife is papering the strong box with liberty bonds.

"The one big difference between the shiftless and the successful fellows, particularly the farmers, is that the first buries himself on the farm, while the second brings in the business himself.

"Now I'll give you the whole meat of the nut which I have cracked, in a few words. The blacksmith who waits in his shop for business surely gets the work from the thriving farmer, but he doesn't ever get any work from the other kind. You've just got to go out and dig them up; pull them out of the rut and make them get busy.

"As soon as they begin to see that they can save money by keeping their farming machinery in good order, then they begin to bring the smith the business. But it takes real missionary work to get some of them started. And it was just that sort of missionary work that I did Sunday.

"And that's no joke, either. Missionary work means converting folks, and, believe me, I had some job Sunday converting a few of those shiftless farmers.

"The young Hinkley boy was a hard nut. He inherited his farm from his dad. Used to be quite a nice hunk of land when the old man run it, but the boy, with his half-baked notions, plastered it white with mortgages and bought a whole new set of farming too'ls. Told me he believed in efficiency; said a good man couldn't work with poor tools; said that old machinery was just like old men, only fit for scrap. The only way to run a farm and do it right was to keep all the tools new: as soon as a plow got rusty or broke its point, throw it out and get a new one.

"When I suggested fixing up the old junk for him, he called me a grafter and confidence man—goodness knows, I deserved his confidence, and as for being a grafter, I'll guarantee to graft on a new plow point that's just as good as the original. That being the case, I kept cool and thanked him for his good opinion of my abilities.

"It seems he had bought a patent forge and about fifty dollars' worth of tools and tried to do his own blacksmith work. That's the reason he knew that a farm tool couldn't be fixed by a blacksmith, or thought he knew it. You should see some of his welding jobs; no wonder he got disgusted with the results. Plowing with one of his fixed-up plows must be like trying to shave with a tin case knife. It can't be done.

"I finally persuaded him to let me take a whack at one of his rusty plows. Told him he could have the work for nothing if it didn't suit him. But he's honest, and so I guess when he gets his plow back he'll be glad to pay me and pass over some more work besides.

"Good gracious, don't you feed your horse any more? Put a muzzle on him, will you, before you bring him in here again? He's eating the side of the shop out. Tie him out in the middle of the road there, and let him eat that.

"Now that you've got the arguments, ain't it about time you decided to bring down some of your farm tools and let me fix them up for next spring? Did you say yes, or have I lost my hearing? That's the first time you ever agreed with me without an argument, and I must say I think you're beginning to chase the spiders out of your brains and brush out the cobwebs.

"So long as you're feeling good, let me make another suggestion. Here 'tis the first of December and winter is 'in our midst,' as the Bugle puts it. Have you thought about harvesting ice yet? Course you haven't; you farmers never do until the pond freezes over and its time to cut it: then all of you land on me at once with tears in your eyes, want your ice cutters and markers and plows all fixed and sharpened within an hour.

"If I try to put you off for a day or so, you almost threaten to burn me out of house and home. I can't do all your work in a minute. You want to remember that the early iceman fills his house, while the fellow who waits gets left.

"I'll have this wagon fixed up for you tomorrow noon, so's you can bring down your old junk. You'd better quit bothering me now and go home and pick up some of it. Think over the ice-cutting proposition and bring down those tools, too. Might just as well make one trip of it."

ONE HUNDRED PER CENT AMERICAN.

There once did live a Patriot true,
Whose name was J. C. Wagner.
He didn't shoot the kaiser up,
Nor hunt him with a dagger.
But he did have one son, did John,
A sturdy six foot Danny,
Who donned the khaki uniform,
And fought for Uncle Sammy.

* * *

Besides his son, old Johnnie had
A clock that said "Cuckoo."
And on its back, in letters bold,
"From germany to you."

* * *

When J. C.'s son had marched away,
That clock no more was heard;
The Cuckoo you will recollect,
Is hunland's national bird.

* * *

For thirty days and thirty nights,
Old John scarce shut his eyes;
His idea was, perhaps you know,
That clock to naturalize.

* * *

With saws and drills and bits of wire,
J. C. began to work,
He rigged a funny bellows up,
From last year's hard boiled shirt.
At last he rested from his toil,
His work is finished right;
The clock is running once again,
The bird now says "Bob White."

Why Not Make a Number of Snow Plows for the Nearby Farmers?

The Old Style Triangular Snow Plow, Made from a Couple of Boards, Is Not Worth the Effort Required To Build It; Make a Real Serviceable One Instead

F. L. ALMY

One of the popular weather prophets, who says that he never makes a mistake in forecasting, says that this winter is going to be the longest in history. He says that he knows this because of the thickness of the goose bone, or something like that.

So long as the winter does not get any worse than it has been up to the present time, we won't have to worry very much about it. However, as a rule, from the first of January to the end of March, we are visited by many snow storms. Of late years, most of our snow has fallen late in the winter.

The ordinary old-fashioned snow plows which one sees on the street may be all right in some parts of the country where the snow seldom falls to a depth of one-quarter of an inch. The snow plows that I see in New England usually consist of two boards bound together at the front, triangular in shape, and drawn by horses. Such is the construction of these plows that they invariably ride on top of the snow, very seldom clearing the ground.

The path that this leaves is full of ruts and holes, and I much prefer walking in the street to following such a plow. As far as the triangular shape is concerned, perhaps the idea is good, and working on this supposition, the plow shown in the accompanying illustration is designed.

At A, shown in the center of the drawing, is the completed plow. The artist has thoughtfully placed an old automobile top on the driver's seat to protect him from the storm. This is merely ornamental, however, and not at all necessary. At B is given a plan view, at C a cross-section taken at the center line. At D a section taken just above the ground level. E shows a section taken on the line XX of the view D. F shows the point and one of the runners. G illustrates the shape of the runners and H the shape of the wood block which fits inside the plow point to hold the latter to the plow and give it a firm base.

In constructing this plow a regular triangular frame is made consisting of two runner boards, J, measuring six feet in length, twelve inches in width and two inches in thickness. At the top of these runner boards, which are shown in the sketch A, are two boards of the same size which have been cut out for entrance to the driver's seat.

The runner boards and the sides are mortised and bolted to the front or pulling post, L. One will note that the original frame of the device does not come to a point as usual in snow plows, but an old plow point is fastened at the front. In order to prevent this plow point from filling with snow, an iron bottom, P, should be welded in place.

Fitted to the inside of the point is the block H and to this block the plow point is fastened by a number of wood screws. This block also serves as a base by which it may be bolted to the pulling post. The pull bolt passes through the plow point and to this is fastened the pull bar R.

The runners shown at G extend about one-half of an inch below the runner board, while the point O is put on a level with the runner board. In this way there is a general tendency for the plow to stick to the ground, rather than to ride up toward the surface or on top of the snow. The shape of the runners adds to this tendency.

As a means of strengthening the plow a floor board M is put in place slightly below the top of the runner board C. With this as a bottom, a compartment is had at the front, wherein may be placed shovels or picks, or any other tools necessary.

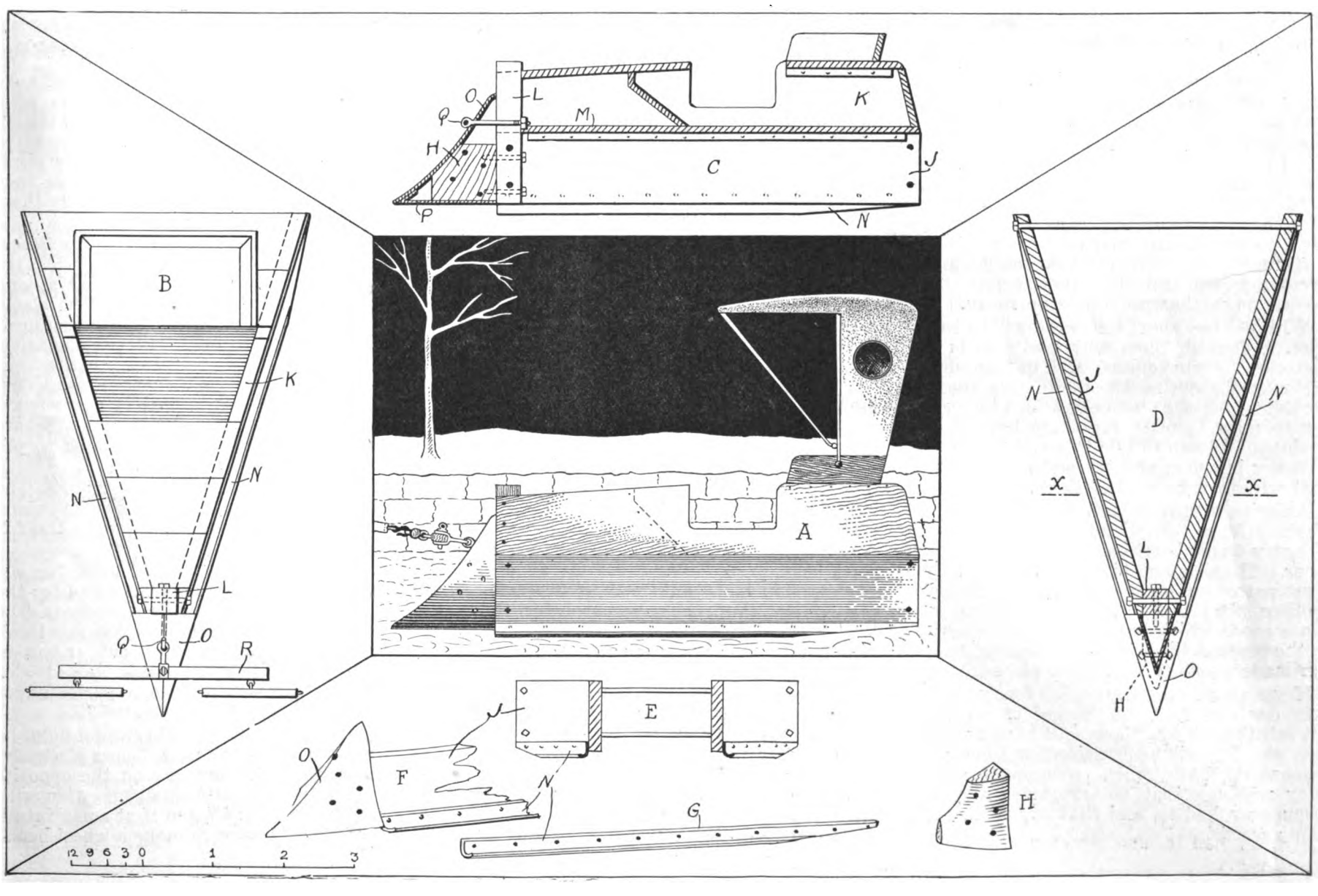
The seat is mounted at the top of the plow and may be made from three-quarter inch boards or from an old carriage.

Every blacksmith in a farming community should find quite a little profit in turning out his plows. They are easily made and after a little experimenting in the exact location on the plow point, one will find that he can turn out a better snow plow than any of those on the market at anywhere near the same price.

Do not make the mistake of locating the pull bolt Q too high on the front of the plow. If the pull is directly ahead or at all downward, there is danger that the plow point will catch in the ground, whereas if the pull is slightly upward, the plow itself will work itself downward.

We Are Here to Help You and So, Bring Your Problems to Us.

WE don't want our blacksmith readers to lose sight of the fact that we are in this office to help them. We are interested in every blacksmith reader who is seeking for knowledge and we want all of our readers to come to us with their problems. If you want to know of a particular book or a particular article, or in fact any information relative to the blacksmith or automobile trade, do not hesitate to write us a letter. The three cents which you spend for the stamp is a good investment. **Make it to-day.**



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Our Editor's Letter.

FROM where I sit in my office, I can look out upon the North River and see the many transports come in from day to day bearing our boys from the other side who have been doing the fighting. Transport after transport arrives and each one is greeted by sirens and bells.

So great is the enthusiasm that occasionally I notice someone on the roof of a building waving his hand and shouting at the top of his lungs. We are so glad to get our boys back that we can hardly keep quiet. We take them to the theatre and give them rides in our automobiles. We can't do too much for them, for we feel that they surely have earned more than we can ever repay.

Within a few short weeks we will be called upon to furnish them with positions in our factories, in our offices, and in our shops. We must be optimistic as we face the big problem. All of us who can afford to, should try to make a place for these boys in our business. If we can't do this now, we should plan our business and try and increase it so that we can take care of them.

America is rich enough to take care of all of these boys. With but little trouble the industry can absorb all of this additional labor. There is one big "if," however. We must patronize home industries. You, or I, brother blacksmith, cannot afford to purchase goods which are not made in America, at the present time, if we can obtain American made goods to take their places.

If we spend our money for foreign products, our own American manufacturers cannot sell theirs. Our boys will have no place to work. We will be criticised, and justly so, because we have fallen down in our duty. They will say that we supported the war because we had to, and that our thanks are empty words.

The boys don't want sympathy and don't want our gratitude in words. They don't want charity either. They are too proud for that. All they desire is a chance to re-establish themselves in business.

There is another point that probably will arise in relation to the employment of some of these boys, probably in the smaller towns. Before the war, a boy might have earned for himself a poor reputation. We should not let this count against him. We must realize that he has torn out this page of his history. Uncle Sam has made him an upright, strong, clean-hearted American. Military

Announcement of Another Prize Photograph Contest

ALL of our friends know how interesting the prize photograph contest was. We had a chance to get acquainted with our other brothers in different parts of the country; to see what their shops looked like, and in many cases to see their faces. Taken altogether, we consider that our prize photograph contest for ten months was the best part of our magazine.

Every blacksmith who reads our magazine and has occasion to do automobile work is eligible for a prize in the contest starting with our next issue. Three prizes will be awarded. The first prize of five dollars will be given to the subscriber sending us a picture which shows the most automobile work going on in his shop. The second prize of five dollars will be given to the best looking shop. The third prize of five dollars will be given to the person who writes the best letter telling how successful he has been in doing automobile work.

In automobile work we include repairs to motor-driven vehicles of all kinds. All you need to send us is a clear photograph of your shop. The size does not matter. As soon as the picture has been published in our magazine, we will return the photograph together with the half-tone which we used in printing the picture.

These half-tones can be used by your local printer, on the tops of your letterheads, on the tops of bills, or in advertising literature. It does not matter how many pictures you send us. You can enter as many as you wish. We will choose the best one, in our opinion, and publish it. In some cases we may publish more than one of the same shop, if they are particularly good. All it costs you to enter the contest is three cents postage for your letter, and for this three cents you will receive a half-tone which is worth anywhere from one to five dollars. Besides this you stand a chance of getting one of the prizes, so sit down to-day and write us a letter enclosing a photograph.

High Salaries for a Few, Mean High Costs For Everybody

MR. GOMPERS, president of the American Federation of Labor, has announced that labor will not surrender the gains that it has made in the way of increased wages in consequence of the great war. When Mr. Gompers uses the word "labor," he does not mean labor in general but simply the labor controlled by the American Federation of Labor and allied organizations.

It is estimated that there are some over two million labor unionists in the country. As against that, there are probably thirty-five or forty millions of people who are not organized in unions and who are as much interested in getting increased pay as any other. A large proportion of this forty million did not succeed in securing any such advance in wages as the labor unionists got.

Is it fair for a small proportion of the workers to continue to get war-time wages under peace conditions which others cannot participate in? We are very far from desiring to see wages reduced. In many cases they should be increased but in some there can be no question but what they are too high.

In other words they are not evened up justly. When the Government was paying big wages it was because it had to have war supplies and have them in a hurry. In peace conditions a very few manufacturers can afford to pay such wages as the Government paid. A manufacturer has got to put his goods on the market at a price which will enable him to sell them. If the cost of labor, which is the biggest factor in the production of anything, is exorbitant, the goods will cost so much that they will not be salable.

It all simmers down to the great question of supply and demand. While the Government was forced to accept high priced war material, the great purchasing public cannot be forced to accept anything that it does not want. There is bound to be a tendency downward and this tendency will be very marked if the present Underwood Free Trade Tariff law is continued in force, because under this law large quantities of goods can be shipped into this country from foreign countries made by foreign workmen at low wages, and will compete with similar goods made in this country by high priced labor.

The only way to keep wages up to a proper point in the United States, is to enact a tariff law which will bar out low priced foreign goods. It should be kept in mind that every dollar's worth of goods made in a foreign country and shipped into this country and sold here, which could be made by our own people, takes just so much out of the pockets of our laboring men. There is no escape from this conclusion. Free trade in theory may be all very well, but in practice it is destructive to any nation which has to pay high wages.

Of course most people will remember that before the great war broke out in 1914 a wave of depression had spread all over the country caused, it is believed, by the Underwood low tariff that was letting in millions of dollars worth of foreign goods that we ought to have been making in this country. These same conditions will be repeated unless the next Congress takes hold of the matter in earnest and enacts a satisfactory tariff measure.

When You See an Article You Like, Paste It in a Book

THERE is one fact which always attracts the attention of the publishers of a magazine such as The Blacksmith and Wheelwright. From year to year blacksmiths throughout the country ask questions about work which had been answered at some time previously in the magazine. Frequently these questions come from old subscribers.

As a rule, it pays to keep all of The Blacksmith and Wheelwright magazines. At the same time, however, we realize that a complete file takes up a lot of room. The blacksmith in search of a particular suggestion is obliged to look through every magazine. Consequently he does not always bother, but writes a note to us. We never refuse to answer a question. It is part of our service, and if you take the time to write us, we are more than pleased to take the time to answer.

There are many blacksmiths, though, who do not take the time to send us a letter, and it is to these men to whom we make the following suggestion.

Obtain some sort of an old book; an old telephone book can be used very well for the purpose. When you see an article in The Blacksmith & Wheelwright which you think will be valuable to you, clip it out, and paste it in the indexed telephone book. All articles relating to Horseshoeing can be pasted under the indexed letter "H" or under "S."

If you are a wheelwright, you might be interested in the letter from Jasper McGrady, for instance, which appears on the opposite page. You would paste this suggestion with the picture under "W" and if at some future time you should want to make a wheel bench

it would be an easy matter to find it. You can have one scrap book for wheelwright work, and another scrap book, for shoeing, and still another for miscellaneous suggestions, indexing them according to your own method. Within a few months you would find that you could hardly do without the book.

The Value of Double Tires.

From a Reader in Ohio.—I will try and answer Mr. Max Maser's question about double tires on wagon wheels. Before putting on double tires, the wheels must be in good shape, and the old tires tight. Then the double tire can be applied outside the old one, giving the second tire five-sixteenths of an inch draw. This will make a satisfactory job, and a strong wheel.

Only a few days ago, I saw a wagon at my shop that had been fitted with double tires three inches wide, and the man that owned the wagon said the tires had been on over fifteen years, and he was well pleased with them.

A few years ago, I worked in the southern part of Ohio where the State was doing a small job of paving. Most all the wagons that were used on the job had one and a half inch tires, and as three inch tires were required, the teamster asked me if I could suggest a way to change for larger tires without rimming the wheels—a job that he could not afford as the work did not pay him enough profit.

We tried out one wagon by shrinking a three inch tire on top of the old one-and-a-half inch tire. In less than a week I had all of the wagons to tire in the same way. He found that the mud did not clog the wheels as it did the regular three inch wheels, and therefore it was really better than a wider wheel.

Now, I believe in giving the prices as well as the answers to questions. I charge $2.25 for each tire, that is, in addition to the cost of material. The real trouble with the blacksmith today is, that he cannot get money enough. He can get plenty of work, but can't seem to make the money that he should. That is the reason that so many blacksmiths can't afford to take a trade paper, simply because they cannot finance their business. If they made profits in their business they would all take trade papers.

Mr. Lynn is right when he asks you not to turn the Blacksmith and Wheelwright into an automobile paper, but of course a little automobile stuff is all right, and we need it. There are about fifteen garages in this city, and they have all been sold out at least three different times in the past five years. What is wrong with them? You can't say that about the blacksmiths.

We have in this same city four blacksmith shops that have been doing steady business for over 50 years. I like Mr. Lynn's suggestion, and I wish every other brother was like him. The trouble with us blacksmiths is that we don't read enough. Every blacksmith should write his trade paper once a year and give conditions and prices. Mr. Lynn wrote an article on "thank you" jobs—tightening old shoes and giving prices, and jobs which otherwise took up his time, and telling about the man who would take advantage of these favors and then go to another shop. His article saved me considerable money.

I have stopped doing such work, and I am going to stop un-hitching horses for people. It takes too much time when I am busy. A liveryman charges 35c. for this work, while very often the people who come here and expect me to do it only want an old shoe put on, and the money I get doesn't pay for the trouble. The public expects too much from us poor blacksmiths.

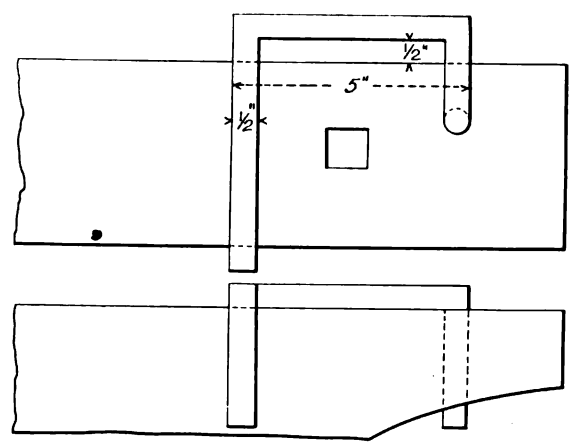
Not long ago, a farmer asked me what I would charge to stop at his house some evening as I was driving by, and put two shoes on his horse that was so lame he could not get him to town. I asked him what the veterinary charged for going out to his house, and he said $3.00, so I told him that that was what I would charge too, and even though he got pretty angry, it was the best I would do.

Stay in the blacksmith business, brothers, raise your prices, buy an oxy-acetylene outfit, put in machinery, and above all, keep up with the times by taking the Blacksmith and Wheelwright.

A Handy Vise Clamp.

From James Howard, Pennsylvania.—I am giving you herewith the drawing of an iron clamp which I made to hold shoes which are to be sharpened on the anvil. I designed this device many years ago, and I also invented a sharpening block that is used a great deal.

Obtain a piece of half inch square iron, and round one end for a distance of two inches, and fit it in the round hole at the heel of the anvil. Bend it at right angles flat upon the face of the anvil. Turn it so that



A Handy Clamp.

it extends half an inch over the edge of the anvil and bend it again at right angles so that it extends along parallel with the face of the anvil.

Five inches from the first bend, make another right angle bend so that it goes across the face of the anvil at right angles to it, then bend it down the side nearest you and cut it off.

You will find that it is as good as a vise. When welding a toe on a shoe, the iron need not be lifted out of the anvil, just hit it with the hammer, and swing it out over the anvil. As the hole is round, it will swing very easily.

A Letter From South Carolina.

From Fred J. Turner, South Carolina.—I am enclosing my subscription money, I get so many hints and short cuts from The Blacksmith and Wheelwright that I can't afford to discontinue it.

My shop has a five horsepower motor, a Silver band saw, hand-made jointer, emery wheel, Little Giant hub borer, Brooks cold tire setter, Champion hot shrinker, two Champion electric blowers, Champion drill press and hand tools as well as a tire bender.

In shoeing, I find that a three-quarter inch rope with a strap 12 inches long, fitted with a ring in each and a whip save lots of time with contrary horses or mules. With the strap around the back ankle and a rope around his neck a horse is much safer as he cannot kick. The strap is better than a rope because it will not irritate the ankle.

If the work cannot be done in this way, pull the foot forward until it is high enough to work on. The device will hold the front foot up, and works just as well as putting a rope around the body.

I can save lots of time and labor by using a drill press to work spoke ends. I have a pit under the press to receive part of the wheel. When the pit is not in use a board covers it.

I haven't time to do much auto work, but take a little of it if it is strictly blacksmith or woodwork. Have made several neat hangers for Ford engines. These hangers were used to replace the lugs which had been broken from the sides of the flywheel housing and which supported the power plant. I made them from iron ⅜ by 2½ inches and fastened them to the housing with studs.

At present I am rebuilding a log cart, built by a neighboring smith. The very principles of design are wrong, so I know he does not read anything on the subject, if he did, he would realize that he was making many mistakes.

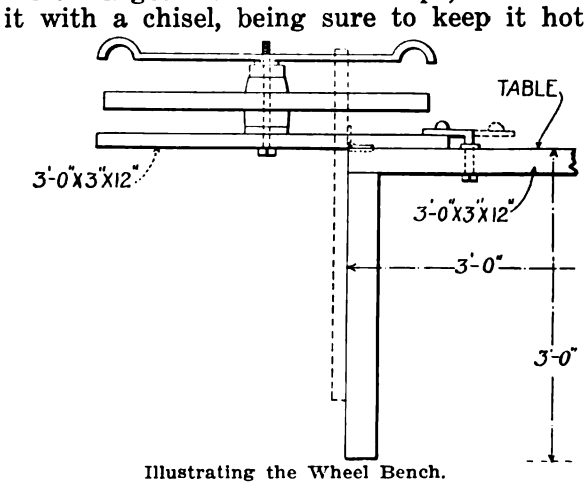
(Editor's Note.—For the benefit of Mr. Turner, as well as our other readers, we would suggest that there is a device called the Hudson crankcase repair arm, now on the market, sold by Hudson Motor Specialties Company, 1606 Real Estate Trust Building, Philadelphia, Pa., which makes the above repair in a few minutes in much the same way and at probably less cost than making one by hand.)

A Wheel Bench.

From Jasper McGrady, Virginia.—I don't think that I can afford to get along without your paper. Every once in a while I find an article that is well worth what it costs me for one year. I am sending a pencil sketch of my wheel bench and have tried to make the drawing plain enough so that everyone can understand it.

How many smiths do any re-working of old axes? I wonder if they know how to make them so they will chop better than new ones. Here is how I fix them: I first heat the ax to a red heat, then draw out a bit. I am careful to hammer both sides alike so that the strains in the steel will be prevented.

I often get the axe out of shape, so I trim it with a chisel, being sure to keep it hot



Illustrating the Wheel Bench.

when I am trimming. Of course, it requires more drawing after it has been trimmed. After I get the axe drawn out, and sharpened correctly, then I temper it, and this is the most particular part. I first have the tempering bath to suit me, by mixing it with salt.

I then heat the axe to a cherry red, and harden with the point up, three-quarters of an inch. I let the temper run down until I can file it a little, then dip in the bath again. Then I lay the axe aside and let it cool slowly, watching it to see that it don't get too soft. By letting it cool slowly, the steel is toughened, and kept from breaking. My motto is, "Read all I can; work all I can; charge what I think is right, and talk about nobody."

The Metal Turning Lathe

Part 1.—Every Blacksmith Should Know How To Use the Screw-Cutting Lathe, It Is a Valuable Tool

The most useful of all power-driven tools used for cutting metals is the turning lathe. There may be other power tools which the repairman will have to purchase before he invests in a lathe, but they are not many. He may have to buy small tools and perhaps a drill press before installing a lathe. However, small tools cannot be used to turn and shape metals, while a lathe will do a large percentage of the work done on a drill.

An engine lathe has but few power driven parts. The spindle in the headstock is the principal one. Its function is to provide rotation for the work in order that a tool may be held against the piece and metal removed. The work may be held on a face plate or in a chuck or between centers. In any of these cases it is the spindle that provides rotation. In fact, rotation of the work is, on the ordinary lathe, provided in no other way. The spindle then is a most vital part of the lathe.

Other moving parts of the lathe have to do with the lead screw. All the movements have to do with the feeding of the cutting tool to the work or the reverse. No rotations of the work are dependent upon the lead screw or related parts. Cutting tools are fed to the work, as a rule, either by the hand or by means of a tool holding device controlled by the hand. But whenever considerable force or great regularity of feed is sought, the power driven lead screw is naturally brought into service.

Relation of Lead Screw to Spindle.

Now it so happens that the lead screw is driven by the spindle or the mechanism concerned in driving the spindle. Moreover, in general, the rotation of the lead screw is absolutely controlled by the rotation of the spindle. The speed of the latter absolutely controls the speed of the former. Thus, when the spindle turns round once, the lead screw will turn round a certain definite number of turns—as three turns, two turns, one turn, or half a turn.

It may be gathered from the foregoing that the spindle and the lead screw are two vital parts of the moving mechanism of the lathe. This is true. If we are about to purchase a lathe, we will advantageously center a very large part of our attention upon these parts and the parts with which they connect.

The spindle is in the head stock and if it runs true and at desirable speeds, we know that a large part of the essentials of a first rate lathe have been covered.

In order that the spindle may run true and continue to do so in spite of wear, the following specifications should ordinarily be met. (1) The two bearings should be wide apart. If one wears faster than the other, the distance between the bearings will tend to minimize the effect upon the work. (2) The bearings should be broad. The inevitable wear will then be spread over a considerable surface with the result of lessening the depth of wear. This is what we want.

Figuring Spindle Speeds.

As to proper speeds. If the lathe spindle is driven by means of a cone-pulley, then the fastest speed will be secured when the belt is on the smallest step, and the slowest speed (in case there is no back gearing) when it is on the largest step. If there are four steps, we can very readily get a good range. Suppose the countershaft runs at 130 revolutions per minute (R. P. M.). It will not be difficult to determine the speeds of the spindle corresponding to the various possible positions of the belt.

Divide the diameter of the step of the countershaft cone-pulley by the diameter of the lathe cone-pulley and multiply the result by the number of revolutions per minute of the countershaft. Suppose, for example, that the smallest step of the lathe cone-pulley is 5 inches in diameter and that the corresponding step on the countershaft cone-pulley is 15 inches and that the countershaft speed is 130 R. P. M. We divide 15 by 5, giving 3 as a result and then multiply by 130. Then the spindle speed will be 390 R. P. M.

Let us now consider the slowest speed. Suppose the two steps have diameters of 7 and 14 inches, the countershaft cone being the smaller this time. We first divide 7 by 14, giving .5, then multiplying by 130 we find that the spindle will run at 65 turns per minute.

These speeds may be suitable or they may not. Note that the fastest speed is six times as fast as the slowest. We can't change this relation between the fastest and the slowest without changing the lathe or countershaft cone-pulleys. See Fig. 1.

However, if we simply want to make all the speeds of the spindle faster or all slower, we may do that without altering either cone-pulley. We may simply arrange to run the countershaft itself more rapidly or more slowly. We may do this by using a smaller or a larger simple pulley on the countershaft to correspond with the pulley on the line shaft.

It is important to have the speeds of the lathe right. If the lathe cannot be slowed down sufficiently, we may expect difficulty or

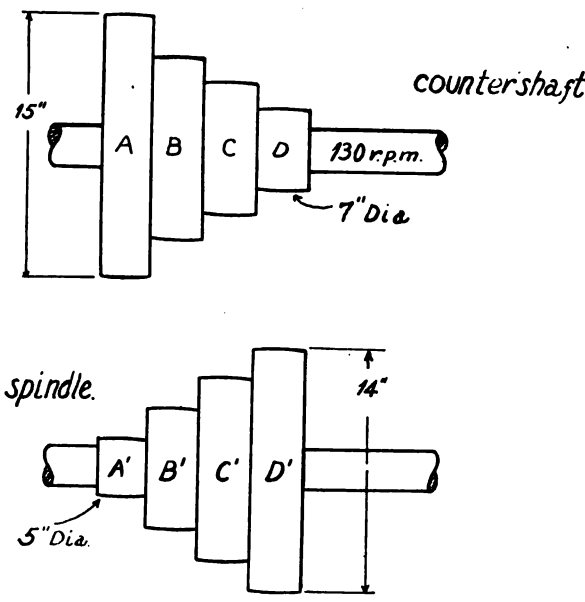


Fig. 1—Countershaft and Lathe Pulleys.

loss of time. Similarly, if it cannot be speeded up to the proper point.

If the slowest and fastest speeds are both right, then we may rest fairly content. The maker of the lathe will naturally arrange matters for suitable intermediate speeds. A four-step cone will give four speeds. For general use in an automobile shop, four speeds will be sufficient. Five steps will only serve to enable the workman to change a little less abruptly from one speed to the next. However, if the shop is going to do work where very slow speeds are required as well as the faster ones, then it may be well to consider the added expense of installing a lathe fitted with back gearing.

Back Gears.

Back gears arranged at the head stock of the lathe provide another set of speeds. If we can have a four-step cone, then with back gears we can obtain four slow speeds in addition to the four fast speeds. We have a complete new set of speeds. The back gears may be so arranged that we get a reduction of say one to eight. Or, it may be stated that the back gear ratio is 8. Either way, the meaning is the same. The new slow speeds are one-eighth as fast as the old fast ones without the gears. That is to say, we get a new slow speed for every position of the belt on the cone pulley.

It will be one-eighth as fast as the speed for the same position of the belt with no gears used. In the example we had before, the slowest speed was 65 R. P. M., obtained at the time when the belt is on the largest step on the lathe cone. If the back gears are now brought into action and the belt remains in the same place, then the new speed will be slightly over 8 R. P. M. (that is, 1/8 of 65). When the belt is on the smallest step, we get instead of 390 R. P. M., the speed of about 49 R. P. M.

In selecting a back-geared lathe, an important matter is the jump from the fastest back-gear speed to the slowest speed without gears. In the present case we have about 49 for the one and about 65 for the other. That is a big jump. Unless we absolutely know that this jump will not be too big a one, it will perhaps be better to obtain a lathe with back gears having a ratio of 7 instead of 8. With 7 (or 1 to 7) we shall now have new speeds that are one-seventh of these of the old set. Thus, corresponding to 390 and 65, we shall get with the gears 56 and 9 (about). The jump from 56, the fastest speed, with gear to 65, the slowest speed without gear, is a reasonable one—one that is a very great improvement over the jump from 49 to 65.

Let me summarize some main points. If the lathe in contemplation is driven by a cone pulley and does not have back gears, then we shall have exactly as many changes of speed as there are steps on the cone. If the lathe is back geared, we get an additional set. Find out what the fastest speed on the lathe is and also the slowest, when the countershaft is rotated at the speed at which you propose to rotate it.

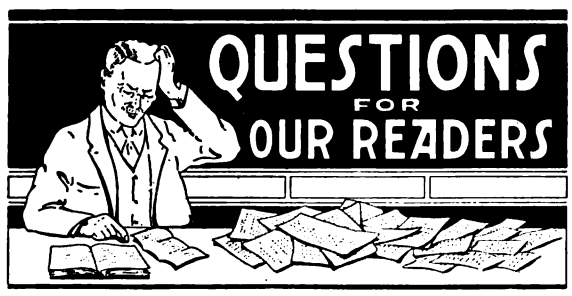
If the fastest speed is not fast enough, or the slowest not slow enough, then consider what to do. It is possible that a change in the countershaft speed may give you what you desire. Make the calculations, or get some one to make them, and see whether the fastest and slowest speeds will now be satisfactory. If not, then leave that particular lathe alone. Further, if you are about to get a lathe with back gears, find out what kind of a jump in speed is made when you go from the slowest without gears to the fastest with gears.

If it means a doubling or anything like a doubling of the speed, it will be well to consider before you buy. The jump may be a permissible one for you or it may not. At any rate, stop and consider. A back geared lathe costs considerable more money. It will be well to make sure you are getting what will prove satisfactory.

The speeds desirable on a lathe will depend upon the work to be done. Hard cast iron and tool steel will require comparatively slow speeds. Soft brass should be cut at a comparatively high rate of speed. Machine steel is properly cut at intermediate rates. We can vary the speed some, but not to a very great extent, if we propose to operate economically.

We must consider what kind of work we are going to do. If there is going to be a good deal of soft brass work of small diameter, then we will want some pretty rapid speeds. Soft brass should be cut at the rate of, say, 100 feet per minute. This means that the chip should come off at that rate. This is a different thing from 100 revolutions per minute. If the brass work on the lathe is 1 inch in diameter, then the chip taken off in one turn is about 3 1/7 inches long. To get 100 feet of chip, we will have to have as many turns as 3 1/7 inches go into 100 feet. One hundred feet is 1,200 inches. Dividing by 3 1/7 inches, we get 382 turns (about). If we want 100 feet of chip in 1 minute, then we will have to rotate the work fast enough to get 382 turns in 1 minute. From this it will be seen that the spindle speed of 390 R. P. M., mentioned a little while back, will not be too rapid. We obtained that speed from a countershaft speed of 130 and pulley steps of 15 and 5 inches on countershaft and lathe cones.

(To be continued.)



A short time ago we received a letter of distress from a Georgia reader, and we are thankful to say that the brothers were very loyal. We received a great number of answers from blacksmiths who were willing to help him out by giving him work. We give below a letter from one of our brothers of Canada. Perhaps someone will be able to solve his problem. Write to us if you can.

Can You Help?

From R. W. H., Canada.—The trade in this section of the West is just as bad as anything can be. Probably the hard times are due to the poor crop which was harvested this year. We have practically no work at all, and have had but little since the middle of the summer. I have had to beg in order to get food for my family of seven small children, and I do not like to do it because I am willing to work for my living.

The blacksmith in the Canadian West on the average is very poor, as I have found in my past three years of village shop work. I have had considerable experience and am able to do mechanical work and blacksmithing in the right way, but there seems to be little opportunity here to do it.

Power Hammer for Shop.

From B. H. Brooks, Texas—Will some brother tell me the best make of power hammer for a small shop? Also what is the best process for sharpening or rolling discs cold?

Will Answer Questions.

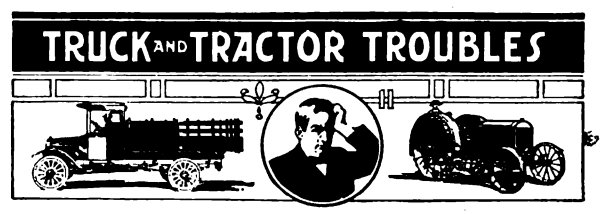
From L. F. Tarbell, New York.—I have had about 39 years' experience at doing blacksmith work in farming communities. I have also done lumbering and some carriage work. Have fashioned many of my own machine tools that are not generally used and found them convenient. I will be very glad to give my best judgment on questions referred to me by any of my brothers.

ANOTHER PRIZE CONTEST.

If you do any automobile work in your shop, don't fail to read the new prize contest announcement on our editorial page. Here is a chance for you to collect some easy money, and at the same time obtain a halftone cut of your shop. Every picture that we publish in our magazine we must reproduce on a copper plate. These plates are called "halftones" and can be used for printing letterheads, billheads, or advertising folders of any kind. The printer uses them just as he does type.

As soon as we have published the picture of your shop in our magazine we will return your original photograph together with the halftone which we used for printing it in our magazine. This does not cost you one cent and you will save quite a little money in making up billheads or folders for yourself.

You don't have to be a good writer to enter this contest. All you have to do is to send us a picture of your shop, providing you do automobile work, together with a short letter telling about your business, or the shop itself, or telling about how well you like the automobile business; whether you like it better than blacksmithing, or in fact telling anything that you think would interest your other brothers throughout the country. Now turn to the editorial page and read about the prizes.



Interested in Automobiles.

From Elmer Uren, Wisconsin.—I am very much interested in the automobile stories that are being printed every month in your magazine. One of these articles is worth double the price of the paper. I think that every blacksmith should try to do automobile and tractor repair work. These machines will furnish the big business for the blacksmith in the future.

I, myself, do a great deal of car repairing and sell tires, tubes, gasoline, cylinder oil, and keep a good supply of Ford extras on hand. My shop is equipped with a very good set of machine tools, an engine, a rip saw, an emery wheel, grindstone, disc sharpener, post drill and a free air outfit that cost me $100.

Personally I think that this is a good investment for anyone who sells tires and tools. Get into the automobile business, brothers. It is much better than breaking your back shoeing horses. I have often forged supply parts for cars when it was hard to get the supplies.

I weld many automobile springs. Anyone can weld them. I do not temper the springs at all, and they stand very well. Oftentimes people try to tell me that they cannot bore holes in automobile springs. That's easy; use turpentine on the drill instead of oil and the hole can be bored very easily.

Wants Wiring Diagram.

From Tom Benner, Illinois.—I wish some one of my brother blacksmiths would send me the wiring diagram of an Oldsmobile model 53, six-cylinder car. This car is equipped with the Delco electric system and an Excide 24-cell battery. There are eight wires leaving the battery box.

Steel for Auto Springs.

We want to call the attention of our readers to the fact that no one has told us what kind of steel they use for automobile springs. One of our subscribers wants to know, and we shall hope to receive a letter telling him about it as soon as you have read this magazine.

Phoenix Horse Shoes and Bull Dog Calks.

The Phoenix Horse Shoe Company of Chicago, Ill., manufactures a line of horse shoes and calks which is well known all over the world. This line includes the celebrated Phoenix horseshoes and the Bull Dog calks.

The constant demand for Phoenix horseshoes is perhaps the best proof of the high quality of this product. These shoes are practical to the highest degree and they are made of unexcelled material. The Bull Dog calks are warranted to hold firmly to the shoe, never to jump out, when set, and they are easy to drive and perfect in every detail. The Phoenix products are for sale by all dealers, but readers who are interested should write for samples and interesting literature direct to the manufacturers.

The Bush Car.

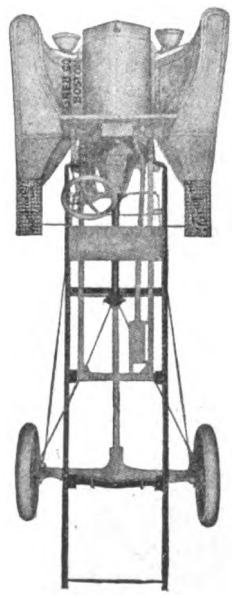
Many country blacksmiths are so situated that they could easily be successful as agents for automobiles, and it is quite practical to sell cars from illustrated catalogues instead of going to the expense of maintaining a regular salesroom.

The Bush car, manufactured by the Bush Motor Co., Bush Temple, Chicago, Ill., can be sold exclusively by country blacksmiths. This is a five-passenger, 35 H. P. car, having 116-inch wheel base, Goodrich tires, 32 x 3½, Delco ignition, Dyneto starting and lighting; in fact, a thoroughly up-to-date motor car.

Good agents are wanted throughout the United States, especially in the country towns. Some of the very best territory is still open. Prompt shipments are guaranteed. A live blacksmith can make good money on this proposition. In writing to the Bush Motor Co., address Dept. A-5.

Repair Shop Specialties.

We illustrate two live specialties for the auto repair man. The cut will give our readers a fair idea of the appearance of the Farmford extension, for making



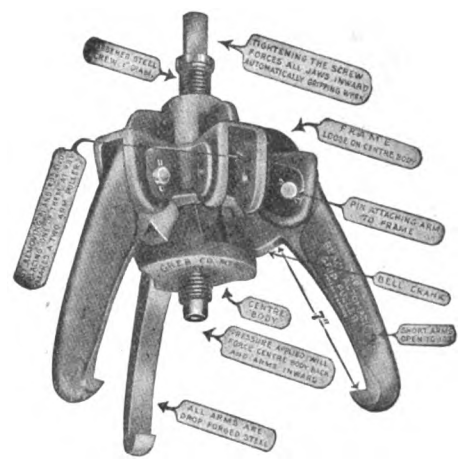
The Farmford Extension Applied.

any Ford car into a serviceable truck. With a Farmford extension unit you can quickly lengthen the wheel base of a Ford car to 115, 124 or 130 inches.

With this unit it is not necessary to even cut or alter the Ford frame in any way. Many blacksmiths can do a good business on this unit by changing Ford cars to serviceable trucks. Many farmers are buying high grade cars, and this would make an excellent use for their old Ford machines.

We also illustrate a good wheel or gear puller which is as indispensable in the garage as a hammer. It may be used in a great many ways. It is said to be practically the only tool with which a flywheel may be removed without the attendant danger of breaking the crankshaft. The Beach Automatic Grip Puller, as it is called, is built mechanically right, and when once the jaws are closed on the work and the screw is set against the shaft, it is impossible for them to unhook. Tightening the screw forces the jaws inward, automatically gripping the work, throwing pressure toward shaft or axle, making it more positive and requiring less pressure than the ordinary puller.

Positively removes wheels, gears,



Beach Automatic Wheel Puller.

flanges, couplings, universal joints, wrist pins and any number of other things. Quick, strong, durable, efficient and simple. It is complete with two sets of jaws: three 7½-inch jaws (open to ten inches) and three 12-inch jaws (open to eighteen inches). Either a two or three jaw combination may be used, as there is an extra jaw socket directly opposite one of the jaws. It is also made with a locking device by which the jaws may be set and locked in any position, which makes it a one-man puller.

Both of the specialties illustrated are manufactured by the Greb Company, 213 State Street, Boston, Mass., to whom all inquiries should be addressed. A liberal discount is given by this company to jobbers, dealers and garages. This discount will also apply to blacksmith shops.

Giant Grip Products.

Although this has been an unusually mild winter season so far, we may expect before spring to see considerable snow and ice, and of course this will mean a demand for calks and other winter horseshoeing supplies. The Giant Grip Horse Shoe Co. of Oshkosh, Wis., manufactures the well-known line of Giant Grip shoes, calks and tools. The quality of these products is well known, but readers who are not fully acquainted with the merits of this line should write direct to the manufacturers for interesting free literature.

Niehoff Defectometer.

The above is the name of a new testing instrument which has been put on the market by Paul G. Niehoff & Co., Inc., 232-242 East Ohio Street, Chicago, Ill. This instrument is guaranteed to locate shorts in a magneto. It is accurate and time saving, and will soon pay for itself in any garage or repair shop. Write for interesting free literature direct to the manufacturers.

Northwestern Horse Nails.

The Northwestern Horse Nails have been on the market for many years. These nails are made of the best quality material. They are perfect in form and finish and will hold the shoe firmly to the horse's foot. The re-enforced point makes this nail an easy one to drive and a safe one to use. Write for samples and descriptive circulars to the Union Horse Nail Co., Chicago, Ill.

An Instructive Book About Autos.

Thousands of blacksmiths throughout the United States have taken up automobile repair work, and many of these blacksmiths have been very successful in this branch of business.

The only trouble, however, is that many blacksmiths do not place sufficient confidence in their mechanical knowledge in regard to motor cars, and to meet this want, the American Technical Society, Dept. A-7641, Chicago, Ill., has brought out a set of books under the title "Automobile Engineering." This work consists of five profusely illustrated volumes giving full information in regard to every conceivable mechanical subject connected with motor cars and repairing same. A partial list of contents is as follows:

Explosion Motors
Welding.
Motor Construction and Repair
Carburetors and Settings
Valves, cooling
Lubrication.
Flywheels
Clutch
Transmission
Final Drive
Steering Frames
Tires
Vulcanizing
Ignition
Starting and Lighting Systems
Wiring Diagrams
Shop Kinks
Commercial Garage Design and Equipment.
Electrics
Storage Batteries—Care and Repair
Motorcycles
Commercial Trucks
Glossary

This valuable work will be sold to the readers of The Blacksmith and Wheelwright at a low price and on wonderfully easy terms. Any blacksmith can pay for this set of books at the rate of only seven cents a day. Remember this work is authoritative and by the very best mechanical experts, and the five volumes contain 2,400 pages (5½ x 8¾ inches), also 2,000 illustrations, tables and explanatory diagrams; in fact, this work is a complete automobile library, and any blacksmith by studying these books can particularly fit himself for expert repair work.

Readers who are interested should use the coupon which is attached to the advertisement of The American Technical Society appearing in this issue of our magazine.

Nicholson Files.

The files and horse rasps manufactured by the Nicholson File Co. of Providence, R. I., are favorably known all over the world. This is the largest concern in America manufacturing files, and their product is of standard quality. Ask your dealer or write for free literature direct to this company.

Wonder Disc Sharpeners.

With the large acreage of crops planted, there is certain to be an unusual demand during the coming season for agricultural implements of every description, and this will mean that the blacksmiths should put in a complete line of machinery for repairing agricultural implements and farm tools. The Wonder Disc Sharpeners are manufactured by A. E. Durner, Evansville, Wis., and are money-saving and money-making machines.

The Little Wonder Disc Sharpeners can be successfully used to sharpen plow discs of 22 inches or less. The Giant Wonder will sharpen any size from 12 to 32 inches in diameter. These machines are for sale by leading jobbers in United States, Canada, Mexico, Spain, Australia, Argentine Republic, South Africa and Fiji Islands, but readers who are interested should address all inquiries direct to the main office of A. E. Durner of Evansville, Wis.

Standard Horse Nails.

The Standard Horse Nail Co., New Brighton, Pa., manufactures a full line of horse nails, and readers who are likely to be interested should write to this company for catalogue, prices and samples.

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, 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.

For Sale

FOR SALE.
New Machines. 9-inch Jointer, $50.00; 5-inch Jointer, $30.00; 5-inch Bench Jointer, $25.00. Cast iron and steel construction; quick, easy adjustable device for changing cut. Also circular and square style cutter heads for wood frame Jointers, 3 to 17-inch cut, from $7.50 to $40.00. Saw arbors, any size or style; emery grinder stands. Send for circular. W. L. SHERWOOD, Kirksville, Missouri.

FOR SALE.
One Defiance 60 ton Iron Frame Hydraulic Press; two Defiance 18" Broad Belt Polishing Machines; one Defiance No. 3 Hub Reaming and Boring Machine; one Defiance "Sharpsteen" Spoke Facing Machine; one Bentel & Margedant Rif or Felloe Polishing Machine; one Treavor & Company Double Spoke Equalizing Saw; one Gleason Disc Facer with Bentel & Margedant Spoke Equalizing Saw; one Gleason Disc Facer with Bentel & Margedant Spoke holding attachment; one Gleason Spoke Throating Machine. NESS BROTHERS & COMPANY, York, Pa.

FOR SALE, BLACKSMITH SHOP.
Located in good farming country; only one shop in town; surrounded by big territory; rare chance for man who understands his business. I have two 50 ft. lots; shop is L shaped, 30x60 and 18x30, cement floor; two gasoline engines, one 8 horse power, one 2 horse power, Little Giant trip hammer, one plow sharpener, 2 forges, 2 anvils, three large vises, emery stand, disc roller, turning lathe, cold tire setter, shears. Further particulars as to price, terms, will be sent on application. Address AUGUST NORDSTROM, Wausa, Nebraska. Reason for selling, old age.

For Sale

FOR SALE.
Blacksmith business; lot 200x220, brick shop 35x80, three forges, one frame building 25x50, concrete floor. Extra fine location, plenty of work, good prices. Four churches, fine school, good water, fine farming country. Good man can get rich here. Reason for selling, old age, want to retire. Fine stand for a garage, plenty of that kind of work here if a man wants that kind of work. Too old to do it myself. Address R. B. LINK, Marvell, Arkansas, Box 155.

FOR SALE.
Two anvils, two electric blowers, one new L. S. P. Calking Machine, and forty kegs of shoes. Address WALTER HARRIS, Fairfield, Iowa.

FOR SALE.
A rich Iowa community offers a live mechanic a general blacksmith business unequalled anywhere. Work for three or four men the year around. Get particulars at once from A. J. ULVESTAD, Lake City, Iowa.

FOR SALE.
One 2½ H. P. Gasoline engine and one 4 H. P. Gasoline engine, one tire bender. All in good order. Have put in motor. Will sell cheap. F. H. HERBST, Highland, Ill.

Tires

DOUBLE TREAD TIRES
GUARANTEED
SPECIAL OFFER TO AGENTS. Write for Catalogue
Get our special price on new tires
M. LIBEN & CO.
205-AK West 48th St. New York City

DOUBLE TREAD TIRES.
We carry a full line of new and used tires and tubes. GINSBERG & BERKOWITZ, 236 West 48th St., New York City.

Wanted

WANTED.
Blacksmith and horseshoer, steady. Electric power. Address WILL MADDOX, Palestine, Illinois.

OPPORTUNITY.
Splendid opening for blacksmith. One of the best agricultural districts in the state, good territory, no competition; can rent shop for ten dollars per month and no lack of work. Address, PRIMROSE COMMUNITY CLUB, Primrose, Nebraska.

Personal

PERSONAL.
TOBACCO HABIT may be easily overcome. Quit the terrible injury and expense. I'll gladly send necessary information. G. S. STOKES, Mohawk, Florida.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

Steel Wheels.

A complete line of steel wheels to fit any axle, plain or grooved, is manufactured by the Electric Wheel Co., Box N, Quincy, Ill. The same company also manufactures steel or hickory axles of any size and a full line of wood and steel farm trucks with either steel or wood wheels. Readers who are interested should write for the interesting free catalogue which is issued by this company.

Chase Drednaut Motor Topping.

Many of our readers are doing automobile repair work, and in all blacksmith shops where such work is done, more or less top material is required for making new tops and reupholstering old cars. The Chase Drednaut motor topping is highly recommended for this purpose, as this material "defies time and the elements."

This fabric is manufactured by L. C. Chase & Co., Boston, Mass., and readers who are interested should write for particulars and free samples of this durable and reliable top material.

F. W. S. Roller Bearings.

Ever since the Ford car was placed upon the market many years ago, car owners and repairmen have been in search of some sort of a bearing to replace the ball bearings in the front wheels of this car. F. W. Stewart, 1406 Michigan Ave., Chicago, Ill., in putting on the market the F. W. S. improved roller bearing, answered the problem.

This roller bearing can be used both in Ford and Chevrolet front wheels as a replacement part for the old fashioned ball bearing. The inner race or cone is made of a specially prepared steel carefully hardened and ground to the correct size.

This part fits upon the Ford or Chevrolet front wheel spindle in place of the regular cone. Upon it are mounted the large rollers which are contained in a strong steel cage, which is reinforced by a heavy turned edge. Surrounding the roller and cage assembly is the outside race or ring which, like the inside cone, is carefully ground and hardened.

Autoists who find that the ball bearing in the front wheels of their Ford or Chevrolet cars are rapidly destroyed by wear, should investigate these bearings. The cost is low and satisfaction is guaranteed.

Subscribe for THE BLACKSMITH AND WHEELWRIGHT. $1,00 a Year.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 2. NEW YORK, FEBRUARY, 1919 TERMS ONE DOLLAR A YEAR

Design, Construction, Operation and Repair of Automobiles and Motor Vehicles

Part XIII—Dealing With the Construction of Springs and Brakes and How These Important Units Should Be Cared For

AS FAR as comfort is concerned automobile springs are the most important units on the car. Manufacturers have worked upon various spring designs and types ever since the automobile first came on the market, consequently the present spring is a product of many years of intense study.

There are many different types of springs of which we show only the main ones; the others are modifications of those shown. In figure 58, at A is shown the full elliptic spring, probably the first type adopted since it resembled those in use upon carriages and wagons. This spring was hung upon a flexible joint at the top in most cases and fastened rigidly to the axle. In a few cases full elliptic springs were used crosswise of the car, but there was a general tendency toward spring breakage, due to sidesway, and the method was discarded.

At B in the same figure is shown the half elliptic spring, used to a great extent at present. In this case note that the front of the spring is fastened to the frame through a movable pivot while the rear is hung upon a toggle. Where both ends are hung on toggles, as in the Ford car, the spring is referred to as being semi-elliptic. This type is shown in figure 59.

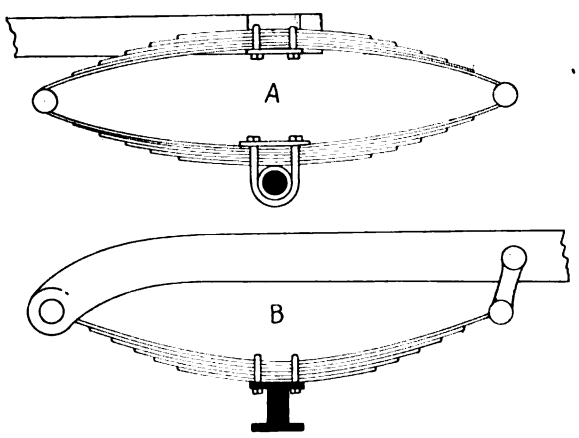


Fig. 58—Two Types of Springs. A, Full Elliptic; B, One-half Elliptic.

Three-Quarter Elliptic.

The three-quarter elliptic spring, though seldom used, has many points of merit, in one way it resembles the half-elliptic, except that instead of fastening directly to the frame, the main spring, through a toggle, hangs upon a quarter elliptic section of spring as shown at A in figure 60.

In all of these elliptic springs the general tendency is to absorb shocks and rebounds but in the device shown in figure 60 at B, another principle enters.

The latter spring is termed the cantilever and while it absorbs shocks it tends to change the up-and-down motion of the car to a lengthwise shock. The spring at one end is fixed to the axle while the other end is fastened, either through a toggle, or sometimes directly to the frame. The center of the spring is free to swing upon a pivot which is fastened to the frame.

Designers have been faced with many problems in making springs. In the first place a spring must be resilient enough so that it will yield to the weight of the car body when the wheels drop into a depression in the road. If, however, the spring is too

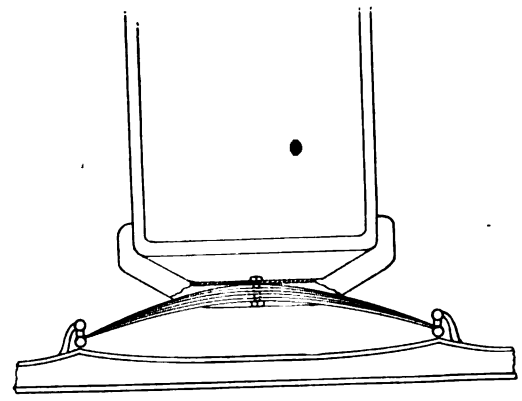


Fig. 59—Semi-Elliptic Spring as Used on Ford Car.

light the body will rebound and break the spring.

If on the other hand a spring were made from one piece of metal, strong enough to withstand the road shocks, it would not be resilient. One can understand this statement better if one rides in an unloaded motor truck or an unloaded trolley car. All of the road shocks are transmitted through the springs, because the springs are made heavy to stand a load. As soon as the truck is weighted down, or as soon as the trolley car is filled with people the machine rides easier.

Manufacturers worked for a long time to obtain a spring that would be resilient, but strong—seemingly one factor worked directly against the other. The only answer to this perplexing problem evidently was to make a spring from a number of pieces called leaves as shown in figure 61. Each leaf is designed to carry a certain portion of the load, and each leaf is made just as springy or resilient as possible.

Spring Construction.

The main leaf is fitted at each end with bushings, usually bronze, and around these bushings the spring leaf is curled as shown in the figure. In the semi-elliptic, or in fact in all elliptic springs the main leaf has a slight curve depending upon the size of the spring. The second leaf which rests upon the main leaf has a slightly deeper curve, while the next one has still a deeper curve and so

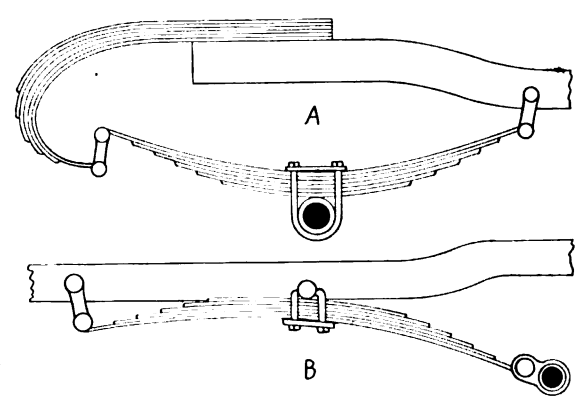


Fig. 60—A, Three-quarter Elliptic; B, Cantilever Springs.

on until the top is reached. If, therefore, all the leaves are packed one upon the top of the other they will not fit together as they do in the car. Most of the pressure will come upon the ends of the leaves.

As a general rule the leaves are fastened together into a unit by means of a center bolt though in some cases no fastening is necessary for the reason that the spring clips hold them together. When the spring is in place, the weight of the car is evenly distributed over the main leaf, for every leaf above it is slightly shorter than the next.

When the wheels drop into a hole in the road the weight of the car tends to straighten out the curve in the spring, therefore the ends of each leaf slide along the leaf below; this action has a tendency to absorb the shock. It would seem that if resistance were offered to this sliding motion the shock would be absorbed more readily, but it is not the case. A clean spring, having all of the leaf surfaces well polished and lubricated, absorbs shock much better than a rusty one.

In repairing springs they should be entirely pulled to pieces, the rust removed from the surfaces and the surfaces polished. Before putting the springs together the contacting surfaces should be given a thick coating of oil. Should one find that the springs are in good condition, that is, the surfaces clean,

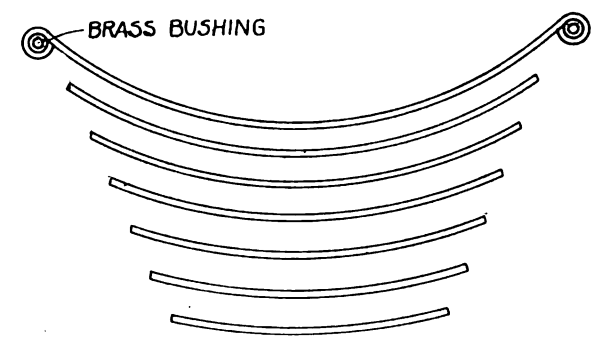


Fig. 61—Parts of a Semi-Elliptic Spring.

there is no necessity for removing them from the car. However, they should be oiled.

In oiling a spring the weight of the car should be removed from it. The car may be propped up on a box or by means of a jack, but there should be no spring tension. If there are any spring clips they should be unfastened or removed, then each leaf should be pried away from the next one to it and heavy oil or graphite applied to the contacting surfaces.

A Poor Method.

Many amateur repairmen use a cold chisel or a screw driver and a hammer to pry apart the leaves. This is a costly proceeding, however. The spring leaves may be bent out of shape and sooner or later the leaf will be weakened and break. There is a small spring spreading tool on the market which should be in the hands of any one doing automobile repair work.

We have said that heavy oil or grease should be applied to the springs. There is a difference of opinion as to the best spring lubricant. Heavy grease mixed with graphite makes a good lubricant. In some cases repairmen prefer graphite alone. In any case the lubricant can be applied to the spring by means of a thin piece of tin or a case

knife and spread over the surface by means of a heavy thread or wire. In this way the spring leaves need not be separated any great distance. In doing this work always be careful not to separate the leaves any further than necessary.

In overhauling a car there is one point which is often neglected—the point where the spring joins the frame or the axle. As we have explained above a bronze or steel bushing is usually found. Every movement of the spring means a movement in this

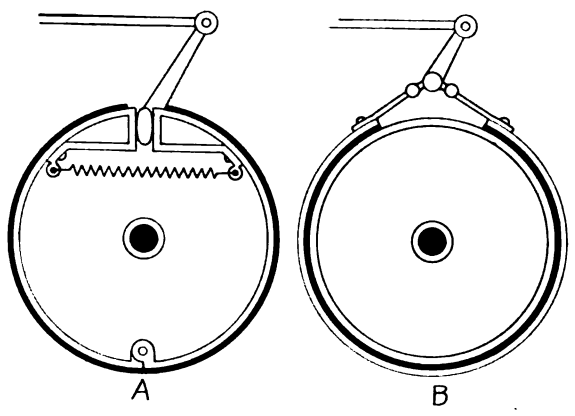


Fig. 62—Illustrating Two Types of Brakes. A, Internal Expanding Shoe; B, External Contracting Band.

bushing. There is a great tendency for the bushing to wear oval or egg shaped. Practically all of the road strains come upon the bolt which passes through this bushing, therefore the bolt itself wears very rapidly unless well lubricated. The average driver does not realize the importance of lubrication at these points and neglects them; consequently it is up to the repairmen to educate the driver and to be sure not to send out a car that is worn at these points.

The Braking System.

Next to the steering gear there is no more important part of the car than the braking system. Poorly adjusted brakes have resulted in a large percentage of automobile accidents. There are two types of brakes illustrated in figure 62—the internal expanding shown at A and the external contracting shown at B. These brakes are usually located on the rear axle while the other unit termed the brake drum is fastened to the wheels.

Referring to figure 62 at A the small cam is fastened through suitable linkage to a foot pedal or a hand lever. When the foot pedal is depressed or the hand lever pulled backward, the cam is turned upon its axis. This presses against the brake shoes and expands them until they press against the drum on the wheel. This has a tendency then to lock the wheel and prevent it from turning.

The external contracting brake shown at B works in exactly the opposite direction, that is when the foot pedal or the hand lever are operated, the external contracting band squeezes together around the brake drum. The two sets of brakes act independently, that is if the internal expanding brake is connected with the foot pedal the external brake will be operated by the hand lever.

Of late, manufacturers of the better cars have been in the habit of covering the brake shoes or brake surfaces with a braking material. This material may be made of a heavy asbestos fibre through which is interwoven steel wire for reinforcement. In applying this material to the brake bands, particularly the external contracting bands considerable care is necessary.

Applying the Fabric.

In referring to figure 63 at A is illustrated the first step in applying the lining to the band. The material is cut so that it is about one-eighth of an inch longer than necessary. It is placed in the band and the rivet B put into place. The excess or slack is allowed to bulge out as shown at D and the rivet C is put into place. Finally D is straightened out and riveted to the band. The fabric then should fit the band all the way around. It should have no projection or depression.

After it has been applied it should be tried around the brake drum and shaped to fit the drum as closely as possible, then it is put in place on the axle and adjusted so that when the brake is operated the band will draw together and contact with the drum all the way around.

In fitting the internal expanding bands the same care is necessary. It is essential that the fabric touch the inside of the brake drum at all points at approximately the same time when the brake is engaged. In riveting the fabric to the band or to the shoe the heads of the rivets should be countersunk as shown at E in figure 63. If this is not done as soon as the fabric wheels slightly it will cease to grip the drum and the rivets only will contact—the braking action will be impaired.

The adjustment of brakes is also very important. Should the left-hand brake lock the wheels before the right-hand one does, the car tends to skid and an accident may result. In the writer's opinion there is but one method of adjusting brakes properly. Support the car so that both wheels are free to turn, and engage the brake slightly so that its action can be noted upon the left-hand wheel.

Adjusting the Brakes.

Attach a spring scale to the outside of one of the spokes and with it pull the wheel around. We will assume that it takes two pounds to move the wheel. Apply the spring balance to the wheel on the other side of the car and adjust the brake until it requires the same pressure to turn it. In order to check up this adjustment engage the brake slightly more until it takes from ten to fifteen pounds to move one of the wheels, then make the adjustment again if necessary.

The same care should be exercised in adjusting both systems of brakes—the internal and the external.

Aside from the application of the brakes

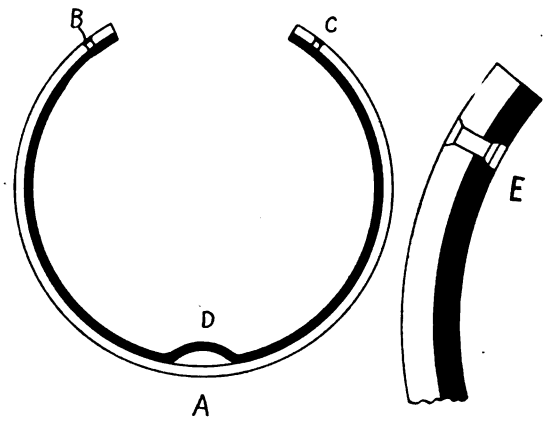


Fig. 63—Showing How the Fabric Should Be Applied to the Band.

directly to the wheels there is another method which is becoming popular. In this case usually an external contracting brake is applied to a drum on the propeller shaft either in the transmission or directly behind the gearset. The Ford car is a good example of this particular system. Manufacturers claim that a brake acting upon the propeller shaft is more effectual for the very reason that since its action is distributed through the differential to both wheels, the braking action is evenly distributed. There is practically no danger of skidding because of unevenly applied brakes.

There is another advantage which is evident. Assuming that the gear ratio, that is the driving gear ratio in the differential is three to one—one pound pressure upon the band around the propeller shaft brake is equal to three pounds pressure around a drum on the wheels.

WHY HORSESHOES ARE CONSIDERED LUCKY.

All superstitious people know that a horseshoe nailed over a door will keep out evil and bring good fortune; that a miniature horseshoe worn as a watch "charm" or suspended from a chain around the neck is infinitely "lucky," and that a floral horseshoe forms a part of the decorations for festivities.

The efficacy of the horseshoe is well known and can no more be doubted than can the luck-bringing qualities of the right hind foot of a rabbit caught in a graveyard at midnight during "the dark of the moon."

While only a few iconoclasts will deny the luck of the horseshoe, not many of even the most ardent devotees of that charm know how or why it gained its magical properties.

It was St. Dunstan, the blacksmith, and the patron of all smiths and Smiths, who made the horseshoe lucky.

St. Dunstan was an Anglo-Saxon ecclesiastic who lived in the Tenth Century. He entered the Benedictine order at an early age, and when not engaged in religious duties he was employed as a blacksmith.

One day he was toiling away at the forge, thinking, doubtless, of heavenly things, when a shadow fell athwart the doorway. The saint looked up and whom did he see? The devil—no less!

Dunstan, serene in his piety and faith, was not in the least afraid of his visitor, who, according to all accounts, looked very much like an ordinary man, save that he had horns, a tail and cloven hoofs.

The blacksmith inquired of His Satanic Majesty the occasion of the dubious honor he had paid him, and the Prince of Evil replied that he had been traveling so long and so far that his hoofs had become sore and tender, and he desired to have horseshoes put on them.

Dunstan agreed to do the job, and he made it as painful as possible for Old Nick. The devil bellowed and roared in rage, but Dunstan was very strong and refused to let go of his hoofs until the Evil One had promised that he would never enter any house where a horseshoe was nailed above the door, nor molest any person who carried a horseshoe charm.

This legend accounts fully for the good fortune that is supposed to attach to a horseshoe, but it raises an interesting question.

Satan promised to respect the horseshoe as a sacred talisman, but the efficacy of the charm rests solely on a promise given by the author of all evil.

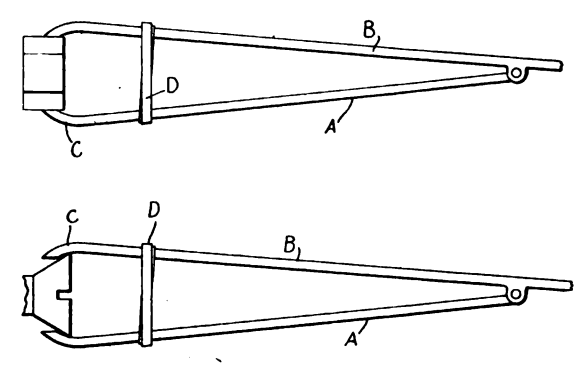
It was nearly a thousand years ago that the devil entered into that compact, which is a long time for even the best of folks to remember a promise.

TWO TWEEZER TIPS.

BY CHAS. E. DURYEA.

A slim cotter pin often can be used as a tweezer. The point can be shaped easily to suit the work at hand. If it needs to be extra good its point may be case-hardened after shaping. It can be sprung to remain closed if it is preferred that way, although to lightly spring open is the usual form.

An old umbrella bow makes a long tweezer,



Two Handy Tweezers.

as shown in the sketch herewith, with which screws can be dropped into inaccessible holes or nuts picked out of deep crank and transmission cases. The brace, A, and the short end of the bow, B, are about the same length, and their ends, C, can be shaped to suit by softening them. A rubber band, D, around them will hold them closed on the article and they can be forced apart by inserting a rod between them. The cost for material is nothing and the time required to make it very little.

Shop System Not Practical Without a Time Card

Furnishes Record for Keeping Track of All Time, Stock, Etc., Including Unproductive Labor—Prevents Leaks

BY FRANK A. OWEN

The first requisite in connection with the use of any time card of a system is to have it and a pencil in the most convenient place possible, so that the workman will not have to go out of his way to make his entries. The card shown is so planned than a workman who may not be good at figures can easily keep his record and accurately. Of course, if he cannot read and write he must ask someone to make the entries for him, but once the importance of regularly doing this is impressed upon him he will attend to it just as faithfully as the man who can properly keep his own record.

In keeping this time card the workman draws a line under the proper time as designated on the card every time he leaves a job, whether finished or unfinished, and makes the proper notations, for whom, order number and what the work was. The net time is figured out by the bookkeeper or whoever attends to making the charges for work done. In our case this is done each morning on the previous day's time cards.

Card a Benefit.

The effect on the men of being obliged to furnish a written account of their full time is very beneficial. For the proprietor who takes an active part in the work it is also advisable to keep a record of his own time, otherwise there will be a good many charges made for the jobs done which will not include anything for the labor he himself put into them.

One of the principal causes of unsuccessful blacksmiths and wagon men is the leakage or small things that do not get charged. The completed time card assumes a record of all labor customarily charged for at hourly rates, as well as a record of the time on so-called piece-work or fixed price jobs. The card also should be used by the workman to keep a record of stock used on the individual jobs, so far as is practical, though final responsibility for this really belongs to the bookkeeper, but he will be greatly assisted if all the workmen follow the practice as suggested. The completed time cards also furnish the figures for keeping a record o the cost of the productive and the non-productive labor, the latter a heavy item in overhead expense.

Keeping Track of Costs.

On the time card shown herewith, all filled out, it will be seen that there is also a space provided for kee ing account of motor time, another common source of leakage. The workman sets down, or has someone else set down, the net time he uses motor power, every time he uses it; then if he uses it several different times on one job the bookkeeper charges up the total.

John Jones, the blacksmith, began work at 7 o'clock, February 1, 1918. The first half hour he spent fixing his cold chisels and cold cutter, so when he finished he drew a line under 7.30 on his time card, wrote down Shop and Rep. Tools. After that he worked until 9.15 for G. A. Brown, setting two tires 3 inches wide; so he drew the line under 9.15 and made the proper notations as illustrated. Then he worked until 10.30 repairing evener irons for the City Transfer, and so on through the whole day he made the records immediately after finishing each job. It will be seen that he used the motor 15 minutes for the City Transfer and he, himself, set down the net time in the proper place.

On the morning of February 2 the bookkeeper gathered in all the previous day's time cards and on Jones' card he set down 30 minutes net time for the repairing of tools for the shop. From 7.30 to 9.15 is one hour and 45 minutes, so he wrote down 1.45 for setting Brown's tires. The succeeding entries on the time card were similarly figured out and adding the net time for all the individual jobs showed that Jones worked nine hours that day.

Here, you see, is evidence of the moral influence on the workman of being obliged to keep an accurate record of his full time. Of course we know, as probably many of you readers know from experience, that there are a good many workmen whose morals do not encompass the belief that they should work the full number of hours they were hired to work, but we believe the keeping of his time card record does have a good effect on the average mechanic. Occasional "follow-up" inquiries by the foreman or the

TIME CARD

John Jones Feb. 1. 1918

	NET TIME	MOT.	FOR WHOM	ORDER NO.	WORK
7.00 7.15 7.30	30		Shop		Rep. Tools
7.45 8.00 8.15 8.30 8.45 9.00 9.15	145		Geo. A. Brown	4270	Setting 2 Tires 3"
9.30 9.45 10.00 10.15 10.30	115	15	City Transfer	4272	Rep. Evener Irons
10.45 11.00 11.15 11.30 11.45 12.00	130		C. D. Clark	4268	4 Shoes on Horse #5
12.30 12.45 1.00 1.15	15		(Noon) O. D. White		Planing Repairs
1.30 1.45 2.00 2.15 2.30 2.45 3.00 3.15 3.30	215	130	Smith Const. Co.	4271	Making 6 Truss Rods 75 lbs. Iron 10 " Nuts
3.45 4.00 4.15 4.30 4.45 5.00 5.15 5.30	130	45	Davis Express		Ironing New Wagon
			(Overtime Space)		
TOTAL	9		JOBBING W.&I. 7 / Paint	NEW WORK W.&I. 1½ / Paint	NON-PROD. W.&I. ½ / Paint
Week's TOTAL					

A Time Card Enabling Workman to Keep Accurate Record of Labor, Stock, Etc.

proprietor regarding the amount of time charged in doubtful cases will tend to increase this moral effect.

If the bookkeeper keeps separate records of jobbing, new work and non-productive work, he fills in the proper spaces as shown, "W. & I." standing for Wood and Iron work. The spaces marked "Paint" are of course for keeping record of the painters' time. "Week's total" is only filled out on the last card of the week. The six cards for the week may be placed in an overlapping group, index fashion, so that the figures in the footing spaces are visible and form vertical columns and they may then be added very readily to obtain the weekly totals and compute the workman's wages.

Many Benefits Derived.

Having explained the technical features and the manner of recording the day's work on the time card, we will now proceed to show the benefits resulting from the practice of using the system. The first entry, 30 minutes repairing tools for the shop, is not directly chargeable to any one customer and is entered in the non-productive space, eventually to be added to all other items of overhead or running expense. If perchance the reader thinks it is unimportant and too much bother to keep accurate account of such "small" items, let him take thought unto himself in this manner: John Jones, the blacksmith whose time card we are considering, draws 40 cents per hour wages, therefore repairing those tools cost the shop 20 cents, or one-eighteenth of the day's expense, so far as the cost of the blacksmith's labor was concerned. Now, even if we forget or ignore the coal used to fire the forge, the electricity to run the blower, accident and fire insurance, shop rent, office expenses, breakage, depreciation, fuel for heating, poor account losses and numerous other expenses frequently estimated to amount to 25 per cent. or one-quarter of the total cost of doing business, who will say that one-eighteenth of his expenses is so little that it is not worth while to bother about such things? Give the time card credit for one point, for furnishing the cost of non-productive labor.

Points Out Cost of Work.

Item number two: Setting two 3-inch tires for G. A. Brown, one hour and 45 minutes. William Wade, the helper, also had the same amount of time on his card. It is probably universal practice with all blacksmiths to have a fixed price for setting tires, so for this kind of work the advantage of the time card lies chiefly in the fact that the entry serves as a memorandum to make the charge against the customer. It is also, of course, an advantage for the proprietor of the shop to know how much time is spent on this "piece work," for he can figure up the labor cost, add all other items of expense, and determine whether or not his prices are what they should be. How else, than by use of the time card, can fixed piece-work prices be determined intelligently?

Item number three: One hour and 15 minutes for the City Transfer repairing evener irons. Charge for this work would be for actual labor as recorded on the time cards. This is the first job on the card on which the motor was used, and the bookkeeper charges the City Transfer for one and one-quarter hours' labor of Jones and one quarter hours' motor time. Very likely William Wade, the helper, also had an hour and a quarter on his time card charged to the same job. In that event you see we would have three entries recorded on the two cards for charges to be made by the bookkeeper against this concern.

Charging Lost Time.

Comments on item four are about the same as on number two; it was a piece-work job and the record is of value as a detailed memorandum to make the charge for the four number five shoes on a horse.

The fifth entry, 1 o'clock to 1.15, was for time spent with O. D. White discussing proposed repair work on his express wagon. How about it? Do you charge for time so spent? If not, why not? We pay Jones for his time while he is talking with White. Where do we get off if we don't charge it to White? We do, if he gets the work done; if he doesn't, that makes 15 minutes more of non-productive labor to be added in reality to overhead expense.

But usually we get them and the bookkeeper makes some kind of a memorandum of this time, which is later added to White's account when the work is done. Without the time card this charge would probably be lost.

From 1.15 to 3.30 Jones worked for the Smith Construction Co. making six truss rods, and used the motor one and one-half hours cutting threads on same. He also made the entry of 75 pounds of iron and 10 pounds of nuts.

This is another profitable feature of the system connected with the keeping of time cards, keeping account of the amount of stock used, and the regular practice by the workmen of so doing prevents a big leak

which would be pretty sure to occur if there were not some simple system for recording the stock used at the time it was used.

The last item on the time card, 3.30 to [illegible] was on a new wagon for Davis' Express, also there was an entry of 45 minutes' motor time on the same job. The particular feature desired for illustration in this case is the provision afforded for keeping account of the labor of building new vehicles. It is the bookkeeper's duty to keep a careful record of all the time spent by blacksmiths, woodworkers and painters on new vehicles and he can easily do so by "charging up" each day the labor recorded on the daily time cards. Then when the job is completed of course he can figure up the total labor cost, add the cost of stock, overhead expense, etc., and then know what the job cost.

Time cards more than pay, many times over.

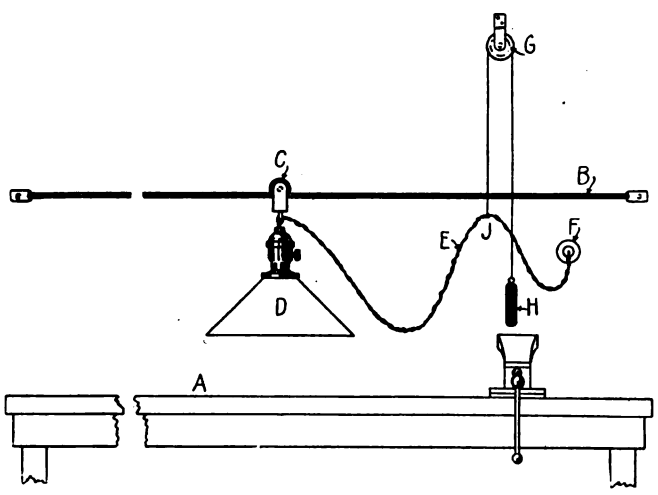
A HANDY BENCH LIGHT.

The Workbench and Vise Should Be Well Lighted or the Mechanic Cannot Do Good Work.

A few days ago as I was passing through a machine shop, I was attracted by the peculiar antics of one of the workmen. He was dancing up and down and occasionally he would wave one hand in the air; he wasn't doing this quietly by any means, but was filling the air with a sulphurous string of words that hardly look well in print.

So interested was I that I stopped to watch. After quieting down, Kelly, for that was his name, snatched rapidly at something on the workbench, and again went through the same performance. There was nothing offensive looking on the bench, and I certainly was curious as to the reason.

Kelly went through the same trials for a third time, then crawled beneath the work-



A Handy Lighting Arrangement.

bench and in a minute backed out again; then he went to work as though nothing had happened.

"What happened to Kelly?" was the question that kept running through my mind, and finally I returned to him and put the question to him directly. He acted rather "sheepish" for a minute or so, then solved the problem. "Nothing but a bare light wire," he said. "The thing fell across one of those wrenches, just the one I wanted, and I didn't want to crawl down beneath the bench to turn off the current."

There you have the reason for many minutes of lost time, doubtless the same trouble exists in many repair shops. The flexible lamp cord gets into the oil and grease and sooner or later the insulation is worn off. If a fuse doesn't burn out, the wire will give every workman "nerves" if he don't watch out.

Keep the wire out of grease and away from the bench in the manner illustrated. On the wall back of the bench screw a long, round bar, B, and upon it mount a pulley block, C, which is soldered to a light socket and shade, D. Cut the flexible cord just long enough so that the light can be carried to the end of the bar B, attach it to its plug in the wall, F, and overhead place a second pulley block, G.

About midway between the light and the socket, on the cord, tie a length of string, carry it over the pulley G and hang a weight to it as at H.

You see that the device answers two purposes. It preserves the light wire and it sheds light to any part of the workbench, just where the mechanic needs it.

SECOND ON THE LIST.

Down in a little Kentucky town there lives a negro by the name of Rastus, who conducts the only blacksmith shop. The town is small and Rastus found soon after he became established that blacksmithing did not occupy all of his time, so he bought a barber's chair and sat it up in the corner of his shop.

One morning, not long since, a traveling salesman hustled into Rastus' tonsorial parlors and requested a hurried shave. He made it clear that he was in a dickens of a hurry for he wanted to catch the early train out of town.

Rastus first eyed the salesman in the chair —then he glanced at his forge. Then he did what every perplexed man has done since Adam dwelt in the Garden of Eden, he scratched his head. He seemed very much in doubt as to what might be done.

Finally he solved the problem in his own mind for he said: "Ahs powful sorry, suh, ahm sure, but dere's a mule ahead of yuh."

The Rock Drill Blacksmith

Part VI—Apparatus Used For Quenching, The Depth of the Liquid and the Effects of Various Baths

I am indebted to Mr. Gilman's article already referred to for information as to a quenching apparatus employed by the Homestake Gold Mining Company. This apparatus is designed to give a drill bit a limited depth of quenching when first put into the water but to increase the depth continuously from that moment, until the quenching is completed.

The illustration shows the Homestake method of securing a deeper and deeper dip as the cooling goes on. The water or brine or whatever liquid is used is in a circular tank. It is supplied through a suitable inlet tube which discharges at the top of the quenching bath. On the diametrically opposite side of the tank, an overflow tube is arranged. There is a cock provided for the inlet tube, but in this case none is shown for the outlet tube.

A bearing is arranged centrally in the tank to support a rotatable vertical shaft. The shaft passes through the center of a circular platform, and the arrangements are such that the rotation of the shaft carries the platform around. However, the platform is not supported by the shaft but the latter rather supports the former. The two are secured together by screws shown in the drawing. These screws secure to the shaft tube the two halves of a spherical socket.

There is at the center of the circular platform a kind of hub in two parts. These are bolted or riveted to the platform and constitute a "ball" which with the aforementioned socket makes up a ball-and-socket joint. The lower part of the socket rests on the top edges of the bearing in the tank. The shaft projects down into this bearing and turns within it.

The weight of the combination of the shaft, platform and ball-and-socket joint (in so far as it is not carried by the rollers arranged around the inside of the cylindrical wall of the tank) rests on the top edge of the bearing in the center of the tank. The rollers are set so as to compel the platform to rotate in a plane a little different from the horizontal.

The rotation is effected by a horizontal belt which drives a pulley arranged on the upper end of the shaft. The shaft is provided with radial wings or brackets for the purpose of holding the drill steels in a vertical position with the cutting face resting on the platform. The steel is temporarily secured by a suitable catch or equivalent device.

The Apparatus in Operation.

When the apparatus is used, the hot drill bit is set up, face down, at a point where the bath is quite shallow over the platform. As the latter turns, it carries the steel around, submerging the face more and more. After passing the point of deepest submergence, the steel encounters a knock-off lever, A. The effect is to knock the hardened bit from the apparatus and leave a vacant place for a fresh, hot one.

It will, perhaps, be noted that by starting the hot bit at points more or less removed from the outside edge of the rotating platform, variations in the initial quenching depth may be obtained.

Some may be puzzled as to what purpose may be served by starting a hot bit with a shallow immersion and then increasing the depth of the submergence. The effect of the first part of the dip is to chill quickly the actual cutting edges—the actual points of metal that come into contact with the rock. This sudden chilling produces or tends to produce a high degree of hardness.

The parts of the bit above the level of the bath at the moment of first immersion get ultimately a less sudden chill. What chilling effect they do get comes first from the cooling metal near by which is actually in the water and second from a delayed contact with the water. The effect is to leave these portions of the bit, which are back a little from the actual cutting points, somewhat softer and tougher than would be the case if they were chilled very suddenly.

Quenching Liquids.

The favorite liquid for quenching rock drill steel is undoubtedly plain water. Water is a good quenching substance, doing its work promptly and effectively. Besides, it is easy to get and ordinarily costs little or nothing. Why should it not be the favorite medium?

And yet there are other substances in commercial use. In fact, water is used in more than one way. The foregoing facts are sufficient, perhaps, to show the reader that it is very possible that there may be some advantages in using liquids other than water and in employing water in ways other than the usual one.

To understand the matter, it will be necessary to have before us some of the scientific information, now available, with reference to the behavior of steel when it is quenched.

Rock drill steel will vary, let us say, in respect to its carbon percentage, around 0.80 per cent. Some drill steel will be softer, some will be harder. This means that, in the annealed condition, pearlite grains will constitute nearly the whole, or at least a large part, of the mass.

There may be a "honeycomb" separating the grains from one another. If so, it will probably have quite thin walls. It will consist of pure iron or of cementite. In short, rock drill steel will consist mostly of just one substance—pearlite. When the metal is heated to the proper hardening temperature and then suddenly cooled, an internal change will take place. The mass as a whole—inside and out—will become hard.

It is the **suddenness** of the cooling that in some mysterious way affects the hardening. In general, the quicker the cooling of the steel, the harder the result. There are other things that enter. Nevertheless, when other things are the same, a slow cooling with plain water produces a drill bit lacking in hardness, while a fast cooling under the same circumstances will bring about a higher degree of hardness. As it is desirable to have drills harder at one time than at another, it is useful to know what to do to get the desired result.

The **temperature** of the water affects the result. The colder the water, other things being the same, the harder will the steel become; and, similarly, the warmer the water, other things being the same, the softer the steel will turn out.

For example, the blacksmith will be forging, reheating and quenching rock drill bits. At the beginning, the water in the usual tub will be quite cool. Later on, the effect of the repeated quenchings of hot bits will result, it may be, in the water becoming warm or even hot. If the hardness be tested at the beginning and a good while later when the bits are being dipped into heated water, a difference will be noted. The drill bits now come out of the water in a softer condition.

To avoid this result, a flow of water through the quenching tank should be maintained. Even where no actual flow of water is provided, it is of advantage to move the hot work about in the bath, as this brings it into contact with cooler water.

Hardening Rate Is Vital.

Now it so happens that liquids in general differ in their power of absorbing heat from heated steel. And, even with the same liquid, it is possible to get different results by heating or cooling the liquid, or by adding some substance to it. Such variations in the quenching bath affect the **rate** of cooling the hot steel. **In hardening, rate is pretty nearly everything.**

Common salt, dissolved in water, hastens its cooling action. Ice would produce the same result. But it is probably easier in most shops to salt than to ice the water.

Various **oils** may be used in quenching baths as substitutes for water. In general, a change of temperature of the oil in a bath will not produce as marked an effect upon the hardness as will the same change of temperature of the water.

Where flowing water can not well be provided, a stationary oil bath will probably produce less variation in hardness than a similar water bath. The reason has already been given. An oil bath has, then, a considerable advantage, if a flow of the quenching liquid can not be conveniently arranged. However, oils are generally slower in action.

Whether an oil bath will be suitable depends upon whether its general average produces the right result upon the steel bits for the particular work they have to do in a given mine.

Let me now go into more detail. **Brine** is very quick in its action—quicker than pure water. Further, it retains its quickness of action better as it heats. In fact, if brine is used in a tank big enough and the contents of the tank are sufficiently kept in motion by stirring or otherwise to prevent the temperature getting above 150 degrees F., then the brine need not be used in the form of a flowing stream.

It is sufficient to use a simple bath. Brine acts very evenly for all temperatures from that of the shop up to 150 degrees—so evenly in fact that the difference between dipping a hot drill-bit into brine at 80 degrees and brine at 150 degrees is negligible.

The thing to decide at the mine divides itself into two questions:

(1) Does brine at the ordinary shop temperature give the degree of hardness desired?

(2) Will it be convenient to provide for the shallow dip required and still prevent the temperature from getting above 150 degrees?

If **both**—not one, both—these questions can be answered Yes, then brine is the liquid to use.

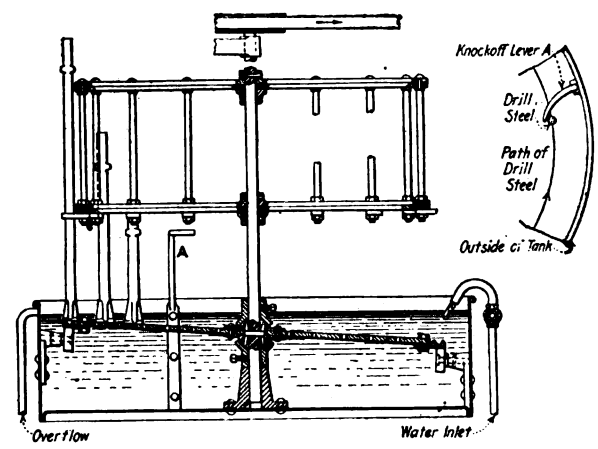
Water—that is, ordinary pure water—is quick in its action, although not quite so quick as brine. It is decidedly quicker than any of the oils in the list herewith. It has, as has already been said, the bad quality of varying its rate of cooling the hot steel as it itself warms up. Water, in fact, begins to change its rate of cooling the steel as soon as it itself warms up something over 100 degrees. We may, perhaps, regard it as having a uniform effect on the hot steel up to the point when the bath reaches a temperature of 120 degrees. What has to be decided at the mine is, as before, divisible into two question:

(1) Does plain water at the ordinary shop temperature give the degree of hardness desired?

(2) Will it be convenient to provide for the shallow dip required and still prevent the temperature from getting above 120 degrees?

If both questions admit of affirmative answers, plain water is the thing to use.

The following table gives a list of quenching oils used in commercial work. The number of seconds opposite the name of each oil is the average number of seconds required



The Homestake Quenching Tank.

to cool a piece of steel 500 degrees in **25 gallons** of the oil, the oil being started at 80 degrees and not allowed to get beyond 250. The steel was heated to a **dull cherry.** The average numbers will afford a guide by which to compare the various oils.

Commercial Quenching Oils.*

Name of Oil	Number of seconds to cool steel 500 degrees
1. New fish oil	85
2. No. 2 lard oil	87
3. Prime lard oil in use 2 years	99
4. Boiled linseed soil	101
5. Raw linseed oil	102
6. New extra-bleached fish oil	106
7. New yellow cottonseed oil	107
8. New tempering oil (cottonseed 60 per cent., mineral oil 40 per cent.)	122.6
9. New mineral tempering oil	130
10. No. 1 dark tempering oil	157.3
11. Special "C" oil	164.7

* This table is taken from D. K. Bullen's "Steel and Its Heat Treatment."

All these oils, Bullen's curves seem to show, are more dependable than brine and water for producing the same hardening results as the bath warms up—that is, all but Nos. 10 and 11. However, it is to be remembered that the bath is not supposed to heat above 250 degrees. As water boils at 212, this is a pretty high temperature for a bath. The smith contemplating using an oil should consider the following questions:

(1) Which oil, if any, produces the desired hardness, when used at, say, 150 degrees temperature?

(2) Is it sufficiently convenient to arrange the bath so that the shallow dip will be provided for and the oil temperature kept below 250 degrees?

If both questions can be answered suitably, then the oil decided upon would appear to be the quenching liquid that the smith should use.

The problem of keeping the temperature down may be easy or difficult to solve. It depends upon conditions. If the amount of work to be quenched in a short time is quite moderate, it may be sufficient to provide a big quantity of the quenching liquid for the bath. It will then, perhaps, only be necessary to stir the bath now and then with a steel rod or by other means.

It is, however, very necessary now to overlook the requirement that the bit shall be dipped only a short, pre-determined distance into the bath—say, ¼, ½, ⅝ of an inch—and that the face of the bit shall enter the bath horizontally.

This means that some method must be adopted to limit the depth of immersion and at the same time require the shank of the bit to be vertical. The perforated false-bottom set at the proper distance below the surface of the bath constitutes one solution of the problem. But, it may be necessary to modify the arrangements, elsewhere described, if it is proposed simply to stir the liquid by a rod held in the hand. A central space might be left open for this purpose. Or some arrangement of a paddle or a paddle-wheel might be rigged in between the true and the false bottoms.

In the latter case, the shaft on which the paddle-wheel is mounted may be arranged to rotate in a stuffing box on one side of the tank. A hand-wheel or crank outside will then enable the operator to turn the paddle-wheel now and then.

A method of securing a continual flow through the tank—in at the bottom at one end and out at the top at the other—has been described in another portion of this article. It is particularly adapted for use with the public supply of water furnished under pressure. There are many cases, however, where a flow of water is not so convenient.

Where an oil is to be substituted for flowing water, one can not, of course, depend upon a public distribution of oil through one or more pipe lines. Nevertheless, it is not necessary to abandon the method depending on flow. A supply reservoir connected with the inlet end of the tank and a receiving tank connected to the outlet end would seem to provide essentially what is wanted. The supply reservoir is set up above the desired level of the bath in the quenching tank.

This arrangement provides pressure on the oil—pressure to force it into the quenching bath against the oil already in it. The receiving tank is, naturally, set below the level to which the surface of the bath is to sink. Suitable cocks should be provided to control the inflowing and outflowing oil. The receiving tank may conveniently be provided with a strainer near the bottom.

With the foregoing provisions, it only remains to arrange for transferring the strained oil in the receiving tank to the reservoir. This may be done now and then by a suitable pump. Or, if the amount of oil to be transferred at a time is small enough, the oil may be drawn, a bucketful at a time, and transferred by hand. Naturally, the discharge spigot on the receiving tank will be set above the strainer near the bottom.

Keep the Bath Clean.

The quenching tank may, probably will, develop a tendency to gather on its bottom all kinds of waste materials. Some of this waste stuff may be impurities in the water or oil; some may be dirt washed off the heated drill bits; and some may be miscellaneous material such as dust and odds and ends that naturally are received by an uncovered tank. It is not desirable to have such settlings come into contact with the work. With the quenching tank arranged for a continual flow of liquid and provided with a perforated false bottom upon which the bits may rest—with this apparatus there should be no trouble with settlings getting to the work.

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OUR EDITOR'S LETTER.

WHEN I was a little, curly-headed youngster, quite a number of years ago, by the way, my dad, who was a machinist, used to take me down to his shop and let me amuse myself driving nails in a board. Usually when I arrived home, at the end of a long day of heavy toil, my hands would be anything but white, my face would be the color of ebony and my clothes almost ruined.

Days not spent in the machine shop were occupied in amusing the village blacksmith, who had a shop just over the hill from my house. The town where I lived boasted of about 800 people, really a big family, for everyone knew every other resident. The smith was really the biggest business man in the place and was looked upon as an authority. He gave advice upon everything from politics to sick hens, for he had traveled wide and seen the world.

I remember Reilly well. Despite the fact that I was but five years old, that good-natured Irishman left a great impression on my mind. Next to my mother and father, I think he had my greatest esteem. I would sit for hours, playing with horseshoes and nails and had I been older I am sure that his wise sayings would have influenced me greatly.

Perhaps it is due to Reilly that my heart is warm toward the Irish, the lightest hearted people on earth, as well as the kindest. When anyone tries to scoff at them, I can't help but clench my fists, despite the fact that I know the Irishman is able to hold his own in any argument at any time.

There is one thing that I have noticed about the average blacksmith, he has a sense of humor. He is willing and waiting to be amused. He likes to play, provided he can find anyone to play with him. That's why I liked to visit Reilly when I was a little shaver.

Bearing that fact in mind, it has occurred to me that perhaps you, brother blacksmith, like Reilly, are fond of a joke. You like the Blacksmith and Wheelwright magazine because of its mechanical hints and suggestions, but wouldn't you like a little fun mixed with it? I hope you will answer yes, because I've taken a chance and inserted an Old Timer story which isn't just a mechanical article, but contains a few humorous sketches.

If you don't like it, however, just take a pen and a bottle of ink and send me a letter, call me anything you like if it eases your mind, and I won't make the mistake again. Of course, I have one advantage over you, all I need to do is write one letter and publish it—you all read it; while it takes quite a few thousand letters for all of you to get your ideas to me. I'm willing to make one concession. If you want to roast me real hard and let the other subscribers know about it, I'll publish the letter.

On the other hand, even if you don't roast me even a little I'll publish the letter if it contains anything interesting to the rest of our subscribers. I usually find that when any of my brother blacksmiths take time to write a letter, it is interesting enough to publish. So—let's get better acquainted; write me a letter to-day.

Always Try To Keep the Work In Your Own Shop

A SHORT time ago we received a letter from one of our blacksmiths who said that he worked in a town where another blacksmith shop was located, and that when he didn't know how to do a certain job he turned that job over to the other blacksmith. This shows that there is something wrong somewhere.

It is true that not every blacksmith can do all kinds of work, still what one man can do every other man should be able to accomplish, unless he has not the necessary equipment or tools. The blacksmith specializes too closely. Perhaps it is the fault of the work.

In certain communities smiths may do little else but plowshare and farming implement work. In other communities the smith may have farming implement work. In other communities the smith may have his hands full, horseshoeing. Continuously plugging away at the same kind of work makes a specialist who does not like to do anything else.

The attitude is wrong. The blacksmith should never say "I can't do that work." He should familiarize himself with all kinds of work and at least know how the work should be done. He can do this by reading the trade papers and books. No one is too old to learn. In these days work comes too hard to be ignored.

Every piece of work that you turn away from your shop into another shop means that the other fellow steals your customer. Not only will you lose work at that particular time, but in the majority of cases the customer will not return to you again. A satisfied customer is the best means of advertising that you have at your command. Don't let him keep away!

Try To Interest Your Son in the Automobile Business

WHAT argument can be used to convince a young man that the blacksmith field holds forth good promises for the future? So many of our blacksmith readers ask us this question that perhaps it is just as well for us to get together to solve it once and for all.

Doubtless many of our old "young" readers (we find that the blacksmith remains young until he is at least seventy years old) would like their sons to go into business with them. Every man feels that his business is perhaps the best, but usually it is hard to make a young man see the advisability of going into the blacksmith business.

You, who are blacksmiths and have sons old enough to work, should do a little thinking before you ask your son to work for you. For instance, suppose you had six daughters, all of whom were musically inclined. Would you think it best to teach them all how to play the piano? Wouldn't you prefer to teach one how to play the violin, another the 'cello, and so on? In that way you would have a sort of co-operative orchestra, all your own, whereas if each played the piano you would soon tire of this kind of music.

Again, suppose you were a doctor and your son wanted to get into the profession. Would it not be best to have him train for an apothecary rather than a doctor? Perhaps you could start him in the business and in that way, you could work together.

It is a strange fact that a son seldom likes the business of his father, but surely he can be interested in a line which is closely allied with his father's work. Acting upon this suggestion then, why would it not be wise for our readers who have sons ready for business, to educate their sons along automobile lines? The mechanical work which the father could not do, would go to the son. The blacksmith work that the son had, would go to the father. The two working together might be compared with a pair of clasped hands. One would uphold the other. When business was poor in one department, undoubtedly the shop could be filled with the other class of work. At any rate the arrangement is worth thinking over.

It can be applied in other ways as well. Why should a blacksmith purchase many tools and costly equipment, and permit an automobile repairman to go in business in the same town and purchase much of the same kind of machine tools? Why not combine the two shops into one larger one? Make a partnership of it, and help hold each other up. Don't you think this is worth thinking over?

We Still Have Many Duties Toward the Boys Coming Back

THERE is an old saying which we have all heard time and again. "Out of sight, out of mind," and this old adage has many applications. It is particularly true today. Only a few weeks ago each of us was enthusiastic and patriotic. Our pocketbooks were at the disposal of our country. We gave considerable money for charity and we always had a few cents ready for the cause.

The war is over now, and many of us feel that we want to forget it, not because we are not grateful to our boys who have done the fighting, but because we feel we have done our share and that no more help is needed.

Now is the time, however, when many of the large organizations such as the Red Cross, the Y. M. C. A., the Knights of Columbus, the Jewish Welfare Board, and the Salvation Army need a great deal of money. All of us remember that these organizations are taking care of our wounded, are helping to repair the devastation which has been wrought by the war, and are feeding the homeless.

Heretofore they have been assisted greatly by the different countries and the military organizations. Now, however, the load is the greatest and they must bear it alone. No matter how much we have given, we cannot have given too much. We owe a great debt of gratitude which we cannot repay to our boys who have fought for us. We owe still more to those boys who have been wounded.

You and I, brother blacksmith, who have stayed at home, have been comparatively safe. In way, we have sacrificed nothing. The boys who have gone to France, however, have sacrificed their careers and in many cases their lives. Yes, we know that you have given. Perhaps your business does not warrant any more charity gifts. Even so, however, to quiet your conscience, you should do your little part in helping the worthy causes which we have mentioned.

Much money has been expended, and much more will be necessary. Heretofore your gifts have been in the nature of an investment. They have been your duty. Now, you are called upon to give purely from sympathy.

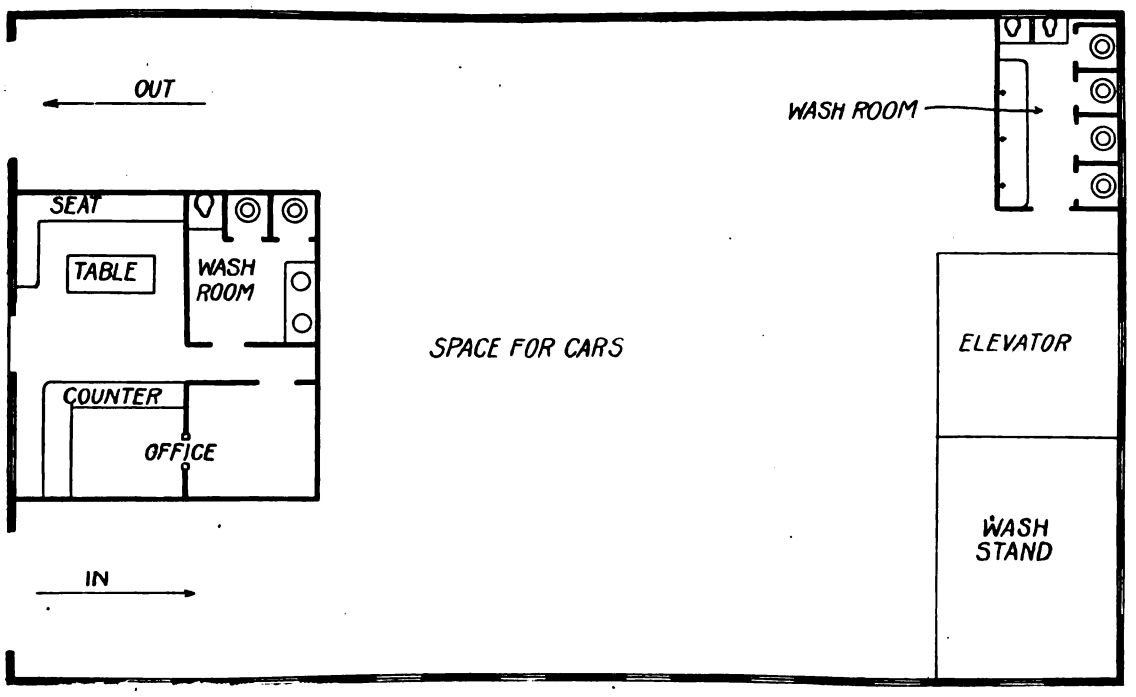
Stable Versus the Garage

How a Stableman and a Wheelwright Achieved Sucess In a New Line

JAMES F. HOBART, M. E.

I can count up at least three livery stables which have given up altogether the handling and care of horses and have gone into automobile handling, storage and repair altogether. One in particular, occupied a rambling brick building with all kinds of room inside, some of which was used only for the storage of accumulated rubbish and still left room for keeping over one hundred horses and a large number of vehicles.

When the mandate went forth to close out the livery business, the building was



Illustrating How Ground Floor of Stable Was Arranged for the Automobile Business.

cleared from top to bottom and everything which could be moved was thrown out. Then the walls were swept well and whitewashed. The ground floor was ripped out and a good concrete floor put in, with adequate washing and toilet facilities. Two toilets were installed, one for patrons, the other for attendants, thus avoiding the necessity for communication between office quarters and the garage proper, either for workmen or for visitors.

The building was originally supplied with a steam heating plant and this was well overhauled and put in perfect condition. Mezzantine floors were then constructed all around the building, high enough above the ground floor to permit automobiles and trucks to pass freely under said floor. The middle of the building was left open to the roof, which was pretty high in the middle of the building, especially as it was a pitch roof and well supplied with skylights which could be opened or closed at will from the ground floor.

Installed Elevator.

A platform elevator was installed which connected with the mezzantine floor and on this floor were kept all supplies, and a stock of automobiles for sale was also stored on that floor. In the rear, a space was partitioned off for a repair shop and it was fitted with lathe, drill, arbor puller, grinding machines, brazing and welding outfits, both oxy-acetylene and electric. A vulcanizing outfit was also to be found, but in a little room of its own, upstairs, and connected by stairway with the repair shop downstairs and by passageway with the tire and stock rooms.

A well appointed office and waiting room was erected on the ground floor, at the front of the building, and as stated, the patron's toilet and wash room was adjacent thereto.

For the past ten years the business of the old livery stable had been slowly dwindling away and the last year had barely business enough to pay expenses. But after the change was made, the business increased so fast that the owner had hard work to take care of it properly. He was obliged to employ nearly a dozen men to take care of the large volume of business which immediately began to flow in his direction. It took him a little time to get acquainted with the details of his new business, which was very much different from the "horsey" situation to which he had been accustomed.

But the owner went into it right, therefore he came out right. He did not attempt to carry on such a business without efficient help. Before he had been in the rejuvenated garage ten days he found himself simply snowed under with a business which was strange to him and the details of which he knew absolutely nothing.

And right here the owner showed another bit of long-headed wisdom. Instead of plugging along, finding out by expensive experience what and how to do, the owner immediately engaged a capable, experienced man, who knew the automobile business from the ground up, having grown up with it. This man was paid a large salary from the very start—and he earned every cent of it and more, too. He immediately set the business aright, engaged competent help and installed the peculiar ways and customs which make or mar the automobile business.

The owner immediately began in his quiet way to "go to school" to his manager, and to act as assistant thereto, instead of trying to run the business himself. The result was that the owner soon acquired a working knowledge of the business and quickly proved that he knew a thing or two by fixing up his capable assistant in such a manner that it was almost an impossibility for said assistant to ever leave the business of the owner.

This was effected in a very simple manner. The owner simply made his assistant a partner—gave him an interest in the business and went to work in harmony with his capable assistant, dividing the work between them in a manner which gave to each man that part of the necessary routine work which he liked best and consequently was best fitted for.

I have not been at this garage since February, 1917, but I assume that its business is still growing, for it is situated near, but not in, the center of a large and thriving city, where business is to be had by the competent concern merely for the taking.

How the Little Concern Grew.

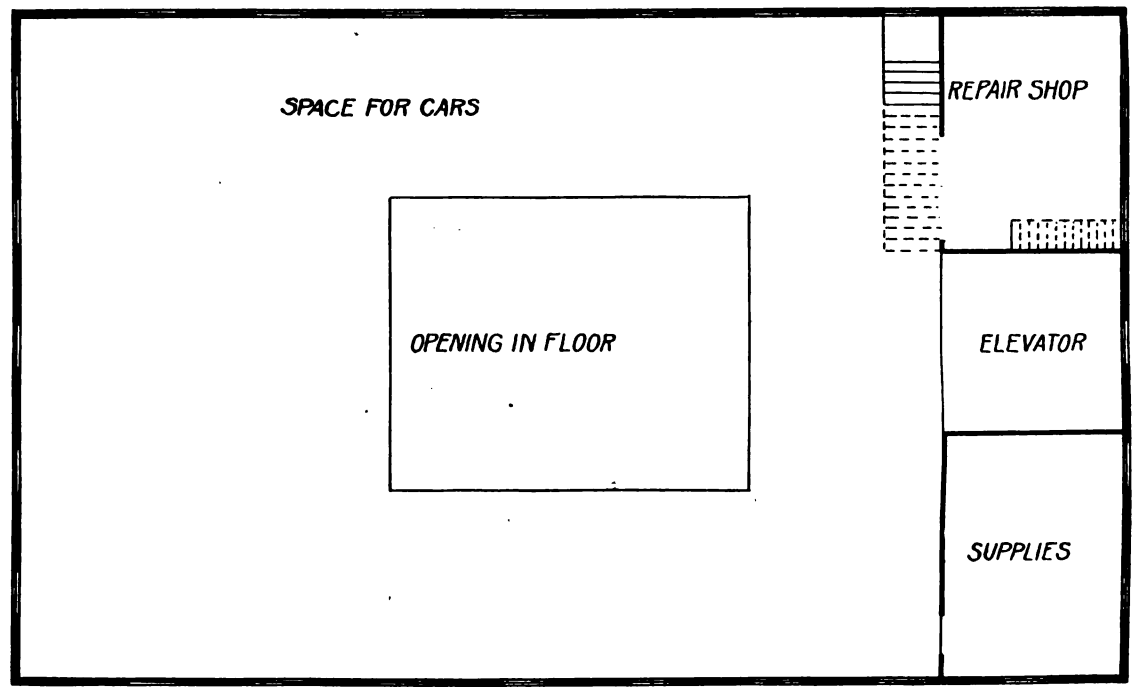
Much different was the course followed by a man who had a smithy in the outskirts of the same city, but several miles from the center thereof. This man had a large shop, big enough for three fires and there was a space which had been used by a wheelwright in the days past, before two or three large concerns had monopolized the wagon making business.

This man went to work and cleaned out his shop, removing all rubbish and material which would not be needed for automobile work. He reserved a small space near the forge for horseshoeing, for there was still a little to be made in that business, also in occasional wagon repairing. The latter, however, was to be taken care of in the automobile department.

Makes a Start.

Next, this smith, who, by the way, had a few hundred dollars to work with, procured an underground gasoline filling tank and set up in the shop a little air compressor, operated by an independent gasoline engine. The gasoline device was installed by the roadside and the air pipe brought to the same point with the hose thereof so arranged that it could be safely locked up at night inside the gasoline cabinet.

Next, the smith held an earnest debate with himself as to whether it was best to break into the business alone, or to hire a competent repair man and act in accordance with the advice of that man. While making up his mind as to the above, the smith put out his big "Repair Sign" which he had pre-



The Supplies and Repair Shop are Located On the Second Floor and Reached By an Elevator.

pared, filled the gasoline tank and sat on his anvil between horseshoeings, waiting for sick autos to come along to be cured.

And they came, soon and several. The smith jumped right in, did the best he could, acquired automobile engine knowledge and made what repairs and adjustments he could

and sent into town such work as he was not fitted to handle in his little "one-horse" repair shop.

Rushed With Work.

Within a week the smith was completely overwhelmed with work. He hired a smith to shoe the few horses and to help on autos between shoeings. But all the time the smith saw jobs going away from him—he had to send them to town himself—which were the cream of the whole thing and wherein the most profit would be found.

Thereupon the smith took stock with himself and sought for and hired an experienced auto repair man and with him began to install, one by one, as soon as possible, the machines and appliances necessary for doing all kinds of repair work pertaining to automobiles.

That little desolate, lonesome smith is now a bustling auto repair ship with a dozen men busy in it all the time and machines waiting their turn to be brought in. The smith was in town last time I was at his shop. He was arranging with a contractor to put up an addition to the shop, and the addition was to be built of poured concrete! Therefore, smiths, go to it. Be not afraid to venture everything in the auto repair business, provided you have the necessary skill and can obtain the "know-how"!

FIRST ENTRY IN CONTEST.

We have always known that New Jersey was on the map, and just about a lap ahead of every other state—now we have proved without a shadow of a doubt that the Blacksmith and Wheelwright readers from that state were just as up-to-date.

Our first picture received and published, entered in the prize contest, comes from New Jersey. From Mr. Ewing, and although Mr. Ewing does not look lonesome in the photograph, the two photographs were the only ones received up to the time this paper went to press. At this rate Mr. Ewing will win all three prizes. So get busy, brothers, and send in at least one picture. For the benefit of our new readers we will repeat the terms of the contest.

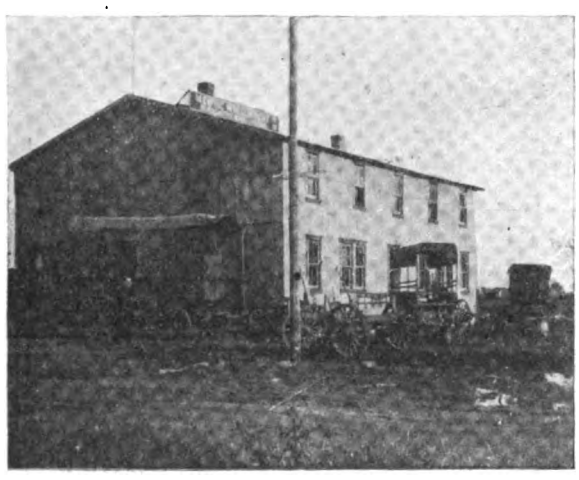
The contest is open to all readers of the Blacksmith and Wheelwright. Whether you are a subscriber or not you stand a good chance of getting a prize. There are three prizes to be given out, the first of five dollars will be given to the reader who sends a picture in which is shown the most automobile work going on in his blacksmith shop. In case of a tie, five dollars will be sent to each of those who, in our opinion, have shown the most automobile work in their shop.

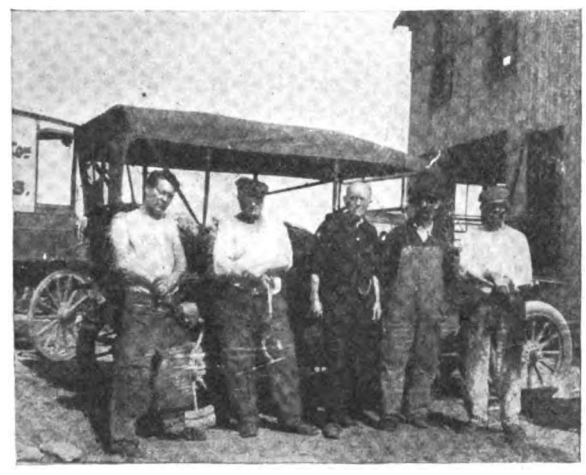
The second prize of five dollars will be given to the reader who sends in a picture of the best looking shop, and the third prize of five dollars will go to the reader who writes the best letter, telling how successful he has been in doing automobile work.

After we are through with the half-tone cut which we use for printing the picture in the magazine we will return it, together with the original photograph, to the original sender.

It doesn't cost you anything to enter your picture in the contest, there are no strings attached to the prizes. In any event you will receive a cut which you can print on your billheads. The cut alone is worth from two to five dollars. In our last contest one of the men who entered pictures used the cuts to advertise in his daily paper. The winner of the first prize had a fine long article published in his local paper

The contest will close on October 1, 1919, so send in your picture to-day so that it will appear in our next number. "The more the merrier."





Prize Photo Number 1.—Mr. Ewing's Shop Measures 36 by 50 Feet and Was Built in 1917. In the Group at the Right, Mr. Ewing is at the Center.

HARD SOLDERING OR BRAZING ALUMINUM

The process of hard-soldering aluminum differs from ordinary soft-soldering, principally because the solder has a much higher melting point than soft solder. The term "brazing" is generally applied to this kind of soldering. Brazing is one of the oldest included in the mechanical arts, and was well known to the ancient Egyptians, as many relics of their work indicate.

Hard-soldering or brazing is a fairly simple process, but proficiency in it requires practice. It is usually employed where greater strength is required than can be given by soft-soldering, or where an article has to stand a temperature that would cause soft solder to melt.

A brazed joint in most metals, properly made, will withstand a strain nearly equal to the tensile strength of the adjacent metal.

One of the conditions essential to success in all brazing is that the solder should unite to form an alloy just where the brazing occurs, and this should take place spontaneously. This actually happens when brazing such metals as copper, gold, iron, and silver, and such alloys as brass, german-silver, gunmetal, etc., but not in the case of aluminum.

This metal is without doubt one of the most difficult to braze effectively, due largely to the vast difference in the fusibility of aluminum oxide and aluminum metal. The melting point of metallic aluminum is about 655° C., whereas that of the oxide is nearly 3,000° C.

In making brazing solders for aluminum it is always desirable that the constituent metals should be commercially pure, because impurities interfere to a great extent with the strength, fusibility, malleability and color of the metal. A solder with the color of aluminum is obviously an advantage; hence it should contain a percentage of aluminum; zinc is often added, as its color resembles that of commercial aluminum and many of its alloys.

For work where the joint has to withstand bending stress, a high percentage of zinc should be avoided, as it is apt to cause brittleness. The fusing point of brazing solders for the general commercial metals should be as close as possible to that of the metals joined, as a more tenacious union may thus be secured; but experience shows that brazing solders for either aluminum or its alloys should melt at an especially lower temperature than the metal on which it is used, for between 500° and 550° C. these metals become very friable and their tenacity practically disappears. It is therefore recommended that brazing solders for aluminum should not exceed a melting range of from, say, 400° to 450° C.

Care should be taken to guard against the effects of expansion and contraction, since the co-efficient of expansion of the metal is considerable; indeed, while a piece of work may be quite good so far as the joint itself is concerned, it may be rendered useless owing to the deformation caused by the heat.

As previously stated, these hard solders have a high melting point; therefore they cannot be melted with an ordinary soldering bit. The work is sometimes done on a coke or coal forge fire, but the usual process is to raise the temperature by a gas blowpipe, applying the blast by a power-driven fan or by foot or hand bellows. Suitable gasoline, gas or kerosene brazing lamps may also be used.

The blowpipes with gas and air blast are more preferable than the hard fuel system, because the metal and flux are kept clean and free from particles of dust, and, therefore, a more reliable joint may be made.

During the brazing operation joints will often appear to be sound, but when the superfluous metal is removed, such as by filing, grinding, etc., it will be discovered that there is no metal in the joint, the solder having failed to penetrate it. This is frequently the case with aluminum, as the rapid formation of the oxide prevents the solder from flowing easily between the surfaces to be united. Consequently, the process known as "dip" brazing should not be attempted, as it is unsuitable for aluminum.

As is well known, the essentials of a brazed joint are the contact of perfectly clean surfaces free from oxide and dirt. In aluminum we have a wonderful bright and clean-looking metal, and probably this is the reason why so many workers are somewhat mystified regarding the difficulty in soldering it satisfactorily.

The question is often asked why, if aluminum cannot be effectively soft-soldered it should not be brazed; but the bugbear to successful brazing is precisely the same as that encountered in soft-soldering, namely, the difficulty in eliminating the refractory oxide from the hot metal, the oxide preventing the interfusion or alloying between the brazing solder and the surfaces to be united.

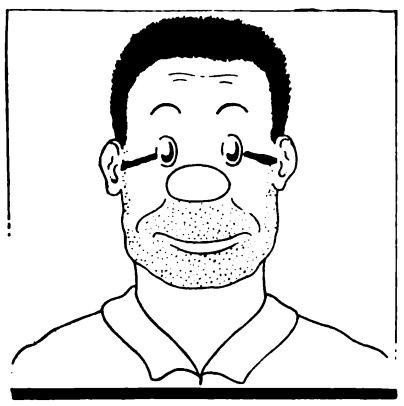
It is evident that aluminum and many of its alloys do not lend themselves to brazing. Not only is there the difficulty in removing the oxide, but the metals are more liable to fuse during the operation than many of the brazing compounds used.

The writer is referring to the operations of brazing proper as generally carried out when brazing copper, brass, iron, steel, etc., not to operations where the worker uses a blowpipe or blowlamp simply to melt the solder or to heat up the pieces to be joined. In the operation of brazing, the heat is not usually applied to the solder, but rather to the work from which it travels to the solder.

The search for a reliable flux for use in brazing aluminum is unquestionably one of the most difficult. There is no reliable flux for brazing aluminum of which the composition has yet been made public, although several special spelters are manufactured for aluminum brazing.

A series of interesting experiments was recently carried out in a large engineering works with the brazing of various sheet-aluminum articles, ranging from 1/32 inch to 1/8 inch in thickness. Several types of joints were made, namely, the ordinary dovetailed joint, wedge or scarf joint, overlap joint, butt or edge to edge joints, etc. Many brazing solders and fluxes were also employed.

The articles were mostly of a cylindrical shape, and varied from about 1½ inches to 10 inches in diameter. The surfaces to be brazed were thoroughly cleaned, accurately fitted, and the pieces were fastened securely together. The brazing was effected on an ordinary brazier's hearth, and for heating the work clean and small coke was the fuel employed. The results were unsatisfactory, in that the aluminum fused before a sound joint was obtained.—(From Work, an English Publication).



The Village Blacksmith Gives Advice

Another Old Timer Story In Which the Smith Does Most of the Real Talking

For the fifth time in as many minutes, the blacksmith scratched a match and lighted his pipe, just as the old timer limped into his shop. A man can't do more than ten things at once and the blacksmith had just managed to finish what he had started out to do: hold up the oil base beneath a truck engine with his knees, put in a couple of bolts with one hand, and turn on the nuts with the other. No wonder his pipe couldn't be managed, in the bargain.

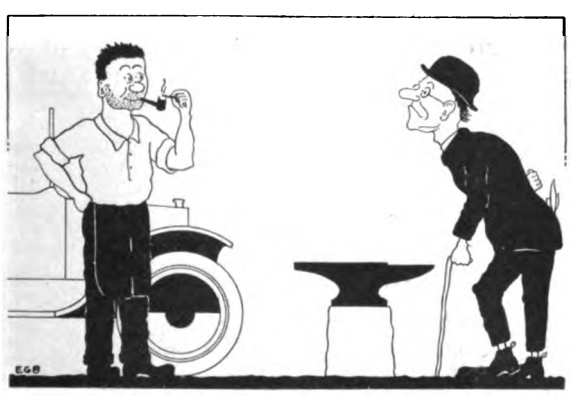
"If I didn't know you, you tight fisted, leather backed, penny squeezer," said the old timer, "I would think you were insane." He didn't get any farther with this thought, but exclaimed—"By Heck, I guess you are insane."

This last exclamation surely had its reason. The blacksmith had been rather busy and evidently the dust and grease had bothered him. A black streak led from the corner of each eye and ran directly back to his ears, where he had rubbed his face with the back of one oily finger, giving him a most peculiar expression.

The old timer evidently decided, however, that for the time being he was safe and continued his first line of thought. "Of all the blamed idiots, you surely are one," he said. "I'm willing to bet a dollar against a five cent piece that you've got two hundred dollars' worth of iron right on this floor now, and three times that amount on the bench. Looks as though it had all just come in, too. Don't you know the war is over?—Where'll you get off when the prices of iron drop?

"Should think a five year old baby would know enough not to lay in a stock of iron or parts now, when things will drop in price within a month. Sure that Peace ain't turned your head a little?"

"If your character was as straight as my brain is just now," said the smith, "You'd be advertisin' in the papers for everyone, who thought you owed them something, to come to you, and you'd pay them off on demand. No, I'm not daft or crazy, but just a derned busy man, and if you don't get your worthless number fifteen shoe off that box of parts for this truck, you'll need a pair of crutches 'stead of just a cane. What's happened to you, anyway? Stub your toe in an



"He Lighted His Pipe for the Fifth Time."

argument or hurt it kicking the cat out of the milk house?"

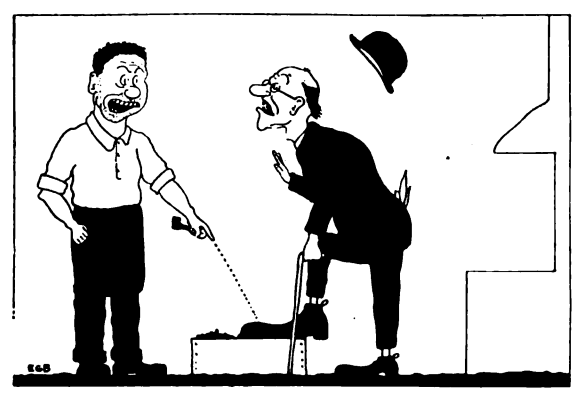
"It's none of your funeral what ails my foot, but so long as I'm here for the forenoon, I might as well tell you—that new horse you shod last Saturday stepped on it yesterday, guess she caught bad manners from you. But why in blazes have you bought all this iron junk around here?"

"Stepped on your foot, did he? Too bad, too bad, serves you right for keepin' such an unmannerly horse. If you had only a few brains you'd have sold that horse 'bout a year ago and got a truck, like the other enterprisin' farmers 'round here. Since you brought up the subject, that's one of the reasons I've got all this junk, as you call it.

"You see, about all the farmers hereabouts own trucks; they've found that they can save time and money on them over horses. They can do twice as much work and cover five times as much ground with one of the things as they can with a two-horse team. I'll tell you more about what they can do in a few minutes.

"This winter has been pretty light so far and they've been usin' the trucks right along, but a truck ain't like an automobile; it requires a certain amount of repairin'. Every time a truck passes the shop, I hotfoot it out and listen to the racket. If the old engine is knockin' and the thing sounds like a tin-shop in full operation, I hail the driver and ask him to spend five minutes with me.

"I tell him that it's time to repair the machine. That a truck will work like the dickens until it is all worn out and then it



"If You Don't Get Your Worthless Number Fifteen Shoe Off that Box—You'll Need a Pair of Crutches."

will fall apart all at once. When he uses his truck right up to the last minute, he is taking away years of service from it. But if he tends to it, takes up a few bearin's and replaces some of the worn parts it will be almost as good as new.

"Most generally I can persuade him to let me look it over and see what needs replacin'; sometimes he will tell me to go ahead on the job, so I order all the parts I think he will need and when they come in, I take a trip over to his house in my flivver and he brings down the truck. In that way, I can give him real quick service and he can use the truck until I'm ready to repair it.

"I generally try to get onto the job just as soon as I can, 'cause there is no reason why, so long as he is going to pay for overhauling, the truck shouldn't be repaired right away.

"A truck is just like a carriage in one way—let one of the spokes get loose and another soon loosens up, then the wheel falls to pieces. If you get busy as soon as the spoke loosens, then the repair bill is pretty small. But if you wait, then the whole dern thing goes and the bill is 'bout ten times as big.

"Take a truck f'rinstance; we'll s'pose that it's been running all summer, carryin' milk over rough roads, haulin' lumber, garden truck, and most everything else. The farmer always intends to lay it up for a few weeks as soon as snow flies and he don't care to put it in the shop when he needs it. This year we've had a pretty light winter, no snow to speak of, and so the farmer has run his truck nearly every day for ten months. Stands to reason the truck needs some attention, don't it?

"P'raps the engine began to do a little knocking 'bout the first of November. Farmer thought it would last over for another week or so, then snow would come and lay it up for at least a month, but the snow didn't come and he kept runnin' the truck. The knock grew worse, strainin' the engine all the time; finally something gave way and the farmer was out a couple of hundred dollars.

"The old sayin' of 'A stitch taken in time saves nine' applies to trucks and any machinery if you change it a bit to 'A knock taken in time saves a big repair bill.'

"That's the sort of dope I've been handing round to the farmers hereabouts and I guess I've got them scared a bit. At any rate I've got my hands full of work. Most of this stuff you see is either repair parts or worn out pieces from trucks I've repaired.

"The old stuff I'm collecting as fast as I can into a pile so that I can get rid of it to the next junk man. Don't do to hold on to old iron nowadays, junk prices on iron are high but dropping fast. If you've got any old iron or metal on your farm, better get rid of it right away.

"This truck bug has certainly got under my skin lately, it's about all I can think of. I used to be a regular blacksmith but it don't pay nowadays. I soon found that the farmers always kicked about my charges, same as you do. So I began to get hold of all the automobile and engine dope I could and study up on it. Then I bought a flivver, an got some real experience. I used to keep the thing out in front as a sort of bait for the traveling fellows.

"When a fellow goes past a shop and doesn't see any machines inside, he ain't apt to stop to have his machine fixed even if the sign says 'Automobile Repair Work Done Here.' I used my flivver just to catch those fellows. It's a scheme that always works and is old as the hills. All farmers know enough to put a china egg in a nest, it fools the hens. Hens and humans are just like sheep in some ways, they follow the leader.

"It's time you farmers woke up to the fact that horses are a back number. Course you'll always need one or two for certain kinds of work, but the motor truck is the thing that is worth a barnfull of horses. Suppose you didn't own any horses now that you are laid up with a sore foot, 'twouldn't cost you one cent for feed for them. As 'tis you are losin' about three dollars a day on them, and you will keep losin' until you get back to work.

"If you had a truck, in the first place, it wouldn't have stepped on your foot and if it had, you wouldn't have to feed it until you used it again. You could keep it goin' from sunup to sundown if you wanted to. When you weren't usin' it, your hired man would keep it busy.

"Have you ever stopped to figure how much it cost you to get milk to market? Well, in the first place you have to harness up the horses in the morning, soon as the milk is ready, that takes a little time from other work, then you have to load the milk, but you'd have to do that anyway so it don't

"I'll Bet a Dollar Against a Five-Cent Piece."

count. But it takes you a good hour to get the milk down to the freight, then you have to unload it and that takes another fifteen minutes. The milk buyers make you pay the freight to town and then they have to unload it at the station and take it to their shop.

"Their price to you takes into account that little item of haulage. Now suppose you owned a truck. You wouldn't have to harness it up in the mornin'. Instead of taking

the milk to the station, you'd take it direct to town and save freight and save that haulage charge the milk company makes, and finally, by Heck, you'd save time too, cause you'd be back home sooner.

"The milk item ain't much perhaps, but when a man runs a farm as large as yourn, he could manage two or three trips to town with loads of green stuff, fruit and anything else. You could usually manage to pick up something to bring back, either for yourself or neighbors and so you would save freight charges and make a little money on the side.

"There ain't any limit to what you can do with a truck, that is within reason, course you can't expect the truck to shingle the house or milk the cows or pick apples, but when a fellow's got brains, he can keep the machine working out its board.

"Just listen a minute, you hear that steady bzz, bzz? Well that's the old saw of Henderson's. Jim has got his old wood saw rigged up and goes out cutting stove wood for the farmers and villagers. You remember he used to have a gasoline engine and circular saw mounted on an old lumber cart? Well he pulled off the saw rig and put it on his truck. Fixed it so the pulley stuck out over the edge of the truck.

"Now when he has a little spare time he runs into town and cuts wood for people. It don't take him but a minute to jack up one of the truck wheels, block the others, put on a belt and whizz goes the saw. I made him a pulley that fits onto the truck wheel hub. He's got his youngest boy trained to mind the throttle and the old saw just eats up the wood.

"The whole rig is fixed so that he can slide it right out of the truck in twenty minutes. I helped him fit it, most any smith could do the same thing.

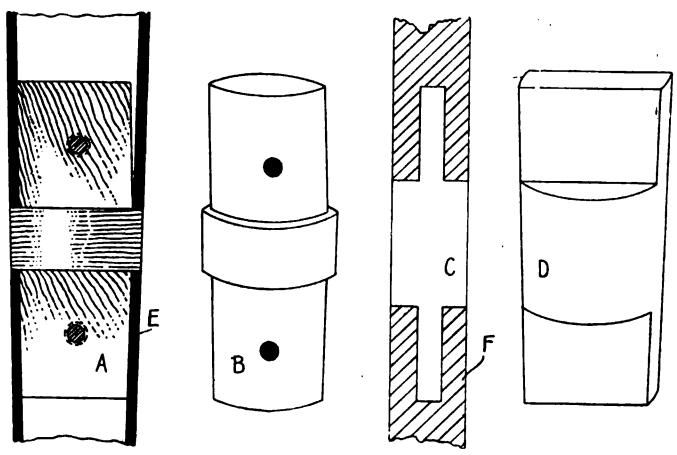
"Now I've told you some reasons for buyin' a truck, they save doctor's bills, time and cold cash. They don't kick, you don't have to worry about them catching the colic and they don't shy or balk, if you know how to manage 'em. So get busy old man, order that truck before Spring, I'd much rather tighten a connecting rod than shoe one of your cankerous horses.

"Guess it's about time for dinner, ain't it? Come on, hop and I'll take you home in my flivver. She's not much on looks, and she's kinder noisy, but she's got your little mare beat for speed."

MENDING TOP BOWS.

Top Bows Can Be Mended by Binding Splints Across Them, But the Job Has an Unsightly Appearance.

One thing that the war has done for me is to teach me how to conserve, not because I wanted to learn, but because I couldn't afford to be quite as extravagant as formerly.



Repairing Bows and Bow Irons.

A short time ago I tried to run my car beneath a shed that was just half an inch too small for the machine—that is, the roof of the place was just on a level with the top. Consequently, as the shed was strongly constructed, my top yielded up the ghost and telescoped into itself, before I knew what had happened.

Before the war I would have thrown the top in back of my neighbor's garage (all his empty cans are behind my garage), then gone to the topmaker's and in one compound word said "giveusanother."

As it was, however, I tried to manicure and massage the bent tubes into shape. I didn't succeed, so I took the wreck to a topmaker and suggested that he do his derndest—he did.

I hung around for a while and watched him work, thought it would make a good story for my blacksmith readers. In the first place he removed the covering material from the bent portions and broken bows, so that he would have room to work. Then just above each dent or bend he cut the tubing across with a hacksaw.

He carefully trimmed down a piece of pine wood into shape that approximated the inside of the tube and drove it into the tube. After a little coaxing the tube was straightened out, except for the extreme ends, where it had cracked. He cut off this cracked place and then turned out a piece of oak into the shape shown at B in the accompanying sketch.

After he had fitted this plug to the tube he drove it in and then drove the other part of the tube over it, as shown at A. I noticed that he used plenty of orange shellac, and finally he pinned the plug into place by two rivets, one in each part of the tube.

A few of the wood bows were so badly splintered that they were discarded, but two of them at least were repaired by doweling, as shown in Figure C. The dowel pin was shaped by hand, as shown at D, and glued into place. After the joints had been given a couple of coats of paint, one would hardly know where the repair had been made.

The Metal Turning Lathe

Part 2.—Various Types of Tool Post Feeds, The Speeds of the Work for Different Kinds of Metal and Rotation at Various Diameters

The power-driven turning lathe in the form known as the engine lathe, when provided with usual accessories, is probably the most useful of all machine tools. It is competent to do not only its own proper work, but also a good deal of work that is ordinarily done on other machines—as for example, drilling holes, grinding, etc.

The modern lathe is driven by a belt-operated cone pulley, by a geared head operated by a plain belt-driven pulley, by the individual electric motor combined with a geared head, etc. The most usual thing in an ordinary small shop is perhaps the cone pulley drive operated by a belt from a corresponding but reversed cone pulley on a countershaft.

The object of the various steps on the cone pulleys is to provide for changes of speed of the lathe spindle. When the belt is on the smallest step of the cone pulley mounted on the spindle, it is in shape to obtain the highest spindle speed. As the belt is shifted from one step to any larger step, the rate of spindle rotation is decreased. One of the objects in view in changing the speed of the spindle is to keep the work at the proper cutting speed. This remark will perhaps become clearer after some explanation.

Tool Post Feeds.

The cutting tool is fed to the work in two directions: It is fed longitudinally with the length of the lathe, and it is also fed towards the center of the work in a direction perpendicular to the other feed. The combination of the two feeds determines the rate at which metal is removed.

Consider now a piece of metal held in the jaws of the chuck. Suppose it is purposed to machine the face of this work, beginning on the outer edge and working in towards the center. A suitable combination of longitudinal and transverse feeds is first adopted. The work will pass the nose of the cutting tool at some definite rate of speed—say, 40 feet per minute. This means that the chip is coming off at this rate.

Suppose now both feeds are kept at just the same speed and an unaltered spindle speed is maintained (i. e., its number of turns per minute). When the tool reaches too near the center the chip will be cut off at a very slow rate—nothing like 40 feet per minute. The chip may be cut at only four or six feet in a minute's time.

This is, of course, all wrong, time is being wasted at this extremely slow cutting speed. If 40 feet per minute is right at the beginning, it will be right generally throughout the cut from start to finish.

We could make the chip heavier by increasing either the longitudinal or the transverse feed or both; but this will often be inadvisable. It will be quite easy to do something else. That is to increase the rate at which the spindle turns. What we want to do then is to speed up the spindle from time to time with the view of maintaining the cutting of the chip at the rate of 40 feet per minute. Consequently, we begin work with the belt on the big end of the cone pulley, and, as we work in towards the center in making our cut, we shift the belt from step to step. When we get down to the smallest pulley, we will have the most rapid rotation of the spindle possible.

Various Cutting Rates.

We have been talking about 40 feet per minute as a rate at which the chip came off. As a matter of fact, there are various rates of cutting speed. They differ with different steels. With modern high speed tool steel as the cutting tool, we can use rather high rates. With the usual carbon tool steel, a more moderate rate is best.

For a good average cutting steel, 40 feet per minute is a fair rate, when cutting low or medium carbon steel. If we have to cut high carbon steel, we may adopt a somewhat slower speed or else reduce the size of the chip.

It's a very good idea to find out whether we are running our lathe right—that is, whether we are using the proper speed, considering the kind of metal in the work and the kind of metal in the tool. We may be running much more slowly than we need to run. But, how are we going to find out the rate at which the chip is coming off? It is very easy to say that it should peel off at the rate of 40 feet or 50 feet per minute. But, how are we going to find out?

Well, there are two or three ways. The easiest way is to make use of a special instrument called a cut meter. We hold it against the work and readily determine the speed in feet per minute at which the work is moving, at the point of contact with the instrument. We haven't anything much to do except hold on to the instrument and read off the number of feet. We use a watch or a clock to give the length of time.

Using the Cut-Meter.

The calculation will be a simple one. If the instrument has a rubber-tired, small wheel, which is to be held against the rotating work whose diameter is such that the circumference is just four inches, then all we have to do is to divide by three the number of turns indicated on the dial during one minute. We shall have at once the number of feet per minute. One turn gives us four inches—that is, 1/3 foot. If we have 130 turns shown by the dial in the course of one minute, then we have 130 x 1/3 as the total distance covered in one minute. That is, we get at once 43 1/3 feet for the one minute's work.

There is another way of getting at the speed at which the chip comes off. This method calls for a little calculation. We first find out the spindle speed. How this is done was explained in our former article. We then have the number of turns per minute made by the work. We next measure the diameter of the cut we are making. By mul-

tiplying this diameter by 3 1/7 we will obtain the length of the chip taken in one turn. Suppose we measure the diameter and find it to be 3½ inches. Multiplying by 3 1/7, we obtain 11 inches. That is, every time the work makes a complete circuit, we take off 11 inches of chip. Suppose now that the spindle was going at the rate of 46 turns per minute. Then the total length of chip in one minute would be 46 times 11 inches. This is 506 inches, or slightly over 42 feet.

Speeds for Special Work.

Now 46 turns of the spindle per minute is a pretty slow speed. Our arrangements with the line shaft, counter-shaft and cone pulleys may or may not be right to take care of this speed. Sometimes very slow speeds are gotten by using back gearing on the head-stock of the lathe. But we should not need to resort to the back gears in order to handle an ordinary cut of 3½ inches diameter. We should be able to take care of it with the belting arrangements, using the big end of the cone pulley.

If, for any work that has to be done, especially if there is a good deal of it, it should be necessary to make special arrangements for a slow spindle, we may put a small pulley on the line shaft and a big one on the counter-shaft. This may seem cheaper than buying a lathe fitted with back gears.

(To Be Continued.)

GRILLE FOR BOUNDARY WALL.

BY ARTHUR W. JORDAN.

The grille shown in Fig. 1 was made some years ago for the boundary wall of a public school in London, England. It was one of several, all to the same design, let into the wall facing the road, and is notable both on account of its design and the way it was put together.

Without being too florid, the design is good, and based on the style then most in favor for school buildings. It was made under the direction of the writer and although there is nothing particularly intricate to make demands on the blacksmith's art and ingenuity, there are several portions needing care in the proper bending of the iron to get the correct shape and proportions, for on these depend the beauty of the design.

It was always the writer's practice, when getting out such work for the smith, to draw with chalk on a board, or brown paper, every scroll to the full size, even to the dimensions and section of the iron to be used. This leaves no loophole for mistakes and although it takes up much time, it also saves it in superintendence and in answering questions, and a practice that years of experience has not proved to be wrong or wasteful.

Every portion of the grille was of wrought iron, except the monogram plate in the centre, which was of sheet iron nearly 1/16 in. thick. The sizes of the grille, over all, were 3 ft. wide by 3 ft. 6 in. in height. It was strongly made to stand any rough wear to which it was likely to be subjected by schools, every part that touched another being riveted together as far as possible.

Fig. 1—Elevation Showing Grille in Position.

The semi-circular band bedding down on stone coping and finishing with a scroll each side at the top, was of 1¼ in. by ¼ iron. The top scroll, A in Fig. 2, was of same dimensions. The other scrolls ing of slightly lighter stuff, the width of top scroll acted as a sort of weather protection, preventing somewhat the dripping of rain on the higher parts of the grills, and the artistic effect was good.

The scroll, B, was of 1 in. by ⅜ in. and was forged down to the section shown at the squared part of the design. The scrolls, C and D, were of ¾ in. square, the ends being forged to a tapering flat point. The squared frame for the monogram plate was of the same size and section and was welded into one piece. The sheet iron was fixed as shown at E. The letters were saw pierced and finished up by filing.

The other scrolls were all ⅝ in. square iron, that at F being to the section shown at the point marked, at others it was square. The center rod, finishing in a lanced shaped point, carried the other floriated scrolls which were forged separately and welded on.

The first portion to be made was the bottom semi-circular piece which forms a sort of foundation for the remainder. This was quite a simple job, and calls for no further comment. The top scroll A was next formed, and these two made a kind of frame into which all the others had to fit. This latter scroll is also quite simple, only requiring a

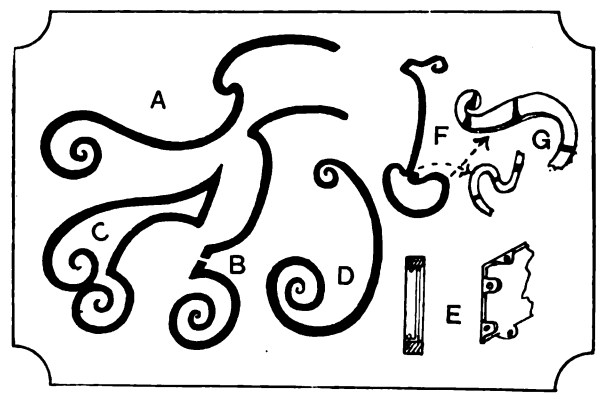


Fig. 2—Various Details of Scrolls and Fitting.

little manipulation to get the top center portion right and the little "tuck" just under the ends of this.

The scroll B was measured for the top and after the similar but slighter "tuck" had been given, the squared part on each side was forged. It was important to get the shape of this right from the first, so that it required no springing to get it into place, as a little of this would have spoilt the carefully arranged arched part at the top and only a trifle would have tended to show up unpleasantly by reason of the other arched bar above it being so near.

The shape of the scroll C required forging at several points, but this was nothing difficult, only needing care in the following of the full size working drawing. The most important of these forgings was the top pointed corner where the two pieces of iron, of which the scroll was formed, were welded together. This proved to be quicker than making the scroll of one piece of iron and then bending and forging out to form the point.

The scroll F required a little careful fashioning as it was of rather stout iron for so small a scroll, but it was not desired to have it made of lighter stuff for several good reasons. The squared portion at the top was made more readily by the nicking out with the file underneath the bends, and the iron being good, the amount of heating and hammering required was not excessive. The ends were forged to a taper scroll. A section of the bottom part is shown at G. Similar work was necessary to get the small bottom scroll in the center which was also of the same stout material for similar reasons. The small ring in the middle was about 2 in. diameter and was made of ¾ in. by 3/16 in. iron. This was secured on both sides to the scroll by rivets. The small scroll supporting the frame for the monogram is so simple as to need no description.

The whole grille was easily put together as far as the several parts were concerned, for by making each separate to the full size working drawing, if only care is used in the fashioning to shape the assembling together is much eased. Of course there was some awkward riveting which might have been avoided, but the architect insisted on each part being strongly riveted together, and after all there was wisdom in this, for notwithstanding rough wear the grilles were in position for many years and never needed any money to be spent on them, except for paint.

After being put together, each grille was cleared free from grease, etc., and given two coats of lead and linseed oil. The second coat having one-third less oil and the quantity made up with turpentine. After being fixed in position they were given a third coat of paint to the architect's specification.

The wall being gambled round as shown in Fig. 1 the effect of the grilles let in between was very good. This was enhanced by the iron work being painted a dead black and by the stone coping coming between them and the red brick wall.

Trading With the Farmer.

From a Reader in Ohio.—I have a few minutes in which to write, and perhaps you would be glad to publish the letter if it is interesting to the other readers.

In the month of August there were six blacksmiths who called at my shop, and only one of them reads a trade paper. Just think of it, Brothers! No wonder the blacksmiths (some of them) are back numbers. Their excuse was that they did not have time; two of them said that they could not read very well, anyway. There are about four out of every ten smiths that don't care to read; that's another reason we are not at the top.

A mechanic that doesn't take a trade paper is a back number. The —— & —— is worth $5 a year to me (Editor's note—This statement was so strong that we thought it best to leave out the name of the trade paper which this reader likes so well; modesty forbids the mention), and yet it only costs one dollar. The advertisements and suggestions in it are worth a dollar a month to a mechanic.

I like to keep up with improvements. If the blacksmiths had to go back 18 years and work with such tools as they had in those days, they would go out of business. I know that if I could not use the machinery in my shop I would quit right away: I could not make my salt. Just think of the old bellows, the hand drill, and so on.

With the machinery I can do in one day work that used to take three days to accomplish. We are just like the farmer (but the farmer is a bit ahead of us); take the farmer's machinery away from him and he cannot run his farm, because he can't hire the help—nor can we blacksmiths hire the help either, so we have to get machinery instead.

All the wise, up-to-date farmers take two or three farm journals and they find out from these papers how much stuff is worth and where to get the machinery. We blacksmiths don't know how to get prices for our work

because we don't read enough. I wish the Government would fix the prices on our work. I know we should get more. Half of the blacksmiths in the country are not making living wages today, and I can prove it.

Nineteen years ago I started in the blacksmith business, and our prices were somewhat as follows: Horseshoeing, $1.25; buggy tires, ¾ by ¼ inches, $5.50; buggy spokes, 20 cents each; wheel rims, $1.25; plows sharpened, 20 cents, and so on. Horseshoes cost us $3 a hundred in those days.

Today, however, we get only $2 for shoeing; buggy tires, ¾ by ¼, $7; buggy spokes, 25 cents each; wheel rims, $1.50; plows sharpened, 30 cents, but horseshoes cost us $7 a hundred.

The farmers for whom I did work often used to ask me to trade with them. I kept one horse, and for my work I obtained six bushels of corn for $1.25, that is 25 cents a bushel. Sometimes I got three bushels of wheat at 45 cents a bushel. If I shod a horse, to pay for it the farmer was willing to give me five old hens at 25 cents each. There's no use for me to go any farther and mention such things as bacon, ham and eggs; they are too high to mention nowadays.

Now if the farmer were to trade today, he would get a little the best of it. I would get either one bushel of corn, one bushel of wheat, one old hen, or only a smell of the ham, to shoe his horse; but still he is not satisfied. Think this trading matter over, brother blacksmiths, and use it as an argument when the farmer kicks at your prices.

Editor's Note.—This reader enclosed with his letter a clipping from a newspaper, which we are reproducing herewith. The reader makes a notation on the article to the effect that corn, in his part of the country, now costs $2 a bushel, bringing the total value of the corn to $600.

Farmer's Grain Buys More Than It Did in the Past.

A merchant in a western town showed a farmer a buggy, priced at $90, and the farmer kicked because twenty years before his father had bought one just like it for $60.

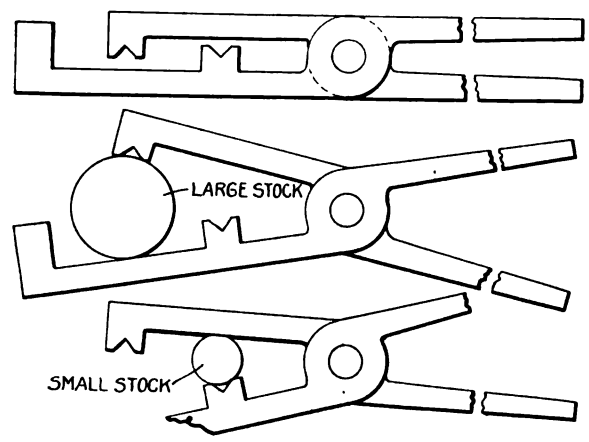
Then the merchant looked up the sale and found that the father had turned in 300 bushels of corn for that buggy. So he told the farmer's son to deliver him 300 bushels of corn and he would give him:

One	$90.00	Buggy.
One	75.00	Wagon.
One	20.00	Suit of Clothes.
One	20.00	Dress.
One	5.00	Baby Dress.
One	5.00	Crib.
One	3.00	Box of Cigars.
$10.00		worth of Sugar.
10.00		worth of Tea.
100.00		worth of Gasoline.
15.00		worth of Lubricating Oil.

The total figures $365.00 as the value of 300 bushels of corn, and it is needless to say that the high cost of living disappeared from the farmer's mind and he bought the buggy.

A Pair of Handy Tongs.

From Frank Lachman, Kansas.—I get a great deal of benefit from the Blacksmith and Wheelwright and I think that I really



Illustrating a Handy Pair of Tongs.

owe the other readers something because I have never written for your paper. I am sending you a sketch of a pair of tongs which I designed myself, and I think they are the best for round and square stock that I have ever used.

One pair is so made that it will hold any size from one-quarter inch to one and one-quarter inch without a chain. When holding small stock, use the projection at the back. When holding larger stock, put it at the center, and hold it with the upper pair of teeth, and when using still larger, put it way out at the end. My sketch explains the whole thing very well.

Double Tires in Utah.

From E. W. Berry, Utah.—In your October number, Mr. Maser of Texas asks about double tires. One man in Fresno says that double tires are applied so that heavier loads can be carried on lighter felloes. That is true, but is not always the purpose in this part of the country. We apply them for the following reason:

We have long, steep grades down which to haul ore from the mines. The grades are from two to three miles long, and require very heavy braking. Years ago I found that it is impossible to hold the wheels together with one tire. The heavy brakes or the friction on the tires heated the tire so much that it would expand and loosen up. Then down would go the wheels.

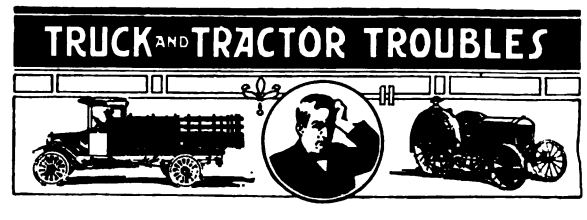
When double tires are used, the outside one may get hot from the friction, but the inside one stays comparatively cool, and so prevents the wheel from falling to pieces. In putting on double tires I drill four half-inch holes through both the tire and the felloe and countersink the heads. The underneath tire should be made tight so as to keep the wheels solid. I use on 4¼-ton ore wagons 3½ x ¾ inch stock for the under tire and 3½ x 1 inch for the outside. I give the outside tire one-half inch draw. The bolts keep the tire in place when it is hot.

If the old tire is not too badly worn, it can be put next to the rim. Always use lighter iron for the under tire. If Mr. Maser does not understand this, send him out to this town and we will show him.

Just in Time.

From Ed Loffer, Montana.—Received your Blacksmith and Wheelwright a week or so ago, and it certainly came in handy. I was at the time working on a Ford magneto, and sure was stuck, but with your explanation I was soon straightened out again. I think that the automobile articles are fine, and if you give them up somebody will be the loser.

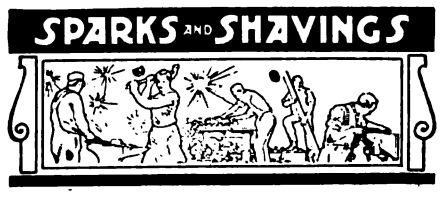
I am going back to the automobile repair game myself, simply because I don't have to carry such a big stock on hand. We have had an extra good fall out here, and there has been a great lot of wheat put in the barns. I saw forty-four wagons, two, four and six horse teams, and three trucks all waiting to be unloaded at one of our elevators on the eighteenth of October. I put on five hundred plow points up to October first this year and sharpened one thousand lays besides.



Steel for Auto Springs.

From J. F. Murphy, Nevada.—I noticed in the January number that one of my brothers wanted to know what kind of steel to use for automobile springs. If he will write to the Sligo Iron Store of St. Louis, Missouri, and ask for Sligo's special spring steel, I am sure he will be satisfied.

I have used quite a lot of it and find it excellent for replacing broken spring leaves or for making new leaves. It is self tempering and hardens according to the degree of heat applied.



A DISTINCT DEPARTURE IN ROLLER BEARINGS.

Accepts Thrust Pressure Equally As Well As Radial Loads—and Is Self Aligning.

Departing from the usual type of roller bearing design the Geo. D. Bailey Co., makers of the Bailey Ball Thrust, have placed on the market a front wheel bearing for Ford and Chevrolet 490's under the name Shafer Roller Bearing that eliminates the chief source of front wheel bearing trouble, namely the inability to take a heavy thrust (sideway) load without damage to the bearing and take care of axle spindle deflection as well.

The outer surface of the inner cone is convex, having the contour of a perfect ball, and the rollers possess a concave surface, thereby forming a cradle as it were for the cone and allowing it to swing to meet any deflection of the spindle when same gets out of alignment. The cone being free to move with the spindle and the load being taken upon the full length of the rollers causes no strain or binding of bearing itself, as in the case of the rollers of a bearing the cone of which is held perfectly rigid and cannot meet the misalignment or deflection of spindle.

The concave surface of the rollers at all times presents an equal load-carrying surface both from the side as well as the top and therefore the bearing is able to accept thrust (sideway) loads equally as well as radial (downward) loads. This feature in itself is a distinct departure and permanently stops the real source of front wheel bearing trouble.

Moreover, nothing but the highest grade chrome nickel alloy steel is used throughout. This fact coupled with three years of most severe road and breakdown tests enables the makers to guarantee every Shafer bearing without reservations.

Steel Stamps.

Where more than one blacksmith is located in the same shop, in order to avoid confusion it is always best to mark their wrenches or tools with steel stamps. In many cases the blacksmith if he is putting out very much work desires to put his own mark or the name of his shop upon his product. S. D. Childs & Co., Dept. 2, 136 S. Clark Street, Chicago, Ill., make a specialty of steel stamps for all purposes, either letters or figures, and also manufacture name plates.

Vises and Anvils.

There is no tool in the garage of more importance than the anvil. Next to the anvil comes the vise, and it is poor economy to purchase an inferior tool—a tool that will smash in a few weeks and need replacement. The cost of two poor vises or two poor anvils is much greater than the initial cost of a high grade device. The Columbian Vises and Anvils made by the Columbian Hardware Co. of Cleveland, Ohio, are among the first in this line. This line of vises and anvils is extremely large and the blacksmith who is equipping his shop should surely investigate the Columbian line, for they are dependable.

Universal Wheel Compressor.

Every blacksmith who is called upon to do any automobile wheel repairing should investigate the Universal Wheel Compressor manufactured by the Universal Wheel Compressor Co. of Cedar Rapids, Ia. This device is so arranged that it can be swung like a turntable when the wheel is in place, and is fitted with a number of compressing screws. With it the rim can be put in place and compressed, the spokes being given the desired dish, and the rim applied.

It is so aranged that wheels of practically any size can be taken care of. In addition to its utility as a wood wheel repairer the device can be used for truing up wire wheels. An automobile wheel undergoes considerable strain at all times when in use, and should be kept in the best of condition or a serious accident might result. The average blacksmith should be able to do quite a little business in repairing wheels.

Plymouth Punch and Shear.

The Plymouth Foundry & Machine Co. of Plymouth, Wisc., are manufacturing a handy machine tool for the blacksmith. This device is known as the Plymouth Combined Hand Power Punch and Shear. It is operated by hand. The blades are extremely heavy and the shear will cut iron 4 inches wide by ½ inch thick, 3 inches wide by ⅝ inch thick or one inch round.

In addition to the shear the lower jaw is designed to carry a number of punches from ¼ inch in diameter to ⅞ inch. These punches are arranged on a sliding rack so that either one may be brought under pressure as required. The punches always remain in the machine so that there is no chance for loss.

Dyke's Automobile Encyclopedia.

As will be seen by reference to the advertisement on another page, the ninth edition of Dyke's Automobile Encyclopedia is announced to have 940 pages and the cost of this new edition will be, postage or expressage prepaid to any part of the United States or Canada, $4.46. This encyclopedia is a standard work. It covers the whole ground thoroughly and is having a big sale everywhere. Our readers who want to keep thoroughly posted should send to us for a copy at once.

New Prices on Kerosene Engines.

Those who are thinking of buying a farm engine will be interested in latest prices on the Witte—the better quality engine—longest on the market, easiest to use, fuel-saving, reliable. As usual the Witte factory offers the most favorable prices to the customer, and now as before the war, and during the war, buyers can buy on practically their own terms. Every Witte Engine—gasoline or kerosene—is sold on a valid five-year guarantee backed by the largest exclusive engine factory in the world selling direct to user. A handsome new engine catalog, and big illustrated folder, showing what Witte users are doing, together with latest prices, mailed free on request to Witte Engine Works, 2492 Oakland Avenue, Kansas City, Mo., or to 2492 Empire Bldg., Pittsburgh, Pa.

Luverne Truck Parts.

We know from actual experience that there are thousands of shops throughout the United States who have the necessary equipment and help to enable them to build motor trucks and to convert passenger cars into motor trucks for the trade in their local territory on a basis which will furnish their customers with the maximum of truck value and service, and at prices which will easily meet outside competition and enable the concern to become an actual motor truck factory with a permanent and profitable future.

To operate successfully and on a small investment it is necessary that these local truck factories have access to a supply of truck parts which they can get promptly and in small quantities as needed, and the Luverne line of truck and truck unit parts is offered to the trade to meet this demand.

The Luverne line of truck parts are furnished in several sizes suitable for trucks and truck units of from three-quarters to three ton capacity, and consist of axles, wheels and tires, frames, fittings, springs, motors, transmissions, bodies, cabs, hoists, etc.

All parts are complete in themselves, ready to assemble and are sold either in complete sets or as separate units.

The Luverne line of parts is also well adapted for the export trade, for foreign firms who are in position to assemble the parts, and build bodies and equipment locally.

Standard Motor Pep.

Automobile owners in all parts of the country complain of the gasoline which they are obtaining at the present time. The more volatile elements of this fuel seem to be lacking, while the lower test products comprise a large proportion of the fuel.

The objections to this gasoline are first, that a large portion of it will not vaporize rapidly, consequently an engine is difficult to start; second, the liquid carbonizes in the cylinders; and third, the fuel finds its way into the crankcase, and dilutes the lubricant.

All three troubles are caused directly by the fact that the fuel does not burn rapidly enough for the engine. Manufacturers have devoted considerable study to the problem and the Utilities Co., 310 Citizens Building, Cleveland, Ohio, have offered a solution in the shape of a fuel energizer called Standard Motor Pep. This product is guaranteed by the manufacturers to give 20 per cent. more power; to eliminate carbon, and to increase the mileage obtainable by one-eighth.

The fuel is in the shape of tablets and the manufacturers back the product by strong guarantees. They claim to return the money if the tablets do not give the results they claim. A small trial package may be obtained at a very low cost. We should advise our readers to make a trial of it.

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.

H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, Washington, D. C. Established 1855. 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.

For Sale

FOR SALE.

One Defiance 60 ton Iron Frame Hydraulic Press; two Defiance 18" Broad Belt Polishing Machines; one Defiance No. 3 Hub Reaming and Boring Machine; one Defiance "Sharpsteen" Spoke Facing Machine; one Bentel & Margedant Rif or Felloe Polishing Machine; one Treavor & Company Double Spoke Equalizing Saw; one Gleason Disc Facer with Bentel & Margedant Spoke Equalizing Saw; one Gleason Disc Facer with Bentel & Margedant Spoke holding attachment; one Gleason Spoke Throating Machine. NESS BROTHERS & COMPANY, York, Pa.

FOR SALE

Spark Plugs	Doz.	$4.50
Sterling Plugs	Doz.	4 00
Ford Hose Connections	Doz.	1.00
Ford Hose Connections	Per 100	8.50
Radiator Hose, all sizes		
Primary Ignition Cable	100 ft.	2.50
Secondary Ignition Cable		6.50
Durabestos Brake Lining	correct	prices
Valve Grinding Compound	Each	.18
Rie Nie Grinding Compound		.27
Emery Cloth, assorted	Doz.	.70
Emery, per 10 lb. can		1.20
Key Stock, 1-8, 3-16, 1-4, 5-16	Per ft.	.10
Key Stock, 3-8—12c., 7-16 and 1-2		.15
Babbitt	Per pound 15c. to	1.25
Solder, Half and Half	Per lb.	.55
Tire Tools, Diamond—6c., 15 in. steel		.25
Ford Valves	Each	.12
Ford Timers	Each	1.00
Ford Tail Lamps, Electric		.65
Ford Headlight Doors		.65
Ford Rubber Robes, lined		2.00
Ford Linoleum Mats		2.00

Ford Felts, Gaskets, Engine Packing, Taper Pins, Lock Washers, Cap Screws, Set Screws, Machine Screws, Nuts, S. A. E. Screws, hundreds of other items. Mechanics' tools and shop machinery.

BICKNELL MFG. & SUPPLY CO.
Janesville, Wis.

FOR SALE

About 100 feet of two-inch internal wire carriage tire made by the Victor Tire & Rubber Co., will be sold cheap to close out. This is new stock. BECK-HAWKEYE TRUCK WKS., Cedar Rapids, Iowa.

FOR SALE

Blacksmith and wagon-shop, stock and tools. Good chance, in one of the best sections in southern Minnesota. Address WM. H. GOEDEN, Triumph, Minn.

FOR SALE

Country blacksmith's shop and store. Ten room house, acre of ground; unusual opportunity. Owner wishes to retire. F. W. LEWIS, Olyphant, Pa., R. F. D.

FOR SALE

Blacksmith shop, two lots, building, tools all handy. The only shop in town. Must sell on account of sickness. The best equipped shop in Potter County. Write for price. We must have a blacksmith before March 15th. Address JOHN WOLF, Box 62, Tolstoy, South Dakota.

FOR SALE

Blacksmith's shop, stock and tools, house, barn and two acres of land. Only shop in village and work enough for two men. Reason for selling, poor health. Address CHAS. BEMIS, Burlington, N. Y.

FOR SALE

368 page book containing 3,000 valuable money making recipes for the home, farm, workshop, mechanic, and manufacturer for $1.00, prepaid. Address H. GOCHNAUER, West Willow, Pennsylvania.

FOR SALE

Blacksmith and machine shop. Will sell machinery and rent building or will sell entire property. Splendid opening for good workman. For further particulars address MISS HATTIE HOFFMAN, Glasco, Kansas.

For Sale

FOR SALE

Blacksmith and wagon shop. Stock, tools, machinery, house and two lots, or will sell half interest. Address SCHMIDT BROS., Waldorf, Minnesota.

FOR SALE

For Immediate Shipment—9-in. jointers, $50.00; 5-in., $35.00. Bench jointer, 5-in., $30.00. 14-in. square style cutter head with attachments, $20.00. Circular style cutter heads for wood frame jointers from 5 to 12-in. Combined outfits, jointer head and pole rounding head, jointer and saw arbor, with various attachments; saw arbors and emery stands. Catalogue No. 15 for the asking. W. L. SHERWOOD, Kirksville, Mo.

FOR SALE

12 horse power double opposed air cooled auto motor with high tension magneto, $25. Two trailer wheels with roller bearing axle, solid rubber tires, carry 800 lbs., $20. Battery charging 6-volt dynamo, $10. Address F. WAYNICK, Reidsville, N. C.

FOR SALE CHEAP

Hydraulic cold tire setter No. 4 scientific, hand or power. Also L. S. P. calking machine; both in good shape. Address MRS. M. A. TUTTLE, Lake Charles, La.

FOR SALE OR TO RENT

Fine old established blacksmith's and wheelwright shop; two-story building; 30 by 70 feet; location excellent; well equipped for business; large country trade. Owner has recently died. Address for price and further particulars, A. B. SWAB, St. Johnsville, N. Y.

FOR SALE.

FOR SALE! "THE PALACE HORSE-SHOEING SHOP," in the town of Easton, Maryland. On account of poor health, will sell my dwelling and two shops—equipped complete for horseshoeing and up-to-date. Beautiful tidewater surrounding country, state roads and good prices. For price and particulars address JNO. W. MORRIS, Owner.

Wanted

WANTED.

Blacksmith and horseshoer, steady. Electric power. Address WILL MADDOX, Palestine, Illinois.

WANTED

Would like to hear from one who has a blacksmith's stand for sale with from 10 to 20 acres or more of land. Address L. LUBER, Box 23, Prairie View, Illinois.

WANTED

Two all around blacksmiths in general repair shop. No boozer need apply. Address CLEM STEVENS, Clifton, Colorado.

WANTED

A good all around blacksmith for a steady job, or will sell or rent my shop and outfit. Address E. J. PERRON, Ontonagon, Mich.

WANTED

To buy two second-hand Mole Shrinker and Benders. Must be in good shape and cheap. Address A. L. MERITHEW,, Burnham, Mo.

Tires

TIRES--DOUBLE TREAD

Guaranteed for good service. Big - Strong—Extra Heavy. 30x3 Tire $5.50; 30x3½ $7.00; 33x4 $10.00; 34x4 $10.25; 36x4½ $13.00; 37x5 $14.00. Big saving on other sizes and Tubes also. Trade in your old Tires. 10% deposit required on C. O. D. orders. Send for list now! State size and bead of tire. Orders filled same day received.

M. LIBEN & CO., 205-RK, W. 48th St., N. Y. City

Motor Topping.

At the present time new cars are hard to obtain, and this condition will exist probably until late this year, for it will take some time for the motor manufacturers to get back to full production. For this reason there will be considerable overhauling of cars done this spring. The principle part of an automobile to show excessive wear is the top and the upholstery.

A car looks no better than its top and everyone knows that when a top is exposed to the weather for two or three years it detracts from the appearance. The blacksmith or wheelwright should be able to do considerable work along the line of top replacement and should they decide to do this they should investigate the Drednaut Motor Top material manufactured by L. C. Chase & Co., of Boston, Mass. Any of our readers who decide to retop cars or do upholstery work should send for samples to this company.

Phoenix Horse Shoes.

Our readers should not overlook the fact that one of the oldest lines of horse shoes is manufactured by the Phoenix Horse Shoe Company of Chicago, Ill. Now that winter is here our blacksmith readers should investigate the Bull Dog Toe Calks manufactured by this concern.

Inventor's Manual.

The Norman W. Henley Publishing Co., 2 West 45th Street, New York City, announce a new book which they have just put on the market called the "Inventor's Manual." Doubtless many of our readers are interested in inventions. Very possibly many of them intend to have an article patented in the near future. This book tells how the new inventor can make mistakes as well as how to avoid making them. It tells how to obtain a patent and gives a valuable list of occupations which should be of interest to the person who is trying to invent a device, since he will know beforehand just how many people may be interested. The book contains over 130 pages and sells for $1.25.

Gillette Shearing and Clipping Machines.

The Gillette Clipping Machine Co., 129-131 West 31st Street, New York City, are manufacturing a very complete line of clipping and shearing machines, both electrically and hand driven. The electrically driven machines can be had to operate upon either direct or alternating current from the regular lighting system. All of the machines are guaranteed to be of the best materials and made by expert workmen.

Sandbo Starter.

The blacksmith is the logical man to sell automobile equipment to the farmer, and he should become familiar with automobile accessories. He should be able to make quite a little money by installing starting devices on old cars, or cars not equipped with starters. The farmer who intends to keep up-to-date should investigate the Sandbo Starter designed especially for Ford cars and manufactured by the Bear Manufacturing Co., Rock Island, Ill.

This device can be installed upon practically any Ford car and requires but little work in installing it. It is said to be positive operating since it turns the engine over past two compression points. Our readers who are interested in this device should write the Bear Manufacturing Co. at the address given above.

Gasoline and Kerosene Carburetors.

We have repeatedly suggested to our Blacksmith and Wheelwright subscribers that they go into the automobile repairing game since this field offers quick returns and easy money. An education however is necessary, and to get this education the blacksmith must read suitable books or magazines.

The Norman W. Henley Publishing Co., 2 West 45th Street, New York City, have just published a book entitled "Gasoline and Kerosene Carburetors" written by Victor W. Page, which sells for $1.50. This book explains carburetion very fully. It takes up in detail many of the standard makes of carburetors now on the market. It is well illustrated and contains over 200 pages. The blacksmith who purchases this book will find that he has made a good investment.

Bauer Kerosene Engines.

Every mechanic realizes that one of the cheapest forms of power is had by the kerosene engine. The engine can be used in any part of the country for running any sort of apparatus. Every blacksmith should know about kerosene engines for the reason that very frequently he can sell these machines to the neighboring farmers for pumping water or for running farming machinery.

In many cases the blacksmith or wheelwright may be interested in purchasing one of these machines for himself to use in his own shop. The Bauer Engine Co., 110 Bauer Block, Kansas City, Mo., manufacture a very complete line of engines in sizes from 2 to 18 horse power. This concern makes a special 60-day trial offer and guarantee their machines for five years. Our blacksmith readers should write this concern for catalog and price list.

Simonsen Hot Trimming Shear.

The Simonsen Iron Works of Sioux Rapids, Ia., are manufacturing an interesting device for blacksmiths called the Simonsen Hot Trimming Shear. This device can be obtained in two sizes. No. 1 can be used to cut hot plow steel as thick as 5/16 inch and as long as 6 inches. No. 2 will cut the same thickness but slightly longer. It will cut to 8 inches. It can be used for cutting plow points, trimming cultivator shovels, or in fact trimming practically any hot steel within its range.

Variable Speed Blower.

Blacksmiths who are not satisfied with the air supply to their present forges or smiths intending to install a blower should investigate the "Kazoo" Variable Speed Blower manufactured by the R. P. Warner Electric Co. of Kalamazoo, Mich. This blower is designed to operate upon alternating current, and consists of a motor and a fan both mounted upon one base and both enclosed in dust-tight housings. The bearings are bronze and oiled by special ring oilers.

The big feature of this blower is that speed is varied through the blower itself by means of a special device. No outside rheostat or resistance is necessary. Different speeds are obtained by moving a handle in the side of the motor. If a smaller volume of air is required the motor can be slowed by means of this handle and less current is consumed.

Brooks Welding Apparatus.

There is no line of work which should be of more interest to the blacksmith than Oxy-Acetylene Welding. This work always finds an outlet in any part of the country. No matter whether automobiles are to be repaired or harvesting machinery overhauled, a welding outfit should be of value.

The farmer requires quick repairs or he will lose his crops. He has no time to wait for replacement parts to come from the factory, and for this reason the blacksmith can easily obtain high prices for welding work. The blacksmith should investigate the line of machines and welding apparatus manufactured by the Brooks Machine Co., 219-229 W. Lewis St., Wichita, Kan.

This company manufacture portable and stationary acetylene generators and tanks and both welding and cutting torches. The Brooks Machine Co. protect the torches and tanks with a special flash back exhaust safety valve. Every blacksmith intending to do welding should write for catalogs and price lists to the above address.

Wolfe Tire Cooler.

The attention of our readers is called to the excellent tire cooler manufactured by Matt. L. Wolfe of West Carrollton, Ohio. This device is one of the oldest on the market and well known throughout the trade. Our readers who desire to install a tire cooler in their shop should investigate it and write for circular and descriptive matter to the above address.

Crane Puller.

No matter what sort of machine repair work the blacksmith does, there is one tool which he finds necessary more than any other, that is a wheel or gear puller. Such a device is manufactured by the Crane Puller Co., of 54 Lake St., Arlington, Mass., and is unique in design in that it may be used either as a gear or flywheel puller, or can be used in conjunction with a special base as an arbor press. The parts of this device are exceptionally well made and the cost is low.

Champion Shock Absorber.

The first article of this issue deals with the care and repair of springs and in the article the fact is mentioned that spring breakage may be caused by rebound or recoil. As a matter of fact a spring seldom breaks under the downward pressure, but usually on the up-throw of the car. A Champion Shock Absorber particularly designed for Ford cars is said to absorb the rebound.

In addition to this, the device absorbs the downward jar as well. Side sway is reduced to a minimum, and all shocks are absorbed through a unique combination of springs and levers. The device should be of interest to every blacksmith who deals in automobile supply parts. The Champion Shock Absorbers are sold by the Champion Shock Absorber Sales Co., Inc., Dept. B, Indianapolis, Ind.

Northwestern Horse Nails.

Every blacksmith realizes that a straight driving nail is essential to good workmanship. A horseshoe nail that bends while being used is dangerous and may result in a lame horse. The Northwestern Horse Nails manufactured by the Union Horse Nail Company of Chicago, Ill., have many interesting features. In the first place they are carefully designed to be easily driven. The one feature of these nails is a special reenforced point which is said to prevent breakage and bending.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 4. NEW YORK APRIL, 1919. TERMS ONE DOLLAR A YEAR

The Care and Repair of Tires

The Construction of Tires, Various Types, the Curing of Rubber, Methods of Storing and Proper Inflation

THE late George Fitch described the pneumatic tire as the "turkey buzzard in the ointment of the automobile owner." Most motorists will agree with him that tires cause the larger portion of the troubles that help to make the operation of a car retain the element of interest and uncertainty that has been a part of it since the days when exhibitors at the automobile shows demonstrated their creations by driving them around an indoor track, that was built for the purpose, adjacent to their booths.

Tires have their faults, it is true. But probably not less than ninety per cent of the failures of tubes and casings to give the service that is expected of them are due to mistreatment that follows a lack of understanding of the proper use of tires or just to good old-fashioned neglect.

It is really marvelous, when one stops to consider it, how a combination of vegetable products, the sap of a tree and the gossamer-like fibre from the seed-pod of a little bush, can endure with even a moderate amount of resistance the thundering impact of a two-ton car that is driven at railroad speed over roads that would destroy a tire of steel in a comparatively few hundred miles.

Preliminary to treating of the factors that cause the untimely deterioration of tires and the methods of coping with them, it is interesting to know something about the construction of a tire and the materials that enter into it. The average driver sees only a tube and a casing that he pays for and puts on the rim with a silent prayer that "this one will give some service."

Tire Construction.

Generally speaking, a tire consists of an outer casing of fabric covered with rubber, providing the tensile strength to hold the internal pressure and the resistance against road wear; and an inner tube of softer rubber serving as an air-tight lining to prevent the air from escaping. When such a tire is placed on a wheel and inflated, the effect is that the wheel is actually suspended on compressed air, the most elastic substance that is commercially available.

Slight shocks, which in the case of a solid tire would be transmitted in a direct line to the axle and thence to the body of the car, via the springs, are absorbed by a slight distortion of the air chamber.

The size and construction of tires have been so standardized that a study of any make gives an excellent idea of all makes. It is true that each maker has secret formulas for the compounding of rubber to obtain toughness, resiliency, etc., but the finished tires show little difference in the main.

Casings fall naturally into two divisions, those in which layers of canvas are used to give the strength, and those which are constructed of layers of parallel cords. Tire-makers say that the advantage of the former, and in fact its only excuse for existence today, is its low initial cost. The cord construction, while more expensive per tire, seems to offset this by the increased mileage which it gives and the smoother riding qualities it possesses by virtue of the fact that it does not need to be inflated as tightly as the fabric tire in order to prevent breaking down of the internal construction.

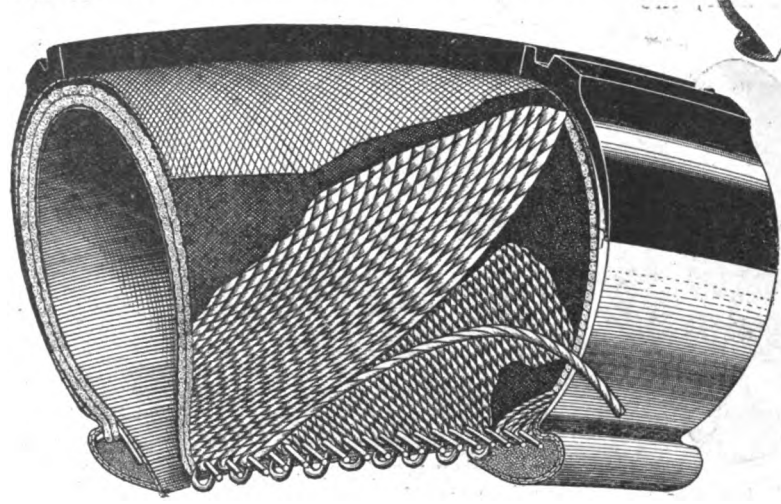
Both kinds of casings are made in three styles; they differ principally in the shape and construction of the beads, in other words, in the method of attachment to the wheels. The clincher tire has soft beads that permit it to be stretched over the rim of a wheel just the same as one would stretch a rubber band over a spool. This style is now used only in the smaller sizes of tires such as on Ford cars where the expense of any but the simplest rims would be prohibitive.

The Quick Detachable Clincher (known as the Q-D) has beads shaped the same as the regular clincher, but instead of being elastic, these beads have steel wires built into them. In placing this tire on the rim one side of the rim is removed and when replaced is locked by means of a spring or other device. The Straight Side tire also has a non-stretchable bead, but of different form, and is used on special rims somewhat similar to those used with the Q-D type.

Tread patterns are almost innumerable, apparently being limited in design only by the imaginations of the manufacturers. They offer a means of adding to the thickness of the tread without making the tire unduly rigid, and under some conditions are advantageous in preventing skidding.

Two Materials Used.

It will be noted that the casing is made of two materials, fabric (which includes both the cord construction and woven canvas) and rubber. The fabric is usually a high grade of Sea Island cotton, which on account of its long fibre supplies strength and resiliency. The rubber merely holds the layers of fabric together so that they stretch and bend as a unit, and protects the fabric from actual contact with the road and from the deteriorating action of water, oil and other enemies.



Partial Cut-Away Section of Goodrich Cord Tire, Showing the Two-Ply Construction of Their Silvertown Tire.

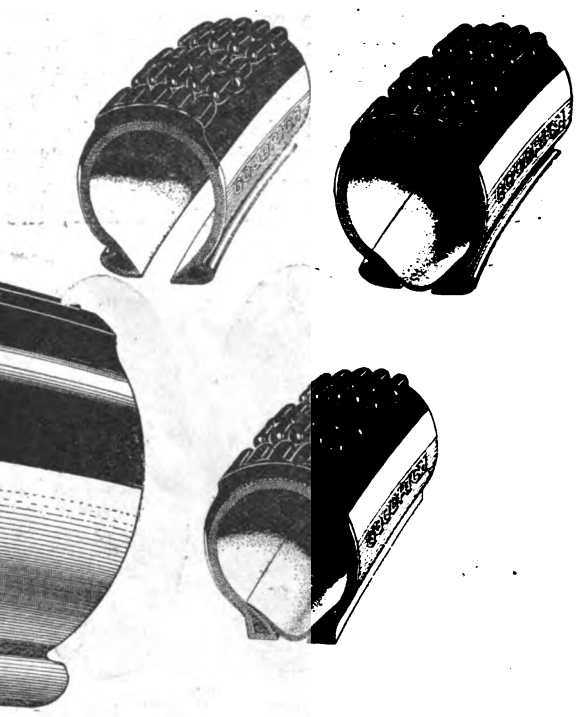
The rubber has practically nothing to do with the shock-absorbing ability of the tire. That is all left to the air inside of the tire, and the chief function of the casing is to keep the air inside. It appears that if it were possible to make a tire as thin as this sheet of paper, yet with strength enough to resist puncture, we would have the ideal, so far as easy riding is concerned. It seems that the aim of the tire designer is to use as large a volume of air and as little canvas as possible consistent with adequate strength.

In making a casing, an iron core or mandrel, ring-shaped and having a cross section the same as the inside of a tire, is coverel with several layers of fabric which have been thoroughly impregnated with rubber. From four to six layers are used, depending on the size of the tire. These are each carefully rolled and pressed together and as the fabric is applied it is continually stretched so as to eliminate stretching in use. On the fabric is placed a 1/8 inch layer of soft cushion rubber and over this comes a loosely woven strip of fabric—the breaker strip. Then comes the tread, compounded of tough rubber to stand the wear of the road. Of course the beads have been applied during the process of laying on the fabric.

Vulcanizing or Curing.

The next process is the vulcanizing or "curing" of the tire. (Some manufacturers partially cure the fabric body of the tire and the tread separately and then vulcanize them together later.) This is simply a matter of applying heat at a certain temperature while the tire is kept under pressure in moulds which determine its shape when finished, much as a waffle is moulded. Just as in culinary processes the temperature and the length of time heat is applied are vital to the success of the result.

In building tires by the wrapped tread method which is almost universally used for smooth tread tires, the pressure on the tire is obtained by wrapping it while on its iron mandrel with strips of muslin. Afterward iron moulds conforming to the finished product are clamped tightly over the wrappings.



Cross Sections of Goodrich Tires. Regular Clincher: Q. D. Clincher, and Straight Side Tires.

The whole affair, moulds, tire and mandrel, is then placed in a large cylindrical tank much like a boiler and large enough to hold many tires at one time.

Heat is applied for about an hour by admitting steam into the sealed tank at a pressure which corresponds to a temperature of approximately 300 degrees F. The steam itself has nothing more to do with the vulcanizing process than to distribute the heat uniformly over the tires being cured. Hot dry air, or any other method of supplying

heat would serve the purpose equally well if means could be provided for a uniform distribution of heat.

The fact that steam, on account of its convenience for this purpose, is commonly used for curing rubber has misled many people into the belief that the steam itself had some mysterious chemical influence, or supplied moisture that prevented overcuring, but this idea is entirely wrong. At the temperature used in vulcanizing, steam contains less moisture than average illuminating gas. It is practically dry. Maintenance of the proper temperature is the important point.

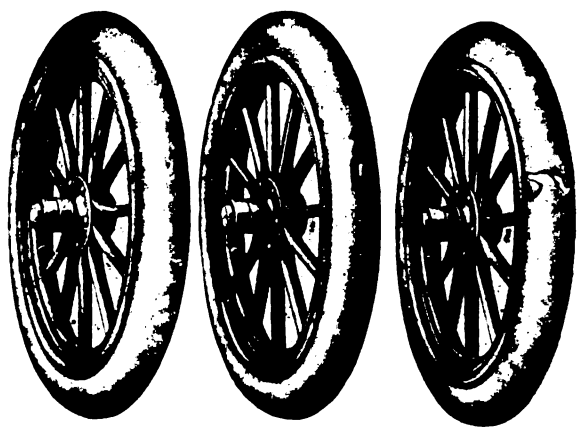
The Inner Tube.

We have seen that the rubber used in casings is of a tough variety designed to stand the wear of the road. On the other hand the inner tube, which is protected from outside damage, and must remain absolutely air-tight, is made of quite a different kind of rubber. A very elastic compound is used, so strong that a good tube may be inflated until it is more than a foot in diameter without bursting. Demonstrations have even been made in which the weight of a loaded car has been suspended in the air by means of an inner tube, and most of us have seen cars towed by using a tube instead of a rope.

Inner tubes are made on mandrels, too, but in this case the mandrel is a piece of steel tubing of proper diameter, straight, and of a length equal to the circumference of the completed tube. This mandrel is put into a sort of lathe and as it revolves the raw rubber in narrow strips is wound upon it. Several layers of very thin rubber are applied to insure freedom from leaks that might occur if only one layer were used, and then strips of cloth are wound on top of the rubber to give the pressure that is required.

Curing is accomplished by inserting a hundred or more of these mandrels into a steam-heated chamber for a suitable length of time. When the cure is completed the cloth is unwrapped and the rubber is stripped from the mandrel by turning it inside out, which accounts for the tube being smooth on the outside and rough inside. Then the ends of the tube are vulcanized together either by heat or by chemical means, a valve stem is attached and the tube is ready for use.

The matter of color in tubes and casings was discussed quite widely a few years ago. The natural color of pure rubber is a sort of amber. Some of the colors that appear in finished tires are the result of using chemicals that affect the properties of the rubber and others are merely a disguise to trademark a certain brand of tire. The only real proof of a tire is the service it gives, and if the tire is made by a reliable manufacturer and given reasonable care by the user, the



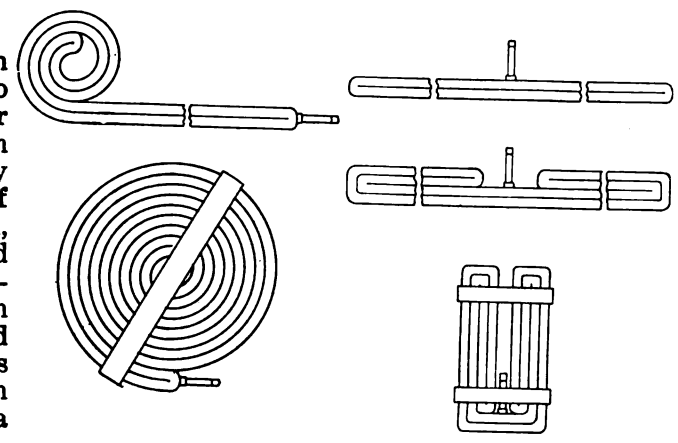
Three Stages of Tire Disintegration: A Small Cut Appears in the Tread; At the End of 500 Miles a Sand Blister Forms, and in 500 Miles More the Tire Blows Out.

service will, aside from unavoidable accidents, be all that can reasonably be expected.

Possibly the fact that tire makers have placed guarantees of from 3,500 to 5,000 miles on their product has led the average car owner into the mistaken belief that the guaranteed mileage is about all he has a right to expect and that any service he receives in excess of this guaranteed mileage is due either to exceptional tire quality or exceptional good luck.

While that may be an optimistic way of looking at the situation, it should be remembered that no matter what mileage may have been secured from a tire that has been allowed to go without attention or care until its life has ended, there is no doubt that the observance of a few simple precautions, easily within the ability of anyone, would have added hugely to that mileage. It has been well established that a reasonable amount of attention will invariably be repaid in the mileage that can be obtained from any good tire.

As an illustration, the writer recently had occasion to correspond with a number of



Two Methods of Folding and Storing Tubes.

motorists to whom a certain tire manufacturer had awarded prizes for securing exceptional mileage. All of these people had driven twenty thousand miles or more on the tires that were under observation. Some almost reached the twenty-five thousand mark. Without exception, while they admitted that the quality of the tires had had something to do with the result, they agreed that the care the tires had received was a highly important factor.

Another case that has been authenticated is of a tire that has given more than thirty-eight thousand miles and when last heard of was still in active service. In this case, too, the care that had been given was considered largely responsible.

The life of a tire should be over ten thousand miles under ordinary usage and conditions; but it is safe to say that two-thirds of the tires used are thrown in the junk heap before they have gone more than half that distance.

In this section, therefore, we shall take up in detail some of the methods that motorists have found effective in obtaining the higher figure.

Proper Inflation.

The importance of proper inflation certainly entitles it to consideration as the first of the factors entering into the securing of the mileage that is built into a tire. Most people do not realize the damage that underinflation will surely cause. The novice is sometimes afraid of inflating his tires too tightly, something that cannot be done with a hand pump and is seldom done with a power pump.

Nothing will wear out a casing so quickly as running it with too low an air pressure. The fabric is bent and twisted so much that the threads cut each other, the rubber is disintegrated, and the tire wears out like an old leather hinge. The layers of fabric become separated—a good bump bends the casing so much that the inside layers break—the tube works itself into the crank—and then comes one of those inexplicable blowouts, often in a new tire, that makes the tire adjuster want to change places with the recording angel.

Roughly speaking, a tire is properly inflated when it will stand up full and round under the weight of the loaded car. A kick at the tire tells you nothing. A tire gauge is the only sure way of knowing anything about the pressure.

Tire makers indicate on their tires the correct pressure to be maintained, and their instructions should be rigidly followed. The general rule is twenty pounds of pressure for each inch of cross section. That is for a 3½ inch tire the pressure should be from 65 to 70 pounds if the tire is carrying the normal load for which it is designed.

If exceptionally heavy loads are to be carried the pressure should be increased correspondingly. Especially during the first ten days a tire is in use it should be attended to daily, for the casing stretches more or less and the pressure is thus reduced. After this period, unless the tire shows symptoms of a leaky valve or other leak, an inspection once a week will be sufficient.

There is a popular impression that the pressure in a tire should be reduced during hot weather. This is absolutely wrong. Really more care should be taken to keep the tire up to full pressure in the summer than when the weather is cool. A loosely inflated tire is subjected to so much extra bending as it passes over the road that it actually heats more than if it were pumped up to the standard pressure.

It is the heat that injures the tire by causing the rubber to lose its adhesiveness so that the fabric separates. In addition there is the danger of rimcutting, bent rims and other damage. The expansion of the air in the tire due to the heat of the atmosphere will only increase the pressure a few per cent so that there is no danger of a blowout from that cause.

One should never drive on a flat tire, even for a few rods, because there is the certainty of damaging both casing and tube, and the likelihood of skidding or loss of control. The safest way to do if caught without a spare casing is to remove casing and drive on the rim. Don't remove the rim or you are liable to have the whole wheel fall to pieces.

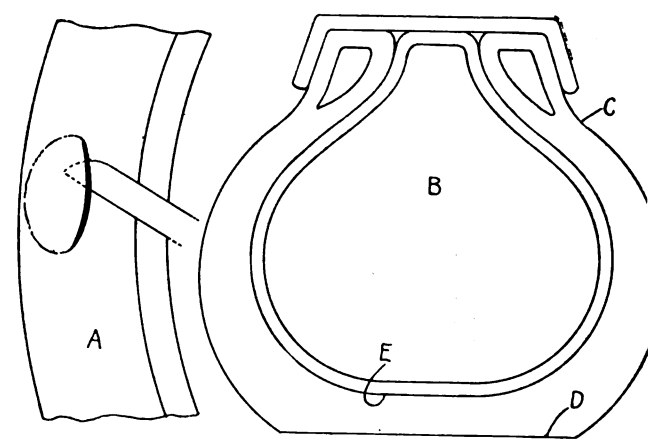
Remember then, as the first and most important rule for tire conservation, to keep your tires pumped full all the time.

Care During Storage.

Most motorists know that continued exposure to direct sunlight will harden and crack the varnish on their cars, but they do not always realize that the rubber in the tires is the same sort of a vegetable product and that light has the same effect on a tire. Park your car in the shade when possible, and when it is in the garage keep the garage dark.

When a car is used only at infrequent intervals, it is a good idea to jack up the wheels and partially deflate the tires. This is done, not so much to take the imaginary strain from the weight of the car off the tires, as to prevent the weight of the car from settling down on a tire that may have a slow leak, and pinching the tube and casing. If a tire is fully inflated the pressure per square inch on the inside of it is very little different whether the car stands on the tire or is supported on jacks.

Keep in mind that conditions which will rust iron will rot a tire that has its fabric exposed either by cuts through the tread or by exposure of the inside of the tire when



A, Opening a Sand Blister To Let Out the Dirt; B, Result of Underinflation; C, Tire Bends Excessively at This Point Causing Rim Cuts; D, Large Ground Contact Means More Punctures; E, A Bump on the Road Will Bend and Break Fabric at This Point.

stored off the wheel. Moisture has no effect on the rubber, but it is ruination to the cotton fabric.

In winter it is best to remove the tires from the wheels and after being sure that they are perfectly free from oil, water, etc., wrap them with cloth and paper to keep out the light, and store them in a place where it is cool and dry. If the car is set on jacks the tires may be partially deflated and wrapped as they are on the wheels.

If the tires are taken off the wheels leave the tubes in the casings and put in enough air to keep them round. Do not hang the tires on a nail or hook as that will cause them to take an unnatural strain that may deform them badly. It is much better for the tires if you will simply pile them on the floor.

Why Wheels Must Run Parallel.

Unless the wheels are parallel the tires are shoved along the road instead of rolling in a straight line and the result is about the same as if they were pushed over a big piece of sandpaper. The treads are worn rapidly, so that if a tire shows signs of undue wear in the center of the tread examine your wheels and straighten them out or have it done immediately.

A loose steering gear that lets the front wheels wobble has much the same effect. Above all things the front wheels should not "gather" or "toe out." It is better to have them "toe" in so that the front edges of the rims are half an inch nearer together than the rear. This offsets the effect of the slant that is caused by the slight deviation of the steering knuckles from the perpendicular and makes steering easier without harming the tires.

Substances That Destroy Rubber.

Light and heat, as explained before, have the effect of overcuring the rubber and hardening it. Water, when admitted to the fabric, rots it and causes it to loosen from the fabric. To a large extent it is impossible to protect a tire from these, but there is another enemy that causes more trouble than all of the others. That is oil.

Oils of various kinds are ready solvents of rubber and will rot a tire quicker than any other substance. Consequently the garage floor should always be kept clean and dry and if in oiling the car or as a result of leaky bearings oil is spilled on the tires it should be cleaned off immediately. Use soap and water, not gasoline.

What Rusty Rims Will Do.

Iron rust eats into canvas very quickly and for this reason the rims should be examined and cleaned a few times each season. Assuming that the rim is clean, as it should be when the tire is attached, it may be kept so indefinitely if proper attention is given to keep the rims straight and if the locking nut on the valve stem is drawn tight so that no water can work in through the hole in the rim.

If on inspection the rim is found to be rusty, even though merely in small spots, the rust should be sandpapered off and the rim given a coat of thin shellac. Ordinarily stove polish, which contains graphite, is also excellent for preventing rust and making it easy to remove a tire in case of an emergency.

Any dent or bend in a rim should be corrected as soon as discovered, for if the bend is inward a great strain is brought on the bend and side of the casing. If the bend happens to be outward there is a fine chance for water, oil and dirt to work in between tire and rim.

The driver who likes to show how quick a start he can make, or who puts unnecessary strain on his tires by starting with the high gear engaged is usually the fellow who wonders why his tires don't give him the service that some of his more conservative neighbors receive. He forgets that the entire energy required to set a mass of a ton or two in motion is all concentrated into one huge kick applied at one small point on the rear tires. Start on low. That's what your gears are for. Take curves and corners at a moderate pace for safety as well as for economy.

On wet or frozen roads skidding is practically unavoidable unless chains are used. The chains must be adjusted loosely enough so that they can travel around the tire, otherwise they will gouge the treads and tear them loose. Take off the chains as soon as the necessity for their use has passed. On a soft road the chains sink into the ground and do not hurt the tires but when you get on a hard road it is another story.

Winter driving is usually wet weather driving, and consequently the treads should be watched even more carefully than in dry weather for the appearance of cuts that may let water get to the fabric. Even the small holes due to punctures ought to be fixed right away. It will be economy to pay the repairman for doing the work if you do not have one of those small, inexpensive vulcanizers that are so easy to use for this purpose without even taking the tire off the wheel or letting the air out.

At all times endeavor to keep out of ruts. It is better for your tires and for the rest of the car, too, to drive on the rough part of the road than to have the sides of the ruts grinding away at the sides of the tires and throwing the car from side to side.

Street car tracks are even worse than ruts. Keep away from them. The tire is distorted and bent as it runs along the rail groove, and on curves and crossings especially there is almost always a knife-like fin sticking up to cut the tread all the way around. This cutting is exceedingly likely to occur in wet weather.

Don't apply the brakes suddenly enough to lock the wheels and drag the tires. Your car will come to a stop sooner if you tighten the brake to the point where the wheels just barely revolve, and your tires will not suffer. Remember that it is the friction of the tires on the road as well as the grip of your brake-bands that stops the car, so don't try to stop all at once. Plan to coast to your stopping point and use the brakes as little as possible. Be sure that your brakes are working equally, or one tire is going to do more than its share of the work and will suffer accordingly.

Application of Tires.

First be sure that the rim is clean. Examine the inside of the casing to see that there are no particles of dirt, or possibly the nail that caused the puncture, remaining to damage the tube. Put into the casing enough soapstone or graphite to cover the inside well and prevent the tube from adhering to it even after long service. Be careful not to use too much soapstone as the excess is likely to collect in one spot, harden and hurt the tube.

Before placing the casing on the rim inflate the tube until it is round and run your hand around inside to be sure that it isn't twisted or wrinkled. If your tire is equipped with a flap be careful to have the flap free from wrinkles or kinks. Never insert a tube in a casing that is damp, and never put in a tube that is still damp from testing for a puncture.

*Editor's Note.—Mr. M. E. Faber is the Advertising Manager of the C. A. Shaler Co. and is considered a high authority on tire construction, repair and vulcanizing. Mr. Faber has written for many book publishing houses and delivers lectures at the University of Wisconsin. We are printing this series of articles for our blacksmith readers because of late we have had many calls for vulcanizing information. Many smiths repair tires as a side line and find the work pays well.

The Rock Drill Blacksmith

Part VIII—Methods Adopted in Welding Rock Drill Steel and Fluxes Commonly Used

People nowadays are often in doubt as to what is meant when the word "welding" is used. Does it mean the process of uniting by means of gas flames—the new method which has in recent years come into vogue? Or does it mean the procedure used by blacksmiths from time immemorial? At any rate, what the writer means by the sub-title Welding Rock Drill Steel is this old-time process applied to the steel used in rock drills. As this kind of welding is a very ancient thing, perhaps a word of explanation may be due as to why the author does not take it for granted that this style of welding is very well known to all blacksmiths.

Let me tell a little story substantially as I recollect it. A distinguished lawyer was engaged in a case before that august tribunal, the United States Supreme Court, and was addressing the court. In the course of his address, he laid great emphasis on certain points of law which were very elementary and such as all lawyers might be expected to know. And yet, there he was, explaining some of the A B C's of law to this great court.

As you may know, things go on in the Supreme Court in a very courteous manner; so the lawyer was allowed to proceed for some time with his explanations of the kindergarten part of law. But after a time one of the venerable judges interrupted the lawyer to say:

"Mr. Smith, don't you think that perhaps this court may have already heard these principles of law, and that you could well assume that all of the judges here are very well acquainted with them?"

The lawyer promptly answered, "No, sir, I do not."

"Why, why, my dear sir, how is that? You can certainly assume that we all are thoroughly acquainted with the lessons that belong in the infant class at a law school."

"Well, your honor, I assumed all that when I was addressing the court below this. If it hadn't been for that, I wouldn't be here now with an appeal, but would certainly have won my case in the lower court."

Now, I don't know whether this story is 100 per cent true. At the same time, it illustrates a very useful point. Never be too sure that the other fellow, to whom you are explaining something, understands the basic facts. You may wake up suddenly and find that he is weak at some point. I do not believe a good master blacksmith, who is rightly disposed, will very seriously object if I go over the details of ordinary welding. He may find something new.

Welding Steel.

Steel is good, weldable metal. That is, it is possible to make steel unite to steel at a point a good deal below the melting temperature. This is a very valuable quality indeed. The welding temperature may be had at an ordinary forge. Whether one could easily

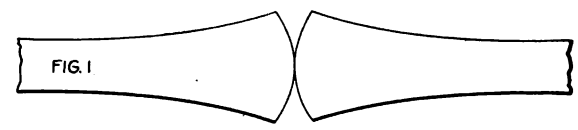


Fig. 1—The Butt Weld.

get the melting temperature may be doubted. The union is made, in ordinary welding, by heating the two surfaces to the welding heat and then forcing them together. Wrought iron requires a higher heat than steel. Probably, the different varieties of steel can be welded at various temperatures, dependent upon how much carbon they contain or some other varying feature.

Probably an average temperature for steel will be about 1,950 degrees, F. This is a light yellow. It is not to be confused with white. The smith should exert himself to know what is the lowest heat at which a given steel can be welded. Then he should use this lowest heat. I venture to say that a good many rock drill blacksmiths could weld at lower temperatures than those they are now using.

Advantages of Low Welding Heat

The drill steel used at a mine or quarry will probably, for the most part, be of a single kind. It will therefore be worth while for the blacksmith to get any advantages that are possible. For example, if he finds out the very best heat for welding the particular steel used by his mine or quarry, he will then be able, without further experi-

menting, to do a very great deal of work at advantage.

For it is really advantageous to use a low temperature. It is well known to many that as steel is heated up above a medium cherry red, the grains grow, and that the bigger they get to be the greater will be the damage to the quality of the metal. The very lowest welding heat possible will mean that right at the weld itself the metal has had very large grains and that to either side of the weld the grain size has also been pretty large. In fact, the grain size will be enlarged as far away from the weld as medium cherry red is located.

In welding together two pieces of drill, the grain enlargement may involve a very considerable distance on each piece. From medium cherry red to light yellow may cover quite a bit of steel. All this steel, on both pieces, is damaged steel, for the reason that big grains means loss of tensile strength and probably other qualities.

The advantage of using as low a welding heat as possible means two things: (1) a shortening of the amount of metal involved, and (2) a getting rid of the worst damaged part. As to the advantage of shortening the metal involved, it will be well to note that less metal will be colored with heat, if the end is heated, say, to a full yellow, than would be the case if the heating of the end went up to light yellow. As to the second point, it

Fig. 2—Scarfed Ends for Lap Weld.

will be evident that, if the heating does not need to go to a full yellow, but stops short, then all the full yellow portion which would contain the biggest grains is disposed of.

Now a good deal of rock drill steel used in the various mines, quarries, etc., may very well be weldable at a lower temperature than that in use. If so, then a double advantage would be gotten by using this lower heat.

Experimentation Easy.

To experiment and see whether the particular steel used by his people may not be welded at a lower heat should not be a difficult matter for the blacksmith to cover. Let him heat two pieces to a lower heat than usual and test the matter out. He may find that, with better scarfing, cleaner surfaces, and better hammering, a distinctly lower temperature may be used. Further, while the smith is seeking improvement in respect to temperature, he may also find that he need not heat quite as much of the metal to the temperature of welding. Really, the only locations where union actually occurs is on the surfaces.

Of course, it may be necessary to heat more than a thin film to the welding temperature in order to cover the loss of heat which occurs in transferring from the fire to the anvil and in getting ready. The welding heat must be existent when the two surfaces are being forced together by the hammer. It is granted, then, that the metal must have more than a thin film heated to the welding point. But it may very well be that the smith will find, upon paying attention to the matter, that he can lessen the amount of metal involved in the high heat.

Preparation of the Ends.

There are quite a number of styles of welding applicable to the rock drill rod. But some will suit the situation better than others. There will be two principal kinds of work, dependent upon whether the rod is absolutely solid or whether it is pierced by a hole that has to be maintained. First, let us consider solid rod.

The Butt Weld.

The authorities on welding do not seem to be of one mind as to the comparative strength of the butt weld. J. F. Sallows, p. 33, "The Blacksmith's Guide," says: "The butt weld is the strongest weld for heavy, round stock, and is the easiest weld to make." J. L. Bacon, author of "Forging," makes, on p. 19, the statement: "A butt weld is not as safe or as strong as a lap weld." Ernst Schwarzkopf, author of "Plain and Ornamental Forging" and instructor in forging in Stuyvesant Technical High School, New York City, remarks, p. 88: "A butt weld does not insure a strong and safe weld, consequently it should not be used if avoidable."

T. F. Googerty in "Practical Forging and Art Smithing," p. 31f., says: "Iron may be welded by butting the ends together. In doing this the bars must be long enough so that they can be handled without tongs. For instance, two bars of one-inch round stock, one five feet long and the other shorter, are to be welded. This size is about as light as can be welded by this method. . . . This method makes a good weld, providing the heats are clean."

There is a good deal of contradictory statement in the foregoing. Mr. Googerty does not speak decisively, says only that it is possible to get a "good weld." Messrs. Bacon and Schwarzkopf speak decisively, however, against the strength and safety of the butt weld; while Mr. Sallows, just as decisively, commends it, "for heavy, round stock," as the "strongest."

The truth is probably this. The butt weld is a strong and excellent weld when made with intelligence and skill, but is not the best where skillful care and attention can not be counted upon. Mr. Sallows may very well be talking about welds he himself was able to make, while the others may not have had their own personal work in view.

If the butt weld is to be used, the ends of the pieces are to be rounded as in Fig. 1. Upon being heated to the proper point, the one piece is driven, with hammer or sledge, lengthwise against the other.

The effect is to upset both ends and produce a bulge all round. This is so managed as to eliminate the seam. Clean surfaces and skilful handling of the hammers may be counted upon to get a good union and the disappearance of the seam. The work is then heated and the bulge reduced and disposed of by the use of the hammer.

The Lap Weld.

One has in the lap weld an undoubtedly strong form. This may be understood from the fact that this type of joint has the sanction of the United States naval authorities, being used in making hand-welded chain cables of large size.

For example, at the Boston Navy Yard

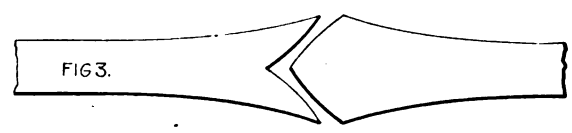


Fig. 3—Ends Prepared for a Split Weld.

3½-inch iron (not steel) bar was welded into links in making protective cables to stretch across the locks of the Panama Canal.

To make a lap weld of approved style, the two ends are properly scarfed. That is, they are hammered down to form wedge-like forms. One is lapped over the other as in Fig. 2, and the weld made. It is important that the two surfaces of the scarfed ends, which are welded together, shall not be flat nor concave.

They should be rounded, somewhat like the under side of the bowl of a tablespoon. When one is laid upon the other, there is only a small contact. This is what is wanted—or, at least, part of what is wanted. When the hammer blow is struck, it should come upon the outside in such way that the hammer strikes just above the place of contact. The effect is to start union here. The smith then works from this point out.

What it is desired to accomplish is to force slag, etc., out of the weld. This is very important, and is facilitated by putting convex surface to convex surface and then making the weld. It is considered good practice to upset the ends before scarfing. The object in view is to provide an extra amount of metal at the welding point to cover losses.

Thus the hammering to effect the weld may reduce the cross-section. Then there may be some loss from scaling. If the work is not too large, a hammer with a ball-pene may be advantageously used to do the scarfing. The pene end is employed to do the rough forming of the scarf and the flat face to do the finishing. The length of the scarfed part of the bar will naturally vary with the customs of different blacksmiths.

If the scarf end is made of a length equal to 1½ diameters of the stock being used, good results may be expected. Thus if the solid bar being used is 1½ inches in diameter, the scarfed end may properly be 2½ inches long.

The Split Weld.

The split weld form is suitable for solid stock of round and hexagonal cross section. One, or even both, ends may be upset. The one end is then split to produce a kind of Y form as shown in Fig. 3. The other is given a double bevel like a cold chisel. Both pieces are heated to the welding temperature and then the one is driven against the other. Then the arms of the Y are beat down onto the bevel faces of the other piece.

It would seem advisable here, as well as in the case where plain scarfs are made, to round the faces which come into actual contact, in order to force out dirt, scale and the like.

This type of weld is understood to be especially suitable in cases where tool steel (high carbon steel) and low carbon steel are to be joined; or where high carbon steel is to be united to iron.

Fluxes.

The object of a flux is to clean off the surface. It performs no service, in making the union, other than assisting in making sure that it is steel that is next to steel or iron that is next to iron. A piece of scale in between the two surfaces would not be pure metal. Borax is the thing to use for rock drill steel. Sand is sometimes used as a flux, but it is scarcely to be commended. The flux has to melt to do its work properly. This means practically that the metal on which it is put must be heated up beyond this melting point whether such a high heat is really needed for the actual welding or not.

Borax melts at a lower heat than the usual sand. When sand is used, especially with steel, it may very well happen that the steel will have to be heated up beyond any welding necessity merely to get the sand to flow. This means bigger grains and consequently greater damage to the steel. Use borax and reject the sand for drill work.

When borax is bought from a dealer, it is likely to contain more or less water incorporated in its mass. When borax is used in this condition as a flux, it will boil and foam on the metal and perhaps drop away from it. The blacksmith may put his borax in proper shape for use by driving off the aforesaid water. This may be done by heating it up to a red heat and then permitting it to cool. It will then be in a condition resembling glass. It may now be powdered and used as a proper flux.

It is doubtful whether there is any substantial advantage in mixing anything else with the borax. If, however, the smith desires a mixture, he may weigh out four parts of borax and one part of sal ammoniac, both in powder form, and thoroughly mix the two. A good way to mix is to sift through a sieve at the same time and repeat this operation eight or ten times.

An approved way to use a flux is to spread it on the surfaces just before they get to the welding heat. The metal is then returned to the fire and the flux allowed to do its work. Apparently, what it does is to unite with the scale and run off the surface, leaving perhaps a coating which serves to prevent the formation of more scale.

I may, I think, advantageously quote from the experienced blacksmith, J. F. Sallows, at this point: "In placing pieces in the fire after scarfing and dipping in the flux, always turn them so the scarf will come uppermost, thus keeping the scarf away from the blast and preventing the flux from dropping off into the fire; but just before the pieces are ready to be removed from the fire, turn the scarf down, and when taking out to weld, tap lightly, to shake off the dirt, but not hard enough to remove the flux."

But perhaps the point at which most smiths fail in connection with ordinary weld-

ing is with the fire itself. Whatever necessity there may be for a clean fire or a non-oxidizing fire, when forging and hardening are being done, is still more distinctly true when welding is in question. The metal is heated to a much higher point for welding and is in consequence undoubtedly in more danger from sulphur, oxygen and the like.

Fuel containing either no sulphur or a very insignificant amount is the thing. Such fuel may be wood charcoal, anthracite coal and perhaps coke. If possible to heat without exposure to the bare flame, then that is better yet. Or, if a flame must come into contact more or less, then the best thing is to shape the forge or the furnace so that there is a considerable distance between the bed of coals, the oil burner, or whatever supplies the heat. The reason is this: It is desirable to give the gases time and opportunity to burn and thus suffer destruction of the power to do harm.

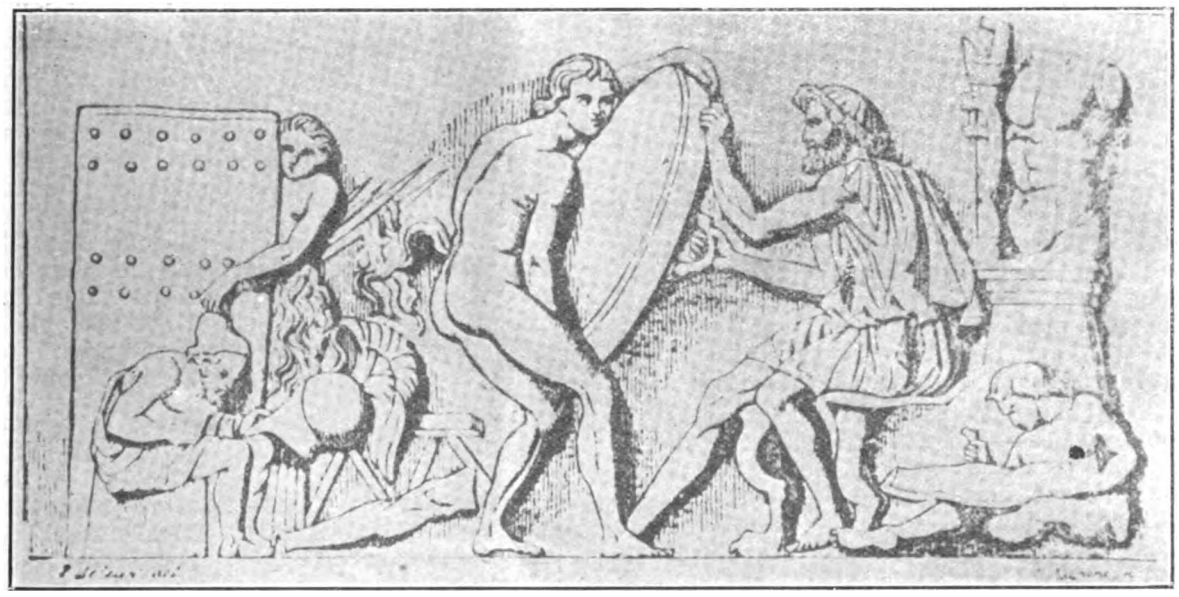
(To be continued)

An Illustrated History of Smithing

Part IV—Historical Drawings Showing Smith Work As Practiced By Early Greeks and Romans

BY H. H. MANCHESTER

Several highly interesting pictures of Greek and Roman smithies have recently come to light in addition to those which we published about a year ago, and serve to clarify our idea of conditions in that period. The first noticeably important improvement in the apparatus used by the blacksmith in ancient Greek days was the high or stack furnace. This is illustrated in one of our pictures. The furnace is in the form of a hollow cylinder probably constructed of pottery. The fire may be seen at the bottom of the stack.



A Greek Plaque Representing Vulcan Making the Armor of Achilles. Note the Furnace and the Assistants at Work on the Helmet.

Behind it, it is very important to notice the goat skin bellows, which may be identified by their irregular form. One of the smiths may be seen extracting a hot lump from the furnace by means of a pair of tongs. These tongs, as will be observed, are jointed near one end, thus differing from the Egyptian pincers, which were of the spring variety.

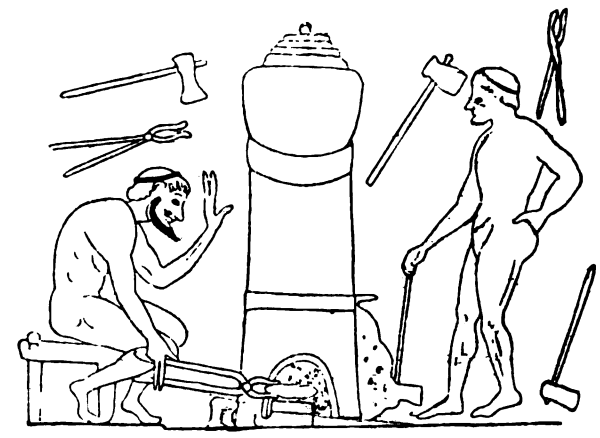
At the top of the furnace is what apparently represents a bowl or kettle. This was probably used to melt the softer metals, as for instance copper and tin in the making of bronze. One curious feature about this kettle is the very top. The step-like form of this suggests several different covers, each larger than that above, which could be put on or taken off to help regulate the draft. It is also worth noting that the hammers and axes had long handles in contrast with the earlier Egyptian in which the handle was the smith's own arm.

Besides the goat skin bellows, shown in this picture, the bellows constructed of two pieces of wood, much as the hand bellows today, are said to have been invented by Ctesebius, who lived about 500 B. C.

The story of the fashioning of the armor of Achilles by Hephaistos, or Vulcan, must have been a popular theme for Greek and Roman artists as there are several representations of it still extant. In the one which we are reproducing the furnace seems to be rectangular in shape with several rows of holes at the top and part way up to afford a draft. Peering from behind it may be seen a workman whose job it was to blow the bellows. He seems to be grabbing off the cap of another workman who is engaged, with a hammer and punch, in finishing the plumed helmet of the warrior. The famous shield is shown in the middle of the picture, while at the right an assistant is working on one of the greaves.

A little frieze, which is in itself a good example of the metal work of the Graeco-Roman period, and at the same time illustrates the methods of operation, depicts several cupids that work as smiths. The form of the anvil is interesting, and it is curious to see that two of the smiths are striking in quick succession, much as might have been done in modern times. How true their blows must have been is evinced by the fact that another cupid is holding the fish, which is being hammered out, by his hand alone.

At the right another cupid is finishing the embossed figure on the shield. It is important to remember that during the whole Graeco-Roman period, the smith was not yet specifically a blacksmith. This was partly due to the fact that bronze was still used more than iron or steel, and that the smith of the time usually wrought in both metals.



An Ancient Greek Furnace. Note the Goat Skin Bellows Behind It, the Cupola Form, the Pointed Tongs and the Long Handled Hammers. The Kettle at the Top is Probably for Easily Melted Metals.

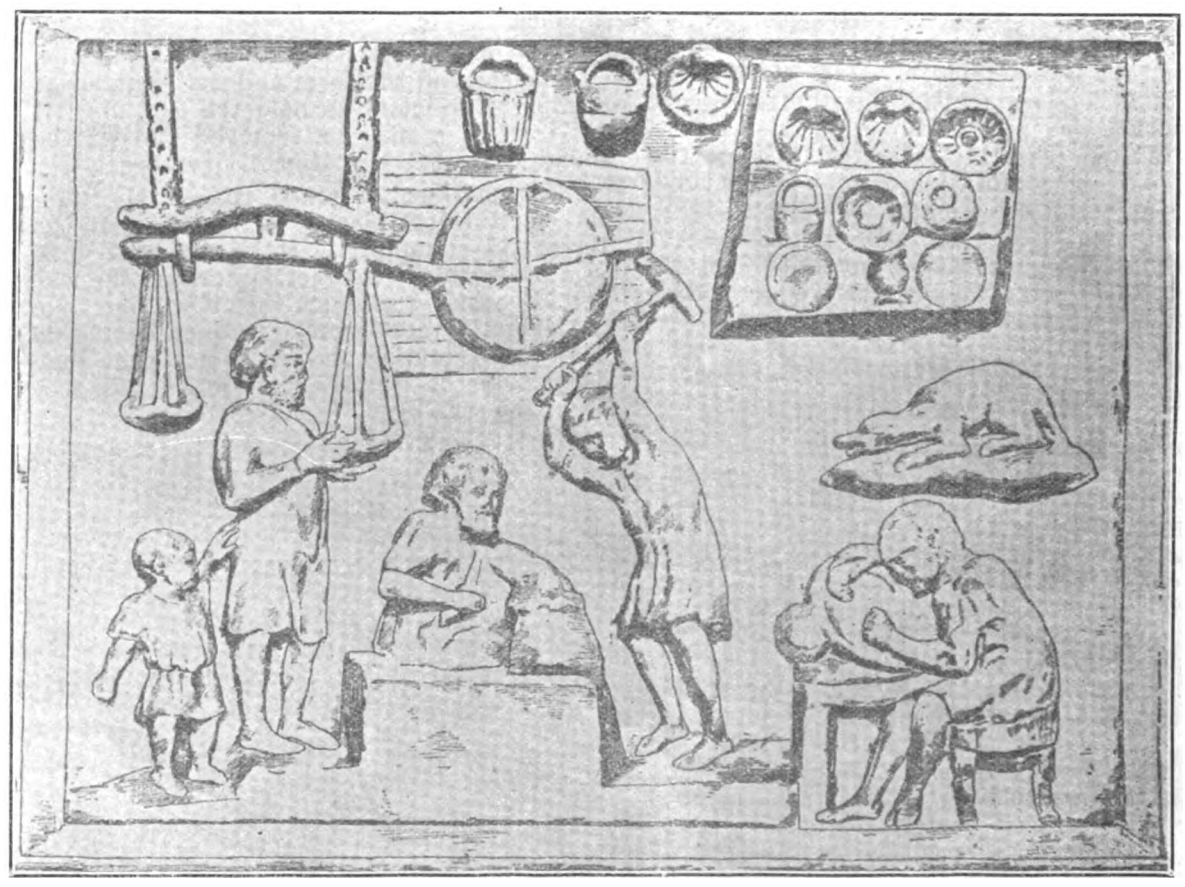
The shop of a smith, where work is being done on some metal which is capable of being wrought cold, is pictured in a small plaque of the Roman period. The anvil and the piece which is being hammered are somewhat obliterated, but the sledge hammer of the workman is plainly depicted.

At the right a workman seems to be finishing a bowl or vessel. Other vessels and a pair of scales, which were presumably made in the shop, were hung upon a wall in the background.

The Greek and Roman smiths had plenty of products upon which to busy themselves, some of which were either new or else far more highly developed than previously.

While bronze statues had been made by the Egyptians, the Greek and Roman smiths brought them to a perfection never before known. Bronze furniture such as chairs and couches had also been made by the Egyptians, but was much more common in Roman times.

Bronze shields, greaves and other defensive armor were made by the Assyrians, but were still further developed by the Greeks and Romans. Among them locks and keys reached a development never even approached before, and may be considered practically a new field at that time. The keys were comparatively ornamental and considerable larger than at present, although the



Roman Smiths Working Bronze or Other Metals Which Could Be Hammered Cold.

locks were themselves much simpler and easier to pick. In general both locks and keys were of the variety common a generation or two ago.

Another new field for bronze and iron work was the ornamental fence, of which there are several pictures which date back to Roman times.

Still another novel field came from the baths which were first greatly developed in the Roman period, and required various paraphernalia in the way of kettles and pipes.

Iron and steel were used particularly in the

The Tombstone of a Smith Who Was Formerly a Slave. Gallo-Roman Period.

blades of cutlery. One new invention was the crossed shears which were a decided improvement over the old spring shears still employed not so long ago for the shearing of sheep. Most sharp-edged tools were also sometimes made of iron or steel, although the use of bronze had not by any means disappeared.

It is well to remember that the smith of the period was in general either a slave or freed slave. This is illustrated in a monument in memory of a Gallo-Roman smith who apparently is given a band around his right ankle to signify that he has been a slave. At all events, his garb as well as that of all of the other smiths in the pictures we have been reproducing belongs to that class.

PHILIP S. DYER DIES.

We are sure that, with us, the trade will mourn the death of one of its oldest friends, Mr. Philip S. Dyer, the president of the American Horse Shoe Co.

Mr. Dyer was the son of Col. G. W. Dyer and came from a well known New England family. He was born January 14, 1857, at Calais, Maine, and received his education at the public schools.

As a young man, Mr. Dyer became interested in the lumber business, but later, in 1879, associated himself with Thomas A. Edison in the laboratory at Menlo Park, N. J. As representative for T. A. Edison, Mr. Dyer shortly after went to Europe.

In 1892 Mr. Dyer returned to the United States and founded the American Horse Shoe Co., with which he has been identified ever since. He was well known in the industry, being associated with many prominent firms in directorial capacities.

Mr. Dyer was a figure in public life and is mourned in many circles.

Tips From the Old Man

The Old Time Blacksmith Gives the Young Man a Few Valuable Tips About His Work.

BY JAMES F. HOBART

"Let's go at this spring business right," said the "Old Man" one day as the blacksmith was taking down a spring with two broken leaves in it. "What kind of steel are you going to make that new leaf of?"

"I don't know," replied the smith, "whatever kind there chances to be in the stock rack, I suppose. Does it make any difference?"

"I should say yes," the Old Man replied. "Springs, nowadays, are made of special steel which contain, within the make-up of the bar, all the tempering necessary. Procure a bar of this steel from your dealer and all that is necessary will be to cut off the proper length, forge the ends by plating and pointing them, punch in the necessary holes, drill the bolt holes if any are necessary—which I rather would be absent than in my springs—and then you only have to form the leaf to the proper curvature and then put it in place under the automobile."

"How," said the smith, "can the leaf be formed to the proper curve? Seems to me that would be a 'ticklish' piece of business. What is the best way of doing that job?"

"It's very easy," the Old Man replied, as he lifted the shop cat out of his easy barrel-chair and sat down for a smoke—"it is very easy to make a form for any shape of spring leaf. Take a piece of half-inch by one and a half-inch steel, black iron, 'slay-shoe' steel (Fig. I at A) or any kind that is at hand. Cut off a piece a trifle longer than the spring leaf (B) and bend it very carefully to the curvature required by the new spring leaf.

"Next, heat the new and finished leaf to a good red heat—not a white heat or a 'cherry red' but to a good mellow red. Then clamp the hot leaf against the cold form, using a half dozen pairs of tongs or clamps (C) to press the leaf against the form. Place one pair of tongs or clamps near the center of the spring, say five inches from the center, squeeze the leaf against the form and slip a ring over the tongs—log or clamp to hold them firmly in place. Then put on another pair of tongs or clamp the same distance the other side of the center of the leaf, ring these tongs also, then put on two pairs more tongs or clamps on either side of the pair already in place.

"That makes six pairs of tongs or clamps on the leaf and the form and that number of clamps is sufficient to hold the leaf until it cools, when it may be removed and will be found formed to the proper curvature.

"But just keep in mind," the Old Man continued, "that the placing of the leaf upon the form and clamping it there must be done in a pretty lively manner, otherwise the leaf will have cooled so much that it will not take the shape of the form. Two men should do the tongs-clamping and clamp act, then they can be put on quickly, before the thin leaf cools appreciably.

"No! Don't try to do any hardening or

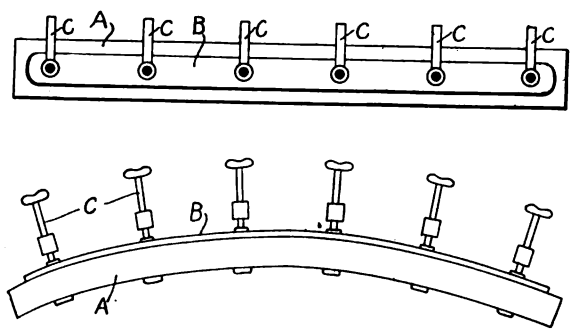


Fig. 1—Shaping a New Spring Leaf.

tempering. Provided you have the right kind of steel, made for automobile springs, just forge, finish and form as above described and the 'temper' will take care of itself. Yes, good springs can be made of carbon or 'cast' steel, but such springs require tempering and a fire much larger than the smithshop can show, is necessary for heating springs for tempering. Therefore, get special spring steel, go ahead as I have told you and the springs you make will be good!"

Having thus delivered himself the Old Man scooped three kittens out of his easy barrel-chair and inserted his own body before the kits could scramble back again.

A Sprung Service Brake.

A car came into the shop with the left side service brake so badly "sprung" that the band hung halfway off the drum on the inner side of the brake—the side away from the wheel. The smith was figuring how to get the brake strap off so as to straighten the end of the plate to which the brake was attached.

The smith found that the plate was riveted to the rear axle mechanism and was studying how to proceed next, when the Old Man got up out of his chair, looked at the bent brake and said, "just wait a bit."

The Old Man then went to the stock rack and picked out a piece of one-half inch hexagon tool steel about two feet long, hunted out a bit of chain which was large enough so the bar of steel would pass through the links. Then he went to the automobile, told the smith to take off the link from the bent brake. After this had been done, the Old Man passed the rod underneath the plate lug and passed the rod through the chain and brought the latter up behind the bent plate.

An old ⅜-inch bolt chanced to be lying on the floor. The Old Man put the bolt over the

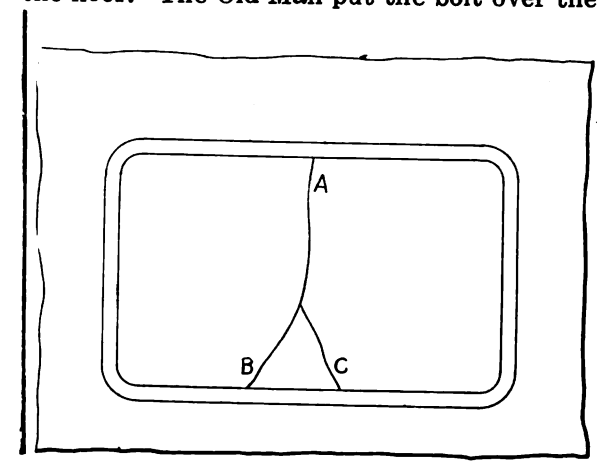


Fig. 2—Broken Rear Curtain Light.

top of the brake lever housing in such a manner as to engage a link of the chain and to make the chain fast to the housing. Then the Old Man, holding the bolt, which he was able to do by the great leverage with which he had attached it to chain and housing, told the smith to "heave on the rod." This the smith did, lifting with all his might and making two or three tries at it before the Old Man said: "There, that'll do." Then the brake band was found to hang true upon the drum. The bent plate had been straightened.

"I've seen that trick done before," the Old Man said, as he went back to his chair. "One day I got caught in a bad storm, in a clay country, where the roads soon got full of mud as thick as cream and as slippery as glass. I stopped to put on the chains, and being in a hurry, and unable to move the car by hand, I had to lay the chains out and pull the car over them by power.

"Well, the car came over the chains all right, but I couldn't stop as I wanted to and one chain caught on the tire, came up over the wheel and wound up in a tangle over the service brake and bent the plate almost exactly the same as this one was bent.

"I managed to get home, and went to work to straighten that brake. If there had been a large monkey wrench handy I could have done the job with that. But the largest wrench I had was nine inches long and it was no good for that heavy work.

"Just then I saw a whippletree hanging to the slats of the corn crib in which I kept my

machine. Instead of rings in the ends of the tree, for trace chains, there chanced to be stout hooks to which either trace chains or leather tugs could be attached. Well, I put that whippletree under the plate lug, same as I did the steel bar. The hook in the end of the tree came just high enough above the brake lever housing so that I could get an old bolt into the hook over the housing, same as we did on this job. Then I had my man heave on the whippletree for a lever. And he did heave, until suspender buttons flew around, but he straightened the plate lug, same as we did, a few minutes ago!"

Repairing a Rear Curtain "Glass."

"Say, Mr. Smith," said the driver of a four-passenger car which had just stopped in front of the shop—"can you help me out a bit? Just look at the celluloid window in the rear curtain of this car. The wind is coming up and if I drive with the window in that condition it will be torn all to pieces before I get back home. The wind will get under the torn edges and tear the celluloid all to ribbons. Can you fix it a bit?"

"How about this, Dad!" called the smith to the Old Man who came out, looked at the curtain window and said to the smith: "Get me eight good sized common pins, then plane a piece of soft wood board and saw it out the size of the window. John!" the Old Man called to the boy: "get an old three-corned saw file and grind the tang sharp, slim and square to make some holes with."

The celluloid was broken as shown at A B C, Fig. 2, one crack extending clear across, about eight inches, the shorter crack C, running into the other crack as shown. "How did you do that?" asked the smith of the car driver.

"Why," said the driver, "last night I got stuck in a clay-hole and had an awful time. I was in a hurry to get some tools and threw the rear cushion up so hard and far that a corner of the cushion struck the window and 'busted' it as you see. I never had that happen to me before—and it won't happen again."

"Here are the pins, Dad," said the smith as he handed them to the Old Man who at once proceeded to cut off the heads and points as shown at D and E, Fig. 3. Then he seized each piece of brass in a pair of plyers and bent both ends of the wire as shown at F and G, forming some very "long-waisted" staples. Holes were drilled in the celluloid, the staples inserted and then they were hammered down as shown at H and I, holding the celluloid securely and preventing wind-currents from getting under the torn edges and "whipping them to a frazzle."

The piece of board having been planed smooth and sawed to fit inside of the setting N, Fig. 4, the boy was given the task of holding the board securely in place while the smith used the sharpened file-tang to drill holes J and K, spacing the holes apart exactly the length of one of the staples, which was done by making one hole, inserting therein a staple-leg and then marking accurately where the other end of the staple touched the celluloid.

The pairs of holes were also spaced as evenly apart as possible and as fast as a pair of holes was drilled through the celluloid, the staples were driven in as shown at L and M. After all the staples had been inserted, the boy was directed to very carefully remove the piece of board, to take it off very gently and the smith tapped any staple which chanced to stick, so the board was removed leaving all the staples hanging in the celluloid.

"Now, put the board back on the other side of the curtain," said the Old Man—"then bend down the end of the staples as at O very carefully. Better hold on to one staple leg while you bend the other," he continued, "then there will be less danger of driving the wire sidewise and tearing the celluloid. After one end of a staple has been bent over it will hold itself while you bend over the other end and you can do a good job without splitting the celluloid through any of the holes.

"Here! Scat you beast!" called out the Old Man as he started to rescue his paper of tobacco with which one of the kittens was playing tag around the barrel easy chair. "Beats all what fool cats and fool folks there are in this world"—he snapped as he rescued his tobacco and sat down to fill his pipe—"'nan I shouldn't be surprised some of these fool days to see fool men taking fool cats out to ride in autos, same as some fool wimmen take out fool dogs!" And the Old Man settled down for a quiet smoke.

"Knocking Out" a Knock.

"Say, you Auto-Sharps," called a man from an auto, stopped before the shop, "can you folks take the knock out of my engine? They tell me at home that it is caused by carbon deposits and there may be something in that for after I have the carbon burned out, the engine works well for a little while but very

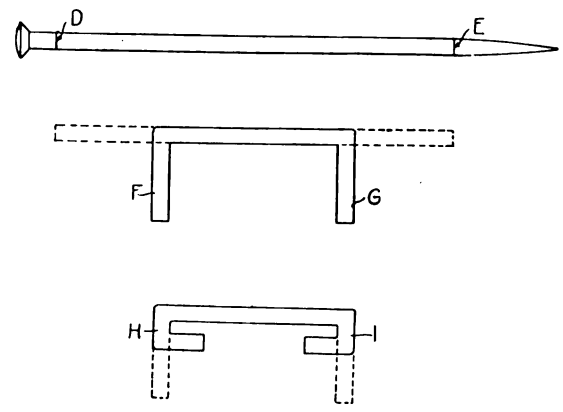


Fig. 3—Pin Staples.

soon it begins to thump again and the longer I run the car the worse the knock gets!"

"How does the engine crank?" asked the Old Man as he hung his pipe on a nail keg and started down to the car. "Notice any difference in the cranking of the car just after the carbon has been burned out and after the engine gets to knocking?"

"Why—yes—come to think of it, there is a difference. The engine cranks a lot easier after the carbon has been burned out and it is all I can do to pull her over the center now, and the engine sure knocks badly."

Too Much Compression.

"All right, then," said the Old Man, "we can stop that knocking and carbon burning all at the same time. It will take about two days to do the job and we shall have to take down the engine and make quite a lot of adjustments. We will take the cylinders off, put a fiber washer under each one, make new connections where necessary to suit the different location of the cylinders, and when you start again I assure you there will be no knock due to carbon deposits!"

"How do you figure it out that way?" said the auto driver. "What good will it do to

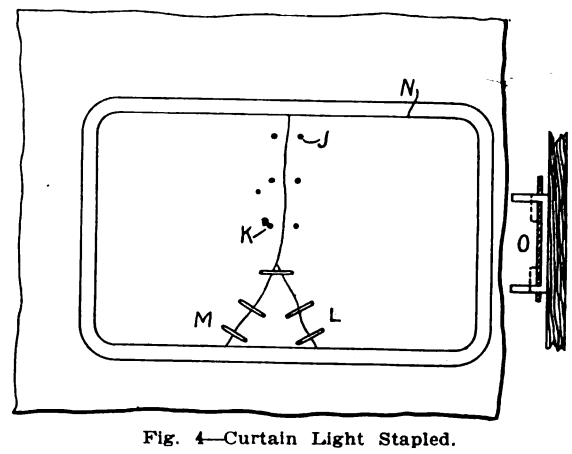


Fig. 4—Curtain Light Stapled.

raise the cylinders a little? I don't see how that is going to stop a carbon knock?"

"It is this way," said the Old Man; "the manufacturers of your car, or of the engine, made the cylinders with just as little clearance as possible and not pre-ignite the compressed charge of gas and air. This was evidently done to gain as high compression as possible. When the interior of the combustion chamber becomes lined with carbon, the compression space is reduced and the charge pre-ignites from compression, forming the nasty knocks.

"When I raise the cylinders, the combustion chamber is enlarged, the compression becomes a little less, the engine cranks easier and the danger of preignition is removed, together with its accompanying disagreeable and dangerous knocking and thumping. That's what will be accomplished by raising the cylinders a little," said the Old Man as he reached to his pocket for his pipe.

"That sounds good to me," said the car driver. Go ahead and get ready. I will be back past here in an hour, as soon as I can get somebody to take me to town, and then I will leave the car for you to fix up. Suppose you will guarantee that the treatment will cure the knocking?"

"It sure will," said the Old Man. "It will cut down the power of your engine a very little, compared with what it is when the cylinders are clean, but the power after the change which I will make will be more than you get now, when the combustion chamber is covered with thick carbon, and, say, use a leaner mixture and you will not be troubled with carbon in a hundred years after the combustion chambers have been enlarged a trifle. Bring on your car and we will put you on easy street where they don't have carbon pavements!"

If you like this magazine and feel that it is useful and interesting, the one best way to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Blacksmith and Wheelwright.

THREE HANDY CHUCKS.

Perhaps there will come a time when someone will mix an alloy that will be so hard it will last forever, but until then the mechanic will have to be content with lathe tools which wear and break.

No part of a lathe receives such constant usage as the chuck and after the jaws have

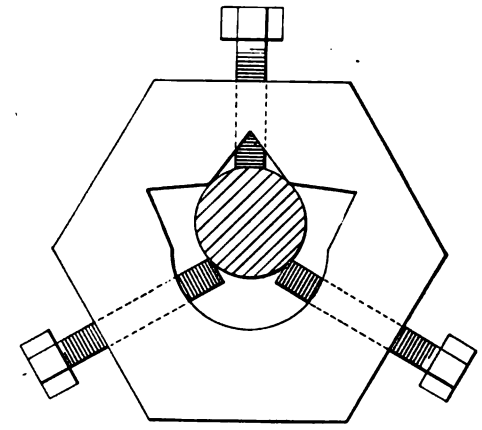


Fig. 1—Small Chuck Made form a Nut.

been set up many times against steel pieces, they are blunted and will not hold small objects.

If the smith is called upon to turn pieces or rods of less than half inch he should be supplied with small chucks which he can make very easily himself.

The chuck shown in figure 1 is made from a ¾-inch hex. nut, the inside of which has been cut by three wedge-shaped slots. If the slots are properly located opposite the two side screws and over the middle screw practically any size stock up to the limit of the nut may be handled.

In figure two are shown two types of chucks which may be used in the lathe chuck

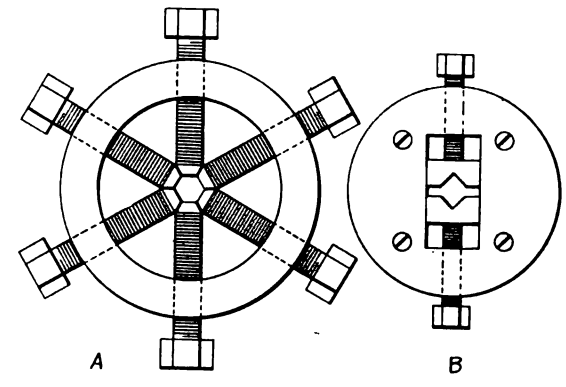


Fig. 2—Two Easily Made Chucks.

or bolted to the face plate. The first, shown at A, is made from a one-inch steel ring, while the one shown at B is made from a flat steel circle.

THE BLACKSMITH & WHEELWRIGHT

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Our Editor's Letter.

JUST about this time of the year all of us feel that if we had plenty of extra money we wouldn't bother to put on our overalls or office coats but would spend our time sitting in the sun on the south side of the house. Leastwise, that's the way I feel, and I think most of the readers are affected by these warm spring days just as I am.

Notwithstanding this general laziness, you and I, brother reader, have work to do and being Americans, we don't yield to the temptation but we buckle down to work just as usual.

There is a class of people, however, who are lazy by nature, who want to take advantage of our work and spend the money that we have earned. A class of men who are willing enough to divide our savings and so obtain a share for themselves, but when it comes to parting with any of their own—that is another question. They call themselves Bolsheviki and threaten to overrun the world.

We have a fair sample of what they can do to a country if they get into power. Russia never was afflicted with too much freedom, but under the old monarchial conditions, Russia was a Paradise as compared with what it is at present. It is not safe for one to go on the streets in that country.

Despite this horrible example, despite the murders of innocent people, there are a few people in this country who are frank to say that Bolshevism will soon visit us, therefore it is up to us to prevent such a fatality.

If we have accumulated a little money, by hard work, so we will not need to depend upon our neighbors, the county or the state in our old age, we do not want someone to take it away just because that "someone" has been so lazy that they have not saved anything in the past.

Bolshevism is a fine creed—for the man who has nothing. But if he has an extra suit of clothes he can't afford to adopt it or he will lose that extra suit. No matter how little a person may have, there is always someone who has less.

Riches are but comparative; in the eyes of an African you are wealthy if you have anything more than a string of beads and a loin cloth. But do you think that you should work twelve hours a day and share your profits with that African who has spent his time hunting or fishing? If your answer is "yes," then Bolshevism is a good creed for you to adopt. If your answer is "No," then you should discourage all Bolshevism.

If you are a good Bolshevik, you will set fire to your home and shop, because dwellings and buildings are a sign of wealth. If you are a good Bolshevik, you will purchase a gun and shoot every one who wears a collar or owns any property. If you are a good Bolshevik you will try to upset all law and order, you will kill and plunder, but you will expect to be killed or robbed yourself at any minute, for is not that what Bolshevism is?

The Bolshevists say that they will soon rule America—let's see that they suffer a disappointment. Let's show them that they can't instill their crazy doctrines into a nation of intelligent, cool-headed, honest people. But let's begin to show them now, we can't afford to wait until they have gained a foothold.

The Most Popular Topic of Our Discussions at Present.

DOUBTLESS all of us have openly discussed the biggest topic of the day, the League of Nations, we have our own opinions about it. Some of us think the scheme is visionary, others impossible, but we must all remember that nothing is impossible.

Let us consider just what might be meant by a League of Nations and how such a visionary league might be compared with present day conditions. Every individual in the country is subject to a general law which has been made by people elected or appointed for the purpose.

A person cannot start a street brawl or steal from his fellow man without being punished by the law. We admit that such a general law is necessary and we all do our parts in enforcing it. We admit that it is for the common good. We know that to a certain extent it restricts our personal liberty but we do not protest.

In the same way, the states of the country are forced to obey a certain code of laws. One state cannot infringe upon the rights of others. That code of laws is so drawn up that it takes into consideration the good of the greatest number.

Indirectly the individual is responsible for all laws. True, one cannot elect or appoint whoever one chooses for any political position, but every one has a voice in the appointment and the majority wins.

Such a state of systematic law we term as government. We admit it and we would not know how to do without it.

The various nations of our earth have realized that a government of some sort is necessary and working upon the same basis have decided that a government of the governments is just as essential.

Just as the individual is subject to certain state laws, so should the nations be checked by a master code, a set of laws that would govern the relationship of countries in so far as the rights of one country affect the rights of other countries.

If such a league existed in 1912, germany would have been in the same situation as the thief who enters your house at night, she would have been punished by the united might of all the other nations of the earth. She would have been hauled into court like any other common criminal and would have been the defendant in the case of Belgium versus Germany. The world would thus have been saved the cost of a four years' war and the destruction of valuable lives and property.

Like every other legal process, undoubtedly there would be those who would object, but in the main and on the average, laws would be made for the majority of the nations.

In discussing this subject, the League of Nations, therefore, let us be governed in our arguments by practical examples, the details can be worked out and will work out at a later date. At present we are mostly concerned in arriving at some sort of tentative understanding with the other nations.

Your Reputation Is Based Upon Your Responsibility.

THERE is a general tendency to-day, on the part of the average man, to shirk responsibility. How often one purchases an article or has a piece of work done only to find that the article or the work is worthless. When the article is returned or the worker criticized one is met with the question, "What do you expect for your money?"

For the past few years we have come to expect this treatment and have taken it as a matter of course. We have taken what we could get, paid the price, whatever asked, and if we were not satisfied, we have smiled and said nothing.

But those days have passed; we have no sympathy with the fellow who shirks responsibility for his work, we have no use for idlers. If a thing is worth doing at all, it is worth doing well—this is the present day spirit and the man who takes that as his motto will succeed.

Everyone should be willing to take the responsibility of their own work, it is what they are paid for. No matter whether one is driving a nail or building a wagon, there is no excuse for poor work. That being so, one should be willing to stand behind one's work, to be willing to say to the customer—"I did that and as far as workmanship is concerned, I know the product is the best on the market."

When a man comes into your shop and pays you to do a certain kind of work, either you must do that work right or refuse to accept the pay, for only upon that basis can you build a reputation.

Our Own Manufacturers Can Furnish Excellent Products.

THERE is one form of propaganda that is very annoying to the good American, the statement that "It is not as good as before the war because we cannot obtain such excellent dyestuffs or chemicals. Those products were obtained from germany and can't be duplicated by American manufacturers."

Such a statement, and one hears it on every side, should be questioned at every opportunity. It is not true, moreover, because American manufacturers can and do make just as good products as did germany, but the store clerk has adopted this form of excuses for his product.

If such an excuse is used to you—don't buy the product, go to some store that can furnish you with an American-made article that they are willing to vouch for. Above all else, be loyal to America and home trade.

Every time you discourage American-made goods you are catering to foreign trade. Ultimately our own manufacturers will be forced out of business and taxes will thereby be increased.

Let Us Know What Kind of Articles You Want Published.

AT the present time there are but few blacksmith books on the market, the young blacksmith, in learning his trade, depends largely upon the experience of his teacher and has no chance to study. This is one reason why there are so few expert smiths.

Horseshoeing is a science and requires a great deal of experience, if the work is to be done well. Just one little mistake, or one slip, and the horse is injured.

At present we do not receive enough letters relative to horseshoeing from our readers. But it is time for our readers to get busy and

send us some, so that we can publish them. It is our intention to run a series of articles dealing with scientific horseshoeing in the very near future, but we would like to hear from some of our readers first.

While you are writing the letter to us, you might give us a few suggestions for articles, undoubtedly you are looking for information along certain lines, and if so, don't hesitate to ask for it. We want to publish articles which will interest our readers, but we want to know just what the readers want.

In "Those Good Old Days" of Long Ago of Which the Old Timers Speak.

THOSE who are compelled to pay the exorbitant prices charged now for meats of all kinds will be interested to know what meat cost seventy-five or eighty years ago.

The editor and publisher of this journal recently came across a bill for meat which was delivered to his father, Thomas Richardson, in 1832. One item is 6 lbs. veal at 4 cents—24 cents; another item is 5 lbs. beef at 6 cents—30 cents; 4¾ lbs. pork at 10 cents—48 cents.

In those good old times it did not cost so much to live as it does now, but perhaps the people of those days had just about as much trouble paying their bills because wages were low and hours long, and money not easy to get hold of.

The writer remembers when carpenters and other mechanics worked twelve hours a day and thought nothing of it. It was the regular thing.

The value of scrap, whether in industrial works or in moral law, is on the same basis—we cannot waste the milk without losing butter.

The Metal Turning Lathe

Part 4—Shaping and Grinding the Lathe Tool, Cutting Threads, the Use of the Steady Rest and Correcting Centers.

The grinding will be a matter of resurfacing the top face and bringing it to a new flat surface parallel with the old. If the nose needs, however, to be heated for the purpose of reforging, we may have a good deal to do besides. It would seem advisable to seek to avoid all reforging if possible, in order to prevent warping and other deformations, which lead to the necessity for extensive grinding. Now it may happen that, when we regrind a dull tool, even though we grind only the top surface, we may heat up the edge enough to destroy part of its hardness. This will require that we reharden the tool. And rehardening requires reheating and possible warping.

Care in Grinding.

The thing to do, then, would appear to be to handle the grinding in such a way as not to affect the hardness. About the only sure and simple way is to grind in water. We may arrange for a stream of water direct onto the nose of the tool. Let this stream be rather a generous one, fully up to its duty of carrying off the heat generated by the friction of grinding. If this is done, we may reasonably expect that, in many cases at least, we shall have no other grinding to do after we are once at work than the mere resurfacing of the top of the nose end of the tool.

The grinding and regrinding will naturally result in wearing down the nose of the tool on top. We will need to pay attention from time to time to the matter of making sure that this top surface is exactly on a level with the axis of the prospective screw. This is an important matter, wherever an accurate screw thread is to be cut.

In cutting a screw thread, as in lathe work in general, the final cuts should be very light ones. This matter is, of course, regulated by the hand.

Screw threads are of many kinds. One of the principal varieties is the 60-degree, sharp

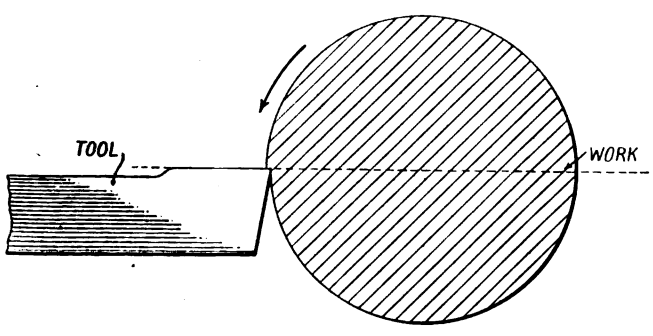


Fig. 3—The Top of the Cutting Edge of the Tool Nose Should be on a Level with the Center Line of the Work.

V thread. With this thread an axial section shows an equiangular triangle, each of whose angles is 60 degrees. The corners are either left sharp or are rounded a very small trifle. The groove is precisely the same as the thread. There is another type of thread in which the top of the thread—and the bottom of the groove—is flattened.

Then there is the Whitworth (British) thread in which the angle at the top of the thread is 55 degrees. So also with the bottom of the groove. Then the top of the thread and the bottom of the groove are decidedly rounded. There is also such a thing as a square thread, including a square groove. The lead screw on the lathe will probably have a square thread. But the threads that are more or less pointed are the ones in common use. They may be cut by following the directions I have given.

Making the Tool.

Perhaps the most difficult matter will be the making of the tool to do the cutting. The vital thing in forging and grinding the cutting end will be the accurate shaping and

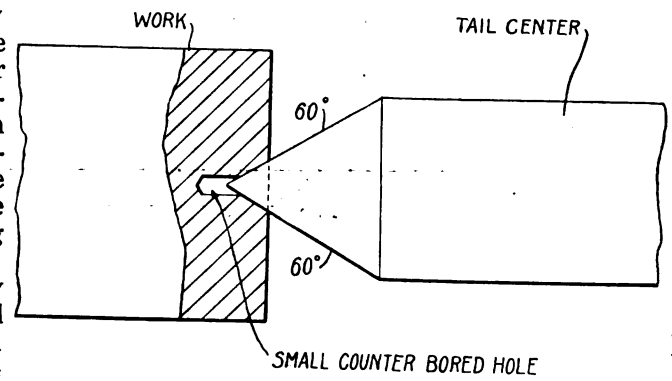


Fig. 4—Showing Section of Counterbored Work and 60 Degree Tail Stock Center.

sizing to the exact form and size of an axial section of the proposed screw. This work done, the rest ought not to give much trouble, unless we attempt to deviate from the directions I have been giving.

The work of screw-cutting that I have been explaining concerns particularly external threads. In the shop, however, we shall have to deal with internal threads as well. Ordinarily we will do the cutting by means o taps.

Let us now consider a point or two with regard to the mounting of the work for external screw-cutting. The work will ordinarily be put together in a chuck and be supported entirely by the head stock or else it will be mounted between centers set in the head stock spindle and in the tail stock. Where the latter method is applicable, it will probably be found to give the most accurate results. There are many cases of work having small diameters and short length for which a mounting between centers would be almost or quite absurd. Then there is work which cannot well be set up between centers.

There is one thing to remember with great faithfulness in connection with work mounted in a chuck: Never disturb the work after it has once been secured and the cutting started. Work mounted on centers may be taken off when half done and put back again later for finishing, without serious danger of getting it "out of center"; but this is not the case with ordinary mountings in chucks. When you have once begun, then, don't let up until the job is finished. Of course it may be left on the lathe over night or over Sunday, provided it is not disturbed. The cuts should be light, even from the beginning. This reduces the work's liability to dislocation or to bending. A fairly high speed and a very light cut is the combination suitable to thread cutting.

I have already used language implying that exactness might be expected when the work is mounted between centers. This should be understood in reason. It is possible to mount the work imperfectly, which will then make errors possible. Besides, work mounted between centers will often be long and of rather small diameter as compared with the length. Such work is liable to bending during the cutting operation. There are at least two remedies.

The Steady Rest.

First, the work may be supported at a point intermediate between centers by means of a steady rest. This is an upright frame or bracket suited to support the work without interfering with its rotation. The steady rest may be shifted from point to point as the conditions at the moment demand and permit. The second remedy is gentle cutting. High speed and a light cut constitute again a very good combination.

I come now to the matter of mounting the work on the two centers. The center in the spindle of the head stock rotates with the work—it is a live center. The tail stock center, on the contrary, remains fixed. The work twists around on its point. The two centers have conical points. These should be neither too slender nor too blunt. If the full angle of the conical vortex is 60 degrees, the center will be just about right for average work.

Conical holes, also with 60-degree angles, are bored in the ends of the work. These should be deep enough to cause the support given by the two centers to be supplied in part by rather thick portions of the center points. Then the conical holes should be bored deeper at the bottom by an ordinary cylindrical drill bit of small size. The depth of these little holes should be more than sufficient to enable the conical center points to be introduced into the conical holes and brought up tight without running any danger of the extreme tip of the center point coming into contact with the metal of the work. Make the little holes deep enough and to spare. The object in view is to prevent damage to the tip of the center.

The lathe operator may find that it is not at all easy to bore the conical holes so that the work will run true. There are two difficulties. First, the holes may not be started in the exact centers of the ends of the work. When it occurs, this is a bad error and calls for correction before going on with the work. The second difficulty is to keep the conical hole central with the work as we continue to bore it.

It is a bad error to get these holes out of

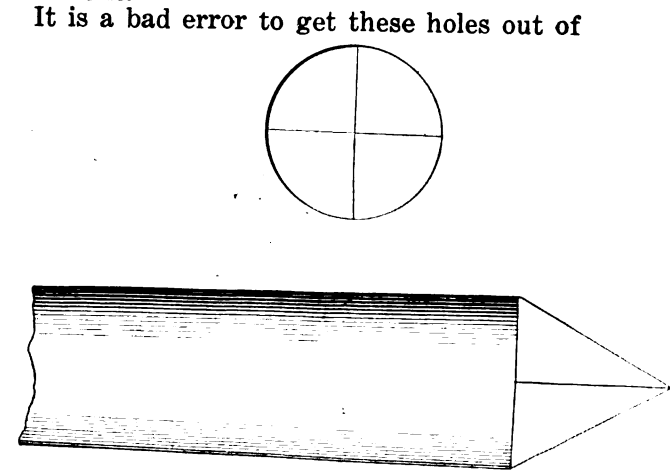


Fig. 5—Hardened Tail Stock Center With Pyramided Point for Correcting Centers.

line with the axis and consequently very probably out of line with each other. However, in respect to both difficulties, it may be as well to say at once that slight errors may often be corrected.

The following method may be used with

a view to correcting small displacements of center holes. Provide a piece for the tail stock that shall be a duplicate of a center point with the exception of two things. First, instead of a conical point, a three-cornered or four-cornered pyramidal point is used. Second, this point is to be hardened. It is proposed to use it as a boring tool. To do this, the work is run on this tool as if it were the dead center.

Correcting a Poor Center.

Use plenty of oil in the center hole and on the center point. Now bring a tool up close to the work—say, half way between the ends—as if it were the intention to make a cut. By rotating the work, by running the lathe slowly by hand, it will be noticed that the work approaches and recedes from the end of the tool. This is because the center holes are wrong. Now, instead of a cutting tool, bring up against the work a blunt piece of

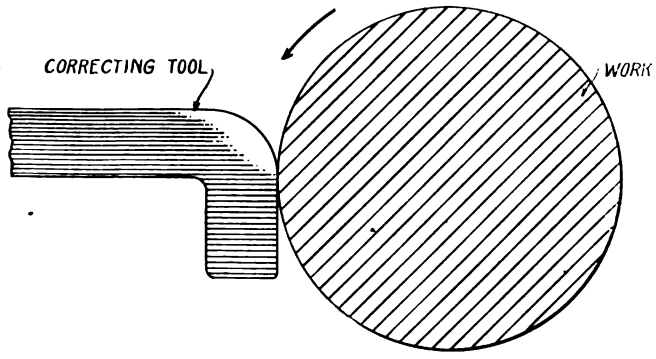


Fig. 6—Illustrating Method of Correcting Center Hole, Slightly Out of Center with Axis of Work.

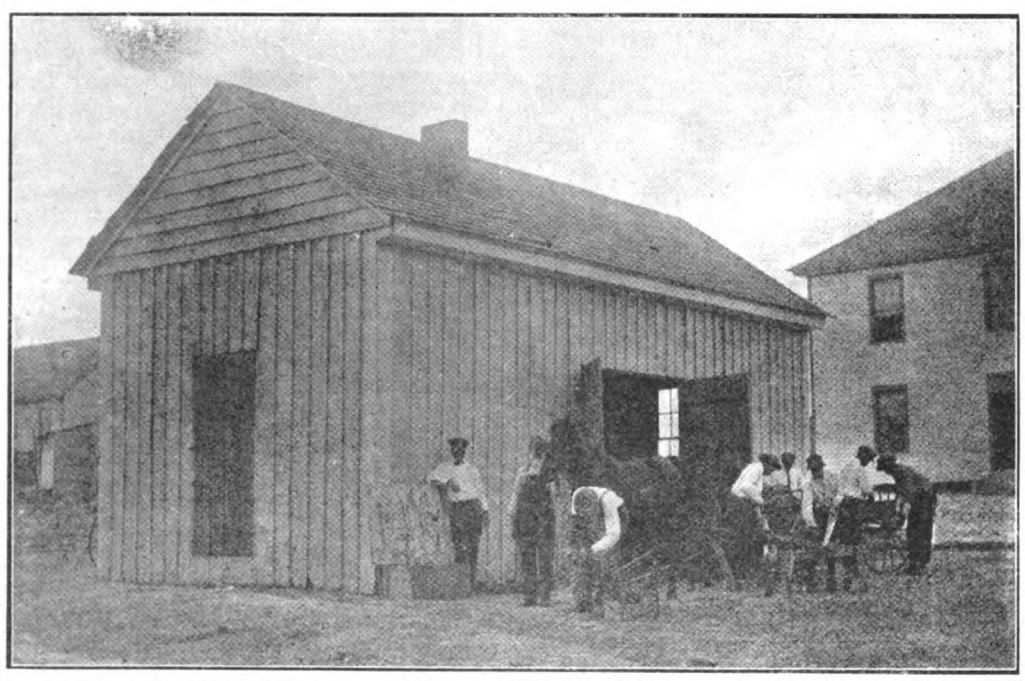
steel. Have this piece held firmly in the tool post. As the work goes round, the hand being used as before to effect rotation, the work will rub the blunt end for a moment and then be out of contact with it.

The idea now is to gradually force the blunt piece against the work. A slight cutting action will start up in the center hole at the tail stock end of the work. Continue to press the tool forward until the work runs perfectly true and bears evenly against the blunt piece all the way round. The operator must judge when he can use power to work the lathe. When beginning with power, begin with a very slow speed and feel your way.

When the hole at one end is in perfect shape, take the work out and reverse it. Then do the same for the center hole now bearing against the pyramidal center point in the tail stock as you did for the other hole. Start by working the lathe by hand, and feel your way as before.

LAURINBURG NORMAL AND INDUSTRIAL INSTITUTE.

One of the worthy enterprises which has sprung up in the South and which has been incorporated for the benefit of colored men and women is known as the Laurinburg Normal and Industrial Institute.



The Blacksmith Shop of the Laurinburg Normal and Industrial Institute.

This institute is supported largely by popular subscription and in addition to its regular courses of study, blacksmithing is taught. Herewith is reproduced a picture of the blacksmith department. The shop is located on the northeast side of the campus and is 18 by 32 feet in size. It is a single story frame building, but is fairly well equipped.

The shop is furnished with a stationary forge, a Champion blower, a 98-pound anvil and a tool bench 2½ by 5 feet. The bench is furnished with both a sledge and hand hammer, eight iron swages, five pairs of tongs, six hand punches and a blacksmith vise.

The smith course is divided into three years' work and extends from shop cleaning to scientific horseshoeing.

In the first year the students are taught proper shop arrangement, the names of tools and machinery, and simple work like the making of hoops and staples and the management of horses.

The second year the students take up the anatomy of horses' feet, the setting of axles and general repairing. In the third year forge practice, tool making, implement repairing and scientific horseshoeing.

In addition to the ordinary work the students are given a general idea of bookkeeping, billing and stock inventories.

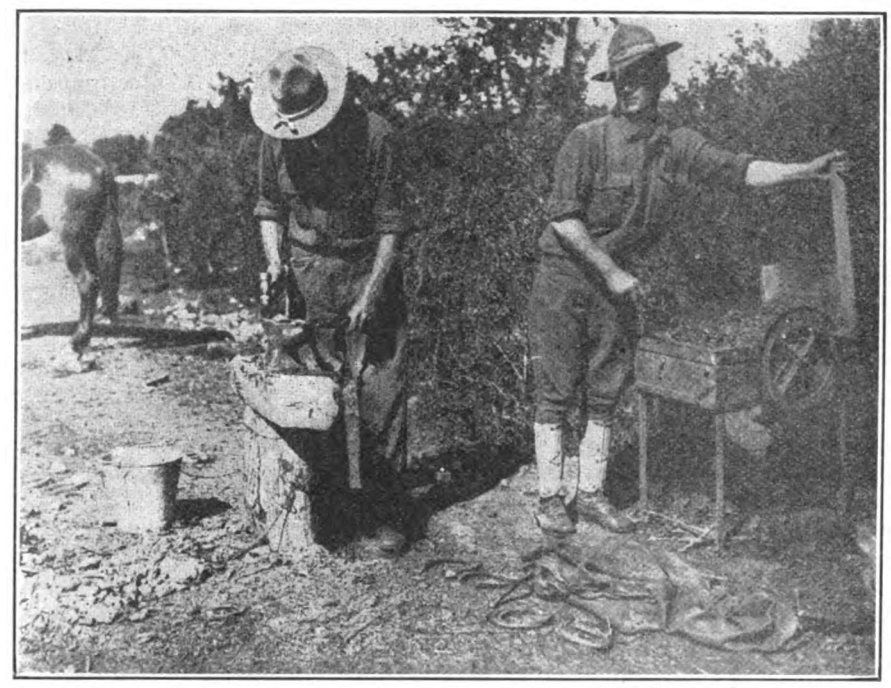
Our Boys in France.

On every hand we hear stories about the various departments and industries that made possible the defeat of the hun, but seldom do we hear anything about the blacksmith. One should not get the impression that the worker in iron was a negligible factor for on the contrary he played an important part.

Both horses and mules, particularly the latter, were used in enormous numbers and our Government trained men especially for smith work. It is a question as to whether the mechanic or the blacksmith was the most necessary. The average automobile and truck mechanic might have been able to make ordinary repairs, but machines underwent terrific service over rough ground; service which strained the machines, smashed the axles and bent the frames.

Repairs of this class required the attention of skilled smiths, men who did not depend upon lathes and similar machines, but who could really work the iron or steel and put it into shape again.

When Uncle Sam's boys do a thing, they do it well, and when their country called for blacksmith and metalworkers, they responded with a will. Whether the work was to restore a truck which had encountered a hun shell, or shoe a horse as shown in the photograph, the boys cheerfully did their work.



Two of Our Boys Busily Engaged in Smith Work on the War Front. Photo by Press Illustrating Service.

ANNOUNCEMENT.

We are informed that Mr. E. R. Yarnelle has been elected president of the American Horse Shoe Co. to take the place of Mr. Philip S. Dyer, who recently passed away and whose obituary notice appears elsewhere in this paper.

Mr. Yarnelle was formerly vice-president of the same concern and his promotion shows how well the board of directors regard his services.

A LITTLE SLICE O' LIFE.

So runs the title of a short story which appeared in the Evening Mail (New York) a short time ago. The article is so interesting that it bears repeating for our readers:

Job hunting has become acute.
The other day a jobless man
Stood by the river and another man
Was drowning. The drowning man
Cried for help.
"Where do you work?"
Asked the Jobless One.
"Thirty Green St.," was the reply.
"Go ahead and drown," said the
Jobless One. "I'll get your job."
He hurried to 30 Green Street
And said to the proprietor:
"Your man has just drowned.
I have come for his job.
Hurry up and give it to me."
The proprietor said calmly:
"You're too late, young man,
The guy who pushed him in
Has got the job."

If you like this magazine and feel that it is useful and interesting, the one best way to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Blacksmith and Wheelwright.

Entries In Prize Photograph Contest

We are pleased that the blacksmiths are beginning to send in photographs for our prize contest regularly. For a time it looked as though all of our readers were ashamed of their shops or were not proud enough of them to have any pictures taken, but evidently the signs were wrong, for we have received a number within the past week.

Just before the magazine went to press we received a very interesting picture from one of our subscribers which showed the front of his shop. In all of our experience we have never seen such an idea in the shop line. We say this because we want all of our readers to watch for the next issue in which the picture will be reproduced.

PRIZE PHOTO NO. 4.

We reproduce herewith a picture of Mr. Theo. Anderson's shop and in the Workshop Experience Department we have given Mr. Anderson's letter in which he gives some details about it. We did not put Mr. Anderson's letter on this page simply because he gave a number of interesting suggestions and sketches which really belong under the Workshop Experience Department.

Evidently Mr. Anderson Takes No Chance With the Fire Fiend. His Shop Is Fireproof.

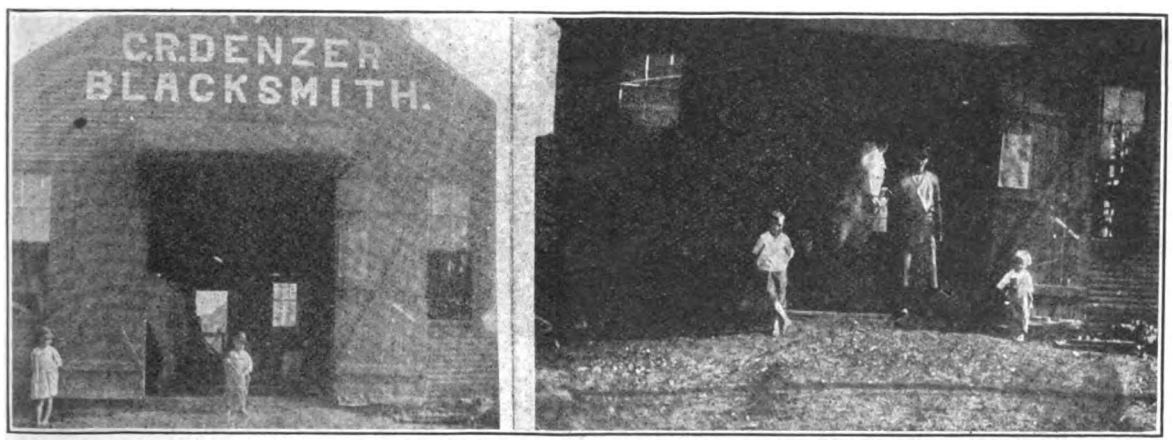
PRIZE PHOTO NO. 5.

From C. R. Denzer, Ohio.—I am sending two pictures which I should like to enter into the contest. Picture No. 1 is of my shop, and the fellow with the hammer in his hand is my youngest son. His sister is standing by the door. The other picture is of my oldest son on the right, the youngest son on the left, and myself in the center.

My shop is 24 by 50 and has 12 windows in it. We have plenty of light. I have two fires as I have some help sometimes.

We are getting $2.40 up to No. 5 shoes, $2.80 for No. 5 and No. 6's, $3.20 for No. 7 and No. 8 open shoes. Reset up to No. 5's, $1.40, No. 5 and No. 6, $1.80, No. 7 and No. 8, $2.20.

I read The Blacksmith and Wheelwright every month. I get it here at the newsdealer's and think it is a great help. I do some auto work such as repairing radiators, truss rods, tenders and such work as that.



C. R. Denzer's Shop, Showing Himself and his Two Sons.

PRIZE PHOTO NO. 6.

From H. F. Towner, California.—I have read the Blacksmith & Wheelwright quite frequently in the last three or four years and though I have but just become a subscriber I have always appreciated the paper.

I often read and get different ideas about doing work and various tools and this information is a big help. I seldom see articles in your paper written by California blacksmiths and so, being somewhat of a plunger, I am going to dive into your columns (if you will permit me) and give you a few ideas as to the way we do things out here.

My shop is located in Santa Ana, the county seat and center of Orange County, the richest county in the state, where we raise almost everything that grows and farm twelve months in the year.

Doubtless everyone knows that the work we do here is altogether different from work done in the east, since everything in the tool line is much heavier. (Western tools are called "California Specials" by the eastern jobbers.) Among the special tools are subsoilers which were originated in California for deep tillage.

This subsoiler is built with as many as seven standards which break the ground to a depth of from 18 to 22 inches. Subsoilers are usually worked with the 75 Holt caterpillar and are becoming quite popular in this district. If any of the readers are interested in knowing more about these subsoilers I will gladly furnish drawings for the magazine.

In my shop I have two hammers, one heavy, which will handle a 3½-inch weld in one heat. This hammer I had built to order. The lighter hammer, 50 pounds, a Giant, is fitted with special dies for forging, this with the hammer tools makes it equal to a 75-pound head. I have used several makes and am perfectly satisfied with the Giant.

I also have two base drills, one with a back gear for reaming up to three-inch holes, mostly for well tool work, the other with the base cut off on the front side so that it will take wheels or bands.

I have also a pair of shears which I designed and had built to order in Los Angeles. The shears with a five horsepower motor cost $1,000, and they will cut one-inch flat steel six inches wide, or 1½-inch round or square steel, or 4 by ½ inch angle iron, and will punch a one-inch hole in one-inch steel.

To complete the list of power-driven tools, I have a number 34 automatic thread cutter, an emery wheel stand and a back geared hack saw which will handle 12 by 1 inch plow steel, stock that I use for subsoiler standards.

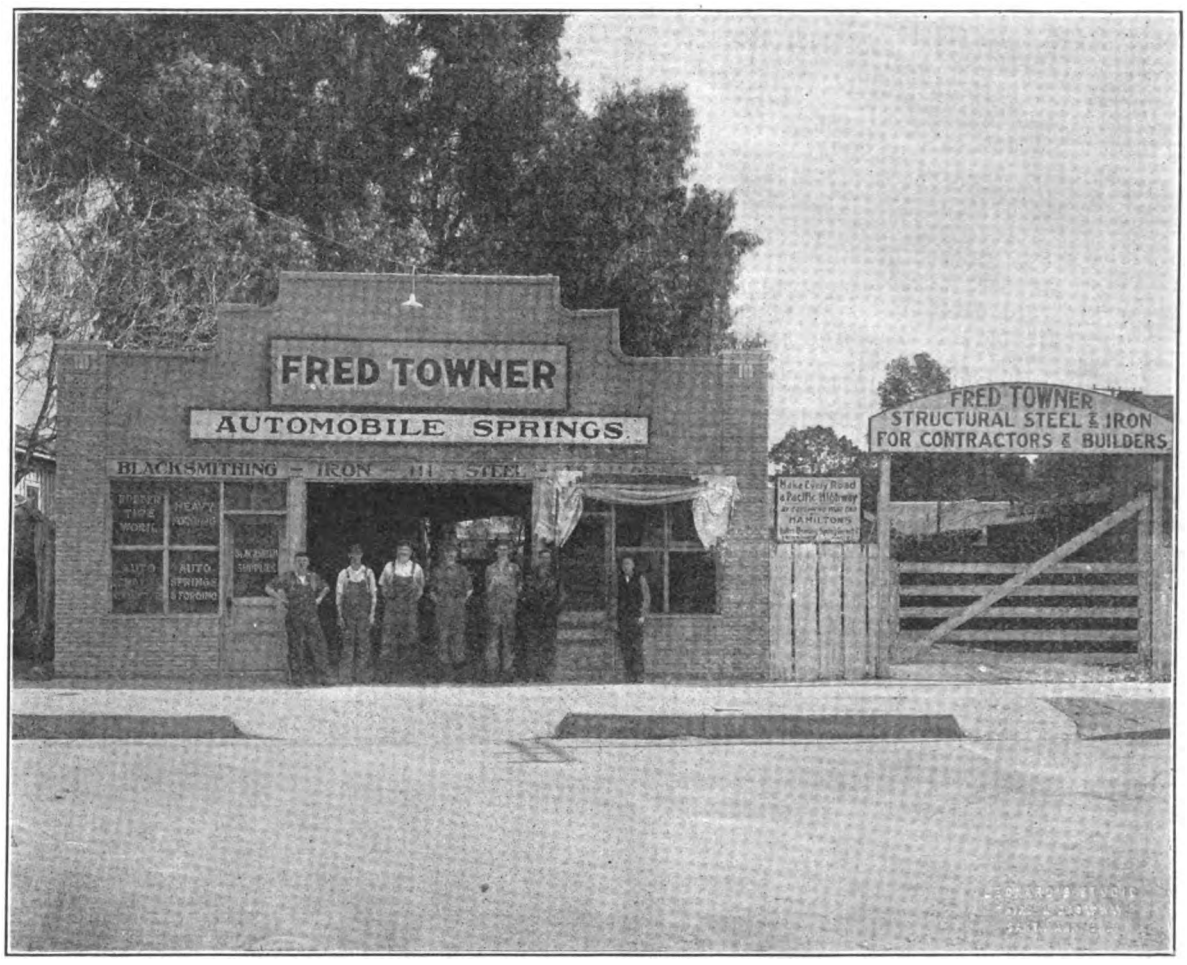
For forging, cutting round ends on finished work, swedging, fullering and flattening, I use the power hammer except in a very few cases.

As additional equipment I have a Burdett welding and cutting outfit with a double hose so that I never have to change from a welding torch to a cutting torch, all I need do is to change the tips for different size jobs. Two 300 feet Presto-Lite tanks and several oxygen tanks assure me of a good supply of gas at all times.

Automobile spring work is also in my line and I carry springs for all standard makes of cars. I carry a full line of bolts up to one inch and a few lengths of 1⅛ and 1¼ inch iron. I also carry a full line of steel up to 6 by 1 inch flat, up to 3 inch round and 3 inch square. I also deal in blacksmith coal.

I have the county agency for roller bearing inserts for automobile springs and will say that they have been a good money maker for me. If any blacksmith would like to make money in his odd times, let him write to me.

(Editor's Note:—Mr. Towner has sent us the sketch for a special spring hammer which will be reproduced shortly in the Workshop Experience Department.)



Mr. H. F. Towner's Smith and Auto Shop.

A Practical Truck Body

The Average Blacksmith or Wheelwright Can Earn Money In His Spare Time Building Truck Bodies

BY F. L. ALMY

Herewith are reproduced the details of a handy truck body which the average blacksmith or wheelwright should be able to build. This sort of body should be of general utility to the farmer but is designed more especially for contractors who move household furniture or similar articles.

The body is mounted upon a Studebaker chassis which has a wheel base of 125 inches. In length the body measures ten feet, while the width is five feet four inches. Inside the distance between the floor and the top is five feet ten inches.

The body is built upon two runners, one of which is shown in the illustration at F. This runner is ten feet long, seven feet wide and three inches thick, and the two runners are held together at the back by a board thirty inches long and of the same width and thickness.

Resting upon these runners are five cross members, G, which carry the body. These cross members are five feet in length and made from four by three inch stock, bolted to the runners as well as to the frame of the car. It will be noted that they extend out over the wheels in order to give the maximum width to the body.

Extending lengthwise upon these runners are the sills H and J. The two side sills H are ten feet long, five inches wide and two and a half inches in thickness. The center sills J are the same length and thickness, but need be but four inches in width.

These sills are mortised and screwed to the end sills. The front sill is five feet four inches, while the rear sill measures six feet three inches in length. Both sills are two and a half inches in thickness. The floor should be made of two-inch stock and reinforced by hoop iron running lengthwise.

For the sides there are six posts, K, and one at the front shown at L. These posts are five feet four inches in length and made of two by four inch joist. Across the tops of these posts are two top sills as well as one crosswise piece, N. These sills are all made from two by three inch stock.

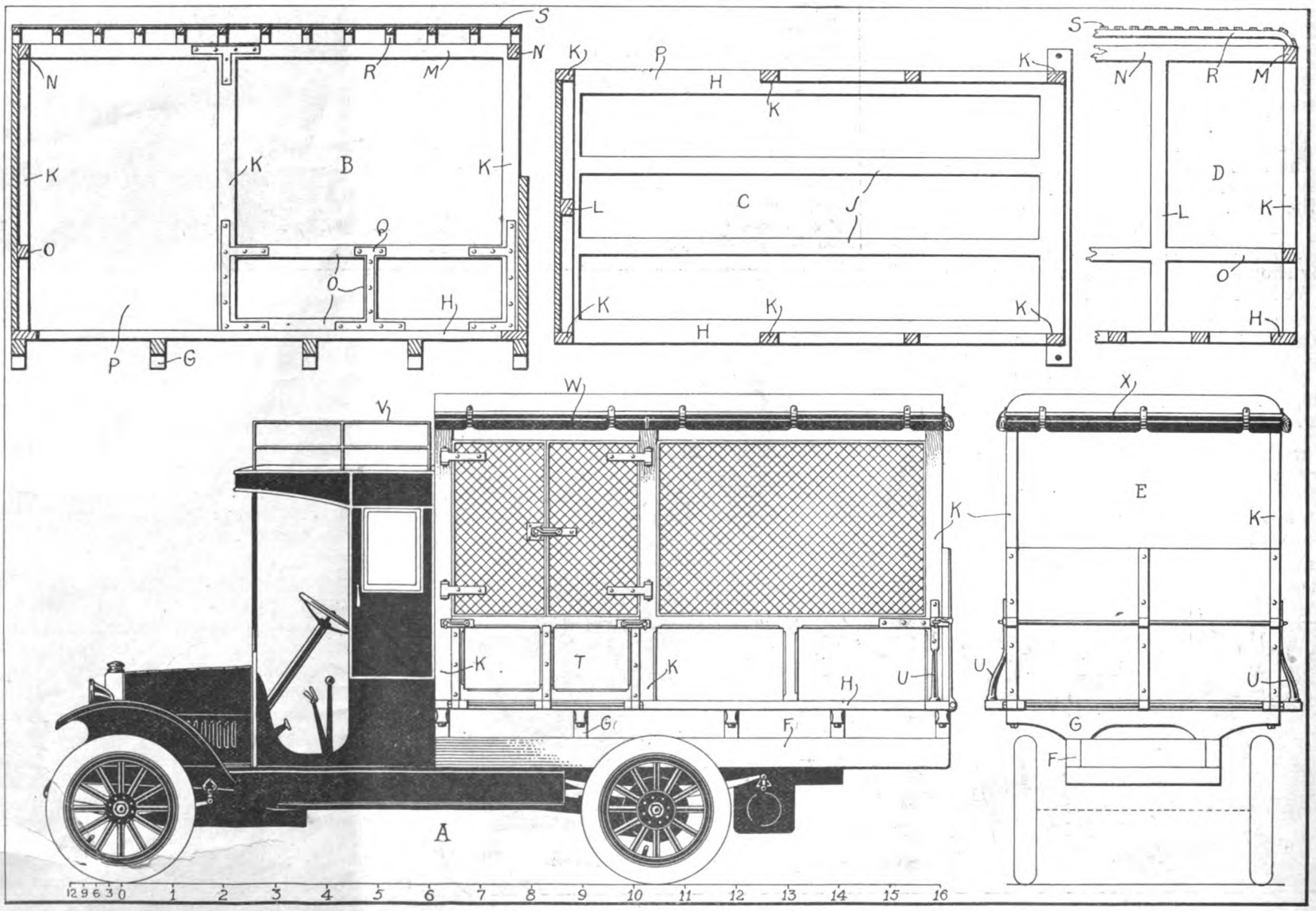
The panel support, O, are made from two by three inch stock, the top panel support being located twenty inches from the floor. The side opening or door at P is three feet eight inches wide. All of the sills and supports should be well braced with strap iron as clearly shown in the various sketches.

The forward end of the body is panelled its full width and height. There are thirteen roof bows, R, made from one-inch square stock. The ends of each bow are bent so as to give a five-inch drop. Running lengthwise at the top there are twenty roof boards, S, measuring one and one-quarter by one-quarter inches and ten feet long. These boards help to shape the roof and hold the covering in place.

The sides ordinarily should be made of heavy wire screen held in place by wood screws. The two panels shown at T in the door should be arranged so that they can be opened without disturbing the screen doors at the top and the two top doors can also be opened without disturbing the panels T at the bottom. The side door is very handy especially on rural express routes where the loads can be removed both at the front and at the back.

The tail gate at the rear measures five feet four inches by three feet and is hinged at the bottom as well as at the middle. For carrying spare tires the top of the driver's cab is enclosed by a metal railing, V.

Extending over the sides of the body as well as across the back and illustrated at W and X are side and back curtains which can be unrolled and fastened to the panels at the bottom in case of wet weather.



An Easily Constructed Body for a Studebaker Truck Chassis.

AN EXTRA FINE LETTER

From Tobias W. Nolan, New Jersey.—For the past sixteen years I have been a faithful subscriber to your famous paper, and I want to give testimony that each and every copy has given me the greatest pleasure; each and every issue has contained some article that has proven of great value and information to me, that I have said many times that one article is worth the price of an entire year's subscription.

I have saved every copy from the very first one I received, with one exception, and I think a tramp blacksmith who was in my shop stole that one while I was outside hitching up a horse that I had just shod for a lady. The tramp must have known a good thing, for when he went, my paper went also; I don't accuse him of stealing it, but it just kinder followed him off. Well, I hope the reading of it made him see the error of his ways.

I hope he has reformed and now has a prosperous shop of his own, and reads these lines. My only regret was the loss of the copy which spoils the collection. And my greatest regret was that I had not subscribed 10 or 15 years sooner.

After I read my first copy I realized how great my loss was, but the publisher had taken care of just such cases as mine, for a short time before he had published a set of four books entitled "Practical Blacksmithing" in four volumes.

These works contained the best articles that had been published in The Blacksmith and Wheelwright for ten years previous, put in book form for the price of $1.00. Oh, how I read these works and figuratively devoured every article. Shortly afterward he published the "Practical Horseshoer." You can just bet that I got the first copy. Next came "Artistic Horseshoeing." I bought that also. I also bought some similar works from another publisher and although I have a couple of hundred volumes in my library to-day these same old works have a prominent place in it, and I have never tired of reading them.

I have been in seven different States of the Union and part of Canada, and must say the blacksmith who forges ahead is the one

who reads and learns how. When I stop and look back, I consider I spent eight years under instruction in some of the best shops trying to learn the trade at very low wages, but after that I just coined money. The trouble with most of our young blacksmiths is that they start in business before they have really mastered the art, for bear in mind, brothers, the blacksmith's trade is an art; it is the most difficult of all trades to master, for you must work fast while your iron is hot, and think while the iron is in the fire.

Always try to have a clean fire. Many smiths try to weld steel in a fire so dirty that you could not successfully weld iron in it. Bear that in mind. Also weld the thin ends of your laps first, for they get cold first, then pound the middle or thick part afterward, for a loose lap makes a weak weld.

In shoeing a horse be as kind as possible to him; remember that he is one of God's creatures, and if he appears restive, let his foot down for a few minutes. Sometimes he has a cramp in his leg, and after a short rest will stand quiet.

Also remember that the foot is a sensitive, living thing, operate on it as such. Do not cut away too much, leave the frog alone except to trim loose pieces, it sheds off so often anyway.

Do not open the heels or cut away the bars —it only weakens the foot; use a good sharp rasp to level the foot, apply a hot shoe only lightly for a second, so you can see where to rasp. The man who burns it in level should be arrested.

Drive your nails only high enough to hold shoe on, heel nails the lowest. Try and keep hoof at the proper angle. Don't file gutters under the nails when clinching up and when all done, black off the outside of the hoof with some dressing—pine tar makes an excellent dressing thinned with oil—this fills up the pores of the hoof that the rasp has opened. Unless filled up, rain will get in and the hoof rots.

Take your time, charge a good price for your work, and never do a job that you are ashamed of. Success will crown your efforts. I have never regretted that I learned the good old trade, but I see that the automobile has put a big crimp in wagon work, so be up to the times, follow the band wagon and as you lose wagon customers make up your mind you will have to fix automobiles or you will be left by the wayside weeping.

The auto repairing game is a trade by itself, and will have to be learned. This is the way to do it. First buy a Ford for yourself, the older the better; it will soon get out of order. Try and find out what's the matter. If you don't know, ask all your friends. The chauffeurs will tell you, and I will guarantee that before a year is up you will be fixing Fords for other people.

You can always keep busy building grocery and express bodies for them. Also there are plenty of second-hand ones always for sale. Buy one, fix it up, put a business body on it, paint it, and you will find it quite a side line, and as you go along you will become more expert.

The publishers of The Blacksmith and Wheelwright have been printing articles lately instructing us how to do certain repair jobs in automobiles. If you are not in the game, all of these articles are Greek to you, in fact maybe they are somewhat distasteful, but wait until you are in the trade, how eagerly you will read and profit by these articles.

I have retired from the good old blacksmith trade, but never, never have I regretted the day I learned it, and now as I go past some door of an open smithy and stand and look in as the little children did of yore, and the aroma of burning horse hoof floats out and greets my nostrils, I feel sad, and wander on, for fear the strong impulse which overwhelms me will cause me to rush inside, and shout "Here I am" and don my old leather apron again.

An Oil Fire Furnace.

From Mr. Theo. Anderson, Nebraska.—I have been intending to write to you for the past year, but have had so much to do in the shop in addition to work in the garden that my time has been fairly well taken up.

There are a number of things that I want to tell about which might be of interest to

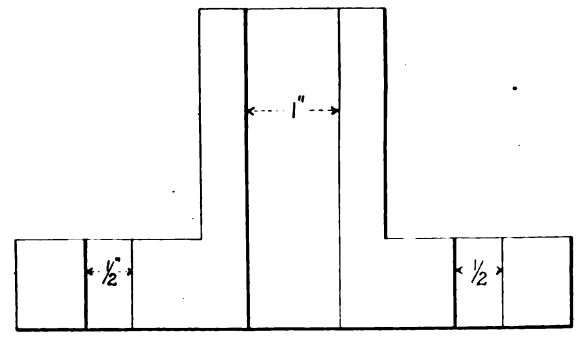


Fig. 1—Mr. Anderson's Rig for Threading One-Inch Stock.

the other blacksmiths. In the first place, I have used my Monarch disc sharpener for cutting threads. I have a sixteen-inch pulley on the line shaft and installed a six-inch pulley on the disc sharpener shaft, so as to get the proper speed.

For cutting a thread on a three-quarter inch size stock, I first cut a thread about half an inch long on the bar and screwed it into the place where the bolt is located which holds the disc to be sharpened. Then I start the die on the three-quarter inch shaft and give the shaft plenty of oil. The die feeds itself without any attention.

For cutting threads on five-eighth inch shaft, I obtained a buggy stub and cut the thread so that it would fit in the disc sharpener plate, then I bored a hole and tapped it for five-eighths of an inch stock, cut a five-eighth inch thread on the stock at one end and screwed it into the buggy stub.

For cutting thread upon a one-inch stock, I obtained the square part of a one and one-quarter inch stub and drew it out a little so as to leave plenty of metal both on the flange and at the center as shown in figure 1. Then I bored a one-inch hole at the center and two half-inch holes at the sides so as to fasten it to the machine.

I tapped the one-inch hole at the center to take the one-inch bar. This arrangement has saved me lots of hard work when cutting the thread on long rods and bolts.

In my shop I have a two H. P. electric motor, an emery wheel and stand which has a

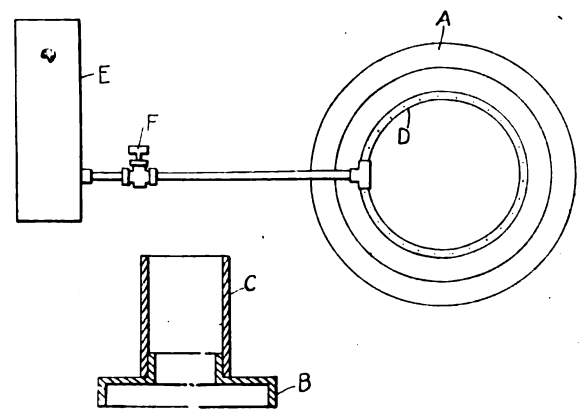


Fig. 2—Details of the Oil Heater.

saw on one end, a disc sharpener, a drill, a Little Giant Hammer, a lawn mower grinder, a double forge, two anvils, a cold tire setter and a rubber tire setter.

Where I have wide tires I heat them in an oven built according to my own design which is heated by kerosene and wood from the shop.

My building is built of cement blocks and is 25x60 feet in dimensions with a cement floor. I have electric lights and power and city connections. I don't believe in using booze and won't employ men who do use it if I know it.

The tire heater of which I spoke is built of brick and is circular in shape, as shown in figure 2 at A. Over it there is a hood, B, with a stove pipe, C, at the top. This hood and pipe slips into place after the tires have been put in the stove.

I use about a gallon of kerosene together with shavings for the fire. The kerosene is contained in the tank E and controlled by the valve F and leads to a circular burner, D, which is punched with a number of small holes.

I have a cross trestle upon which to lay the wheels while the tire is being set. This trestle is located out of doors and is made of lumber two by ten inches in dimension and shown in figure 3. Upon the top of the trestle are located two by four inch joists which are hinged upon bolts at one end. One end of the joist is cut down so as to form a handle. You can lift the wheel by this handle without burning yourself.

In this part of the country we get fair prices and have plenty of work both on plows and horseshoeing. I do some auto repairing

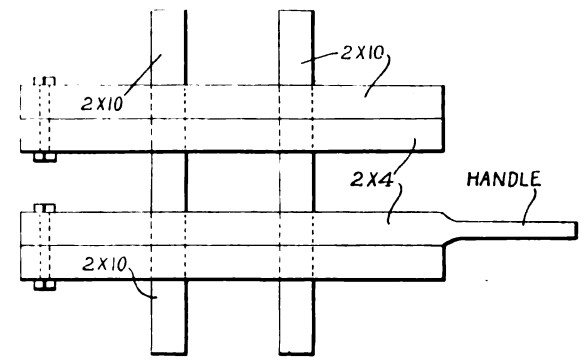


Fig. 3—Tire Setting Trestle.

as well as work on tractors and do job work on most anything from a pocketbook to a threshing machine. I have been in this town in business for about ten years, that is, working for myself.

Prices in Iowa.

From J. S. Shultz, Iowa.—I am well pleased with The Blacksmith and Wheelwright and get lots of good information from it. It's surely cheap for the price. Have had all the shoeing that two of us could do for seven weeks. We are getting:

$0.50 for resetting.
.85 for steel plugs.
6.00 for wagon axles.
5.25 for wagon tongues.
6.00 for sled runners.
1.00 for setting tire 1½ in. and smaller.
5.00 per set over that size.
.40 for new spokes.
.35 if more than five are put in.
1.25 for sharpening plows.
2.00 for pointing plows.
.25 for sharpening each disc blade.
1.75 for sharpening shovels.
2.75 for pointing up shovels.

These are a few of our prices, and I'm not a cheap fellow. The farmers don't kick about the price of anything. They want to get the work done, and I have been offered a dollar extra if I would go to my shop to shoe a team after supper, but I refused to go; I tell them that from six to six is shoeing enough for one day.

Lots of the farmers tell me that they would not work as hard as I do shoeing horses for twice the price. Collections have never been better. There is very little money outstanding, hardly enough to speak of.

A NUMBER OF ANSWERS.

From S. F. Clatterbuck, California.—I have only taken the Blacksmith and Wheelwright a short time, but as I notice that the editor is very glad to have the brother blacksmiths write him, and give a story about their part of the country, I am going to tell a bit about the trade out west.

I have noticed in several issues of the Blacksmith and Wheelwright that most of the blacksmiths are anxious to hear more from their brothers in California. I see that most of the smiths give their price lists and a story of their experience, and many of them ask different questions about different kinds of work.

Particularly one in the November number, in which some brother asked how to point a plow, and in the next issue Mr. J. A. Allen says to use a horse rasp or a piece of hammered steel ⅜ x 1¾.

I agree with Mr. Allen that will make a nice point for the average plow from Colorado on east. But the further west you go from Colorado the heavier the plow points are made. The forming is done on a little larger scale, and a little cheaper than it is in the East.

For instance, we will take California. I have been here about five years in different parts of the State, and its about the same all over, and the average plow in this part of the country is ½ x 2 or ⅝ x 3 hammered steel for a point, and then we draw it out until it is about 5 or 6 inches long or sometimes as much as 8 inches from the throat to the end of the point. And then they wear them out from one to two day's plowing, away up to the bar of the share, and I harden them as hard as fire and water will make them.

Most of the plowing in California is done by caterpillars, and they generally break the ground from 9 to 16 inches deep. So it takes good long points to do it. Generally, they figure on each share to plow about 12 to 18 acres of land at each sharpening.

Each caterpillar has from ten to twelve, and sometimes as many as twenty 18-inch shares, and they turn over two to three hundred inches of soil at once, and they keep them going day and night.

I have had several shops in the East and Middle West. Now I have a nice shop of pressed brick, 25 x 70. I have three electric blower fires and one "four-hundred" hand blower, two new Kerrihard hammers, one 30 lb. and one 75 lb., thread cutting machine, saw, emery stands, drill and other machinery.

Every time I buy something I try to get the best, for I have been in the business for the last 46 years, always on the job, and I have found out to buy the best and do good work is always cheapest in the long run. I have had this place for over two years. I started out with one fire and now I own my own building and everything is paid for.

I have two other men working for me and I work myself. In the busiest part of the year I have five men. My shop generally runs from six to twelve hundred dollars a month, and I will not credit anyone unless he can put up good security, or go to the bank and get them to stand good for his work. Having lost many thousands of dollars by credit before I came here, I know that it doesn't pay to do credit work, and I don't do it.

While the work in this State is different from that done by my brothers in other States, I'll give you a part of my price list, for I think that I get a little better price than the average shop, and I would like to see the smiths get together and go still higher, for a blacksmith can never earn too much for his labor.

Wagon Work.

Setting tires 3 and 4 inch, per tire	$2.50
Setting tires 4 to 6 inch, per tire	3.00
Cart tires, per set	4.25
Buggy tires (4)	5.00
Wagon felloes, 3 inch	1.50
Wagon felloes, 4 inch	2.00
New wagon tongues with old irons and up.	$12.00

Horseshoeing.

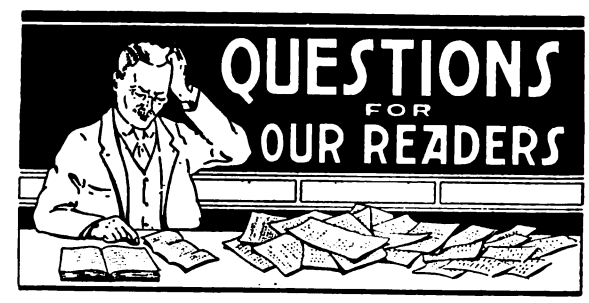
Plain 0 to 3	$2.25
4 and 5	2.50
6 and 7	3.00

12½ cents extra for each calk. No old shoes reset.

Plow Work.

Plows sharpened,	10	inch	$0.30
Plows pointed,	10	inch	1.25
Plows sharpened,	12	inch	.40
Plows pointed,	12	inch	1.50
Plows sharpened,	14	inch	.50
Plows pointed,	14	inch	1.75
Plows sharpened,	16	inch	.75
Plows pointed,	16	inch	2.00

Stockton shears sharpened 40 cents and up. The rest of my prices are based accordingly. One of my smiths has just told me that I ought to have stated above that some farms here have as much as fifteen thousand acres in grain at once.



A Saw Table?

From Chas. Jenkins, Canada.—Will some brother be good enough to tell me through the columns of the Blacksmith and Wheelwright how to build or make a small saw table or stand for a circular rip saw with tilting table and give full measurements and also how fast the saw should run. How many R. P. M., say, on a ten or twelve inch saw for use in a small country shop.

Sandbo Starter.

Now that the automobile owners are putting their cars into condition for the spring and summer seasons, undoubtedly there will be a great call for the installation of starting devices on the older cars which are not equipped with starters.

There is one device called the Sandbo Starter, manufactured by the Bear Mfg. Co., Rock Island, Ill., which is well worth investigating, because it is cheap and well within the reach of the average farmer. It is designed particularly for Ford cars and is termed a "mechanical starter." The device can be placed upon the Ford car very easily and the blacksmith should be able to pick up quite a little money on the side making these installations.

The starter is said to be positive in action because it turns the engine over past two firing points with but little effort on the part of the driver.

Wagon Bodies and Parts.

The blacksmith or wheelwright who has much wagon work, either for repairs or building, should by all means get prices from the American Carriage Co., Kalamazoo, Michigan, who make a specialty of low priced parts. Their line of parts is very large and they also manufacture special wagon bodies. They claim that their products are far below market prices.

Bryden Horse Shoes.

We want to call the attention of our readers to the line of horse shoes which is being manufactured by the Bryden Horse Shoe Co. of Catasauqua, Pa. This concern was established in 1882 and the organization has made a specal study of shoes for many years. In this factory every shoe is inspected by a practical horseshoer of long experience.

Their range of models is the result of long, patient selection and the co-operation with farriers all over the country. The three trade names under which the Bryden horse shoes and racing plates are known are the "Boss," "Banner," and "C and K." This company also manufactures a line of ribbed steel bars as well as racing plate bar steel.

Subscribers should write for their illustrated catalog of shoes and steel shapes.

Wolfe Tire Cooler.

Wheelwrights who do very much tire setting should investigate the Wolfe Tire Cooler which is manufactured by Matt L. Wolfe, West Carrollton, Ohio. This device is a favorite one among wheelwrights and has been on the market for a number of years.

Crane Puller.

The blacksmith who does automobile work, as well as the wheelwright, has a frequent call to remove stubborn gears, pulleys, fly wheels or flanges from shafts. In many cases he is called upon to bend iron rods or pipes to certain dimensions and may be able to do this work without special fixtures.

Undoubtedly one of the tools which the mechanic finds most useful is the gear puller. Many shops are equipped with not only a puller but with a special arbor press. The Crane Puller Co., 54 Lake St., Arlington, Mass., manufactures a puller which has a number of unique features and which should be investigated by all of our readers.

This puller is of such a design that it may be used for removing gears or pulleys or any ordinary pulling work, but may also be used in conjunction with a base as an arbor press. The device is furnished with two sets of arms, a short set and a pair of extensions, so that it can be used for a varied line of work.

As an accessory for the puller, the smith can obtain at a slight additional price a pair of special pipe or shaft bending arms and an attachment for the pressure screw. At an additional investment of very little money, the two arm puller can be converted into a three arm puller, simply by the use of a special crow foot beam, utilizing the same arms and one additional set.

One unique feature about the puller is the special locking arrangement, a feature which makes it a one man device. The adjustable locking screws clamp the arms against the sides of the gear or pulley, while the pressure screw comes against the shaft.

Lawn Mower Grinder.

Within a few weeks your neighbors will begin to use their lawn mowers in a vain effort to keep the grass on their lawns down. This means considerable business for you in the nature of sharpening the knife blades on these machines. Many blacksmiths pick up considerable money doing this work. Hand sharpening, however, is a slow process and the results are always questionable.

The Root-Heath Mfg. Co., 137-149 Bell St., Plymouth, Ohio, manufacture a machine lawn mower grinder which is said to do a complete job in fifteen minutes. It must be understood that the mower blades do not have to be removed. The lawn mower is put right into place and the knives ground in position.

The Ideal Lawn Mower Grinder is a well constructed machine. The bearings are of the ball type and the machine can be driven by belt or by hand, as desired. In addition to the lawn mower grinder attachment, a special attachment is furnished for grinding skates. The machine is sold on terms and our readers should investigate prices.

Sure Grip Calks.

Many blacksmiths prefer the threaded type of calks to the driven kind and many owners have the same preference. A specially large line of this type of calks is manufactured by the American Calk Co., of Detroit, Mich. Our blacksmith readers would do well to investigate the prices of these calks and write to the manufacturers for their latest catalog.

Drednaut Motor Topping.

When the blacksmith or wheelwright is called upon to repair the tops of wagons or automobiles he is frequently at a loss as to where he may obtain the topping material, particularly if the customer desires to obtain an extra good grade.

The L. C. Chase & Co., of Boston, Mass., manufacture a motor topping and sell it under the trade name of "Drednaut." When this fabric is used the top is water proof and has an extremely fine appearance. It is claimed that this material will withstand the hardest usage without showing wear.

It will not seam or crack under the action of the elements and can be obtained in just the right sizes to fit the particular job that is being done. Our readers should write for samples and prices.

Auto and Tractor Instruction.

We know that many of our blacksmith readers realize the value of automobile and tractor repair knowledge. There is a big demand for mechanics who are well versed in automobile work. As a matter of fact the blacksmith himself should be able to increase his business during the dull seasons of the year and so keep himself and his men busy.

The Rahe Auto & Tractor School, 3164 Oak St., Kansas City, Mo., have a special course which we should advise our readers to investigate. Every interested reader should write to this school for their free booklet which tells more about the automobile course.

Bauer Kerosene Engines.

Undoubtedly the farmer makes a good customer for kerosene engines. The intelligent farmer knows that he can increase his output by the use of machinery and the elimination of manual labor. All over the country one finds kerosene or gasoline engines operating separators, ensilage cutters and smaller farming cutters. Our readers should investigate the kerosene engines manufactured by the Bauer Engine Co., 110 Bauer Block, Kansas City, Mo. These engines can be obtained in various sizes from 2 to 18 horse power. The prices are very low and the engines may be purchased for cash or on a term basis.

At the present time this company is willing to place the engines in the hands of the customer for a 60 day trial. They guarantee the engines for five years.

Star Steel Shapes.

In days gone by the village blacksmith often built as well as repaired plows. In many cases he found that he could replace parts or build the plows much cheaper than such devices could be purchased. At the present time, however, the smith will find that he can purchase shapes for plowshares, landside plates, plow points and similar pieces at a much lower price than he can make them.

The Star Mfg. Co. of Carpentersville, Ill., makes a specialty of soft center, solid cast, crucible steel shapes for every line of work. Readers should investigate the line of products manufactured by this company and write for their latest catalog.

Automatic Grip Puller.

There is no workman in the industry who spends more time removing gears and wheels from old machinery than the blacksmith. Very frequently if he uses the hammer method of driving off the gears or wheels he is forced to stand a loss on account of breakage.

The smith could save both time and money by purchasing the Greb Automatic Grip Puller. This device is designed especially for pulling gears and wheels of practically any size within its capacity. Two sizes are made. The junior for small work has a capacity from 1 to 7 inches, and the senior size has a capacity of from 1 to 18 inches.

Greb Automatic Grip Puller.

This figure being the spread of the arms.

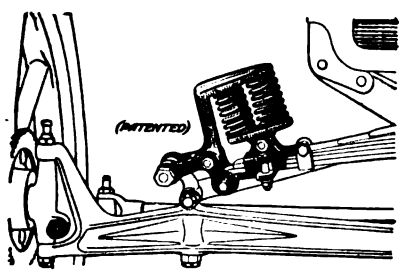
The device consists of heavy body upon which are cast four arm holders. These holders are so arranged that a number of puller combinations are possible. Two puller arms may be placed in them at opposite sides or three arms may be used spaced at thirds at the circumference wheel. The puller arms are held in position by removable pins and two complete sets of three arms are furnished with the device.

As pressure is applied to the center screw all of the arms or jaws automatically are forced inward, thus gripping the work firmly. The greater the pressure on the screw the greater the pressure of the arms upon the work. The price on the device, which is sold by The Greb Company of 219 State Street, Boston, Mass., is exceptionally low and worth investigation by the blacksmith.

Champion Shock Absorbers.

The Champion Shock Absorber Sales Co., of 918 North Senate Avenue, Indianapolis, Ind., manufacture a shock absorber of considerable merit. This device is designed primarily for Ford cars and consists of a unique lever combination of coil springs, and castings.

To the axle housing is attached an inverted L shaped casting and hanging upon the lower end of this casting upon a movable pivot is the car spring. The L shaped casting itself is free to swing vertically.



A Champion Shock Absorber

Between the L shaped casting and the spring are mounted two heavy coil springs. One can see, therefore, that two systems of levers are used, which tend to reduce the vertical body movement and to convert it to sidereal motion. The springs tend to absorb shocks and rebound. The shock absorbers are easy to apply and require no change in spring or car design.

Absorbine.

Practically every blacksmith in the country is fairly familiar with the merits of Absorbine, that remedy which is manufactured by W. F. Young, P. D. F., of 55 Monmouth St., Springfield, Mass.

The remedy has been on the market a great many years and is used by all horse owners who appreciate the value of having a preparation on hand at all times which will kill pain, stop lameness and remove blemishes.

The blacksmith should be able to sell Absorbine to his customers very readily and at the present time there are many arguments in its favor. We say "at the present time" because the spring buying and selling has begun. The buyer of horses is on the lookout for clean, sound stock and is willing to pay a good price.

If the farmer has blemished horses he should get busy at once and try to cure or remove the blemishes so that the buyer will pay a good price for them. In many cases a breeder has been able to increase the market value of a horse by $40 or $50 simply by removing blemishes before selling.

Many of the successful horse breeders are aware that Absorbine will remove blemishes and keep a bottle on hand at all times. W. F. Young, who is an enthusiastic horseman, is willing at all times to help our brother readers out by giving them advice on the care of horses.

Roller Bearing Inserts.

We have repeatedly dwelt upon the fact that a large percentage of spring breakage is caused by poorly lubricated springs and we have cautioned our readers to keep the springs in condition.

A spring will not give satisfaction unless the leaves can slide past each other, and to assist this action, the Hamilton Roller Bearing Insert Equipment has been designed. This insert consists of 112 case hardened Bessemer steel rollers which are mounted in 16 nickel steel cases and designed to slip between the leaves of the spring.

The steel cases are filled with heavy graphite grease and when installed the device requires but little attention. The manufacturers claim that the spring action is much easier and that danger of spring breakage is reduced to a minimum. The Hamilton Roller Bearing Insert equipment is manufactured by the Hamilton Mfg. Co., of Los Angeles, Cal.

Emco Malleable Iron Castings.

Our wheewright readers, or in fact any readers who use body irons for all sorts of vehicles, should get acquainted with the Eberhard Mfg. Co., of Cleveland, Ohio. This concern makes a specialty of malleable iron castings.

The castings are of the best quality and are not to be confused with ordinary cast iron fittings which break under the least strain. Emco Malleable Iron Castings are said to withstand the hardest usage. As a proof of this, the malleable iron castings manufactured by this concern can be bent cold without snapping or weakening. Readers should send for their bulletin entitled "Assemblies of Irons," which will be sent free of charge to anyone interested.

Kazoo Blower.

The R. P. Warner Electric Co., of Kalamazoo, Michigan, manufactures a unique variable speed blower which has one particularly interesting feature. It is complete in itself, that is, it has no outside resistance or rheostat. The speed of the blower can be varied by moving a handle on the blower itself from one side to the other. As the speed decreases the amount of current used is diminished.

The blower and the electric motor are mounted on the same base and use the same shaft, thus eliminating all gears or couplings. The two units are enclosed in dustproof housings which are fitted with bronze bearings and noiseless ring oilers. Undoubtedly it is one of the simplest installations possible and should pay for itself by the elimination of trouble and the saving of time.

The motor is designed for operation on alternating current only. Readers who are interested should write to the R. P. Warner Electric Co. for their prices and descriptive literature.

Punch and Shear Combination.

A handy combination of punch and shear is being manufactured by the Plymouth Foundry & Mch. Co., of Plymouth, Wisconsin. The device is extra heavy and made of the best of materials. The shears will cut 1-inch round iron or half-inch iron four inches in width or the equivalent of this amount of metal.

The punch, or punch rack, for it contains seven different sizes of punches varying from ¼ to ⅞ of an inch, can be moved along the base as required, without the use of a wrench or any special tools. The punch attachment is also very heavy and will take care of practically any ordinary work done by the average shop.

Phoenix Products.

One of the biggest problems which the blacksmith faces today is the cost of materials. It would be well for the smith to get acquainted with manufacturers who give him the benefit of lowest possible prices and good service. The Phoenix Horse Shoe Co. of Chicago, Ill., who manufacture horses and mule shoes, as well as Bull Dog toe calks, products well known among the trade, make a specialty of low prices and good service.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, 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.

For Sale

FOR SALE
Blacksmith and wagon shop. Stock, tools, machinery, house and two lots, or will sell half interest. Address SCHMIDT BROS., Waldorf, Minnesota.

FOR SALE
About 100 feet of two-inch internal wire carriage tire made by the Victor Tire & Rubber Co., will be sold cheap to close out. This is new stock. BECK-HAWKEYE TRUCK WKS., Cedar Rapids, Iowa.

FOR SALE OR TO RENT
Fine old established blacksmith's and wheelwright shop; two-story building; 30 by 70 feet; location excellent; well equipped for business; large country trade. Owner has recently died. Address for price and further particulars, A. B. SWAB, St. Johnsville, N. Y.

FOR SALE.
Blacksmith business; lot 200x220, brick shop 35x80, three forges, one frame building 25x50, concrete floor. Extra fine location, plenty of work, good prices. Four churches, fine school, good water, fine farming country. Good man can get rich here. Reason for selling, old age, want to retire. Fine stand for a garage, plenty of that kind of work here if a man wants that kind of work. Too old to do it myself. Address R. B. LINK, Marvell, Arkansas, Box 155.

FOR SALE.
Wagon and blacksmith shop and implement business in a good live town; well equipped and doing a good business; only shop in town. For particulars address THEO. PATZNER, Hannibal, Wis.

FOR SALE.
A rich Iowa community offers a live mechanic a general blacksmith business unequalled anywhere; work for three or four men the year round. Get particulars at once from T. SOLVBERG, Paullina, Ia.

FOR SALE
The only shop in a good town with large territory. Electric power, good equipment, plenty work and top prices. For prices and particulars write or come and see L. J. MILLER, Germania, Iowa.

FOR SALE
Blacksmith's shop, stock and tools, house, barn and two acres of land. Only shop in village and work enough for two men. Reason for selling, poor health. Address CHAS. BEMIS, Burlington, N. Y.

FOR SALE
Shop and tools and small stock, or will sell tools and stock and rent shop. Fine location on paved main street next door to $42,000 City Hall. Only one other shop in city of 4,000. Broken leg reason for selling. F. H. BECHTER, Independence, Iowa.

FOR SALE
Blacksmith and wagon shop, stock, tools and machinery. Also three lots and new six room bungalow house. Enough work for two men. Reason for selling poor health. Address JOSEPH OBETKA, Pittsville, Wisconsin.

FOR SALE
Blacksmith, implement, hardware and garage business. Oil and gas station. All corner property. Ill health reason for selling. Write for particuars, W. J. OTT, Woodlake, Calif.

For Sale

FOR SALE
A few rebuilt ROTO Electric Blowers, good as new. One year guarantee. Until sold $25.00. THE ROSEWATER ELECTRIC CO., Cleveland, O.

FOR SALE
24 inch Hardwood Planer with double belted head and in good shape. Also 24 inch Jointer with new knives and bearing. Will sacrifice the two machines for $260.00. Address JOHN W. SPANGLER, Aspers, R. 1, Penna.

FOR SALE
An old established horseshoeing and wagon shop with stock and tools with nine room house and garage, also 1¼ acres land. Will sell at a bargain. Reason for selling, am in poor health. For particulars write owner, J. ALEXANDER, North Main St., Winsted, Conn.

FOR SALE
6—double and heavy pedestal emery grinders complete—$22.00 each. Lathes, milling machines and other tools. BICKNELL MFG. & SUPPLY CO., Janesville, Wis.

FOR SALE
1—8 h. p. Ohio gasoline engine $175.00; 6 h. p. Rockford $140.00—4 h. p. Webster $70.00. All overhauled and in fine condition. BICKNELL MFG. & SUPPLY CO., Janesville, Wis.

For Rent

FOR RENT
OPPORTUNITY—Excellent opening for good blacksmith at Prosper, Minn. Building rented very reasonably. Will stand investigation. Call or write—MILNE & HARTZ.

Miscellaneous

PRINTING FOR BLACKSMITHS.
Increase your business by handing out our printed business cards with "The Blacksmith's Ten Commandments" printed on back; 100 for $1.25. NEWS PRINTING CO., Stockton, Ill.

AUTOMOBILE REPAIRS
Blacksmith who own automobiles or repair automobiles in their shops should subscribe for the Automobile Dealer & Repairer; 120 page illustrated monthly devoted exclusively to the care and repair of the car. The only magazine in the world especially devoted to the mechanical and practical side of motoring. The "Trouble Department" contains five pages of numbered questions each month from car owners and repair men which are answered by experts on gasoline engine repairs. $1.50 per year or 15 cents copy. Postals not answered. CHARLES D. SHERMAN, 52 Windsor Avenue, Hartford, Conn.

Tires

TIRES--DOUBLE TREAD

Guaranteed for good service. Big—Strong—Extra Heavy. 30x3 Tire $5.50; 30x3½ $7.00; 33x4 $10.00; 34x4 $10.25; 36x4½ $13.00; 37x5 $14.00. Big saving on other sizes and Tubes also. Trade in your old Tires. 10% deposit required on C. O. D. orders. Send for list now! State size and bead of tire. Orders filled same day received.

M. LIBEN & CO., 205-RK, W. 48th St, N. Y. City

DOUBLE TREAD TIRES
We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

$0 ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.65
32x3½	7.15	7.70	3.00
34x3½	8.25	8.80	3.00
31x4	7.70	8.25	—
32x4	9.50	10.50	2.75
33x4	9.50	10.50	3.25
34x4	9.80	10.80	3.50
35x4	9.90	11.00	3.50

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write to-day—yes—to-day.

Look up rating in Dun's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.60
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For rebuilding your old tires we charge you 60% of the above prices.

We have a special proposition to dealers on Double Tread, new and factory seconds. With all orders received for tires up to May, we will give a first guaranteed tube for the low price of $1.50.

B. LIBEN & COMPANY

261-A WEST 54th STREET NEW YORK CITY

THE HOME OF DOUBLE TREAD TIRES

BICKNELL'S POWER Punch and Shear

CUTS FLATS AND ROUNDS

A Time Saver in Any Shop

Write for Price

Bicknell Mfg. & Supply Co.

Janesville, Wis.

THE ARMSTRONG MFG. COMPANY

BRIDGEPORT CONN., U.S.A. NEW YORK OFFICE 248 CANAL STREET

like their products, need no introduction to the experienced steam or gas fitter. To others, our catalogue No. 14 will show why we are so popular.

"Makers of the Genuine ARMSTRONG Stocks and Dies."

Wanted

WANTED
Blacksmith—experienced in forging small tools under power hammer; steady employment. WILLIAM JOHNSON, Hedenberg, Works, 249 Plane St., Newark, N. J.

WANTED
Good all around blacksmith at once. Young married man preferred. M. W. ABTS, Morrill, Nebr.

WANTED
Would like to hear from one who has a blacksmith's stand for sale with from 10 to 20 acres or more of land. Address L. LUBER, Box 23, Prairie View, Illinois.

WANTED.
Good all round blacksmith; top wages for right man. Address T. SOLVBERG, Paullina, Ia.

Universal Battery Service.

The Universal Battery Co., 3418 S. La Salle Street, Chicago, Ill., carry a complete line of battery replacement and repair parts consisting of plates, separators, connectors and terminals for practically every make of battery on the market.

In addition to this, this company manufacturs complete batteries which can be used for replacing standard batteries in practically every popular make of car. Their 1919 catalog which is now off the press is ready for distribution and our readers should write for it now.

Self-Measuring Gasoline Station.

One of the devices which attracted considerable attention at the automobile show was termed the Brady Visible Measure Gasoline Dispenser, manufactured by the Gasoline Dispenser Co. of America, Inc., located at Louisville, Ky.

The pump is operated through an electric motor which forces gasoline to a measuring tank at the top of the mechanism. This tank is fitted with a visible gauge somewhat resembling the gauge on a thermometer, but marked in gallons.

By this system, the purchaser can see just the amount of fuel that is being delivered to him. When the machines are put out by the factory the gauge and the measure are guaranteed and since there is no method of tampering with the device, for the very reason that it does not depend upon a pump for quantity, the purchaser is protected.

A similar device is manufactured by the same company which is operated by hand rather than by the electric motor. In conjunction with the pump is furnished a 250 gallon acetylene welded underground tank. This tank is fitted with a gauge by which the amount of gasoline put into the tank can be checked.

THE SANDBO STARTER

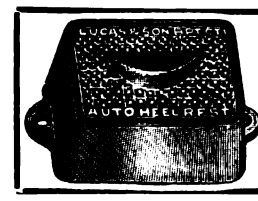
—Two Compression— FOR FORD

Write BEAR MFG. CO. Rock Island, Ill.

FOR SALE

Axles—half fan, half coach, 1⅛x7 and 1⅛-x1 1/16 x 6½. Long beds, not welded; price, $3.00 per set. Also Bolts, Screws, Clips, and Light Spring Wagon Bodies, Buggy Spring Bars, etc., below market prices.

AMERICAN CARRIAGE CO.
KALAMAZOO, MICHIGAN

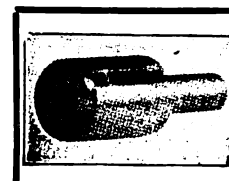


Auto Heel Rest

Made in 4 Sizes of Frosted Aluminum ½ in., 1 in., 1½ in., 2 in.

Ask your Dealer, or sent post paid, 75c.

J. L. LUCAS & SON, Inc.
1 Bridgeport, Conn.



THE only successful Chuck to hold square taper shank wood bits and drills so you can use them in your drill press. See the spring. It keeps the drills from dropping out of the chuck. Made right Priced right. If your dealers won't supply you we can.

WHISLER MFG. CO., Gibson, Iowa

"The Timesco Dealer."

We are in receipt in this office of a wholesale catalog issued by the Times Square Auto Supply Co., corner of Broadway and 56th Street, New York City, which is being distributed by them to dealers throughout the country.

The booklet is called the "Timesco Dealer" and is a combined catalog, trade journal, and dealer's reference book. The Times Square Auto Supply Co. have branches in many of the large states throughout the country and upon the inside cover is given a map with the names and addresses of these dealers.

The book contains many thousands of illustrations of accessories sold by this company. As an example of how valuable the book should be to dealers, let us refer to the dealers' reference charts which form a part of the catalog. In these charts are listed practically all of the popular cars on the market together with the model, the light-bulb sizes, spark plug sizes, piston ring, tire, lens and brake lining sizes. The reference chart alone should be worth considerable money to the average dealer.

To every authorized agency a special sign is furnished. Every dealer who is interested in low priced and honest priced accessories should write to the above company for information and their catalog. Dealers should be sure to write on their letterheads, for the catalog is mailed only to bona fide dealers and garage men.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 5 NEW YORK, MAY, 1919 { TERMS ONE DOLLAR A YEAR

The Care and Repair of Tires

Part II.—Roadside Repairs and the Use of Small Fireless, Gasoline and Electrical Vulcanizers

IT is generally accepted that the use of an inside liner will prolong the mileage of an old casing. However, they should not be used in new tires as they stiffen the tire, taking from its resilience, and by adding to the thickness of the fabric tend to generate heat.

* * *

The experience of the tire manufacturer has taught him how thick a casing should be in order to give the best possible service. The same statement applies to outer casings adapted to be used over a standard tire, and to the practice of sewing or cementing two tires together.

In the manufacture of tires the strength and durability of the tread is carefully balanced with the resistance of the fabric to the strains it must withstand. The retreading of an old tire is always of doubtful value as the chances are that the fabric has had its day and will not last long enough for the owner to get the full value out of the new tread.

Retreading is apparently a real economy in the case of a comparatively new tire that has had its tread destroyed by some untimely accident such as tight chains, misaligned wheels, careless braking, etc., providing the fabric has not been exposed to moisture enough to cause deterioration. Cord tires, owing to their construction, which largely eliminates wear of the fabric due to bending, will usually outwear the original tread sufficiently to make retreading very profitable to the owner.

Care of Spare Casings.

Needless to say, the spare tire should be protected from light, water and air by the use of a first-class tire cover. If the tire is carried inflated, it should not carry more than half the pressure that it would carry when on the wheel. This may be a little bit inconvenient, but it is better than having a new tire go wrong within a few miles after it is put in use. Many motorists put the new

Fig. 1—Patching a Tube with a Small Portable Vulcanizer.

casing on the wheel at once and carry an old one for a spare, believing that this practice reduces the chance of trouble on the road as well as prevents the new tire from having a chance to deteriorate before it is ever used.

If a spare tire is carried otherwise than inflated on the rim, keep water out of it. Examine it after washing the car or driving in the rain, and if it is wet inside wipe it dry.

Care of Spare Tubes.

From three to six extra inner tubes used to be considered as an indispensable part of every car owner's equipment. Punctures were unavoidable and it was practically impossible to make reliable repairs on the road.

Now, however, a great many thousands of people have replaced their stock of tubes with one of the little vulcanizing outfits that carries the rubber patch and a chemical heat unit in one convenient cartridge all ready to put on the tube and vulcanize a permanent repair at any time. It is just as easy and

The motorist who carries tubes is usually quick to take out a tube, vulcanize it, and replace it as it is to change tubes. Not only is the investment in tubes saved, but a repair bill is eliminated.

forced to carry them in the toolbox with other articles, which unless protection is given, as likely to ruin a tube before it is ever put into a casing. The jack and the pump and the oil-can all do their bit and their job of destruction is made easier by the heat from the engine.

The spare tube should be carefully folded to prevent chafing and carried in a bag that has been well dusted with soapstone. Put it in the coolest corner of the toolbox, away from the exhaust pipe. Pack it in so it can't rattle around.

We illustrate two excellent methods of folding tubes so that they will suffer the least. In both methods it is necesary to take out the valve-inside and let all the air out of the tube while folding, then put the valve back together to keep the air out. Don't tie tubes with a string. Use a wide strip of cloth or some rubber bands half an inch wide, cut from an old piece of tube.

The strength of a tire is in the fabric. The tread is only a covering to keep destructive substances away from the fabric. As soon as a stone cuts through the rubber the weight of the car begins to drive dirt into the cut. The dirt is forced between tread and fabric

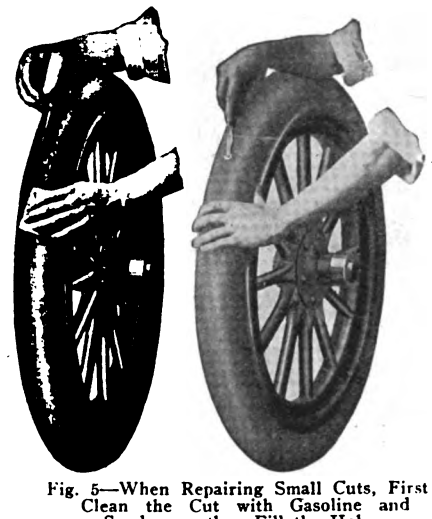


Fig. 5—When Repairing Small Cuts, First Clean the Cut with Gasoline and Sandpaper, then Fill the Hole with Para Rubber.

and usually the first symptom of trouble is a sand blister that may appear several inches from the cut where the dirt entered.

Of course water gets in, too, and as it has no chance to escape it starts a decay in the fabric that almost invariably causes a blowout sooner or later and then both tube and casing are ruined.

Here is an opportunity to take the stitch in time that is so much easier than the nine that must be taken if the first is postponed. At regular intervals, and especially after long trips the casings should be examined carefully for little cuts that penetrate to the fabric. Take your vulcanizer and seal these cuts before the germs of tire trouble begin to infect them. It means the difference between wearing our your tires and having them blow out.

It's like cleaning your teeth to save trips to the dentist, you know. And it isn't much

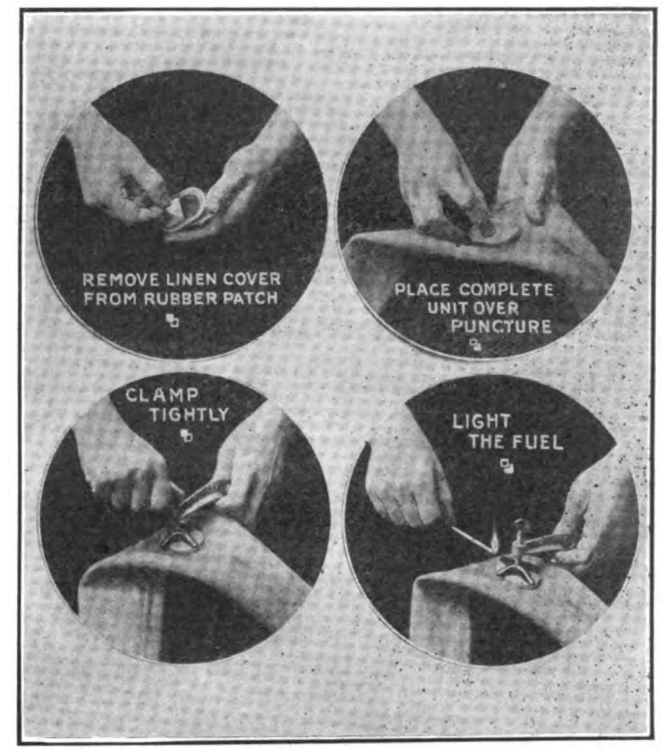


Fig. 2—The Four Steps in Tube Repairing Showing How a Portable Vulcanizer is Used.

more difficult than cleaning your teeth, either, for it isn't necessary to take the tire off the wheel or let the air out of it.

When on a trip or if it is inconvenient to make permanent repairs for some other reason, use one of the prepared patching gums for a temporary filling until you can get around to use your vulcanizer.

In case a sandpocket appears a good way to arrest the progress of it until you can make a repair is to cut through the tread half way around the blister on the side of the tire so that the dirt can get out as fast as it comes in instead of being crowded in further between rubber and fabric all the time.

Second in importance only to proper inflation is the care of small tread cuts and sand blisters. With an open cut in the tire, a few hundred miles is enough to cause a destructive blowout—and blowouts are expensive. It has been said that the last mile in a tire is the cheapest and unless one takes prompt care of the little cuts he can be mighty sure that he will never get any cheap miles.

The information we have given is based largely on the advice of tire manufacturers who have given it willingly in order that users of their products may secure all of the mileage that is built into their tires—and after all mileage is what we really buy when we buy a tire.

We have already considered in detail a great many of the preventable causes of premature tire failure and the precautions that any motorist may take to reduce roadside delay due to tire trouble to a minimum. However, as long as pneumatic tires are used, motorists will always have to face the chance of a puncture, and in the case of an old tire, a blowout. These things are certain to occur

sooner or later and the wise motorist will be prepared to meet them as they come.

As protection against the delay caused by a tire going flat, the average car owner carries at least one inflated spare tire. The exchange

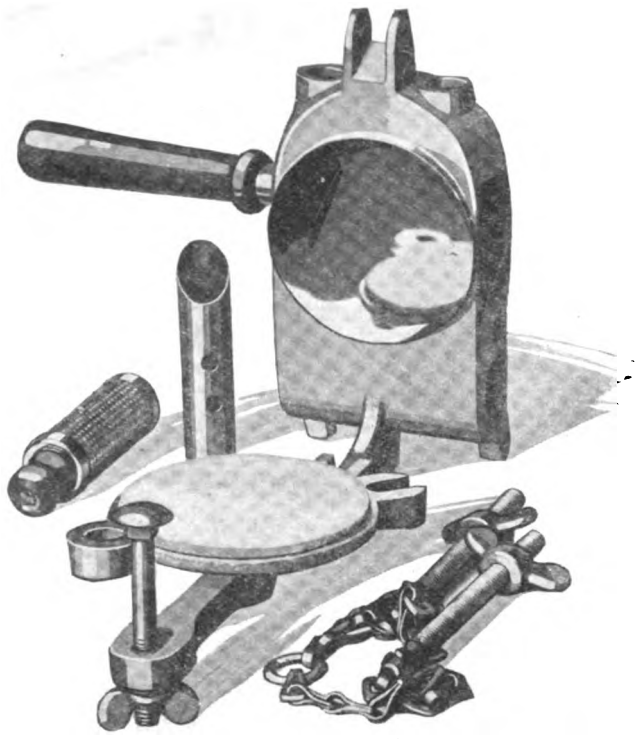


Fig 3—Parts of Road Vulcanizer Which Can Be Used Both for Tube and Tire Repair Work.

of this for a tire that is punctured is merely a matter of minutes. One simply removes the valve cap, jacks up the wheel, removes the clamping nuts around the rim and off comes the rim and punctured tire with it.

This operation is simplified if the wheel is turned so that the valve is at the top and the rim is removed by pulling at the bottom. Care should be taken not to bend or otherwise injure the valve stem as the rim is taken off. (If the ground is too soft to give a firm footing to the jack, take one of the floor boards out of the car and place under it.)

Be Careful in Replacing Rim

In replacing the rim, reverse the operation, and in putting on the clamping nuts, give each a few turns by hand to make them take hold, then go all around the wheel drawing each one up fairly snug, and then go around once more for final tightening. If any one of the clamping nuts is drawn up tight before the rest are up to the point where they hold the rim in its proper place the rim is liable to be distorted and subject the tire to an entirely unnecessary strain.

It almost goes without saying that care should also be taken to attach the rim which has been removed very securely to the carrier, but some people do forget it with the result that at the end of their trip they find that the punctured tire and its rim have been lost along the road.

Sometimes there is no provision for carrying a spare tire on an extra rim, or a second puncture makes it necessary to take the tire off the rim and change or repair the tube. Since there are so many styles of rims that operate differently, there is not space for a description of the method to be followed for each. It is highly advisable for the car owner to have the agent from whom the car was purchased or a competent repair man show him how to make a tire change, as the information is sure to come in mighty handy.

Many motorists still follow the time-honored practice of carrying from one to half a dozen spare tubes as protection against the possible series of punctures that may occur in the course of one trip. The inefficiency and inconvenience of having to patch tubes made the expense of this extra equipment an almost necessary evil of motoring in days gone by.

No matter how carefully a patch was stuck on, the fact that it was not really welded to the tube by means of heat, left it liable to come loose when heated by running. Patches have been much improved since the early days of motoring, and those made now, if properly applied will give almost as good service as vulcanized repairs.

However, during the past few years the development of inexpensive, quick operating vulcanizers that could be used by anyone anywhere, has made it possible for motorists to save the expense of the set of spare tubes, for it is now as easy and quick to take out a punctured tube, vulcanize and replace it, as it is to change tubes. Even those who carry spare tubes also carry the repair outfit for an emergency or for use at home.

For Roadside Repairs

For roadside repairs there are a number of styles of vulcanizers of various degrees of simplicity. The one which we illustrate in Fig. 1 is particularly easy to use.

The outfit consists of a small clamp and a number of patching units, each of which is really a miniature vulcanizer in itself. That is, each patch unit consists of a little metal pan containing the correct amount of a non-flaming solid chemical fuel and having attached to its under side the patch of uncured Para rubber. The metal pan, which acts as the vulcanizing surface, is concave on the bottom so as to mould the repair to a feather edge that it is impossible to loosen. These units are made in several sizes so that both plain punctures and cuts or tears may be mended.

To mend a puncture the tube is cleaned with sandpaper or gasoline and one of the metal pans placed on it so that the rubber patch is centered over the puncture. The pan is then clamped tightly to the tube and the fuel lighted. All the steps in this repair are illustrated in Fig. 2.

At the end of five minutes the pan may be removed and thrown away like a wornout razor blade, and the tube is ready to use with no further chance for trouble from that particular puncture. And this process is as quick and easy as patching and the result is permanent.

Gasoline Fuel Vulcanizers

Other types of vulcanizers use gasoline for fuel, and as they not only make repairs to tubes, but enable any motorist to mend casing-cuts, sand-pockets, etc., without removing the tire from the wheel or even letting the air out; a great number of motorists who have learned the simplicity of vulcanizing from the use of the little five-minute outfits also have these for home use and to carry on long trips that may take them out of reach of repair shops. Such a device is shown in Fig. 3.

In repairing a tube with one of these, the puncture is prepared by cleaning and applying a coating of vulcanizing cement. A small piece of raw rubber is placed in the puncture, another piece the size of a quarter is placed over it, and the tube is clamped in the vulcanizer, as illustrated in Fig. 4.

The correct heat is secured by pouring a

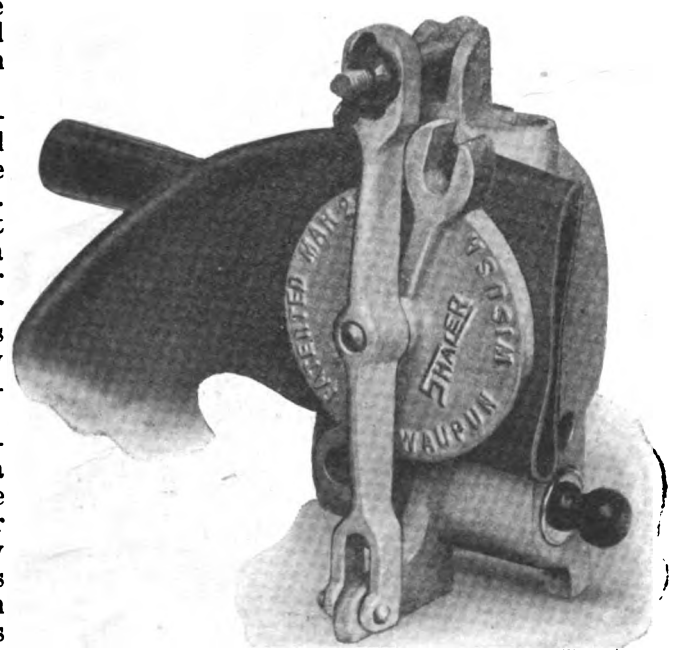


Fig. 4—How the Vulcanizer Shown in Fig. 3 is Used for Tube Repairing.

measured charge of gasoline into the absorbent burner and allowing it to burn which it does without exposed flame or smoke. Repairs made by this method actually renew the puncture tube by not only welding a patch over the puncture, but welding the puncture itself full of new rubber, the same as a repair man would.

In repairing a casing cut, the hole is cleaned, as shown in Fig. 5, coated with cement, and filled with scraps of raw rubber which do not even need to be cut to fit, as they flow together when heated. A curved surface of the vulcanizer is used on casings, as illustrated in Fig. 6, and the heat is supplied the same as to tubes. Repairs of this sort last as long as the tire and should always be made as soon as possible after the cut is discovered of the fabric may be irreparably weakened by exposure.

On a trip it may be inconvenient to vulcanize little cuts of this sort, and as a temporary substitute until a permanent repair can be

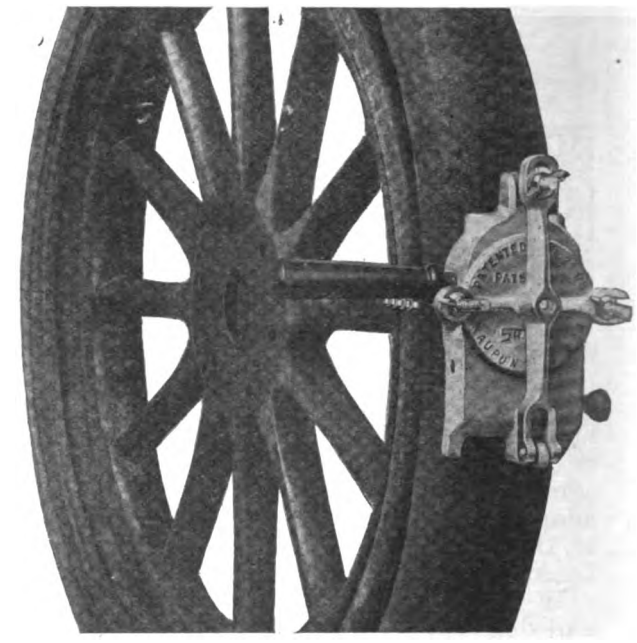


Fig. 6—The Vulcanizer Shown in Fig. 3 as Used for Tire Repairing.

made, it is recommended that cuts should be filled with one of the prepared gums that can be secured from any tire dealer.

Such is the simplicity of the vulcanizing process when carried out with one of these outfits that there is no reason why any motorist should hesitate to undertake his own tire repairing, at least as much of it as it would be inconvenient or impossible for him to take to the repair shop. As a protection against the emergency when the last tube is punctured and it is a case of stop or run on a flat tire, they are well worth the small initial cost.

Should the use of cemented or cementless patches be preferred, simply follow the manufacturer's instructions, taking especial care in cleaning the tube. If cement is used, let it dry thoroughly for several minutes before applying the patch, or in the case of a cementless patch which must be moistened with gasoline, let the gasoline all evaporate.

After applying the patch pound it all over with the hammer handle, or clamp it to the tube for a few minutes in order to secure the best possible adhesion. The chief fault of patches is that they have an appreciable thickness at the edges which makes it comparatively easy for them to start to come loose, and furthermore, the heat of running often decreases their sticking power and prepares the way for the air pressure to force its way between patch and tube.

In addition to punctures, there is a form of accident that may occur as a result of neglected tread cuts, or to rim cutting, or other causes, and that is the casing blow-out. It is impracticable for the average car owner to attempt the repair of blowouts as the expense of the necessary equipment is out of proportion to the amount of work it would be called upon to do.

As a protection against delay due to blowouts every motorist should carry at least one "blowout patch" and a "tire boot." The blowout patch, consisting of several layers of fabric vulcanized together, is placed on the inside of the casing to hold the pressure of the inner tube, and the boot is laced or hooked on the outside to keep dirt from being forced into the hole to tear it larger. The boot should be put in place with the tire only partly inflated and the tire pumped to full pressure later.

Needless to say, a good jack and a good pump are indispensable parts of every mo-

torist's equipment, and a small can of tire talc and a pair of tire removing tools should also be carried.

(*To be continued*)

* EDITOR'S NOTE: We are indebted to the C. A. Shaler Company, of which Mr. Faber is the advertising manager, for the illustrations used in this article.

Practical Horse Shoeing

Before the Beginner Can Hope to Shoe Horses He Must Know Something of Anatomy

BY F. L. ALLEN

IT has been demonstrated very conclusively during the past few years that improper horseshoeing is the cause for a large majority of horse diseases. A valuable horse may be permanently injured if the smith makes even a single mistake, and in many cases even if the injury is not permanent, it may give rise to other complications and the value of the horse greatly decreased.

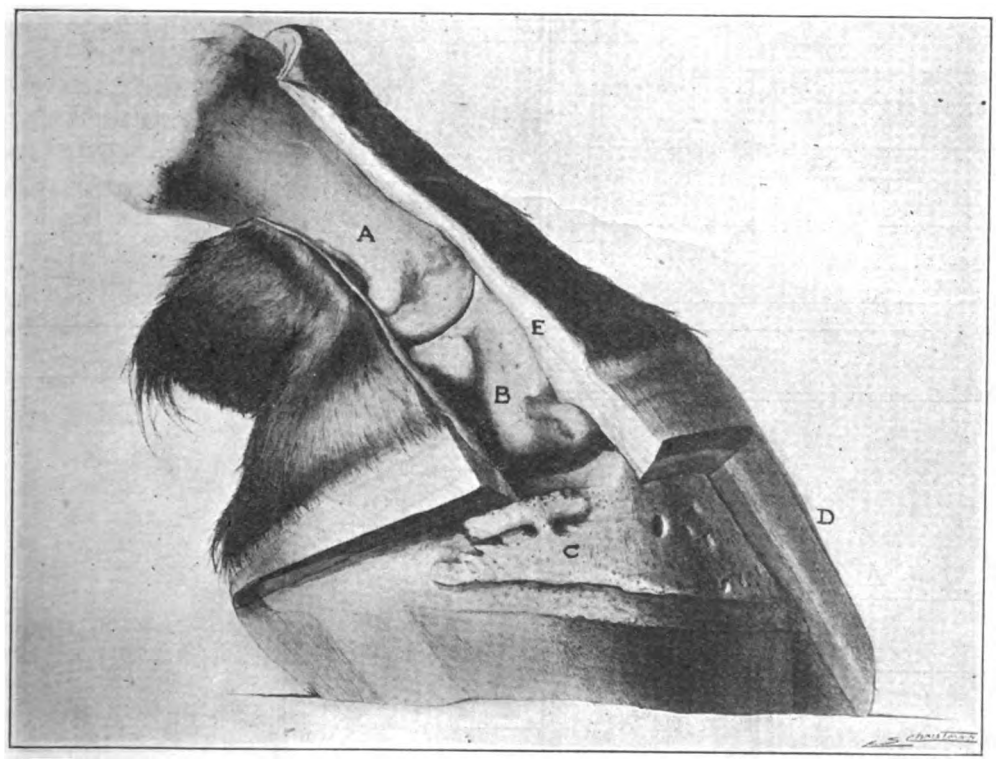
Horseshoeing as an art is almost as old as history. In olden times leather sandals were used and as early as 481 A. D., we have records of metal shoes. Kings and rulers often shod their horses with gold or silver, while copper and brass shoes were frequently used for the purpose.

In his primitive state, the horse probably required but little attention insofar as his feet were concerned. The roads were soft, he roamed the meadows, and he was used mostly for farming purposes. As the hoofs grew, the corresponding amount of friction with the ground naturally removed the horn.

With the advent of hard roads, the necessity for shoeing grew, for if the horse were to walk in his "bare feet" soon his whole hoof would be worn to the skin or bone and he would be unable to walk at all.

Before the smith can hope to become a "Scientific Shoer" he must thoroughly understand the anatomy of the horse's foot and to a certain extent the general anatomy of the horse as well.

I know of no better illustration to use, when describing a horse's hoof than by comparing it with the human foot, encased in a leather shoe. In such a condition there would be a bony framework encased by live flesh and controlled by certain tendons and cords.



Partial Section of Foot. A, Upper Pastern Bone; B, Coronary Bone; C, Coffin Bone; D, Horny Wall; E, Anterior Extensor.

Outside the flesh would come a casing of leather, hard and nerveless.

High Heels

Imagine what might happen if you were forced to walk all day in a pair of boots, the heels of which were from one to two inches high. By evening your legs would be so sore that you could hardly walk. The whole weight of your body would be supported on an inclined surface and rest upon your toes. After a few days of this, you would become a nervous wreck and your body would ache from your shoulders to your toes.

On the other hand suppose the taps or toes of your shoes were too high, the strain of your body would then fall upon your heels and since Nature did not intend that your feet should be treated in this way, you would suffer thereby. The same thing is true if either side of your shoe is worn, your foot is thrown out of balance and every muscle in your body is strained or stretched until everything is readjusted again.

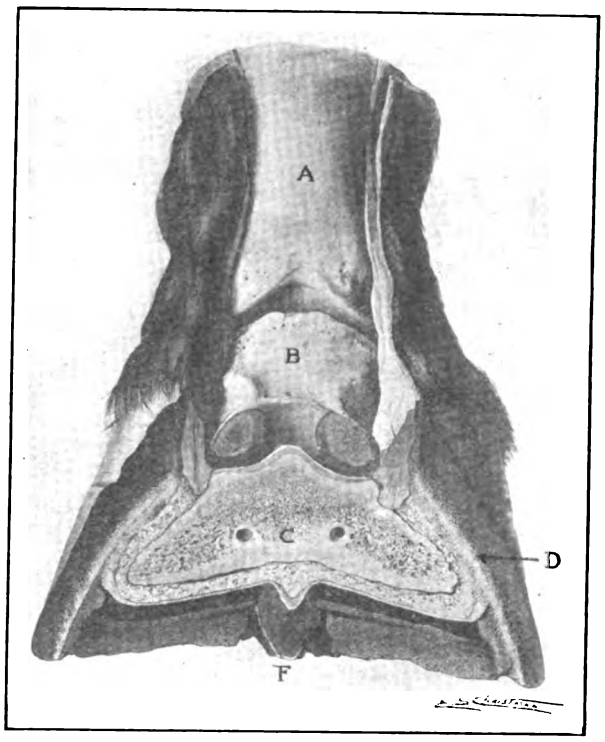
The basis of the foot is a triangular shaped bone called the Coffin or Pedal bone. Scientists call it the "Os Pedis," but at any rate it is upon this bone that all the weight is carried. In Figure 1 the bone is shown at C, while in Figure 2 the same letter is used referring to a cross section taken near the front of the triangle.

Except at the top where this bone joins to the next two bones, the coffin bone is surrounded by a layer of sensitive membrane. At the front this membrane is termed the "sensitive laminae." At the bottom is the sensitive sole and at the rear the sensitive frog. Surrounding this tissue is the horny portion of the hoof through which are driven the nails for holding on the shoes.

This wall is really the horse's toe nail. It is much thicker at the front than towards the quarters and the heels. Where the horny crust joins the flesh of the lower leg the portion of the hoof is termed the "coronet." Instead of completely surrounding the foot, the horny wall ceases at the frog and forms a triangular shaped projection. The sides of this triangle at each side of the frog are termed the "bars." The purpose of these bars is to prevent the walls or horny portion from contracting against the sensitive membrane.

The Frog

The frog is a spongy, elastic cushion situated between the bars at the heel of the foot. Its purpose is to absorb the vibration and jars, much the same as a rubber heel acts on an ordinary shoe. On the primitive horse, it probably served to prevent him from slipping on stony ground or upon ice. The wall of the foot does not form the bottom part. It grows very much like a finger nail, in that it projects downward and does not increase in thickness. It is the growth downward of this wall that necessitates a change in shoes and the leveling off of the foot very occasionally.



Partial Front Section of Foot. A, Upper Pastern; B, Coronary; C, Coffin; D, Horny Wall; F, Section Through Frog.

If this wall grew at the same rate all the way around, shoes might be left upon the foot until they were totally worn. On many horses, however, one portion of the wall has a more rapid growth than the other. The average growth is approximately three inches in a year.

In order to protect the sensitive lower portion of the foot, Nature has furnished it with a horny sole which completely covers the portion inside of the wall. This horny sole when in good condition, increases in thickness, but the increase in thickness automatically scales off. This sole is softer and more fibrous than the wall. Where it connects with the wall it is slightly thicker. The outside surface of the sole runs parallel with the lower edge of the coffin bone and upon this coffin bone depends the whole balance of the horse, as we have stated before.

Coffin Bone Position

We must realize that the lower edge of the coffin bone should be kept parallel with the ground in practically every case. Evidently Nature intended that the horse should walk with this bone in that particular position. She designed the horny frog so that its surface would be parallel with the surface of the bone. This being the case, the smith, in shoeing the horse, should always bear that point in mind and trim the wall down to a level with the horny sole, after having removed the flakes and dirt from it.

On a healthy hoof, the junction between the horny sole and the wall is evidenced on the outside by a white line. Frequently, however, Nature makes mistakes and often after exercising the greatest of care, hoofs are not trimmed evenly. In such a case, the horse himself has a method of making known his trouble by his method of standing upon the foot in question.

Let us examine the anatomy of the hoof still further and see what effect an improperly trimmed hoof might have.

Resting upon the coffin bone "C" and lettered A in Figure 1, is the coronary bone which is often termed the "lower pastern bone, forming a sort of a brace and an additional support is another bone termed the "navicular" or nut bone. At the top of the coronary bone comes the upper pastern bone lettered A in Figure 1. Surmounting this is

the cannon or shank bone which is shown in the large illustration.

From the cannon bone to the end of the hoof both the front and hind feet are constructed practically alike. The sizes and shapes differ slightly, but as far as construction is concerned, they are the same.

Various Muscles

Connected with the projections at the front of the coffin bone is a heavy muscle which is termed the "anterior extensor," while fastened to the back of this same bone is another flexor muscle to move the foot backward. Each of the bones is similarly equipped with tendons and muscles to hold it in place. The whole construction much resembles a pile of bricks, the lower three of which are at a slight angle, while the upper bricks extend straight upward.

Practically the whole weight of the horse's body, then, rests upon the foot bones at a slight angle and with the muscular arrangement, the angular weight moves forward until it rests directly upon the coffin bone.

Suppose, however, the coffin bone were tipped slightly, that is, the front of a shoe might be made slightly high. This would tip the whole foot backward, and coronary bone, instead of resting upon the axis of the coffin bone, would press heavily upon the nevicular bone and thus bring a tension upon the tendons of the flexor muscle.

In a short time inflammation and pain would cause the horse to limp and in his endeavor to distribute the weight evenly he would move his foot forward, thus bringing the lower surface of the coffin bone parallel with the ground.

Such a proceeding would lessen the pain in his foot but naturally the relative position of the cannon bone and his body would be changed. His weight would then rest upon the muscles of his upper leg and sooner or later inflammation might develop there.

Should the heel of his foot be raised too high, the foot would be moved backward when the horse was standing and the results to the various upper bones and tendons would be similar to that when the toe was too high.

Thus, it would seem that in all cases of muscular strain and similar troubles, the first point to consider in making the cure would be the shoes and the trimming of the hoof.

Oftentimes the owner of a lame horse is advised that the best cure is to turn the animal into the pasture, but after a week of rest, the horse is very apt to be in a worse condition than before. It is easy enough to see the reason for this, if one stops to think.

Suppose the smith, in trimming the foot, left the front slightly too high. As explained above the horse might go lame and if turned into the pasture his lameness would grow worse, simply because the cause would not be removed.

In grazing, the horse would be forced to strain still further the muscles, and unless the hoof were properly trimmed, there would be no cure.

The smith, therefore, should make a study of each horse when the horse is brought into the shop and before the old shoes are removed. By observation he can tell whether or not the old shoes are properly set and by the horse's standing position just what part of the hoof is too long.

Besides the fact that improper shoeing or trimming causes lameness, there is one more point to be considered, that of nailing. In driving the nails it is important that all of them enter only the hard outer shell, for immediately they enter the sensitive inner foot, they injure the horse and cause lameness. In fact such an accident may cause infection and blood-poisoning.

Farm Truck Body

DUE to war conditions the output of wagon factories and body building shops was seriously diminished and doubtless it will be some time before all of the accumulated orders will have been filled.

Such a condition has resulted in an unfilled demand for farm wagons of all kinds and the farmer is often willing to pay a big premium provided he can purchase just the type of wagon he wants. This opens the market for the country smith and wheelwright. In a farming community there is no reason why considerable money cannot be made by the average smith.

A hand-made wagon body, built from sound stock throughout and practically made to order is doubtless of more value than a mail ordered wagon in many cases. When the farmer purchases a wagon from his local smith he knows that it is suitable for his needs. He can inspect the body and many times he can actually oversee its construction.

The body shown in the drawing herewith is designed especially for attachment upon a Studebaker one-ton chassis and is of general utility. It may be used for carrying green stuff, garden truck, or even live stock to the market or slaughter houses and for the small farm is extremely practical.

As the sketch shows, the construction is extremely simple. The body is built upon a heavy frame composed of four sills measuring 3 by 5 inches, mortised together and so arranged as to rest, at the sides directly upon the frame. The rear sill extends six inches beyond the sides and from the ends, a pair of braces clamped to the sides extend to the flare boards and brace this part of the body.

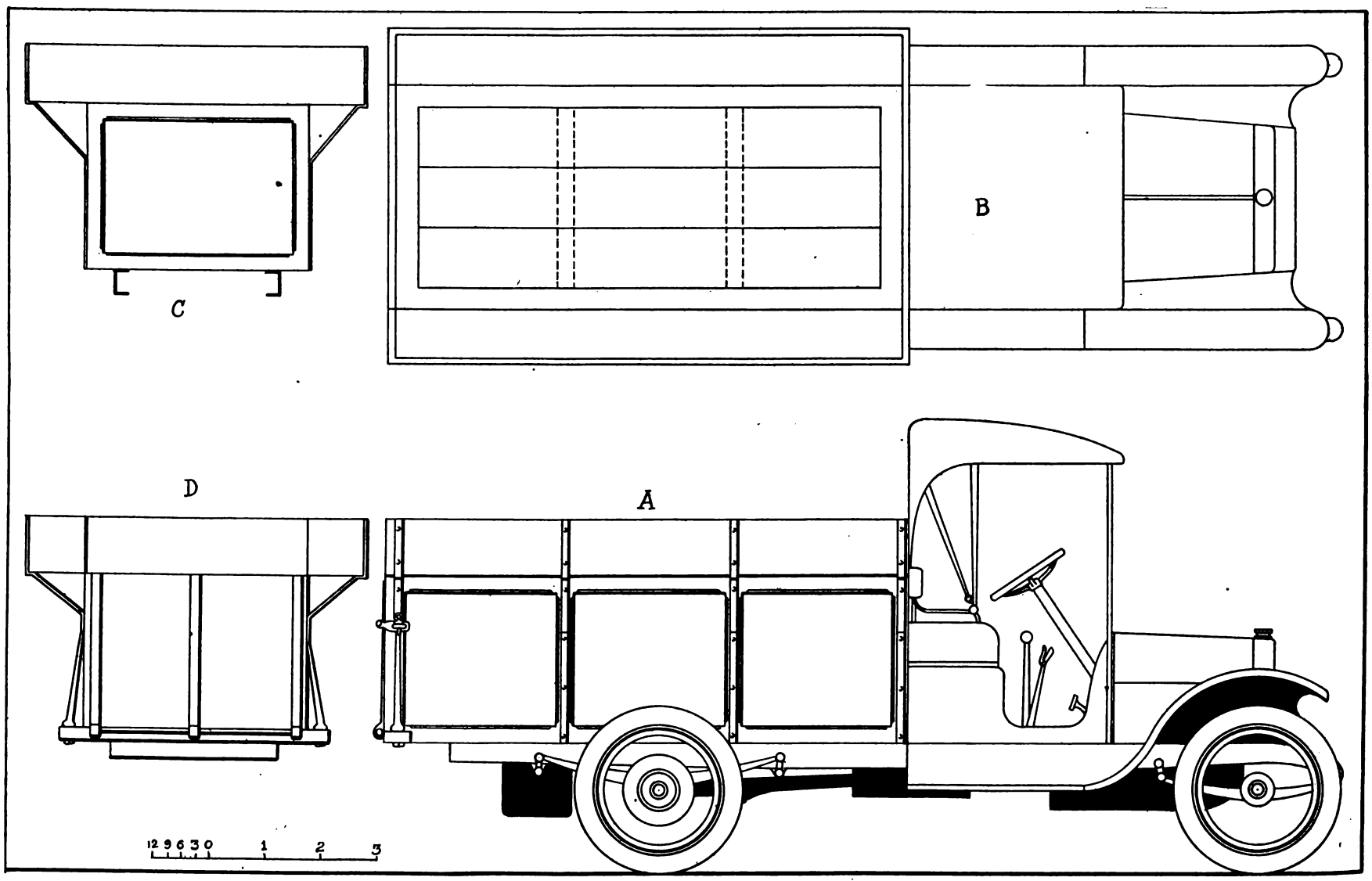
At the center, to support the floor, there are located two cross members (shown by the dotted lines) and these members are made of 1½-inch stock, three inches in width and mortised into the frame. The floor boards should be made of stock at least 1½ inches thick and preferably 12 inches in width. If 12-inch boards are obtainable, three will just fill the space which is 36 inches in width.

To support the sides, four panel posts are used and mortised to their tops are the top sills. These members are all of 3 by 2-inch stock and the panels are 1½-inch in thickness.

The flare or overhang is made 12 inches in width from 1¼-inch stock and is braced from the side uprights by strap iron braces. A convenient height for the flare is 12 inches, or the width of the widest stock obtainable.

For conveniences, the tail gate should be high enough to enclose the main body which is three feet in height and the gate should be made of 1½-inch stock, well braced for the tail gate may then be used as a running skid when loading the wagon.

With the one-ton Studebaker chassis there is plenty of room for a body nine feet long behind the driver's seat. With the construction, as described, and the absence of cross sills the body can be hung upon the chassis considerably lower than usual.



An Easily Constructed Truck Body.

A Jack of All Trades

The Village Blacksmith Often Is Obliged to Attempt Some Mighty Peculiar Tasks

By JAMES F. HOBART

THE chap who called the blacksmith a "Jack of all Trades" wasn't far out of the way, for the writer has seen a smith hurry the shoeing of a horse to cut a man's hair, and to finish the woodwork of a wagon and then give it five coats of paint and varnish! Nowadays it is nothing out of the ordinary to see a smith clean carbon from the cylinders of an automobile motor, adjust the carburetor or weld a cracked water-jacket with oxy-acetylene where some chap had let Jack Frost try to run the water-cooling end of the automobile.

But about the last word in Blacksmith versatility is still standing on St. Claude Avenue in New Orleans, where the, or rather "a" smith, made and erected as fine a looking barber's pole as ever was seen inside of New York or out of it. The affair, as shown by Fig. 1, was made mostly from a piece of eight-inch water or steam pipe, some pipe fittings, a cast iron ball from a junk yard, a couple of forgings, United States flag, flagstaff and some good paint and varnish.

The Blacksmith's Barber Pole

I don't suppose the Blacksmith will never corner the Barber's Pole market, but he may occasionally be able to pick up a bit of ready cash by setting up a barber pole, so I will describe the New Orleans pole and the manner in which the smith made it up. The piece of eight-inch pipe A, was about ten feet long. The smith "picked it up" in a junk yard. It originally came from the fittings of a Mississippi River steamboat.

The base B was made of concrete and the entire lower portion of the pipe, imbedded in the ground, was also encased in concrete as shown by the dotted lines. Piece C was an ordinary pipe cap, screwed to the end of pipe which had been threaded on the top end only, the lower end being plain.

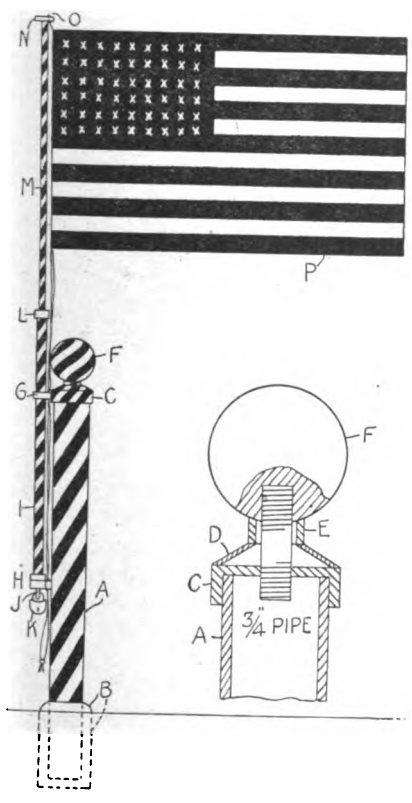


Fig. 1—Details of the Flag Pole.

A hole was drilled and tapped for three-quarter inch pipe in the middle of cap C, also in ball F, which, also found in the junk yard, was about eight inches in diameter. A piece of three-quarter inch pipe was threaded into the holes in C and F, the latter being screwed fast against the pieces D and E.

Piece E was nothing more or less than a wall-collar for four-inch stovepipe. The collar was filled with concrete inside, as was collar E, which was nothing but a band from an old buggy hub. The piece of pipe was put in place, D and E located and filled with cement and gravel, then after it was set, ball F was screwed in place and the top end of the pole was complete.

Two screw-sockets were then inserted, one in the post as shown at H, and made as large as the hole inside of three-quarter inch pipe, or a trifle larger. The screw-socket at G, which was screwed into cap C, was made just large enough so that three-quarter inch pipe would slide easily through it. Both these sockets were so located, as shown at G and H, that the pipe I would stand parallel with pipe A.

A piece of black steel was flat-forged and a hole punched in it as shown at J, to receive the staple of a small lock K, then piece J was welded into pipe I. This locking up business was an afterthought—after the "boys" had carried away the fine flagstaff I M, flag and all. They left it in place after lock K had been added. A plain pipe "reducer" applied at L served to receive the "topmast" M, which was made of one-half inch pipe. The first one was made of three-eighths pipe, but it broke off at L twice; so after it was stolen the smith made the new one from one-half inch pipe.

Cap N was made from a cast-iron washer, three inches in diameter. The smith intended to put in a pulley at O, but found it was going to be a lot of work to fit in the pulley, also to keep the halliards Q R on the pulley after it was in place, so he simply drilled a hole through N, at O, rounded off the corners all around the hole and let the cord Q R run directly against the metal of cap N. This worked just as well as a pulley.

The halliards or cords Q R were brought down and made fast to screw-socket H. The barber wanted to fix the halliards in some way that lock K would prevent the flag from being lowered, but the smith gave up that problem in disgust and told the barber that unless he made the halliards of chain or wire cable that the lock K would do very little against jackknife attack on the halliards.

Striping the Pole

When it came to the striping of the pole, the smith scratched his head a bit, then he procured a ball of twine and wound two lengths around the pole from top to bottom. A little experimenting gave just the angle and the equal distance between the strings as required for the alternate red and white stripes. The smith stretched the strings very tight, fastened them securely, then drew his pencil along both strings, making plain marks on the iron post-pipe. Then the strings were removed and the red color "cut-in" between two of the pencil marks and the stripes were formed with no further trouble.

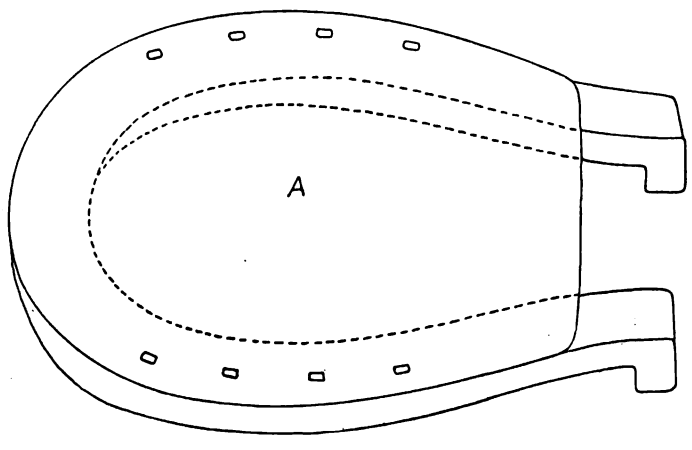


Fig. 2—The Tinned Shoe.

The stripes on ball F were also laid off with a single string. A little hole was drilled in the top center of ball F, a string made fast to a pin driven in the hole, then the string was drawn tight over the ball and against collar E. A soft pencil was then drawn along the string, after which the string was moved along the desired amount and another pencil mark made on the ball. It was found desirable, before stretching the string, to make short pencil marks around the middle of ball F, spacing these marks by the eye, then drawing the string in such a manner that it would pass directly over in turn, each mark made as described above.

"Tinning" Mule's Hoofs

One day I got to talking with a smith in a shop on Girod Street, New Orleans, and found him industriously "tinning" the hind feet of each mule he shod, a piece of tin A, Fig. 2, being cut to fit the hoof and placed under each shoe which was set on mules.

"The tin is necessary," said the smith, "to prevent nails from sticking into the feet and frogs of the animals. There are a good many small nails lying around underfoot where these mules are used and if I don't 'tin' the bottoms of their feet, some of them are sure to be laid up all the time from 'nail prick.'"

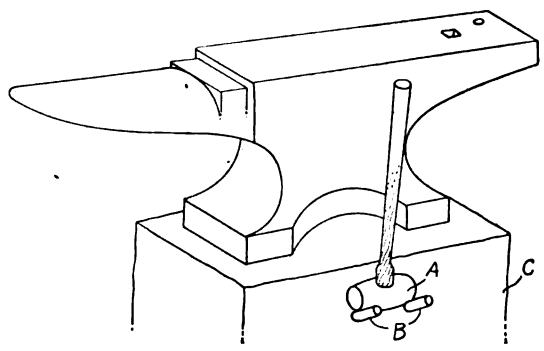


Fig. 3—Handy Place for the Hammer.

One of the smiths in this shop was a bit of a wandering showman, too. He had an educated goose and a rooster. He was repairing a little wagon to which the goose would be harnessed and which the fowl would pull around in great style under direction of the rooster, who, perched upon the "box" would hold the reins in his beak and make a great fuss about "driving" his web-footed motive power!

One day, about a week later, I was in the shop of Herman Nehlig, 633 Montague Street, of the "Crescent City," and we got to talking about using tin under the shoes of horses and mules. Mr. Nehlig condemned the practice very strongly, saying that it spoiled the animal's feet, as it heats and rots the frogs. The practice in this shop seemed to be that of cutting off toes, digging out heels and the free use of quarter-bars.

Making Vehicles "Track"

I heard a very interesting story in this shop about making vehicles "track." A certain cab which had been ironed in a shop where the story-teller worked at the time, always gave trouble by not "tracking" properly. Built to fit the street-car track, the vehicle, when started off down the street, would drop its front wheels between the rails as soon as it hit the track, but the rear wheels would sometimes go for blocks, when they hit no switches, without falling in between the rails.

The smith who told the story said that one day a smith came along who allowed that he "would make the cab track, or he'd eat it"! All the smith did, that the story-teller could see, was to take down one of the springs, cut off a bit, replace the spring, and the rear wheels of the cab fell "bang" in between the street-car rails before the cab had moved ten feet along the track!

Mr. Nehlig had early seen the "handwriting on the wall" and knew that for self-preservation he would be obliged to go into automobile work. To do this, he went to work in a very novel way and one which certainly should prove adequate and effective. The shop had an apprentice, a promising young man nearly "out of his time," and one whom it was the intention to take into partnership at no very distant day. With this young man a scheme was made up that he should appear to leave the blacksmith in order to get into automobile repairing.

The "apprentice" got a job in a first-class repair shop and then went systematically to work to learn everything about the business form A to Z, and the amount which a determined young man can absorb of auto work in a year is surely a whole lot. At the end of the year the young man will have complete lists of the tools and equipment needed in a garage and a mighty good idea of how to handle the different classes of work which come to auto repair shops. It seems to the writer to be a mighty good way of "breaking into" automobile repair work.

The smith figures that the horses will be a little scarcer by the time his apprentice has "caught on" to the automobile game, then

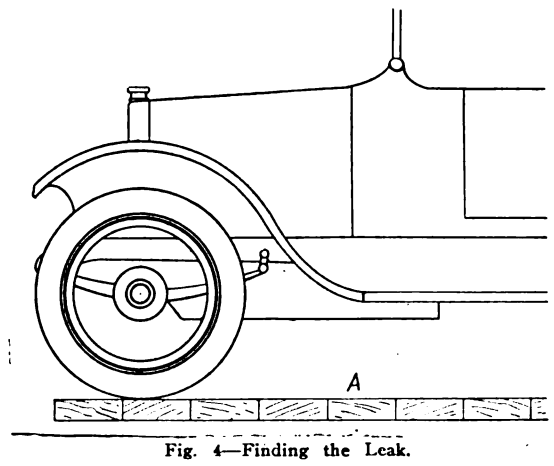


Fig. 4—Finding the Leak.

they will shove the shoeing gear all back into one corner of the shop, the apprentice come in as a full partner, his experience and "know-how" against the shop of Mr. Nehlig, who personally will care for what "hoss-work" comes in, and incidentally "catch on" to the automobile game himself. It looked to the writer as a mighty good scheme and one which other smiths should try out for their own interests before the "hoss famine" hits their business too strongly.

New Orleans' Streets Hard on Shoes

"New Orleans streets are very hard on horseshoes," said Mr. Nehlig. "New shoes will last only about a month on animals which are on the downtown street all day. You see, New Orleans streets, or a large part of them, are paved with big blocks of very hard stone, eighteen by twelve inches. These blocks of stone were brought here by vessels as ballast when they came for cargoes many years ago. Sailing vessels, they were, and had to be ballasted in order to 'stand up' during the voyage here. These hard stones wear the shoes horribly and sometimes the shoes won't last as long as stated above."

From Clerk to Army Farrier

The smith who owned the shop described above had a son who did not care for blacksmithing, and after working at it as a boy, while not in school, took opportunity as he grew up to get away from the shop into an office where he was making good as a clerk. One day the draft caught the young man and he knew that he would have to go, as he was sure of making Class A. His father sent for the young man and said: "Now, son, just quit the office and come into the shop and harden your muscles against the time when you will be called. You will probably have six weeks or two months, and in that time, with what you know of shoeing, you can qualify as first-class farrier and thus get a pretty good standing in the army."

The young man took his father's advice and went at the work of shoeing with much greater interest than ever before. He had not been a month in camp before he was in the farrier's division or squad, and very soon a sergeant's stripes on his sleeve gave him many privileges which he could not have obtained in the trenches. And who shall say that he did not do as much for his country shoeing horses well and skilfully as though he had been firing guns at the Huns?

In New Orleans and other Southern cities it seems to be the universal practice, among the smaller shops at least, to make the shoes used from old iron which may be picked up from junkshops or from machine shops along the big river. "It used to be our stint," said a smith in one of the shops, "to shoe eight horses a day, each man, and to make all the shoes from old bolts, using three-quarter-inch steel for ordinary shoes, seven-eighths inch for the larger horses and five-eighths inch round black steel for racing and driving horses."

"When two men worked in a shop one would help the other in 'drawing' a batch of shoes with the short-handled, round, double-faced sledge so much used in smith shops in this part of the country. It is much less work, forming shoes from bolts when you have a lusty hand at the sledge to 'belt out' the rods into shoe shape. But when there was only one man in a shop he sure had to 'go some' with his forging arm to draw out and shape those thirty-two shoes and to fit and drive them in one day."

"How do you manage the drawing out without a striker?" the writer asked one smith. "Oh, I usually keep the little double-faced striking hammer A, Fig. 3, on a couple of five-eighths inch pins B, which have been bored and driven into the anvil block C on the back side thereof. The striking hammer lies there all the time, out of the way, and with its fifteen-inch handle projecting up and away from the anvil, I can reach over the anvil at any time and get hold of that striking hammer handle, and, using it one-handed I can forge out those bolt-shoes a whole lot faster than with the forging hammer."

An automobile stopped at a smith shop one day to have a bit of the linkage straightened out, and while at the work the smith was told by the driver of the car that he was using more oil than he thought necessary and sometimes thought some of it leaked out. "But I never have found any leak," he declared, and added that he had hunted the crankcase all over for leaks, but never had found one.

"Let's have a try at leak-finding," said the smith, and upon the owner consenting, the smith brought out a dozen short boards and laid them under the automobile, placing them as close together as they would lie, as at A, Fig. 4. Then he busied himself with the links which were to be straightened, and finished the work in about a half hour. Then he went to the boards under the automobile and looked for oil-drippings—and found some. He traced the points from which the oil came which was falling on the boards and thus located a leak in the gear case and a couple more in the engine, where the driver had never even thought of looking for oil leakage. "That's a mighty good way of tracking grease," said the smith. "I first started to use that scheme to find out whether or not grease was working out of carriage axle boxes, but it's all right for automobiles, too."

Three More Entries in The Prize Photograph Contest

IN the April issue we announced that a novel photograph had been received for our prize photograph contest; here it is on this page, and doubtless you will agree that you have never seen a shop like it.

Evidently the builder was a real artist and knew how to advertise. The occupant of this shop does not need to tell the trade what he does, why, even the horses (so we assume) must have the habit of stopping in front of the place when they need shoes.

Perhaps those same horses often wonder where the horse lives that once wore the shoe around the door; he sure must have been a fairly sizable pacer.

It rather looks as though we might have some trouble awarding the prizes, all of the pictures so far have been so interesting that it will be a difficult matter to pick the best, perhaps we will have to award more than the three prizes, so you had better send in that picture of your shop.

Just bear in mind that it doesn't cost anything to enter your picture in the contest. As a matter of fact every one who enters a photograph of their shop receives a prize in the shape of a halftone engraving, the one we use for printing the picture in the magazine. Practically any printer can use this engraving for reproducing the picture on the tops of bill heads and letter heads.

Send That Picture Today

PRIZE PHOTO NO. 8.

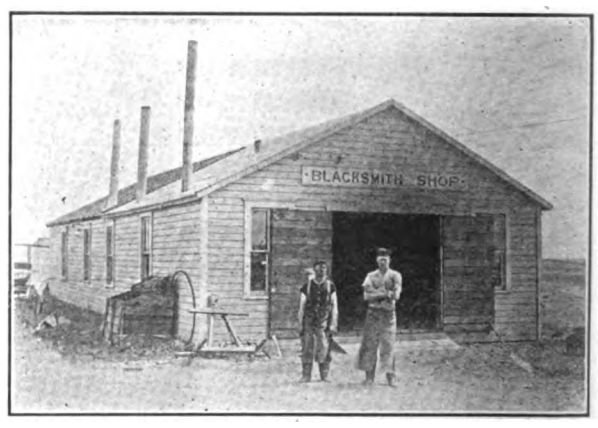
From Fred Littlefield, Montana.—I am sending you a photograph of my blacksmith shop which shows how it looked in the summer of 1917. The tall man in the picture is R. E. Welliever, while the short one is myself.

I built this shop in November, 1916, and during that winter I did horseshoeing. In the Spring of 1917 I put in power machinery consisting of a trip hammer, two blowers, drill press, double-emery stand; tire shrinker, three vises and a foot vise, three fireplaces and one hand-blower.

The power machinery is operated by a five-horsepower electric motor. I have all kinds of small tools and fifty pairs of tongs which I made myself (I haven't enough tongs yet). I am greatly interested in the articles which you publish about welding as I intend to put in an oxy-acetylene plant. The lathe articles also are interesting, and I intend to have a lathe this coming summer.

There is a great deal of automobile and tractor work to be done around here and so I expect to start in the automobile repair business this spring. I think that this is the coming business, but we still have plenty of horseshoeing. Of course, at the present time, the plow work amounts to the most.

Personally, I should like to see articles in your paper about shop systems and business methods, for I think that one of the reasons why the trade is not so successful is because of its business methods. In the near future the blacksmith will have to have an office, a desk and a cash register—a place where he can do business in a businesslike way, and



Mr. Littlefield's Shop.

so train the customers to have a certain amount of respect for our methods.

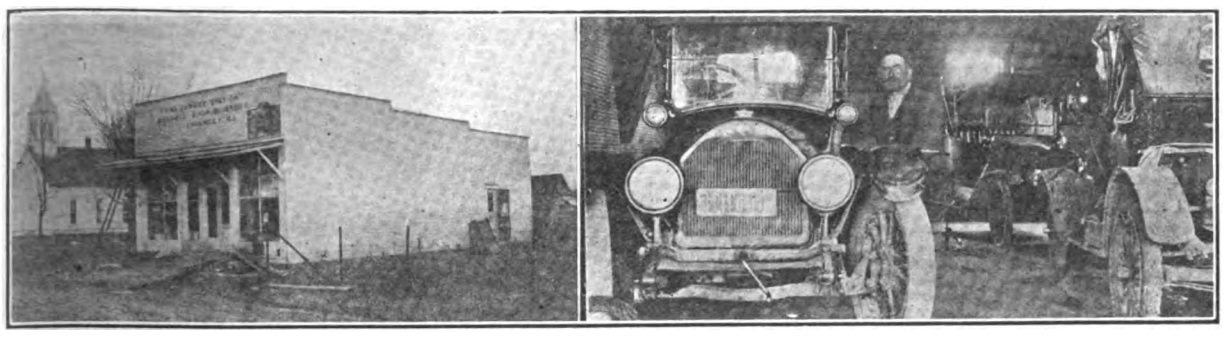
In fact, I think that the blacksmith business should be run just like well regulated department stores and until the business is run that way, we cannot expect to take our places among businessmen.

I do a strictly cash business here and find that the customers like it just as well, after they get used to it, as they did the old credit plan. There are three shops in this town now. I was the last one to arrive, but I am getting my share of the business. One of the shops will charge anything and do work on credit. The shop shown in the photograph is 24 by 56 feet.

A good temper is better than a legacy, or a public pension.

PRIZE PHOTO NO. 9.

From the Correll Shop, Illinois.—We are sending you a number of photographs of the building in which we do our repair work as well as a picture taken of the inside of the shop, and we would like to enter at least one of them in the prize contest. The writer intends to send in an article a little later, but does not have time now.



Mr. Correll's Shop as Viewed from the Outside and an Inside View Showing Mr. Correll.

EDITOR'S NOTE.—We have taken the liberty of reproducing two of Mr. Correll's pictures, one which shows the outside of the shop and the other, the inside. We trust that Mr. Correll is not quite as ghost-like as he appears in the photograph. Evidently a double exposure was made, and we are sure that the picture is more interesting on this account.

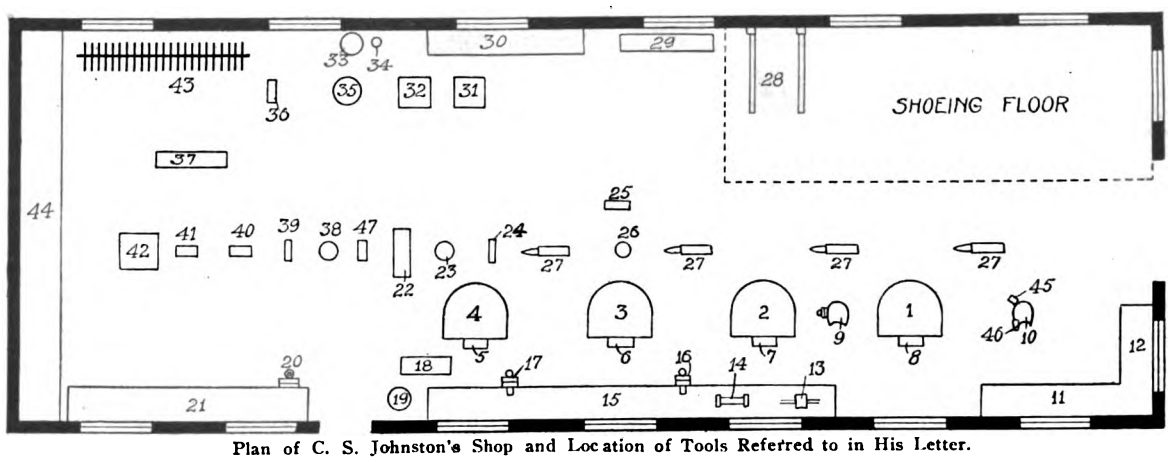
Upon close investigation one will note that the Ford car at the rear of the shop shows clearly through Mr. Correll's body. Perhaps when Mr. Correll writes to us again, he will tell us how he managed to obtain such a result and produce a picture which showed his face and arms clearly but the rest of his body in shadowy outline.

PRIZE PHOTO NO. 10.

We reproduce herewith a photograph forwarded by C. S. Johnston, of Montana, and with this photograph we have reproduced the plan of the shop. Mr. Johnston gave no details, nor did he tell who designed the building, but we are sure that all the readers will agree that it is one of the most ornate and fitting smith shops that they have ever seen.

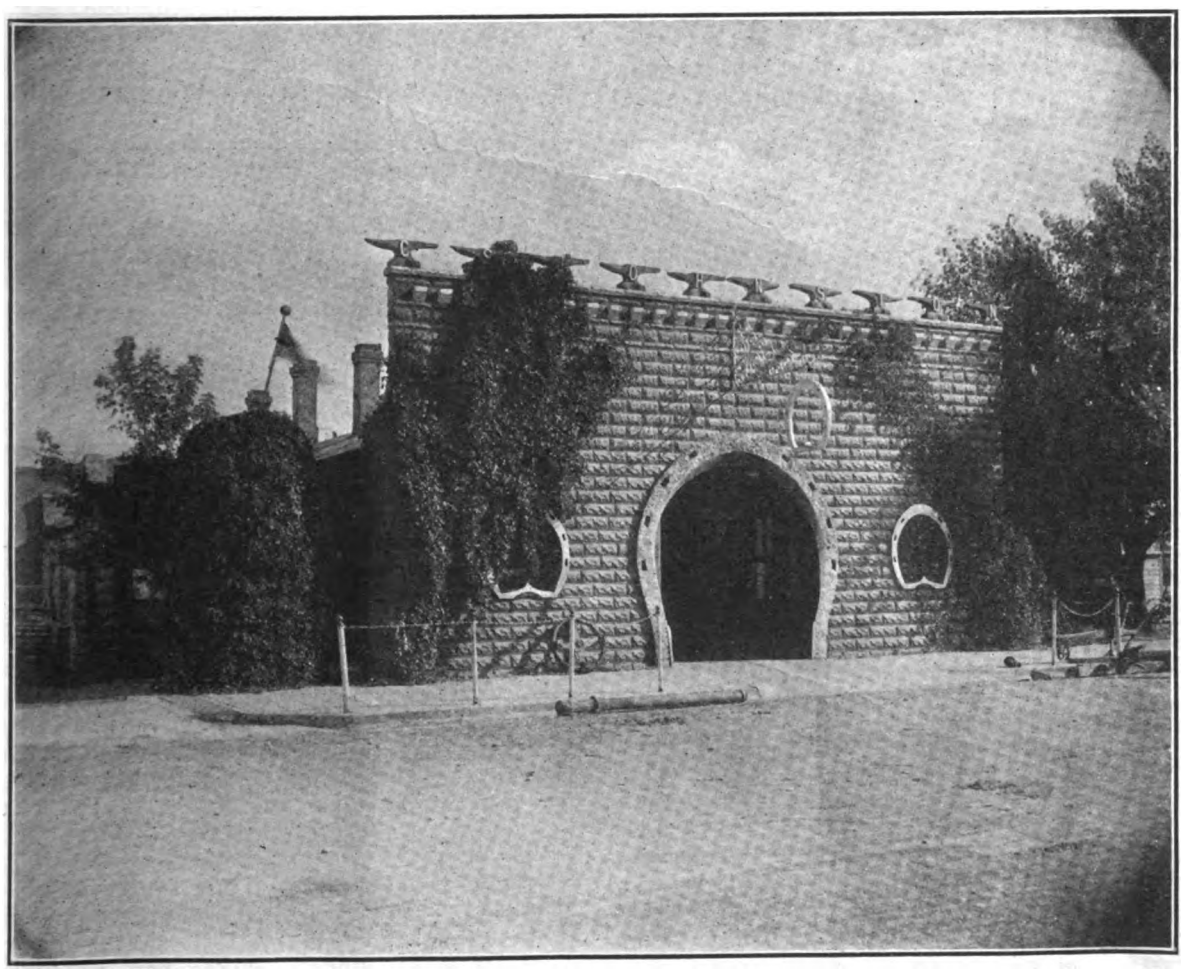
Not only is the building itself beautiful, but there seems to have been great care exercised in locating the shrubbery and placing it in the yard. In referring to the sketch of the shop, the following numbers are given on the back of the sketch, and reproduced herewith.

Nos. 1, 2, 3 and 4—Horseshoe-shaped forges.
Nos. 5, 6, 7 and 8—Electric blowers.
Nos. 9 and 10—Horseshoe-shaped vise benches.
Nos. 56 and 46—Vise and shoeing vise.
No. 27—Four anvils.
No. 13—Neverslip automatic power tapping machine (our own invention).
No. 14—Emery stand.
Nos. 16 and 17—Vises.
No. 18—Power bolt tapping machine.
No. 19—Press drill.
No. 20—Wood vise.
No. 21—Woodwork bench.
No. 22—Cold tire setter and power shears.



Plan of C. S. Johnston's Shop and Location of Tools Referred to in His Letter.

No. 23—25-lb. trip hammer.
No. 26—50-lb. trip hammer.
No. 25—Tire shrinker.
No. 24—Shears.
No. 38—Drill press.
No. 47—Power hacksaw.
No. 39—Grind stone.
No. 40—Lawn mower sharpener.
No. 41—Spoke turning machine.
No. 43—Iron rack.
No. 36—Shears.
No. 42—Universal wood worker.
No. 44—Wood stock.
No. 35—Welding forge.
No. 32—Welding Table.
No. 31—Welding furnace.
No. 33—Generator.
No. 34—Tank.
No. 30—Welding supplies.
No. 29—Lathe.
No. 28—Barcus shoeing rack.
The shop measures 50 x 100 feet.



The Ornate Smith Shop of C. S. Johnston.

Fully Warned

Fortune-teller to motorist: "I warn you, a dark man is about to cross your path!"

Motorist: "Better warn the dark man."—*Sydney Bulletin.*

PRICE LISTS WANTED

In order that our readers may keep informed as to prices prevailing in various parts of the country, we have decided to publish a price report, monthly in the BLACKSMITH & WHEELWRIGHT. In order to do this, we must have the co-operation of all our subscribers.

We therefore have reproduced a convenient blank list for the smiths to fill out. It is not necessary for the reader to fill every item, but only such items as are of particular interest to him in his part of the country.

The blank is not complete, by any means, and we suggest that if the smith wishes he may add any items and prices that occur to him.

It is our suggestion that each smith, in renewing his subscription, fill in such items as he can and enclose the blank with the subscription money. Just before publication date we will compile the table from the blanks received and publish it in the next BLACKSMITH & WHEELWRIGHT. Thus you will know whether or not your local dealers are charging fair prices and are giving you fair prices for your work.

This plan has, to our knowledge, never been tried in a trade paper of this kind, but it is our candid opinion that if our subscribers will only co-operate by filling in the blanks as they appear every month, this department will save them hundreds of dollars every year.

For the next few months, we wish that every reader would fill in the blanks so as to "start the ball rolling." We wish that every reader would add items which he thinks are necessary.

Price per lb. received for junk iron.....
Price per lb. received for junk steel.....
Price paid per lb. for square iron bars.....
(Give one or more sizes)
Price paid per lb. for flats.....
Prices received for shoeing No. 1.....
Prices received for shoeing No. 4.....
Prices received for shoeing No. 6.....
Prices received for calks.....
Prices received for resetting.....
Prices received for new tires.....
Prices received for spokes.....
(*Add other items.*)
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Subscribers who wish to know when their subscriptions expire should consult the address tag on the wrapper of each copy mailed to them.

Our Editor's Letter

UNTIL the prize photograph contest started, I had no idea that there were so many fine looking blacksmith shops. Somehow or other I had the idea that a smith shop was a combination farmyard and junk-shop.

Perhaps my idea was formed by a shop which I once knew. The smith had a fair sized yard and had built the shop at the rear of it. His front yard was perhaps about a hundred feet square and in all of my life I had never seen such an assortment of farm wagons and farming machinery in one place.

And all of the machinery was old and broken down. Evidently the smith believed in making collections of relics for some of the junk had probably been out in his yard for the past many years.

Such a pile of old stuff had certain effects upon his business and I doubt if he was justified in keeping it. Many of the farmers (in my hearing), often have said, "I'm always afraid to take any of my farming machinery to Jim because he likes to throw it in the junk pile, he doesn't care to fix up old stuff and may say that it is no good."

The farmers were right, too, for Jim was a shirker to a certain extent, he liked to work on new machinery, but when it came to working on a rusty part, then he grew careless and usually tried to persuade the farmer that a new machine or part was necessary.

You know yourself that an attractive and neat place of business has more weight with you than an ill-kept place. A neat store makes you feel that the proprietor is also neat and business-like, and you feel that his prices are just as clean cut and charged upon a practical basis.

If I am to judge by the average photographs entered in the contest, I should say that the smith realizes that a clean shop invites trade and confidence, for if this is true in any other business it surely is just as applicable to blacksmithing.

I feel that the smith should keep a clean shop, just because I know that the average smith is so good natured and clean in his own heart. Daily I receive many letters from various parts of the country and everyone of those letters from blacksmiths shows a willingness to help his brothers in the trade.

You can see this helpful spirit reflected in our "Workshop Experience" department in the suggestions and articles sent us. Each article shows a brotherly spirit.

It only remains for all of us to pull together, not try to play the game all by ourselves, but to unite and by our united efforts climb together to success.

Our Open Market

SOME time ago one of our brothers suggested that a set of price lists published at least once a year might be very helpful for blacksmith readers. Only a few days ago a reader suggested that if the smiths only had an idea as to prices in various parts of the country, they might be able to fix their own prices accordingly.

Farm journals often make a point of publishing farm produce prices and undoubtedly it is this form of co-operation that has put the farmer upon his feet and helped him to obtain a fair price for his commodities.

Upon one of the pages, at a lower corner, in this issue, our readers will find a blank form which every reader is requested to fill out. It will be noted that only general headings are used and the smith is requested to put in the necessary details. For instance, on the line "Square Iron," you may have recently bought some one-inch square stock, if so, simply put the size on the line and the price per pound you paid.

Such a blank will be printed every month and after it is filled in, it may be pasted upon the back of a post card and mailed to the BLACKSMITH & WHEELWRIGHT, 71 Murray St., New York, N. Y.

When we receive the card we will put it with the thousands of others which we receive and in the following month we will publish a list of prices under various headings, showing the prices at various points throughout the country of the different items.

If you wish any particular heading added to the blank, just put the heading on the dotted lines at the bottom, together with your price on that stock or article and this item will be added the following month.

If all of our readers co-operate, this will form the most valuable part of our magazine. You will know whether or not it will pay you to send for iron to Chicago, or if you can obtain a specially high price for junk in a nearby city.

As time goes on, the items on the list will increase in number. You will be able to show your customers how much a certain job might cost in another part of the country, how much your stock costs; in other words, this department will help you to justify your prices when the farmer "kicks."

An Unjustified Attack

IN order that he may clear himself, or try to, in the eyes of the public at large, our Postmaster General, Mr. Burleson, has made a sweeping charge against the magazines and newspapers as a class.

He has claimed that the present antagonism of the Public has been stirred up by the newspapers and magazines. He claims that the publishers are his enemies because of the second-class postal bill for which he was sponsor.

This is not to the point and does not answer the criticisms. True, the publishers have criticized the law which has increased postage, in some cases more than 100%, but this criticism is based upon the fact that some time ago a committee investigated postal costs and found that a reasonable and just rate was being charged at the time.

It is the people as a whole that have been aroused, they have realized the present inefficiencies of the wire systems, the rundown conditions of the telephone service.

Not only has the general public protested but even the employees of the telephone and telegraph systems have raised their voices against Mr. Burleson.

The Democratic party have openly condemned the Postmaster General's autocratic attitude and his general "Public Be-Damned" policy, may have issued the statement that Mr. Burleson's management (or mismanagement) of the telephone and telegraph systems has undoubtedly done more to ruin all chances of Government ownership than anything else that might be done.

Formerly, under private administration, no rates could be raised without the consent of the Interstate Commerce Commission, yet our worthy Postmaster General held himself above all laws and arbitrarily made his own.

Where any constructive criticism was made by individuals in the employ of the telegraph systems, the criticism was ignored and sooner or later the person, who had dared to raise his voice above the others, was placed upon the list of unemployed.

Certain officials of one of the large telegraph systems were driven from their own offices, simply because they tried to protect the public against the raise in rates.

The public are so used to the tardiness of mails that they ceased long ago to complain about the Postal Department. The present agitation is based upon circumstances of later date, the telephone and telegraph service and until Mr. Burleson explains this situation, it is useless for him to try to divert the storm by referring to the old dispute between the publishers and himself.

Capital and Bolshevism

ONE of our subscribers whose letter is printed in another part of this magazine, suggests a thought which might bear considerable elaboration at this time when Bolshevism and Bolshevists are the subjects of much discussion.

Primarily a Bolshevist believes that all personal property, real estate and other wealth should immediately become Nationalized and an even division of money made. One man may work just as hard as he pleases, but at the end of a year or so he will have accumulated nothing, for his earnings will have gone to enrich the nation at large.

Again, a second man not quite so industrious as the one just mentioned, might spend his days in idleness, might make a show of working but in the end accomplish little or nothing. At the end of a year or so he would be just as rich as the industrious one.

In other words, the incentive or reason for exertion will have been removed. Man works because by working he is able to accumulate worldy goods, to dress his family well, to own an automobile or horse, to own his own home or enjoy the theatre and the minute that man finds he cannot gain anything by hard work, then he ceases to work hard.

As a matter of fact, few of our readers could possibly gain by a redistribution of wealth. The national wealth in 1917 amounted to practically $187 per person, not enough to buy much more than a fair wardrobe and hardly enough to fit out a smith shop with even the necessary tools.

Bolshevism is a fine creed for the man who has nothing—absolutely nothing—but is not practical for the man who has anything in the line of worldly goods.

Let us analyze the meaning of Capital. To your banker, Rockefeller or Carnegie represents Capital: to your local wealthy farmer, the banker represents Capital; your local farmer has more actual wealth than you: while to your helper or apprentice you may represent Capital. Your apprentice is probably often asked for money by people in poorer circumstances and it is claimed that even the hobo class has its layers of rich and poor. Therefore, it would seem that riches or capital are only comparative things.

It may be all very well for you to ask for a share of your rich farmer's wealth, or for me to insist upon an equal division with my next door neighbor's riches, but when it comes to dividing our money with someone not so fortunate as we are, then somehow or

other the matter doesn't seem quite so satisfactory.

You, brother reader, have earned your money by the sweat of your brow, it is not right that you should be made to share it with someone whose only labor is the spending of the seeds of Bolshevism, a soap box orator, long on theories and promises but short on brains and ability.

You have a horrible example in Russia where Bolshevism is working along its own lines, where long-haired orators feed the public on big words and theories, while stomachs go empty, where everyone takes what they want and murder has ceased to be a crime, where every man is at war with every other man, and women are public property.

Think it over!

What About Your Scrap?

ARE you selling your scrap iron and metal for a fair price or are you letting your local junk dealer make a big profit on it? Unless you know something about scrapping metals, about separating iron, steel and other metals and many other points about scrap, you may be losing a lot of money.

There are many things about scrap metals that might interest the readers of the BLACKSMITH & WHEELWRIGHT, and so we have arranged to publish one or more articles dealing with this subject. Watch our June issue for the first article—written by a man who is on the inside of the metal market.

The Rock Drill Blacksmith

Part IX—How the Butt Weld Is Made and the Type of Furnace Generally Used for Heating

WHEN welding rock drills, the fire may be damaging because the blast of air is excessive. That is, in the eagerness to obtain the necessary high temperature for welding, the air may be supplied too rapidly. It may, in fact, be supplied so fast that the fire will not use all of the oxygen in the air. This extra oxygen may then be expected to injure the heated steel.

The Oxidizing Flame

It is highly desirable that all blacksmiths and those having control of smiths should understand the evil of what is called an *oxidizing flame*. Its evil effect is not confined to rock drill work, but has especially to do with steel work in general.

The atmosphere around us contains two principal gases—nitrogen and oxygen. The nitrogen is four-fifths of the whole; the oxygen, one-fifth. There is, besides, a great difference between the two. Nitrogen does not appear to be especially harmful to steel at any temperatures likely to be used in ordinary blacksmith work. Oxygen, on the other hand, is very energetic. It is especially so against steel. This fact is made use of in cutting steel by the oxy-acetylene process. There are, in effect, two jets directed against the metal. One jet consists of a mixture of oxygen and acetylene. This oxygen does little or no harm because it is pretty well used up in burning the acetylene. This particular jet creates a heat, and thus enables the cutting to be started and then kept going.

The second jet consists of oxygen alone. It is used at a fairly high pressure. The effect on steel hotter than red is wonderful. It

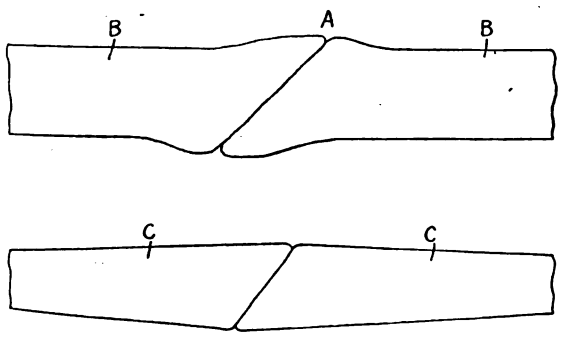


Fig. 1—Making the Butt Weld.

seems to get hold of the metal in some way and burn it. In short, the oxygen jet cuts into the steel in much the same way as a saw cuts into wood. And it operates at a pretty good rate, too. Now, when a blacksmith's air blast furnishes more air than is needed, the remainder will consist in part of oxygen. It won't be at such a pressure as the oxygen jet with the oxy-acetylene cutting apparatus and so will not burn up the metal so fast. But this oxygen will certainly damage the hot steel. And the higher the heat, the more injurious the effects may be expected to be. Scale forms because of the action of the oxygen on the steel. And scale is a great enemy of good welds.

In heating steel for welding, then, let the injurious effects of too much air be kept in

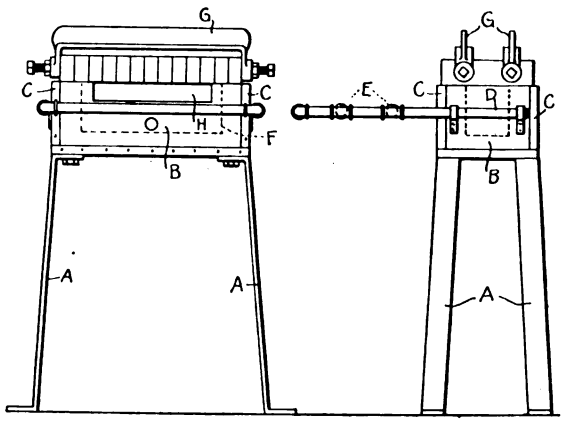


Fig. 2—The Oil Forge.

mind. Push the fire, but with a sharp attention to results.

If the welding job can be done with one heating, all the better. The less the metal has to go back to the fire and be exposed, now to this thing, now to that, the more likely will the weld be a good one.

Strength After Welding

A good many blacksmiths are doubtless under the impression that they can and do make welds of such high quality that the work is as good as new. Hear what some of the authorities say. In "Iron and Steel," a textbook written by O. F. Hudson, p. 149, one finds: "The operation of welding involves the heating of the two ends to be joined to a very high temperature, usually approaching the melting point, and consequently leads to local overheating. The effect of this overheating may be more or less completely removed by hammering during welding and while the metal is cooling, but even if the actual weld is perfect, the metal in its neighborhood nearly always suffers deterioration. Most hand welds show a reduction, frequently to the extent of 40 or 50 per cent of the tensile strength of ductility, or of both."

Prof. Bradley Stoughton, in "Metallurgy of Iron and Steel," second edition, p. 364, says: "In the actual manipulation for welding, the two pieces that are joined together are usually 'upset,' or in some way enlarged in size, so that after the junction the part of the bar right at the weld A, as in Fig. 1, is larger in size than the remainder B. This part is then hammered continuously until the metal is at a red heat, the object being to break up the coarse crystals produced by the high temperature, and by having a low 'finishing temperature,' to obtain a small grain-size.

"With proper welding, this object will be attained so far as the metal immediately adjacent to the weld is concerned, but there is always a spot within six inches or so of the weld which must necessarily have been overheated without subsequently receiving mechanical treatment, i.e., 'hammer refining,' down to the proper finishing temperature. Thus it is that most welded pieces break at a point not far from the junction, and under a strain much less than the original strength of the bar."

This is a very useful passage, suggesting that hammering should be carried on "continuously" and that it should not cease until the metal has dropped to a red heat. It also promises that the small-grain size will be regained in the region of the hammering. But the statement goes on to call attention to parts away from the weld itself, parts that have been highly heated but have not had the hammer applied to them. Here the bad effects of the high welding heat, uncorrected by subsequent hammering, damage the metal, taking away a part of its strength.

The author continues: "Balcksmiths and experienced welders are wont to declare that if a welded bar does not break in the weld itself, then it must be as strong as the original metal. However, this is by no means true. In a welding test carried on with great care in this country by skilful and experienced welders who were placed until their mettle, the strength and elastic limit of the welded bar was seldom as great as the original bar and in some cases was less than half."

It is clear from the foregoing statements that their writers did not view a hand-made weld as necessarily very perfect. The defect might be elsewhere than in the weld itself. Nevertheless, it is a defect due to the welding operation.

It will be useful, then, to recollect that when steel has been highly heated, its restoration will extend no further than the activity of the hammer—unless, indeed, the work is annealed. But let us concentrate our attention just now on the hammering. Prof. Stoughton thinks it is an adequate way of restoring the quality. The thing to consider is how to do this.

The problem is simply this: It is necessary to hammer everything that has gotten above, say, a medium cherry red. It is not only necessary to hammer all this part of the work to the two sides of the weld but to keep the hammering going without a let-up at any point for more than a few moments.

Perhaps the best way to cover this rather hard requirement is first to get rid of the hammering necessary to close the weld and then concentrate attention upon working the metal as it cools. Naturally, if the smith is

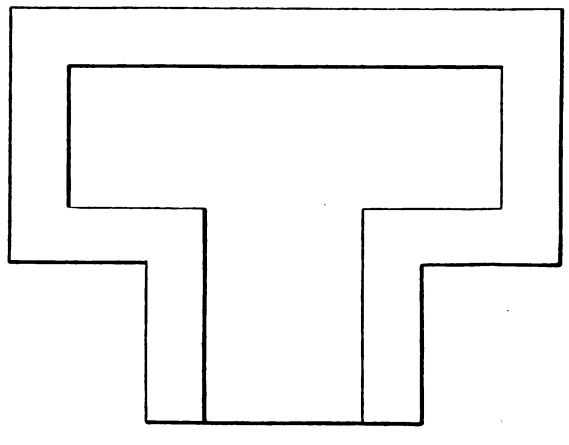


Fig. 3—Plan View of Oil Forge.

to hammer over and over all the highly heated portion of the drill rod, he will be reducing the diameter all the time. In order to provide metal to permit this reduction, the upsetting should be done in such a way as to give the required metal to a sufficient distance away from the joint. That is, the ends to be joined are to be thickened for a generous distance, as at C, Fig. 1.

The hammering is to be done vigorously—not with gentle tappings, but with blows reaching into the interior. Only that part of

the interior, in fact, will be restored which feels the hammer and has its grains broken up. The heat does nothing, probably. It is the hammer that must do the work.

The hammering is to be done back and forth, back and forth, round and round, and round, from the medium cherry red, to one side of the weld, over to medium cherry at the other side.

The smith will, perhaps, prefer to work out his own method of keeping the hammering going—that is, he will possibly want to decide himself whether he will work from end to end in a straight line and then turn the welded bar a quarter turn and work from end to end again; or, whether he prefers to keep the bar turning as he goes from medium cherry red to medium cherry red.

The region that the smith should work will grow shorter and shorter as the bar cools. That is, the distance from medium cherry red to medium cherry red will grow less and less. He is to remember to do no hammering on metal that has no color from the heat.

This matter of working over the steel to each side of the weld is something that has probably been neglected pretty much everywhere in the blacksmith shops. The smith doubtless did not understand the necessity to work the steel anywhere else than right in and around the weld. He didn't know perhaps that all heat above a medium cherry red would, especially with drill steel, have the effect of damaging the steel and that working it continuously until it had cooled to medium cherry red was a very good remedy.

An Oil Forge

The illustration, Fig. 2, shows a front and side view of a fuel-oil forge, apparently indorsed by George H. Gilman in the *Engineering & Mining Journal* (May 12, 1917). It is of simple construction and can readily be made by an intelligent blacksmith with ordinary material and tools. The furnace stands on four steel legs A. These should be secured to the floor in order to prevent over turning of the furnace when loaded with drill bits.

The legs support a plate steel box B, 34 inches long, 17 inches wide and 13½ inches high. At the four corners are uprights of 1½ inches angle bar C. These are riveted to the outside of the plates, thus providing a smooth interior. A 1½-inch steel band runs all around the furnace at the bottom. This band is riveted onto the outside of the vertical wall of the forge, and with the angle bars constitutes the stiffening of the whole.

Two brackets are arranged at each end on the outside. In these are supported the end arms D, which extend horizontally to the front. To these are secured two or more rods or tubes E which parallel the front face of the furnace and provide a rest for the shanks of the bits while they are being heated.

This whole arrangement is horizontal. It may conveniently be made of 1½-inch piping and pipe connections. If the bottom does not seem sufficiently stiff for the strain that will come when the legs have been attached at the corners and the loads are added, a rectangular frame may be provided. The legs would be attached to it and likewise the furnace itself. Or—and perhaps this would be better—angle bar could be substituted for the band.

The steel box is lined with firebrick F, on the bottom and sides, leaving a compartment 7½ inches wide. This is the firebox—all but the roof. The latter is also made of firebrick held together by a couple of clamps G.

The roof, or cover, may be lifted on and off. The bits are introduced through an opening H in the front of the furnace, this opening being 3½ by 20½ inches. In the front of the forge, just below this opening, will be seen a round hole half-way between the ends of the steel box. This hole provides for the introduction of the fuel-oil burner, or its supply pipe. The type of burner will, it would seem, necessarily be one supplying its own combustion oxygen, as apparently no other adequate provisions are made for air.

I am not sure that this is the best practical form for a fuel-oil forge. The objections center on the nearness of the burner to the work. Necessarily, it would appear, the highly heated metal is exposed to the bar flames. Such a furnace—that is, one which puts the work and the burner near together—was found to produce bad results upon big chain links at the Boston Navy Yard. The metal there was, presumably, a puddled iron, and not steel. However, I do not see that this makes a great deal of difference.

It was found, though, that by arranging the firebox so that a greater distance was put between burner and work, good results were obtained.

On the whole, then, I think the precise form of the furnace described by Mr. Gilman is best avoided. But this does not mean that this furnace may not be modified so as to overcome the objections. My suggestion of a suitable modification is to be taken for what it is worth. It is this: Arrange a front extension of the firebox so as to set the burner a considerable distance in front of the present firebox. That is, let the whole firebox have the shape of the letter T, as shown in the plan diagram, Fig. 3, of the accompanying figure.

I do not know of this exact scheme having been tried, but it is near enough, in principle, to the Boston Navy Yard improvement to justify some confidence. Of course, the front arm of the T is to be covered with firebrick. If the reader proposes to make use of the suggestion, let him not be afraid to make the front arm good and long. There won't be much loss of heat because of the length. About all the loss there could be would come from heat absorption by the firebox. It is approved practice in burning fuel-oil to give plenty of room for the flames. It is also good practice to get steam boilers a goodly distance from the fire.

The smith may be interested to know why a considerable distance would be advantageous between burner and work. Let me explain a little. When the fuel-oil starts to burn, it is in the shape of a multitude of little globules. The heat causes them to break up into two or three gases. The force with which the oil emerges from the burner carries the globules onward. And whatever draft there is would have some effect.

In short, the globules and the gases into which they turn rush forward at a pretty rapid rate. For the gases to burn, they must not only be hot but must combine with oxygen from the air. Fix the attention on a little particle of some gas from the oil—say, hydrogen. This little particle rushes on, heats up and enters into partnership with some oxygen nearby. When this partnership is entered into, heat results. In fact, it is largely in this way that we get our heat in furnaces.

If the reader has followed what has been said, he should have but little difficulty in understanding that *time is required* for the various events—for the globules to be hurled forth from the burner, for these globules to break up into various gases, and for those bits of gases to find their oxygen partners and go into combination with them. But time means space. It is important in a forge heating steel that all these events should precede the contact with the hot metal.

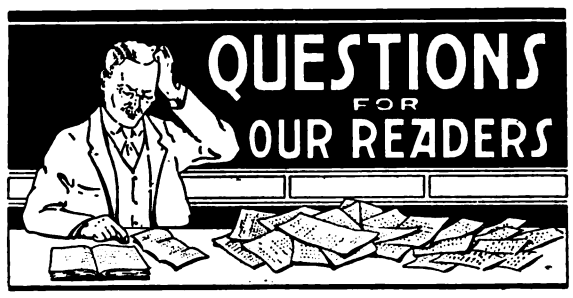
The gases coming from fuel-oil are some of them injurious to hot steel. It is important that these gases shall first find their oxygen partners and go into combustion. They are then comparatively harmless. For example, a bit of carbon striking against hot steel is something that is not wanted. But if the carbon has already found its oxygen and the combustion has already taken place, little or no harm will result. It is in this way that the good results of heating steel far away from the oil burner are to be explained.

(To be continued)

Both Sides Holding Firm

"Why don't you get rid of that mule?"

"Well, suh," answered the negro laborer, "I hates to gib in. If I were to trade off dat mule, he'd rega'd it as a pus'n'l victory. He's been tryin' fo' de las' six weeks to get rid ob me."—*The Eagle Magazine.*



Infected Hoof

From Charles P. Jenkins, Canada.—I would like to know if anyone can tell me how to cure a hoof trouble which has existed about two years. About two years ago this horse picked up a two-inch nail which entered the hoof just under the frog on his front foot.

The resulting hole heals over at times, but soon breaks open again and puss forms. I have poultised the foot for two months at a time and have poured all kinds of oils and liniments into the hole, but cannot heal it or dry it up.

I have never pared or dug out the hole to the bottom. I think that the nail must have entered a bone or some joint about half way between the point of the frog and the back.

Pulling Off Old Tires

From Maskell Ewing, New Jersey.—For some time I have been looking for some kind of an apparatus with which to pull off old tires from three or four-inch rims.

I have found that it is almost impossible to remove these large tires without damaging the rims. Perhaps some of the other readers can help.

Adjusting a Peerless Tire Bender

From Jonathan Vickers, New Mexico.—We have in our shop a Peerless tire bender which we bought in 1906. This machine has a rule on the side marked 1.2.3.4.5 and can be adjusted by moving the role.

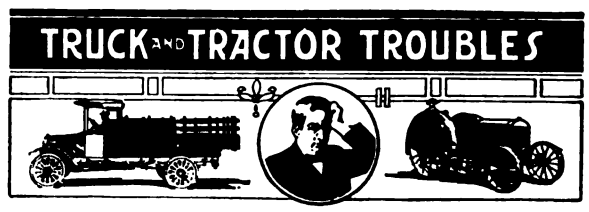
Can any of the readers of the BLACKSMITH & WHEELWRIGHT tell me how to adjust this machine so as to bend a circle of four feet or of three feet six inches, or in fact any particular size that I desire?

Welding Springs

From J. M. Weber, Minnesota.—Will someone tell me the best thing to use in welding springs? (We assume that Mr. Weber would be interested in hearing from smiths who do spring welding as to the entire process, the kind of steel and the methods used. —EDITOR.)

A Kerosene Torch

From C. C. Richter, Iowa.—Will someone kindly send me directions and drawings from which I can construct a kerosene preheating torch in which I can use kerosene under air pressure? (This question was asked in our March number, but as yet we have received no answers, surely someone of our readers have constructed such a device.—EDITOR.)



Automobile Work

From B. W. Benson, Oklahoma.—I notice that you frequently request your readers to tell what they think about automobile work and you often recommend us to take up this branch of the business. In this part of the country, there is not enough automobile work to justify my neglecting the farm work that I have, so that I do not let automobile work interfere with my regular blacksmith line.

I rather feel that the farmer needs the blacksmith oftentimes more than the autoist needs his car, so I always give the farmer the preference, but if a driver comes in with a machine which he uses in his business, I do his work along with my regular line.

I read many interesting letters in the

BLACKSMITH AND WHEELWRIGHT. I find some of the suggestions new and some of them old. I began as a blacksmith helper 37 years ago, but did not take charge of the forge for several years. I have worked for several years in a machine shop and foundry, and know something about how steam engines are made; experience which has been of great value to me since. I also worked in a saw mill as an engineer and have set up engines and other machinery, but about 25 years ago my ill health forced me to go West where I took up forge and bench work.

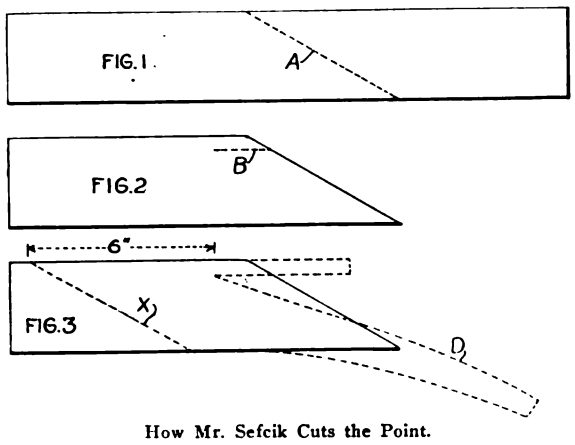
Cleaning Radiators and Lapping Cylinders

From A. Ingraham, New York.—I have two questions that I would like answered in your magazine. (1) How are automobile radiators cleaned before they are soldered? (2) How are cylinders lapped or enlarged without reboring?

Repairing Plow Points.

From John Sefcik, Kansas.—No one has answered Mr. Max Maser's, of Texas, question quite as fully as I would like to see it answered, so I will tell him how I repair plow points.

I buy hammered lay steel in bars one and three-quarters by three-eighths inches and measuring anywhere from eight to twelve feet in length. I usually cut them in half



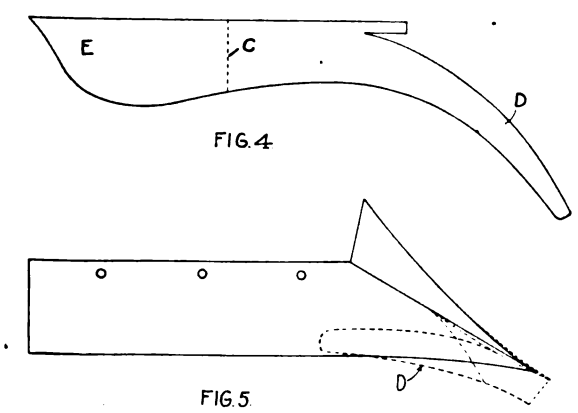
How Mr. Sefcik Cuts the Point.

in a diagonal line as shown at A in figure 1.

Then I take one of the pieces as shown at figure 2 at B and cut a slot about one and one-quarter inches long. Figure 3 shows how the bottom side is worked out and how the whole thing is cut off as shown by the dotted lines at X. I work the part shown by the dotted lines at D before I cut off at the line X. After it is cut out I hammer it into the shape as shown in figure 4.

One should be very careful in making the bend at C. The end E is folded over against D. D is the bottom side. Figure 5 shows how the point is applied to the plow lay. It can be held very easily by a pair of tongs at D. By following these directions you can make very strong and serviceable points and after you have put on a few you will have no trouble.

I make my points during my spare time in



How the Points Are Shaped.

the winter and they come in handy as soon as plowing starts. The winter of 1917 and 1918 I made 80 of these points and in September, 1918, I did not have any on hand at all. I charge $1.50 for each point. If there is any brother smith who has a better way of applying these points I would like to hear about it.

An Answer for Chas. Chism

From George W. Hardy, Idaho.—I notice in the March number of the BLACKSMITH AND WHEELWRIGHT that Charles Chism, of Ohio, wants to know how he can straighten the foot of a horse where the shoe wears rapidly on the outside. I trim the hoof down well on the inside and cut off the heel of a plate, then weld heavy steel calks on the outside of the nail holes.

Then I turn the heel out well to act as a brace, hammer the calks down so that they will not be too high. If the heel needs raising, I swell the inside of the shoe just a little bit. After the shoe is done, I harden the outside by putting it in a dish of salt water and hoof scrapings while it is hot, and then cool it in water in which has been dissolved some salt and potash lye.

I use this same solution for hardening calk and plow shares. After the shoe is done and hardened, it should be set as far as possible on the outside of the hoof, dressing the inside of the hoof down as much as you can. For an extreme case I weld a side brace on the outside of the shoe with a bar across the heel.

I like the BLACKSMITH AND WHEELWRIGHT very much and am greatly interested in the questions and answers from my brother smiths.

Get Good Prices

From Charles Chism, Ohio.—This is a little incident that happened to me last month while I was shoeing a horse for a farmer. The farmer while he was waiting, suggested that all of us blacksmiths must be getting rich because we charged so much for our work nowadays. I asked him what he meant, and he said that the blacksmith in a small village next to this had boasted to him that morning that he had made $41 the previous week—that he had done some work for the farmer and had put on four 3-inch by ½-inch tires.

The shoeing and the tires had brought the blacksmith in altogether $41. I told him that the blacksmith had not even earned his salt, but he couldn't see it until I had explained. I suggested that the smith could obtain at least six dollars in an eight-hour day at any of the mines around this section, for all of the mines need blacksmiths.

I figured stock for the tires must have cost him at least $16, the shoes which he had put on $5, the coal $1, rent $2. The wear and tear of tools and machinery must have cost $2. Adding these items together, one can see that the total figure comes to $26, and if the smith drew a fair salary of $36, the total would be $62 a week that he should have taken in in order to have earned his salary, and yet, the farmer thought that he was making money when he took in only $41.

That is one of the troubles with the blacksmiths today. They are just like this blacksmith in this town. They do not count their time as being worth anything. I am willing to wager that that smith does not take a trade paper, or he wouldn't boast about his $41 a week. When a farmer kicks about my prices, I usually tell him that once upon a time I received six bushels of corn for shoeing a horse, but now I get just enough money to pay for one bushel.

I tell the farmer *he* is the robber, not me. Every blacksmith should keep posted as to prices on farm products in his town, then it is easy enough to handle the farmers. There is one thing in which the farm journals have an advantage over the trade papers. The journals give the farmer the prices on all of his stuff, but the blacksmith is not protected at all.

We don't know what the market price of blacksmith coal should be; we don't know how much our scrap metal is worth; in fact we have no means of finding out the prices on any of our work. I think that the best things the blacksmiths can do would be to send in their price lists and have them published by the BLACKSMITH AND WHEELWRIGHT, then all of us could tear out these price lists and keep them handy. At the time of the Civil War it cost from $3 to $5 to shoe a horse.

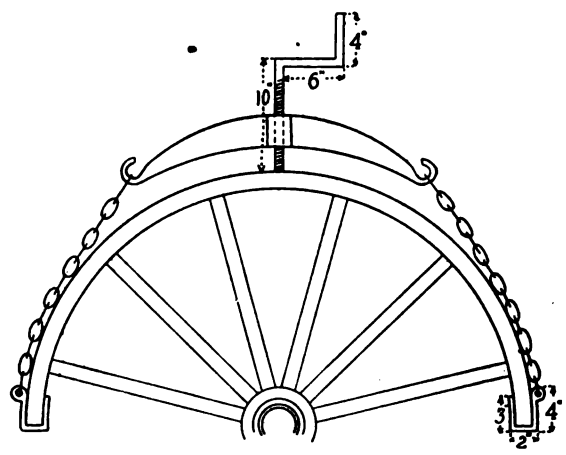
The blacksmiths received that amount of money and yet the cost of living was not as great as it is now. An old blacksmith who I met recently who was living at the time of the Civil War says that he is still shoeing horses for $1.20. Surely, people can't claim that the blacksmiths are profiteers!

Stubborn Rims

From Fred Littlefield, Montana.—I notice in the March issue of the BLACKSMITH AND WHEELWRIGHT that Mr. R. A. Roberts, of Florida, wants to know how stubborn and bent rims can be put on. (Most rims are stubborn, anyhow.)

I found out how to do this work a long time ago and made a rigging just for that purpose and am giving you here a sketch of it. The sketch explains itself. Take a piece of mild steel about 14 inches long, 1 inch in thickness and 1½ inch in width and upset it in the center so that it will offer plenty of body for a ¾-inch crank screw.

Draw the ends down from the center in each direction and bend an open hook at each end. Drill a ⅝-inch hole in the center and tap it out to ¾-inch and make the crank bolt out of ¾-inch stock. It is best to thread this crank up for about 8 inches.



The Clamp for Putting on Stubborn and Bent Rims.

The clamps or hooks on the end of the chain are made of ⅜ by 2-inch stock and made to fit the end of the rim. A piece of 5/16-inch link chain should be welded into each hook and the chain should be long enough for the largest rim usually encountered. Of course the chain is adjustable, so that if the rim is smaller the hooks in the screw clamp can be hooked into center rings. By tightening the screw the most stubborn rim can be removed.

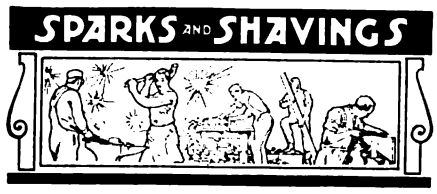
It's Hard to Tell

During the voyage of a great liner, a wag was approached by a fellow passenger, who said:

"We are getting up a tug-of-war between a team of married men and a team of single men. You are married, aren't you?"

"No," replied the wag, "I am only seasick; that is what makes me look like this."—*Boston Post.*

SPARKS AND SHAVINGS



Hi-Lo Jack

The Rowe Calk & Chain Co., of Plantsville, Conn., are putting on the market a device called the Hi-Lo Jack, which is suitable not only for wagon work, passenger cars and trucks, but is adaptable for railroads and building trades. This device is made in six sizes with capacities from half-ton to 12-tons.

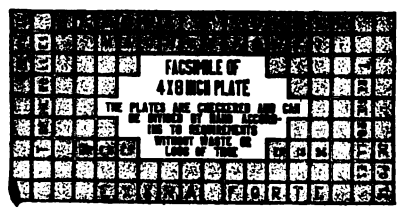
The jack has several features that distinguish it from the ordinary device, the first being its compressibility, that is, it can be closed to within six inches of the ground and at that point will exert a large percentage of lifting power; as the jack extends the lifting power increases, and when fully extended to 17 inches, the power is at its maximum.

It can be seen that this jack has a long lifting range and a low initial lifting point. The device is made from the highest grade of malleable iron, cold-rolled steel and drop forgings. Each jack has a ball-bearing thrust which makes for easy operation.

The load can be raised or lowered a fraction of an inch. The manufacturers claim that they test each jack before it is shipped and each jack is guaranteed to be perfect in every way.

"Laffite Welding Plates"

Your welding problems should be easily answered if you use the Laffitte Welding Plate. The plate is made in two grades, viz., the heavy for material ½-inch in thickness and over, and the light for material under ½-inch in thickness. The plate is 4 x 8 inches and is chequered so



that a piece of any size can be broken off by hand without loss or waste. One plate is sufficient to make from half a dozen to one hundred welds, so that the cost is practically nothing when the saving is taken into account. The chemical action of the plate is said to increase instead of decrease the strength of the weld.

One can weld at a low heat and save 33 per cent in time and fuel. The plates are used in a simple manner, as the two parts to be welded are heated to a cherry red if steel, or a white heat if iron. A piece of Laffitte Plate of sufficient size is then placed between the two parts. They are then pressed together until the plate fuses and hammered lightly and completely in the usual way. The piece may then be reheated to any desired heat without endangering the weld.

A feature of a "Laffitte" plate weld is the fact that a homogeneous weld is secured. It is not merely stuck on but becomes a solid piece, with the strength of the original. In many cases the strength is materially increased as with steel castings. These Laffitte Welding Plates are used extensively by large industrial companies in this country and abroad. The plate welds iron to iron iron to steel, steel to steel, machinery steel, crucible steel, tool steel, and steel castings.

Blacksmiths will find these plates effect great economy in their shop operations. There is no equipment necessary, nor does it require any change in method.

The Laffitte Welding Plates are handled everywhere by all active dealers, and the manufacturer, The Phillips-Laffitte Company, Pennsylvania Building, Philadelphia, Pa., will be glad to furnish samples on request.

Birch Super-Four

During the past few years it has been successfully demonstrated that a large percentage of cars sold in this country find their places in farming communities. Undoubtedly the blacksmith should be able to obtain an agency for automobiles and sell them in his community very readily.

We want to call the attention of our readers to the Birch Motor Cars manufactured by the Birch Motor Cars, Dept. 545, 81 East Madison St., Chicago, Ill. This line of cars is so arranged that they offer ready sale to the largest number of customers for the reason that they are made in four-cylinder and six-cylinder machines, low and high-priced.

The machine has a 114-inch wheel base and a 35-hp. engine. It is equipped with electric lights and self-starter.

The commission, we understand, is very liberal and since the machine sells so easily and the value is so great the blacksmith should be able to sell them as a side line without much effort on his part. We would advise our readers at any rate to write The Birch Motor Cars Co., and get full particulars as well as illustrated literature.

Ends Ford Cranking

Practically the only car on the market that requires hand cranking is the Ford and very frequently if the Ford owner is careless, he is apt to break his wrist or be severely injured when cranking the engine. Then, again, in the rain or mud it is mighty inconvenient to crank the engine.

A remarkable new attachment is being manufactured by the Bear Mfg. Co., 400 Bear Bldg., Rock Island, Ill., which is said to be unfailing in its action—that is, without getting from the seat of the car, the driver can start his engine with this device.

The starting device is said to spin the engine past a number of compression points at every operation. It is very easy to attach, and the blacksmiths in country towns should be able to make considerable money putting them on for the owners in their vicinity.

The device may be obtained free of charge for trial and if it does not work satisfactorily it may be returned, for there is no obligation to purchase if it does not do what is claimed for it.

Important Announcement

On one of our advertising pages our readers will find a short letter from the Columbus Anvil & Forging Co., Columbus, Ohio, in which they tell the smiths throughout the country that they have something important to say in the near future. We certainly were surprised when we found out what they were going to tell you.

They are not going to tell you that they are giving away anvils or forgings or anything like that, but they *are* going to tell you how you can save considerable money. It will be the most important money-saving suggestion that we have encountered in a number of years. Just watch for their advertisement in the next issue.

New Era Springs

Undoubtedly the country blacksmith, at certain times during the year has his hands full repairing springs. Both for automobiles and for wagons.

Satisfaction is not always given when the smith makes the spring or leaf, simply because his experience may not be great enough or the stock of the right kind.

The smith should "get acquainted" with the New Era Spring & Specialty Co., of 1138 Hamilton Avenue, Grand Rapids, Mich., for this firm manufacture a very complete line of springs.

The springs sold by this firm are built to last. The line is so large that a telegram or special delivery letter order can usually be filled within a few hours and the spring shipped to the dealer C.O.D.

The company make a very attractive discount to dealers, and we suggest that our readers, who do spring repairing, write for their lists and prices.

Cylinder Grinders.

With the ever increasing number of automobiles on the market there is a proportionate growth in the amount of repairs necessary. Automobilists realize that an old car can often be restored to practical operation if the cylinders are reground.

Cylinders and valves are practically the only parts of an engine that really show an appreciable amount of wear. The bearings can usually be replaced at a very low cost. Many cars, the cylinders of which have been scored or badly worn, are thrown into the junk yard, when they could be restored to practical operation.

The Heald Machine Co., of Worcester, Mass., with branches in practically all of the principal cities throughout the country, manufactures a practical cylinder re-grinder that is adaptable to the needs of the smallest as well as the largest shops.

This machine is built to take care of practically any automobile cylinder re-grinding job which may come into the shop. The grinding bed is adjustable in three directions so that once the engine is squared up on the base, the cylinders can be ground without a new set-up for each cylinder.

Such a machine should pay for itself in a very short time because once the trade knows that the repairman is able to restore engines it will flock to him.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1919, OF THE BLACKSMITH AND WHEELWRIGHT, published monthly at New York, N. Y. for April 1, 1919.

State of New York } ss.:
County of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared F. R. Whitten, who having been duly sworn according to law, deposes and says that he is the business manager of THE BLACKSMITH AND WHEELWRIGHT, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, M. T. Richardson Company, 71 Murray Street, New York City, N. Y.; Editor, F. L. Avery, 71 Murray Street, New York City, N. Y.; Managing Editor M. T. Richardson, 71 Murray Street, New York City, N. Y.; Business Manager, M. T. Richardson, 71 Murray Street, New York City, N. Y., and F. R. Whitten, 41 Pinehurst Avenue, New York City, N. Y.

2. That the owners are: M. T. Richardson Company, 71 Murray Street, New York City, N. Y. Stockholders: M. T. Richardson, 71 Murray Street, New York City, N. Y.; A. J. Richardson, Ridgewood, N. J.; Mrs. A. Louise Giardeau, Jr., Monticello, Fla.; Mrs. Mildred Ulmer, New Rochelle, N. Y.; Mrs. H. L. Johnston, New Rochelle, N. Y.; W. F. Etherington, 341 Fifth Avenue, New York City, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

M. T. RICHARDSON CO., Publishers,
THE BLACKSMITH AND WHEELWRIGHT.
F. R. WHITTEN, Business Manager.

Sworn to and subscribed before me this 24th day of March, 1919.

[SEAL] ROBERT F. W. SCHMIDT,
Notary Public.
(My commission expires March 30, 1919).

Sepco Vulcanizers.

Ever since vulcanizing equipment began to be extensively used, scores of inventors have attempted to solve the problem of temperature control. In the Sepco steam-electric vulcanizer, made by The Steam-Electric Products Company, of Cleveland, temperature variation in the plate is controlled with one or two degrees by an ingenious but remarkably simple pressure gauge which opens and closes the electric circiut as the steam pressure rises or falls one pound.

In the Sepco vulcanizer a seamless steel tube two inches in diameter is the steam generator. An electric heating coil of special alloy, imbedded in an insulating compound, is wound on the outside of the steel tube and furnishes the heat which makes the steam.

The Sepco tube and tread vulcanizer thus obtains steam heat without using gas, gasoline or other fuel. It can be plugged into any electric light socket and so can be installed anywhere without infringement of fire ordinances.

Sixty pounds of steam is obtained in from ten to twelve minutes after the current is turned on and after the desired temperature is attained the current flows only half the time. In actual operation, current flows about one minute and is off one minute, the circuit being controlled automatically.

The Sepco tube vulcanizer is being built now in two sizes; one with four pressure arms and a plate eight by twenty inches, and one with six pressure arms and a plate eight by thirty inches. The heavier of the two machines weighs only 125 pounds complete and only one square yard of floor space is required.

Sepco vulcanizers are constructed of steel throughout. Steel construction insures greatest strength and light weight. It is stated that the tube plates have been tested to pressures of 600 pounds to the square inch without exploding, though no such pressure is ever used in vulcanizing. Because of the automatic control of temperature Sepco machines are safer than old-style vulcanizers even those with thermostat control.

Radiators.

The B. & W. Manufacturing Co., 5237-5257 Ravenswood Ave., Chicago, Ill. manufacture a complete line of radiators in many styles for automobile trucks and tractors. This concern also carry in stock cores to fit all standard makes of radiators. Dealers who have calls for radiators should write the above company for catalog and prices.

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, 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. Trademarks registered.

For Sale

FOR SALE
About 100 feet of two-inch internal wire carriage tire made by the Victor Tire & Rubber Co., will be sold cheap to close out. This is new stock. BECK-HAWKEYE TRUCK WKS., Cedar Rapids, Iowa.

FOR SALE
Shop and tools and small stock, or will sell tools and stock and rent shop. Fine location on paved main street next door to $42,000 City Hall. Only one other shop in city of 4,000. Broken leg reason for selling. F. H. BECHTER, Independence, Iowa.

FOR SALE
Blacksmith and wagon shop, stock, tools and machinery. Also three lots and new six room bungalow house. Enough work for two men. Reason for selling: poor health. Address JOSEPH OBETKA, Pittsville, Wisconsin.

FOR SALE
Blacksmith, implement, hardware and garage business. Oil and gas station. All corner property. Ill health reason for selling. Write for particulars. W. J. OTT, Woodlake, Calif.

DOUBLE TREAD TIRES
We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

FOR SALE
18 x 6 Screw Cutting Lathe.....$250
Double End Floor Stand Emery Grinders.... $20
Milling Machine $125
BICKNELL MFG. & SUPPLY CO., Janesville, Wis.

FOR SALE.
For cash I wish to sell my blacksmithing trade, stock, a lot of tools and machinery. I will have to give up the trade as my eyes will not permit me to work at the fire, and I need the building to enlarge my shoveling board factory. Have a large trade and have employed a good man for 10 years; could keep another helper if I could get one. Please write P. E. Lane, Urbana, Iowa.

FOR SALE
A new and fully equipped blacksmith and horse shoeing shop. The only shoeing shop in town. Work for two men. A rich farming community awaits a real mechanic. Reason for selling: want to retire. Located on the Peoria branch of C. B. & Q. R. R. Address W. H. Power, Gilson, Knox County, Illinois. P. O. Box 67.

FOR QUICK SALE
I offer at great sacrifice one scientific hydraulic cold tire setter No. 2; one L. S. P. calking machine; $125 buys them both. Address L. L. WARREN, Pendleton, Texas.

BLACKSMITH'S BUSINESS FOR SALE
as a going concern. Well equipped shop of stock and tools. In a good farming district. Plenty of work the year round and good prices. Rent building. Reason for selling going to Europe. Address P. DOIG, R. F. D. No. 1, Redwood City, California.

Wanted

WANTED
Good all around blacksmith at once. Young married man preferred. M. W. ABTS, Morrill, Nebr.

WANTED
Married man with some mechanical ability to work at saw mill. Furnished house, garden spot, fuel and can keep chickens and cow. State wages expected. J. Z. ZEHRING, Elk Mountain, S. Dakota.

WANTED
Good all round blacksmith to work by the day, or will sell stock and tools. Will pay $4.50 for a steady job. State capacity and experience. Address E. J. Perron, Ontonagon, Mich.

Miscellaneous

PRINTING FOR BLACKSMITHS
Increase your business by handing out our printed business cards with "The Blacksmith's Ten Commandments" printed on back; 50 for $1.00. NEWS PRINTING CO., Stockton, Ill.

AUTO SUPPLIES
K. W. Coil Points, doz., $2.40; 100 lots, $15.00
Magneto Files, 15c; doz.....$1.50
Speedometer Gears, 15c.; doz.....$1.50
Brake Lining (Durabestos), per foot:

1¼x3/16	1¾x3/16	2x3/16	2¼x3/16
35c	40c	45c	50c

Radiator Hose, 3-ft. lengths, per foot:

1"	1¼"	1½"	1¾"	2"	2¼"	2½"
21c	26c	30c	33c	38c	42c	45c

Other sizes in proportion
Ford Hose Connections, doz., 90c.; 100,.....$6.00
Ford Felt Packing, per set.....50c
Superheat Packing, per lb.....$1.00
In packages, 410 sq. in., 1/32 in.....$1.00
In packages, 410 sq. in., 1/16 in.....$1.50
Red Head Spark Plugs, doz.....$4.80
Ford Wrenches, thin, set of four.....50c
Pliers, 6", S. J. Black, 25c,; doz.....$2.50
Pliers, 6" S. J. Nickel, 35c.; doz.....$3.00
These prices for dealers only
BICKNELL MFG. & SUPPLY CO., Janesville, Wis.

Gears

PAIGE-DETROIT
Spiral Bevel Gears and Pinions
New Product. Not factory rejects. Car dealers, garage and repair men should get our prices as they will be of interest to you. Sold in lots of one or more direct from stock.
DAYTON AUTO PARTS COMPANY,
1777 Broadway, New York City

Tires

TIRES --- DOUBLE TREAD
Guaranteed for good service. Big—Strong—Extra Heavy. 30x3 Tire $5.50; 30x3½ $7.00; 33x4 $10.00; 34x4 $10.25; 36x4½ $13.00; 37x5 $14.00. Big saving on other sizes and Tubes also. Trade in your old Tires. 10% deposit required on C. O. D. orders. Send for list now! State size and bead of tire. Orders filled same day received.
M. LIBEN & CO., 205-RK, W. 48th St., N. Y. City

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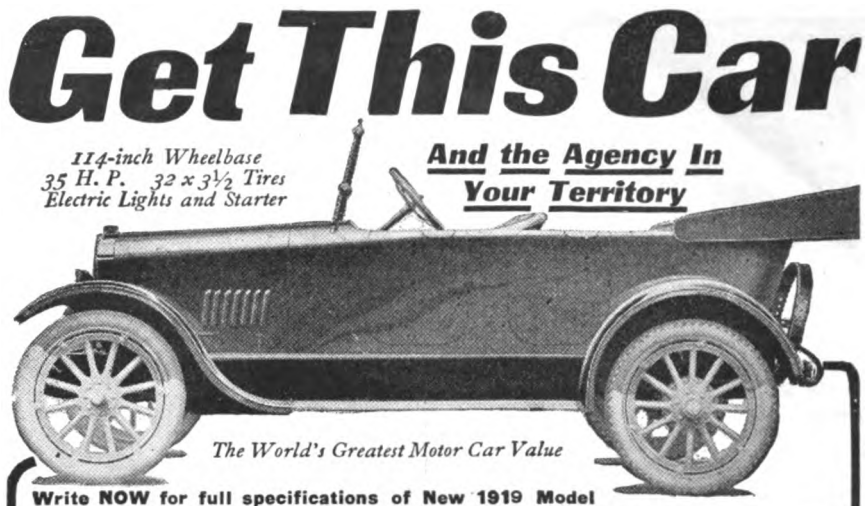


Anthony Pump.

The Anthony Co. of Long Island City, N. Y. manufactures a tire pump which should be of interest to every reader. The "Anthony Tire Pump" as it is known, is made according to the most improved design and of the best materials. It is of the single plunger type and very easy acting. The barrel is made of steel tubing carefully selected for evenness in size.

The barrel cap is a heavy brass casting, while the foot plate is made of gray iron. The piston rod is 7-16 of an inch in diameter and made of cold rolled steel, lathe cut, of great strength so that it will withstand the heaviest usage. The valve is made from a hard drawn brass rod finished all over and carefully tested.

The check is set to be instant in action and perfect in balance so that it will not stick. The tire connection is of improved design of the slip-on lever-locking type. This pump is made in a number of sizes for use on small, medium and large cars.

A New Distributor Appointed.

The Braender Rubber & Tire Company have closed their New York branch office at 250 West 54th Street, and have arranged with Ryan & Hughes, Inc., 1698 Broadway to act as distributors for Braender Tires and Tubes in New York City, Brooklyn, Staten Island and Westchester County, New York.

Their export department has been transferred to 315 Fourth Avenue until May 1st after which time it will be permanently located at 32 Broadway, New York City. The trade is requested to note these changes for their future convenience.

Vesta Storage Batteries.

The Vesta Accumulator Company, 2100 Indiana Ave., Chicago, Ill., are carrying on an extensive campaign to introduce 1,000 Vesta Storage Batteries to automobile owners. This battery is well known to the trade, and offers an attractive field for dealers. At the present time the Vesta Accumulator Co. are looking for new dealers in various parts of the country, and our dealer readers should write them for terms.

Tires — Tires

BUY EARLY AND SAVE MONEY
Double Tread Tires and Tubes
GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.65
32x3½	7.15	7.70	3.00
34x3½	8.25	8.80	3.00
31x4	7.70	8.25	....
32x4	9.50	10.50	2.75
33x4	9.50	10.50	3.25
34x4	9.80	10.80	3.50
35x4	9.90	11.00	3.50

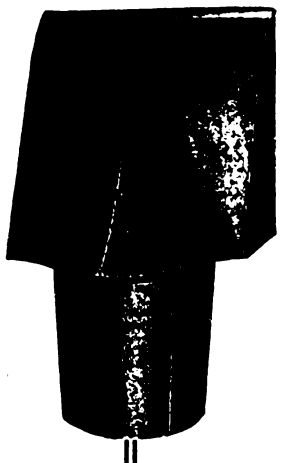
Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write to-day—yes—to-day.

Look up rating in Dun's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.60
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For rebuilding your old tires we charge you 60% of the above prices.
We have a special proposition to dealers on Double Tread, new and factory seconds.
With all orders received for tires up to May, we will give a first guaranteed tube for the low price of $1.50.

B. LIBEN & COMPANY
261-A WEST 54th STREET NEW YORK CITY
THE HOME OF DOUBLE TREAD TIRES



SIX STYLES OF CALKS

but only

ONE BEST QUALITY

and that—the very best—backed up by fifteen years of scientific study and perfect mechanical equipment.

Diamond Calks

are shaped better—wear longer and fit in the shoe tighter.

They're best by test and there's a calk for every purpose.

MANUFACTURED BY

DIAMOND CALK HORSESHOE CO.
DULUTH, MINN.

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

DON'T REPEAT

The annoyance caused car users of hobbling home on a busted spring. For 8 years the New Era "Better" Springs have *stopped the breakage.* Scientifically heat treated—close fit—easy riding—graphited between leaves for two years' lubrication. New Era "Better" Springs don't squeak. Guaranteed from end to end against breakage or sagging—a new one instantly for the asking. Don't pay fancy spring prices—New Era lists on 250 live sellers—low as car factory springs (that did break) at better dealers' discount—freight allowance—quick service—positive fit.

See New Era list in jobbers Catalog or wire collect for spring needed—it will be rushed C. O. D.—fair discount. Better Ford front and rear springs—get the New Era habit.

New Era Spring & Specialty Co.

1138 HAMILTON AVE., GRAND RAPIDS, MICH.

"Better" Spring Bumpers—Strapless Tire Carriers—All trade satisfying—Want information?

STAR STEEL SHAPES

ARE A GUARANTEE OF QUALITY

PLOWSHARES	SHOVEL POINTS
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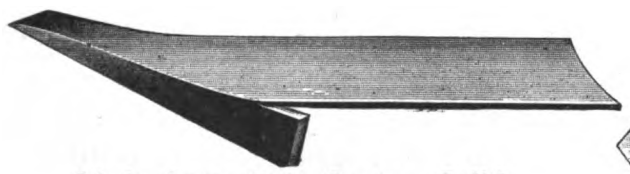
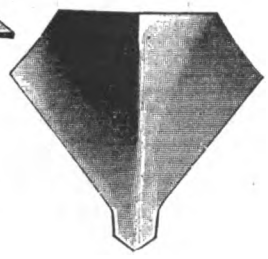
SUBSOILERS	SEEDER POINTS
LANDSIDE POINTS	LANDSIDE PLATES
CULTIVATOR SHOVELS	





Made from Soft Center, Solid Cast or Crucible Steel.

BEST MATERIAL AND WORKMANSHIP.

STAR MANUFACTURING CO.

CARPENTERSVILLE, ILL.

LAFFITTE WELDING PLATES

FOR WELDING IRON *and* STEEL AT LOW HEAT

THE Laffitte Welding Plate is a scientific chemical welding compound, made in the form of a plate and will weld hard steel, tool steel, cast steel, malleable iron, steel castings, etc.

You save one-third in time, fuel and labor, there is no waste with the plate as with powders.

One to one hundred welds from a plate.

By its use you can lower your cost, improve your work and do what you cannot do now.

No change in equipment is necessary.

No loss in strength of steel due to burning.

The chemical action of the plate increases the strength at the point of weld.

A weld once made with Laffitte will never be returned broken in the weld.

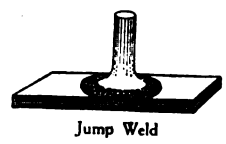
The cost of the plate is nothing when the results and saving are taken into consideration.

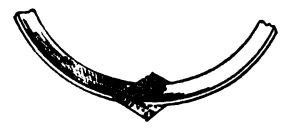
Made in two grades—i. e., heavy for material ½-inch and over in thickness; light for material under ½-inch in thickness.

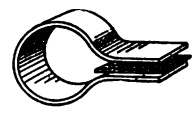
For sale by all active dealers.

Samples free on request.

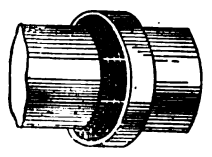
The Phillips—Laffitte Co.
Pennsylvania Bldg., Philadelphia, Pa.


Jump Weld


Welding a Tire—No Riveting


Welding Spring Steel


Welding Broken Wagon Axle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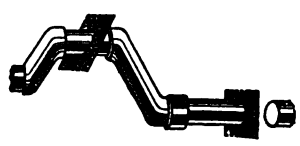
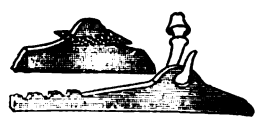

Repairing and Lengthening Auto Crank Shaft


Welding Corner of Angle


Cleft Weld to Lengthen Rigid Frames


Welding two High-Carbon Chisels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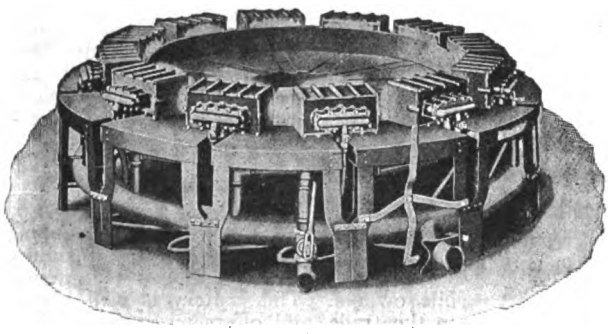
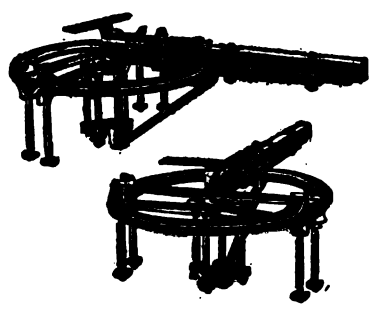




TIRE HEATERS for all fuels and purposes. Oil, Artificial Gas, Natural Gas and Gasoline Tire Heaters. Also Tire Coolers.

OUR GOODS ARE THE BEST IN THE MARKET FOR THE BEST RESULTS WITH HARD SERVICE.

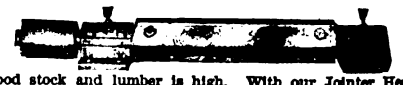
Center and Rear King Bolt Fifth Wheels, End Gate Springs, Flare Board Irons, Body Braces, Heating Furnaces, Blow Pipes, etc.

THE GOGEL MFG. CO., TOLEDO, OHIO.

BAUER KEROSENE ENGINES

Write for Free Catalog before you arrange to try any engine. Sizes 2, 3, 6, 7, 9, 12, 15 and 18 H-P Low Prices. Cash or Terms. 30 Days Trial. 5-year Guarantee.
BAUER ENGINE CO.
110 Bacon Block, Kansas City, Mo.

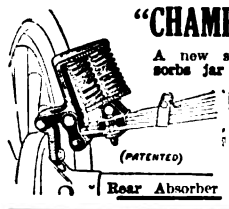
THE WOOD WORKER'S FRIEND



Wood stock and lumber is high. With our Jointer Heads you can buy rough lumber of any kind and dress it to suit your job. Saves time, money and lumber. Would this be any object to you? If so, get circulars and prices. Sold on 30 days' trial. Manufactured by

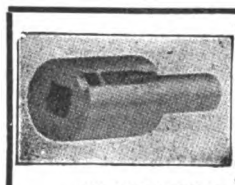
Whisler Mfg. Co. Gibson, Iowa

"CHAMPION" SHOCK ABSORBERS for FORD CARS


(PATENTED)
Rear Absorber

A new spring suspension which absorbs jar and rebound. A wonderful E-Z ride suspension. (E-Z to attach.) Guaranteed by manufacturers. Exclusive sales; big profit for dealers, agents and owners.

Champion Shock Absorber Sales Co., Inc.
Indianapolis, Ind., Mfrs., Dept. B



THE only successful Chuck to hold square taper shank wood bits and drills so you can use them in your drill press. See the spring. It keeps the drills from dropping out of the chuck. Made right. Priced right. If your dealers won't supply you we can.

WHISLER MFG. CO., Gibson, 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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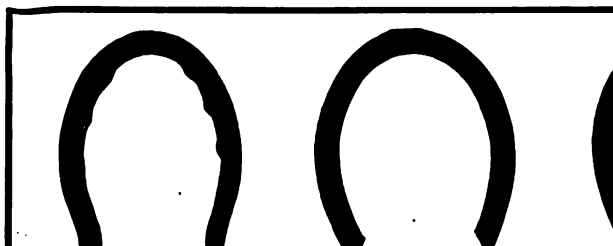
The Blacksmith and Wheelwright



"Brock Pattern" Hand Made Racing Plates

Extra Light, Light, Medium and Heavy weights; in sizes 0-4 inc.

Just What You Need for Trotters, Pacers and Runners

Write for our No. 17 Catalog (free); showing sizes, weights and measurements.

For our regular line of U. S. Horse and Mule Shoes, ask for No. 16 Catalog; showing sizes, weights and measurements of over 500 patterns and sizes.

United States Horse Shoe Co., Erie, Pa.

THE

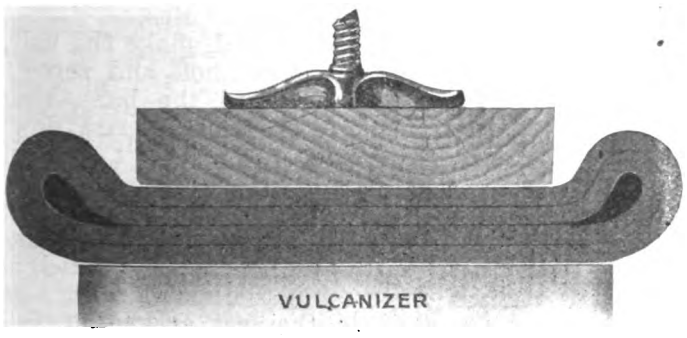
BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 6 NEW YORK, JUNE, 1919 TERMS ONE DOLLAR A YEAR

The Care and Repair of Tires

Part 3.—Repairing Large Tube Cuts, Splicing Over Mandrels, the Acid Cure and Vulcanizing

THE average repair shop is or should be prepared to repair tubes and casings in a more comprehensive manner than the motorist will care to undertake, and for the benefit of those repairmen who are interested in making better repairs we will endeavor to describe the approved methods of mending the common types of tube injuries.



Cross Section Showing Vulcanizer and Clamp in Place on a Tube Which is Being Repaired.

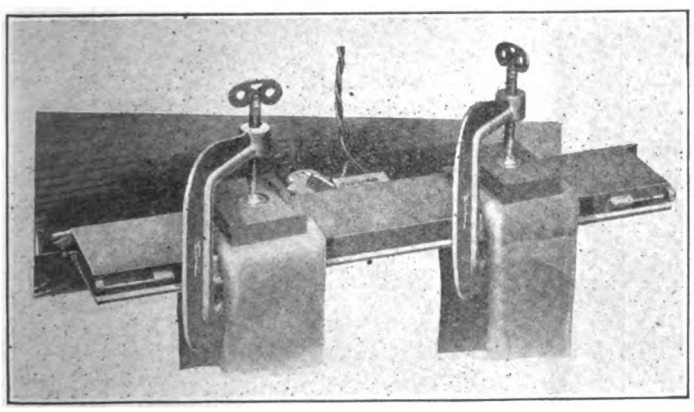
In the previous articles of this series we have learned that rubber possesses the property of changing from a plastic, sticky condition to a permanently resilient state upon the application of heat.

Furthermore, if *uncured* rubber be held in close contact with *cured* rubber while the proper degree of heat is applied, the new rubber will unite perfectly with the old. The process is somewhat similar to the welding of metals.

In repairing tubes, then, we literally weld a piece of new rubber into a hole or cut and thereby make a repair that is permanent because it is an integral part of the tube.

The apparatus used for tube repairing is simply a flat plate heated to the proper temperature by steam or electricity.

The source of heat has nothing at all to do with the process of vulcanizing but it is vitally important that the correct temperature be maintained, either by watching and regulating the heat, or in the better class of vulcanizers, by means of automatic control.



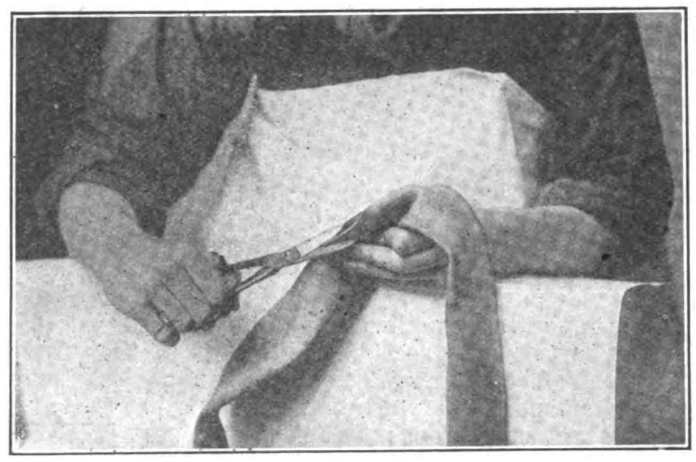
Method of Clamping Tubes on Standard Make of Electric Vulcanizer. The Plate is Electrically Heated.

A safe vulcanizing temperature is 265° F. Higher temperatures vulcanize more quickly but there is danger of injuring a tube if it is accidentally left on the vulcanizer too long. 265° is about the temperature of steam at 40 lbs. and when a steam vulcanizer is used the operator may ascertain the temperature by reading the steam pressure which is indicated on the gauge.

Moisture is absolutely detrimental to a repair and there is no such thing as "moist heat" as the heat from a steam vulcanizer is sometimes called by repairmen who think that because a vulcanizing plate has steam behind it the *kind* of heat is changed in some mysterious way.

Too high a temperature will overcure or burn a tube regardless of whether there is steam in connection with the vulcanizer or not. The correct temperature will vulcanize perfectly regardless of the heating medium that is used.

In vulcanizing tubes the repair is prepared in one of the ways described later. A piece of waxed paper is laid over the repair and the repair placed on the flat tube plate. (The waxed paper is merely to keep the sticky new rubber from adhering to the hot vulcanizer). Then a block of wood of suitable size is placed over the tube and a clamp is applied so as to give a good firm pressure. We illustrate several types of vulcanizers to show the method of clamping.



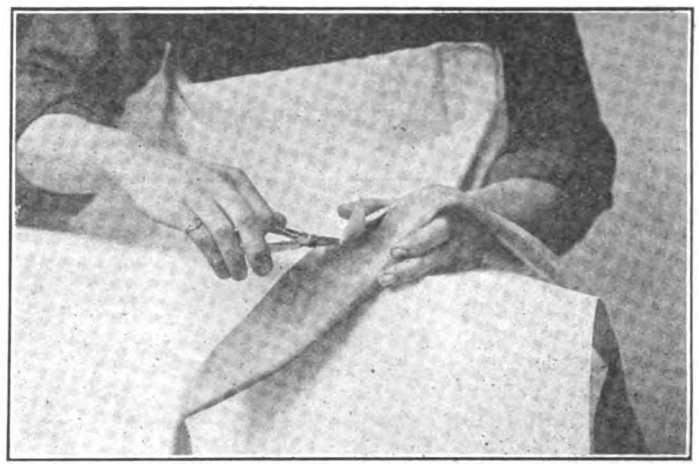
First Step in Tube Repair: Trim the Edges of the Tube.

The tube is left on the vulcanizer for a length of time depending on the size and thickness of the repair, and when removed and cooled is ready for use. If repairs are properly prepared there is no danger of the sides of the tube sticking together because the inside of the tube is covered with bloom, or free sulphur, that will not incorporate into the repair.

In the case of large repairs it is well to avoid the chance of such trouble by placing a piece of paper inside of the tube to prevent the repair from touching the opposite side. The paper can do no harm if left inside.

Preparation of Puncture Repair.

Clean the tube thoroughly with clean high-test gasoline and coarse sandpaper or a rasp for at least an inch all around the puncture; then wipe off the dust with waste or a cloth moistened with gasoline. (The success of repairs is largely dependent on cleanliness. Ordinary commercial gasoline as sold today has a certain amount of oil in it and consequently may even hinder a repair from sticking as it ought to. If you cannot get gasoline that is clean and free from grease, do your cleaning with sandpaper and let it go at that).



Next Insert the Patch with Pincers, Not with the Hands.

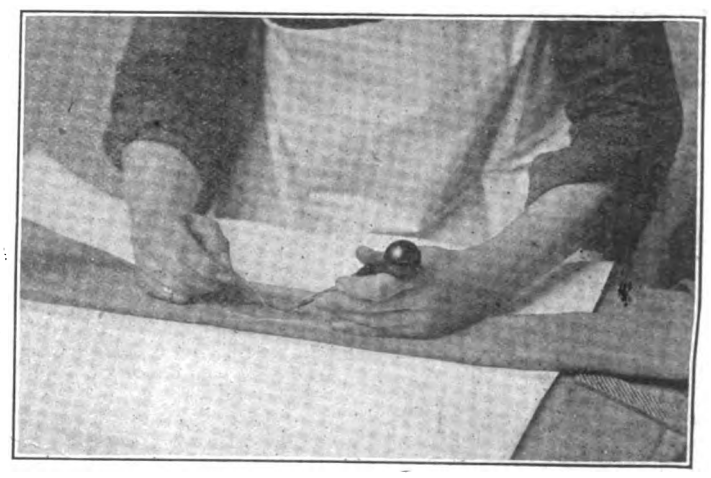
If gasoline is used, let it evaporate and then apply vulcanizing cement to the edges of the hole and spread a thin layer around the hole to cover a space as large as a dollar. When this has dried for ten or fifteen minutes apply a second coat of cement and let it dry thoroughly.

If the hole is only a very small one, push a little piece of the raw rubber into it and then take another piece as large as a quarter and place it over the puncture. Cover with waxed paper and put on the vulcanizer for fifteen minutes at a temperature of 265° F.

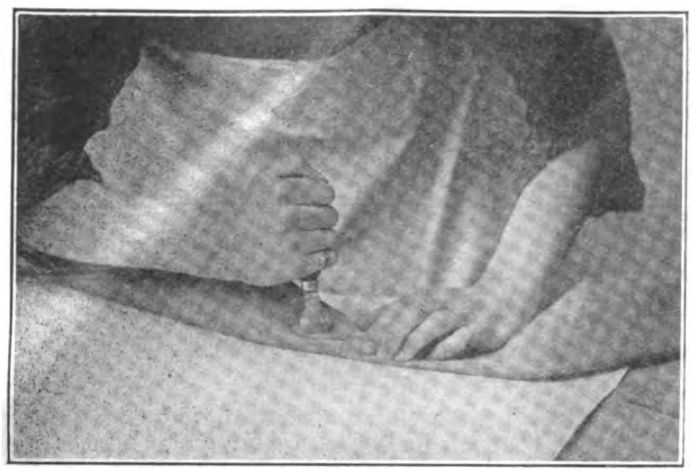
Larger Cuts and Tears in Tubes.

Trim the ragged edges of the rubber with shears so as to leave a slit in the tube about a quarter of an inch wide. Wash and clean the tube inside and out for an inch or more around the cut, using clean gasoline. Roughen with a rasp. Coat the entire cleaned surface with two layers of cement, letting each dry separately.

Insert into the tube an inside patch of one-side-cured rubber by folding and setting in place with pliers as illustrated. The uncured side of this patch comes next to the hole in the tube and the cured side prevents the repair from adhering to the opposite side of the tube.



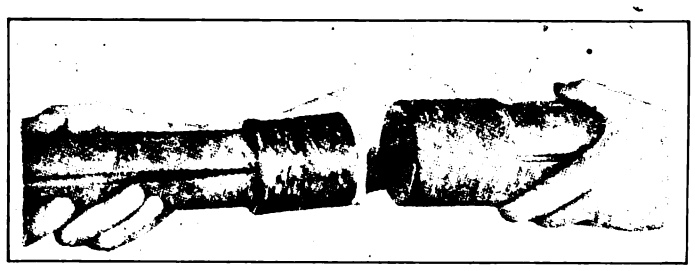
Fill the Cavity with Strips of Pure Rubber.



Before Vulcanizing Roll the Outside Patch with a stitcher.

Then fill the cavity with strips of raw rubber, pressing each down firmly so that the edges of the raw rubber are stuck to the edges of the tube all the way around, and finally roll the repair lengthwise and crosswise with a stitcher, which is a small toothed wheel that insures all of the repair being firmly united to the tube.

There is practically no limit either in length or area to the size of repair that can be made by this method and the finished repair will be at least as strong as the original tube. If the repair happens to extend partly around the tube, it is prepared all at once although the vulcanizing process may require two or three settings in order to get all of the repair into contact with the vulcanizer.



How the Tube is Rolled Over the Splicing Mandrels.

When a tube has been so badly blown out that a patch is impossible, it may be repaired by splicing in a new section. This must be done carefully so as not to twist the tube or change its length. The section to be inserted is taken from an old tube of the same size, and should be cut five inches longer than the piece which was removed so that two and one-half inches will be left at each end for the joint.

Bevel the edges of the tube and section by cutting with a sharp knife or by placing over a piece of board and grinding on an emery wheel. Clean the ends of the tube on the outside for three inches and clean the ends of the new section for an equal distance on the inside.

For ease in putting the splice together splicing mandrels are generally used. These consist of a pair of sheet metal tubes about eight inches long which are split down one side. One of these tubes is about one-fourth inch smaller in diameter than the other.

Put one end of the tube through the smaller mandrel and turn it back over the mandrel for five inches; then turn it forward again half that distance, thus making a double fold. Put one end of the new section through the larger mandrel and simply turn it back two and a half inches.

After the tube and section are on the mandrels, the method of joining will depend on whether the repairman prefers to use acid-cure cement or whether he prefers to vulcanize. The latter method is preferable because, although it takes a little longer, it makes a repair that will not loosen in case a puncture makes it necessary to again vulcanize the tire at a point that will bring the splice in contact with a heated vulcanizer.

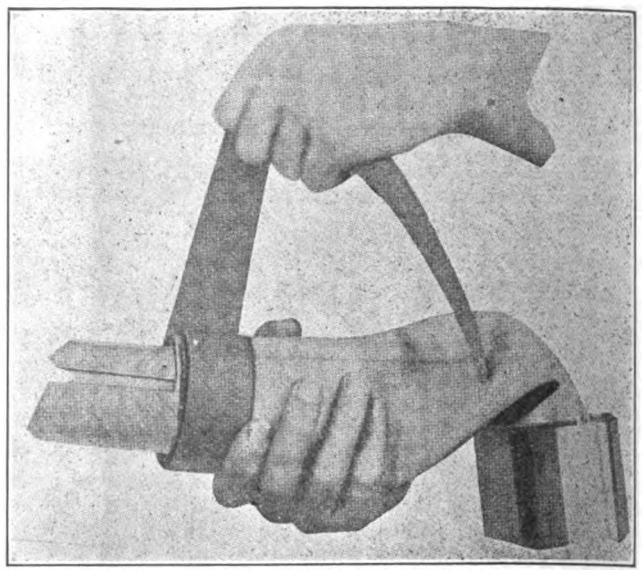
If acid-cure is used proceed as follows. Apply two coats of acid-cure cement to the cleaned surfaces of the tube and section. Give them plenty of time to dry. Bring the two mandrels together and apply the acid to the cemented ends with a wide brush. Then quickly transfer the end of the section from the end of the tube on the large mandrel onto the end of the tube on the small mandrel. Immediately wrap the joint with strips of old inner tube to give the necessary pressure while the acid is working on the cement. Twenty minutes is sufficient. Then straighten the tube out and remove the mandrels by pulling the tube through the slits in the sides of them.

If the splice is to be cured on the vulcanizer, ordinary vulcanizing cement is used and at least three layers are applied to the cleaned surfaces of tube and section. The ends of the splice are brought together and the mandrels removed. The vulcanizing is done in three operations; the last two of fifteen minutes each. A block is used, as shown, to prevent pinching edges of the tube, and after the first part of the cure is done the tube is turned one-third of the way around so that the vulcanizer bears on a different place.

Another method of getting the ends of the tube together neatly is to insert into the tube a bottle or tin can and after the ends are in place this object is removed by cutting a slit in the tube and later vulcanizing it shut again.

Select a good place on the tube and clean a place about 2½ x 4 inches and in the center cut a hole about one-fourth inch in diameter. Remove the nut from the metal valve stem and push the stem through the hole in the tube, allowing it to remain clear inside and away from the patch until after vulcanizing.

Cement the cleaned surface around the hole in the usual manner. Cut an oval or diamond-shaped piece of thin raw rubber about 2 x 3 inches. Make a hole in the center to correspond with the hole in the tube and roll it down on the tube so that the holes register. Cover this rubber with a piece of fabric of the same size and shape. Then cover the fabric with a layer of thin raw rubber one-quarter inch larger than the fabric. Holes should be cut in the fabric and in the last layer of rubber to match the hole in the tube. Place a wad of paper in the holes and vulcanize forty minutes.

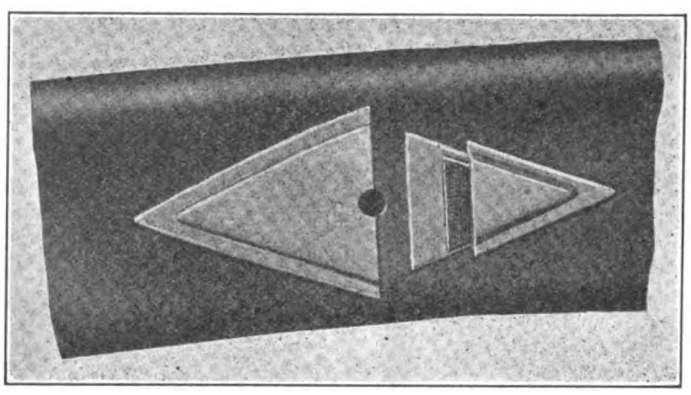


When the Tube is Transferred to the Mandrel, Wrap it Firmly with Strips Cut from an Old Inner Tube. (Acid Curing.)

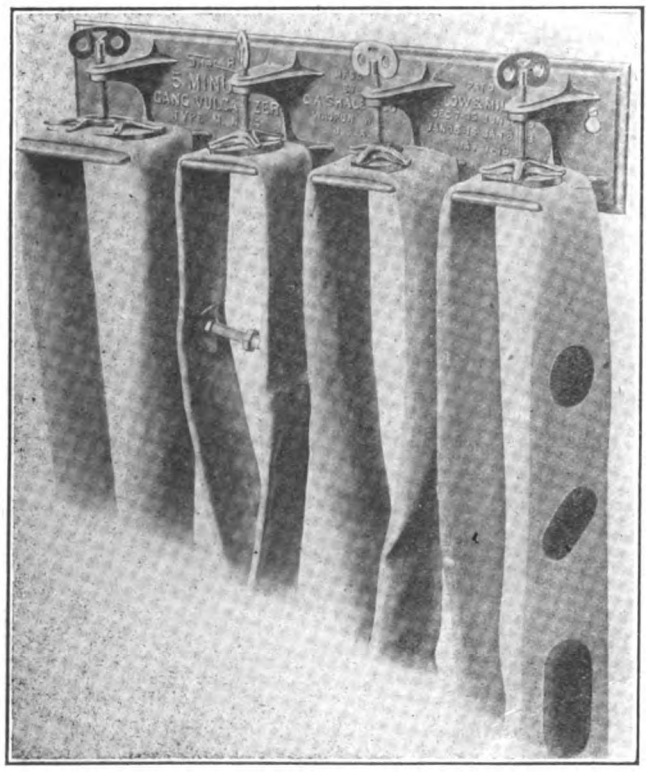
When the patch has cured, shake the valve stem to the vicinity of the hole and force it through the opening until the base rests against the inside of the tube. Screw down the nut on the outside.

High Speed Tube Repairs.

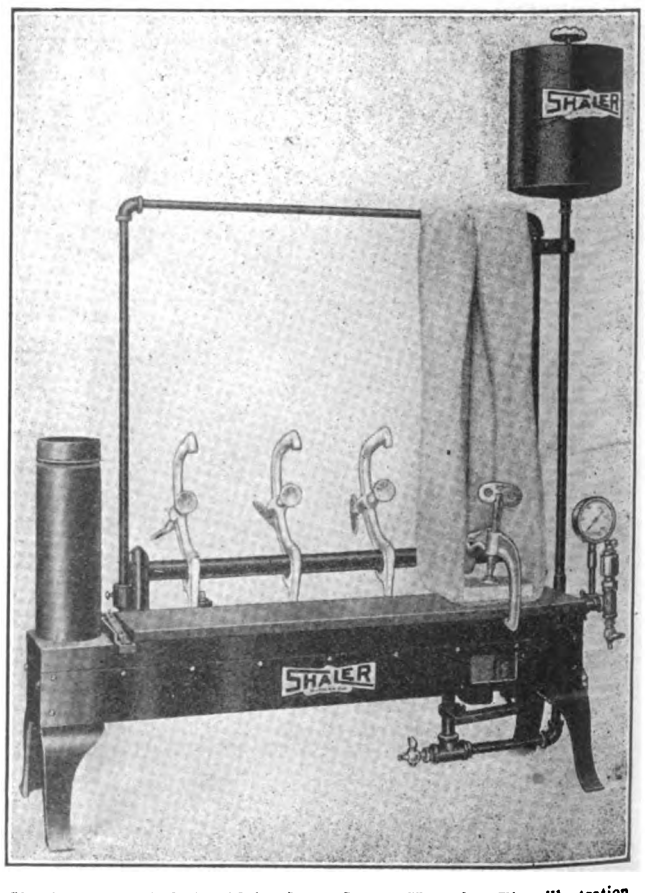
A new type of vulcanizer recently placed on the market is exceedingly simple and quick to use in the repair shop inasmuch as it utilizes the combination patch and heat units described in the last article of this series. These units are furnished in several sizes so that with them it is possible to make in five minutes a perfect and permanent repair to any small tube puncture or cut. This style of vulcanizer, on account of its quickness of operation, and the elimination of waiting for it to heat is very popular both for the shop that only desires to cater to the tube-repair trade, and for use as an auxiliary to the fully equipped shop.



Method of Building Seat for a Valve Stem.



The 5-Minute Type of Repair Shop Vulcanizer.



Simple Type of Tube Vulcanizer, Steam Heated. The illustration Shows the Method of Clamping Tube to the Plate.

(Editor's Note: This is the third of a series of articles prepared by Mr. M. E. Faber of the C. A. Shaler Company. The first article was published in the April number. It is our intention to give in these articles complete directions for repairing every kind of tire and to make the series the most comprehensive work of its kind ever published. In itself, it will be worth the subscription price.) (To be continued)

Practical Horse Shoeing

Part 2—More About the Horse's Foot the Muscles, Joints and Tendons

IN the preceding article, a great deal was said about the various bones of the horse's foot, and in this something is to be said concerning the muscles and ligaments. The reader may wonder at all this, when what he really is seeking is information valuable to one engaged in actual horseshoeing. The answer to this interrogative state of mind is that all this information about bones, muscles and tendons has a very pertinent bearing on the shoeing of the horse. Something was said last month on this point. And I propose to add to it now. If the reader is once convinced that he needs the information in order properly to understand his work, he will surely be ready to go to work and learn it. So then, it will be well worth while to dwell a little on the necessity for this preparatory knowledge on the part of the practical shoer of horses.

The horse's foot, as it is easy to note by observation, swings back and forth at the lower end of the leg. In fact, it swings through quite an arc. It is the same with the human foot and the human hand. There are similar situations elsewhere in the human body—as at the shoulder, at the thigh, at the elbow, at the knee. Machinery built by men is often furnished with a joint permiting a bending action to take place.

Among the mechanical arrangements, both in one's body and in mechanical contrivances, is what is known as the ball-and-socket joint. One has such a joint at the shoulder and another at the thigh. A ball-and-socket joint is a hingeing device where one part of the hinge resembles more or less the *exterior* of a spherical surface while the co-acting part of the hinge is more or less like the *interior* of a spherical surface. That is, one is round and convex, while the other is round and concave. The one rounded surface fits into the other. When the bending movement occurs, one surface slips on the other—or each slips past the other.

Now in the horse's foot and also in other parts of his body, there is something that resembles this ball-and-socket action. So also in the human body. In short, there are multitudes of instances in the bodies of men and animals where there is a joint which seems to be modeled on the standard ball-and-socket joint. Sometimes, the joint will be practically identical with it.

An instance of this is the joint where the thigh bone operates hinge-like in a cavity of the pelvis. The end of the thigh bone is round like a ball or an apple. This is the convex, spherical surface. The hole in the big bone, in which hole it works, is also rounded, but it is hollow. This is the concave spherical surface. The two surfaces co-operate, the one with the other. At one's wrist the situation is more complicated because there are more than two bones to be taken into account. So, with the joint where the horse's foot turns on the end of the leg. There is the ball-and-socket movement, but there are complications because of the presence of several bones instead of just two.

But let us continue, for the present, to regard this joint of the horse as substantially a ball-and-socket affair—or, more simply still, as a simple hinge where a rounded convex part turns in a rounded concave part.

Now the movements of a human or animal joint are usually effected by pulls. That is to say, one tendon is pulled and the hinge or joint is operated in the direction of closing it. Another tendon is pulled, and the hinge opens more or less. The one bone is pulled, now forward, now backward. Note that it is a *pull*, whether the object in view is to open or to close the hinge.

I do not know that in the machines made by men there is any large percentage of cases where a joint is operated by two pulls, one to open and the other to shut. But in the world of living mechanisms made by the Creator, the two pulls are quite common. In the ordinary mechanical world, one may illustrate the hinge-like movement as effected by two pulls by the following examples:

(1) A rudder on a row boat may be so arranged that it is controlled by a horizontal double-arm secured to the rudder post. The person who operates the double-arm, and consequently the rudder on its hinge-like joint, holds two strings, one of which is secured to the outer end of one arm and the other of which is secured to the outer end of the other arm. He pulls on one string and lets the other out. This swings the rudder one way. Then he pulls on the other string and releases the first. This operates to swing the rudder the other way. The person sits in the rear end of the boat facing the bow and operates the rudder by pulling with one or the other string and releasing the other. Here is a case of two pulls.

(2) There is a toy wagon on which a boy may coast downhill. He guides with two strings, pulling now on one, now on the other.

In a piece of machinery, when a part is to be made to rotate on another part, after the manner of a hinge, a wire rope is sometimes used to effect the movement by a pull. Take an ordinary contractors' derrick as an example. The vertical stick is the mast. There is pivoted against the lower end of the mast a second stick. This is the boom. A wire rope is properly attached at or near the outer end of the boom. This rope runs over a small wheel set in the top of the mast. By pulling on this wire rope, the outer end of the boom is lifted.

The wire rope is generally operated by a hoisting engine. This is not important, just now. What is important is to note exactly how the boom is forced to fold up as if it were the fore-arm of a man. The joint is at the point where the lower end of the boom is pivoted against the mast. This is the hinge-like joint. The boom is operated, in so far as a movement tending to close up the hinge is concerned, by the *pull* on the wire rope. This is the kind of thing that goes on in animals and men when a tendon attached to a bone is pulled. The bone is made to turn on its hinge.

Now with the derrick-boom, it is not usual to use two wire ropes, one to lift and the other to lower the boom. The lifting rope is sufficient, as the boom will drop back of its own weight when the boom-lifting rope is relaxed. Still, one can readily imagine a second rope arranged to pull the boom down. When this is the case, gravity being left out of consideration, the boom would be raised by pulling on one rope and releasing the other, and lowered by releasing the first and pulling on the second.

Now, with animals and men, there is something very much like this. Instead of ropes, there are tendons. Instead of hoisting engines, there are muscles. That is to say, a muscle pulls on a tendon and the tendon on the bone. The bone moves, turning on its hinge or pivot—that is, its joint. Another muscle relaxes when the first one pulls. This results in the second tendon also relaxing. The result is that the pull on the bone is permitted to move it, this permission being given by the second muscle and tendon. To swing the bone back, it is only necessary for the second muscle and its tendon to pull, and the first muscle and its tendon to relax.

Now the horse's foot has not simply one joint of the ball-and-socket or hinge-like type, but several. That makes it complicated. But there is simplicity in this. There is, in each case that the horseshoer need be bothered about, this double-pull action. The movements are effected by muscles and tendons. Always, it is a case of *pull*—practically never a case of *push*.

The scientists who treat of anatomy use long words for *front* and *back*. It will be as well to learn them now as later. For *front*, the word *anterior* is employed; and for back or rear, the word *posterior*. An anterior muscle or part is one located on the front, and a posterior muscle or part is one located on the back or rear. Further, the scientist has another word for a joint. He often or generally prefers to call it an *articulation*.

Thus, there are three articulations in the foot of the horse. There is the *fetlock* joint, the *coronary* joint and the *pedal* joint. They are all more or less similar to a hinge or a ball-and-socket joint. The fetlock is an out-and-out hinge.

Now, if I have succeeded in making clear the matter of the folding action, to and fro, as a result of two pulls and two relaxations, the reader will be prepared to understand something of the difficulties imposed by movements and conditions that are not normal.

For example, consider a case where the horse is standing at rest. The condition at each of the three joints or articulations of the foot is to be considered to be substantially as follows: The anterior or forward muscle (located further up the leg) is under a certain tension and the posterior or rear muscle is also under a certain tension. If the horse

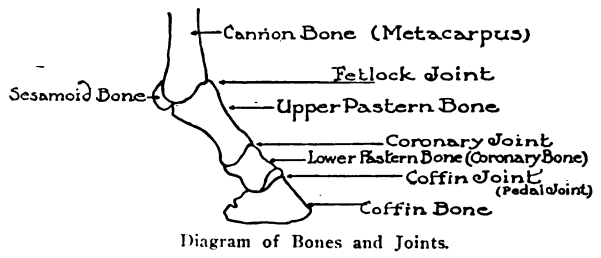


Diagram of Bones and Joints.

is standing so that these joints are fully at ease, then one may say that for each joint the anterior and the posterior muscles and tendons are both at a precisely normal tension—at least for standing. But, suppose that for some reason or other the bones of the several joints are not exactly in positions that will produce the precisely normal tensions. And yet the horse must stand and sustain his own weight. What is the result? Some of the muscles will be under strain or be otherwise put into an abnormal condition.

Now the cause which brought about these abnormal conditions amongst the muscles, ligaments and tendons may be simply a pebble under the horse's foot and so located as to prevent the right and usual placing of that foot. Or, the cause may be an imperfectly trimmed horny wall. It may have been surfaced by the horseshoer in such way that his foot is thrown out of normal position. The result may be just the same as with the pebble; only, when the horse moves on, if the trouble was due to faulty horseshoeing, there will probably be a continuance of trouble, but, if the trouble was simply due to a pebble on the ground, it will be over with, most likely, when the horse goes ahead.

The horse cannot speak and tell us what is wrong. He may indicate in some way that there is trouble. The doctor with a human patient is able to put questions and get answers and in this way get a line on the trouble. But the veterinary surgeon or the horseshoer is cut off from this. He will have to understand the construction of the horse and his behavior sufficiently well to study it out himself.

Similar remarks apply to the horse's foot when he is in motion. There are certain *normal* stretchings, and pulls, etc., of the several muscles, ligaments and tendons on the one hand and certain *abnormal* stretchings, and pulls, etc., on the other. A shoe

wrongly set or a hoof wrongly leveled for the shoe may cause these abnormal occurrences to take place over and over again as the horse moves along.

If the reader wishes to get a line on what happens when the foot is required to act in an abnormal position, let him try running, or trotting, or walking, or even standing, with his feet misplaced. That is, for example, let him slant the bottoms of his feet so that the toes are slightly elevated, or the heels slightly elevated; and then let him stand, walk, trot or run. He will find out how it feels.

The horse cannot correct the difficulty, nor can he tell us about it clearly. At the same time, his behavior does change. He stands a trifle peculiarly, seeks to throw his weight in some unusual manner, or sets his hoofs queerly—or, if we fail to note these indications, he may even "go lame."

One object that the reader should have in view when studying the bones and the muscles, ligaments, tendons, etc., is to learn how to tell when all is well, when something is wrong, and what the something is. People who have given the subject a good deal of attention are convinced that a good deal of trouble with a horse's foot comes from the shoeing in some way.

The horny wall of the hoof has been leveled wrong, the shoe itself has been misplaced, the nails have not all of them followed a proper course, or some other wrong condition is present. The effect on the horse remains unnoticed, perhaps because the horseshoer is ignorant of matters he should know. The thing is a little matter at the moment; but, as time goes on, the continued repetition of the small trouble has its effect on the horse. The only wise thing for the horseshoer to do is to learn all he possibly can about the construction and mode of action of the horse's foot, and what are the effects of errors in shoeing. He will then be in better shape to note when the horse places his foot wrong or when there is a slightly wrong posture of his body, etc.

No Muscles in the Foot Itself

The foot of the horse contains no actual muscles. These are located higher up. In the foreleg, the muscles are above the knee; and, in the hindleg, above the hock. While such muscles are not in the foot, they are still the engines, as it were, which operate it. It is their pulls which compel the bones of the foot to perform their movements at the various joints.

The Ligaments and Tendons

While the muscular apparatus of a horse's limbs are more spectacular than some other parts, because of their evident connection with his movements, yet there are other things to which we must also give attention. It is very necessary that the various bones be kept in place. There are many occasional movements when there is a tendency to move a bone out of its place and break up a joint. The muscles control the to-and-fro movements of the foot bones through the agency of their tendons, as the cords which connect muscles and bones are called.

But it would be almost too much to expect the muscular effort exerted through the tendons to be sufficient to hold the various bones in place. There is a special type of tissue, called *ligaments*, which performs this duty. That is to say, they act as guides and restraints whose function it to hold the bones in place and yet not prevent the hinge-like movements imposed by the muscles and tendons. A ligament may act like a cup or a container, holding its bones inside it but nevertheless permitting certain slight movements.

Others are more like bands. They extend from one bone to its companion and prevent the two from coming apart. A little consideration will, perhaps, convince the reader that the function of the ligaments is very important indeed. They must allow so much, but no more. They must be strong to do such work successfully, and they are strong. But that doesn't mean that they are ready and able to withstand all kinds of misuse.

Such misuse may come from the foot resting on the ground wrongly, or striking the ground wrongly when the horse is moving. Naturally, it is the weight of the horse and the force with which his foot strikes the ground that make the misplacement of his foot of importance. Even then, unless the misplacement is very considerable, the wrong placings of the foot would probably not be very important as a general thing, if they are not repeated. But where the ligaments are forced to some unusual duty over and over again, they are apt to suffer, and the horse "goes lame" or contracts some disease. Here again the horseshoer may be the real cause back of ligament trouble, because he has so placed the shoe that the horse sets his foot wrong, whether at rest or in motion.

The error in setting his foot that is imposed on the horse by the faulty shoeing may be small. It is, however, not the single occurrence that is so much to be feared as the constant repetition. Perhaps trouble from strained ligaments are more frequent than trouble from wrongly stressed muscles and tendons. At any rate, it is important that the horseshoer inform himself as much as possible about these important parts of a horse's foot.

As already said, there are three joints in a horse's foot. The fetlock is the one which is practically a perfect hinge. The others vary a trifle from this precise form or limitation. Each of the three joints, or articulations, has a *capsular* ligament. This type of ligament envelops more or less completely the bones of the joint after the manner of a sheath. Each capsular ligament consists of two layers of tissue. The exterior layer is strong, firm and fibrous, while the inner one is soft and delicate. This soft and delicate tissue is in contact with the bones of the joint. This inner layer of the capsular ligament supplies lubricant to the articulation. It secures this lubricant from the activities of the living body and holds it in readiness for the use of the joint. The lubricant is sticky and is not unlike mucous. It has a yellow-white or a yellow-red color and resembles the white of an egg. It is called *joint oil or synovia.*

The actual surfaces of the bones, where the joints are, have a covering of cartilage, which is a kind of leather-like material. One's ear is of this kind of tissue. This cartilage covering of the convex and concave surfaces is smooth and also elastic, but it requires lubricant. This the inner layer of the capsular ligament supplies.

There are other types of ligament. Thus, there is the lateral or side ligment which binds bone to bone as a band extending from one to the other. The lateral and other ligaments of the foot in general are fibrous and have a glistening, whitish appearance. They are tremendously strong. In fact, they do not often break, for the reason that they are generally stronger than the bone tissue.

The three foot joints are such that there is but little side motion permissible—in the case of the fetlock joint, practically none at all. The opening out of the bones of the joint is termed *extension;* the movement tending to close them, *flexion.* The muscles and tendons operate to produce these flexions and extensions. The various ligaments permit them, but otherwise, for the most part, resist other movements.

The Fetlock Joint

At the fetlock joint, several bones are concerned. The cannon bone (metacarpus) provides the upper surface of this joint. It supplies, in fact, two convex surfaces with a slight ridge between. This little ridge extends lengthwise of the horse, as a little thought prepares one to understand.

The fetlock joint turning like a hinge in the direction of the length of the horse will naturally require any ridge in the very joint itself to lie in the same direction. So then, the bottom end of the cannon bone has two convex surfaces with a ridge between lying in the direction in which the horse moves. A scientific word for these surfaces is *condyles.* These surfaces co-act with three bones underneath. One is the *upper pastern* bone. This bone was marked A in the two illustrations in the May issue. Back of this bone and underneath the cannon bone are two *sesamoid* bones. These three bones supply a kind of socket for the convexities of the lower end of the cannon bone. All four bones unite to make the fetlock joint.

A little consideration will, perhaps, make it clear that the number of parts here tends to create a complex situation which may result in trouble, if ill-attended to by people having to do with the horse. Nature provides a complex joint probably because of complex requirements. She provides smooth surfaces possessing elasticity and she provides a lubricating oil. She also furnishes eight or nine distinct ligaments to keep the four bones in position.

Thus, there is at the fetlock joint, a capsular ligament which envelops all the four bones. It covers the ends of the two big bones entirely—that is, the ends of the cannon and upper pastern bones. The two sesamoid bones are held in the same capsule, only the ligament here covers only the borders of the joint surfaces. Then, there are two side bands—*lateral ligaments*—which join the two big bones on the sides. That is, these ligaments join the cannon bone and the upper pastern bone, one on the left side and one on the right. When the hinge action comes into play, there is simply a movement of the bones between the two bands. These two bands are also attached, one to each, to the sesamoid bones.

The sesamoid bones have lateral ligaments. There is also a special ligament which binds the two bones very firmly together. There are a number of other ligaments. But I will not now confuse the reader with an account of them, preferring rather to take them up, if necessary, at a point in this series of articles when they have an immediate bearing upon the matters in hand.

For the present, let it suffice us that we know that there is a capsular ligament enveloping all four bones of the fetlock joint, that there is a special ligament holding the two small sesamoid bones together, that there are certain lateral ligaments, and that in addition to the foregoing there are a number of others. Nature has done her part in locking the four bones together in such way as to permit the proper motions but nevertheless to hold all the parts together in proper position.

(*To be continued*)

A Lover of the Horse

Evangeline Booth, the gifted Commander of the Salvation Army, in the *Rider and Driver,* pays a beautiful tribute to the horse. "The horseless age which was predicted when the motor came," she says, "has not arrived, and never will." She continues:

"From the very beginning of all things, through the march of the centuries in every sphere of life, the horse has occupied a significant place.

"In sport, in art, in literature, in war, in peace, in commerce, in romance, in tragedy, in drudgery, in love, in religion, in life and in death, this reliable, courageous, ever-ready for command, servant of man has proved himself a most potent factor.

"His fleet hoofs have flashed light from the pebbled path of every poet; his arched neck and tossing mane have taxed the skill of the ablest sculptor's chisel; his attractive figure has made realistic the story of every class of literature—historic, fiction, fact, and biblical; the delight of childhood, the willing slave of man, the sure trust of old age, this faithful ally through all time has plowed the fields, and hauled the loads, and penetrated the wilderness, and waded the rivers, and with blood-stained flanks has carried the warriors in battle, and tossing snowy mane has borne the victor home through triumphant arch.

"And a thousand times ten thousand when worn by toils and lack of food to a mere skeleton, that faithful friend has pressed on with his task with a patience, perseverance, and a sweetness of temper that one could almost call divine."—(Quoted from *Our Dumb Animals.*)

In Little Old St. Louis

Suggestions for the Smith Who Does Horseshoeing and Needs a System

By JAMES F. HOBART

IT sure is a delight to go into a clean shop; one where is not a speck of dirt to be seen on walls, ceilings or windows. Where the walls are all neatly whitewashed and all the old shoes neatly packed away and all new stock as well displayed as though it were in a hardware store.

That's the way the writer found things when he walked into the shop of Mr. H. W. Jurczye, in "Little Old Saint Louis." The living rooms were overhead, but as Mr. Jurczye is as yet a confirmed bachelor, he rents most of the up-stairs to a family, reserves three rooms on the third floor for his

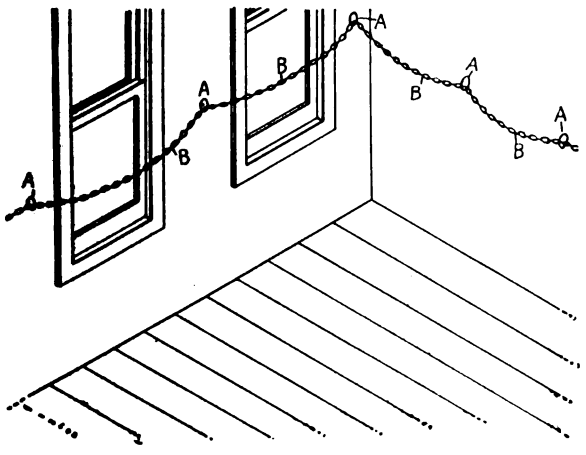


Fig. 1. The Horse Tieing Chain.

own use, and eats with his tenant! Some arrangement that. It isn't every blacksmith who has "all the pleasures of home" with none of the responsibilities!

The Shop in a Store Building

The entire interior of the shop is whitewashed each fall, using a machine which the smith purchased for that purpose. The horse-hitching facilities in this shop are most excellent and complete. All around the whitewashed walls, on three sides of the shop, heavy staples have been inserted about every six feet and each staple carries a ring made of half-inch iron and about three inches in diameter as shown at A A A, etc., in Fig. 1.

Between the rings A A old chains B have been placed—good strong chains too, about ⅜-inch iron or steel was used in the links. The chains were evidently made from unwelded links which were closed after being slipped into the chains and the several rings. Horses can certainly be tied anywhere, around this shop. The shop is lighted by a row of electric bulbs, suspended six feet from the walls, and extending entirely around the shop.

When the driver needs light in setting a batch of shoes, he has only to turn on one or two lights exactly where he needs them. And, turning the lamps out when not needed, saved a lot of "juice" for the shop owner. The floor of the shop, where horses are tied, is thickly coated with sawdust, there being in the back yard, three commodious bins, one for coal, one for fresh sawdust and one bin for dirty sawdust and sweepings from the shop floor. The fresh sawdust on the floor, the clean whitewash on walls and ceiling, and the *clean shop windows* certainly present suggestions for most pleasing innovations in some other shops!

Two Concrete Double Forges

There is one part of one side of this shop where no horses are ever tied, consequently there are no staple-rings and chains, but there are two double forges, giving the shop a capacity of four fires, with only two chimneys, two slack "tubs" and two coal boxes. Fig. 2 shows the manner in which the forges are constructed, a square opening C being made and the fire placed in that opening, where wind seldom gets a chance to blow any ashes or gas fumes into the shop. At D, a space was left when the concrete was put in position and coal to the amount of one and one-half kegs can be stored in the cavity left for that purpose in the concrete forge, the coal being common to both fires, the spaces for which are separated merely by a sheet iron plate set in the concrete.

At E, is shown a wooden frame which supports a square cast iron vessel for taking the place of the usual "slack tub." It will be noted that the wooden support is entirely open underneath, so that the shop sweeper can get his broom in there and leave no bunches of dirt. It may also be noted that the top of the concrete forge, as shown at F, has so steep an inclination that nothing can be laid on top of it. This was done purposely. It effectually prevents a choice collection of odds and ends from gathering on top of the forge—something sure to happen were the forges made flat on top!

There is a boy in this shop. A real lively boy, a young chap in his teens, who surely has one eye on the blacksmith's trade, for he is always looking for a chance to strike with the sledge, to clean off the hoof of a horse and to cut clinches and make new ones when the driver will let him. That boy brings in all the coal, looks after the sawdust on the shop floor, takes care of the old shoes and fetches new ones as required. He is the general handy man around the place and in fact, enables four smiths to do the work of five by taking over such of their work as he can do.

And there is one thing which suits this boy "from the ground up!" In the yard, back of the shop, is a cute little brick stable,

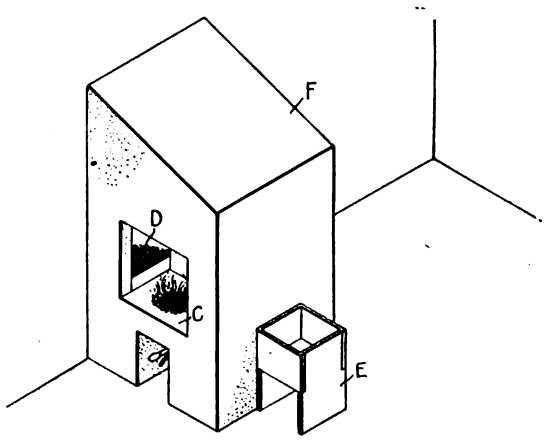


Fig. 2. The Double Forge.

just big enough to contain one small horse, one small boy and one large bale of hay. Here is kept—the boy cares for it—a little saddle horse which is the especial perquisite of the shop "boy." He is expected to fetch to the shop, horses to be shod, and to return them to their owners after they have been attended to.

Goes for and Returns Horses

The owner of the shop, Mr. Jurczye, has contracts with many concerns in the city of St. Louis, such as the Express Company, the Lively Biscuit Company, the Crane Company and other large users of horses, to do all their shoeing. The shop "boy" upon receipt of a telephone call, will jump upon his horse which stands saddled all through working hours, go and fetch the strings of horses to be shod and return them again after the work has been done. And, perhaps this part of the work don't suit the boy? Well, some, mostly!

Horse Shoes by the Carload

Horse shoes for use in this shop, are brought in large lots. Ten thousand shoes comprising a recent order lasted the shop but

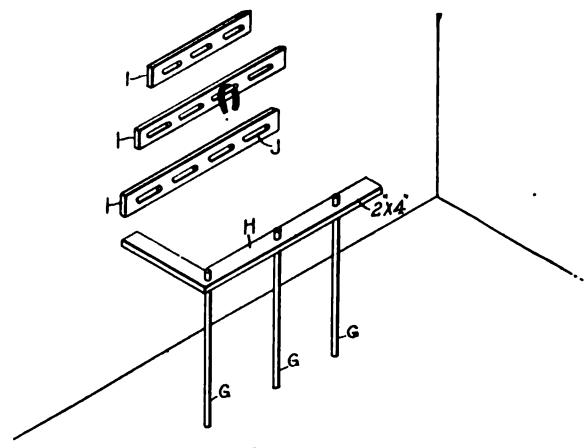


Fig. 3. Horse Shoe Racks.

three or four months and often, a carload of shoes is purchased at one time. There are horse shoes all along the forge side of the shop. Shoes stacked in great piles, in racks, and on pins which have been driven into scantlings along the wall.

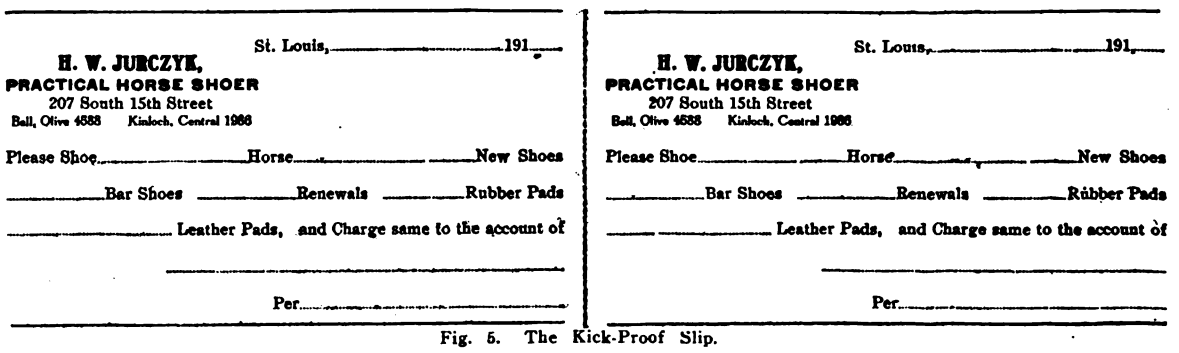
Figure 3, shows how some of the shoes are disposed of. Rods or pieces of gas pipe are driven snugly into holes bored in the floor as shown at G G, Fig. 3, and a piece of 2 x 4 inch scantling is fastened to the tops of the rods as shown at H. These rods are piled full of new shoes, packed carefully and evenly, and it is surprising how many shoes can be stored in one of these racks and what a pleasing appearance is presented by the columns of shoes when a bit of care is taken with their piling.

Above the floor storage racks, scantlings are spiked to the wall over and between the two forges, and pins have been bored and driven into the scantlings to receive sets of fancy shoes. The wall scantlings as shown in Fig. 3 at I I I, have been placed from 8 to 10 inches apart, as they are to receive small or large shoes, and the pins J, have been spaced far enough apart to allow shoes to be put in place and removed from the pins without the bunches of shoes being in the way of each other.

Shoe Racks Near the Forges

More shoe racks—double-barrelled ones—are placed at each anvil, convenient to the smith, so there never is any excuse for a mixed-up pile of shoes on the floor beside of any anvil. This rack is shown by Fig. 4. It is made much the same as the one shown by Fig. 3, only there are two scantlings and two rows of rods or pipes instead of one row. Fig. 4 shows a portion of one of these racks, the scantlings, shown at K K, being made as long as desirable or as there may be room for them. Those in the St. Louis shop are about four feet long.

The old shoes which are removed from horses, are taken care of by the boy, and once a week, these shoes are carefully looked over and those that can be used again, are taken to a forge and piled in one of the racks, to have the attention of a smith at the very


St. Louis, 191

H. W. JURCZYK,
PRACTICAL HORSE SHOER
207 South 15th Street
Bell, Olive 4588 Kinloch, Central 1966

Please Shoe Horse New Shoes
Bar Shoes Renewals Rubber Pads
Leather Pads, and Charge same to the account of

Per

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Fig. 5. The Kick-Proof Slip.

first opportunity. The rest of the shoes, those not fit to be used again, are placed in the yard by the boy, not thrown down helter skelter, but are packed "in and out" as closely as possible, under a shed. Sometime, these shoes will be sold, whenever the price for old iron is favorable. But Mr. Jurczye told the writer, that until the war came on, he had not sold old shoes for several years and had a young mountain of old ones in the shed which brought mighty good war prices!

One Blower for Four Fires

A single, electrically driven blower furnishes plenty of air for the four fires, all drawing the necessary blast from a single trunk-pipe and regulating the air received by a gate at each forge. The air pressure in the trunk pipe being maintained at maximum pressure all the time, even while all four fires are going "full steam ahead."

In the rear of the shop is a portable forge, and this is often pressed into use in cold weather, and when 250 horses are shod some days—and nights—the five fires are surely needed. There are also hand blowers for two of the fires for use in case the work does not make it necessary to run the large blower.

A "Ticket" System

Mr. Jurzye said that for several years, he had frequent disputes with customers in regard to what had been done, and when, to certain of their horses. It had become almost impossible, he said, to get along without more or less constant friction and he was put to his wit's end to find some way for keeping things straight. It did not make so much difference, he said, where customers had only three or four horses, for then it was easy to remember what was done when the horses went to the shop.

But, he said, when several concerns had over 100 horses each, and knew each horse only by the number branded upon its hoof, then "keeping track of this" was a tough proposition. The problem was solved, very satisfactorily for this shop at least, by making use of the slips, or "tickets" shown by Fig. 5.

When a horse came to the shop, a set of these tickets (two exactly alike) were filled

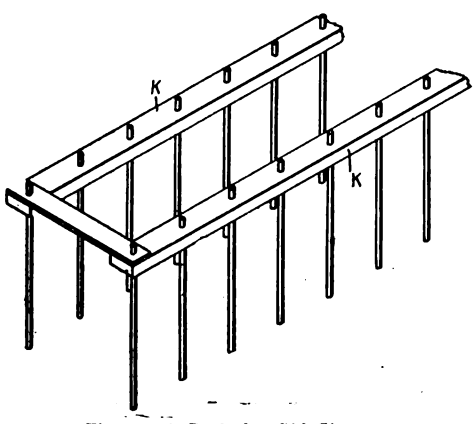


Fig. 4. A Rack for Old Shoes.

out, one given to the man who brought the horse and the other, torn from the first along the perforated line, would be filed by the smith for use when making up his bills at the end of each month. When the boy, on his saddle horse, went after a string of horses, he took a bunch of these "tickets," and before taking the horses back to the shop, he filled out a pair of tickets for each horse, had the half signed which came to the shop with the horse, and then, there was no more trouble in the settlement, about what had been done to any horse at any given time, for a look through the slips, would tell the story.

The slip which came to the shop, showed the smith exactly what he was to do to each horse and also carried the signature of someone in authority to do the work in question. The slip which was given to the horse owner, enabled him to check the bills of the smith, also to check the work which had been done on the horse at the time it was returned from the smithy. All in all, the ticket system, so the writer was advised, proved a great convenience, and by no means would the shop do business without that or some equally good system of keeping track of work done and ordered.

It was suggested that a sort of duplex book be used, so as to avoid writing out two tickets, exactly alike. This method was criticized because, it was stated, that the use of carbon paper was not a very inviting proposition on account of the rather hard usage the tickets were sometimes subjected to, being carried in the pocket, horseback or afoot, and the handling of carbon paper in wind or rain not being very desirable. But the writer is still of the opinion that a duplex book, with the backs of the "original" sheets carbon coated, would prove far more convenient than the double ticket as shown by Fig. 5.

Filing the "Tickets"

For taking care of the "tickets" and their proper protection and segregation, a cabinet was used, into which the half-slips would just slide easily without projecting for wind to drag them from their pigeon holes. The cabinet shown by Fig. 6, contains 13 compartments and the horizontal partitions are all left loose. The tickets or slips are hard to get out as they do not come quite to front edge of the cabinet, but lie a fraction of an inch back of the front. But, by grasping the partition and its pile of slips with the thumb and finger, the slips—and the partition—are drawn out together until the slips can easily be gotten hold of. Then, the partition is pushed back, out of sight and out of the way.

"Ticket" Case

Some pieces of sheet zinc were cut to the same size as the half-tickets and one of the zinc strips was placed on top of the slips from each customer. In that way, it was possible to place several accounts in each pigeon hole of the cabinet, thereby adding greatly to its capacity and making the 13-hole affair take care of 100 or more accounts.

The Rock Drill Blacksmith

Part X—Construction of Various Types of Fuel, Oil and Coke Heating Furnaces

I now propose a design based largely on the improved form of oil furnace developed at the Boston Navy Yard for the purpose of imparting temperatures up to welding heats to big-chain links. In both their original form and the later improvement, two burners were employed, each sending its jet upward. Compressed air was supplied from both ends of the furnace, so that one air jet was directed against the other. These air streams, horizontally disposed, would naturally unite with the upward jets from the burners.

An aperture was left on the roof or cover, and, of course, the general combination of gases and air flowed upward through it. In the earlier form, the link would be let down into this aperture, with its lower end actually inside the fire-box. As already said, the results were not good. "It was found that in spite of careful attendance the link would burn away and be badly scored or otherwise damaged."

The later form provided a kind of chimney surrounding the aperture where the flames issued forth. The link would be let down into this chimney. The new position was perhaps 10 or 12 inches higher than the old. "No further trouble was experienced and heats were readily obtained." We have here the testimony of one of the Naval officers concerned. It tells us not only that the remedy was successful, but that the heating capacity was still good. Doubtless some heat was lost, as the chimney must have absorbed a certain quantity. On the other hand, this loss may very well have been fully offset by the fact that more gas was probably burnt in advance of the flames reaching the work than was the case with the earlier form of furnace. This would mean more heat developed before the work was reached.

I now propose that we utilize the successful experience at the Boston Navy Yard* and put it into shape usable for rock drill bits. The furnace may conveniently be built up from the ground B (see the accompanying figure showing a vertical cross-section viewed from one end of fire-box). Naturally, the floor C and the wall L L, the roof G G, and the upper extension of the fire-box E D, are all of firebrick laid in a refractory cement. The fire-box A, is thus constructed, and also the flue M F, is merely an addition to the height of D.

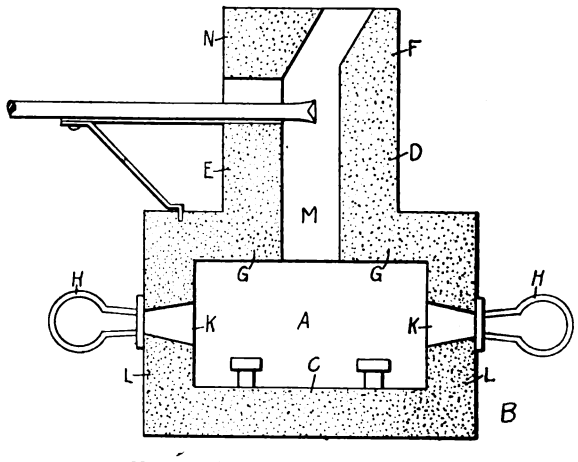
N, is the fire-box arch, arranged over a long narrow opening through which the work is introduced until the parts to be heated are squarely over the flue M. Two oil burners are shown at P P. The connections and service pipe through which the oil is supplied are not shown. H H, are two branches from the air main and K K are their inlets into the fire-chamber. It will be understood that the oil burners are arranged in a double line extending from near end of the fire-box to near the other end.

To each pair of burners standing abreast, there are two opposing streams of air supplied by the branches H H and entering through the inlets K K. As to dimensions, these will naturally be governed largely by the conditions at the mine. The top of the wall E, it will be, perhaps, convenient to get at about 34 inches above the general level B. The width of the fire chamber A, may be taken at, say, 24 inches, and its height at, say, 12. The width of M may be set at 6 or 7 inches.

The length of the furnace and the length of the fire-box and flue will naturally depend on the amount of work. The size of the air pipe H H, will turn in part on the number of openings K K, to be served. The entire furnace may be held to shape by a shell of steel plate. A door should be arranged at one end to facilitate access to the interior of the fire-chamber for the purpose of repairs and the like to the burners. There should be little or no dirt.

Facts as to Fuel Oil

Fuel oil is a product of petroleum obtained after kerosene, gasoline, and other light-weight oils have been removed. It varies greatly in accordance with the districts from which the petroleum is secured. Under ordinary conditions, it is cheap, provided the point of use is not more than a hundred miles or so from the refinery. Perhaps an average price will be from three to five cents a gallon.



Vertical Cross Section of Fire Box.

It has splendid heating qualities, 1 pound of it being equal to about 1¼ pounds of high-grade steam coal.

The burners differ greatly. In some, the oil is forced through little passageways in such manner that when the oil emerges from

* See paper in *Trans. Soc. Naval Architects and Marine Engineers*, vol. xxi (1913), p. 165 and plate 96.

the burner it is already atomized—that is, broken up into minute drops. Burners of this type are scarcely suitable for commercial use, unless adequate arrangements are made to strain the oil before sending it on to the burners. Fuel oil is often rather dirty, containing sand or other foreign matter. Other burners, use a jet of compressed air or of live steam to break up the oil as it comes out through the oil nozzle of the burner.

At some mines, compressed air will be as convenient as steam. At others, steam will be more easily gotten. With a good, commercial burner, made for dirty oil, there should be little or no trouble from clogging, whether air or steam is employed. The steam method may be used without compressed air. That is, the air needed to keep the flames going will not have to be supplied under pressure, but may simply be allowed to enter the fire-chamber.

It will now be understood, perhaps, that the type of burner may affect the arrangments of the furnace. Thus, in the improved type of oil furnace, the diagram shows tubes supplying compressed air. Naturally, when compressed air is not to be used, these tubes will be omitted. However, where simply the natural air in its uncompressed form is to be used, adequate provision must be made for admitting it into the fire-box. Oil furnaces use a good deal of air.

Naturally, oil will be bought in quantity and kept stored in some way. A steel oil tank may be used for the purpose. Let it be located in a pit and at such a level that the upper surface of the oil is well below the tips of the burners. The pit may have a concrete lining. In fact, the oil itself may be kept in a concrete reservoir, if proper steps are taken with the concrete.

A Special Coke Forge

I am indebted to the American Tempering Co., Springfield, Illinois, for particulars of a special design of forge suited to take care of a large number of drill bits at one time. Their plan shows locations for the forging appliances, the slack tub, the tub for tempering, and a pair of the special forges. The latter are disposed so as to be within convenient reach of the point where the forging is done. First, I propose to consider the design of the forges.

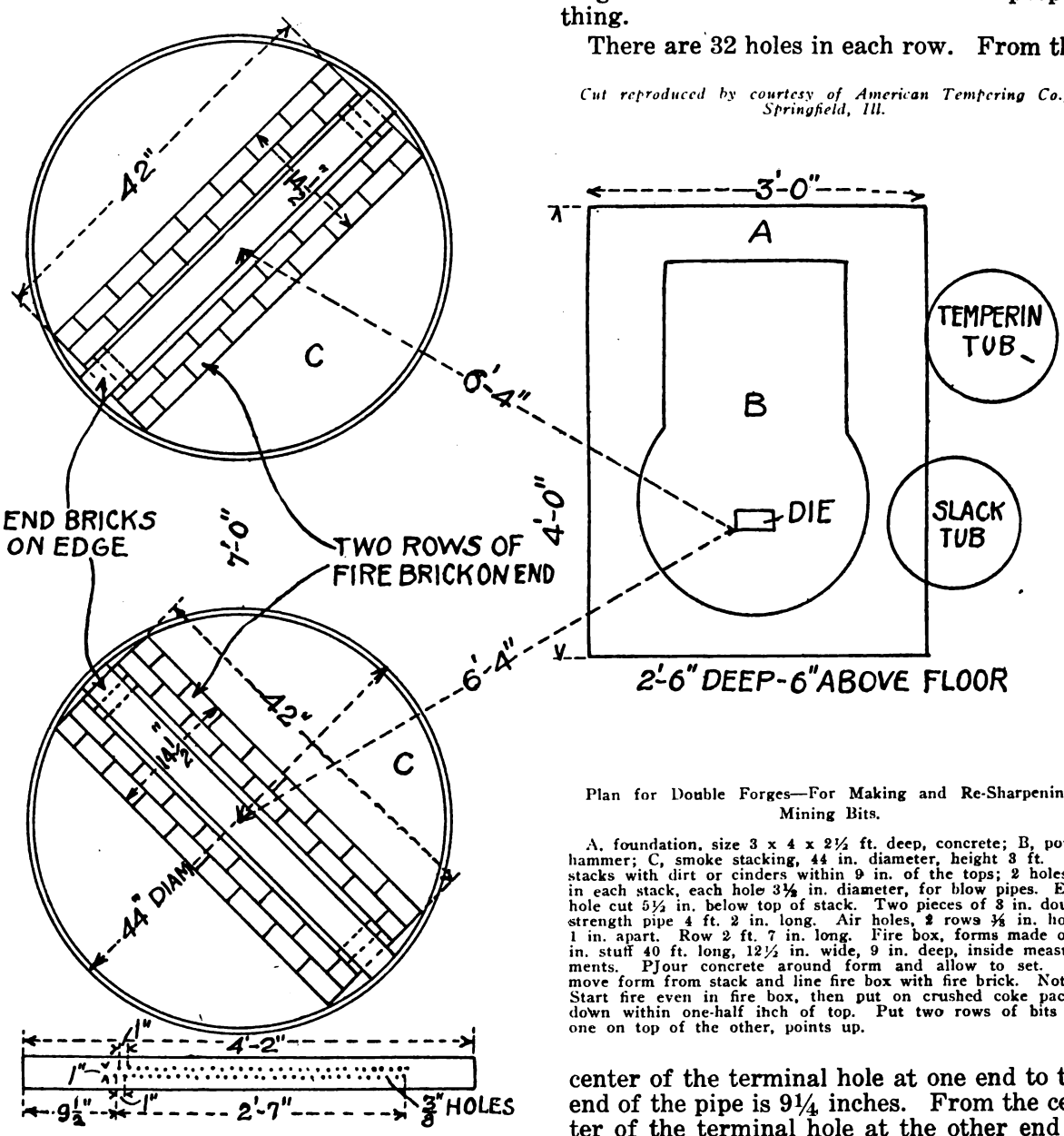
This forge burns crushed coke. It may conveniently be constructed of smoke-stacking, concrete and fire-brick. A ring of stacking, or the equivalent, is set up to form a cylindrical shell 3 feet high and 44 inches in diameter. Two holes are cut in the shell with their centers at the opposite ends of a diameter. These are 3½ inches in diameter and are both set with their centers 7¼ inches below the top of the shell.

A blow-pipe is to be passed through these and furnish the pressure air for the forge. This pipe is 50 inches long, of 3-inch size and double strength thickness of wall. When the pipe is in place, there will be something like 5½ inches clear space between its top and the top level of the shell. There is to be a long, narrow fire-box open at the top, having the blow-pipe stretched along its bottom. The shell is set so as to put this fire-box in correct position, relatively the point where the bits are to be forged. When this has been done, the shell is filled with dirt or cinders to a level 9 inches below the top, or to just about the under surface of the blow-pipe.

Concrete is to be filled into this 9 inches of space, leaving only the proper space for the fire-box. A suitable form is now to be constructed, say, of one 2-inch board for the purpose of excluding the concrete, when it is poured, from the fire-box space. The proper outside dimensions for the form are 42 inches for the length, 14½ inches for the width and 9 inches for the depth. If the end pieces are to be set in between the two side pieces, then there will be required, two boards each 42 x 9 inches, and two end pieces each 12½ x 9 inches. If, however, the side pieces are to be set in between the ends, what will be required are two boards each 40 x 9 inches, and two end pieces each 14½ x 9 inches.

This form may now be set in position, care being exercised to locate it so that the blow-pipe when passed through the holes in the shell will be exactly parallel with the long sides of the form. If it should be a trifle large, the corners may be pared down a little. The position, once determined, is marked with chalk on the inside of the shell, in case the form is to be taken out and wetted preparatory to pouring the concrete. If, however, the form is to be greased, instead of wetted, then it may be left in.

As it is quite important to have the blow-pipe fairly parallel with the form, it may seem best to cut holes in ends of the form and put the blow-pipe through shell and form. The form may be wetted or greased to prevent the concrete from sticking. In either



Cut reproduced by courtesy of American Tempering Co., Springfield, Ill.

Plan for Double Forges—For Making and Re-Sharpening Mining Bits.

A, foundation, size 3 x 4 x 2½ ft. deep, concrete; B, power hammer; C, smoke stacking, 44 in. diameter, height 3 ft. Fill stacks with dirt or cinders within 9 in. of the tops; 2 holes, 1 in each stack, each hole 3⅛ in. diameter, for blow pipes. Each hole cut 5½ in. below top of stack. Two pieces of 3 in. double strength pipe 4 ft. 2 in. long. Air holes, 2 rows ⅜ in. holes, 1 in. apart. Row 2 ft. 7 in. long. Fire box, forms made of 1 in. stuff 40 ft. long, 12½ in. wide, 9 in. deep, inside measurements. PJour concrete around form and allow to set. Remove form from stack and line fire box with fire brick. Note—Start fire even in fire box, then put on crushed coke packed down within one-half inch of top. Put two rows of bits on, one on top of the other, points up.

case, the work should be thoroughly done. Greasing is perhaps the easier thing with which to make a sure success. Crude vaseline, properly thinned with kerosene, will be a suitable grease, but various oils may be used. The form is put in place and the concrete poured to fill in the space between it and the shell on both sides.

The concrete may be made in accordance with the formula; one measure of (Portland) cement, 2½ measures of sand and 5 measures of crushed rock. The cement should be of good quality. The sand, if it is not free from loam, clay and the like, should be washed until it is quite clean. Clean pebbles may be used instead of the crushed rock. Cinders may be substituted, but will hardly make a very good concrete. The third ingredient may, in fact, be left out entirely, and a cement motar made instead of a concrete.

The mortar will, ordinarily, cost something more, as it requires more cement to produce the same bulk at the end. The formula 1 to 2½ or 1 to 3 may be used, if only cement and sand are to be employed. These formulae mean 1 measure of cement and 2½ or 3 measures of sand. As the character of a concrete, or mortar, depends in part upon the mixing, care should be taken to make a very thorough job of it. The concrete or cement mortar is allowed to set.

Fire-bricks are used to line the space left after the form has been removed. That is to say, a double lining is put in place on each side for the full 42 inches of length.

The 50-inch blow-pipe is to be provided with a double row of small holes for the discharge of the air into the fire. These holes may properly be made ⅜-inch in diameter. The holes in each row are placed at intervals of one inch, measuring from the center of one hole to the center of the next. The two rows are placed so that the line of centers of one row is one inch from the line of centers of the other. Further, the arrangement of the two rows of holes is what is called a "staggered" arrangement. That is, the holes in the two rows are not arranged so that we have a column of holes, two abreast. The diagram will make clear what is the proper thing.

There are 32 holes in each row. From the center of the terminal hole at one end to the end of the pipe is 9¼ inches. From the center of the terminal hole at the other end to the end of the pipe is 9¾ inches. The staggered arrangement distributes the pressure better than the two-abreast mode of placing, and in addition does not weaken the pipe wall as much.

As the mode of laying off these holes may not yet be fully clear, let me state it in a somewhat different way. Lay off lengthwise on the pipe two parallel lines one inch apart. Measure 9½ inches from one end of the pipe on one of the lines and mark the place. Then mark the line at intervals of one inch until a total (counting the one 9¼ inches from the end) amounts to 32. The last mark should then be 9¾ inches from the farther end. Now, go back to the other end of the pipe and measure on the other line from the pipe-end a distance of 9¾ inches and mark the place. Then mark this line at intervals of one inch until a total of 32 places has been marked. The final place marked should be 9¼ inches from the farther end.

The blow-pipe when properly perforated is put in place and connected up with the blower or other source of pressure air. The forge will then be ready for business.

(To be continued.)

THE BLACKSMITH & WHEELWRIGHT

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Our Editor's Letter

JUST about this time every month I pull the cover from my typewriter and limber up my fingers to write a personal letter to all of the readers. Usually I am brimming full of ideas and can punch out words by the hundred, but this month there does not seem to be anything left to say. I sit at my desk and gaze soulfully at the Statue of Liberty which I can just see through the fog, but she does not seem to give me any ideas.

When I can see her no longer because of the falling rain I hunt through the papers, but they are full of Peace Terms, Women's Suffrage, Trans-Oceanic Flight and the weather. I don't dare talk about the weather, it is not a safe topic to dwell upon. I feel like cussing every time I think of my little two by four garden where the beans crawled out for a few brief hours and were washed back again by the rain and the tomato plants withstood the downpour for nearly a week before they too melted and returned to the earth. I assume that my readers have the same feelings about the weather.

Neither is it fitting for me to say much about Women's suffrage, for my wife occasionally reads the magazine. I wrote an editorial setting forth my views as to the Peace Terms so that subject is crossed from the list. The Trans-Oceanic flight is only two-thirds over and as the daily papers carry all the news about it, there's nothing left to say.

If I were at a party and had no more to say than I have now, I would keep quiet, but there is half a column to fill and something must be done about it. Reminds me of the ancient Assyrian whom the King requested to tell a story which would last forever. The Assyrian told of the immense granary which an Egyptian had built and into which one ant had gained entrance. The ant gathered just one tiny grain and carried it to his hole, then he came back for another, and so on.

The King suggested that in the course of years the supply of grain might run short and so the story would be ended, but the wily Assyrian said, "No, for at the next harvest the granary was again filled."

Like the Assyrian, I might easily fill the space assigned for this letter, I might tell about the crow which came to visit the corn in my garden and "caw-cawed" for half an hour, or the chickens in the next yard that "cheep-cheep" for hours at a time, despite the weather. But somehow or other a column of "caw-caws" or "cheep-cheeps" is not interesting reading. If one has nothing to say in print, one must say it in an interesting way or not at all.

There is just one thing that I might mention, however, and that is regarding old metal. The smith should not hold on to his old metal at present for it looks as though the prices on junk iron and steel were on the downward path. Doubtless there will be a big call for these metals for building work, but within a short time the market will be sold up and metal return to pre-war prices or nearly so.

At present, too, it is a good plan to buy only enough iron for current work.

I wish that the smiths would send in price lists, for if I could publish even one list in each issue, the readers could be kept informed as to prevailing prices and charge accordingly.

The Money Question

WITHOUT doubt of all the skilled laborers, the Blacksmith is the most poorly paid and yet, strange to say, the smith himself does not realize it. As we go over the price lists which we receive from various parts of the country, we often marvel at the figures. We wonder how any business man can afford to invest his money in his business and then be content with a daily wage.

The average smith is rather inclined to figure only upon the material used and his time without taking into consideration the fact that his machine tools and shop are things that should be paid for, in time, by his customers.

The smith who owns a shop and does his own work must figure upon making a fair day's pay, then to this, he must add the cost of rent, light, fuel, interest on the money invested in his shop, a certain amount to pay for the wear and tear on tools and the cost of stock used.

In making the charge to his customer, it is only fair that he explain his figures if necessary. If his customer is fair minded he will not complain. Too much business is done on the "guess" plan. The smith who estimates on a job and plans to make only enough to cover cost of material and his own time, looses money. In time, even though he seems to make a fair day's pay, he is forced to close up shop and work for some one else.

Every smith in the country, even if his shop is a one-man, one-forge, one-anvil affair with room for not more than one horse at a time, should keep track of his business so that he knows just how much money he makes and whether or not he must advance prices.

The smith who does good work need not fear that he will lose his customers just because he adds a few cents to his price list. If his customers had the choice between poor work at low prices and good work at reasonable prices they surely would choose the latter.

Practical Horseshoeing

IN this issue we print the second installment of a series of articles entitled, "Practical Horseshoeing," and, though doubtless many of our older readers will feel that some of the information is out of place and unnecessary, the information given is the foundation of the theory of horseshoeing.

One might just as well try to train a surgeon by allowing him to operate at a hospital without giving him any previous teaching, as to start a young man into the smith game without a general idea of horses.

In order to build a house a contractor must know something about cement and brick, but he must also know something of the ground upon which the house is to stand. If he builds the house upon sand, his foundation must be deep or the house will settle. So it is with the blacksmith, he must know something about the foot of the horse and why certain things must be done, or his work will not be correctly done.

Anyone can shoe a horse, simply pull off the old shoes and nail on some new ones. This might go rather hard with the horse, but he couldn't tell anyone about it until the extra hoof growth caused lameness. Besides, if the hoof growth had been even, then the shoe might be all right until the next smith did the job in the right way. But the good smith, whether he has studied anatomy or not, knows how to shoe the horse in the right way the first time.

One cannot learn too much about one's trade, so we advise all our subscribers, young or old, to read through each article in the series.

Wait But Work

THERE is an old saying, which is often quoted, that "All things come to him who waits."

Like many popular sayings this one is defective and misleading inasmuch as it seems to imply that one has simply to fold one's hands, sit at ease and time will bring the result desired. "Watchful Waiting" may be desirable under some circumstances, but is usually the resort of the man who has not the courage to make a decision and tries to postpone the settlement.

Nothing could be farther from the truth than the saying referred to. It could be amended profitably as follows: "All things come to him who waits and works," for working will have far more to do with the result than the "waiting" part of the programme.

The Cry of the Spoiled Child

BUT a short time ago we were figuratively patting ourselves on the back and telling each other that we had "done the job right," that we "had Germany upon her knees" and that "Peace is forever assured." As we read over the reports from that country we began to realize the colossal egotism that pervades Germany. Instead of taking her medicine in good grace, she must howl like an angry and spoiled child.

She refutes the responsibility for the war and blames Russia, England, France, Italy and practically every other nation, even Belgium seems to be at fault for trying to prevent Imperial Germany's hordes from trampling upon her soil and laying waste her towns.

To quote the words of her statesmen, "Germany did not want war, it was her only desire to have peace and it was only her desire for peace that drove her to her own defense."

"And besides," the German government now says, "the Americans claim that they fought imperialism, not the German people. That being so, it is not right that the German people pay the indemnity."

Our terms to Germany are harsh but just. She can never repay the loss which she has caused, but evidently she is unwilling to pay even a small part of the property damage losses and feels that the Allies are the ones to pay the indemnity.

At present, Germany's cry is not that of the conquered but the wail of a spoiled child who knows himself to be in the wrong but expects someone else to pay for the damage.

The taxes in Germany are not much greater than they are in our own country, simply because Germany is not the bankrupt nation that she claims to be. If Germany were to be given her own way and we were to accept the peace terms which she has so obligingly outlined, she would be ready for war again within five years and we would have the whole job to do over again.

The only hope for the world is to keep Germany where she belongs, to make her realize that she lost money by the war.

THERE'S NO EXCUSE FOR A SHABBY BUGGY

Manufacturers of paint and leather substitutes can supply anything needed to keep a carriage in good condition and looking bright and neat.

Paint will greatly lengthen the life of any vehicle; in fact, looking at it from that standpoint, the paint really costs nothing.

It may be safely left to the paint dealer to sell one the right kind of goods. For the wheels and body, use a special carriage varnish; for the top, a top renewer designed for that particular purpose.

If the top is worn out, some good leather substitute which is sold by the yard by stores handling dry goods, also by auto and carriage top makers, will be found a very satisfactory material for a new one. It is best to have an experienced top maker make the new top.

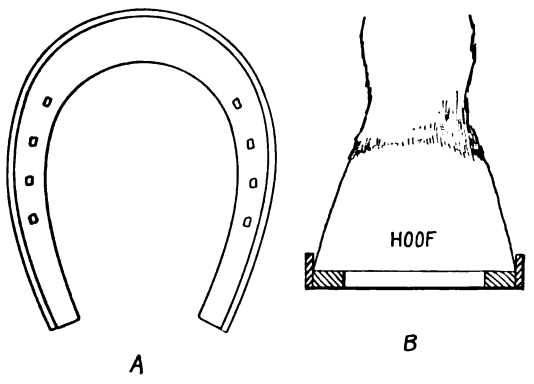
If the top is kept dressed with the top renewer, it is likely to last as long as the body and wheels.

The same is true of the seat and back upholstery. A seat dressing will help greatly to prevent or retard the deterioration of the upholstery.

Shoeing Foundered Horses

From L. L. Ott, California.—I am just back from the service and in looking over the old numbers of THE BLACKSMITH AND WHEELWRIGHT notice that Mr. Albert Baker, of Wisconsin, wants to know how a foundered horse can be shod. The horse can probably never be cured because the trouble is due to long service.

The shoes that my father makes have a



piece welded on all around them. The idea is to keep the foot intact, that is so that it cannot spread and break, for the foot is very brittle. The sketch at *A* and *B* clearly shows how the outside edge of the shoe is fitted with a piece of iron to prevent the foot from spreading.

Repairing Old Wagons

From Roberts & Roberts, Iowa.—In our locality we find many farm wagons which have been dumped into some corner and forgotten and have managed to persuade the farmers to let us repair them.

Most of the wagons are regular 3′ 8″ or 4′ 6″ standard size and fitted with narrow tires. The wheels are usually dished so badly that they are useless and a tire cannot be kept on them.

Generally the wheels can be cut down to 3′ or to 3′ 8″, taking out most of the dish, then putting on a 3 by 2¼ inch bent rim and a 3 by 9/16 inch tire. The whole thing is then given about four coats of paint and we find that jobs done in this way have given ten years of service and are still in service.

It once seemed good economy to throw away the wagon gear, just because the wheels were dished, but is no longer economical. We are turning out from twelve to fifteen jobs per year of this kind and they work in with our regular work very well. By doing this work, we keep busy and save jobs that otherwise would be lost. We save material that otherwise would go to the scrap heap.

We get $42 for the job mentioned or for $57 we can furnish the four wheels new. We hope that this information will be of value to some one of the other readers and that the other smiths will make an effort to persuade farmers to have their farm wagons repaired.

For Mr. Weber of Minnesota

From W. B. Fagg, Nebraska.—I notice in the May issue of the B. & W. that Mr. J. M. Weber of Minnesota wants to know about spring welding. This work is easy if a smith goes at it in the right way and uses the right welding compound and a good clean close fire.

If you want a spring to last, it should never be split welded but flat welded. The end should be scarfed thin at the edge and at first heated to a cherry red, not above that color. Use E. Z. Welding compound and as soon as the flux flows and is thoroughly melted, place the two ends together, place some Crescent Compound on the joint and pound the metal out flat.

I have welded hundreds of springs in the last thirty years and it used to be a difficult job for me to get the welds smooth.

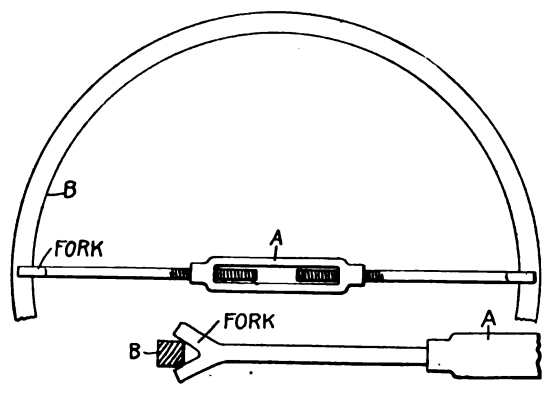
I am now getting along in years and soon I will have to let others take my place but I will never get too old to read the B. & W., if I can get it. I want to do more writing for the magazine but of late have been pretty busy since the war took all my boys.

I see so many questions asked by the other smiths, questions that I can easily answer, that I want to write and help them. My prices are good and most of my work is done for cash. If I had to do work for some of the prices which I see published in the B. & W. I would have to shut up shop.

It is time that the smiths woke up and put their prices up where they belong. This can be done now, there never will be a better time. We should all stick together.

Opening Stubborn Rims

From G. D. Gillis, New Hampshire.—If Mr. R. A. Roberts, of Florida, will take a three-quarter inch turn buckle, as shown at *A*, and weld on enough three-quarter inch rod to make the required length and adjust



An Easily Constructed Rim Opener.

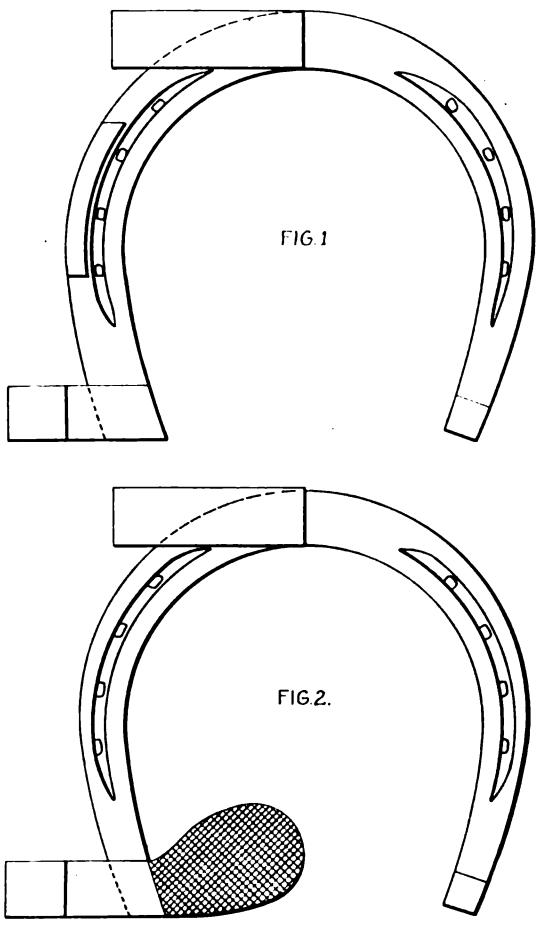
the device by putting in a block of wood for larger rims, then split the ends *B* and point them to keep them from turning, I think he will be able to open stubborn rims very satisfactorily.

Straightening a Horse's Foot

From G. W. Kenyon, New York.—I notice that Mr. Charles Chism, of Ohio, wants to know how a hoof can be straightened when the horse wears his shoe on the outside, and as yet I have not seen any suggestions. I suppose most blacksmiths might consider this a simple question easily answered, but it is not as easy as it looks. There are plenty of blacksmiths who do not know the correct method for shoeing.

Every day I see horses whose shoes are worn badly on the otuside and not worn at all on the inside. Sometimes this trouble is due to a faulty gait and sometimes to improper shoeing, though I never have any trouble from the latter cause. If the gait is faulty, a crooked shoe is necessary, a straight one should not be used.

My best suggestion to Mr. Chism is that he send the horse to me, but since this would be impractical, I will try to tell him how the work can be done. In the first place, the foot should be dressed level. Then a shoe should be made, as shown in Fig. 1, if the case is very stubborn, or in some cases a shoe like that in Fig. 2, will work very nicely. I make such shoes from new steel tire iron one by one-quarter or one by five-sixteenths. In some cases one and one-eighth by five-sixteenths and sometimes one and one-quarter by five-sixteenths.



Shoes for Straightening a Foot.

The size of the shoe in most cases will determine the size of the stock to use. You will notice that shoe No. 2 just fits the foot, while that one shown in sketch No. 1 extends from one-quarter to one-half of an inch to the side. Both designs show the shoe for the right foot.

A smith who cannot shoe a horse that is not deformed or does not have a faulty gait, and do the work so that the horse will not wear the shoes unevenly had better quit the trade and find another job.

Conducting Business

From George W. Hardy, Idaho.—It has been sometime since I have written anything for your magazine and this letter may not be of much interest, but I will try and give a few hints on building and conducting a smith shop.

I think that we should change our policies a little bit and have our blacksmith shops well lighted and have plenty of room, if we can afford it. The shop should be kept warm, but well ventilated. A cold shop with open cracks and broken windows is hardly fit when used as a barn, much less as a workshop.

My shop is made of stucco, the walls are three inches thick, upon the outside of that a thickness of wall paper, and over that a

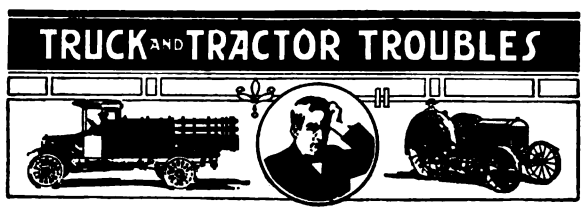
facing which is painted so that I am not bothered with wind or cold.

I think that a shop should be kept clean and attractive, both inside and out. I keep my old shoes and small scraps of iron from the anvil piled in a neat, round pile in the street at the front of my shop. This makes a nice advertisement for me and a convenient place for old shoes. Tools should all have a place and they should all be kept in it as well as be kept in good condition, for a man can do better work with good tools and faster work if he knows where they are.

A smith should be urged to read not only the blacksmith papers, but other publications so as to keep posted on up-to-date methods. He should try to be honest with his customers and do his work as best he can and make a point of never putting out a job unless it is well done. He should try to do the work as it comes into his shop and not show any favoritism. If the smith will only adhere to these rules, there is little doubt of his success.

I ran a shop over 20 years in old Mexico and moved from there in 1912. I spent some time in Arizona and then came to this town where I have been for about four and a half years. When I came here I had a large family and could not get any help. I ran into debt for tools and material for my building, but now I am out of debt and have managed to build a comfortable house.

In my shop I have two forges, a power drill, a disc grinder, emery wheel and am now installing a trip hammer. All this machinery is run by an electric motor. I expect to put in an oxy-acetylene welding plant next month.



A Trailer Car

From L. L. Ott, California.—I am greatly interested in trailer cars and have done a lot of experimenting along that line. I notice that those that were pictured in your November number were all right, but in some ways they are not.

My experience tells me that the front spring is not correctly put on. I use a trailer on a Ford car and in making the spring I use one and one-quarter inch or one and three-eighths inch steel axle stock which I took from an old spring wagon. I had the spindle ends turned down to fit the Ford front wheels and cones, then cut it and welded it so as to give a 56-inch tread.

I would suggest that the sills be made of ash, oak or hickory. I made mine out of pine, but found that it was not satisfactory. Fig. 1 shows a side view of the trailer. The side and end gate boards are removable so as to give a floor rack for lumber. The springs that I have are not heavy enough to carry 800 lbs., but will carry 600 easily.

Sketch No. 2 shows the spring and my method of hanging both upon the sill and the axle. I left a six-inch clearance at *A*,

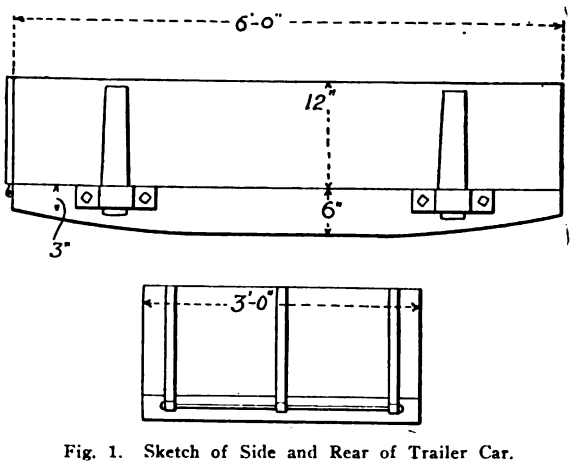


Fig. 1. Sketch of Side and Rear of Trailer Car.

but if the load is heavy an eight-inch clearance is probably better. At the rear end of the spring the fitting upon the sill has a slot in it, as shown at *B*, so that the bolt which holds the spring to the sill can slide back and forth. The tongue or towing bar was a problem and I gained considerable experience from my trailer. First, I put the towing spring on the front of the trailer axle, but it would not work satisfactorily so I changed it and put the towing bar on the middle sill

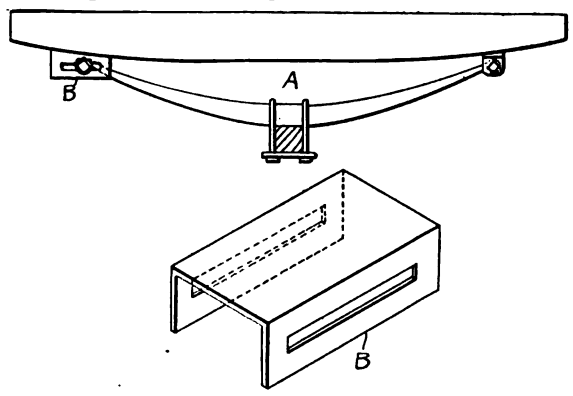


Fig. 2. How the Springs Are Hung.

of the trailer, one bolt in the end at the center of the trailer with two clips to hold it in place.

Before I explain how the towing iron was made I will give my reason for fastening it to the trailer body instead of the axle. As the trailer moves along the wheels jump up and down in order to take care of ruts and bumps in the road, but the body of the car runs more smoothly. I found that if the trailer were towed from the axle the bar would have too much up and down motion.

In Fig. 3 I show the hitch or tongue which I used. The tongue itself is made of round iron rod which will slip inside of the pipe *A*. A recoil spring *D* is put upon each side of a pin in this bar and the pipe slipped over it. Upon the end of the pipe is screwed a cap *B* and the towing arm *C* fitted to it.

This towing arm fork fastens upon the fitting, shown at *E* and this fitting which is made of five-eighth by two and a half inch iron with a seven-eighth inch hole through it, is fastened so that it will fit right over the Ford spring clips. The trailer hitch, shown at *F*, goes on the other end of the pull bar and fastens to two eyes on the trailer body. This permits up and down movement

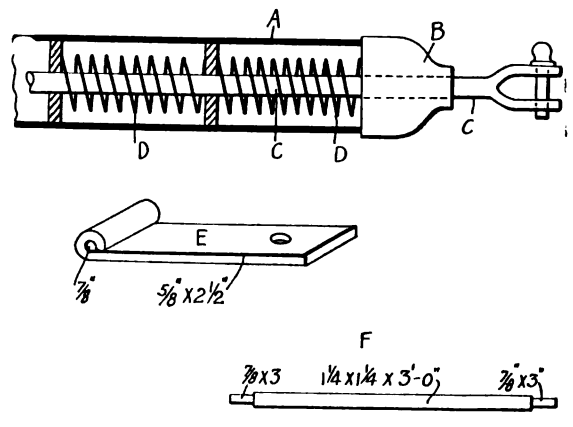
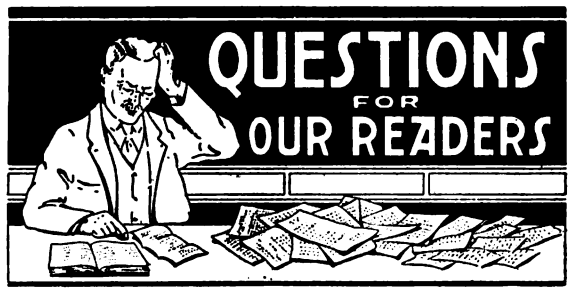


Fig. 3. The Towing Bar.

of the trailer. The hole in this is large so that there is plenty of play and the car or trailer can be turned.



A Saw Table?

From Chas. Jenkins, Canada.—Will some brother be good enough to tell me through the columns of the Blacksmith and Wheelwright how to build or make a small saw table or stand for a circular rip saw with tilting table and give full measurements and also how fast the saw should run. How many R. P. M., say, on a ten or twelve inch saw for use in a small country shop.

A Kerosene Torch

From C. C. Richter, Iowa.—Will someone kindly send me directions and drawings from which I can construct a kerosene preheating torch in which I can use kerosene under air presusre? (This question was asked in our March number, but as yet we have received no answers, surely someone of our readers have constructed such a device.—EDITOR.

Adjusting a Peerless Tire Bender

From Jonathan Vickers, New Mexico.—We have in our shop a Peerless tire bender which we bought in 1906. This machine has a rule on the side marked 1.2.3.4.5 and can be adjusted by moving the rule.

Can any of the readers of the BLACKSMITH & WHEELWRIGHT tell me how to adjust this machine so as to bend a circle of four feet or of three feet six inches, or in fact any particular size that I desire?

Tire Bench

From John O. Lane, Arkansas.—Will some one of my brothers tell me how to build a bench from angle iron? I want to use this bench for putting on tires.

CARRIAGE BUILDERS' NATIONAL ASSOCIATION

We have received notice from Mr. Henry C. McLear, Secretary of the Carriage Builders' National Association that the annual convention and exhibition will take place in the Hotel LaSalle, Chicago, Ill., during the week commencing September 23, 1919.

Both the convention and the exhibition will be held under the same roof and the committee have arranged with the Hotel LaSalle for railings, chairs, tables, rockers, settees, as well as for the other furniture needed to fit up the exhibitors' spaces.

The exhibitors must be either active or associate members and the exhibits must be confined to models of vehicles or automobiles and to the materials used in the construction of the same, as well as coachmen's outfits, harness and horse furnishings. No finished vehicles will be exhibited.

Exhibits may be placed in position either on September 19th or 20th, and after being placed upon exhibition cannot be removed until after 5 o'clock on Friday, September 26th. As usual, the exhibition will close on certain days so that attendants and visitors may attend the business meetings. All applications for space as well as membership may be addressed to Mr. Henry C. McLear, Secretary, Mt. Vernon, N. Y.

Only Horses

These fine lines from Captain Galtrey's book on "The Horse and the War" every lover of the horse will keenly appreciate:

Every head across the bar,
Every blaze and snip and star,
Every nervous, twitching ear,
Every soft eye filled with fear,
Seeks a friend and seems to say,
"Whither now and where away?"
Seeks a friend and seems to ask,
"Where the goal and what the task?"

. . . . . .

Wave the green flag! let them go—
Only horses, Yes, I know;
But my heart goes down the line
With them, and their grief is mine—

. . . . . .

There goes timid, child-like trust
To the burden and the dust!
High-born courage, princely grace,
To the peril it must face!
There goes stoutness, strength and speed,
To be spent where none shall heed;
And great hearts to face their fate
In the clash of human hate.

. . . . . .

Wave the flag and let them go!—
Hats off to that wistful row
Of lean heads of brown and bay,
Black and chestnut, roan and gray!
Here's good luck in lands afar—
Snow-white streak and blaze and star!
May you find in those far lands,
Kindly hearts and horsemen's hands.

(Quoted from *Our Dumb Animals.*)

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

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

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, 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. Trademarks registered.

For Sale

FOR SALE
Blacksmith, implement, hardware and garage business. Oil and gas station. All corner property. Ill health reason for selling. Write for particulars, W. J. OTT, Woodlake, Calif.

FOR QUICK SALE
I offer at great sacrifice one scientific hydraulic cold tire setter No. 2; one L. S. P. calking machine; $125 buys them both. Address L. L. WARREN, Pendleton, Texas.

FOR SALE
1 No. 408 Champion steel horseshoer's forge, $25; 1 heavy floor emery stand, $10; 1 No. 1 Eureka, new style tire bender, $10; 1 iron split pulley, 28 in. diameter, 5 in. face, for 1 11/16 shafting, $5; 1 new steel shafting, 1 11/16 x 12 ft. long, $5; 1 steel shafting, 1 7/16 x 16 ft. long, $4; 9 adjustable 12 in. iron drop hangers for 1 7/16 in. shafting, $2 each; 1 "one cow" Viking cream separator, good as new, $20. Address Andrew Bjerk, Box 105, Colgate, N. D.

FOR SALE
A fully equipped blacksmith and horseshoeing shop. The only shop in this village. Plenty of work for two men. A rich farming community. Reason for selling, I have bought a farm and wish to move on to same. For particulars, write, E. K. Johnson, Box 64, Grasston, Minn.

FOR SALE
Arco Wand Vacuum Cleaner runs by motor or gas engine. I have both. A big money maker for a live young man acquainted with this business. Will sell with motor or engine or both. Have no one to run it now. Mrs. M. A. Tuttle, Lake Charles, La.

FOR SALE
One 16 in. lathe with 8 in. bed, with all equipments and chuck, price $200. One 18 in. lathe, 10 in. bed, with all equipments. Price $225. Both lathes in good shape and suitable for auto shops or small machine shops. Cullander Machinery Co., Belzoni, Miss.

FOR SALE
Blacksmith Shop, fully equipped, in a first-class farming country, a bargain if taken at once. No opposition. Apply to W. D. Lewis, Box 64, LaMoille, Ill.

FOR SALE
One shop, tools and stock doing $5,000 business; also 1 house and lot. E. J. Bee, Auburn, W. Va.

Wanted

WANTED
Good all around blacksmith at once. Young married man preferred. M. W. ABTS, Morrill, Nebr.

WANTED
Good all around Blacksmith, 16 years' experience, handy with acetylene welding torch, would consider good position in shop where automobile work is done. Please give particulars and wages you are paying in first letter. J. Grusch, Winchester, Wis.

WANTED
Experienced horseshoer as floor man. Must also be able to do job work when not shoeing. Must be a sober, reliable, steady man. To such a good job will be given the year round. Address J. F. Coleman, Rice Lake, Wis.

WANTED TO BUY
Second hand new way two cylinder air cooled gasoline engine, 8½ horsepower. Address I. H. Farmer, Box 23, Taintor, Ia.

Miscellaneous

PRINTING FOR BLACKSMITHS
Increase your business by handing out our printed business cards with "The Blacksmith's Ten Commandments" printed on back; 50 for $1.00. NEWS PRINTING CO., Stockton, Ill.

Tires

DOUBLE TREAD TIRES
We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$11.00
30x3½	"	6.50	35x4	"	10.00
32x3½	"	7.25	36x4	"	10.25
31x4	"	7.50	36x4½	"	11.00
32x4	"	8.00	36x5	"	12.00
33x4	"	9.50	37x4½	"	12.25
34x4	"	10.00	37x5	"	13.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE
282 Halsey St. Newark, N. J.

TIRES

GUARANTEED 4000 MILES

Buy *New Firsts* and save 40 to 50% on the *New Prices*

"Tires that repay in satisfaction"

	Plain	Non-Skid	Tubes		Plain	Non-Skid	Tubes
30x3	10.00	10.75	1.50	34x4	21.00	22.50	2.75
30x3½	12.50	13.50	1.75	34x4½	28.00	29.50	3.50
32x3½	14.00	15.00	2.00	35x4½	29.00	31.50	3.50
31x4	19.00	20.00	2.25	36x4½	30.00	32.50	3.50
32x4	19.75	21.00	2.50	35x5	33.50	36.00	4.00
33x4	20.50	22.00	2.50	37x5	35.50	38.00	4.00

DOUBLE TREAD TIRES

	Plain	Non-Skid		Plain	Non-Skid
28x3	4.50	5.00	34x4	9.00	10.00
30x3	5.50	6.00	36x4	9.00	10.00
30x3½	6.60	7.35	34x4½	10.00	11.00
32x3½	7.00	7.70	35x4½	10.00	11.00
31x4	7.70	8.25	36x4½	10.00	11.00
32x4	7.70	8.25	35x5	11.00	12.00
33x4	9.00	10.00	37x5	11.00	12.00

TERMS: I will send tires C. O. D. privilege of examination. 2% cash discount when remittance in full accompanies order.

NOTE: Special proposition to dealers.

I have built a reputation for service and dependability for over 10 years. In selling you, it is my desire to maintain and uphold this reputation.

I. JAFFESS

1319 B Fifth Avenue
Cor. 111th Street

241 B West 54th Street
Near Broadway

NEW YORK CITY

Tires

Tires

Big Drop in Tire Prices

We reduced our prices on

DOUBLE TREAD TIRES

from 10 to 25%.

30 x 3½	Non-Skid	- - -	$ 6.50
34 x 4	"	- - -	9.75
37 x 5	"	- - -	13.00

Write for full particulars

B. LIBEN & COMPANY
DEALERS AND JOBBERS
In All Makes of Tires and Tubes

261 WEST 54th STREET NEW YORK
TELEPHONE CIRCLE 2460

TIRES--- DOUBLE TREAD

Guaranteed for good service. Big—Strong—Extra Heavy. 30x3 Tire $5.50; 30x3½ $7.00; 33x4 $10.00; 34x4 $10.25; 36x4½ $13.00; 37x5 $14.00. Big saving on other sizes and Tubes also. Trade in your old Tires. 10% deposit required on C. O. D. orders. Send for list now! State size and bead of tire. Orders filled same day received.
M. LIBEN & CO., 205-RK, W. 48th St., N. Y. City

Phoenix Horse Shoes and Bull Dog Calks

Phœnix Horse Shoes and Bull Dog Toe Calks are known wherever horses are shod. Both these products are of standard quality and are made by the largest manufacturers of horse and mule shoes in the world. This company does business on a very large scale, having extensive rolling mills and factories at Joliet, Ill., and Poughkeepsie, N. Y., but the main office of the company, to which all correspondence should be addressed, is at Chicago, Ill. Readers are invited to send for samples of these shoes and calks.

Sandbo Starter

The blacksmith is the logical man to sell automobile equipment to the farmer, and he should become familiar with automobile accessories. He should be able to make quite a little money by installing starting devices on old cars, or cars not equipped with starters. The farmer who intends to keep up-to-date should investigate the Sandbo Starter designed especially for Ford cars and manufactured by the Bear Manufacturing Co., Rock Island, Ill.

This device can be installed upon practically any Ford car and requires but little work in installing it. It is said to be positive operating since it turns the engine over past two compression points. Our readers who are interested in this device should write the Bear Manufacturing Co. at the address given above.

Why Not Do Tire Repairing?

Many blacksmiths are installing tire repair equipment as a means for securing extra income, and there are hundreds of blacksmiths who should investigate this proposition, because, if properly managed, tire repairing can be made a very profitable business. The Akron Rubber Mold & Machine Co., Sweitzer Avenue, Akron, Ohio, manufacture a thoroughly reliable line of vulcanizing machinery. Readers who are interested should write today for free booklet which is published by this company and entitled, "Tire Repairing, the Business of the Times." In writing, readers are requested to use the coupon attached to the advertisement of this company, or else mention THE BLACKSMITH AND WHEELWRIGHT.

Are Your Horses Ready?

Each year before commencing the Spring season of hard work, it pays to look over your horses to be sure that they are in the best possible condition to do their best work. Heal up that sore or remove the blemish that decreases their value. Strengthen the strained tendon or ligament by the mild stimulating action of some good liniment, yet be carefull in the selection of that liniment, choosing one that will not lay up the horse during treatment, that will not remove the hair or leave a scar, yet a liniment that acts quickly and surely. Abrosbine is all this and in addition is economical as it is highly concentrated, requiring only a few drops at each application. Absorbine has been successfully used for over a quarter of a century. Absorbine may be procured of your druggist or will be delivered prepaid to your address upon receipt of price. Interesting booklet on treatment of horses sent free to our readers who write W. F. Young, P. D. F., 55 Temple St., Springfield, Mass.

H-B Tempering Process

We call the attention of our readers to the advertisement of the H-B Tempering Process Co., of Clearbrook, Minnesota, and would suggest that readers who do any steel tempering write this company for particulars relative to their new process of tempering.

Welding Compound

Smiths who do oxy-acetylene welding should send for samples of the new welding compound which is manufactured by the Weldum Products Co., of Indianapolis Ind. We understand that this product is giving great satisfaction and that all who use it are entirely pleased with the results.

Justrite Plow Blade Sharpener

This is the busy season for the smith who works in a farming country, for there is much business to be had in the plow repair line. The old hand methods of doing work are gradually going out of date for the simple reason that with machines many times as much work can be done in the same time and more money made.

The Strite Governor Pulley Company, 307-309 South Third St., Minneapolis, Minn., are marketing an interesting tool at a very low cost. This machine, which is belt operated is designed for sharpening plow lays or blades and is said to do the work in an efficient manner. The machine is not, however, limited in its work for it will take care of practically any knife sharpening operation where a fine drawn edge is required.

In operation, the share, shovel or blade to be sharpened is moved back and forth upon the anvil. At the same time a roller, operated by the machine itself automatically wipes or rolls out the point with a forward and back motion. The machine requires approximately two horsepower and is made of heavy materials so that it should last a lifetime.

Buffalo Forge Catalogue

We are in receipt of Section No. 400, a 33-page catalogue of fans blowers and exhausters. As our readers are no doubt aware, the line of fans manufactured by the Buffalo Forge Company of Buffalo, N. Y., is extremely large and comprises fans for practically every purpose. The fans, blowers and exhausters made by this concern are the result of practical knowledge which has been

gained by years of experience in this particular line.

Blacksmiths who are in need of fans either for the forge or for shop ventilating purposes, of any size should familiarize themselves with the Buffalo Forge Company's line. Send for Section No. 400 (catalogue), it is sent free to interested readers.

New Maxotire Factory

The K & W Rubber Company, of Delaware, Ohio, recently purchased more than ten acres of ground along the Big Four Railroad in Delaware and have erected a new and modern factory which is to be devoted to the manufacture of their product Maxotires. This building is said to be the largest in the world devoted exclusively to the manufacture of tire reinforcements.

The company have already moved into their new factory and say that within a short time will be running their own rubber stock.

Ambrine.

The Ambrine Laboratories, Inc., 347 Madison Ave., New York, N. Y., are putting on the market an emergency case for automobilists in addition to their regular emergency case, which was primarily designed for hospitals and industrial plants.

Ambrine is considered by prominent surgeons and doctors to be one of the best remedies for all kinds of burns or scalds. It is claimed by the manufacturers and borne out by photographs taken of various cases that when Ambrine is used upon serious burns, the cure is practically complete.

Immediately upon the application of Ambrine to burns or scalds the pain is alleviated. Ambrine then forms a shell over the injury which protects the tissues against outside contamination. This shell forms a heat retainer which maintains the temperature of the injured spots so that the injury heals rapidly.

Upon applicaion Ambrine is adhesive but after a short period it becomes non-adhesive. Thus it can be removed practically without pain and without tearing the tissues. Since it can be easily removed the skin heals without apparent scars or without contraction.

Farm Lighting Plant.

At the present time there is a big call for farm lighting plants. The average farmer has gotten over his feeling of dread at the gasoline engine simply because he has accustomed himself to this machine in his automobile. The day of oil lamps has passed and every rural community offers a large field for farm lighting plants.

The Mayhew Co., Meinecice Ave., Milwaukee, Wis., manufactures a complete line of lighting plants. These plants may be had in a great many sizes and styles from 3 to 15 kilowatts. Their type K farm lighting plant (which is illustrated in the advertisement now running in this magazine) is complete and consists of a gasoline engine, a generator, and a set of storage batteries, together with indicating devices and controlling apparatus.

Every reader in a rural community should familiarize himself with this particular line and write for a catalogue, and, if possible, obtain an agency for such an outfit.

This company also manufacturs generators for use in garages where storage battery work is being done. In such event the generators may be had to operate directly from the line shafting.

Insyde Tyres.

Ninety per cent. of the tire troubles today are caused by blow-outs and blow-outs are due to rupturing of the tire fabric. A puncture or any broken place in the tread sooner or later develops into a blow-out unless it is attended to.

To obviate all chances for blow-outs, or in fact punctures and the trouble caused thereby, the Automobile Accessories Co., B. & O. R. R. & Blue Rock St., Cincinnati, Ohio, manufactures an accessory called an "insyde tyre," which not only removes the air pressure load from the tire, but tends to deflect any nails, tacks or sharp pins from cutting the tube.

Insyde Tyres are made of especially tough fabric, which is vulcanized with rubber over tire molds. They are shaped to fit the casing into which they are to be inserted. Thus there is no danger that the tube will be pinched by wrinkles. The part of the insyde tyre which comes in contact with the tube is coated with rubber and so treated that it will not stick to the tube.

The manufacurers claim that when insyde tyres are used the life of the casing will be prolonged from one thousand to five thousand miles. The manufacturers claim that insyde tyres never wrinkle, creep, pinch or stick to the inner tube. They are made in sizes from three inches to five inches tire diameter for practically all shoes on the market.

In order to show what can be done with Insyde Tyres, sometime ago a casing that had been blown out nine times was fitted with an Insyde Tyre and the tire driven over 800 miles with no signs of trouble.

The Bickley Power Pulley.

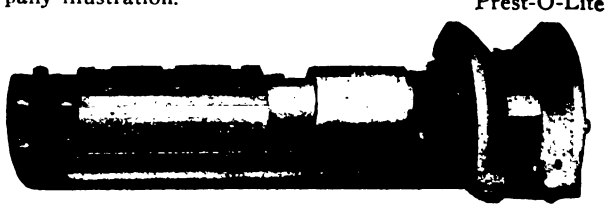
The Bickley Power Pulley is a small compact device 6½ inches in diameter, weighing twelve pounds, which enables one man to move extremely heavy loads. It is built like an automobile transmission, being entirely enclosed, gear driven, roller bearings and running in grease. It is provided with twenty-three feet of cable, all of which is wound on the pulley.

Outfits are provided to fit the needs of the automobilist farmer, contractor, electrician and factory. The cable is instantly ready for use on account of the over-hung construction. A carrying handle retains the cable on the pulley when not in use.

The ratchet handle makes it possible to operate the device in very restricted quarters. It will hoist to within one inch of the point of support. Automatic irreversible pulling ratio up to 150 to one. Fully guaranteed. Operates in any direction. One turn of the handle hoists about one-half inch. The device is made by the Bickley Mfg. Co., 1035 Chestnut st., Philadelphia, Pa.

Wagon Maker's Outfit.

W. L. Sherwood, of Kirksville, Mo., is putting on the market a valuable tool for the wood worker known as "The Wagon Maker's Outfit," which consists of a nine-inch jointer head as shown by the accompany illustration.



The Wagon Maker's Outfit.

The company manufacturers a large line of wood working tools at prices well within the reach of small shops. Smiths who intend enlarging their plants should write for the 1919 catalog, No. 15.

Prest-O-Lite Acetylene.

Every repairman who has ever handled an oxy-acetylene torch realizes that unless the gases used are pure he cannot do decent work. If any moisture is present or if the acetone is driven off from the containers the necessary amount of heat at the torch is not obtainable. In some cases if the acetone reaches the work the metal is badly damaged.

The Prest-O-Lite Co., Inc., 30 E. 42nd St., New York City, are among the leaders in the gas manufacturing line and make a specialty of their "dissolved acetylene," as they term it. Under the Prest-O-Lite service plan, the user simply returns the tanks for filling and receives in exchange a filled set. So great is the distribution of the Prest-O-Lite cylinders that the operator need not wait for his supply, neither must he carry a large number of tanks on hand.

Prest-O-Lite gas is said to be in the purest form obtainable. It is said to give the best results when used with any type of blowpipe or welding torch. Our readers should familiarize themselves with 'Prest-O-Lite acetylene and the service that goes with it.

Ambu Moves.

AMBU devices and equipment for battery shops and garages have made good so well—have so filled a long existing demand—are so popular that they quickly outgrew their old quarters in the Gunther Building.

On May first the American Bureau of Engineering, the makers of the famous AMBU Electric Trouble Shooter, moved their offices and stock rooms to the "Row." They are now located at 1601-1603 S. Michigan Ave., Chicago. Garage men should make note of the new address.

New Black & Decker 3/16 and ¼-inch Portable Electric Drills Have Trigger Switch.

The Black & Decker Mfg. Co., Baltimore, Md., have recently placed on the market two new models: a 3/16" and a ¼" portable electric drill *"with the pistol grip and trigger switch."* This patented feature has heretofore been obtainable only in the Black & Decker 3/8", ½", 5/8" and 7/8" sizes.

The Black & Decker Portable Drill.

These two models are one-hand drills, which is made possible by the pistol grip and trigger switch. This makes it possible to handle the tool like an automatic pistol, the current being controlled by pulling the trigger without the necessity for changing the position of the hand holding the drill.

In addition to the advantage of convenience, this control saves the breakage of drill bitts, so often caused by the drill sagging on the bit when the operator changes the position of his hands to switch off the current.

These two models have 1/6 horsepower motors with series compensated windings, and operate on any current from direct to 60 cycle alternating. Cooling is by means of a vane impeller mounted on the armature shaft, which causes a forced circulation of air all through the housing. Gears run in grease in a grease tight compartment like an automobile transmission.

No Load Speed of the 3/16" drill is 1600 R.P.M., Energy Consumption 175 watts.

No Load Speed of the ¼" drill is 1200 R.P.M., Energy Consumption 175 watts.

The Templar Car.

Undoubtedly there is a large field for automobile manufacturing concerns and since the market at the present time is very short of cars, there will be more cars sold this year and next year than ever before in history. Even the workingman of today is earning enough money to support a car and people who could not afford such a machine two years ago are now able to purchase one.

Automobile plants during the war were cut in production to a great extent and their stock of finished cars was greatly depleted. For this reason, undoubtedly stock in automobile manufacturing plants will be of great value and pay big dividends. Concerns which have been in existence for some time are well worth investigation, and our readers who intend to invest should by all means investigate the Templar Motors Corp., Guardian Bldg., Cleveland, Ohio.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 7 NEW YORK, JULY, 1919 {TERMS ONE DOLLAR A YEAR

The Care and Repair of Tires

Part 4—How Cuts in the Fabric and Tread Are Repaired with Small and Large Vulcanizers

THE importance of casing repair work in the up-to-date garage can hardly be overestimated. The cost of tires, that always seems high to the motorist, makes everyone who has a car highly interested in having every possible repair made. Surely the garage which makes every other kind of repair to a car should be the logical place for the motorist to go to for his tire repairs.

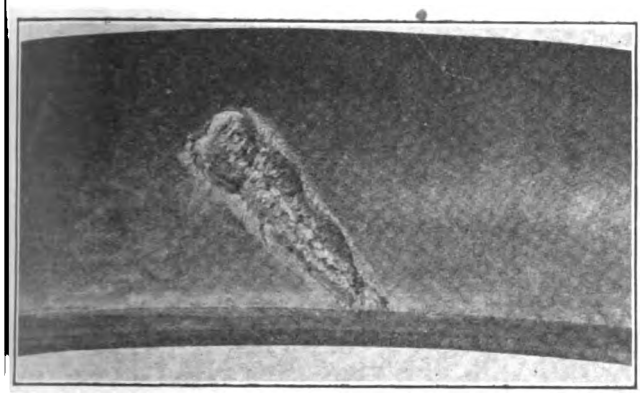


Fig. 1. This Blowout Shows the Fabric Torn clear Through Between the Tread and the Bead. The Principle of Repairing All Such Blowouts is the Same.

And certainly, in these days when it is possible for a repair man to equip himself for all practicable kinds of tire repairing at a cost but little more than that of a good sized tire, and since the vulcanizing process has been simplified to the point where it is no longer necessary to go to a school to learn the business, it is an object for any garage or repairman to prepare himself to get this profitable work.

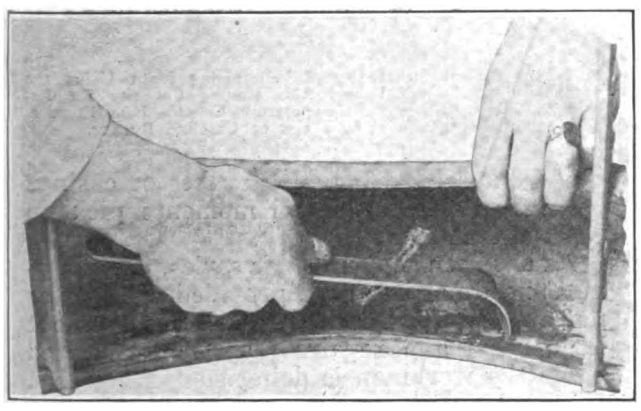


Fig. 2. Thoroughly Clean and Scrape the Inside of the Casing and Clean it on the Outside Tool.

The following description of the method to be followed in mending a typical blowout shows how easy it is for anyone with the slightest mechanical ability to handle such work with the simple equipment and without previous practical experience in tire repairing.

By the word "blowout" we refer to that class of tire injuries in which the fabric has been torn clear through, directly on the tread or close to the rim. It may be large or small, but the principle to be followed is always the same, namely, to reinforce the canvas or cord fabric to its original strength and then to weld the hole in the tread full of tough new rubber.

As an example, let us take the blowout shown in Fig. 1, and follow the various steps in the preparation and curing of a repair that will probably outlast the tire.

The first thing to do is to clean the hole through the tire and for at least six inches all around it on the inside of the casing. This is easily done by keeping the tire moist with gasoline and scraping it as illustrated. When all of the old rubber has been thoroughly cleaned off the canvas on the inside give it a final washing with gasoline and set the tire away to dry until the gasoline has all evaporated.

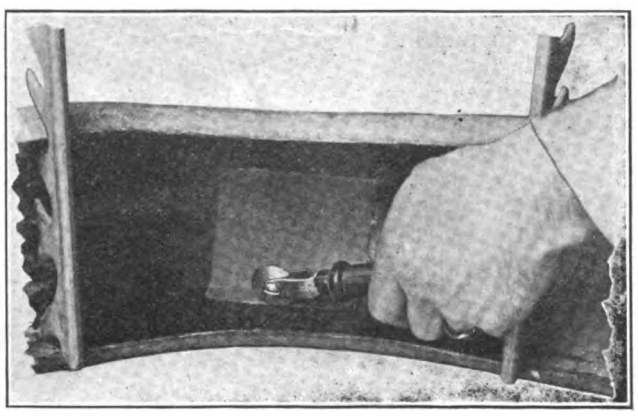


Fig. 4. After the Cement is Thoroughly Dry, Start Building the Repair by Using a Piece of Repair Canvas About Two Inches Larger in Each Direction Than the Hole. Roll This Down Carefully.

Next coat the injury with vulcanizing cement which should be smeared in between any loose plies of fabric at the ragged edges of the damaged part. The entire cleaned surface on the inside is also cemented. Two or three layers of cement are applied, allowing each to dry thoroughly before applying the next.

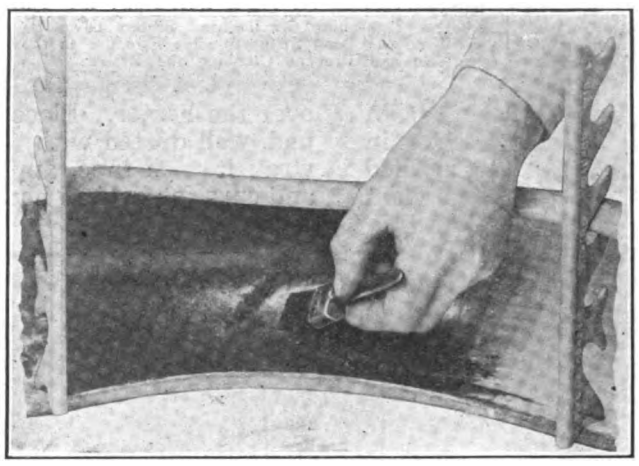


Fig. 3. After the Casing Has Been Cleaned, Coat it with Vulcanizing Cement. The Cemented Surface Should Extend at Least Six Inches All Around the Blowout.

Take a piece of repair canvas which is coated on both sides with raw rubber, and cut a piece about two inches larger in each direction than would be required to actually cover the hole. This is placed on the inside of the tire over the hole and carefully rolled down as in Fig. 4.

Another layer of canvas an inch larger than the first is then applied and rolled into place as in Fig. 5.

For a 3-inch or 3½-inch tire four layers are sufficient, each being about an inch larger all around than the one that preceeds it. For larger tires it is better to use five layers of new canvas in order to make the repair as strong as the rest of the tire. The last layer in all cases may be of fabric coated on one side with rubber. No cement is necessary between layers.

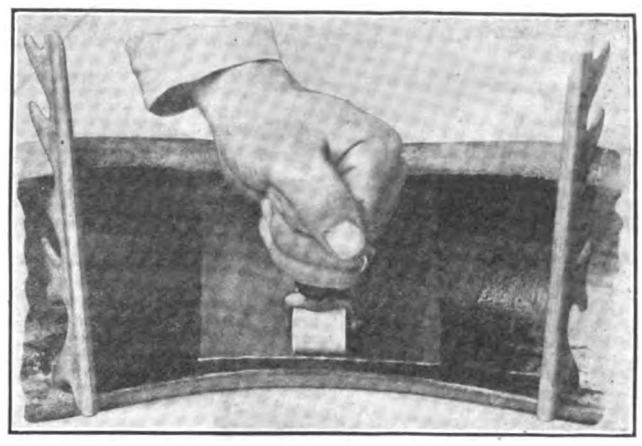


Fig. 5. The Second Layer, Larger Than the First, is Next Rolled Into Place.

Nothing has been cut away from the fabric originally in the tire except possibly ragged, rotten parts that cannot be worked back into the repair. To all intents and purposes a blowout patch has been built upon the inside of the tire and all that remains is to fill the gash on the outside. Practically this is the same as repairing just a superficial tread cut, because the fabric that has been put inside of the tire gives all the strength required and all that is necessary to finish the job is the water-proofing plug to fill the hole through the rubber on the tread.

The preparation of the outside of the tire simply requires filling the cut with scraps of raw rubber as in Fig. 7, which do not have to be cut to fit the hole because the raw rubber melts and flows into every crevice when heated.

Unless the vulcanizer is being used continuously and is already heated, you will have had it heating for the last half hour, so that by the time the last step of repairing the tire is finished the vulcanizer will be ready to go to work. If the vulcanizer has its temperature regulated automatically it will not need to be watched while heating or while vulcanizing, so that one can go right on getting repairs ready while steam is being raised and while other tires are being vulcanized.

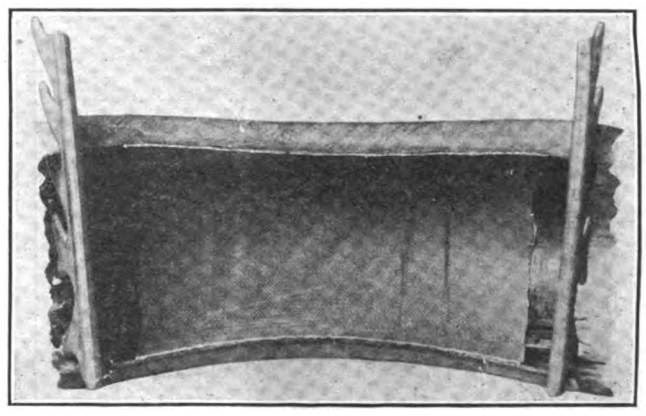


Fig. 6. Showing Appearance of the Inside of the Tire After Placing the Final Layer of New Canvas in Place. Four or Five Layers are Used, Depending on the Size of the Tire. Note that the Fabric is Well Smoothed Down and Does Not Extend Beyond the Cemented Surface.

The prepared tire is placed on the inside

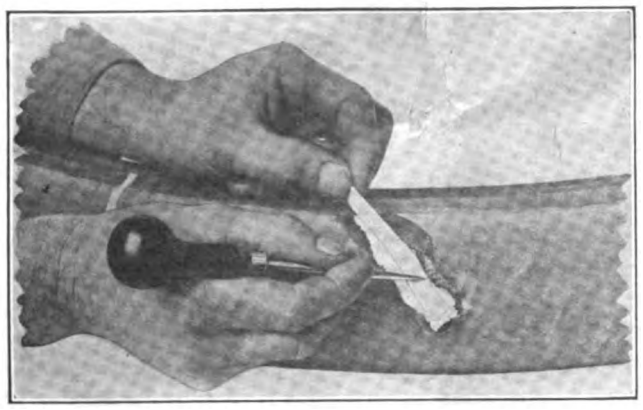


Fig. 7. Fill the Hole on the Outside of the Tire with Scraps of Tread Stock Which Do Not Necessarily Have to be Cut to Fit as the Rubber Flows When Heated. This New Rubber is Carefully Rolled and Pressed Down so That the Edges of the New Rubber Adhere to the Edges of the Cut.

form, which, owing to its peculiar shape will take any sized tire. A binding of heavy linen tape is then wrapped around the tire as shown in Fig. 8. Then by tightening the tension screws in the sliding bar underneath the heater an enormous pressure is produced that forces the repair and the tire very tightly together while they are being heated. To insure a firm pressure on the sides of the tire and to prevent crushing the bead, or clincher, soft rubber bead strips of triangular shape to fit in the groove of the bead, are used under the tape.

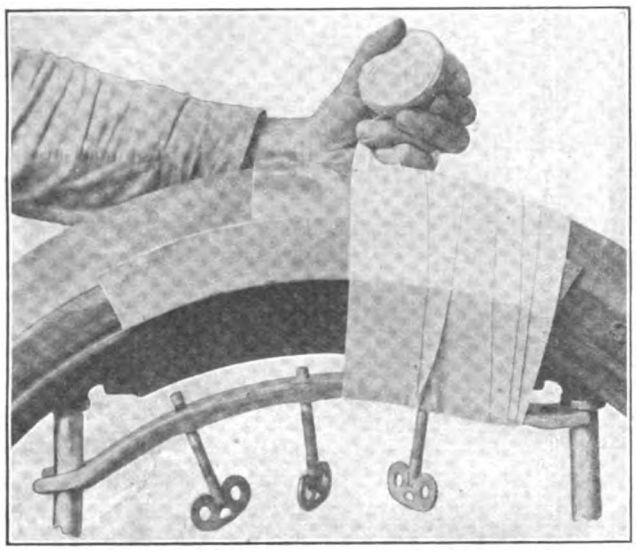


Fig. 8. The Casing is Placed on the Inside Heater and Wrapped with Tape, Which Upon Tightening the Tension Screws Gives an Enormous Pressure. Note the Bead Strips to Give Pressure to the Sides of the Tire and Prevent Crushing the Beads.

The outside heater, which is connected to the steam chamber by means of a flexible hose (or in the case of an electric vulcanizer, is supplied with current through a cable), is next clamped lightly over the repair. It does not need to fit particularly close to the tire because the wrapping of tape shapes the repair and gives all the pressure that is necessary. Thus one outside form will also fit all sizes of tires and it is unnecessary to have a different set of molds for each different size tire with the result that many of the odd sized molds would seldom if ever, be used.

It would be possible to cure the tire clear through with the inside form alone, just as it is possible to cure repairs made by the sectional method by heating only from the outside. But by using this outside form and heating from the inside and outside of the tire at the same time, the repair is cured very quickly—in from 40 minutes to an hour—and all tendency toward overcuring the tire is eliminated.

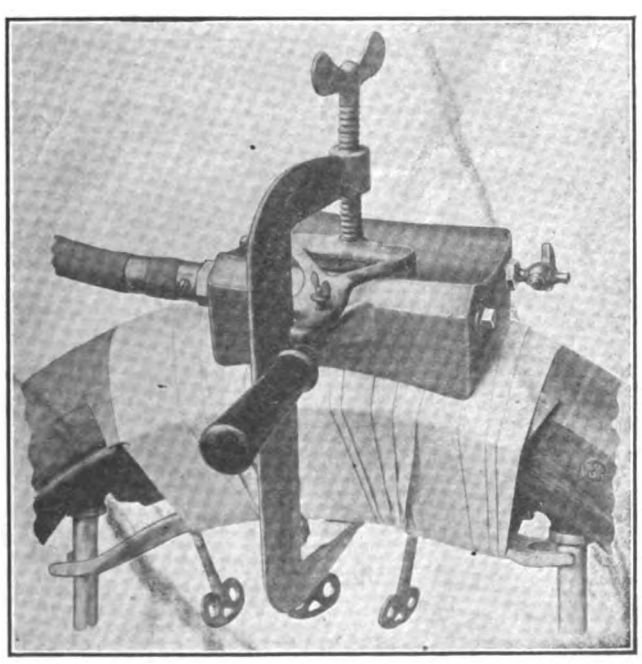


Fig. 9. Then the Outside Vulcanizing Plate is Applied.

When the repair has cured for the proper length of time, which varies with the size and thickness of the tire, the tape and bead strips, which are not injured by the heat and should last indefinitely, are removed. After the tire is taken off the vulcanizer any rough edges are removed with a rasp or a buff, and it is ready to turn over to the customer.

In case the blowout is nearer to the bead than illustrated in Fig. 1, exactly the same method is followed except that the last layer of fabric is brought clear around the bead and up the outside of the tire for an inch or so as shown in Fig. 9. This gives the rim of the wheel a chance to help hold the canvas in place and makes an exceedingly strong repair and one that is far superior in appearance to one made by stripping off the tread and replacing it as some repairmen still do.

In case the tire has a pattern moulded on the tread as is often the case, the following scheme enables one to make repairs which duplicate the rest of the tread.

Take a piece of canvas wide enough to cover the full width of the tread for about a foot and apply enough layers of raw rubber to one side of it to make the rubber about an eighth of an inch thick, or whatever seems necessary to fill the depressions in the tread of the tire. Put the tire on the vulcanizer so that a good, uninjured part of it comes over the heater. Place the prepared canvas pad, well dusted with soapstone, on the tire, wrap it with tape, apply the outside heater and cure for half an hour. The pad will take

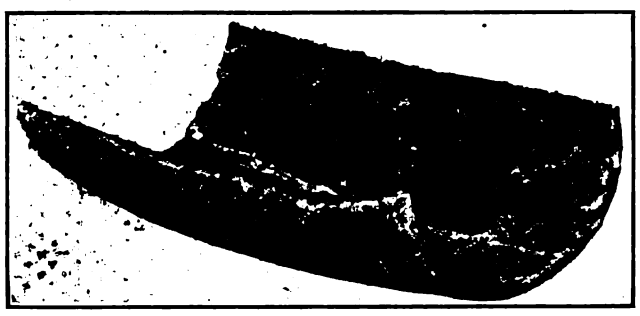


Fig. 11. The Home-Made Mold Used for Saving the Tread and Thereby Improving the Appearance of Repairs.

a perfect impression of the tread pattern, as shown in Fig. 10.

To use it, build the tire repair up in the usual way and when the repair is ready to vulcanize, this pad or pattern is placed over the repair before the tape is wrapped on. The repair will then be forced to conform to the pad and the result will be that the original tread pattern is duplicated over the repair. The pad may be saved for future use.

Other Methods of Repairing Casings

While there are several other methods of repairing casings which have also been in general use for many years, we have chosen to describe the Wrapped Tread Method on account of its simplicity and economy and because it is especially adaptable to the requirements of the repairman who wants to start into the business with the least possible outlay as well as those who wish to do every kind of repairing that it is considered practicable and profitable to handle in the garage.

Speaking generally, the sectional method of repairing casings, and the methods of retreading will only interest a comparatively few repairmen in the larger cities where sufficient of that class of repairs can be secured to make the installation of the expensive, complicated equipment, and the employing of expert workmen a profitable undertaking.

Fig. 10. When the Blowout is Close to the Rim, the Last Layer of Fabric is Brought Clean Around the Bead and Up the Side of the Casing.

The illustrations used in this article were furnished by the C. A. Shaler Co.

This is the last article of the series by Mr. Faber and we trust that many of our readers will profit by the valuable information given.

Tire repairing is an interesting branch of automobile work. Annually there are thousands of tires thrown into the scrap heap that might be returned to active service with but little work.

The average blacksmith, after a little experimentation, should be able to make prac-

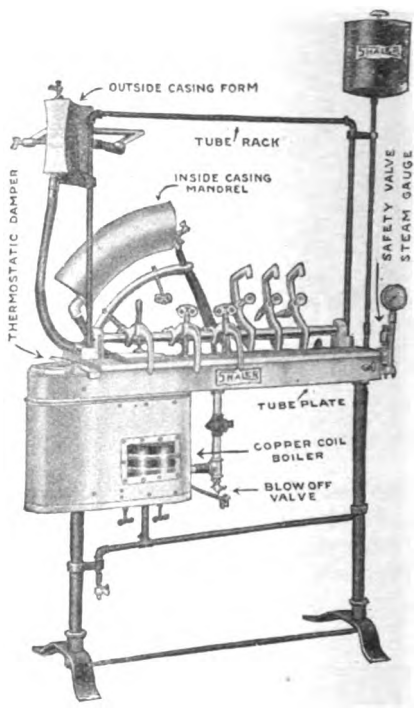


Fig. 12. Typical Steam Heated Vulcanizing Plant Using the Wrapped Tread Method, and Also Having Capacity for Repairing Tubes. Automatic Temperature Control is a Feature. Steam is Produced by a Gas or Gasoline Burner.

tically any of the repairs to tubes or casings necessary and in his odd moments pick up considerable money.

As has been shown in this series, the equipment need not be great, provided the proper machine is selected. The machine takes but little room and repairs may be vulcanized while the workman is doing something else. (Editor).

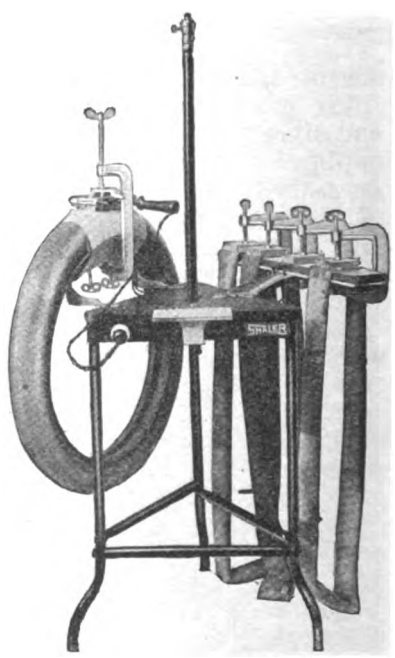


Fig. 18. Electric Vulcanizer with Automatic Heat Control and Using the Wrapped Tread Method for Casings. One of the Features is the Portable Outside Heater Which Can be Used on Tires While They are Inflated on the Wheel in Case it is Necessary to Mend a Cut or Sandpocket. Heats from City Lighting Current at Low Cost.

A Practical Milk Delivery Automobile Truck Body

WITH milk selling at from 18 to 20 cents a quart and from 10 to 12 cents of this money going to the distributor, the average farmer can easily afford to deliver his own milk, particularly if he has very many cows. In small towns in many cases one farmer can distribute all of the milk from his community in one truck. In many cases it pays to carry the milk even as far as ten miles from home if it can be delivered directly to the consumer in the city.

The writer has in mind a small community where the farmer made a speciality of carrying a loaded truck full of milk cans to a city 15 miles distant. In the city the milk was distributed to the customers over a radius of four miles by means of teams. The long haul was made by means of motor truck and it was found that the truck could easily make two trips a day.

We reproduce herewith a handy milk wagon body which is fully large enough to carry 48 cans. The body shown is designed to fit upon a Studebaker chassis and measures 10 feet long by 42 inches wide inside dimensions. In order to accommodate two tiers of cans the body measures 5 feet 4 inches in height. An extra carrying shelf is placed at each side of the body and the handles of the cans may be hooked over angle irons which are evenly spaced along the upper outside sill.

The main body sills should be made of oak measuring three by five inches while the two cross sills shown in the plan view *B* by dotted lines are made from four by two inch planks. The sides of the body should be well reinforced by a wooden ribbed top and supported by two upright members.

The tail gate and its construction is shown in Fig. *C*. One will note that this is arranged with two sets of hinges so that the upper portion can be opened downward without disturbing the cans in the lower compartment. As soon as the cans in the upper compartment are emptied, the whole back can be dropped downward.

If desired, both tail gates can be hinged at the center, the upper gate opened downward and the lower gate opened upward. For long hauls where ice is necessary, the body should be made tight and the roof or top made of three-quarter inch planks. The whole should be covered with canvas and painted with heavy white lead. In such event the upright pieces may be placed upon the outside of the canvas to give the panel design, as illustrated.

In some states where bottled milk must be sold and it is not legal for the milk to be sold from the large-sized cans, special racks may be provided. In such event three sets of shelves on the inside may be built. Free circulation should be provided for inside the body so that the cold air from the ice can circulate readily.

Nothing but one meal a day and a hole in the heel of both shoes can make some men hunt a job.

IT CAN BE DONE

Somebody said that it couldn't be done,
But he with a chuckle replied
That "maybe it couldn't," but he would be one
Who wouldn't say so till he'd tried.
So he buckled right in with the trace of a grin
On his face. If he worried, he hid it.
He started to sing as he tackled the thing
That couldn't be done, and he did it.

Somebody scoffed: "Oh, you'll never do that,
At least no one ever has done it,"
But he took off his coat and he took off his hat,
And the first thing he knew he'd begun it,
With the lift of his chin and a bit of a grin.
If any doubt rose he forbid it;
He started to sing as he tackled the thing
That couldn't be done, and he did it.

There are thousands to tell you it cannot be done.
There are thousands to prophesy failure;
There are thousands to point out to you, one by one,
The dangers that wait to assail you.
But just buckle right in with a bit of a grin,
Then take off your coat and go to it.
Just start in to sing as you tackle the thing
That cannot be done and you'll do it!

—*New York Tribune.*

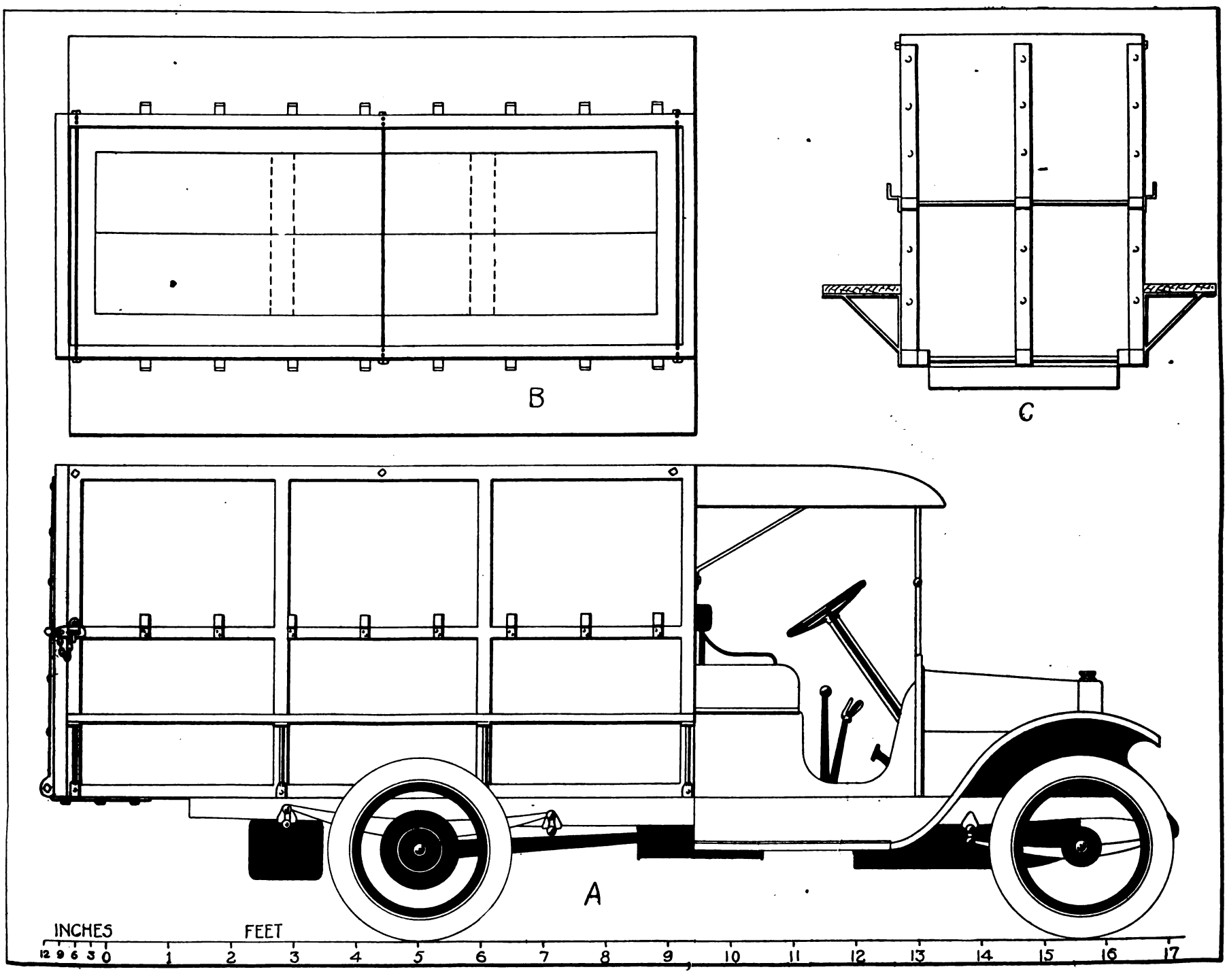
UNFORTUNATELY

Mrs. Blank could find only two aisle seats —one behind the other. Wishing to have her sister beside her, she turned and cautiously surveyed the man in the next seat. Finally she leaned over and timidly addressed him.

"I beg your pardon, sir, but are you alone?"

The man, without turning his head in the slightest, but twisting his mouth to an alarming degree, and shielding it with his hand, muttered:

"Cut it out kid—cut it out! My wife's with me."—*Public Service Chat.*



Selling Scrap Metals

How the Average Smith Can Save Money in the Disposal of His Old Iron and Steel

By G. K. BROMLEY

THERE is probably not one blacksmith in the country, no matter how small his district, who cannot make several hundred dollars or more a year by giving the proper attention to his discarded scrap metal. By scrap we mean discarded iron, steel, and metals, and hereinafter refer to it by that name as it has risen to a position in trade where it no more can carry the opprobrium that has so long attached to it. "Junk," is a word that has become a synonym for worthlessness, but is not representative of the higher latent values now possessed by scrap.

We will not deal at length with the possibilities of the business, but will present facts concerning it from which the man with the ordinary business sense can draw his own conclusions and upon which he can base his operation with more promise of success and profit than by continuing along in an indifferent manner. It is important, however, to understand the elementary facts regarding metals to handle them properly either as new stock or scrap. There are two general divisions, ferrous and non-ferrous, the former including such as contain iron and the latter those containing no iron, as copper, lead, spelter or zinc, tin, nickel, and aluminum. Brass, bronze, and many other composition metals are an alloy of copper and other basic metals.

Loss by Oxidation

The ferrous metals are all very sensitive to oxidization through contact with the air and greatly lose in value through such exposure by rusting. Their susceptibility to rust is greatly increased by the presence of moisture and it also should be remembered that loss through oxidization increases greatly with the proportion of surface area exposed, to the weight. This means that the smaller the piece, the greater the depreciation. For this reason care should be taken to keep collections of iron and steel scrap in a dry place and to make allowance for the amount of rust on the material when purchasing it for resale as scrap.

After a man has determined haulage costs to the nearest freight depot and surveyed his district to ascertain what supply is available from month to month, he can establish a fair idea of what the possibilities are and whether or not it will pay him to go beyond the immediate neighborhood for material to bring his own collections up to a carload-lot size for shipment to the larger city dealer.

It is not recommended that a blacksmith neglect his other work to give attention to his scrap of course, but his spare time devoted to sorting and grading his stocks or in picking up old machinery and scrap in the neighborhood will prove a substantial source of additional income in the course of a year. As soon as it becomes known in his neighborhood that he will handle scrap, he will be surprised by the amount of material that will be brought to his shop.

To stimulate this source of supply, and it is a highly satisfactory one as it eliminates the time and labor of going after it, good results can be obtained by posting a notice in the shop stating the minimum prices that he will pay. In figuring out such a list care should be taken in arriving at the price which will permit a large enough margin on the resale to cover all handling, haulage and to give a profit. Such prices should be from 15 to 25 per cent below the prices he expects to obtain f. o. b. shipping point.

Of course the return for these efforts will be in proportion to the time and study combined with them and the amount of material available for sale. The average blacksmith should realize that in his old horse shoes he has about the highest value so far as scrap material is concerned, for shoes are made of one of the purest forms of iron known as "wrought." In the scrap market wrought iron sells from 100 to 125 per cent more than mixed country iron, the classification in which most shipments of scrap iron come from the rural sections to the city markets. At the city markets iron is sorted into its respective grades by the large dealer who gains the larger profit by so doing.

There are really three basic grades into which scrap is divided, wrought, cast scrap and steel, and these are about all that it is necessary for the average collector to concern himself with, unless he intends to handle some large single lot of one kind or is accumulating material on a large scale, when it is to his advantage to be familiar with some of the specifications adopted by leading consumers in buying scrap.

Highest Grade of Scrap

The most important grade of scrap consumed by steel mills is known as No. 1 heavy melting steel upon which one of the leading consumers exacts compliance with the following qualitative specification:

"Must be one-fourth inch and over in thickness, nothing to exceed six feet in length, free from pipe busheling. All scrap from industrial steel. Railroad scrap in charging-box size will be acceptable under these specifications, to be free from cast iron, malleable iron, or any other foreign substance."

On cast-iron scrap, known as No. 1 machinery cast, a model specification and the one ratified by the American Foundrymen's Association, is as follows:

"This material shall consist of cast-iron scrap of first quality which posses evidence of having been machined, such as planed or turned surfaces, bored or drilled holes, or similar markings. It must be cupola size, no piece to weigh more than 100 pounds, and must not exceed 24 inches in length or width; No. 1 heavy pieces greater than one inch in section; No. 1 medium pieces one-half inch and not to exceed one inch in section; No. 1 light pieces not to exceed one-half inch in section. Scrap classified as railroad cast scrap or under any other classification, will not be accepted under this classification."

Cast scrap in the form of columns, pipes, plates and rough castings is classified under the head of rough cast and a special classification is provided for burnt machinery scrap. Broken cast-iron stock comes under the head of Stove plate and constitutes an important grade used by foundries. It must, however, be free from all burnt parts, grates, and from malleable iron and steel parts as well. Broken radiators are graded under a separate scrap-iron classification.

Scrap Classification

Malleable cast scrap is material that has undergone the annealing process, but malleable cast-iron parts of automobiles form a grade by themselves while valves, flanges and pipe fittings of every description are classed as miscellaneous cut scrap.

Limitations of space forbid the publication of the various classifications of all grades of scrap, but in the following are afforded sufficient information for all practical purposes so far as the small collector is concerned:

No. 1 Agricultural Scrap—Consisting of cast-iron parts of agricultural machinery, free from steel, malleable chilled iron, such as low-plow points, etc., and burnt iron of every description.

No. 2 Agricultural Scrap—Consisting of chilled iron parts of agricultural machinery. Must be free from steel, malleable and burnt iron of every description.

Automobile Malleable Scrap—Consisting of malleable cast iron parts of automobiles, free from steel forgings, stampings and gray iron parts.

Agricultural Malleable Scrap—This shall consist of malleable cast iron parts of agricultural machinery, excluding reaper and mower wheels and pipe fittings.

Agricultural and Heavy Busheling Scrap—Consists of 50 per cent spikes, nuts, bolts and horseshoes; the other 50 per cent heavy agricultural steel scrap, which consists of plows, wagon springs, and similar scrap; free from forks, shovels, malleable iron, etc. All to be in charging box sizes.

Bundled Hay Wire—To be put in bundles in charging box sizes; bundled in such a manner that same will not come loose in transit or in handling; material to be either black iron or steel wire, free from any copper, zinc, tinned coating or any other foreign material; also to be free from rusty stock.

Heavy Melting Steel, Agricultural—Consists of plow beams, plow shares, steel axles, shafting and other heavy steel from agricultural machinery. To be entirely free from rake teeth, sickle bars and any light, trashy material. No piece to be less than 5 lbs. in weight.

No. 1 Country Wrought—Consisting of agricultural wrought, such as rods, bolts, bars, etc., ¾-in. diameter by 6 in. long or longer, including soft steel scrap, wagon ties, wagon and buggy axles and horseshoes. All to be free from cast, malleable, hard steel, sheet iron or any badly bent or crooked shapes.

Mixed Country Scrap—Consists of iron and steel from agricultural machinery, and to be free from light sheets, tin cans, hoops, corrugated iron, bicycle and bed frames, buggy wheels, uncut traction wheels, wood tanks, sheets, cable, wire, netting, steel frames, gasoline stoves, old boilers, and any light, trashy or worthless material. No sheet iron or steel unless 3/16 in. and heavier and not larger than 2 x 5 feet. Not more than 10 per cent pipe allowed.

Unsorted Country Dealers Wrought—Consists of heavy wrought and soft steel scrap as accumulated from the country; guaranteed to contain at least 60 per cent scrap ⅝ to 4 in. round or square; flat 2 in. thick or thicker and 6 in. long or longer; may include horseshoes, but must be strictly free from cast, malleable, hard steel, limed, galvanized or painted stock. No reinforcing concrete bars.

Shoveling Steel—Consists of spikes, bolts, nuts, tie plates, blacksmith shop scrap, structural and boiler punchings; horse shoes or similar heavy shoveling steel and shoveling crop ends. All must be clean and no light or tangled scrap included.

While the foregoing classifications represent but a small percentage of the total into which scrap is graded, they cover practically all the materials which would come within the reach of the blacksmith even though he should collect material in his district, and also give an excellent idea of the specifications which govern the leading consumers in making their purchases.

By comparing the various classifications with the market prices as given below, one can arrive at a fairly good estimate of the values represented in the different kinds and grades of scrap iron, steel and metals.

These prices were current at the opening of the present month in the New York market and are given for means of reference only, as different market minimum prices obtain in various parts of the country with the differentials from shipping points governed by the freight rates to consuming centres. These prices are also much higher than would rule with the average collector of iron, steel and metal scrap as they represent prices paid to the smaller dealers by the large scrap merchants who sell direct to consumers.

Scrap and Iron Steel

Heavy melting steel	15.50—16.00
Shoveling steel	14.50—15.00
No. 1 cast cupola	20.00—20.50
Stove plate	16.00—16.50
Grate bars	16.00—16.50
Low phos. mill crops, guar....	21.50—22.50
Low phos, melting stock	20.00—21.00

No. 1 busheling	13.50—14.00	Locomotive ax. steel rerolling	29.00—31.00
Machine shop turnings	9.50—10.00	Locomotive ax. steel for forg..	32.00—34.00
Cast iron borings	10.00—11.00	Steel car wheels	17.00—18.00
Borings and turnings	8.50— 9.00	Cast iron wheels	20.00—21.00
Agricultural malleable	14.00—15.00	Steel springs	19.00—20.00
Heavy cast scrap	20.00—20.50	Sheet bar crop	18.00—18.50
Comp. sheets	13.00—13.50	No. 1 yard wrought	17.50—18.50
Bundled sheets	11.00—12.00	No. 1 R. R. wrought	18.00—18.50
Rerolling rails	17.50—18.50	Railroad malleable	15.00—15.50
Girder and "T" rails	14.50—15.50	Steel knuckles and couplers..	17.00—17.50
Steel car axles	24.00—25.00	Heavy steel axle turnings	13.25—13.75

Practical Horse Shoeing

A Necessary Knowledge of the Tendons and Cords in the Lower Leg is Essential to the Smith

THE next lower articulation in the horse's foot is the *coronary joint.* It is a very simple affair, as only two bones are concerned, contrasting very decidedly with the fetlock joint with its four bones. The two bones of the coronary joint (sometimes called the pastern joint) are the upper and lower pastern bones—or, what is the same thing, the upper pastern bone and the coronary bone. (It is also correct to say the long and the short pastern bones.) The upper pastern bone has a convex surface at this joint, and the coronary a corresponding concave surface. The joint could hardly be simpler.

There are several ligaments holding the two bones in place. Naturally, the arrangement of ligaments is also simple because of the simplicity of the joint. First of all, there is the capsular ligament whose business it is to hold the joint together after the manner of an enveloping sheath. The capsular ligament of the coronary joint is, however, notable in the circumstance that it is not directly attached to either bone. Instead, it is attached to tendons and other ligaments. It is not an especially strong ligament, its usual and normal duty being a light one. There are, in addition, two side ligaments. These are attached above and below to the bones. In fact, they run on down and are attached to the coffin bone and to the two navicular bones. There are four other ligaments belonging to the coronary articulation. These all lie to the rear.

The Coffin Joint

The coffin joint is the articulation at the bottom of the foot. There are three bones involved. First, the coronary bone, the lower end of which supplies the upper surfaces for the joint. The surfaces are two convexities called condyles. We have already had a similar condition at the fetlock where the cannon bone (metacarpus) furnished two convexities termed condyles, as here. The coffin articulation is sometimes termed the pedal joint. The two lower bones—(the coffin bone and the navicular bone)—supply concave surfaces corresponding to the two convexities of the lower end of the coronary bone.

Note, now, the following particulars concerning the three joints of the foot. Taking them in order from the uppermost to the lowermost, they consist of 4, 2 and 3 bones. All the joints consist of convex and concave surfaces. The convexity or convexities belong, in each case, to the top bone or bones, and the concavities to the underneath bones. These points ought to be fairly easy to remember.

The coffin joint, like the other two, has its capsular ligament surrounding the bones of the articulation. The coronary and coffin bones have side ligaments, one on the right and the other on the left side of the bones, connecting the two and are especially strong. There are one or two other ligaments, but they need not concern us at present.

The Anterior Extensor Tendon

The *Anterior Extensor* tendon is the Latin name for the next tendon to be considered. *Anterior* has already been explained. Its meaning is *front* or *fore.* An anterior surface of a bone is the front surface. The idea conveyed by *extensor* is something that extends. Applied to a tendon, it means a tendon which operates to pull the bone forward. The *anterior extensor tendon* may now be understood to mean the front tendon which extends or pulls forward.

Another Latin name is the *extensor pedis tendon,* which means literally the tendon of the foot which pulls forward. The reader may take his choice of the two names, for both are in use.

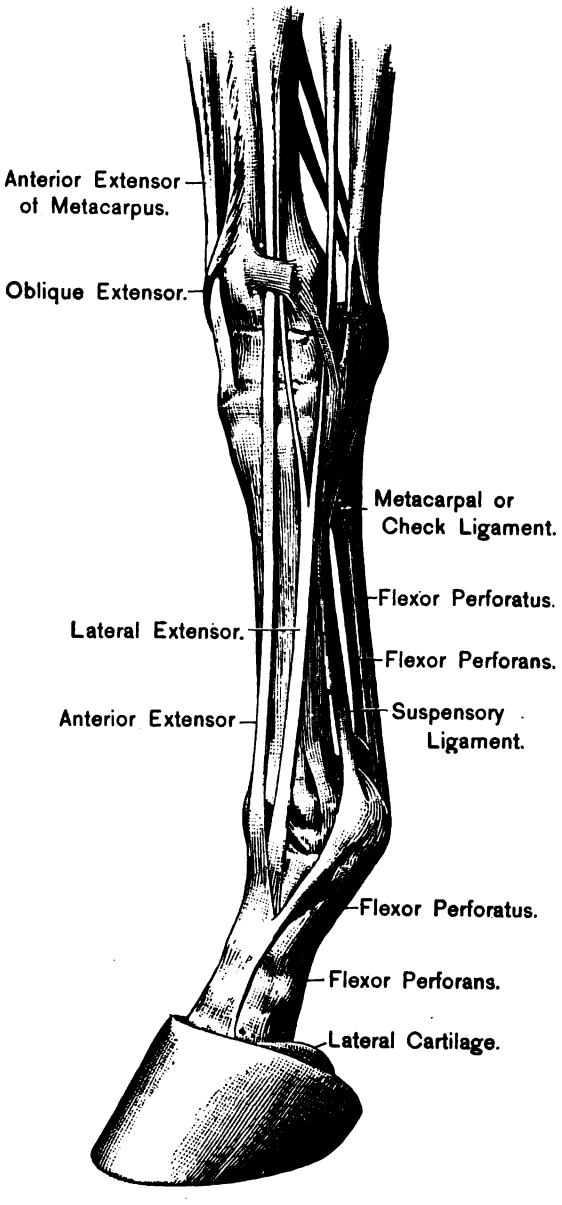
The *anterior extensor* tendon lies on the front parts of the upper pastern, the coronary and the coffin bones. In fact, this tendon comes down from above the fetlock joint. It extends along the front surface of the cannon bone, runs over the fetlock joint and on down over both the other foot joints to the coffin bone at the bottom. That this tendon extends so far up the leg need not surprise one, if one remembers that all muscles are above the knee and hock.

The anterior extensor tendon broadens below the fetlock joint to a width of perhaps 1½ or 2 inches. It is as a broad band that it continues on down over the remaining two joints. This broadening of the anterior extensor tendon is, in part, due to the fact that two other tendons coming from above join it between the fetlock and coronary joints. These are tributary tendons as it were. One comes down the foot on the right and the other comes down on the left. Both are somewhat to the rear. Each is attached to the corresponding sesamoid bone at the fetlock joint. Looking at the whole affair as the anterior extensor tendon, one may say that this tendon is attached to five of the seven bones of the foot. That is, the anterior extensor tendon is attached to the two sesamoid bones, the upper pastern, the coronary and the coffin bones. All the bones of the foot proper, except the navicular bone, are attached. It will be gathered, perhaps, that this tendon is a very important feature of the foot and so it is. The muscular mass which corresponds to it is called the extensor pedis muscle.

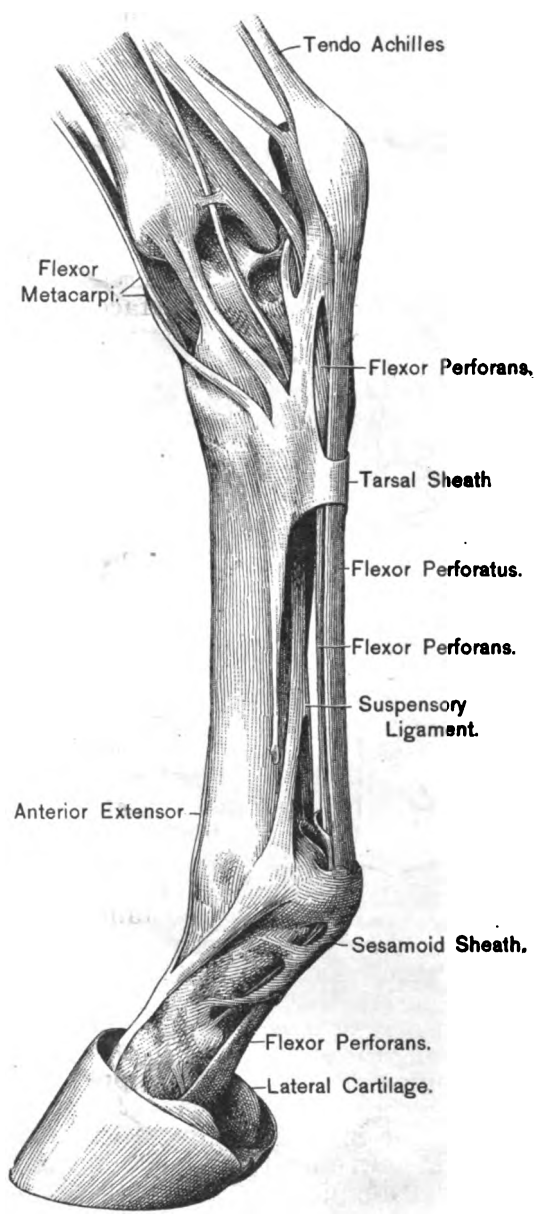
In the fore-leg of the horse, there is a special extensor tendon which is attached to the upper pastern bone. On the right fore-leg, it lies alongside and to the right of the anterior extensor tendon; on the left fore-leg, it lies, correspondingly, alongside and to the left of that tendon. That is, these special tendons on the fore-legs lie along the outer sides of the anterior extensor tendon.

[I may say parenthetically here that the reader should welcome the repetition of hard necessary words in the text as this repetition gives him repeated opportunity to get them fixed in his mind. So, he is not to expect me to avoid using a hard term—like anterior extensor tendon—if that term really has to be learned.]

There are two distinct tendons, common both to fore and hind feet, which operate to move bony parts. The *superficial flexor tendon* (the flexor pedis perforatus tendon) lies just under the skin—hence the adjective "superficial," which means *on the surface.* It is located to the rear and covers up more or less completely the second flexor tendon, which is properly termed the *deep flexor tendon.* The adjective "deep" refers to the fact that it is deep below the surface. There



Tendons of Front Leg.
Outerside and Front View.

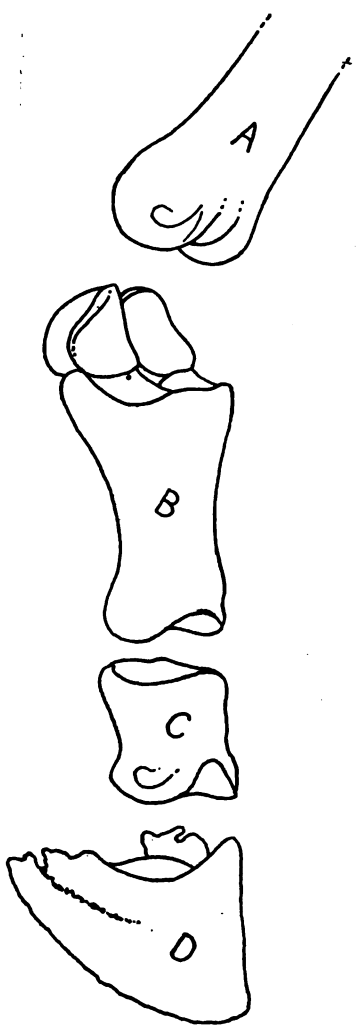


Tendons of Hind Leg.
Innerside and Rear View.

is another name, the flexor pedis perforans tendon.

The Latin names contain some significant information about these two flexor tendons. The word "perforatus" means *perforated;* while "perforans" means *perforating*. The superficial flexor tendon is, accordingly, a perforated tendon, and the deep flexor tendon is a perforating tendon. And this is an exact statement of fact. The superficial flexor tendon is, indeed, perforated and the perforating thing is the deep flexor tendon. The one tendon passes through the other. This is a notable and curious matter and invites our attention. The point at which the one tendon passes through the other is in the rear of the fetlock joint between the two sesamoid bones. The superficial flexor tendon is, at this point, tubular in form; and here the deep flexor tendon passes through the tube and consequently through the other tendon.

The one is perforated, as it were, and the other perforates it, as it were. The superficial flexor tendon divides into two parts as it continues on down below the short tubular part. This branching permits the tendon to have two points of attachment to each of the two bones which it flexes. These two bones are the upper pastern bone and the coronary bone. When the tendon is pulled by the muscle to which it is attached higher up, both these bones are simultaneously drawn back.



Shape of the Bones of the Foot. Each Bone is Shown Away from the Adjacent One so as to Show the Articulation: A, Cannon Bone; B, Upper Pastern Bone; C, Coronary or Lower Pastern Bone; D, Coffin Bone.

The reader may think it pretty hard sledding along here. Let me say then, by way of encouragement, that the tendons and the way they are arranged and other similar matters are among the most important with respect to horse-shoeing. For example, the two flexor tendons often thicken and shorten because of some injury. The result is that the upper pastern and the coronary bones are, one or both, drawn backwards when the muscle is at rest. The foot is thrown more on its toe and becomes stubby or steep-toed. We have here something to which the horse-shoer should be alert. So, the reader need not feel that a good deal of information of a difficult nature is being unnecessarily put before him.

There are hard spots in a horse-shoer's education. The sensible thing to do is to put enough attention on the hard spots and soften them up. When one rolls a lemon preparatory to making lemonade, it resists pretty strongly at first; but after a little, i starts in to soften, and then it gets soft rapidly. So it is often with a hard piece of reading. Work at it seriously, seek out all the points, and persevere. It will often happen that soon the hardness passes off and everything becomes fairly easy.

If the horse-shoeing job were so easy that anybody and everybody could learn it while he is smoking a pipe full of tobacco, then there would be but little need for men to set up shops, as the drivers could soon learn to do their own work. Other things being equal, a hard business to learn is a better business than one easy to learn, as the difficulty tends to preserve the business to the one who already understands it.

The deep flexor tendon (*the flexor pedis perforans tendon*). Some information as to this tendon has already been supplied. It is down beneath other tissues and is accordingly said to be "deep." It passes through the short tubular section of the superficial flexor tendon, and so is termed "perforans," i. e., perforating. It runs down from muscular tissue above the hock or knee along the rear of the cannon bone. Here it is like a cord, being fairly round. It lies below the superficial flexor tendon and above a ligament belonging to the sesamoid bones. At the fetlock, it, as has already been described, passes through the ring section of its companion tendon. It now flattens and becomes fairly broad, and after passing over the navicular bone, "as over a pulley," secures attachment to the lower surface of the coffin bone. It operates to move this bone.

News from Pennsylvania

A Chat with a Smith That Shoes Horses Almost as Large as Elephants

BY JAMES F. HOBART

SOME years ago, there were five horse-shoeing blacksmith shops located almost within a single block in Homestead, Pa. Today, there are two shops, and they are a-plenty. One of these shops, that of Messrs. H. C. Todd & Brother, used to run three fires. Now, one fire is more than enough both for the shoeing and the wagon work and with the latter, the shop seemed to be jammed, both inside and out.

This shop is well, even lavishly, equipped with tools, with drill press and with band saw, jointer, circular saw, hub borer and several other minor tools which the writer did not examine closely. But the feature of this shop is the splendid lighting of the shoeing end. The shop is located in a long, narrow room, originally intended for a store in a city block. High above the smith's head, attached to the ceiling and almost vertically above the anvil of the first fire in the shop, is a 500-watt incandescent electric light which makes shadow-chasing something unknown in this shop.

A big two-horse truck was undergoing repairs at the time of the writer's visit, and several baggage trucks were being overhauled, this shop doing most of the railroad work from the neighboring railroad station. Outside of the shop, several vehicles of lighter weight were lined up for attention, but only three horses were in evidence during the writer's visit, two horses going out and one being led in for shoeing.

Elephant's Shoes

But, those horses surely were big ones, and the shoes in the shop showed it! All around the edge of the slack tub, even disputing location with a few pairs of tongs, big shoes were hanging, some No. 7, but most of them No. 8! "Are you shoeing elephants in this shop?" the writer asked of Mr. Todd—"Seems like it by the shoes, don't it"—smilingly replied Mr. Todd as he busied himself at charing a bunch of coal preparatory to doing a piece of automobile work.

"Yes, the shop does a lot of automobile work," said Mr. Todd in reply to a question. "The garages and repair shops send most of their forging work here and a good many machines are sent here direct when smith work is needed. No, I never do any overhauling. Might go into it if I wanted to. There's money in it all right, but I don't intend to take it up even if lots of auto owners do keep asking us to do so. I'll do their forging work, but I won't go into overhauling autos. I don't like the work. An old wagon is bad enough, but automobile work is too all-fired dirty!"

"You just bet that nails and shoes are high," replied Mr. Todd to a question. "And you are sure of it when some of these big horses go out with a good-sized part of an iron mine on their huge hoofs. But I got out of it pretty well during the war. I always carry a pretty good stock, and just before things went sky-high in price, I stocked up with nails enough to last me until prices get a bit lower. Why, I haven't bought a nail for two years, and have about 23 boxes yet, up stairs, sticking around under the rafters. They will last me a good while yet."

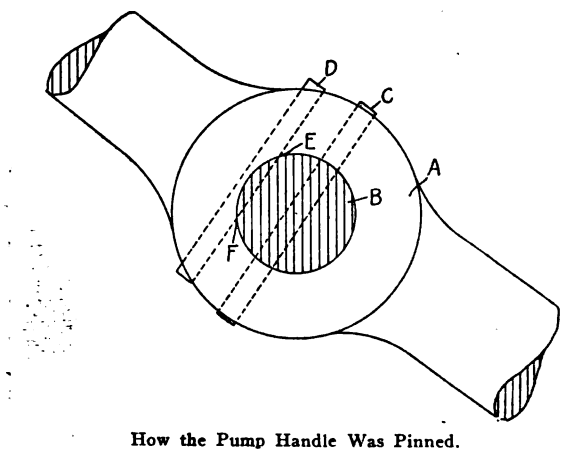
"I didn't come out as well with shoes, for had no place to store them, but I put in all that there was room for, and after they were gone, I had to pay seven cents a pound, same as the rest of the smiths. That is a pretty stiff price, but when old shoes are worth from a cent and a half to two cents per pound, it helps out a little. I wanted to keep my old shoes, but the storage space got full to overflowing and I had to sell a little sooner than I liked to. But I got a pretty good price for the old shoes after all.

"It beats all, though, how horse-owners do have the old shoes reset! Shoes which would have been thrown away three years ago, are now reset as long as they can be made to stay on the hoof, and I wonder if some guy won't work up a scheme for putting two light old shoes on a hoof, instead of one heavier shoe?"

Pump Handle Pins

A farmer, who owned one of the useful water lifts known as a "People's Pump" in which the handle is squared upon the short shaft, was very much annoyed by the rattling of the handle upon the squared portion of the shaft. He had allowed the handle to become loose very slightly and had paid no attention to the slight motion between handle and squared shaft. At the start, the tightening of the nut upon the end of the shaft, or the driving in of a shim between handle and squared shaft, would have prevented the trouble.

But the farmer hadn't taken the trouble to make the small working repairs which would have saved so much labor and ag-



How the Pump Handle Was Pinned.

gravation later. In fact, to speak accurately, the farmer had not realized what it meant to have a bit of looseness in the pump—or in any other machine—and to let the looseness "go and grow." But he found out, and now, he looks after the little loosenesses in his machinery just as carefully as he looks after and attends to the first little bodily

twinges which tell him to "look out for his liver!"

The farmer got very tired of the pump rattling and took it to a machine shop where they bored a round hole through the handle, as shown at *B*, also through the other casting which carried the plunger-rod. So far, so good, but then the machinist made a big mistake. He put a quarter-inch pin *C*, right through the center of the 1¼-inch shaft *B*, and the handle hub *A;* did likewise with the plunger lever, and sent the farmer home with his pump free of all rattle. For about an hour, the pump worked most beautifully, then, all at once, the handle pin *C* "let go" and sheared right off between shaft *B* and casting *A*. The farmer discovered the trouble and put a bit of pitchfork line in place of the pin, and the pump worked a little longer, then the pin through the plunger crank sheared off in like manner.

The farmer returned the pump to the machine shop and soon as the foreman saw the job, he called the man who had mended the pump and said: "Here! Fix this pump right, and do it right away, too. And don't charge him a cent either. You, John, should know enough when putting in a pin to work under the stress it must carry in this case, to give the man something besides a 'wire cutter,' for that is exactly what the device amounts to as you have arranged the pin. Drill another hole at *D*, put the pin so it bears against the shaft as much as ⅞-inch from *E* to *F*."

"With the pin placed at *C*, it is in 'double shear' and has two surfaces to hold, each having an area of 0.049 square inch, or 0.098 square inch in all. With the pin arranged at *D*, there is a section of metal to be sheared off which is about ¾-inch long ¼-inch wide. This gives an area of ¾ x ¼ = 3/16 or 0.1875 square inch, about four times as much surface; 3.8 times as much, to be exact!"

The farmer took this lesson for all it was worth and put it in practice on his other farm machines and now he never has any trouble from the shearing off of pins and says that a pin put in, as shown at *D*, will stand almost as much as a regular key. And it will, provided that it does not weaken the casting *A* too much. Although a pin at *D*, does not weaken that casting any more than if it were placed at *C*, it surely does weaken the casting somewhat.

Therefore, when tempted to make an extra strong job by putting in a very large pin, consider whether or not the hole which must be drilled for the pin will not weaken casing *A* to the extent that it will "let go" before the heavy pin. The strength of both pin and casting, should be so well calculated and proportioned that one will be as strong and no stronger than the other. When that has been done the fastening of shaft to casting has been made as strong as is possible.

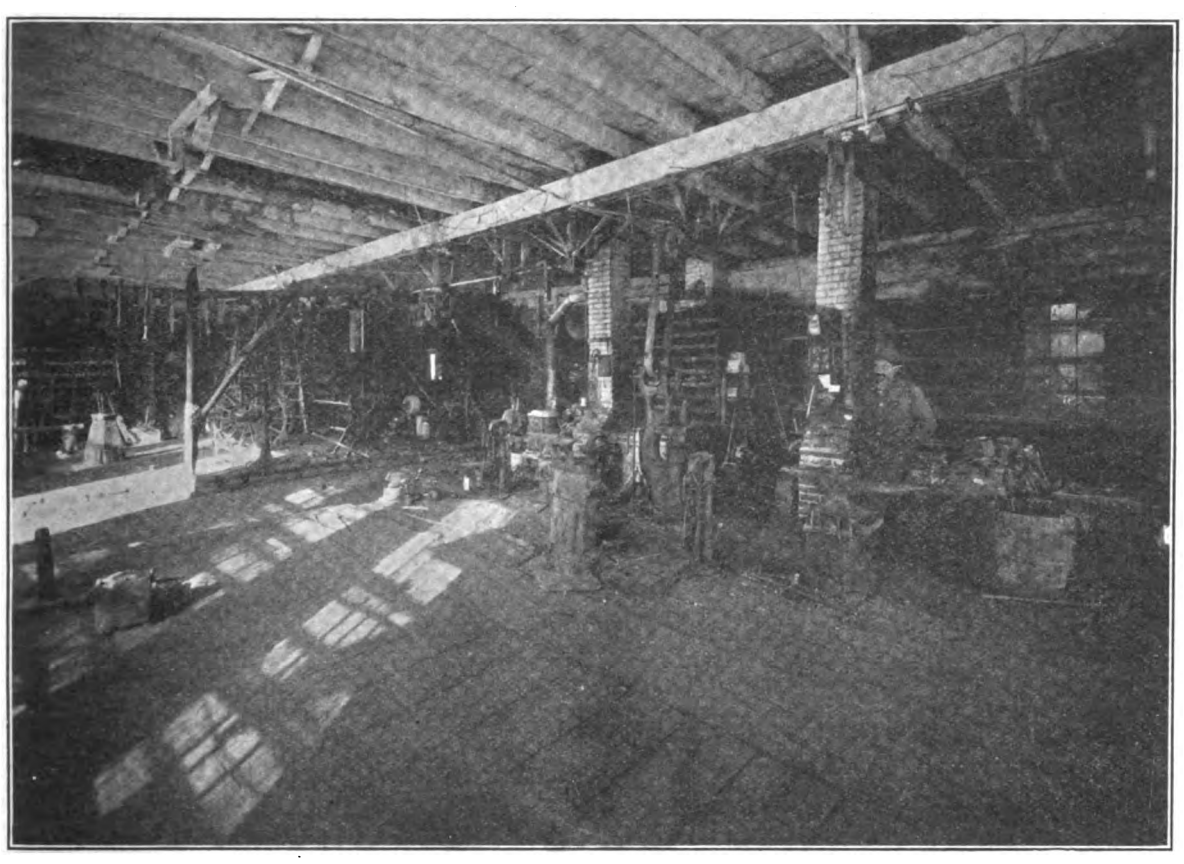
Two Prize Photo Entries

WE are sorry that we are able to reproduce only two photographs this month in our prize contest, but we trust that before our next month's issue goes to press we will receive more. We would suggest that every reader who owns a blacksmith shop send us a photograph of it to be entered in the prize contest. It costs nothing to enter the photograph and everyone stands an equal chance of winning a prize. In any event, the original photographs will be returned as soon as they have been reproduced in the magazine and with the photograph each entrant will receive a half-tone cut which he can use upon his letter or bill heads or envelopes, as he chooses.

The cuts themselves are worth from two dollars and fifty cents to ten dollars, therefore, in themselves, they are practically prizes, so that each reader receives this kind of a prize if he enters a photograph of his shop.

You do not have to be a regular subscriber to enter your photograph and all it costs is the price of three cents postage in sending us the picture. Practically any size picture can be used from the smallest Brownie to the largest studio camera. Of course the clearer the photograph, the better it will reproduce in the magazine.

If you have any sort of a photograph of your shop, put your name on the back of it and send it to us together with a little note telling us about the shop and the work which you do.



Prize Photo No. 12, from Mr. A. W. Hubbard, of Iowa. No Letter Received.

PRIZE PHOTO NO. 13

From A. Cullander, Mississippi.—I have been a reader of your paper for many years and have followed the blacksmith trade for 26 years. I am still in the business, but only in a small way for the machine shop, which we have recently added and of which I am sending a photograph, occupies most of my time.

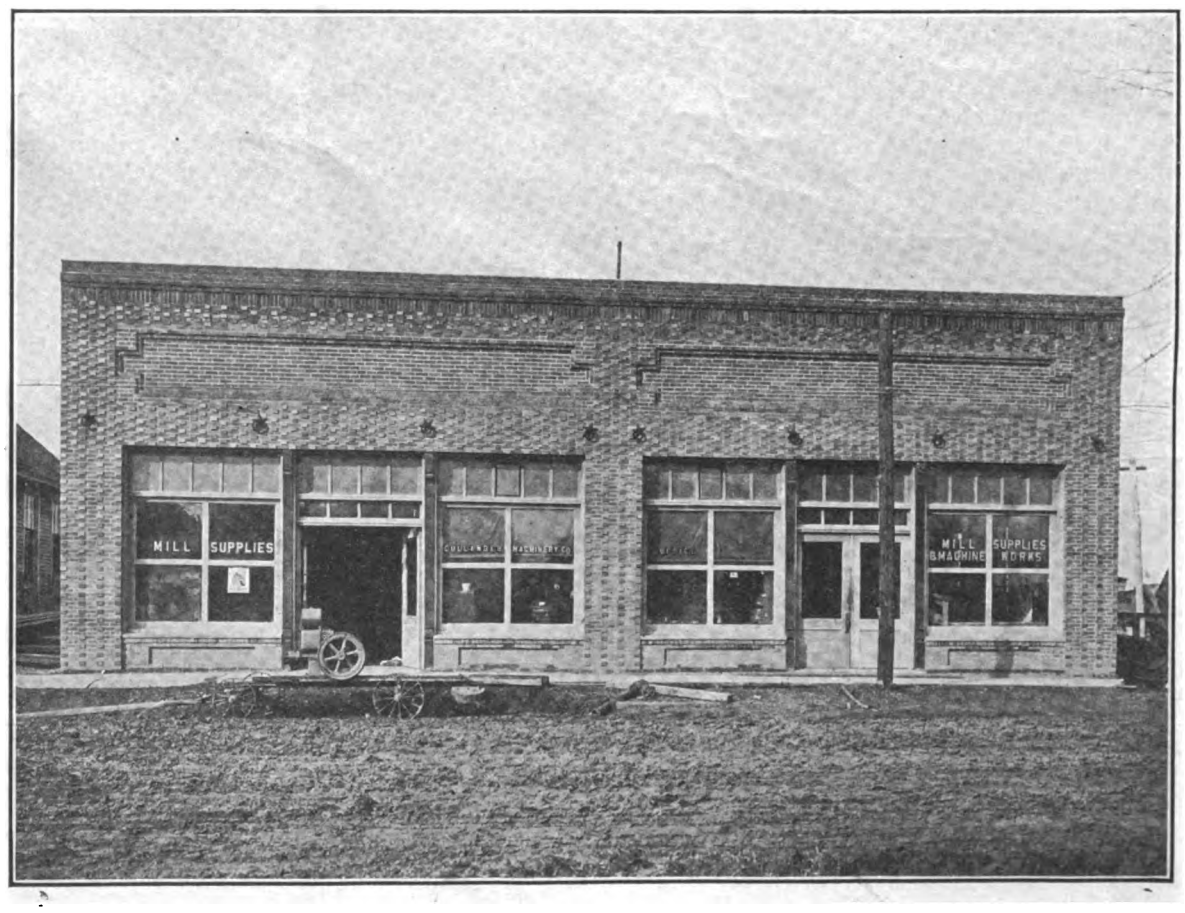
We started here about 12 years ago in a small wooden building, 30 by 60 feet, and have grown to where we now occupy our own brick building which is 60 by 120 feet. Even now, this larger building begins to look small for us and in a short time it will have to be enlarged.

I think that the first part of blacksmith equipment to be purchased is a pair of scales. I have done business with and without scales and find that scales are necessary.

At this shop we divide iron work roughly into classes. In the first class are stock bolts, etc. For instance, for a bolt, ¾ by 12 or up to any length with regular head and threads, we charge ten cents a pound. Flat bars of the same size, cut into short lengths sell for 10 cents a pound.

In the second group comes iron which is bent into shape or drilled. Work such as window grates or screens, etc., falls into this class and for it we charge 15 cents a pound.

For horseshoeing No. 1 to 4, smooth shoes, we charge $2. For shoes of this size with calks we charge $2.50. For refitting, $1.50. For setting tires on wagons, $4.00 per set up.



The Cullander Machine Company's Shop.

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Our Editor's Letter

I DOUBT if there is a state in the Union into which the BLACKSMITH AND WHEELWRIGHT does not enter, so consequently I receive letters from practical every part of the country. It is interesting to find that letters arrive in waves, so to speak, from the various sections. By this I mean to say that one one day I will receive half a dozen from the Pacific coast, but none from the eastern section. Then for weeks at a time, the West will keep quiet while the Central States lick the postage stamps.

I want to receive, this month, a letter from each locality so that I can publish an "All Over the Country Department," in an early issue. Just a short note telling about how business is going on in the various sections. I think such a collection of letters might be made a very interesting feature even if each reader simply wrote a post-card with the line—"business is good"—or "business poor but picking up," or some such a line.

This sort of a department will be interesting in the same way that a weather map is, it will show existing conditions and if carried out fully, perhaps four times a year, it will give all of us something to work on. With such data it may be possible to work out some plan whereby business may be kept more normal.

I wish that I could make all of you realize how much you can better your condition if you all work together for the same end. Suppose, for instance, one of your hands decided to work for itself (if such a thing were possible), and it tried to hammer a drill. Then the other hand, not wishing to hold the tongs, decided to make an entry in the ledger. At the same time one foot decided to go home for dinner, while the other foot tried to go in the opposite direction with the intention of collecting an overdue bill.

You may picture to yourself those conditions and try to figure out how much work you could do if such a thing happened. Each member of your body might be intent upon a very laudable enterprise, but nothing would be accomplished. To a certain extent every blacksmith in the country is the member of a body, perhaps he can get along fairly well by himself, but if all the members work together, then success is certain.

If we all wait for someone else to start something—that something is seldom started—if we wait half-way up the hill of life for someone to come along and help pull us to the top, we usually wait until our whiskers are long and white—then someone comes along and gives us a shove toward the bottom.

Evidently, then, it is up to each of us as individuals to help each other, to pull together and by so doing get to a point where we can look back with a feeling of satisfaction over our past rather than forward with a feeling of envy toward someone who has succeeded.

The Prevention of Accidents

TOO often in our daily papers we read about how Mr. Smith or Jones or Mumford has just lost his fingers or hand in a serious accident which might have been prevented had he used a little forethought. In many cases the only happy thought about the whole affair is that the unfortunate man is protected by accident insurance or by the Employers' Liability Act.

No amount of money can compensate for the pain and misery of the accident, in fact, many of us cannot afford the premiums for accident insurance to such an extent that our protection is complete. The happy solution is to prevent accidents, but should those accidents occur, then we must know how to remedy matters to the best of our ability, to eliminate the attendent pain and to save life if the accident is serious.

Even the casual job holds forth perils. Tomorrow you may pick up an old horseshoe and scratch one of your fingers with the metal. The cut may annoy you because it bleeds, but there is little or no pain and soon it is forgotten and you go about your regular work without even taking the trouble to wrap a cloth around the injury.

In a day or so, however, you notice that the scratch does not heal but begins to inflame slightly, then the finger swells up and by the time a doctor is consulted blood-poisoning has developed. Possibly the finger has to be removed, possibly the hand. All of this trouble because of a scratch.

A live coal may blow from the forge upon the back of your hand while you are holding some work with the tongs, the injury may cause you so much pain that you cannot do good work for the rest of the day. You suffer a loss in time and endure pain as well, in many cases unnecessarily for by proper attention, the burn will give little or no pain after the first few minutes.

Accidents in general, their prevention and first aid methods will be the subject matter for an article to be published in our August number and it will pay the smith to keep the magazine handy in his shop.

Does It Mean Peace?

WITH the signing of the Treaty, Peace is once again restored to the world, but the question arises; does a pen and ink signature change the character of a nation?

Germany has protested every point in the Treaty, has been unwilling to accept any responsibility, unwilling to pay for the damage she has caused, and unwilling to bring the guilty parties before a tribunal. She has said that she signs under protest and candidly admits that she does not intend to conform to the conditions outlined. She is like a disobedient child who says he is sorry even while planning a fresh outrage in his mind. She is like a pile of soft coal afire at the center, a fire that is not evident except for a thin, almost invisible cloud of smoke, but a fire that threatens to break forth at any minute.

We must always bear this fact in mind and remain prepared at all times to enforce the law. We cannot rest in security for as soon as Germany regains her strength she will, undoubtedly, throw off her bonds and start out in quest of more trouble.

The present form of German government claims to be one elected by the people and to represent the people. If we accept this as true, and if we are willing to grant that the present government wants peace, the question arises: Why were the interned war vessels at Scapa Flow destroyed by the people? In itself this act was a breach of faith and contrary to all international law, yet it was countenanced by the government even while preparations were being made to sign the Peace Treaty. Remember, this is only the slight film of smoke above the coal fire!

On every hand we hear the argument—"the terms were too harsh," even if this argument were admitted to contain reason, and we do not, why does Germany refuse to conform to any terms? Why does she break faith and destroy war material which she already has and the surrender of which would serve to pay in part the indemnity? If a person is willing to pay only half what he owes, then the only way to collect in full is to charge double prices. No! The war terms given to Germany are not too harsh, but she will not pay, for it is not her nature.

Germany has taught us how she respects treaties, "A scrap of paper," was the Belgian treaty, given and accepted in good faith by that little country, yet broken without reason. What then is the present Peace Treaty to Germany, a treaty signed under protest?

The world must keep prepared for at the least sign of weakness, the criminal will again make war. Fear of might is the only thing that Germany respects; now that we are awake, let's keep awake.

The Prize Photo Contest

IN this issue we reproduce two more pictures which have been entered in the prize photograph contest. Time passes very quickly and soon the contest will be closed, so it is about time for you to send us the picture of your shop. Just remember that it does not cost you anything to enter the photograph and as soon as the picture has been reproduced, your photograph is returned to you, undamaged, just as you sent it to us.

In addition to the original photograph, you will receive, post-paid, the half-tone from which the reproduction was made. This cut in itself is worth from three to five dollars, sometimes more and you can use it for printing bill heads or reproducing the picture of your shop on letterheads. If you do any advertising, you may have the picture printed on post-cards.

So you see you really receive a good prize whether you win or loose in the contest—but then, you may be the man to receive the cash prize as well. Anyway you look at the contest it is a case of "Heads, you win—tails, you cannot lose."

Send us that photograph!

An Article That Is Different

IN this issue we print an article that deserves particular consideration of blacksmiths; we refer to that which deals with Scrap Metals. The writer, whose business it is to keep in touch with metal markets, is well informed and gives many valuable suggestions.

Undoubtedly the business of "Junk dealing" is a lucrative one. Every state boasts of at least one man who has made a fortune in scrap metals. In many cases the fortunate man started in business with a wagon and an aged horse, collecting junk from house to house.

By a careful sorting of his scrap metals, the average smith in a short time may be able to salvage considerable of value and sell it for more cash than he could otherwise. Read the article carefully, it may be worth money to you.

The Rock Drill Blacksmith

Part XI—Forging and Welding Solid and Hollow Rock Drill Steel Stock

THE mode of operation of the forge described in our previous installment, is quite simple. A fire is started and built up even with the top of the concrete or cement hearths. Then crushed coke is added and packed down until the top of the coke is, say, half an inch above the hearth level. The bits are then laid in place, side by side. Two layers may be put in place, one on top of the other.

Certain variations occur to the writer, which may prove useful. The cylindrical form may be replaced by a box-like shape. That is, the top will be a rectangle in form. The fire-box may be so arranged as to have a broad hearth in front where the bits are to be placed, and a narrow hearth to the rear. The bottom of the fire-box may, it would seem, be advantageously tilted in the direction of the door for the purpose of facilitating cleaning out the ashes, etc. Or, the floor may be tilted so as to descend to the rear, where a long narrow door could be hinged from above, this door providing for the withdrawal of ashes. The advantage of using the cylindrical form of steel sheathing seems to consist mostly in the fact that it may be easily purchased. Of course, this is something to be determined at the time.

The sheet steel shell may, if desired, be entirely dispensed with in the following way: A wooden form of the size and shape wanted may be set up and a forge built up of concrete and "plums." "Plums" is the word used by contractors to designate rather big stones imbedded in a mass of concrete for the purpose of cutting down the expense for cement, etc. They are often used, and used properly, in foundation work. The idea is to fill up space with big pieces of rock that cost but little and reduce the amount of concrete. In the present case, a large part of the base of the forge, 27 inches of depth, may be filled with "plums."

It is assumed that the complete wooden form is in place, including the trough-like arrangement for the fire-box space. It makes no difference whether it is circular or rectangular. Concrete is filled in, say, to the depth of 15 or 16 inches. Then the "plums" are put in, one or two at a time. They need not be placed as a mason would build a wall. Such careful placing is entirely unnecessary. The pile should be able to stand up without tumbling, until the concrete has set.

Care may very well be taken, however, that no "plums" touch the wooden form or come nearer than, say, 1½ or 2 inches of it. When the concrete has, later on, hardened, there will accordingly be a layer of true concrete all round the sides. Likewise, the tops of the "plums" should be kept below the level desired for the hearths. A 2-inch allowance will be a good one.

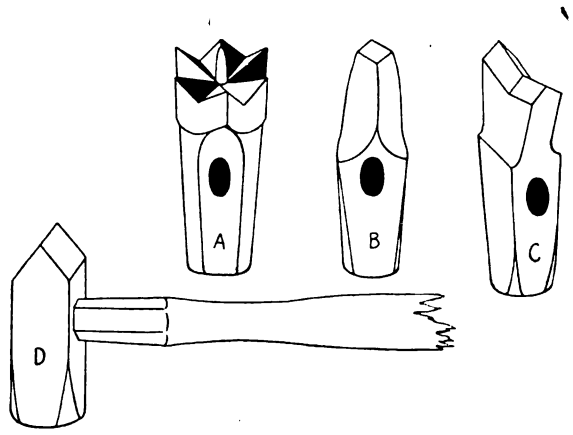
It may be found that the 15 or 16 inches of concrete has risen all the way or nearly all the way to the hearth level. If not, more concrete, and perhaps more of the "plums," may be added. A caution or two as to the use of "plums" may be usefully included here. First, it is desirable that the individual stones be sound. A stone that is about to crack in two or which is weak will mean a possible point of weakness in the resulting mass when the concrete has hardened. Such a weak point may or may not be of importance. The smith may judge at the time. It will be well not to take too many chances.

Further, each stone should be clean all over. If necessary, they should be washed in water containing no grease, or by means of live steam. If a stone is put in that has even a thin coating of clay or loam or other similar material here and there, these spots will prevent the concrete from clinging to the stone. The clay or the dirt interferes with the desired clinging effect. A forge built in this way ought to cost but little for cement. A good big stone may be used, if available, for the central core.

Hollow drill steel comes in several different forms—hexagon, octagon, cruciform, etc. This means that the cross-sections will have an outline of the shape of a hexagon, etc. The accompanying figure will make certain forms clear. It should be remembered that this steel with its central hole is weaker than the same size of solid steel when used similarly in drilling.

The hole will ordinarily not have a diameter smaller than ¼ inch. In fact, the stock steel should preferably be treated for this minimum diameter. This may be done by noting whether a ¼-inch steel ball may be passed through without difficulty. On the other hand, the diameter should at no point exceed ⅜-inch. It is desirable, not to say necessary, that the hole, be fairly central. That is, it should have its center not more than 1/32-inch from the true axis of the bar. Within, the hole should be free from sharp corners. These requirements may be realized in hollow stock generally.

Naturally, when two lengths are, for any reason to be welded together, the same requirements are to be regarded as applying to



Tools for Sharpening Hollow Drill Steel: A, Dolly; B, Gouge; C, Quarter Dolly; D, Spreader. Reproduced from Sullivan Machinery Co.'s Book.

the work after the blacksmithing is done. If any deviations occur, it will be well that the smith consult the superintendent having the drilling in charge as to the permissibility of the variations.

So then, when welding and forging hollow steel, the smith must generally be on his guard not to destroy sizes and forms; but, if he does, to restore them before he considers the job as finished. Similar remarks apply to solid steel, but naturally not to the same extent, the case being simpler.

To forge a bit from new stock, one first cuts the stock across and squares up the end that is to become the face of the bit. The chisel is a proper tool for the foregoing. The end is now heated for the purpose of upsetting. The amount of steel involved in this heat may not be more than 1½ inches. If the length is only one or two feet long, it may readily be upset by striking the hot end down on the anvil, holding the length vertical while doing so. If the piece is too long for this procedure, it may be laid horizontal and upset at the side of the anvil.

The diameter produced by the upsetting is to be somewhat less than that desired in the finished bit. The taper should be such as to agree fairly closely with that demanded in the finished work. For a good deal of work the length of the tapered part will be distinctly less than the diameter of the completed bit.

As an example, illustrative of the foregoing allowances, consider the case where a bit is to be given a finished diameter of 1¾ inches. When upsetting, the diameter may properly be made about 1½ inches. The length of tapered bar may, in the generality of cases, be made 1¼ inches.

If the bit is being made from hollow stock, the next thing will be to punch out the hole. The hand punch is a proper tool. The hole is to be given sufficient size to receive the pin on the dolly. This tool is now employed simply for the purpose of marking the work. That is, it is applied to the face of the work and its pin made to enter the hole. It is brought to proper position, when a sharp blow will cause it to mark locations.

Ordinarily, there will grooves to be made between cutting edges. The gouge may be used to make them. The cut is made by starting at the circumference and working in to the center. The depth of the cut at the beginning may be made one-half the depth of the tooth when finished. The cut is made shallower and shallower as the hole in the center is approached. In fact, the aim is to manage the cut so that it will just run out to no depth at all just before the hole is reached. The smith aims to have a flat uncut ring ⅛-inch wide all round the hole.

The gouge is used on steel that is heated only to a moderate color—say, dull red—the smith being careful that the hardening color is not reached. The object in using a low heat is largely to insure a clean cut with the gouge. Naturally, less muscle is needed with a higher heat, but the work will probably suffer, a ragged cut being the thing to expect.

The hole for the dolly pin is now punched out again. Then the work is reheated, the purpose now being to give a more exact form to the cutting face with the aid of the dolly. The heat should be moderate—say, a medium cherry red. In any case, the work should not be heated to the point where scales begin to form. The forming is not to be completed, however, at this operation. The reason for avoiding a finish is that the result of the hammering to force the dolly would likely upset the bit too much.

It is assumed that the style of bit is a rose that has six or more radial cutting edges. So, then, instead of seeking to shape all the edges in a single operation, the smith is to be content with striking the dolly, say, half a dozen good blows and then using the quarter dolly—sometimes called the fishtail dolly. It will reach clear across the face, but will deal with only two of the grooves. That is, at each setting of the quarter dolly, it will enter two radial grooves which together make up a diameter.

The smith works with this tool, changing its position between blows so as to work round and round the face of the bit. But this is not to be done, generally, without interruption, as the continued use of this tool would doubtless tend to put the face out of shape. So, then, the smith is to interrupt its use now and then and employ the full-faced dolly to correct any small deviations that may have occurred.

Between the cutting edges of the rose-bit face, but on the sides of the taper, grooves are now to be cut. These are really prolongations of the radial grooves in the face, only they are on the sides and not on the face. Their function is, in part at least, to permit the chips of rock cut by the face to find their way to the outside of the bit. When the bit is in action, these chips are forced away from the center by the slant of the radial grooves. Arrived at the ends of the radial grooves they pass up along the side grooves now occupying our attention.

These side grooves, six or more in number, will be deeper or shallower as the size of the bit may require. Possibly, also, the character of the rock may call for variations as to depth. They are to be of a size to perform their duty of passing the rock chips. For an ordinary case, with the face diameter 1¾ inches, a depth of ¼ or ⅜ inch may be just right.

These cuts may be termed dust grooves. It is exceedingly important that they be big enough to pass the chips. If they are too small, then it is necessary that the face should break them to a size small enough to permit their escape. Naturally, when the drill face is engaged in this useless work it is more or less prevented from doing its proper work. In fact, an accumulation of chips unable to escape will tend to cushion the proper blow of the bit face on the rock.

To maintain the gage and to keep the

teeth flat, a small-sized flatter may be employed. The grooves may be cut with a cold chisel or with a spreader. The work is heated, say, to a medium cherry red. Finally, the face is finished with the dolly in such way as to have sharp cutting edges all the way out to the outer rim.

Other forms than the rose bit will naturally require variations in treatment. The foregoing directions, though applying especially to the rose form, will give the general mode of procedure.

Re-Sharpening

The operation of re-forging and re-sharpening the cutting face of a rock drill bit is called re-sharpening, although it is mostly work done with forging tools. The drill steel is set, after having been properly heated at the bit end, with a suitable arrangement to resist blows against its face. There are several ways to provide the necessary resistance. The shank end is set against it and the quarter dolly used to form the face over again. A medium cherry red is a suitable temperature.

Intelligent use of the quarter dolly will enable the blacksmith to reform the face of the bit up to within, say, 1/4 or 3/8-inch of the very edge. The sides of the bit are now hammered in towards the center in order to make them re-take their proper position. A sharpener's cross pean hammer is a proper tool to use for this work.

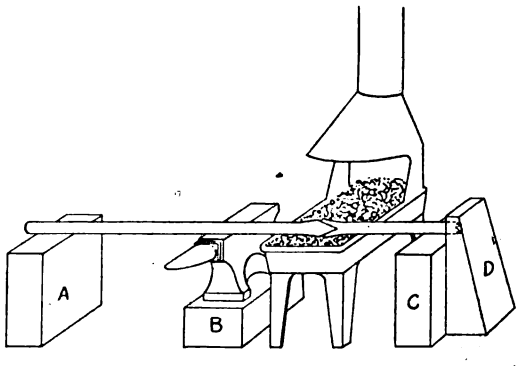
The corners having been brought up, the face of the hammer is now employed to smooth them. The full dolly is next used. It is applied to the face of the bit and a true form given. A flat is employed on the sides to produce the correct gage. Attention is to be given the side grooves (the dust grooves) to see that they have the proper dimensions.

Welding Hollow Steel

It will at times be necessary to weld together two lengths of hollow drill-steel. The special difficulty consists in doing the welding without stopping up or dislocating the hole in the region of the weld. The strength of the finished weld is also important.

To weld hollow stock, it will be well in the first place, to arrange things in the shop especially for the job. It is desirable to provide for easy handling of the work when it is to be shifted from the anvil to the forge and back again. Further, the total length of the work being considerable, it will be necessary to support one or both ends. This support will probably be needed both when the parts to be welded are on the anvil and when in the forge.

A very convenient arrangement, suited especially to cases where the forge fire is in a pan standing on legs out in the shop—that is, where there is open space to each



How Hollow Drill Steel May Be Supported for Welding: A and C, Supports; B, Anvil; D, Abutment. From Sullivan Machinery Co.'s Book.

side of the fire. The anvil may then be set alongside the forge pan. The idea is to lay the work across both pan and anvil. Then, when it is necessary to shift it to bring the joint into the fire or onto the anvil, it will only be necessary to move the work in the direction of its length, without shifting it at all.

There will be little or no difficulty in arranging supports for the ends. These arrangements make it easy not only to shift the joint into and out of the fire, but also to turn it during the heating and forging.

In carrying out the welding procedure, it will, according to the method about to be described, be necessary to hammer the work at one end to drive one part of the joint against the other. It will be necessary, accordingly, to provide some kind of resistance at the end other than the one at which the hammer is to be used. A heavy block of metal properly placed may meet the requirements very well.

The ends to be joined are now prepared. Both are to be upset somewhat and then squared. The one is given a cold-chisel edge. This is a double bevel. A proper angle for the double bevel will be 75 degrees. The end which is to form the other half of the joint and which has already been upset and squared is now split along a diameter and the two sides spread to form a V-groove. The angle in this groove is to be slightly larger than the angle of the double bevel. Thus, if 75 degrees be the angle of the double bevel, the angle of the V may properly be made 80 degrees.

The depth of the V—from the top of the V to its point—is to be about equal to the length of bar devoted to the chisel edge; so that when the chisel end is inserted in the groove end, the joint will have the right amount of metal everywhere to produce the proper diameter of rod when the job is finished.

The purpose in giving the chisel edge a somewhat sharper angle than the V is to provide against a possible rebounding action when the sledge is used to drive the joint together lengthwise. With the sharper chisel edge, actual contact is limited to the region of the very edge. This will either stick or not when the sledge strikes on the distant end. There will probably be no rebound.

After the two ends are shaped in accordance with the foregoing directions, the holes are to be opened. This may be done with a tapered piece of steel. This punch should be so tapered as to open the holes to a double diameter at their mouths and yet not effect this result too abruptly. The preparations are now in such shape as to permit welding to begin.

The two bars are arranged with the prepared ends together and in the fire, the bars extending out and resting on the supports. The outer end of the bar with the groove may also be set against a resistance of some kind, as a block of metal. The two ends forming the joint are now slowly turned as the blast is operated, the object being to produce an evenly distributed welding temperature.

A high-welding heat is not sought, but a low one. Whatever welding compound is used may be sprinkled on at this time. When it is judged the heat is right, a few rapid and light blows are struck with a small sledge on the outer end of the bar having a chisel edge with the object of making the edge stick in the bottom of the V-groove. It will be noted that all this can be done while the joint is still in the fire.

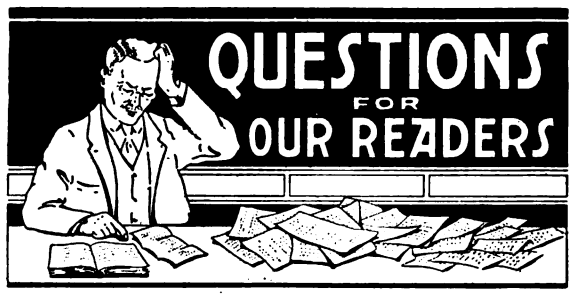
When the two bars stick, the work is shifted lengthwise to bring the joint onto the anvil, provided the joint is still sufficiently hot for welding. If not, then heat it up a bit. The sides of the V are hammered down onto the sides of the chisel edge, the smith taking care to work from the point of the V to the top of it, and not in the reverse direction. Otherwise, slag or other foreign material may be imbedded or otherwise caught in the weld.

The authority I am following here does not specify that the scarf surfaces should be rounded in such way as to present bulge to bulge. Nevertheless, I caution the smith as to this. In practically all kinds of welds, the edges which come into contact should be made convex towards each other, if it is at all possible so to prepare them.

In order to understand what is meant by "convex," one has only to consider a tea-cup. Its bottom will be rounded inside and outside. The hollow (inside) part is concave, and the bulging (outside) part is convex. When two convex surfaces are brought together, they have only a little contact. That is just what is wanted when the welding starts. Then, if the hammer begins at a point so located that the result of the hammering will be to force the two surfaces together at the region of contact, the welding will start right.

The smith now hammers on all sides but close up to the starting point, and continues to work away from it only in a gradual manner. The weld is consequently closed little by little from the first point of contact out. This will tend to force out any foreign material instead of trapping such material. In other words, this mode of procedure tends to produce a clean weld and assist the welding compound. The lesson to learn and apply to the welding of drill rod is to round the surfaces that are to come into contact. In the present case, the sides of the V may very well be bent back in order to produce convex surfaces on the inside.

It may be difficult to round the sides of the chisel end. However, they may be rounded across the bar. I would advise, then, that the smith at least bend the sides of the V and round cross-wise the sides of the chisel end. However, he is still to make sure that when the chisel edge is inserted in the V groove there will be contact only in the region of the very edge of the chisel.



Second Hand Planer

From Geo. MacDonald, Connecticut.—I am in need of a cabinet planer and would like to find a good secondhand, small one, cheap, for cash.

Power Hammer for Shop

From B. H. Brooks, Texas—Will some brother tell me the best make of power hammer for a small shop? Also what is the best process for sharpening or rolling discs cold?

Pre-Heating Torch

From C. C. Richter, Iowa.—Will some one of my brother readers kindly explain how to make a pre-heating torch in which I can use kerosene under air pressure for fuel?

A Saw Table?

From Chas. Jenkins, Canada.—Will some brother be good enough to tell me through the columns of the Blacksmith and Wheelwright how to build or make a small saw table or stand for a circular rip saw with tilting table and give full measurements and also how fast the saw should run. How many R. P. M., say, on a ten or twelve inch saw for use in a small country shop.

Infected Hoof

From Charles P. Jenkins, Canada.—I would like to know if anyone can tell me how to cure a hoof trouble which has existed about two years. About two years ago this horse picked up a two-inch nail which entered the hoof just under the frog on his front foot.

The resulting hole heals over at times, but soon breaks open again and pus forms. I have poulticed the foot for two months at a time and have poured all kinds of oils and liniments into the hole, but cannot heal it or dry it up.

I have never pared or dug out the hole to the bottom. I think that the nail must have entered a bone or some joint about half way between the point of the frog and the back.

A TAILOR'S SIGN

The tailor's sign in a little inland town was an apple, simply an apple. The people were amazed at it. They came in crowds to the tailor, asking him what on earth the meaning of the sign was.

The tailor, with a complacent smile, replied:

"If it hadn't been for an apple, where would the clothing business be today?

A Lifting Jack

From Charles Nelson, Illinois.—I have been at the blacksmith trade for 15 years and still am interested in it. I own my own home and the shop which is located in a small town of about 500 population, with a good farming country around it.

My shop is 50 by 22 feet and it is well equipped. For power I use a gasoline engine and the shop is equipped with a trip hammer, a 34-inch bandsaw, 24-inch planer, cold tire setter, emery wheel stand, cold shear, disc sharpener, 50 and 100-pound vises, together with many small tools, a good stock of steel and wood.

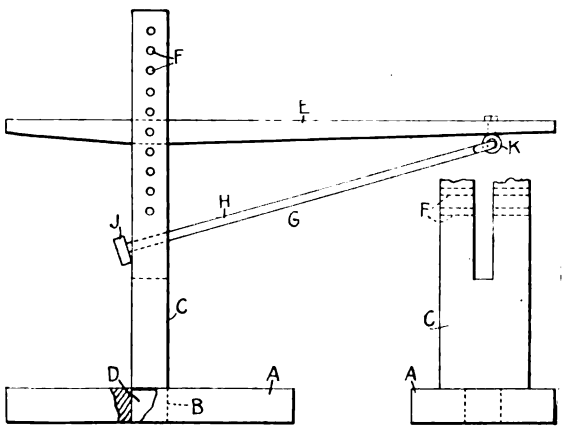
I have one competitor, but we get along finely and treat each other right. If I have a "dead beat" on my books, I tell him about it and he does the same thing for me. So you see it is possible to have a kind of local union even in such a small town. I think the trade would be better off if they would get together and be more sociable.

Let me tell the boys how to make a lifting jack which I think is one of the most useful tools I have ever seen.

First, take a piece of wood, *A*, 2 x 8 inches and about 16 inches in length and bore a 2-inch hole, *B*, in the center of it. Next, get a board, *C*, 2 x 5, 26 or 28 inches in length, according to the height of the lift and cut a tension, *D*, in it so as to fit the center of the 2 x 8 piece.

Next, bore a 1⅛-inch hole in the 2 x 5, about 6 inches from the tension and then saw out to the end (the top). In the sides of this piece, bore a number of holes, as required and as shown at *F* in the illustration. After this is done, the lever arm *E* should be made (of one-inch stock).

The locking rod *G* is made from ½-inch



rod and is fastened to the lower side of the lever *E* by means of the eye bolt *K*. This rod should be about 24 inches long and on the other end a piece of ⅜ x 1¼-inch iron should be welded, this is placed between the fork of the upright and when the weight of the axle or carriage is rested upon the lever arm, this piece of iron locks against the upright.

A Daily Record Sheet

From R. W. Hodgson, Canada.—I am sending you herewith a sample sheet of my daily record which should be of interest either to the blacksmith or the repairman. I have worked out this system after two years of actual practice and have tried many others, but do not find that they are so simple or answer the purpose as well as this one.

Every transaction during the day can be entered on this kind of a sheet and when it is done you have a record of all the work on one sheet, then all or any particulars can be posted to the ledger as required or the daily totals on the sheet can be entered in a book kept for that purpose alone, which will show the total sales, cash paid and received, and give a good analysis of the amount of work to be done.

Together with this, one should keep a pad or job sheet on the desk upon which one can enter the material and labor for any jobs, or any particular job can be kept track of in detail. In many cases such a job sheet saves trouble because when the customer wants further information the sheet is on hand for further reference.

DAILY RECORD AUG 3

NAME	PARTICULARS	WORK VALUE		SALES ?	SALES @		CASH R		CASH P	

The following items should be carefully noted. First, Work Value. This includes the total amount of the job. Under Sales the cash received or charged is noted. Under the heading Cash, simply the cash received or the cash paid out. In order to make everything clear this form allows room for all entries.

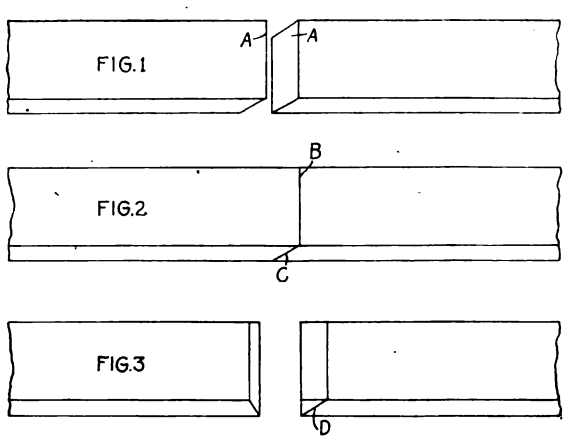
When a job is done, the name and particulars as well as the amount of the charge is entered. When it is delivered, it is extended into the sales and cash columns or if the work is delivered later on in the day or a day following, a new entry is made giving the name and stating whether the particulars were entered in the sales column.

Work that is not delivered when finished is entered on a slate or a pad or a special book, together with the particulars, etc. If any one pays cash on account of a former credit, it is entered in a similar manner in the cash received column. Cash paid out for a similar reason is likewise taken care of. By taking the cost value of materials used each day or week, the turnover or work done as well as the gross profit are determined.

Welding Springs

From J. M. Pigg, Oklahoma.—I have been a reader of the BLACKSMITH AND WHEELWRIGHT for a long time and have obtained from it many good ideas and methods for doing different classes of work. All of this time I have felt that I am the "little fellow" and have kept quiet.

At various times I have seen unsatisfac-



tory spring welding jobs, and at times I have read of methods which do not seem correct, so I wish to write about my method, which I think is the right one. But first let me tell of the general method used.

Oftentimes a spring is brought into the shop where the smith is very rushed with work and the smith wishes to do the job in the quickest way possible so he prepares the spring, as shown at *A*, in Fig. 1. Then he makes the weld, as shown in Fig. 2. The weld may be good, but when a severe strain is put upon it, the leaf snaps, usually at either *B* or *C*, and when the work is brought back to the smith he can say that it did not break at the point where he welded it. He can easily turn the spring over and show where the weld came, as at *D* in Fig. 3, and prove that the weld held all right.

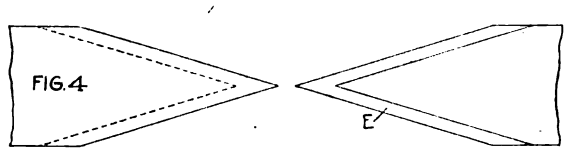
I have a good reputation in this town as being a spring welder and I use the following method in welding springs:

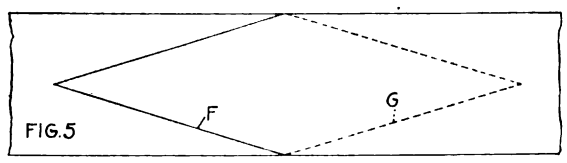
First, I heat the broken spring leaves and bring them both to a point, as shown in Fig. 4. Then I bevel the top side of one, as shown at *E*, and the bottom side of the other to correspond so that they will fit together and lap somewhat, as shown in Fig. 5.

After this is done, both parts should be heated to a bright cherry red and polished with a steel brush or any kind of a scraper. Then the welding compound is applied and the parts put back into the fire until they are heated to a good yellow heat. The color should extend back the length of the lap on both pieces. A clean fire is essential.

As soon as both parts are heated, they should be removed quickly and placed together, as shown in Fig. 5. The work, until the weld is completed, should be done at top speed. With quick strokes of the hammer pound down, first the points, then the center.

The spring is now double thickness, or nearly so, at the center, so strike it with the hammer to knock out the curve and again put it in the fire. Use plenty of borax and heat it to a yellow heat, then work it down





to the correct thickness, finish so as to leave no hammer marks.

As a final operation the spring must be shaped. I bend the leaves so that each one stands open and away from the next one to it, from ¼ to ¾ of an inch, depending upon the length of the leaf. The edges of the leaf should then be rounded off, since this adds to the strength.

Springs should never be heated to a white heat, they will not weld so easily, and they will be destroyed. If the leaf is heated too much, it might just as well be thrown into the junk pile.

If my method of welding is used, practically all of the strain falls upon the spring at the points *F* and *G* in Fig. 5, and since the welded line is at right angles to the strain, there is practically no danger of breakage at the weld.

I charge 75 cents for each Ford leaf that I weld and one dollar for larger jobs, yet I get the work just the same. If any of the other readers have a better method, I wish they would write about it, for I am always willing to be shown.

From the Northwest Corner

From E. Nord, Washington.—My shop is located in the best and richest farming country of the United States and I always have lots of work all the year around. I obtain good prices and do considerable automobile work such as welding springs and relining brakes.

My shop is hardly large enough at present and I intend to build an addition to it of

about 20 feet. I have more horses to shoe than I can attend to, and I also do considerable tractor work. This is the first letter I have ever written for the paper, though I have read it for a number of years.

Frices from New England

From A. D. Keen, Maine.—I have just read the requests for price lists which you published in your June issue, and since I have not seen any lists from this section, you may be interested in those which I am getting.

Shoeing, Numbers 0 and 1, new	$1.25	
Resetting, Numbers 0 and 1	.80	
Shoeing, Numbers 2-3-4, new	1.50	
Resetting, Numbers 2 and 3	.90	
Resetting, Number 4	1.00	
Shoeing, Number 5, new	2.00	
Resetting, Number 5	1.50	
Shoeing, Number 6, new	2.50	
Resetting, Number 6	2.00	
Shoeing, Number 7, new	2.75	
Resetting, Number 7	2.00	
Shoeing, Number 8, new	3.25	
Resetting, Number 8	2.25	
Resetting tires.. ¾:⅞:1-inch	$2.25	per set
" " 1⅛ "	2.50	"
" " 1¼ "	2.75	"
Resetting tires.. 1½ "	3.00	"
" " 2 "	3.50	"
" " 2½ "	3.75	"
" " 3 "	4.00	"
" " 3½ "	4.50	"
" " 4 "	5.00	"

New tires, up to ⅞ x ¼-inch, $6.50.
New Spokes, from 25 to 30 cents each.
New Rims, ⅞-inch, $6.50 per set.
New Buggy Shafts, $2.25 each.

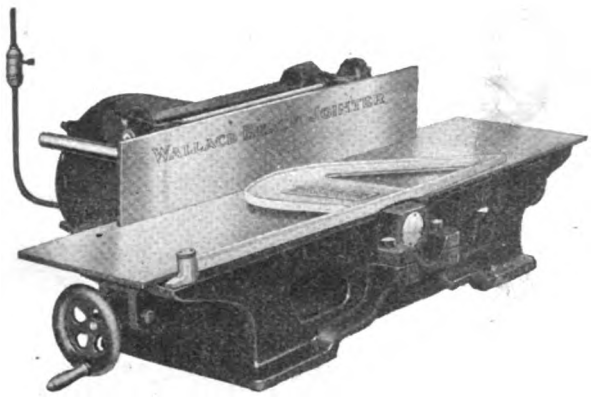
I wish that more of the smiths from this section would send in prices, so that we could have a more uniform scale of prices. I doubt if many of the smiths are really obtaining the money that really belongs to them.

SPARKS AND SHAVINGS

Bench Type Jointer

A very interesting new machine has been successfully developed by an enterprising concern of Chicago, J. D. Wallace & Co., Station C, Chicago, Ill., whose Portable Bench Machines have become so popular among mill workers and wood workers in general.

Known as the 6-inch Wallace Bench Jointer, similar to the 4-inch Wallace Bench Planer and retaining all of the features that have enabled its smaller predecessor to win its way into the majority of well-equipped woodworking shops, this new machine is noteworthy because



of its exceptional power. It is capable of developing three times the power possible with the smaller machine; and, when it is recalled that the 4-inch model has more power per inch of knife than can be obtained from any belt-driven jointer of 3 to 5 horsepower, the effectiveness of the new 6-inch Wallace Bench Jointer is apparent.

Despite its greater size and power, the machine can easily be picked up by one man and carried wherever there is work to be done; and as it is equipped with its own motor, lamp cord and plug all ready for operating at any time from an ordinary lighting circuit, it represents a definite advance in woodworking machinery.

In many woodworking shops a considerable amount of time is consumed by workmen walking back and forth from their benches carrying small work to the big stationary jointer. From the standpoint of economy of the new Wallace product is effective because it enables the workman to do the bulk of the small planing right at his bench, thus saving considerable time and releasing the big jointer for major operations.

An especially interesting feature is a new fence that has been developed in connection with this new machine. This fence is mounted on the motor and slides backward or forward on rods rendering it more quickly and accurately adjustible than any ordinary machine. The fence is also designed so that only a fraction of an inch is lost on the table when the fence is set for beveling.

In examining this new machine one's attention is instantly arrested by the novel manner in which the motor is applied. The cutter head can be easily taken out and other heads inserted in only a few seconds. Tables are arranged to slide backward to permit the use of these special heads or forward so as to work with the narrowest possible throat opening a feature that will prove especially desirable when the machine is doing small or very close work.

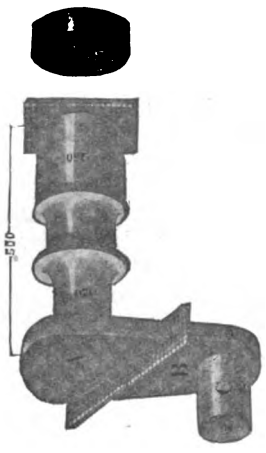
Ball Bearings are used on all motor and cutter head bearings, thus eliminating friction and prolonging the life of the machine.

An extremely ingenious and apparently very efficient arrangement of the flap and shutter guard has been effected by mounting the shutter guard on the cutter head bearing rather than in grooves.

Many of our readers have felt the need of a bench type jointer of this size and power, one they could place at the workman's elbow and thereby do away with all unnecessary walking to and from the big stationary machines. Others have realized the great amount of time and labor that such a machine would save through the elimination of costly hand fitting, trimming and jointing. All of these objects would seem to have been obtained in the new 6-inch Wallace Bench Jointer.

Laffitte Welding Plates

Welding problems are made easy with the use of the Laffitte Welding Plates, which are made in two grades: heavy for material ½-inch in thickness and



over, and light for material under ½-inch in thickness. The plate is 4 x 8 inches and is chequered so that a piece of any size can be broken off by hand without loss or waste. One plate is sufficient to make from half a dozen to one hundred welds, so that the cost is practically nothing when the saving is taken into account. The chemical action of the plate is said to increase instead of decrease the strength of the weld.

Metal can be welded at a low heat. The plates are used in a simple manner, the two parts to be welded are heated to a cherry red if steel, or a white heat if iron, and a piece of Laffitte Plate of sufficient size then placed between the two parts. Then the parts are pressed together until the plate fuses, then hammered lightly and completed in the usual way. The piece may then be reheated to any desired heat without endangering the weld.

A feature of a "Laffitte" plate weld is the fact that a homogeneous weld is secured. It is not merely stuck on but becomes a solid piece, with the strength of the original. In many cases the strength is materially increased as with steel castings.

These Laffitte Welding Plates are used extensively by large industrial companies in this country and abroad. The plate welds iron to iron, iron to steel, steel to steel, machinery steel, crucible steel, tool steel and steel castings. Blacksmiths will find these plates effect great economy in their shop operations. There is no equipment necessary, nor does it require any change in method.

The Laffitte Welding Plates are handled everywhere by all active dealers, and the manufacturer, The Phillips-Laffitte Company, Pennsylvania Building Philadelphia, Pa.. will be glad to furnish samples on request.

Absorbine

If your horse has anything wrong with him, you are naturally looking for something to get him going sound. Have you tried *Absorbine?* This remedy has been on the market for over a quarter of a century and is constantly making new friends as well as retaining the old ones.

Mr. W. J. McManemon, South Weymouth, Mass.. writes under date of February 12, 1919, "I became acquainted with *Absorbine* in 1898. I have used a great deal of it in the past twenty years and have been helped out of many tough spots by its use."

Absorbine does not blister or remove the hair and the horse can be used during treatment. Wind puffs, strains, sprains, bursitis, bog spavin, capped hock, swollen tendons, all are promptly reduced by the use of this valuable remedy which should be in every stable. Special instructions for treatment of your case will be sent upon application. W. F. Young, P.D.F. 55 Temple St., Springfield, Mass.

Advertising Cap Free

If our readers will refer to the advertisement of the Corona Mfg. Co., of Kenton, Ohio, which appears in this number of the BLACKSMITH AND WHEELWRIGHT, they will find that they can obtain free of charge, a cap which we understand is made of the best material and to carry simply the advertisement of the company's product, "Corona Wool Fat Compound." All that is required of the reader is the filling in of the coupon which appears in the advertisement. Therefore, we trust that our readers will avail themselves of this opportunity.

Rego Welding and Cutting Equipment

The Rego Cutting and Welding equipment is manufactured and sold by the Bastian-Blessing Co., West Austin Ave., at LaSalle St., Chicago, Ill. These outfits have been on the market for only a short time and are meeting with tremendous success.

The popularity of this apparatus is due primarily to their remarkably efficient design. In the Rego torch the flashback, which is the bane of the welder's existence, has been eliminated. The design is distinctly different and the gas is carried to the mixing chamber in such proportions that the acetylene is under slightly greater pressure than the oxygen.

So well is the mixture regulated that a truly neutral flame is the result. There is practically no danger of burning or carbonizing the work when making welds. The company manufactures a great number of torches both for welding and cutting and yet the apparatus is not high priced.

Justrite Plow Blade Sharpener

In every modern blacksmith shop, machines are taking the place of men and where a job can be done by machine it can be done cheaper and at a greater profit than by the old-fashioned method. The Strite Governor Pulley Co.. 307-309 South Third St., Minneapolis, Minn., is manufacturing a machine that well deserves investigation by every blacksmith for the simple reason that this machine can be used for a great number of tasks. It is termed a "plow blade sharpener," but in reality can be used for working down to a sharp, smooth edge, practically any kind of sheet metal such as plow blades, road scrapers, shovels, knives, or mower teeth.

The device is mounted upon a heavy stand and driven by a flat belt through tight and loose pulleys. It consists of an anvil upon which the work is placed and a reciprocating roller arm acting under pressure. The power required for operating this machine is but two horsepower and the manufacturers claim that the device will pay for itself within a few weeks. After that time the profits are practically 100 per cent.

National Fifth Wheels

Wheelwrights and blacksmiths who do wagon repair work or wagon building should acquaint themselves with National fifth wheel, manufactured by the Lancaster Foundry Co., of Lancaster, Pa.

We understand that this device is of special design, in that the perch, which is made of wrought iron, is of one-piece construction. The feature of this wheel is that it permits a remarkably short turning radius.

This concern also manufactures other wagon fittings and smiths should write for details and prices for orders can be filled at very short notice.

Welding Compound

N. D. Doxey, of Elmira, N. Y. manufactures an interesting welding product known as Anchor Welding Compound, and which he claims completes a job without unnecessary hammering. So sure of his claims, is he, that any of our readers who care to try the compound may obtain a free sample. Write for the trial package.

Birch Automobiles

Never before in the history of the country have automobiles been so easy to sell. Practically every manufacturer in the United States has sold his product up weeks or months in advance. The prospective purchaser feels grateful to the agent who takes his order.

Such being the case, the sale of automobiles is a very easy matter, no sales arguments are necessary, and the smith who carries the agency need do but little aside from collecting the commissions. We should advise our readers to write the Birch Motor Cars, Dept. 545, 81 East Madison St., Chicago, Ill., for their attractive offer.

This company are in the market with exceptional bargains in automobiles, both four and six-cylinder machines one of which the agent may obtain by but little effort.

H-B Tempering Process

Hits the nail on the head, where practically all Blacksmiths fall down,—Tempering of Steel.

Write for particulars. We can convince you.

You cannot afford to be without this invention. Once tried, always used.

Manufactured by the

H-B TEMPERING PROCESS CO.
CLEARBROOK, MINN.

IT MAY BE

further around the corners of a square deal, but the road is safer.
We have never over-praised the ability of the

Kerrihard Power Hammer

We prefer to leave many of its good points unspoken—as a pleasant surprise to the purchaser.

It does the work of four men.

Write for full particulars.

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and lose from $5.00 to $35.00 worth of milage. Strengthen it on the "inside" and use it from 1000 to 4000 miles longer—**Save that money.**

MAXOTIRES
MAKE ALL TIRES TROUBLE-PROOF

They prevent blowouts (even at rim), punctures, stone bruises—taking grief out of motoring. Are reliable. Dealers *re-order* them in Car Load shipments.

Free MAXOTIRE catalog and name of nearest dealer costs only the price of a postal card and may save you hundreds of dollars.

K&W RUBBER COMPANY
50-60 Channing Street DELAWARE, OHIO
RELIABLE—ESTABLISHED 1906

ENDS FORD CRANKING

A remarkable new attachment for Ford cars and trucks which enables anyone to start the motor from the seat, without getting out to crank, is being offered on free trial by the Bear Mfg. Co., 307 Bear Bldg., Rock Island, Ill. This simple device spins the motor and never fails to start the engine instantly. It should be on every Ford. Easily and quickly attached. No mechanics needed. If you want to try one without any obligation to purchase write them today.

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 the head of the "Want" Department on another page.

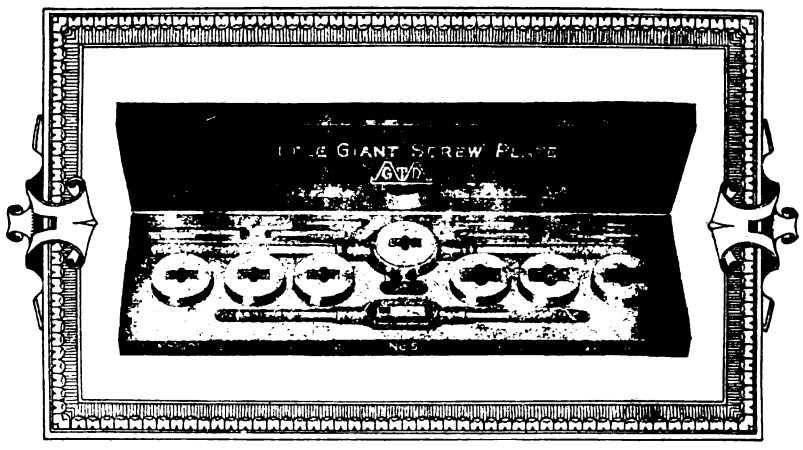
Change of Ownership.

Our readers who are familiar with the Red Head Vitristone Spark Plugs will be interested in knowing that the Emil Grossman Mfg. Corp., Brooklyn, N. Y., has sold out all patents, machinery and good will of this spark plug to the Red Head Spark Plug Corp., of 261 Broadway, New York City, and this latter corporation, which has factories in Newton, Pa., and New York City, will manufacture the product exclusively in the future.

Magneto and Electric Repairs.

Our readers should bear in mind that the Magneto Sales Co., of 1779 Broadway, New York City, maintain a force of thoroughly expert repairmen to overhaul electrical equipment such as magnetos, coils starting motors and lighting systems.

This concern also carries in stock a complete line of parts for practically every standard electrical device for automobiles manufactured in the starting, lighting and ignition systems.



The busiest motor year

This is the greatest motor car year in the country's history. Thousands of new motorists are already trying out their first cars.

Are you ready for all the repair work that is surely coming in the next few months?

Perhaps the rush is already on: then you know the importance of getting jobs done quickly and well. You know how often repair work can be speeded up with a handy

GTD
Look for the trademark

SCREW PLATE

The motorist's first repair visit to you is often a matter of Chance. If he gets the perfect work you can give him with G T D Tools, his patronage is yours as long as he is a car-owner, and one regular patron is worth a dozen transients.

"LITTLE GIANT," "O. K.," "GREEN RIVER," "LIGHTNING."
The Screw Plates that save you dollars.

Our booklet shows cuts of special Screw Plates for all kinds of auto repair work. Write us or ask your dealer for it.

GREENFIELD
TAP & DIE CORPORATION
Greenfield, Massachusetts, U.S.A.
World's Largest Manufacturers of Screw Cutting Tools

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

Northwestern Horse Nails

The Northwestern Horse Nails have been on the market for many years. These nails are made of the best quality material. They are perfect in form and finish and will hold the shoe firmly to the horse's foot. The reinforced point makes this nail an easy one to drive and a safe one to use. Write for samples and descriptive circulars to the Union Horse Nail Co., Chicago, Ill.

A New Vice President

Mr. F. G. Echols, for many years general manager of the small tools department of Pratt & Whitney Company, of Hartford, Conn., has accepted a position as vice-president of the Greenfield Tap & Die Corporation, of Greenfield, Mass.

New Branch Offices.

In order to keep more closely in touch with the trade, the Edgar C. Guthard Company, Chicago, manufacturers of the Billmont Master Wrench, has opened the following branch offices:

Minneapolis, 628 Plymouth Bldg., in charge of Paul Barnard; New York City, 207 West Seventy-sixth Street, in charge of J. H. Cooper; San Francisco, 339 Phelan Bldg., in charge of Ralph Longstaff.

The latest office to be opened is in Kansas City, 230 Rialto Bldg.

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

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, 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. Trademarks registered.

For Sale

FOR SALE—AUTO SUPPLIES
K. W. Coil Points, doz., $2.40; 100 lots, $15.00
Magneto Files, 12c; doz.....$1.20
Speedometer Gears, 15c.; doz.....$1.50
Brake Lining (Durabestos), per foot.

1½x3/16	1¾x3/16	2x3/16	2¼x3/16
35c	40c	45c	50c

Radiator Hose, 3-ft. lengths, per foot:

1"	1¼"	1½"	1¾"	2"	2¼"	2½"
21c	26c	30c	33c	38c	42c	45c

Other sizes in proportion
Ford Hose Connections, doz., 90c.; 100.....$6.00
Ford Felt Packing, per set..... 50c
These prices for dealers only
BICKNELL MFG. & SUPPLY CO., Janesville, Wis.

FOR SALE
1 No. 408 Champion steel horseshoer's forge, $25; 1 heavy floor emery stand, $10; 1 No. 1 Eureka, new style tire bender, $10; 1 iron split pulley, 28 in. diameter, 5 in. face, for 1 11/16 shafting, $5; 1 new steel shafting, 1 11/16 x 12 ft. long, $5; 1 steel shafting, 1 7/16 x 16 ft. long, $4; 9 adjustable 12 in. iron drop hangers for 1 7/16 in. shafting, $2 each; 1 "one cow" Viking cream separator, good as new, $20. Address Andrew Bjerk, Box 105, Colgate, N. D.

FOR SALE
One 16 in. lathe with 8 ft. bed, with all equipments and chuck, price $200. One 18 in. lathe, 10 ft. bed, with all equipments. Price $225. Both lathes in good shape and suitable for auto shops or small machine shops. Cullander Machinery Co., Belzoni, Miss.

FOR SALE CHEAP
Blacksmith shop. Stock and tools, machinery including gas engine, band and rip saws, planer, drill, emery stand, Shaler's vulcanizing machine, plumber's taps and dies, and blow torch. No other shop near. Plenty work for 2 or 3 men. Good place for a garage. Address Box 198, Brewster, N. Y.

FOR SALE
Well equipped blacksmith shop doing fine business in good Iowa county seat, town of 4,000. Rent building or will sell equipment and stock at a sacrifice account of health. Fine opportunity for business, or equipment for shop elsewhere. Write J. H. Hammerand, Harlan, Iowa.

FOR SALE
Well equipped blacksmith shop, good location, doing good business; two-story shop, three thousand feet floor space, also residence property close to business. This is a splendid opportunity. Mack Thomas, Curtisville, Tipton County, Indiana.

FOR SALE
If you can't get the nuts off from old bolts that turn when taking machinery apart, try one of our Nut Splitters. Splits all nuts three-quarter inch and smaller. Get circulars. Whisler Mfg. Co., Gibson, Iowa.

FOR SALE
Ideal lawn mower. Grinder almost like new. Only successful grinder. Can make a dollar in five minutes with it. Runs by hand or power. Apply Mrs. M. A. Tuttle, Lake Charles, La.

FOR SALE
One shop, tools and stock doing $5,000 business; also 1 house and lot. E. J. Bee, Auburn, W. Va.

FOR SALE, GOVERNORS FOR AUTO ENGINES
We make governors for Auto and Cycle engines when used as stationary. Write today for circular. C. L. H., Box 774, Dept. C, Taft, California.

FOR SALE
One Hawkeye power hammer No. 2, $50; one 20 inch Silver's band saw, $20; one Greenriver shoeing vice, $8; one No. 400 Champion blower, $10; one 3 inch tire bender, $5; one Reynolds tire bolter, $3. Want to buy a good lever punch 6 inch throat or more to punch 5/16 inch iron or less, also one shear for cutting sheet iron. Stenberg-Tweet Incubator Co., Radcliffe, Ia.

FOR SALE
Blacksmith shop and garage combined, building 30 x 80 feet; galvanized iron, equipped throughout with modern machinery; only shop in town. Big trade already established. Will take half price of new stuff, and it is all as good as new. L. L. Warren, Pendleton, Texas.

Miscellaneous

PRINTING FOR BLACKSMITHS
Increase your business by handing out our printed business cards with "The Blacksmith's Ten Commandments" printed on back; 50 for $1.00. NEWS PRINTING CO., Stockton, Ill.

Wanted

WANTED
Good all around blacksmith at once. Young married man preferred. M. W. ABTS, Morrill, Nebr.

WANTED
First-class Active Working Foreman Blacksmith with experience in oil and gas well drilling equipment preferred, but main consideration in selecting a man for this place will be thorough knowledge of his business ability to handle men and a record for rapid and accurate production. In making application give age, experience in detail, wages wanted, and references. This is a permanent position with lots of work and good living and working conditions. Apply Box 183, Parkersburg, W. V.

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GUARANTEED 4000 MILES

Buy *New Firsts* and save 40 to 50% on the *New Prices*

"Tires that repay in satisfaction"

	Plain	Non-Skid	Tubes		Plain	Non-Skid	Tubes
30x3	10.00	10.75	1.50	34x4	21.00	22.50	2.75
30x3½	12.50	13.50	1.75	34x4½	28.00	29.50	3.50
32x3½	14.00	15.00	2.00	35x4½	29.00	31.50	3.50
31x4	19.00	20.00	2.25	36x4½	30.00	32.50	3.50
32x4	19.75	21.00	2.50	35x5	33.50	36.00	4.00
33x4	20.50	22.00	2.50	37x5	35.50	38.00	4.00

DOUBLE TREAD TIRES

	Plain	Non-Skid		Plain	Non-Skid
28x3	4.50	5.00	34x4	9.00	10.00
30x3	5.50	6.00	36x4	9.00	10.00
30x3½	6.60	7.35	34x4½	10.00	11.00
32x3½	7.00	7.70	35x4½	10.00	11.00
31x4	7.70	8.25	36x4½	10.00	11.00
32x4	7.70	8.25	35x5	11.00	12.00
33x4	9.00	10.00	37x5	11.00	12.00

TERMS: I will send tires C. O. D. privilege of examination. 2% cash discount when remittance in full accompanies order.

NOTE: Special proposition to dealers.

I have built a reputation for service and dependability for over 10 years. In selling you, it is my desire to maintain and uphold this reputation.

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241 B West 54th Street Near Broadway
NEW YORK CITY

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30 x 3 Plain - $5.00
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PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$11.00
30x3½	"	6.50	35x4	"	10.00
32x3½	"	7.25	36x4	"	10.25
31x4	"	7.50	36x4½	"	11.00
32x4	"	8.00	36x5	"	12.00
33x4	"	9.50	37x4½	"	12.25
34x4	"	10.00	37x5	"	13.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

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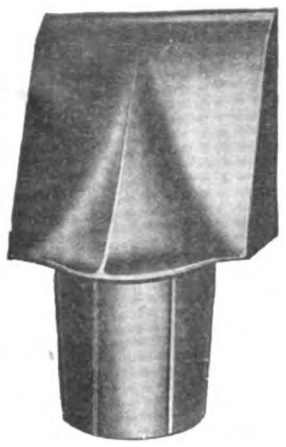
I KEEP the populace awake when otherwise they would slumber—I am the active agent stirring up work for millions of men and women—I keep doors from rusting on their hinges—I make folks think—I compel them to open their purses and buy anything—Everything that is good—
I am Advertising.



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in *design, wear, fit, finish* and all-around efficiency have been, are and always will be, the first consideration in the manufacture of

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CALKS and SHOES

We aim to make our product of such superior excellence in everything that makes for satisfied dealers and satisfied users that they will not only ask for, but insist on the DIAMOND line because they cannot buy a better one.

Your good will and your customers' good will are what we want above all else.

Diamond Calk Horseshoe Co.
Duluth, Minn.

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THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 8 NEW YORK, AUGUST, 1919 TERMS ONE DOLLAR A YEAR

A Cure for a Suffering World

Help the Movement for the Prevention of Accidents and the Cure of Disease

BY H. C. RIDGELY

THROUGHOUT the world, men and women are beginning to realize that the amount of suffering could be reduced if everyone would join in a movement for the purpose. It is necessary to enter upon such a movement with heart and soul, brain and muscle. It is necessary to teach our children the value of such a movement and have them take part in it.

With complete co-operation of this kind, the amount of good that can be accomplished is incalculable. The millions of accidents which take place daily in every country on the globe could be reduced very materially. There can be doubt about it. Man has always been his own worst enemy. He calls himself his own best friend, but he is not. He is careless of himself and of others. Being careless is not being friendly—just the opposite.

Watch Your Eye

More than two hundred thousand eye accidents occur each year in the United States alone. That figure could be reduced if everyone would take part in the great safety movement which has been inaugurated for the coming year. There is no reason why there should not be a better showing, and there is every reason why the improvement should begin at once.

One means for reducing the number of such accidents consists in the wearing of goggles in hazardous occupations where the eye is likely to be hurt. Why there should be any objection to the use of goggles under such circumstances is difficult to say, and yet many men hesitate to put them on. It seems to be a well established fact that the majority of eye accidents happen to men who actually have goggles but do not wear them when they should.

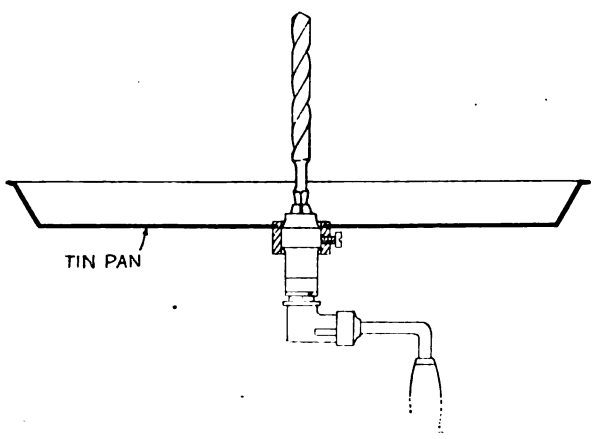


Fig. 1. A Tin Pan Keeps Chips from the Eyes.

One explanation of the widespread objection just noted is that the goggles do not fit or are in some other way unsuited to the individual. If glasses or goggles are uncomfortable, there is always the temptation to lay them aside, and this temptation is yielded to very often just at the wrong moment.

The solution of this problem would seem to be to provide goggles that yield the proper degree of comfort. Then there will be pleasure in wearing them, and the temptation to discard them will vanish. Purchases of goggles should be made from a reliable dealer. Surely the protection of the eye is worth this much consideration.

The work of the blacksmith and wheelwright, although not regarded as extremely hazardous, is one in which care must be taken to protect the eyes. Such protection is advisable even in the simple operations of welding and riveting. Grinding operations also call for similar care. Other instances where caution is expedient are in chipping work, babbitting, the handling of acids, structural iron work of various kinds, and any particular job which common sense points to as more or less hazardous.

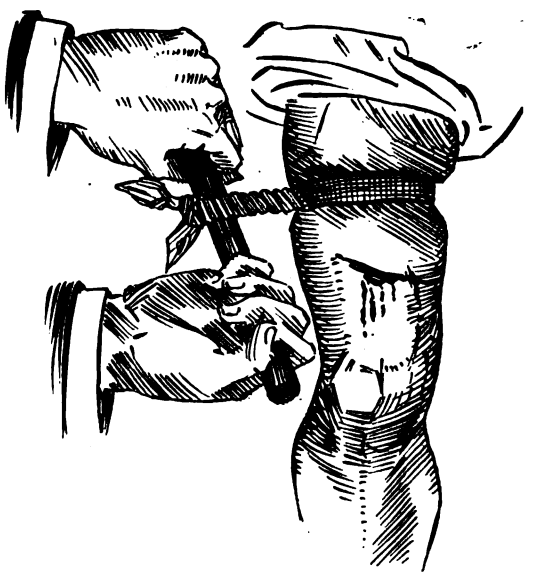


Fig. 2. How a Tourniquet Binds up an Artery.

Goggle Features

In the selection of goggles there is room for the exercise of discretion. That goes without saying, of course, but we do say it for the sake of emphasis. One feature to which some makers are calling particular attention is the advisability of selecting glass that won't break. That might seem impossible, and no doubt is in extreme cases, but still the impossible can be approached, even if it can never be reached, and there is some consolation in that.

Glass that splinters readily should never be used in the construction of goggles for flying splinters are more dangerous than the flying particles that cause the fracture. Some glass is highly annealed and tough, and will stand pretty severe tests. A fairly hard blow from a hammer has been tried on some of the best specimens without causing fracture.

Valuable tests have been made by the U. S. Bureau of Standards to determine the most desirable qualities of goggles for use by aviators. The conclusions apply also to glasses worn by men in industrial plants. There should be no distortion of view and the percentage of light transmission should be high. One can readily appreciate the importance of clear vision in aviation work, and there are many instances that readily come to mind where various forms of machinery could not be operated with safety if the operator's eyesight is impaired.

When Drilling Overhead Holes

When drilling overhead holes, the device shown in Fig. 1 is found to be an excellent safeguard against falling chips which might get in the eye. The device is in reality an ordinary pie plate attached to the brace in such a way as to catch the falling particles.

The construction is a very simple matter. First, a bushing is made that will fit over the bit chuck, and is provided with an 8/32 inch set screw to hold it in place. This bushing is sweated to the pan at the center, where a hole is made. The pan may be about eight inches in diameter or any suitable size desired.

Such an arrangement is useful when drilling for overhead shafting bearings or for any overhead work of that nature. Where there is a large amount of such work being done, the construction of a chip catcher is a paying investment, as it can be made in spare moments and actually requires very little time or effort to complete.

The Severed Artery

First aid is important when an injured person is bleeding profusely, particularly when a large artery is severed. In that case, the blood is a bright red color and sometimes issues in spurts. Pressure should be applied immediately by means of the fingers and if that is not effective a tourniquet of some kind should be rigged up. A simple form is quickly made from a bandage or handkerchief into which a small stick or metal bar is twisted.

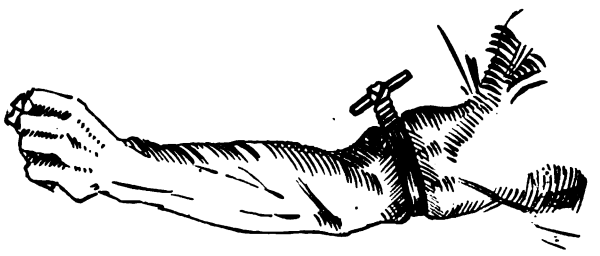


Fig. 3. A Handkerchief Twisted Around a Cut Arm.

What is known as the femoral artery is an important one in the thigh and calls for immediate treatment when severed. It extends in a graceful curve down along the inner side of the thigh, and is really an extension of the iliac artery of the abdominal cavity. The tourniquet should be applied at once if the patient is bleeding badly, and a physician should be called in as speedily as possible.

In Fig. 2 is shown a tourniquet applied to the thigh in a manner to stop the bleeding of the femoral artery. Any other artery or large veins in the upper part of the leg would be treated in a similar manner. The method of applying the tourniquet to the arm is well illustrated in Fig. 3.

Fig. 4. Ambrine Candle for Cut or Burn.

In the case of a deep cut, after first aid has been applied to stop the bleeding, home remedies should cease and the patient turned over to a physician. Applying hydrogen peroxide and similar disinfectants is not always a good thing. Frequently, the physician decides to allow the wound to heal from the bottom; otherwise, the surface may close with very bad conditions inside. The deep wound or cut is plainly a case for the physician.

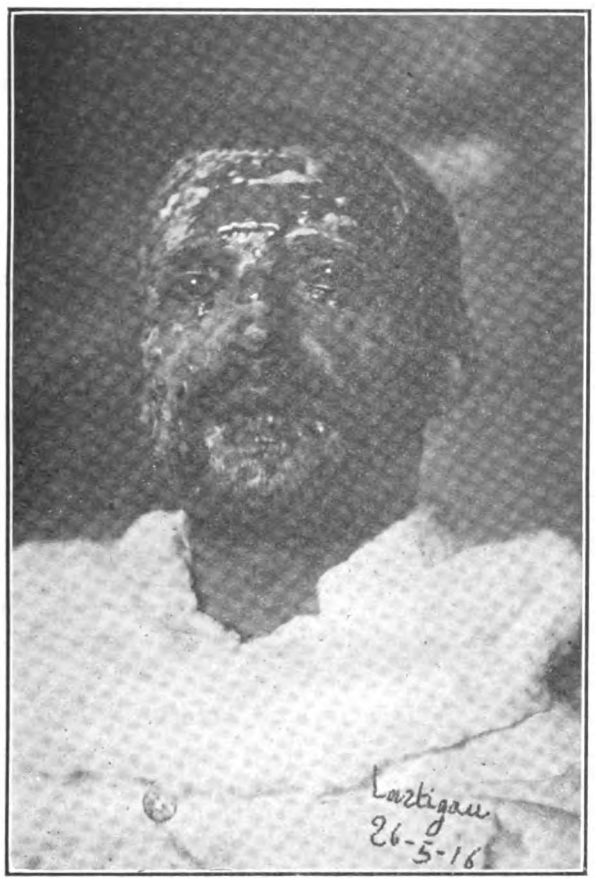


Fig. 5. Severe Burns Treated with Ambrine from Atomizer.

Now and then we hear some wise or unwise man telling how to treat a cut by taking a handful of sawdust from the floor and applying it to the wound. Such a course is absolutely wrong and may cause serious in-

Fig. 6. How the Patient Looked in a Month.

fection. The idea of cleanliness should be kept constantly in mind in all such cases, and no treatment should be resorted to which violates the law of cleanliness.

Gettting low grades of cutting-oil in a wound is a thing to be guarded against if possible. The man who uses wheel grease for a salve or ointment is taking risks. He fails to consider the fact that the grease may have been manufactured from a dead horse and that the horse may have died from the effects of some serious disease. Cutting-oil from machinery sometimes gets in a slight wound and causes soreness. If it does so, the wound should be treated with some disinfectant before serious trouble results. Hydrogen peroxide may be used to advantage if the wound is not deep.

Treatment of Burns

For the treatment of burns, stock solutions of linseed oil and lime water are always kept on hand at the drug stores. It is often referred to as Carron oil, and is a mixture of equal parts of the two ingredients. Vaseline, olive oil, or sweet oil are also used, and give very good results.

Baking powder in solution is often applied by drenching a cloth with it and wrapping the burnt part. Over this, soft linen gauze or an antiseptic compress may be placed, and the whole bandaged.

Burns are divided into three classes, according to their severity. The first class includes cases where the flesh is reddened but not blistered to any extent. The second class includes cases sufficiently severe for the formation of well defined blisters. In the third class or degree, there is more or less charring of the flesh, both the outer skin and the underlying tissue.

The form of treatment will vary somewhat in the three classes. Burns of the first and second degrees, unless they cover considerable surface, are not apt to be of a serious nature. If a third or half of the entire body is affected, the case is serious and may even result in death.

Burns of the third degree are usually the most dangerous, but depend largely upon the size and position. There is usually quite a shock accompanying such burns and death may result in from twenty-four to forty-eight hours. The healing of third degree burns is by the process known as granulation. Considerable deformity of the part may be caused by the contraction of the tissue.

The severe pain which usually accompanies burns is due to the exposure to the air of the very fine nerve ends which terminate in the skin. Exclusion of the air is one of the main objects sought in the various forms of treatment.

In burns of the second degree, where large blisters are formed, it is considered best to puncture the skin and let out the fluid. A clean needle should be used, after first sterilizing it by passing it through the flame of an alcohol lamp.

A New Dressing for Burns

Rather a unique dressing for burns and various kinds of wounds is a form of wax that is melted and allowed to harden on the flesh. It is known as ambrine and was used extensively in the treatment of burns caused by liquid fire, explosions, and accidents in the war zone.

In its simplest form, ambrine is made up into a candle, which is lighted and held over the burn or cut. As the melted wax runs down on the flesh, the end of the candle may be used to spread the dressing out into a thin sheet. The candle form is intended for emergencies and is most readily applied to slight burns or wounds.

In Fig. 4 is shown the ambrine candle, from which the wax is dropping down onto the hand. This does not burn the flesh, for the reason that the wax melts at a low temperature, which is about 120 degrees Fahrenheit.

Another method of applying the dressing is to melt the substance in a small container held over a flame. The temperature in that case is raised to about 150 degrees, which is not sufficiently hot to burn. A brush may be used to spread the melted wax into a thin sheet.

Still another method of application is by the use of an atomizer. The melted ambrine is spread in this way to the proper depth, which is merely a thin layer, and then may be covered with medicated absorbent cotton. A second layer of the melted or atomized ambrine may then be applied, and the whole allowed to harden into a substantial dressing.

Fig. 5 shows a patient who was badly burned about the face and hands and who had his burns covered with the ambrine dressing. The ambrine was applied in patches by means of the atomizer, and before each patch had time to dry it was covered with a thin layer of absorbent cotton and again sprayed.

Fig. 6 is from a photograph of the same patient a month later. The flesh had healed except at a few points where the burns had been deepest. Comparatively little pain was experienced, as the air was excluded entirely, sight is impaired.
and it is exposure to the air which causes much of the pain from burns.

Fig. 7 shows the same patient practically well, just ten weeks after his first admission to the hospital. The face appears normal and is free from scars. The hands have not quite recovered, due largely to the fact that the patient could not be induced to keep his fingers still.

Absence of Scars

The dressing showed no tendency to stick to the newly formed flesh, and this in itself is a good recommendation for the method of treatment. With many forms of dressing, the flesh is torn at each treatment, and this fact alone is responsible for many of the scars that accompany severe burns.

Fig. 7. Practically Well Ten Weeks After Accident.

Dr. Barthe de Sandfort, of France, is the originator of the new method, which has been tried in thousands of severe cases, not only of burns, but cuts, lacerations, amputations, frostbites, bruises, sprains, boils, and many forms of skin affections.

A dozen years of experimenting with paraffin and other forms of wax preceded the final adoption of the compound that has received the name of ambrine. Success was at last attained, and when the war broke out, Dr. de Sandfort saw the opportunity to apply in practice the theories which had been developed with so much patience.

He took charge of a hospital at Issy-les-Moulineaux, and from the very start the results obtained were most gratifying. Comfort was given to patients who had been suffering the most terrible agony. Many are the soldiers who can thank Dr. de Sandfort that they are not scarred for life and that their sufferings were reduced to a minimum.

The hospital soon became renowned throughout the world, and physicians journeyed there from long distances to study the new methods and witness the wonderful cures that were wrought. In this way ambrine became known in the chief countries on every continent. It is now manufactured and be-

ing put on the market in large quantities in the United States.

The Splinter Beneath the Nail

One of the most painful and annoying things is to have a splinter under the finger nail. Sometimes pus gathers in the wound and may lead to blood poisoning if all particles of the splinter are not carefully removed. It is not always an easy matter to get at a particle of foreign matter that has penetrated far beneath the nail. A convenient method sometimes used is to scrape the nail thin and then cut out a V-shaped piece, close up to the flesh. This can be done readily by working the flesh loose from the nail by means of a knife or sharp pointed instrument of any kind.

When this has been done, the splinter can be reached for more readily than if the nail had not been cut in the manner described. In removing the splinter, an ordinary penknife is often the most convenient means at hand. A needle or a pair of fine pincers are also convenient implements to have on hand for such purposes.

Counteracting a Poison

What to do in the case of poisoning is important to think about before the occasion arrives. Of course, it is not always possible to determine beforehand just what the circumstances will be, so that all that can be done is to form general plans which may be modified for particular cases.

In the case of carbolic poisoning, the most effective cure is alcohol, administered as whisky or in some other form. Care must be exercised not to give wood alcohol by mistake, as that would be simply adding one poison to another. Now that there is a ban on whisky, it is hard to say just what difficulties will be placed in the way of this form of treatment. Why so many persons who attempt suicide should select carbolic acid is a mystery, for it is one of the most painful deaths imaginable.

When a case of poisoning has been discovered, send for a physician immediately, and if possible have the messenger tell the physician the nature of the poison taken. Then apply the first aid relief. Usually it is desirable to produce vomiting as quickly as possible. Luke-warm mustard water or warm salt water are good emetics. These should be given in large quantities. Dish water and any kind of soapy water are also good. It is well to tickle the patient's throat inside, by means of a feather or similar object. The vomiting should take place several times, but must be stopped before the patient is exhausted.

This may be followed by a soothing liquid, such as a little milk or raw eggs, preferably beaten. If an acid poison was taken, a tablespoonful of hartshorn in two cups of water makes a good antidote. Other antidotes are soda, chalk, plaster, whiting, lime, magnesia, or even a mild solution of wood ashes.

Treatment for Electric Shock

If the person shocked is still in contact with the wires, the first thing to do is to disengage him, and this calls for skill. If possible, the current should be turned off at once. If it is not possible to break the circuit, then the rescuing party must work carefully and stand on dry boards or other suitable insulation. A dry cloth or rope may be used to pull the patient away from the wires, or with the proper care his clothing may be taken hold of, but in no case should his hands be grasped, nor should his face or any other portion of his bare flesh be touched.

When the patient is free from the wires, artificial respiration should be resorted to. If a pulmotor is at hand, it can be used to advantage, but if not the arms may be worked slowly back and forth above the head and down again to the sides. Striking the soles of the patient's feet has been found to be an excellent method to pursue when restoring him to consciousness. Hot water bottles may be used to keep the patient warm or blankets may be wrapped about him.

Practical Horse Shoeing

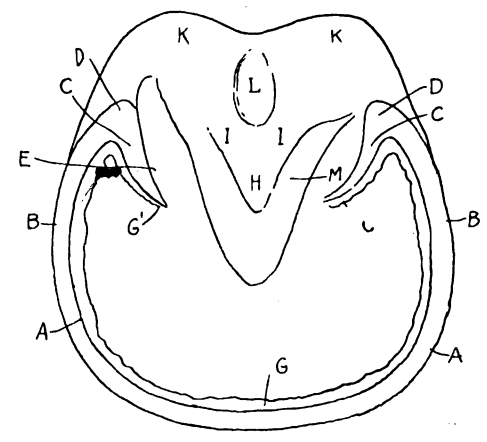
A Careful Study of the Horse's Foot Can Be Made After Removing the Horny Capsule

General Review

BEFORE going on, it will be well to pass in review some of the more salient points which have been under consideration. The bones of the foot may be reckoned as seven in number. Starting from the upper part, they are: (1) the lower end of the cannon bone, (2) the upper pastern bone, (3) and (4) the two sesamoid bones, (5) the coronary bone, (6) the coffin bone, and (7) the navicular bone.

There are three articulations: (1) the fetlock joint, involving the cannon, the upper pastern and the two sesamoid bones—four in all; (2) the coronary joint, involving the upper pastern and the coronary bones; and (3) the coffin joint, involving the coronary, the coffin and the navicular bones. All three joints are more or less hinge-like, the fetlock joint being especially so, and consist of one or more convex surfaces above, working in concaves below.

There are many ligaments whose duty it is to hold the various bones in place, while nevertheless permitting them to make their proper hinge-like movements. Three are capsular ligaments which envelop the several joints more or less after the manner of a sheath. There is also a special ligament which binds the two sesamoid bones together. Then there are side, or lateral, ligaments at all the joints, one on the left side of the foot Ultimately, this impure blood goes to the lungs where it is purified by the action of the air that is breathed by the horse. Life itself depends upon the continuous, uninterrupted action of the pump, which is the heart; of the lungs, which are the purifying apparatus; and of the piping, which consists of veins and arteries.



Under Surface of Right Fore-Foot. Bearing Surface of Toe is from A to A; Bearing Surfaces of Quarters Extend from A to B, on Each Side; Heels, from B to C. D Shows Commencement of Bars; E, Lateral Aspect of Bars; G, White Line, Extending to Bars at G'; H, Horny Frog; I, Bulb or Glome of Frog; K, Bulb of Heel; L, Median Lacuna of Cleft of Frog; M, Lateral Lacunae of Frog.

The blood must circulate and keep on circulating. Otherwise, the horse dies. However, a rupture or other injury to a tube carrying blood *to* the heart, generally termed a *vein,* is apt to be much less serious than a similar injury to a tube carrying blood *from* the heart, this tube being usually termed an *artery.* In general, the arteries are smaller in diameter, have thicker walls and are less numerous than the veins. Usually, they are more deeply set in the body. Unlike the veins, they have no valves.

The smaller bore, thicker wall and deep position are Nature's provisions against rupture from the strong current flowing from the heart and against accidents from the outside world. If the finger (not the thumb, however) is lightly pressed on a blood vessel, there may be noticed a slight throb repeated regularly. If so, then this blood vessel is an artery. If an accident has occurred and blood is flowing from a ruptured tube, the last is an artery if the blood flows in jerks and is also a bright red.

The flow from a severed vein will be steady and the blood will be a darker shade. In the case of a dead horse, the veins will generally contain blood while the arteries are empty. They were thought to be tubes carrying air, prior to the time of Harvey who discovered the circulation of the blood about three centuries ago.

In addition to the veins and arteries there are fine, hair-like tubes which occur at the outer ends of arteries. The blood is urged along by the heart's action, the fluid portions escape to some extent through the thin walls of these little tubes and supply to the tissues material necessary to them.

The horse's foot is well supplied with blood vessels. The only parts of the foot not so supplied are those made up of horny tissues. But the parts which produce these horny tissues are more than ordinarily well supplied with blood. The arteries are largest at and near the heart. As they continue their course away from the heart, they divide and branch and grow smaller and smaller. Similarly, the arterial walls are thickest near the heart and thin as they become more and more distant. Naturally, then, one will expect the arteries in the foot to have declined in bore and thickness of wall because of the distance from the heart.

The movements of the horse's foot are brought about by contractions of muscles. All of these muscles are distant, being located above the knee or the hock. They transmit their pulls by means of tendons. The tendons which operate to extend bones —that is, to make them reach forward—are located principally on the anterior, or front, faces of the bones and are called extensor tendons. Those which operate to bend bones backward are arranged to the rear and are termed flexor tendons. The foot has three principal tendons, one extensor and two flexors. The anterior extensor tendon runs down the front faces of the cannon, the upper pastern and the coronary bones and secures final attachment to the coffin bone. It covers all the joints. Two lateral tendons coming down from above join it, on the right and left sides of the leg between the fetlock and coronary joints.

Counting all three as the anterior extensor tendon, one may say that this tendon is attached to five of the seven bones involved in the foot. That is, it is attached to both sesamoid, to the upper pastern, the coronary and the coffin bones, but not to the navicular bone.

The fore-foot has a special anterior extensor tendon which is attached to the upper pastern bone. On the right fore-foot, it lies to the right of the main anterior extensor tendon; and on the left fore-foot, to the left of it.

The flexor tendons are two in number—the superficial flexor tendon and the deep flexor tendon. The superficial tendon has a short section just back of the fetlock joint where it is tubular, and the deep tendon passes through this tube. The superficial flexor tendon is attached to and flexes the upper pastern. The deep flexor tendon is attached to and draws backward the coffin bone.

Finally, there are several ligaments, which hold tendons in place. Thus, the superficial flexor tendon is held, back of the fetlock joint and a little lower down, by ligaments which envelop it; while the deep flexor tendon has a ligament covering its lower extremity.

Special Tissues in the Foot

We come now to some important tissues in the foot of the horse. I mention first the two lateral, or side, cartilages and the frog. "These are peculiar to the horse, and do not occur in the same form in the foot of any other animal. They, therefore, make the horse's foot different from all others."

Cartilage is a rather firm, white tissue of close grain. It is quite tough. It contains no nerves or nervous tissue, and is, accordingly, insensible to stresses and blows, and

is consequently free from all pain. Cartilage is flexible and elastic. By "flexible" reference is made to the capability to bend easily; and by "elastic," to the capability to regain its normal form and size when released from pushes and pulls. The long external ear of the horse and mule consists of cartilage. The surfaces of the foot joints, particularly, the portions which come into contact with other surfaces, are covered with cartilage.

Elastic tissue when seen under the microscope, is disclosed as consisting of fine fibre which are conjoined in a kind of network. Sometimes, elastic tissue will occur in an animal in the form of a bundle, and sometimes in the form of a cord or band. Sometimes, it will form the whole tissue. If one of the fine fibres is broken, it curls up. A larger fibre if pulled will, when released, fly back to its normal position, bending this much like a strip of rubber. Elastic tissue itself contains no nerves or nervous tissue, although it may be more or less closely associated with such sensitive material.

There are two lateral cartilages to the coffin bone, one on the right and the other on the left. They thus appear as if they were prolongations of that bone in the upward and backward directions. They rise to a level above the center of the coronary bone. Each is, in front, attached to the anterior extensor tendon, and also to the coffin bone. The cartilages are likewise attached to the frog. At the rear, the cartilages reach beyond the coffin bone and bend somewhat towards each other.

The Frog

The *frog* is a cushion. Indeed, it is very properly called the "plantar cushion" by some. It covers, underneath, the central portion of the rear two-thirds of the sensitive "sole" of the foot. It consists principally of yellow elastic fibre and white fibre. Associated with these fibres are fatty cells scattered throughout the general mass. It lies next to the horny frog which is exposed to examination of anyone desiring to observe it.

Next to the frog, on the inside, is the deep flexor tendon. However, the frog has a certain extent of attachment to the coffin bone. It is a heart-shaped affair, one end being quite large and the other tapering to a point. The thick end is set to the rear. The right and left halves of the rear part consist of bulb-like forms. They are very soft, and provide cushions to the bulbs of the foot. Each bulb of the frog is connected by a strong elastic cord with the lower end of the upper pastern bone. These cords have been called the suspensory ligaments of the bulbs. The frog is held in place largely through its attachment to the coffin bone, but also, in part, by means of the elastic cords mentioned and other tissues.

Blood Vessels of the Foot

The horse, as well as animals in general, resembles man, in that it is provided with a system of tubes connecting with the heart. These tubes extend all over the body from the head to the feet. The heart is a pump which compels the blood to flow to the outlying parts of the body and to return. Further, the pump causes blood to flow to and return from the lungs. The blood flowing from the heart to outlying parts of the body is pure and possesses a bright red color. The blood returning is distinctly inferior in color. It is in fact carrying waste materials.

The Skin

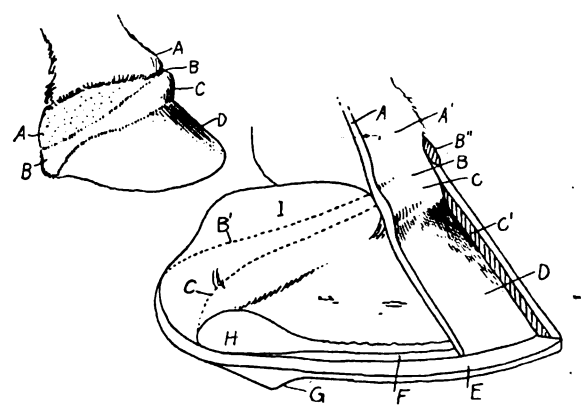
Just as with other animals, the horse has a skin over pretty much the whole of his body. This extends down fore and hind legs, covering the bones, ligaments and tendons of the foot. In fact, it covers even the coffin bone, although it is in this region invisible, being itself covered by the horny-hoof.

The visible skin is ordinarily covered with hair. It consists of three layers: (1) the epidermis, (2) the leather-skin (the dermis), and (3) the sub-cutaneous tissue. We shall not tarry long with these. The epidermis is so called because it lies *upon* the dermis, the Greek word *epi* meaning upon. There are in the epidermis no blood vessels nor nerves. It consists of horn-like cells or scales which lie side by side and form a thin, uninterrupted layer. It is a protective sheath for the horse's body. Abrasions and the like which do not quite pierce through it are usually unimportant. No nerve or blood vessel is thereby ruptured. However, it is possible through pressures or flat blows to injure underlying parts without breaking open the epidermis. But, if blood appears, one may know that the epidermis has been pierced all the way through. If nerves are exposed, one reaches the same conclusion that the epidermis has been torn through. However, it may not always be so easy to determine whether nerves are actually exposed. Just a tenderness would hardly be sufficient, as that might be caused by a broad, flat blow which did not open up the epidermis.

Actual piercing of the epidermis is not to be disregarded, even though the opening may be a small one. Big or little, it is an avenue through which all kinds of trouble may enter from the outside world.

The dermis, or leather-skin, is made up of solid, fibrous and elastic tissues. There are in the dermis many blood vessels, nerves, sweat glands, oil glands, and hair follicles. This layer may be converted into leather when given the proper treatment—hence one of its names. To the rear of the fetlock joint is a horny spur surrounded by a tuft of long, coarse hair known as the footlock. In the case of high-bred horses, this tuft will often, or generally, be smaller and of finer hair.

The epidermis is produced by the underlying dermis. The outer flakes of the epidermis are constantly becoming loose and are dropped or carried off. New cells or scales



The Small Figure Shows a Foot with the Horny Capsule Removed. A is the Corium, on which are Hairs. B is the Perioplic Ring; C, Coronary Band; D, Sensitive Wall. The Large Figure Shows Foot from which Parts of Horn Wall and Sensitive Structure Have Been Removed. A' is the Hairless Part of Corium; B Indicates the Perioplic Ring, and B' the Upper Border of Same; B", Section of Perioplic Horn; C', Section of Wall at Toe; C, Upper Border of Coronary Band; D, Sensitive Wall; E, Horny Sole; F, White Line; G, Horny Frog; H, Planter Cushion; I, Lateral Cartilage.

are just as constantly being formed on the upper surface of the dermis and relinquished to the under surface of the epidermis. That is to say, the epidermis is continually losing material from its outer surface and just as continually gaining material at its under surface. The epidermis has no "feeling" of its own, because when the dermis gives up cells to it, it does not follow them up with extensions of nerves.

The third layer of the skin, the sub-cutaneous tissue, consists of a loose, fibrous material connecting the under surface of the dermis with the tendons, ligaments and bones. In parts of the body where there are muscular layers—as in the leg above the knee or hock—it also connects the muscular tissue with the dermis. In the foot, however, where there is no muscular tissue, it is only the tendons, ligaments and bones, and the like, which are connected to the dermis in this manner. The sub-cutaneous tissue is that loose fibrous mesh or network which is cut through in removing the hide from the carcass.

The Hoof-Skin

So much for the skin in general. Where it disappears from sight and envelops the coffin bone beneath the horny covering called the hoof, the skin is termed the *hoof-skin.* This hoof-skin calls for the horseshoer's very particular attention, because of its close relation to his work. It is an extension of the dermis. The horny layer of the hoof corresponds to the epidermis. Otherwise, there is no epidermis. The sub-cutaneous tissue is wanting everywhere in the bottom of the foot where the hoof-skin covers the coffin bone. Further, the hoof-skin has no hairs, nor oil glands, nor sweat glands. Instead of hairs, there are small projections resembling threads. These are called *villi.* On the outer surface of the hoof-skin are thin, fleshy layers which are of a sensitive nature. When a horseshoe nail goes astray and passes all the way through to the under surface of the horny hoof, it causes pain by coming into contact with these sensitive layers. These layers constitute what is sometimes called the "quick." Just as the epidermis is a surface production of the dermis, so is the horny hoof a production of the underlying hoof-skin.

The horseshoer may want to study the hoof-skin by means of an actual example. If so, let him secure a horse's foot or the lower part and then remove the horny layer constituting the hoof. This is accomplished by permitting the whole to decompose, in part. This will occur in about a week, if the foot is left in a place where the temperature will remain about that of an ordinary room. The hoof may then be taken off without injury to the underlying hoof-skin. The hoof-skin itself consists of several parts, five in all.

(1) There is the *perioplic band.* This is a narrow ridge of material only about 1/5 or ¼-inch in width. It forms the upper edge of the hoof-skin. The ordinary skin, covered with hair, extends down to the perioplic band. Then comes this perioplic band, and then the coronary furrow. This is a depression or groove. The perioplic band has its highest part on the front. Here it is also a little wider than at average points. Further, it is distinctly wider at the point which may be called the heels. It is to be understood that the narrow perioplic band is not everywhere at the same level. In fact, it runs on both sides backward and downward from the high point in front to the bottom of the rear of the foot, where it passes over the bulbs of the heels and ends in the velvety tissue of the fleshy frog. It has a slightly glistening appearance. The thread-like projections already mentioned—the villi—are everywhere to be seen on its surface. These are short, like the hairs on a man's face some hours after a shave. They may be as long as 1/12-inch, and they may be only half that length.

Attention has already been called to the fact that the horny hoof is an outgrowth of the hoof-skin. Naturally, the various sections of the hoof-skin severally produce corresponding parts of the hoof. The reader will, accordingly, be prepared to understand that the perioplic band produces the soft horn of that part of the hoof which overlies it. This part of the hoof is called the perioplic ring. The two parts are not to be confused. The ring is horn. The band is a part of the hoof-skin. Further, the outside layer of the hoof is due to the perioplic band, although it extends over the whole horny wall. How it is able to do this will be explained later on.

(2) The *coronary band* is another narrow strip. It extends along with the perioplic band. In front, at least, the position of the coronary band is that of a front wall while the position of the perioplic band is that of a roof. The coronary band is not a perfectly plain band, but is somewhat rounded or convexed, especially in front. As it runs backward and downward, under the perioplic band, it flattens. It is thick with villi, which are longer here than on the perioplic band. The coronary band or cushion is, for a part of its length, about 4/5-inch wide; but, at the bulbs of the heels, where it extends forward and inward to near the top of the fleshy frog, the coronary band narrows to 1/3 or ½-inch. This narrowed part is termed the *bar portion of the coronary band.*

The coronary band produces the larger part of the horny wall of the hoof, but not the perioplic ring. The middle layer of the hoof is the part which comes from the coronary band.

(3) The *fleshy wall* is all that part of the hoof-skin which is overlaid with fleshy leaves. These fleshy leaves lie close together and form parallel rows. They extend in straight lines down from the coronary band to the bottom edge of the coffin bone. The general surface is not smooth.

General Utility Body

Easily Made in the Shop

EVEN the blacksmith who is not regularly engaged in the construction of new wagons has an opportunity now and then to make to order a body of special design. Therefore, it is well to keep abreast of the times and to absorb all the ideas upon the subject that it is possible to secure. You may not wish to construct the new body precisely in accordance with the design which you have seen, for your customer may wish a combination of features not often ordered.

Some blacksmiths keep a scrap-book in which they paste drawings and descriptions of wagons. A prospective customer can inspect such a record and talk more intelligently about his plans than if they were carried entirely in his head. It is not always an easy matter to make a clear statement about construction work. The customer may think that his descriptions are understood, and the listener may think that he understands them, and yet when work actually begins the two men may discover that they are as far apart in their ideas as the North Pole is from the South.

Possibly you will consider the wagon body illustrated below worthy of a place in your scrap-book, or if you do not keep such a book perhaps you will wish to keep a file of back numbers of BLACKSMITH AND WHEELWRIGHT and will place this number in your file. The body shown is of the general utility type; that is to say, it can be used for various purposes, according to the requirements of the purchaser. It is of the tilting type, as you will note, and it is well balanced, in order to make the dumping operation an easy one.

At *A*, of the figure, is shown a side view, the dotted lines indicating the position assumed when the body is tilted. The truck framing is made to limit the slant. The dimensions are chosen to suit the requirements and can be adapted to any style of truck.

B is a sectional view on line *F* in *A*, looking in the direction of the arrow. *G* is a plate bolted to the body and has projecting pins on which the body rests. A front view of *G* can be seen to better advantage in part *A* of the drawing.

C is a sectional view on line *E* of the side view *A*, the body being shown in the normal position. The channel irons of the truck are indicated in cross section, and are seen to support a casting, *J*, on which the forward end of the body rests when horizontal. This casting is indicated also at *J* of Fig. *A*.

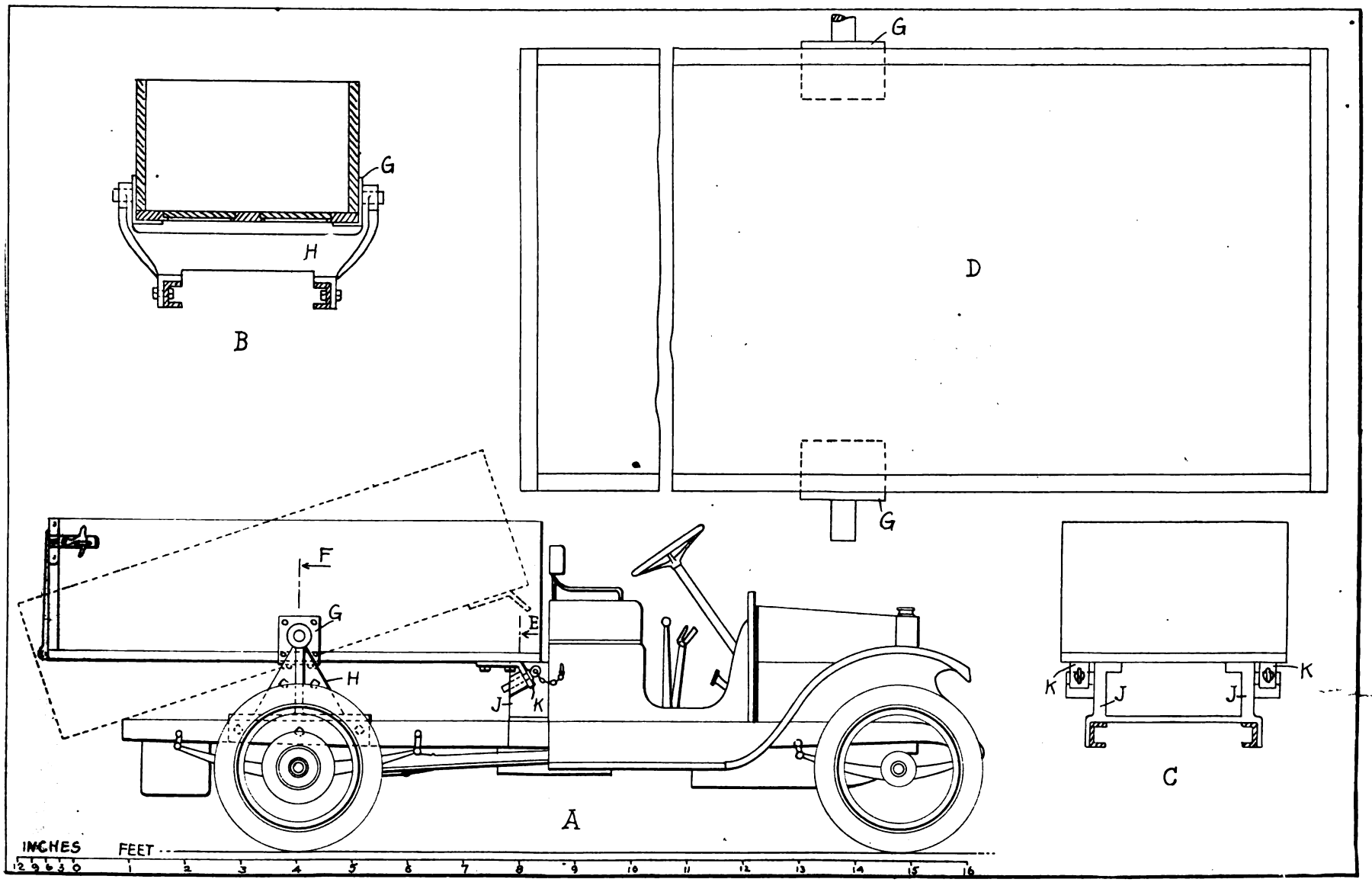
D is the plan view of the body, and shows the lugs *G*, or plate with the projecting pins. To save space in the illustration, a part of the body is shown cut away in this view.

The bearing plate *H* is bolted securely to the chassis frame and consists of heavy casting extending the width of the body, as shown in Fig. *B*. An end view of the bearing casting may be seen at *H* in Fig. *A*. The strengthening ribs make the bearing additionally stout and secure.

At *K* is shown a pin for locking the body securely when horizontal. This pin passes through a plate attached to the body and penetrates the casting *J*, or a lug that is cast on it for the purpose. The position of *K* may be seen from the two views *A* and *C*.

A body of this type is useful for a variety of purposes, as previously stated. It would be useful on a farm or for the work of a city contractor. It would be well suited to a general haulage business.

The haulage business is forging ahead with such leaps and bounds that the extra body business should take on new life in the near future. The blacksmith and wheelwright who can turn out bodies of a good quality will be in demand. Some one has to make the bodies, and the big wagon makers are not able to fill all their orders. The one-man business has a good chance if the one man is also good. That is the test of the case, of course. It takes a good man to make a good wagon body.



HORSE SENSE

The following suggestions for the care of horses in hot weather are offered by the Freight Transportation Department of the Packard Motor Car Company:

1. Load lightly and drive slowly.
2. Stop in the shade if possible.
3. Water your horse as often as possible. So long as a horse is working, water in small quantities will not hurt him. But let him drink only a few swallows if he is going to stand still. Do not fail to water him at night after he has eaten his hay.
4. When he comes in after work, sponge off the harness marks and sweat, his eyes, his nose and mouth and the dock. Wash his feet but not his legs.
5. If the thermometer is 75 degrees or higher, wipe him all over with a damp sponge. Use vinegar water if possible. Do not turn the hose on him.
6. Saturday night give a bran mash, lukewarm, and add a tablespoon of saltpetre.
7. Do not use a horse-hat unless it is a canopy-top hat. The ordinary bell-shaped hat does more harm than good.
8. A sponge on top of the head, or even a cloth is good if kept wet. If dry it is worse than nothing.
9. If the horse is overcome by heat, get him into the shade, remove all harness and bridle, wash out his mouth, sponge him all over, shower his legs, and give him two ounces of aromatic spirits of ammonia, or two ounces of sweet spirits of nitre in a pint of water; or give him a pint of coffee, warm. Cool his head at once, using cold water, or if necessary, chopped ice, wrapped in a cloth.
10. If the horse is off his feed try him with two quarts of oats mixed with bran and a little water and add a little salt or sugar. Or give him oatmeal gruel or barley water to drink.
11. Watch your horse. If he stops sweating suddenly or if he breathes short and quick, or if his ears droop, or if he stands with his legs braced sidewise, he is in danger of a heat or sun stroke and needs attention at once.
12. If it is so hot that the horse sweats in the stable at night, tie him outside with bedding under him. Unless he cools off at night he cannot well stand the next day's heat.

A Look Around the Shops

A Friendly Visit to Your Neighbor's Place of Business Will Often Result in New Ideas

BY JAMES F. HOBART

SEEMS to the writer that he can never put his head inside of a blacksmith shop without seeing something interesting. There must be a whole lot of interesting things scattered around the world or else "ye scribe" may not be able to find more of them bye and bye! The above thought has often come up. Nevertheless, there's no use worrying about there being no more new things to find and write about. A blacksmith always has something novel.

One smith of my acquaintance is surely going to get a Christmas present from the writer. It will be a big box of pills or some stronger medicine, if it can be found—for the fellow "put one over" in good shape the other day. This smith well knows the writer's fondness for new and interesting things, and this shop has yielded many of them. But just a few days ago, as the writer was passing, the smith set up a hail: "Oh, Hobart! Come in here and I will show you something which no man ever saw before!"

The writer 'bit," and swallowed the bait, hook and line. Later, he wished he had swallowed the smith, too, for that worthy got out his pocket knife, cut open an apple and said: "There! No man ever saw those seeds before!" But usually the writer gets ahead of the smiths, and sees the interesting things in their shops before the smiths have decided whether the "old codger" is a hobo, a book agent or a delegate from the "bughouse"!

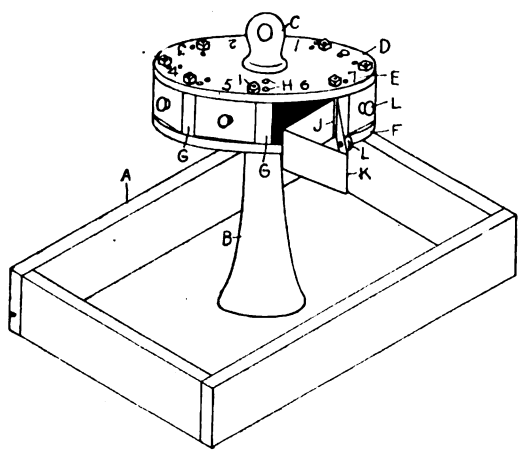


Fig. 1. Convenient Style of Tool Box.

One day last May, during a visit to the shop of Mr. Thomas Carter, on 1118 Beecher street, near Shelby in Indianapolis a shoeing box was seen like that in Fig. 1. The box, and others like it in this shop, were made by the proprietor, who is a colored blacksmith—and a good one, too. There are two fires in this shop, which originally was the barn belonging to a sizeable farm.

Power in the shape of an electric motor has been put into the shop and grinding wheel, drill press, band saw and buzz planer are in evidence. The power drill stands right between the two fires, very handy to both the smiths, and convenient to the woodworking department of the shop which is located directly opposite the forges. These woodworking machines are in one end of the barn, all by themselves and partitioned off from the rest of the shop.

Hoosier Shoeing Box

Two points of excellence stand out above the others in the shoeing box, shown in Fig. 1. The box is open, all the way around, and tools may be thrown into it from any or all sides. The smith never stopped to lay down a tool. He just gave it a toss, and into the box it went, striking against the central post *B*, which acted as a soft buffer for tools. The box or tray, *A*, was of ordinary size and shape.

The eye *C*, serves as a handle for lifting and carrying the box, or for hanging it up out of the way when not in use. I really saw one box hanging up, while in this shop. Eye *C* is hollow and tapped to act as a nut for a bolt through *B*, holding that member to box *A*. The nail-box *D* turns on a short bit of pipe through which the bolt passes. A washer is placed between the bit of pipe and post *B*, then eye *C* is screwed down hard against the pipe and nail box *D* is free to turn around the pipe, upon the washer, and underneath eye *C*.

The nail "turn-head" can thus revolve freely while post *B* is held securely to the box or tray *A*. The head consists of the two wooden discs *E* and *F*, separated by eight pieces of wood *GG*. Screws through these pieces hold heads *E* and *F* securely together. Bolts *I* and *J* also help make the nail turn-head solid. There are eight swing drawers for nails and these are marked consecutively 1 to 8, on the top of disc *E*.

The little three-cornered nail drawers are made of galvanized sheet steel. The proprietor says, "When I get rich I will make some of brass!"

The manner of hanging the eight little drawers is simplicity itself. The ¼-inch bolt *J* passes through a hole drilled or punched for it in the very tip end of the drawer. The upper part of the drawer bears against the bolt, and that is all there is to it. Simplicity so simple that it makes one ache! A knob *L* is lifted to each drawer, in the middle of the front thereof, by means of which the drawer may be pulled open. The nails in this shoeing box are always clean. There are no hoof-chips in them, and they are always at hand, as the turn-head is easily spun around until the required size of nail is opposite the workman.

Trouble jumps into many smith shops because the owner, the driver of a horse and the smith fail to come to a full understanding when work is ordered. Sometimes the driver will order repairs which, although necessary, are not brought to the owner's attention. In some cases the driver may order work not necessary, and, failing to tell the owner, more friction arises between the owner and the smith when settling-up time comes.

Keeping Tabs for the Owner

M. BEGLEY
2722 North 11th St.
BELL, TYLER 1920
KINLOCH, CENTRAL 4894

St. Louis,.....191..
Please Shoe.....
Horses .....
New Shoes.....
Reset .....
.....
.....
And charge same to....
.....
Driver .....

Fig. 2. A Good Job Slip.

To overcome this trouble, which often caused him much unpleasantness, a St. Louis blacksmith got up a lot of slips, as shown in Fig. 2, and used two of them, with carbon paper between, for each and every job of shoeing which came into his shop.

The smith did not trouble himself whether the owner had ordered the work or not, but let the owner settle that with the driver. The smith got a signature on his Job Slip, under the order for work, together with the owner's name, and that slip, thus signed, constituted all the "original entry" required by law, to back up the claim of the smith.

This simple expedient worked so well and was so very simple—only two slips with a bit of carbon paper between them—that many other smiths could use the method to advantage. And it is possible to simplify the above method of two slips and carbon, by one-half. Just have the slips bound at one end in a stub book and have the slips in pairs, the first of each pair printed on paper with a carbon-coated back. Then, the loose carbon may be dispensed with.

To use the "duplex" stub book, open the cover, which is simply the folded-over end of the cover at the end opposite the stub binding. Raise a pair of the slips, fold the top cover under them, using that leaf of the cover to write upon, thus preventing the pencil from marking through any of the carbon sheets save the top one. When the work is charged into the smith's loose leaf ledger, the remaining slips are torn from the stub book and filed away as the original entries. The pencil slip, of course, being given to the driver for the owner.

Try this scheme, brother smiths. It's a good one and may be extended readily to fit any business, by the addition of other blanks and lines for the various kinds of work handled by the particular shop which is to use the system.

Dead Ones Barred

Mrs. Youngbride (at the grocer's): "I'll take a few of those beets if they are live ones."

Clerk: "Live ones, ma'am?"

Mrs. Youngbride: "Yes. I must have live ones. I heard my husband say he has no use for dead beets."—*Boston Transcript.*

Can't Be Done

"A man betrays hisse'f by braggin'," said Uncle Eben. "When I hears a man tell'm 'bout how easy he kin drive a mule, I knows right off he ain't no reg'lar mule driver."—*Washington Star.*

HE KNEW WHAT A FILE WOULD DO

A certain blacksmith, observes *Pearson's Weekly,* although an expert at his trade, was quite ignorant of surgical methods. When he sprained his wrist one afternoon he hurried to a doctor's office.

The doctor examined the wrist, and then took a small bottle from a shelf, but found it empty. "James," said he, turning to an assistant, "go upstairs and bring me down a couple of those phials."

"What's that?" exclaimed the patient, suddenly showing signs of emotion. "I merely asked my assistant to bring me down a couple of phials from upstairs," answered the doctor.

"Files!" cried the blacksmith. "No, you don't! If that hand has got to come off, use an axe or a saw!"

A Comment on Our Editorials

From B. W. Benson, Oklahoma.—I want you to know just how I appreciate the two editorials in the April BLACKSMITH AND WHEELWRIGHT, "Our Editor's Letter" and "The Most Popular Topic." I am an American bred and born in the United States and I love the name of our Country and what it stands for, therefore, I have no sympathy for Bolshevism.

The Bolshevists are a false and rotten set who raise a cry against a war of defense while planning to make war on the followers of all civil and moral laws.

A Bolshevist is against Capital and the Christian Religion. Without capital nothing could be done—you could not publish the BLACKSMITH AND WHEELWRIGHT—I could not run my little shop.

Who (but a Bolshevist) would want to live in a country in which there were no schools, no churches, no Sunday Schools? Yet the Bolshevist is against all of these institutions.

As for your second editorial, the League of Nations is an experiment to be tried—we hope that it is a step in the right direction. We hope that it will tend to eliminate future wars. Who among us want wars just for the glory and grandeur of the things? You do not! I do not! But at the same time all of us are willing to arm ourselves in the defense of our country and our homes.

(Editor's Note.—Mr. Benson's clear letter requires no comment; it is the truth and the point about capital is well made. Every reader of this magazine is a capitalist so long as he owns a pair of overalls or an Ingersoll watch.)

Prize Photograph Contest

Interesting Pictures Come to Us From Various Parts of the World

THIS month we are reproducing two more photographs for our prize contest. Any reader who owns a blacksmith shop is privileged to send in a photograph. If we can use it we shall be only too glad to do so. It costs nothing to enter the contest and anyone stands a good chance of winning a prize. If your photograph is used, the cut will be forwarded to you and may prove very useful in connection with your circulars and letterheads. We will also return your original photograph if desired. Even if you do not win a prize the cuts are valuable in themselves and are worth from two to ten dollars. You do not have to be a regular subscriber to enter the contest.

You should remember that the clearer the photograph, the better will be the reproduction. Practically any size picture can be used, from the smallest to the largest. We shall be glad to see a new supply of photographs coming in.

No doubt we shall have considerable difficulty in determining the prize. Many of the pictures are very good and it is hard to pick out the best. Perhaps we shall have to award more than the three prizes originally offered. Send in your photograph at once!

PRIZE PHOTO NO. 14.

From R. C. Hux, Mississippi.—I shall be glad to have the two pictures of our shop entered in the prize photo contest.

I want to tell you what I am trying to do. In the first place I am trying to make an honest living. I hammer iron and steel for a living and anyone who has ever tried it will know about what that means. I do horseshoeing and all kinds of plow work and make harrows, plow stocks and work on Fords. I have two sons who help me in the shop. One of them is a horseshoer and general blacksmith. The other works on cars and runs a grist mill. We grind corn every day and we work on anything from a coffee pot to a car. We have a good line of customers and do our best to keep them. We advertise in the home papers, and find it helpful.

We have been in our shop seven years and are improving daily. We have two forges, two anvils, two vises and three circular saws. We cut our own timber for plows and harrows. The sign that I put out at my grist mill may be worth publishing in your paper. It is rather unusual for a blacksmith to be a miller. The sign is as follows:

I am a miller
And have three sons
Will grind your corn
Whenever you come.

PRIZE PHOTO NO. 15.

From Will Cummings, Pennsylvania.—I am sending you a photograph of my shop and family.

I do horseshoeing and all kinds of repairing, but this summer I have confined myself principally to the shoeing business. I have a shop equipped with a four H. P. Meco gasoline engine, an 18 inch rip saw, a 30 inch band saw, a 9 inch jointer, a 16 inch turning lathe, two emery wheels, a power drill and a wood-boring machine.

We get 60 and 70 cents for common shoes and 35 and 40 cents for re-setting shoes. All of us in this section belong to the local horseshoeing association, of which I am secretary. In my opinion, if there are any localities that are not organized, they should become so at once. It is the only way to run a horseshoeing business at the present time. We have ten members in our local association and meet once a month to have a good old chat. We are friendly, work harmoniously and do not "bite" one another in the back.

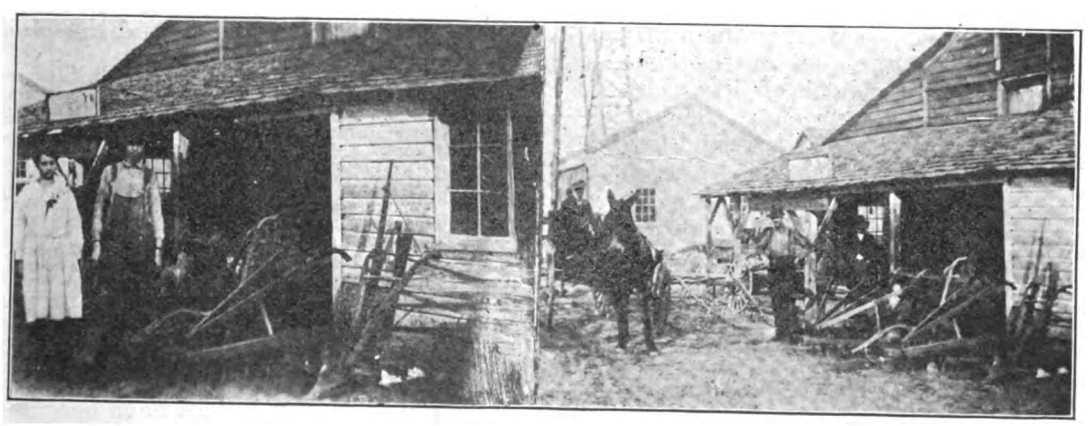
I am sorry to add that we lost one of our members recently, an old and much honored veteran in the business. At the time we were aided very much by the promptness with which the death benefit was paid by the Master Horseshoer's Association.

I want to say that I don't know of a trade that has a better outlook than horseshoeing and blacksmithing. The new men who are learning the business will certainly profit by our experience and will be greatly aided by our efforts in forming the Master Horseshoer's Association. A good horseshoer who starts in the business now or in the future will get any price he may ask for his work if well done. Among other things the new horseshoer should make a careful study of the anatomy of the horse's foot.

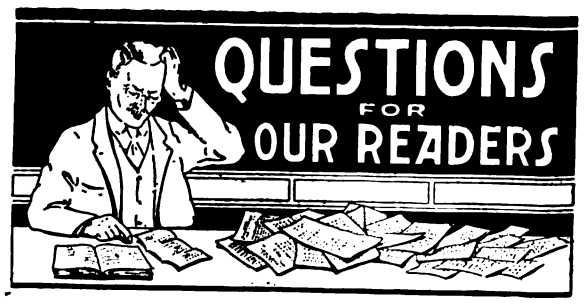
Will Cummings Says "Study the Hoof."

The man who is heart and soul in his work is not apt to get tired very soon.

Success in business is not found ready made, as is a hen's egg in a barnyard nest.



Where R. C. Hux Shoes Horses and Writes Poetry.



A Saw Table

From Charles Jenkins, Canada.—Will some brother be good enough to tell me through the columns of the BLACKSMITH AND WHEELWRIGHT how to build or make a small saw table or stand for a circular rip saw with tilting table and give full measurements, and also how fast the saw should run? How many r.p.m., say, on a ten or twelve-inch saw for use in a small country shop?

A Non-Slip Shoe

From John Johnson, Maryland. — Will some brother blacksmith give his opinion as to the best type of horseshoe to use on roads where there is an excess of tar? Some of these roads are very slippery, and a number of accidents have come to my attention of late.

In their enthusiasm in constructing roads suitable for the automobile, the road makers have overlooked the horse. Either the roads should be suited to both the horse and the machine, or else the horses will have to be shod differently.

I understand that in England a prize contest was held recently in an effort to produce a shoe which would be suited to the purpose, but that the result was far from satisfactory.

Second Hand Planer

From George MacDonald, Connecticut.—I am in need of a cabinet planer and would like to find a good second-hand, small one, cheap, for cash.

Power Hammer for Shop

From B. H. Brooks, Texas.—Will some brother tell me the best make of power hammer for a small shop? Also what is the best process for sharpening or rolling discs cold?

Infected Hoof

From Charles P. Jenkins, Canada.—I would like to know if anyone can tell me how to cure a hoof trouble which has existed about two years. About two years ago this horse picked up a two-inch nail which entered the hoof just under the frog on his front foot.

The resulting hole heals over at time, but soon breaks open again and pus forms. I have poulticed the foot for two months at a time and have poured all kinds of oils and liniments into the hole, but cannot heal it or dry it up.

I have never pared or dug out the hole to the bottom. I think that the nail must have entered a bone or some joint about half way between the point of the frog and the back.

Cylinder Oil Test

From J. W. Johnson, North Carolina.—Will some brother give me a satisfactory fire test for automobile cylinder oil? This would be of great value to many of us who are doing automobile work in connection with blacksmithing. I always read with much interest the replies given by the various brethren in the blacksmithing business.

Others Have Noticed It

Uncle Ezra: "So ye just got back from New York! What's the difference between the city and the country?"

Uncle Eben: "Wal, in the country you go to bed feeling all in and get up feeling fine, and in the city you go to bed feeling fine and get up feeling all in."—*Life.*

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Our Editor's Letter

AS a matter of fact, the editor is on his vacation. We promised not to say anything about it, but to get out the magazine just as if he were present. A letter comes from him every day or so, telling about the pleasures of fishing, swimming, motor-boating, and the hundred other things in which the country fellow has the advantage over the city man.

After all, the idea of a vacation is to obtain a change of scene. It is like changing the acts of a play, and should bring about a corresponding variety of thought and action. It was "Bill Shakespeare" who said "Variety is the spice of life," and it must be confessed that William made quite a study of the subject. Probably no man ever lived who could speak intelligently about so many kinds of business as "The Bard of Avon." He would have made a good blacksmith if he had cared to put his time on that subject.

Blacksmithing has changed considerably since those days however. Like every other business, it is moving up to a higher plane. There was a time when the blacksmith had to know how to make a point for a spear or other weapon. If he knew that, he was a good blacksmith; if he did not know that, he was no blacksmith at all. Probably the modern smith would make rather a poor spear and a much poorer sword. The construction of those implements is fast becoming a lost art, and rightly so.

The sword is of no value even in warfare at the present day, even if some army officers do cling to it like grim death. The bow and arrow would be better, if we must have an ancient weapon. An American Indian could arm himself with a bow and arrow and whip the best swordsman on earth. A man with a pistol or small rifle can stop the attack of several swordsmen if he sees them in time.

Yes, blacksmithing has risen to a higher plane since the days when it was engaged largely with arrow tipping and spear point making. There are many things in the shop today that would mystify the old-fashioned knight of the anvil. If one of those old fellows could come to life and see a gasoline or an acetylene torch in the modern shop, he would look upon it as a brand plucked from the lower regions. He would view the machinery of the up-to-date shop as something handed down by the gods. If he saw a power forge, he would think that some one had stolen the "Hammer of Thor."

Your Business Educates You

YOUR shop should be your school. Education does not stop when one ceases to attend grammar school, high school or college. Education continues throughout life.

Every blow from a hammer must be guided and controlled by the brain to be effective, and hence every blow helps to train the brain. Hammering is mental exercise as well as physical. The brain cells develop with the muscle tissue. The force of the blow and the point struck, as well as the number of the blows, are all determined by that little pile of gray matter within the skull.

What is true of the hammer blow is true to even a greater extent of all the various operations required for completing a piece of work. Thought must precede action always. We may not be conscious of many things that we do, and yet there must be thought back of all action.

When we have learned to do a thing well, we do not have to think with so much effort. The child learning to walk has to think consciously of each step it takes. After a while, when walking has become automatic, we do not have to devote so much thought to the subject, and can use our brains for other work. That is true of the work in the shop also. The beginner has to work his brain pretty hard in striking a blow with a hammer. Notice how he screws his face up. He does not look handsome exactly, and he evidently feels the mental strain.

Yes, your business educates you. Life is a great school in which all may learn many and valuable lessons. We may learn them well or poorly, just as we did when we went to the old school house. You remember the excuses the students made. The lesson was torn out, or the student was sick and not able to study. He could not sleep all night, etc.

In the school of life, excuses do not count for much. You may say that you did not know that the iron was hot and that you ought not to be punished for putting your finger on it, but you will get burnt just the same. The discipline is stern in the practical school of experience. Nature is a rigid disciplinarian, and yet absolutely fair. There are certain rules that must be obeyed, and the scholars soon learn that they disobey those rules at their peril. If we did not get burnt when we touched the hot iron, the finger would be consumed. It is for our own good that we are burnt. Nature is just in enforcing the discipline.

Some try to "play hooky" in the school of life, just as they did in the graded school. They stay away from the shop and shirk their work. They become tramps and paupers. They go to the foot of the class in the great practical school of life, just as they did in their younger days. Then they start work again, many of them, and become good students once more in life's great school.

The education obtained in the shop is valuable. Those who try hard can get a great deal out of it. Every new idea of value is just so much added to your education. You may make use of those ideas some day. They may lead to some useful invention or to some important improvement in your shop. Therefore, get ideas wherever and whenever you can. Get them from your books, your magazines, and your shop. It does not take long to get ideas. Sometimes they come like flashes of lightning. Sometimes they seem to come from the sparks that fly from beneath your hammer, and are just as enlightening. Catch the ideas, keep them, make use of them.

Making Odd Things

WHY do not more of the blacksmiths make odd things during the spare moments, and incidentally make spare money? By odd things is meant many small but useful things outside the usual line of business. There are many possibilities of this nature, if the subject is given the necessary consideration.

As an example of the useful and odd things which could be made in a shop, we might mention household utensils. A good poker is readily constructed, and can be made superior to the ordinary commercial product, which is usually too short. A good long poker would be appreciated and could be disposed of at a private sale or through the medium of the village stores.

Such a poker can be constructed in a few minutes, from very inexpensive material. A rod of soft iron, three-eighths of an inch thick and four feet long, can be changed into quite a useful and artistic fire implement. A few inches of the rod are heated and bent over the horn of the anvil to make a suitable handle, which may be oval, circular, or any other shape desired. The opposite end of the poker is heated and bent at right angles, and then properly flattened and pointed. It is then complete.

With equal ease, it is possible to make an excellent fire shovel. The three sides of a piece of sheet metal are bent up and riveted or welded. A long handle is then welded on, the upper end being given any fancy shape desired. The upper end might be squared and twisted. It could then be brought around in a small circle and a few inches wrapped around the straight portion with pleasing effect.

A pair of fire tongs can be constructed in a simple manner by bending a long rod in the middle, making the half circle sufficiently large to provide the necessary spring. The ends of the rod are then shaped as in the ordinary tongs now sold.

Andirons or fire-dogs of a fancy pattern are easily forged by a first-class blacksmith. Such things ought to be popular, as the old-fashioned country fireplace is coming into vogue once more.

Another useful thing to make is the door scraper, for cleaning the mud from one's shoes before daring to walk on that nice new carpet. There are lots of things which the intelligent blacksmith can make as a side product, if he wishes to increase his income by utilizing his spare time.

Settlement of Strikes

ONE strike has followed another in such quick succession that it is difficult to keep track of them. Dock hands, river pilots, sky pilots, and various other classes, have been taking turns at this method of settling difficulties. Soon we shall have strikes among the parachute pilots and the pilots of the North Pole Limited.

What an immense waste of wages! There should be a cheaper way of reaching agreements. Agreements are always arrived at finally, and then both sides wonder why the same solution could not have been reached at a very much less cost. A thousand men on a strike for a month would mean a loss of at least a hundred thousand dollars. When we consider the hundreds of thousands of men who have been on strike throughout the world, the total loss is seen to run up into the millions.

Many millions of dollars have been lost in this way from the pockets of labor. There

can be no question about it. The manufacture or capitalists have lost as much as the laborers, or even more. Both sides have spent about a thousand times too much. That is poor business, most decidedly. If others attended to our business for us and lost all that money we would discharge them very quickly. We waste the same amount ourselves and say nothing about it. Will we ever learn wisdom?

It is too much to hope that man will become sensible all at once and stop this terrible waste of wages and property. The subject is one that is worth thinking over now and then, however, and that is why we editors speak of the matter. We wish you to think the matter over, not once but many times. Try to think of some way to spend money to better advantage than by throwing it away. Each one of you could think of a better method, we are sure.

The legal profession should be able to settle strikes. Setting difficult questions is part of their business. If a quarter of a million dollars had been turned over to the legal profession instead of being thrown away, many strikes might have been brought to a satisfactory termination. Many strikes might have been avoided entirely. That is worth thinking about.

The legal profession should go after that business. Suppose you blacksmiths were told that a quarter of a million of dollars is lying around loose, and that you could have it if you would reach out your hands and take it. Would you keep your hands in your pockets? You would not. You would go after the business, just as any other good business man would do.

If there are not enough judges and courts to handle the situation, then other judges could be appointed and other courts created.

The Rock Drill Blacksmith

How to Use the Swages and Gages in Forging the Drill Shanks

THE previous article told of welding hollow steel by making a V-groove in one piece and a chisel edge on the other. Then the work is shifted to bring the joint into the fire where it is heated up again, this time to a forging heat. After shifting the joint back to the anvil, it is reduced under the hammer to the proper size.

It may be advantageous to make use of a long steel wire, of a diameter a trifle less than that of the hole in the stock, for the purpose of keeping the hole open in the region of the joint and of matching the one bore with the other. However, it is not considered necessary. If the wire is used, it is run in after the two lengths are made to stick together, being inserted from one end of the work.

Another Method of Welding Hollow Steel

The ends to be welded are each cut diagonally across to correspond the one with the other. Both ends are then upset, the hole being enlarged during the process. This enlargement of the hole is desired. The two ends are then heated to a welding heat, borax being meanwhile plentifully sprinkled on the diagonal surfaces. The work is then slid

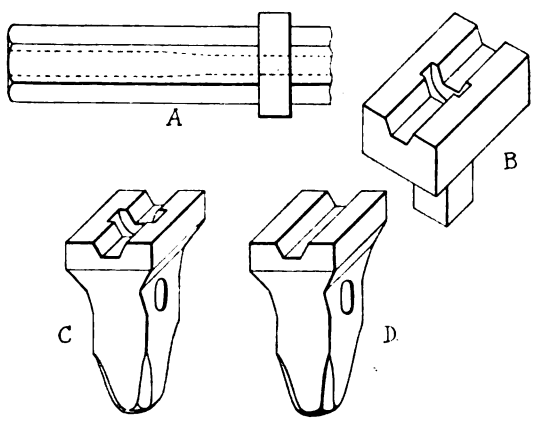


Fig. 1. At A is shown a Finished Shank End. The Upper Swages Are Those at C and D. The Lower Swage is B.

along to the anvil, if the arrangements described in the last issue are adopted; or, if not, the work is carried to the anvil in the usual way. The faces to be welded have previously, however, been hammered to produce rounded convex surfaces. The work is welded at the anvil under the blows of the smith's hammer. The smith strikes immediately above the point of actual contact, and then strikes points next to it, and follows these blows with others next to them, in this way working to close up the weld in such way as to force out all foreign material. It will probably be found at the close that the enlargement due to the upsetting will remain to some extent. It may be removed by chipping, or perhaps with the rasp.

Remarks and directions elsewhere given as to restoring steel that has been highly heated, naturally apply here. Any welding heat serves to overheat and damage the quality of steel. The hammering during welding tends to correct this, but it does not certainly reach all the points where damage has occurred. The steel should, accordingly, be reheated from below medium cherry red to the annealing point for rock drill steel—that is, to a point somewhat above the temperature at which the horseshoe magnet refuses to cling.

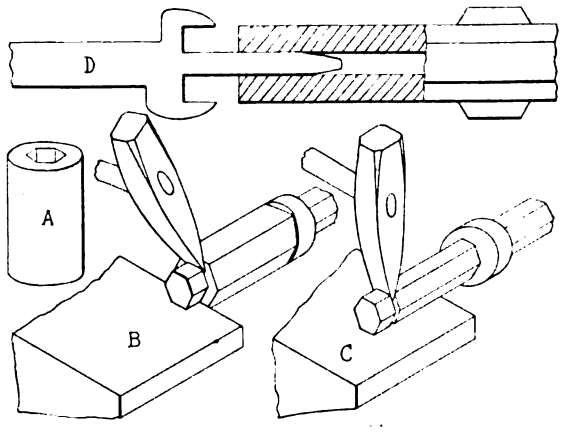


Fig. 2. The Hollow Gage A Fits Over the Shank, as Shown at B, to Verify Shape and Determine the Length to Cut, as at C.

The Shanking of Drill Steel

The forming of shanks on drill steel bars is of considerable importance, especially where hammer drills are employed. The shank may be a simple affair known as the *plain shank*. Naturally, it should be squared, shaped and finished and given the proper dimensions. The *collared shank* is a rib around the bar shaped to suit the machine with which it is to be used. See, for example, Fig. 1 at *A*. Then, there is the *shank with lugs*, which consists of several lugs projecting from the sides of the bar. Mr. C. C. Phelps has given some valuable information in this connection in *Engineering & Mining Journal*. This I follow in part.

The collar may be produced as follows: The end to be shanked is heated to a *full cherry red*. This will provide for two things: (1) It will render the steel susceptible to hardening; and (2) it will soften it. Both conditions are utilized. The end is heated to the specified heat for a distance of about 5 inches. The extreme end is then quenched in water or oil for a distance of 3 inches. This extreme end will accordingly be hard, and the 2 inches remaining will be soft. The bar is now jumped or bounced endwise on a metal slab and held vertically with the hardened end down. The result will be that the soft ring will be upset and a bulge will be formed all round the bar. Then this bulged place is heated in the forge to a full cherry red.

There is another method of upsetting the rib or collar which does not depend upon having a hardened end with a softened section above it. By this alternative method, the upsetting is done with the aid of special tubes. These are (1) the two halves of a split bolster, (2) the ring to surround the bolster halves, and (3) a hollow plunger. The split bolster is so formed that, when set up with the ring holding the halves together, the drill stock may be passed through it. At the end which is uppermost when in position, the bolster has a cylindrical depression of the proper size to receive the open end of the plunger. Further, connecting the small diameter hole through the bolster and this depression, the interior is so shaped as to permit a circular bulge to be formed when the shank end of the rod is passed through the bolster and the hollow plunger is driven down upon it. Naturally, the end of the rod is heated preparatory to this upsetting operation. See *A*, *B*, and *E*, Fig. 5.

This same upsetting operation may be carried out without the bolster, provided a quick-setting vise is used along with proper dies.

A punch is now used to open up the hole preparatory to the next operation, which is concerned with forging the rib to exact shape and size. Two swages or dollies are used for this work. See Fig. 1. The one is set up on the anvil, while the other is provided with a suitable handle. The work is properly held to position in the underswage on the anvil while the swage with a handle is held in proper position over the bar. The upper swage, shown at *B* and *C*, Fig. 1, is then struck repeatedly by a suitable hammer or sledge, while the bar is continually turned a little between blows. Unless conditions are rather favorable, a helper will probably be needed.

After the rib or collar has been rather exactly formed in this way, the work is again put into the forge and now heated to a full cherry red. The punch is again introduced into the hole. A second upper swage is next employed. This swage, shown at *D* in the same figure, has a simple groove corresponding to the form and dimensions of the main body of the shank. It is employed, in a manner similar to the other upper swage, to give exact form and size to the main shank between the collar and the near end of the bar.

Suitable gages enable the smith to determine when the proper forms and sizes of both collar and main shank are right. The gage, Fig. 2, *A*, for the end of the bar may be a short piece of steel with a hole through it of the size and form to fit over the bar when it is right in size and form. Likewise this gage may be given just the right length to serve as a guide in marking off the end of the bar to its proper length. The marking may be done with the cutting-off tool—say, a hot chisel fitted with a handle. After the marking has been done, the end is heated again and the cutting-off operation performed, as shown at *B* and *C*, Fig. 2. The end is to be squared off and, if necessary, filed or ground to exact smoothness when cold.

Certain shanks for some drills have to be fitted with two or more lugs all at the same distance from the end. As before, the steel is heated to a full cherry red for a distance of 5 inches and then quenched for a distance of 3 inches, leaving a heated ring 2 inches wide. Also, the bar is jumped up and down to upset the softened metal in this ring and make it bulge. A second heating to full cherry red is then given and the punch used to open up the hole.

While the metal is still hot, two swages are used to form one or two lugs. *A* and *B* in Fig. 3, show the lower and upper swages

for shaping a pair of lugs simultaneously. The work is heated again and a different upper swage—the lug-diameter-former, *C* in Fig. 3, is employed along with the same bottom swage as before. While the metal is hot, the other upper swage is also used. The center punch is employed during the foregoing operations to maintain the hole in the rod. The ends of the lugs are shaped with a third upper swage, *D*, Fig. 3, another heat being provided at the forge. The shank gage, shown at *A* in Fig. 4, is employed to guide this work. A special end-former is shown at *B* in the same figure. By its use, the end is properly rounded and the hole sized and made central.

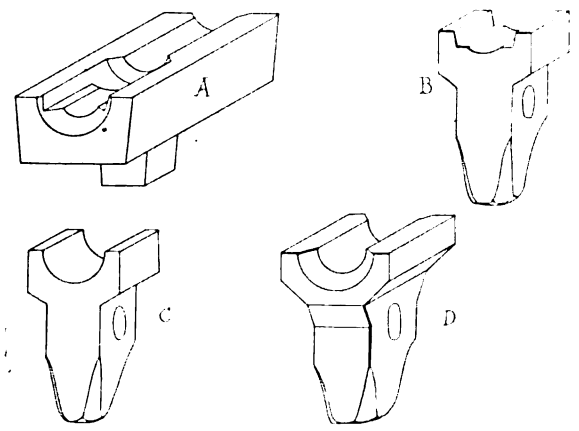


Fig. 3. Swages for Forming Lugs. Lower Swage A. Upper Swages B, C, and D.

Hardening

When the shank-forging and the cutting-off are done, the work is ready for hardening. This is a very necessary operation as it guards the forward parts from distortion through upsetting. The hardening is to be done on a rising heat—that is, the work is to be heated especially for the purpose and no advantage taken of any hot condition that may exist at the end of any final operation with swages or other forging tools. Further, when heating for hardening, the beginning should be made when the metal is comparatively cool, say at a black heat or at any cooler stage down to stone cold. The object in beginning the hardening heat from a low point is to get the advantage of the annealing effect obtained when one heats rock drill steel from below medium cherry red to a low point at which it will properly harden. This point may be determined, as elsewhere explained, by the use of a horseshoe magnet or otherwise.

The quenching is important, as with collars and lugs it is not desirable to have the highest degrees of hardness unrelieved by a tempering effect. On the other hand, in order not to complicate the blacksmith's duties, a special tempering operation will often, or generally, be undesirable. The thing to do when hardening, is not to quench in simple water, but to use oil or oil and water. The objection to water is based on the rapidity with which it does the cooling. Oil is slower. Fish oil is suitable or lard oil. By preparing the usual water bath for quenching and then adding a layer of oil, the sudden effect of plain water will be avoided. The oil, being lighter than the water and not mixing with it, will float in a layer on top. When quenching, the work being plunged vertically, the oil does the first cooling. The water comes into action only after the hot metal gets down the oil.

Sometimes the action of the quenching bath changes as it heats up from work being dipped into it. With plain water, this change becomes rather marked when the water is still considerably below the boiling point. With oil, there will generally be no especially marked change up to 200 or 220 degrees Fahrenheit—that is, up to the boiling point of water (not the boiling point of oil). If the amount of oil, relative to the quantity of work, is so small that it soon heats up to this point, then one may put the oil in a can and the can in a larger vessel containing enough water to make the water level as high as the oil level.

It may be necessary to use a cross piece to keep the can of oil from floating. It will be just as well not only to arrange matters with the cross piece in such way as to hold the can from rising, but also to provide a layer of water underneath the bottom of the can.

A shank end that is too hard tends to fracture the drill piston. One that is too soft will tend to cause trouble by an upsetting action of the metal, which may even result in cutting through the water tube.

A shank end with lugs may be dusted, before quenching, with powdered yellow prussiate of potash. This is put over the shank end as a whole, but especially around the lugs. The object is to increase the surface hardness.

The hardening of the shank end is to be extended from the very end to a point a couple of inches beyond the lugs or collar. This is to be borne in mind when heating preparatory to hardening.

Equipment and Tools

The rose bit with six cutting edges, especially when made from hollow steel stock, will represent perhaps the work which requires the most tools, in so far as ordinary practice with cutting bits goes. Shanking calls for special tools over and above the ones usually in a rock drill blacksmith shop.

For the six-edge rose bit, a dolly, quarter dolly, gouge, spreader and punch will be sufficient special tools. If hollow drill rod is to be shanked, special swages, gages, etc., will be needed. The precise tools will be indicated by the character of the drilling machine. While the resharpening and shanking operations are being performed, the drill rod will need support. A special, quick-acting vise will be very suitable for a good deal of the work, especially if special dies, shaped to fit the forms to be held, are provided.

Certain gages will be of service. The smith may use his ingenuity in providing himself with a gage for every measurement that needs to be frequently determined. For example, the bits for the various sections of a certain depth of hole will begin with a certain gage of bit and this will be followed by regularly decreasing sizes until the final size is reached. The rods will, perhaps, be of lengths corresponding to the various gage sizes. For a different job, the length corresponding to a given gage of bit may however differ. But there will probably be a good deal of uniformity of work, so that—for the standard work at least—a certain length will mean a certain gage size.

The smith will do well to have a single gage having the succession of bit sizes for

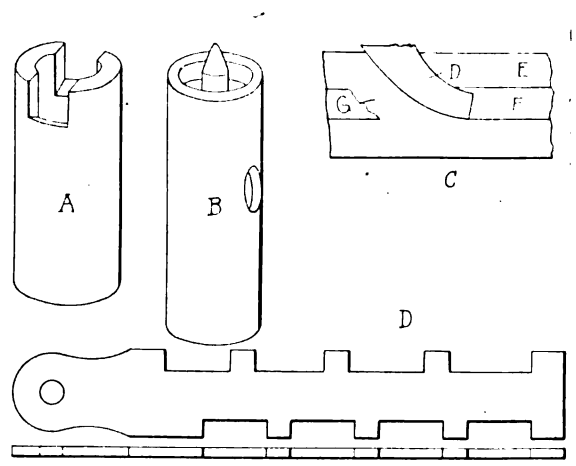


Fig. 4. A and D are Gages. B is an End Former. At C is Shown Method of Punching Side Outlet for Water.

a certain kind of job all arranged on it; and a separate gage for each and every job. In Fig. 4 at *D* is shown a suitable gage covering the requirements specified. Such a gage may be made from a piece of ¼-inch plate steel 3½ inches wide and about 15 inches long. A hole in the handle provides for hanging it on a nail. The gage intervals should be finished with a good deal of care.

An inside and outside diameter gage is shown at *D*, Fig. 2.

Side Hole for Hollow Steel Bits

Bits made from hollow steel sometimes give trouble, because the central hole in some rock tends to form a core which stops up the hole and prevents to a greater or less extent the passage of water through the bit to the face. A little thought will serve to make clear how this core forms. As there is complete absence of metal at the center of the face of the bit, no actual cutting is done at that point. If the rock at the center does not break up because of the cutting action of the rest of the face, then a pencil-like core will form. It projects up into the central hole of the bit. After awhile, it will break off, but it may still be in the hole. At any rate, such cores form and give trouble because they act as plugs.

A method has been devised which prevents the formation of such cores. A hole is punched in the side of the head of the

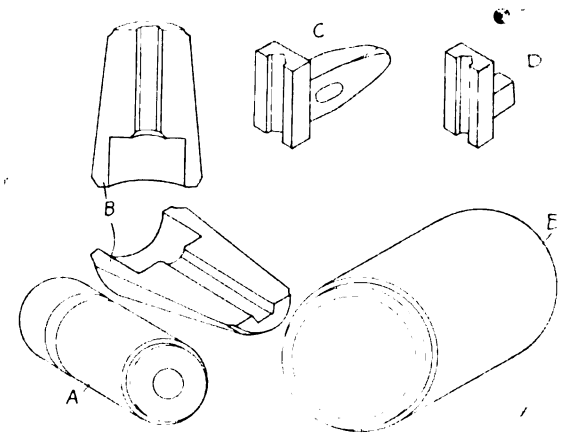


Fig. 5. The Sleeve E Holds the Split Bolster B Together. A is a Plunger. C and D are Shank Dollies.

bit until it connects with the central hole. Naturally, this side hole is located in a hollow or groove in the head. When this hole is punched, things are managed so that the short length of the central hole between the face of the bit and the new hole coming in from the side will be plugged up. The mode of accomplishing this is a very neat piece of blacksmithing.

A punch is made of a tapering form. The end will naturally be of the size of the central hole. But back of the end the punch is to be thickened by the taper. The drill bit, properly heated, is held sidewise on the anvil or other support and a hole started with the punch. The hole is slanted somewhat, as shown at *C*, Fig. 4, and not driven directly down towards the central hole. But the slant is only a small one.

The cold punch will naturally heat up from the hot metal of the bit. It is, accordingly, taken out and cooled in water. It is then put back and the whole driven in the full distance. However, if the smith manages everything right, the end of the punch will, at this juncture, heat up and soften and bend. All this is wanted. But it is wanted in such way as to produce a bent side hole which curves to meet the central hole.

Further, the bending punch, if the smith manages right, may be made to press metal under it and to plug up the central hole next the face. If the desired result is obtained, there will be provided a side exit for the water and metal will plug up the center at the face or just back of it. This latter result is desired, in order to prevent a new core from forming and interferring with the water.

He Didn't Like It

A nervous old beau entered a costumer's and said "I want a little help in the way of a suggestion. I am going to the French students' Christmas Eve masquerade tonight, and I want a distinctly original costume—something I can be quite sure no one else will wear. What can you suggest?"

The costumer looked him over attentively, bestowing special notice on his gleaming, bald and shining head.

"Well, I'll tell you," he said thoughtfully. "Why don't you sugar your head and go as a pill?"

What is right never dies, but what is wrong has a funeral every day.

The Ornamental Grille

How the Forgings and Sheet Metal Are Assembled in Scroll and Support

By ARTHUR W. JORDAN

THE ornamental grille shown in Fig. 1 was designed by the writer, under whose personal supervision it was made. Intended mainly as an artistic feature in the hall of a mansion in the wealthy center of the West End of London, it was set in the narrow center opening between two wooden pillars. Here it served to divert the movements of the occupants of the house and visitors around to the other side of these pillars, through the two wider outer openings of the three divisions into which one side of the hall was divided.

Expense being of secondary importance, only the best work was contemplated in preparing the design, and the execution of it. As it was intended merely to be seen and had no wear or usage to put up with, the grille was made of rather light material which answered its purpose admirably.

The main portion of the grille, it will be observed, is enclosed by a rectangular frame, three-quarter inches by one-quarter inch. On this the top portion is fixed; the two outer scrolls supporting the pediment at the top being fashioned out of the ends of one bar of three-quarter inch by three-sixteenth inch iron. The flat center portion of this runs along the top bar of the rectangular frame to which it is secured by countersunk screws at intervals.

The pediment is of one piece welded into shape, when hot, at the sharp corners from iron of the same size. The small shield and the leaf scrolls at each side of it are made of sheet metal.

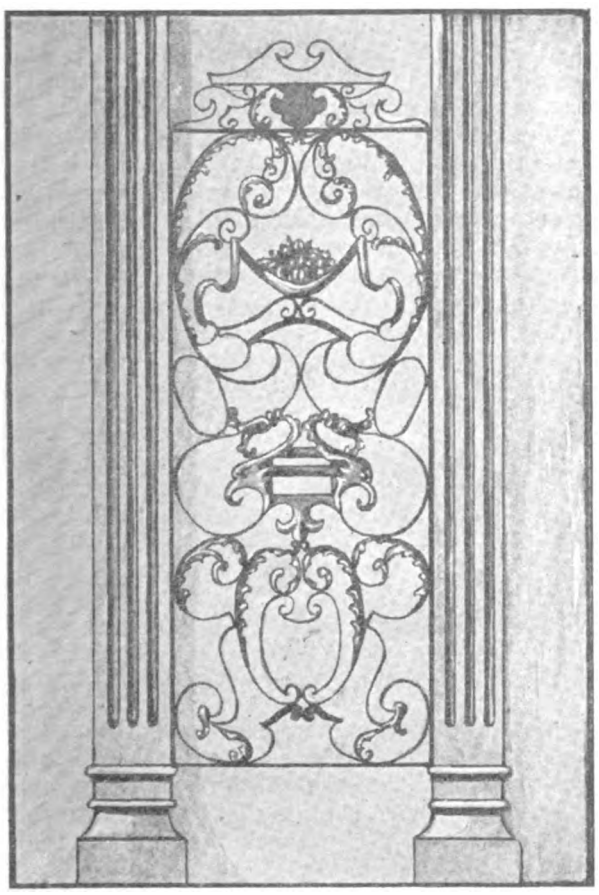


Fig. 1. General View of Grille in Position.

At the top it is secured by screws through two half circles cut on the shield out of the sheet metal and bent at right angles, one turned one way and the other turned in the opposite direction, and by one similarly treated at the bottom. This permitted the shield to be placed centrally on the width of the bar, top and bottom, and as it is seen from both back and front, this was very important. The same screws hold the small scrolls, which are in one piece with the leaves between them and the shield.

The leaves just mentioned and shown enlarged in Fig. 2, at the left top corner, were produced from one strip of sheet metal hammered to shape.

The festoon of fresit, or "swag," as architects call it, shown below in Fig. 2 was also hammered up out of sheet metal. As this was to be suitable for viewing from both sides it was necessary to consider some way of making it for that purpose.

The ribbon was domed to a narrow basket shape, the ends tapering and being domed on one side to perfect the illusion of hanging carelessly from the supporting scrolls. The fruit was domed out of two pieces of sheet iron. The edges at the top were made to fit together and were brazed together, the lower edges being opened out, just fitted inside the ribbon where they were secured by brazing.

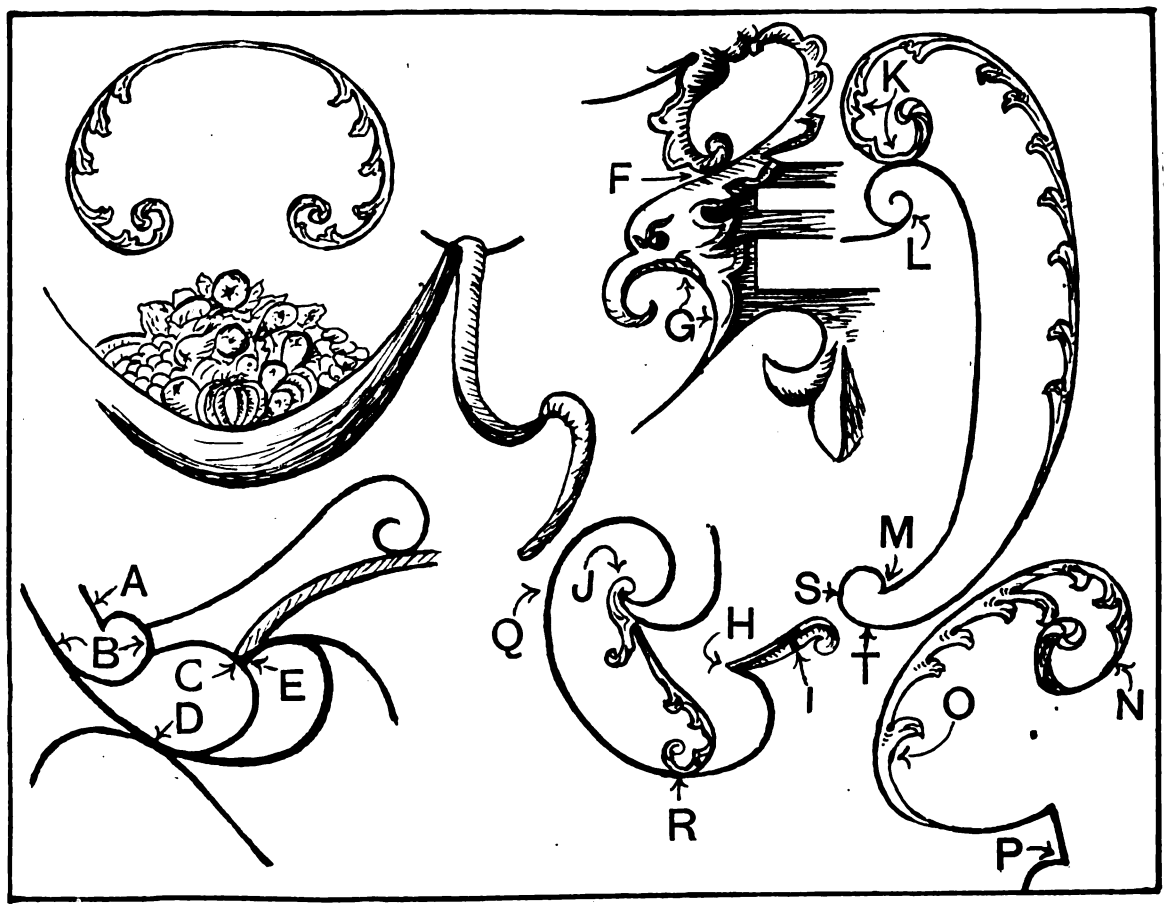


Fig. 2. Some Detailed Points of Interest.

The ribbon is of one piece down to the point at A Fig. 2 where it is secured by screws to a portion of the bar iron of the scroll, purposely left for running up inside a short distance.

The large outer scrolls at the top of Fig. 1 are of one piece down to the point E Fig. 2, where they are welded on to the short circular piece. The former are five-eighth inch by three-sixteenth inch and the latter is one-half inch square, the ends of the scrolls being tapered to it in the welding.

The square iron was used to give boldness and strength at a point where both were needed, although heaviness had to be avoided everywhere. The two pediment shaped scrolls beneath the ribbon are of half inch by eighth inch and they end with the short scrolls from the bottom of the ribbons, beneath the leaves on the large scrolls. The letters B, C and D in Fig. 2 mark the points at which these scrolls are secured by means of countersunk screws or rivets.

Each eagle head was cut out of one piece of sheet metal, being domed and brazed where necessary to secure, when bent into shape. The slotted centerpiece ending in an inverted fleur-de-lis was cut out of heavier sheet metal.

The eagles are secured to the grille by ball knobs which form the eyes, with a screwed pin between, each side being of course the same. The letter F Fig. 2 shows where the husk which comes down from the scroll above is secured to the eagle head and G, where the latter and the flat sheet metal center are secured to the scroll below. This centerpiece was fixed in a manner similar to that adopted for the little shield at the top of the grille as previously explained.

The scrolls at the bottom of the grille are welded on to the shaped pieces, of which a section is given (see I, Fig. 2) at the ends marked H, Fig. 2. These scrolls are of one piece of iron each, and were hammered into shape when hot, where covered by the husk at J. The terminations are indicated by the letters N. O, P, Q and R.

The inner scrolls of lighter stuff are also of one piece, being shaped when hot at M, Fig. 2, and having the piece at the top welded on at L. This was one of the most tricky jobs in the whole piece when it came to getting a perfect shape, but good work was of first consequence and the art of the whole thing was of more importance than a few dollars saved by economy.

The writer remembers the blacksmith was rather prouder of this scroll than of anything else in the grille. The letters J, S and T show the other points of fixing not previously mentioned when dealing with other scrolls.

The whole grille measures six feet ten inches by two feet seven inches over all, and was much admired when put into its place, which is more years ago than the writer likes to remember. It was painted with two coats of lampblack, the first coat being mixed with one part of linseed oil to three of turpentine and the second coat being mixed with turpentine alone.

There was no gilding at all on the grille, preference being felt for a dead and uniform black all over. It must be admitted that it is doubtful if any gilding would have improved its appearance in the position it was designed for, whereas it showed up well in black.

All the leaf work was repousséd up out of sheet metal of suitable thicknesses and was the work of one of the cleverest repoussé workers in London. The blacksmith was also a very able and painstaking man who was well used to work of the highest class.

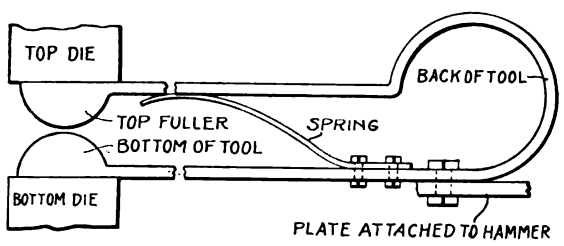
There were one or two nice little forging jobs in this grille, as the practical reader will soon pick out, and there was scope for a man to show what he is made of. The writer made full-size drawings of every part for the workmen to see at a glance, if they had any doubt at all, just what was required.

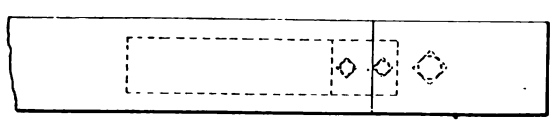
These drawings were made with chalk on brown paper and they were hung up around the shop for reference. Such drawings save all possibility of error.

A Spring Fuller

From H. F. Towner, California.—I am giving you herewith a sketch of a device which I have found to be mighty handy. It shows the shape of the top fuller and the beveled bottom of the tool. The tool is 2¾ inches wide at the front and about 1¾ inches in thickness. The depth of the tool depends, of course, upon the size of the dies in the hammer.

The spring is used simply to hold the top fuller away from the bottom tool about ⅝ of an inch when the top die in the hammer is up. The curve at the back of the tool is made large so as to allow plenty of movement of the dies. This back curve is made of 2½ by ½ inch soft steel which extends up to the tools.





The sketch at the back shows where the device is attached to the power hammer or to an angle plate which is attached to the hammer bed. The device of course must have side braces to hold it straight.

On a Giant hammer this device can be attached by drilling two holes on the back of the frame and by bolting a piece of wide angle iron on a level with the bottom die. Be sure to use two bolts in the tool, and when the tool is not in use, the front bolt can be removed and the tool swung to the side.

I find that this tool comes in handy and use it frequently both in my Giant hammer and in one of the other machines as well.

Prices in Illinois.

From Harry E. Heath, Illinois.—I am sending you a list of prices adopted by the Kendall County Horseshoers Association, every blacksmith in the county joining and forming a local.

4 new common shoes	$3.00
4 old common shoes reset	2.00
1 new toe calk	.10
4 new steel plug shoes	4.00
4 new Neverslip shoes	4.00
1 bar shoe ... up	1.25
1 new rubber pad ... up	1.50
1 leather pad	.25
Packed with oakum	.25

Wagon Woodwork.

New pole only	5.00
New pole complete	7.50
Tongue hounds, pair	2.75
Tongue hound, one	1.50
New bolster front or back, old irons	3.50
Sand board	2.50
Front hounds, pair	4.50
Front hounds, one	2.50
Hind hounds, pair	3.00
Hind hounds, one	1.75
Reaches, 8, 10 or 12 ft	2.00
Axles, front or hind	6.00
Bolster stakes, each	1.00
3 in. rims, ½ in. tires	32.00
3 in. rims, 7/16 in. tires	30.00
3 in. rims, ⅜ in. tires	28.00
½ rim 3 x 1¾	2.25
Sawed fellos, one	.50
Sawed felloes, set	12.00
Spokes, one	.40
Spokes, two or more	.35
Spokes, whole wheel	.30

Wagon Iron Work.

Bolster plates	2.50
King bolt ... up	.75
One set new tires up to 2 in	16.00
One set new tires up to 3 in	20.00
Four tires reset up to 2 in	3.00
Four tires up to 2 in., bolted	3.50
Four tires reset up to 3 in	4.00
Four tires up to 3 in., bolted	4.50
Four tires cut, welded and set	4.00
Pole cap steel	.75
Box strap irons put on	.50
4 cast skeins put on	12.00
1 cast skein put on ... up	3.50
Setting box	.50
Singletrees	1.00
Neck yoke	1.50
Singletree end	.35
Singletree center	.50
Neck yoke ends	.40
Neck yoke centers	.75
Tongue hound iron	.65
Tongue hound iron, pair	1.00
Hammer strap	.50
Hind hound plate	1.25

Buggy Wood Work.

Buggy shafts, pair	5.00
Buggy shafts, one	2.50
Buggy pole ... $3.50 to	5.00
Cross bar weld extra	1.50
Pole circle ... up	1.50
Buggy singletree	.75
Buggy neck yokes ... up	1.50
Buggy spokes, one	.40
Buggy spokes, two or more	.30
Buggy rims set ⅞ and 1 in	7.50
Buggy rims, one piece	1.00
Buggy rims, 1½ and 1¼ set	10.00
Buggy rims, 1⅛ and 1¼ one piece	1.50
Buggy reach, one	1.50
Buggy reach, pair	2.75
Wheels, cut down, old tires	12.00
Spring wagon, box seat	18.00
Bow sockets	1.00
Buggy bows	2.50

Buggy Iron Wagon

Buggy axles, per set	12.00
Buggy axles, one	3.50
Axles, set	1.25
⅞ x ¼-inch tire, per set	7.50
⅞ x ¼-inch tire, one	2.00
1 x 5/16-inch tire, per set	8.50
1 x 5/16-inch tire, one	2.25
Resetting buggy tire, set	3.00

Plow Work

Plow moleboards, polished	1.50 up
Plow, pointed	2.00
Plow sharpened	1.00
Walking plow, beams	4.00
Walking plow, handles	1.50 up
Implement, single trees	.60
Four horse eveners	1.50 up
Gopher blades, sharpened, per set	1.75 up
Cultivator shovels, sharpened, per set	1.75
Point shovels, per set	4.00
Drag teeth, sharpened, each	.03
Sickles, welded	1.00
Sickles, sharpened, per foot	.10
Sections, each	.10
Guard plates, each	.15
Mower tongues	6.00
Sickle heads	.75
Implement tongues	3.00 up

PULVERIZERS SHARPENED

Per disc	.15
Cutaway, per disc	.35
Spaders, per disc	.60
Road grader blades, $4.00 and	5.00

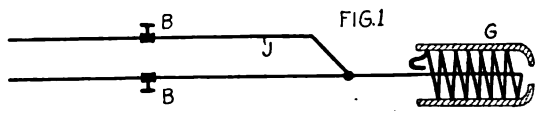
SLED AND SLEIGH WORK

Tongue, complete, old iron	6.50
Pole only	5.00
Tongue, cross piece	1.50
Bolster	2.50
Reach	2.00
Runners, per set	13.00
Runners, one	3.50
New steel shoes, set	10.00
New steel shoes, one	2.75

How to Make a Kerosene Torch

From L. R. Venable, Washington.—In the May and June numbers of your valuable magazine, I notice that C. C. Richter, of Iowa, wants to know how to make a kerosene torch in which he can use air pressure. I will tell him how I made one which gives more than satisfaction; it is simply a joy.

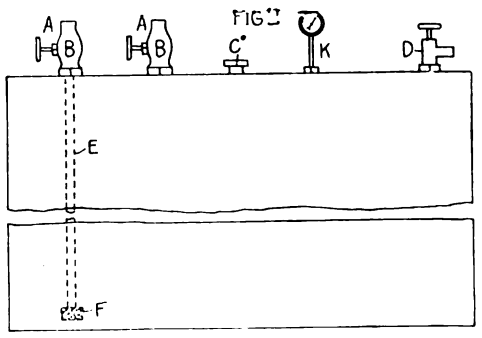
First, secure a length of ⅛-in. D. S. Black pipe and a length of 3 in. Black pipe, 6 in. long. Heat one end of the 3 in. length in a forge and draw down to 1¼ in., as shown at G, Fig. 1. Next, make a straight end on the ⅛ in. pipe, as shown in Fig. 1, between B and G. This part must be about 2 in. long. Now coil back as at G, just large enough to fit snugly (driving fit) in the 3 in. pipe. The end of the coil is drawn down to 1/16 in., and should be made to point toward the end of the torch.



Secure another piece of ⅛ in. pipe and bend and weld to the first piece, as in Fig. 1, first making a ¼ in. hole in the straight pipe and placing the end of the bent piece opposite the hole. The welding may be done with an acetylene torch.

Now, screw in a needle valve on each pipe, as indicated at B, Fig. 1, and screw nipples into the needle valves. Secure a high-pressure tank, equipped as in Fig. 2. The letters AA indicate hose connections; BB, the needle valves; C. is the filling connection; D, the air hose connection. A ⅛ in. pipe, E, extends to within one inch of the bottom of the tank, and has a very fine strainer on the lower end. A pressure gauge is shown at K.

In operating the torch, two lengths of hose about 16 ft. long are connected at AA. After supplying the tank with kerosene, pump up



to about sixty pounds pressure. Open the needle valve in the tank, and let sufficient kerosene flow through the pipe valve, which is connected with the pipe E, to generate the necessary gas. The torch may be further regulated by adjusting the air supply.

A little practice, and you will be able to preheat anything from the smallest gear to a Jumbo bull wheel.

Good Business in Texas

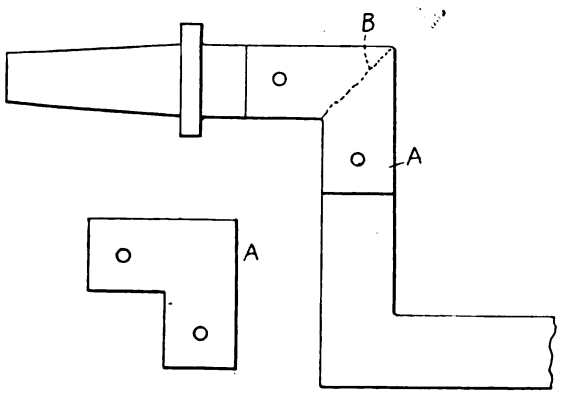
From Samuelson Brothers, Texas.—Everything is blooming in this part of the Golden East where the watermelons and the sweet potatoes grow. This has been about the best year I've ever seen in all my experience. The other day we made a little raise on horseshoeing, and bless my soul, if the Little Preacher from the little backwood church didn't come in to have his horse shod. Well, you can

imagine, he and I had it up and down. I tried to reason with him, but nothing doing. He had it down pat that I was robbing him when I told him he owed me $2.00. I told him if he thought I had robbed him, I would give back his money. But, oh no, he wouldn't have that. He just kept on kicking and raving, until finally like the rest of us poor, hard-laboring blacksmiths, I "went off my head." I told him that what the matter with this old world now was that such 2 x 4 sky pilots and good-for-nothing shrimps like he were raising sand and kicking when a hard working man was trying to live and let live. I told him gently, that if he wanted to come back, I'd be glad to see him, but if he didn't, I'd lose no sleep over it. You know, there are only two shops in town, and what one has, goes. This is the finest town in the state of Texas. Everybody's like a brother, especially the blacksmiths. We're right next door to each other, and if I want anything they've got, I am just as welcome as rain after a drought. And the nicest way we do business you ever saw! If you come to me for a price of a piece of work, and I give you one, it'll be the same thing over in their shop. Here's a few prices:

Horseshoeing	$2.00
Resetting	1.50
For bad feet, extra	.25
Stallions, $3.00 and	5.00
Setting 2-inch tire, cold	.50
Setting 2-inch tire, hot	.75
Setting 4-inch tire, cold	1.00
Setting 4-inch tire, hot	1.50
Wagon axle	$5.00, 10.00
All plow work, per inch	.02
Turning plows from 25 cents to	1.00
All iron, 10 cents per pound; per hour for time	1.00
Old iron, per pound, 6 cents to	.08
Making new wagon	175.00
Making new wagon bed	25.00
Making all pine timber wood frame	15.00

Welding Drop Axles

From Charles Smith, Pennsylvania.—Here is a drop axle welding job which may be of interest to some of our brethren. The break occurred at *B*, in the illustration. I first filed off all paint and white lead. Then I drilled two one-quarter inch holes three-quarters of an inch deep, as shown. A plate was constructed, as shown at *A*, with similar holes in it. Then I heated the axle red hot and nailed the plate to it. Afterwards I welded the plate to the axle using a slow heat. Dry pulverized borax was used as a coating for the part welded. The plate serves to hold the broken parts together during the process of welding. Cut a "V" on



the opposite side and fit on a broad piece of "V" shaped iron of good quality. Flux both axle and "V" shaped piece and nail together. Then heat and weld fast. This will always give you plenty of metal to work on.

If anyone will try this method, he will find it to be very convenient. Do not think that it is a long method, for it is not. The corner of the axle is hammered up to the required shape. This method prevents undue stress on the metal at the inner corner and makes the weld secure.

Prices From Illinois

From William Long, Illinois.—I always like to have your magazine on file and am therefore taking the present opportunity to renew my subscription. I get a great deal of information from the paper.

I have been settled here only since last November, but I have begun to like this section of the country very much and am doing a good business. My shop is 30 by 70 feet and is furnished with power. We get very good prices here for our work.

The following price list gives an idea of our usual charges:

HORSESHOEING

Four Steel Plugs	$3.50	
Four com	3.00	
One bar	1.25	
Reset, each	.50	
Four Neverslips	4.00	
Stallions, each $1.50	6.00	
Plows, Sharpened, 12", 14"	.50	
Plows, Sharpened, 16"	.60	
Plows, Sharpened, 18"	.75	
Pointing and Sharpening	1.50 to $2.00	ea.
Pointing Shovels	3.50	for set of 6
Wagon Axles	6.00	
Wagon Tongues	5.50	

I do a cash business which saves a whole lot of bookkeeping. I wish I had started this years ago.

What You Give Away

From H. H. Hubbard, New York.—For sometime I have been an interested reader of your paper and am taking the present opportunity of renewing my subscription.

We have here a lively and sociable community with three blacksmith shops. I regret this past year has not been a very prosperous one. My partner was called to the colors but he is now back on the job again, I am glad to say.

I do not believe there is any business in which the public expects so great accommodation as in the blacksmith business. If a farmer goes into the grocery store and buys eight or ten dollars' worth of groceries, and happens to take a stick of candy home to little Willie, also, he would have to put down a penny for the candy. If he comes to your shop to get a horse shod and wants a small bolt to put in his wagon or a few hoseshoe nails, he is charged nothing. If you made a charge, a farmer would tell everyone he met that you were an extortioner and robber.

Just keep account of these small things you give away in a year and see what the cost runs up to.

The prices which we charge for work in this section are as follows:

New Shoes, 0, 1, 2	$0.40	
New Shoes, 3, 4, 5	.50	
New Shoes, 6, 7, 8	.60	
Bar Shoes	.75	and $1.00
Calking and Setting of Shoes up to No. 6	.25	
Same as above, Nos. 7 & 8	.30	

News From Texas

From J. H. Puckett, Texas.—I suppose that I would be called an "old timer," as I have been a reader of the BLACKSMITH AND WHEELWRIGHT for nineteen years most of the time.

I notice that you ask your readers to give their ideas in regard to automobile work. I think it is all O. K. I commenced blacksmithing twenty years ago in a small shop. When automobiles were introduced here, I began repairing them.

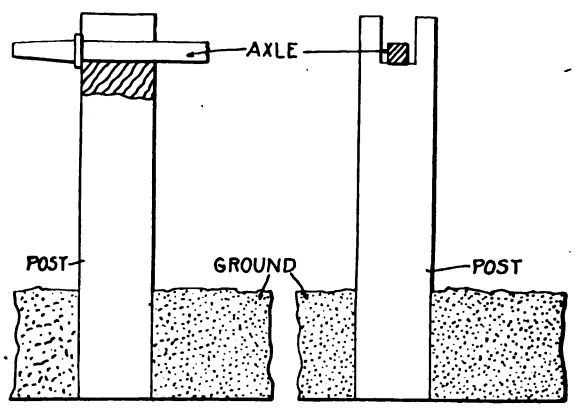
I now have a large shop and am prepared for all kinds of work. I have a 12-horsepower gas engine. I run a grist mill, power hammer, emery grinder, rip saw and small planer. I have a gasoline station and sell cylinder oil. We have a free air supply from a compressor and also sell a full line of Ford car parts.

I employ from two to four men all the year around. We carry a full line of blacksmith and woodwork stock.

There is a welding machine in the shop and all the tools and equipment are paid for. This was not done all at one time. The tools were gradually collected, just a piece or two at a time. I am stating this as it might be of benefit to some other young smith. I can do any kind of work about the shop, although I stay at the forge most of the time as that is my hobby. I like the BLACKSMITH AND WHEELWRIGHT better than any trade paper that I take.

A Wheel Bench

From W. J. Smith, New Mexico.—I thought I would send in a drawing of the wheel bench that we have been using in our shop. We have found this bench very convenient. A post is fixed in the ground, as shown in the figure, and a slot made in the top of it to receive a pin on which the wheel may be mounted. The pin can be arranged at a convenient height so that the wheel will not have to be lifted very high. The method of attaching the pin will be clearly understood from the figure.



Another thing that I have found very convenient in our shop is a tire-heating furnace. This is constructed of brick and built in the wall. The dimensions are five by six feet. Fire grates are constructed so that either coal or wood may be used in the furnace. We always try to keep the shop in order and have a large number of iron pins in the wall for the purpose of hanging the tires on.

Shop Equipment

From Charles E. Windon, West Virginia. I have been blacksmithing since 1894 and have been in my present location seven years. I own my house and shop. I have four lots. My shop is 26 feet square and one and a half stories high.

I do several kinds of work including some automobile repairing such as welding springs, etc.

There is a garageman near here, but he is not familiar with iron work, so that most of that business comes to me. I do a great deal of horseshoeing. There is no horseshoer close to me. The population of this town is about 800, but we do business for a considerable population in the country.

We get top prices for our work here on both wagon and shoeing jobs. I do track shoeing, and forge my own shoes for track horses. I trust this will be of interest to my brother smiths.

Removal of Tires

From L. T. Tarbell, New York.—I want to say a few words to Maskell Ewing, of New Jersey, on the subject of removing wide tires.

A few years ago we made a tool to take off tires without hammering. This tool consists of a standard with a foot resting on the felloe with a hook which takes hold of the under edge of the tire and is operated by a long-handled lever on top. The arrangement is anchored to the hub and swings from point to point as needed. Of course it would be impossible for anyone to build such a device without detailed drawings.

We wanted to patent this machine, but after a careful search of the patent records, decided not to go on with it. We have made quite a few devices for blacksmiths some of which we have patented. One of these is a machine for sharpening horseshoe calks and is the only machine that will sharpen a steel toe calk. Well, we lost a few hundred dollars. The patent has now expired.

We make the best forge we have any knowledge of, also hoof trimmers and some other tools.

I will say a word more about taking off wide tires without special tools. What causes the principal trouble is the fact that the diameter is a little greater in the center than at the edges. I lay the wheel flat and hammer the felloe at a particular point until it loosens. Then, turn the wheel over and hammer at a point diametrically opposite. By repeating this process the felloe will work loose and the tire will come off.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

Topping the Wagon Body.

Sometimes, a wheelwright or blacksmith is called upon to retop a wagon or automobile, and it is very essential that the right kind of fabric is used, especially if the job is to be one to brag about.

A fabric is being marketed by L. C. Chase & Co., of Boston, Mass., that is said to meet all requirements. It is sold under the trade name of "Drednaught." A body equipped with this fabric withstands the weather and also presents a very desirable appearance. Communication to the company are always courteously received.

The U. S. Booster.

The latest quarterly number of the *U. S. Booster and Horseshoers' Advocate* contains interesting matter that is bright and up-to-date. Among the interesting ideas advanced is the opinion that the horse will once more become prominent, even if the automobiles do not decrease in numbers. There will always be those who love a horse and will ride one whenever suitable roads can be found.

The *U. S. Booster* is published by the United States Horse Shoe Co., of Erie, Pa.

Tempering Process.

A reader gives his experience in tempering steel as follows:

"I am proud of the privilege to recommend to all brother blacksmiths the use of the H-B Tempering Process, which I have used in my shop for the last eight months. The H-B Tempering Process has improved my business 100 per cent, and there is no reason why it would not do the same for you.

"Now, Mr. Smith, just stop and think whether I am right or wrong. Tempering steel is the biggest fall-down with all shops. I have been in the business for the last 15 years and I know it to be a fact. No matter how good the workmanship, the tempering is the principle part to make complete the working of steel.

"I have great success in tempering plow shares, not in the old fashioned hit or miss way, but with complete satisfaction, so that I can tell my customers that if a share is not as good as when it came from the factory and better, I will return the money. How many of us smiths could make a business of drawing out axes and guarantee them to be as good as new and better? Tests that have been made in my shop are surprising. I have an old rail lying on the floor that has been all cut up with tempered axes and grub hoes. I find that it is very seldom we are able to chip or break the edges.

"I would never think of running a shop again without this great aid. Don't let your customers go to your competitor, but order this process and get the same kind of success that I have been able to receive by this simple means.

"By all means, brother, do not spoil hard labor and good workmanship with poor tempering when the good is knocking at your door trying to get in. All necessary directions are furnished by the company who manufactures the process, and it really is a whole lot more simple tempering with this process than with the old means (water).

"I trust that you will try this means and be one of many happy blacksmiths."

This tempering process can be procured from the H-B Tempering Process Co., Clearbrook, Minn.

The man who does not advertise because he doesn't know how to write an advertisement should quit eating because he can't cook.

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 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

PATENTS FOR INVENTIONS.
H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, Washington, D. C. Established 1883. I make an 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.

For Sale

FOR SALE
1 No. 408 Champion steel horseshoer's forge, $15; 1 heavy floor emery stand, $10; 1 No. 1 Eureka, new style tire bender, $10; 1 iron split pulley, 28 in. diameter, 5 in. face, for 1 11/16 shafting, $5; 1 new steel shafting, 1 11/16 x 12 ft. long, $5; 1 steel shafting, 1 7/16 x 16 ft. long, $4; 9 adjustable 12 in. iron drop hangers for 1 7/16 in. shafting, $2 each; 1 "one cow" Viking cream separator, good as new, $20. Address Andrew Bjerk, Box 105, Colgate, N. D.

FOR SALE CHEAP
Blacksmith shop. Stock and tools, machinery including gas engine, band and rip saws, planer, drill, emery stand, Shaler's vulcanizing machine, lumber's taps and dies, and blow torch. No other shop near. Plenty work for 2 or 3 men. Good place for a garage. Address M, care Blacksmith and Wheelwright, 71 Murray Street, New York City.

FOR SALE
Well equipped blacksmith shop, good location, doing good business; two-story shop, three thousand feet floor space, also residence property close to business. This is a splendid opportunity. Mack Thomas, Curtisville, Tipton County, Indiana.

FOR SALE
If you can't get the nuts off from old bolts that burn when taking machinery apart, try one of our Nut Splitters. Splits all nuts three-quarter inch and smaller. Get circulars. Whisler Mfg. Co., Gibson, Iowa.

FOR SALE, GOVERNORS FOR AUTO ENGINES
We make governors for Auto and Cycle engines when used as stationary. Write today for circular. C. L. H., Box 774, Dept. C, Taft, California.

FOR SALE
Blacksmith shop and garage combined, building 30 x 80 feet; galvanized iron, equipped throughout with modern machinery; only shop in town. Big trade already established. Will take half price of new stuff, and it is all as good as new. L. L. Warren, Pendleton, Texas.

FOR SALE
Arco wand vacuum cleaner, large size, the kind installed in large residences and runs by ¾ motor or moved from room to room on small truck and attached to lamp socket. In perfect condition. Priced to sell. Have no one to operate it now. If interested, write Mrs. M. A. Tuttle, Lake Charles, La.

FOR SALE
Well established blacksmith, horse shoeing, auto and wagon shop. Equipped with machinery and power. On one of Denver, Colorado's principal streets. Owner wishes to retire. L. A. Pfeiffer, 447 So. Broadway, Denver, Colo.

FOR SALE
Blacksmith, implement, hardware and garage business. Oil and gas station. All corner property. Ill health reason for selling. Write for particulars, W. J. Ott, Woodlake, Cal.

FOR SALE
Country Blacksmith's shop and tools in good location. Also house and barn with half acre land; price $2,000. Address David Young, Wadsworth, Ill.

FOR SALE
A garage and blacksmith shop combined. Good business. Plenty of work for two men. Good location, one hundred miles from railroad or any other garage. Good opening for wide awake man. Reason for selling is, I have bought a place and want to move on it. Address Ed. Tinney, Highway Garage, Reserve, New Mexico.

FOR SALE
PRINTING FOR BLACKSMITHS
75 best grade envelopes and letter heads for a dollar. Guaranteed. Five day delivery. Liberty Press, 1102 Barry Avenue, Chicago, Ill.

Wanted

WANTED
Steady employment by soldier. Will be discharged by August 1st. Ten years experience as a Blacksmith and Horseshoer. State wages willing to pay. Sgt. Johnson, Q.M.C., Fort Crockett, Galveston, Texas.

The man who does not advertise simply because his grandfather did not, should wear knee breeches, silk stockings, and a wig.

Tires

Telephone Circle 2460

B. LIBEN & CO.
DEALERS AND JOBBERS
in all Makes of Auto Tires and Tubes
261 WEST 54th STREET, NEW YORK

Biggest Drop in History in

Double Tread Tires

Greatest selection in factory seconds and blemished tires.

Write for information.

Tire Dealers Attention!

REDUCED PRICES ON DOUBLE TREAD TIRES

30 x 3 Plain - $5.00
30 x 3½ NonSkid $6.75

All other sizes on request. 20% deposit on C. O. D. orders required. Write for list to

M. LIBEN & CO.
793k 7th AVE. NEW YORK CITY

PRICE WRECKERS
Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50		34x4½	N. S.	$11.00	
30x3½	"	6.50		35x4	"	10.00	
32x3½	"	7.25		36x4	"	10.25	
31x4	"	7.50		36x4½	"	11.00	
32x4	"	8.00		36x5	"	12.00	
33x4	"	9.50		37x4½	"	12.25	
34x4	"	10.00		37x5	"	13.00	

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE
282 Halsey St. Newark, N. J.

DOUBLE TREAD TIRES
We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

Wagon Maker's Outfit.

W. L. Sherwood, of Kirksville, Mo., is putting on the market a valuable tool for the wood worker known as "The Wagon Maker's Outfit," which consists of a nine-inch jointer head as shown by the accompanying illustration.

The company manufactures a large line of wood working tools at prices well within the reach of small shops. Smiths who intend enlarging their plants should write for the 1919 catalog, No. 15.

Horseshoes Well Made.

One of the oldest companies in the horseshoe business is the Phœnix Horse Shoe Co., of Chicago. The Bull Dog Toe Calks are of particular note. The shoes turned out by this firm are well made and are giving universal satisfaction.

The reader who writes the firm for a catalogue is sure to get satisfaction. Now is the time to get information on the subject. See the latest descriptive circulars.

Eye-Turning Device

An interesting little machine has been placed on the market by F. J. Kitowski, of St. Cloud, Minnesota, the object of which is the easy construction of a complete and perfect eye. One turn of a lever is all that is necessary in the process, which is simplicity itself.

Eyes formed by this machine are of any size desired, and the dimensions are readily determined. The maker of the device will be only too glad to answer any questions from persons interested.

Our readers will realize that there is scarcely a device which is more necessary to a blacksmith shop than one of this sort. The machine is very simple in construction.

Two New Developments in Halladay Line.

The L. P. Halladay Company, Streator, Ill., has recently put a new bumper bar, named from its construction the "Truss Spring," on the market. This bar is made in two pieces each, full length of the bar joined at the ends by a flexible connection.

The inside or rear bar is curved forward at the center and is secured to the front member forming a truss that greatly stiffens the bar, yet allows it to yield under impact.

The lines are graceful and the strength enormous, making a bar that is both attractive and affords the utmost protection to the car without the disastrous smashing effect to the object struck, that accompany the rigid type of bar.

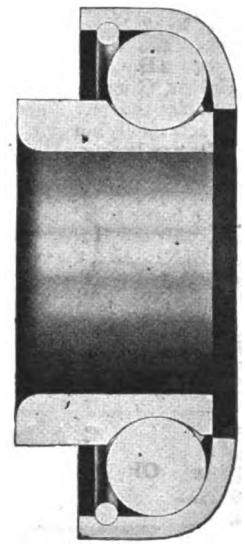
This bar is supplied with the Halladay improved under frame clamp fittings or with any of the Halladay frame connections.

Another new Halladay bumper fitting is especially designed for use on cars equipped with snubbers. For this purpose the frame connection is short, extending back only a few inches from the frame end. It has a wide range of adjustment to conform with any angle and curvature of the frame extension, and is supplied, equipped, with any of the Halladay bars, including the truss spring bar, above described.

A New Ford Bearing.

The Burgess-Norton Mfg. Co., of Geneva, Ill., are manufacturing a new bearing for Ford and Chevrolet front wheels, which combines quality with low cost. This is an addition to the present complete line of Ford replacement parts. The bearing is known as the "B-N Long Life" and is guaranteed to last indefinitely. It is a ball bearing, but constructed in such a way that the cones cannot separate from the ball races, thereby allowing the balls to be pounded and jammed.

From the cut it can readily be seen that it becomes a unit bearing. It is possible to run with a loose adjustment of the front wheel, without any damage being done.



A Cross-Sectional View of the New "B-N Long Life" Bearing for Ford and Chevrolet Front Wheels.

This company has introduced a new innovation, in that every article that they manufacture will be stamped "B-N." This protects the dealer and jobber against inferior goods, and will go a great ways toward obtaining rapid orders. For further information in regard to the "B-N Long Life" bearing and the "B-N" Ford accessories, address the Burgess-Norton Mfg. Co., Geneva, Ill.

ADVERTISE

Believe that you are destined to win, whatever be the odds. The quitter is sure to be a failure.

Quality and Service

in *design*, *wear*, *fit*, *finish* and all-around efficiency have been, are and always will be, the first consideration in the manufacture of

DIAMOND
CALKS and SHOES

We aim to make our product of such superior excellence in everything that makes for satisfied dealers and satisfied users that they will not only ask for, but insist on the DIAMOND line because they cannot buy a better one.

Your good will and your customers' good will are what we want above all else.

Diamond Calk Horseshoe Co.
Duluth, Minn.

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

Laffite Brazing Powder.

The Laffite brazing powder is used to replace ordinary borax and makes an excellent substitute. No blistering results, and the formation of oxides is avoided. A perfect braze is made, and it can be easily and quickly cleaned.

The brazing powders can be used alone or mixed with spelter in the proportion of about fifteen pounds of powder to eighty-five pounds of spelter. This mixture may be used dry or in the form of a paste, as desired. Moisten according to requirements.

Samples of these brazing powders are gladly furnished by the Phillips-Laffite Co., Pennsylvania Bldg., Philadelphia, Pa.

Reinforced Nail Points.

A nail that bends when being driven is dangerous. That goes without saying, and yet with the old-fashioned nail there was much trouble experienced through bending. Many a good horse went lame as the result of the use of poor nails in the shoes.

A nail that resists bending as well as any on the market is manufactured by the Union Horse Nail Co., of Chicago, Ill. One of the features is a reinforced point which makes the nail easy to drive and safe to use. The manufacturers will furnish readers with any descriptive matter and samples desired.

Ready-Made Springs.

It is not always easy or wise to repair a spring, especially when new ones ready-made can be obtained at the figures now prevailing. A blacksmith may not have the right grade of stock handy for making springs, or he may not have had the experience in that particular line to make a spring quickly and satisfactorily. In such cases, it is well to have a list of makers on hand, so that orders can be sent at once and the new article obtained quickly.

Those interested in such matters would do well to write for catalogues and lists provided by the New Era Spring & Specialty Co., 1138 Hamilton Ave., Grand Rapids, Mich.

Company and Town Celebrate.

Because of the centennial celebration of one of its industries, the town of Southington, Conn., will have one of the most elaborate "Welcome Home" ceremonies and festivities for its soldiers of any town of its size in the country.

The Peck, Stowe & Wilcox Company, hardware manufacturers, will celebrate on August 29 and 30, the closing of one hundred years of hardware manufacturing in Southington. In recognition of the occasion they are having built, to donate to the town, a massive memorial to all of its soldiers, which shall serve as a base for a flag pole and flag, also to be given by this company.

Because of the presentation of this memorial, the town decided that these dates would be most fitting ones on which to pay honor to their returned soldiers of the great war, and the occasion has developed into a general "home-coming" time for former residents of Southington as well.

Speakers of national, military, and political standing will make the addresses of the day and express to the returned soldiers something of the gratitude which the country as well as their home town extends to them.

A pageant dramatizing the military and industrial history of Southington and the State of Connecticut will be given following the unveiling ceremonies, and a military parade will take place at the close of the pageant.

The Peck, Stowe & Wilcox Company will give a huge community picnic the day before these features of the celebrations, and it is expected that at least ten thousand will attend this.

A Study in Horseshoes.

A company that has made a study of horseshoes clear back to the earliest historical times is the Bryden Horse Shoe Co., of Catasauqua, Pa. Not only has this study been made, but it has resulted in many modifications in shoe structure which otherwise would not have been undertaken.

The company dates back to the year 1882, and has been actively in the trade ever since. The factory is characterized by the thorough inspections of the various products as they come from the hands of the workmen. Any article not up to the high standard maintained is cast out at a loss. It pays to do this in the long run.

The trade names of the shoes and racing plates are "Boss," "Banner," and "C and K." Racing plate steel is also one of the specialties supplied. Catalogue furnished on request.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXIX. No. 9 NEW YORK, SEPTEMBER, 1919 { TERMS ONE DOLLAR A YEAR

The Car Hospital and the Surgeon

The First of Three Articles, Dealing With Sick Cars Garage-Hospital Equipment and Ambulance Construction

IT has been some time since we have published an article relative to automobile work and so we take the liberty of starting a series of articles entitled "The Sick Car Series." These are not written in the usual dry mechanical way but along lines which have never before been attempted by other mechanical writers. We feel sure that they will meet with your approval and help to solve a great many of the problems which confront the repairman from time to time, whether he is a blacksmith or a regular automobile repairer.

* * *

I really believe that Mr. Butterworth's old automobile has got dyspepsia, and I would be sure of it if dyspepsia were catching, for if I ever saw an automobile with stomach trouble, it surely is that machine.

I happened to overhear this statement made by a certain garage man not long ago, and it was his statement that brought to my mind the comparison between automobiles and human beings. An automobile surely acts human at times. It seems to have its own special likes and dislikes,, its eccentricities, and is affected by the weather. Though it cannot choose its own master, it can protest, and often does, against hard work, by ceasing to work entirely. It acts similar to many people that we meet, by lying down on the job, or tries not to over-exert itself.

The mechanical construction is very similar to the physical make-up of man. Its skeleton is its frame, its wheels are its feet, and its gears are its muscles. It may develop indigestion in its carburetor from trying to digest heavy gasoline; it may become frost-bitten and crack its water jacket; it may fracture its connecting rod or be overcome by the heat in the summer months.

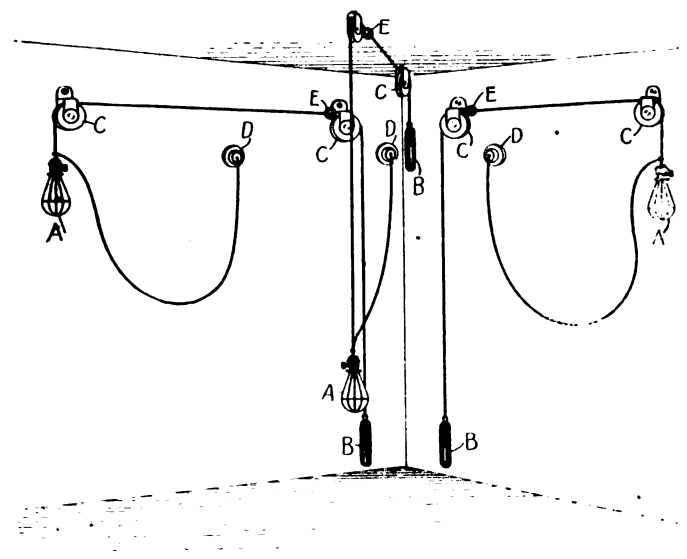


Fig. 1—Suggested Arrangement of Lights in the "Hospital."

Should anything go wrong with our internal machinery we are carried to the hospital. If trouble develops in the automobile, it takes a trip to the hospital as well, only in this case we term the hospital "the garage."

The repairman might be likened to a surgeon and in order to do good work the repairman must have proper tools just as the surgeon must have the best of instruments.

To a certain extent a mechanic may be said to be no better than his tools. He cannot do good work with poor tools, any more than the surgeon can perform a successful operation by the use of improper or inferior instruments. No matter how large or how small the shop may be, there are certain tools and equipment which are indispensable. Even the car owner himself in a good many instances practices automobile surgery and should have his own little hospital equipped with its operating table, which he calls his work bench, and other necessary tools for performing the various operations.

Proper Light Necessary

Perhaps the most important thing to be considered in a car hospital is the lighting arrangement. No mechanic, however adept he may be in the art of performing an engine operation, can do satisfactory work unless he can see the parts upon which he is operating. A garage should have as many windows in the sides as possible. Even the doors should be fitted with large glass panels and if possible, a skylight should be fitted into the roof. In addition to this there should be a number of drop lights furnished, all distributed around the garage in such a way that the mechanic need not spend time in finding an extension light and connecting it with a wall receptacle.

Some time ago I was in a shop where the repairman was working on his back underneath an automobile. If I remember rightly, he was scraping in connecting rod bearings and he would lift the drop light frequently to examine the bearings. About every five minutes he would crawl out from beneath the car and take up a broken portion of the wiring that was dragging on the floor.

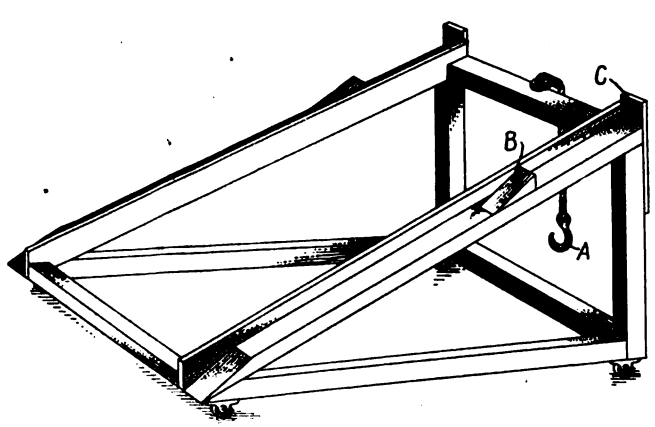


Fig. 2—How the Portable "Pit" May be Constructed.

Occasionally, he would burn out a fuse, all because the insulation on the wire had been destroyed by contact with metallic pieces and with oil, from dragging on the floor. I figure that the time the mechanic spent in repairing the lighting system was greater than the time consumed in making the engine repair. Quite frequently he would receive a severe shock from the light socket which was not conducive to steady nerves and good work.

A Handy Drop Light System

At my suggestion a drop light was installed similar to those shown in Figure 1. The drop light A was connected through a flexible cord with the wall socket D and to A was attached a long heavy cord which was passed through two blocks, as shown at C and attached to a weight B. A knot was tied in the cord E to prevent the light A from being drawn out of reach by the weight. When the mechanic desired light on his work he simply pulled down one of the lights, and as soon as he was through with the light, he released it. The flexible cord was immediately drawn away from the floor and away from contact with oil and grease.

The lights might be arranged on the sides and across the ceiling as shown in our first figure. In all cases, however, the weights must be carried to the side of the room or preferably to a corner where they may be enclosed in a box.

Few shops are built with pits in the floor. In many cases the city or state fire laws prevent such an arrangement, and there are few repairmen that care to do work while in the pit. The mechanic may crawl beneath the car and lie in the oil and grease upon the floor. If, however, he is enterprising he will not care to do this, for he realizes that he cannot do good work lying on his back with his eyes only a few inches away from the work.

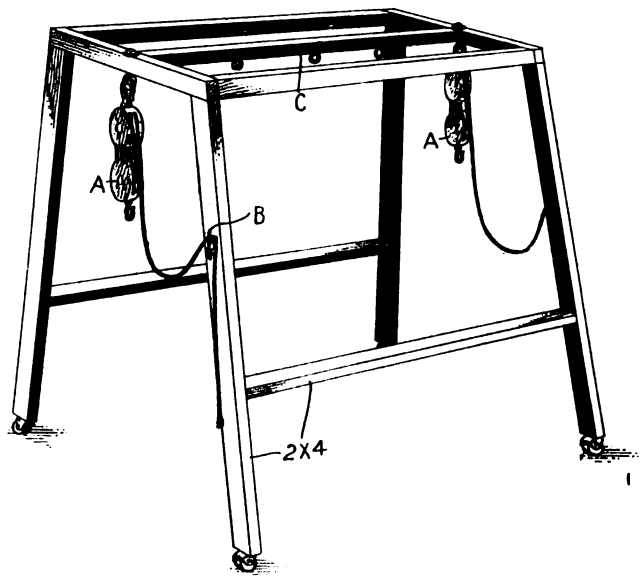


Fig. 3—An Automobile Cradle, Which Should be Found in Every Garage

A Portable Pit

There are two ways to overcome this trouble, and in Figure 2, a suggestion is given which should prove interesting both to the large shop owner as well as to the private car owner. This device can be made of odd pieces of lumber, preferably heavy joists, which may be obtained at almost any lumber yard. The illustration shows just how the device should be built. The inclined runways should each have an adjustable wedge, B, bolted into place and so arranged that it may be placed at a number of different points. The sides of the runways should be protected with boards to obviate any danger of the car wheels running over the sides. Stops should be provided at C to prevent the car from running over the end.

If work is to be done upon the front end of the car the device is pushed against a wall and the car run up the plane and fastened

into place with the iron hook A. As an added protection, the blocks B are put into place to prevent the car from rolling backward. The car with the device in place may be wheeled to any position in the garage, for runway is provided with casters upon the

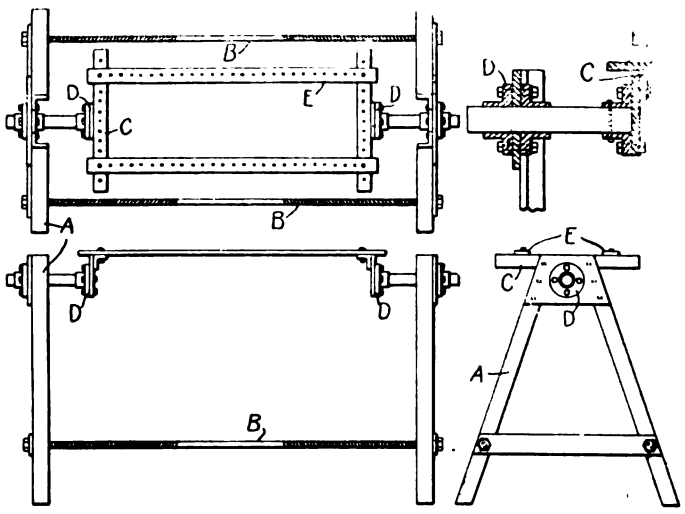


Fig. 4—Details of Construction, Showing How the Engine Stand is Made.

bottom. The mechanic can crawl beneath the car much more easily with it up in the air and do his work much better than if the car rested upon its own wheels.

An Automobile Cradle

Another form of hoist which should be built for every large garage is shown in Figure 3. Four by four joists should be used throughout, and these joists should be reinforced at the corners by means of angle irons. Across the center at C a joist should be arranged and fitted with numerous large eyebolts.

Two sets of block and tackles are used for lifting the whole car from the floor and a heavy clamp should be provided at B around which to wind the end of the rope from the tackle. A car may be suspended in this cradle-like arrangement and an additional tackle hung upon the joist C for lifting out the engine or removing the transmission. As in the device shown in Figure 2, casters are provided so that the whole arrangement may be moved to any part of the garage even after the car wheels have been taken from their places.

An Engine Operating Table

In Figure 4 is shown what might be termed an "operating table," and though there are many of these devices now on the market, the garage man can construct one for himself very easily from pipe fittings, angle iron and cold-rolled steel shafts.

Two large A frames are made from angle iron and reinforced across the bottom with a strip of flat iron. Upon the upper parts of these A frames are two large plates with holes cut through them large enough to carry two inch hydraulic piping. Around these holes should be punched a number of smaller holes to accommodate bolts. Upon one end of a short piece of hydraulic piping is welded or pinned a floor plate D, and this floor plate is bolted to a piece of channel or angle iron as shown at C.

The hydraulic piping should be threaded its full length and provided with two more floor plates. The purpose of these floor plates is to clamp the piping in place upon the A frames, and if the holes in the A frame are properly bored, the frame shown at C may be tipped at practically any angle.

Two more pieces of flat iron are provided as shown at E and both C and E are punched with holes evenly spaced their entire length. upon this frame an engine may be placed bolted to the cross pieces E and tipped at any angle for repairs. At a slight additional expense casters may be mounted upon the legs and the motor operating table may be wheeled into the machine shop or to the work bench. I want to lay special stress upon this piece of equipment for a shop, as I feel that it saves considerable time.

Device Saves Much Time

I visited a supposedly up-to-date repair shop in New England where the owner did not care to invest in a motor operating table such as I have mentioned. I watched one of the mechanics remove an engine from the car, and this is about what happened:

The mechanic loosened all of the bolts in the engine and called two other mechanics from their work-bench to help him. The three men, after much talking and arguing, lifted the engine from its place and carried it to the work-bench where the first mechanic did a little work upon it. He then decided that the whole machine would have to go to the machine shop for repairs, and so he called the two mechanics to help him again. After considerable more trouble they managed to get the engine into the machine shop where two of them remained to hold it beneath an upright drill. The third did the work.

For this one repair, three mechanics were kept busy approximately half an hour each. I didn't stay to watch them put the machine back into the automobile again, but I should judge another half hour might have been consumed in this performance. Three hours of wasted effort per day in overhauling one engine might have been the item charged against this particular repair. It would have been a needless expense had the garage been provided with the device which we have mentioned above.

What a needless waste of time there is in locating small tools! A mechanic crawls beneath a car and discovers that he lacks a hammer. Out he crawls again, goes to the work-bench, hunts around and finds that implement, then crawls beneath the car again.

If he does not find the hammer upon the work-bench, it is very possible that he borrows the tool from the mechanic working under the car next to him. In a few minutes that mechanic misses the hammer and he goes through the same performance, and so it goes. Every day each wastes a dollar's worth of time hunting around for a forty-five cent hammer.

Again, small tools have the extremely bad habit of disappearing. They seem to be equipped with the necessary limbs for their own locomotion, so quickly do they get out of reach. If they are thrown indiscriminately into a general box of tools, their absence is never noticed until they are wanted.

If one arranges repair tools in a box as shown in Figure 5 he will have no trouble in locating them, for the very reason that there is a place for each particular tool, and its absence may be noted as soon as a particular job is completed. The boxes may be made in varying depths, and each one should be made to fit a particular set of tools. One box may hold hammers, chisels, pipe wrenches, pliers, etc., and marked on the outside "general tools."

Another may be fitted to contain tire and valve grinding tools, another woodworking tools, and still another Ford and other special wrenches. After the tools have been selected for a particular box, the box should be made to fit them. Each tool should be put in place and staples driven upon each side of it. Through these staples a length of

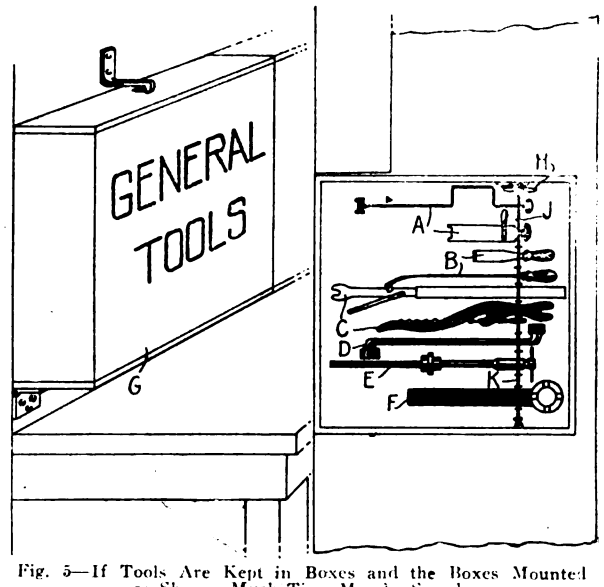


Fig. 5—If Tools Are Kept in Boxes and the Boxes Mounted as Shown, Much Time May be Saved.

heavy cord should be passed and the cord fastened to an ordinary flagpole rope fastener. If the tools are longer, two or more ropes may be used to hold them in place.

The above box shown in Figure 5 contains valve tools and special valve wrenches.

In mounting these boxes on the wall above the bench be sure to have the hinges high enough from the bench so that the box can be opened flat upon the top of the table.

Wall space in a garage should be utilized as much as possible. Many of the heavier tools may be mounted upon the walls rather than thrown beneath the benches.

A Washing Tank

In Figure 6 is shown the unique washing vat combination. The vat is made in two sections of heavy galvanized iron and lined throughout with wood of at least half an inch in thickness. For the heavier pieces, the vat shown upon the left is used. Across the bottom of this vat extending lengthwise are a number of slats, and near the partition, the bottom is cut and a large box-like arrangement soldered beneath it. The front of this box-like arrangement is fitted with a cover held in place by a long bolt, as shown by the dotted lines, and a wing nut. Inside the box is placed a square screen of fairly fine mesh. The purpose of this screen is to prevent dirt from clogging the drain cock at the bottom.

The compartment shown at the right is fitted with two wooden runners in each side

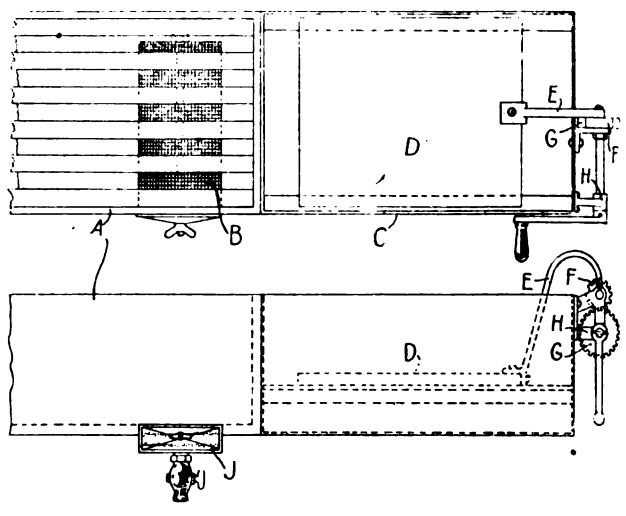


Fig. 6—Illustrating Construction of the Washing Vat for Large and Small Parts.

upon which is rested a flat wooden tray. This flat wooden tray slides back and forth upon the runners a distance of approximately two inches. To the tray is fastened an arm E, and this arm fits upon a small gear, F. The gear F is driven by a larger gear, G, and supported by suitable bearings at H. The larger gear is driven by a hand crank. As the crank is rotated, the tray D is shaken back and forth in the oil thus freeing small nuts, bolts, screws, cotter pins or other parts, from grease and dirt.

After the oil has absorbed much dirt and grease, the drain is opened and it is drawn off through the strainer B. The strainer B may then be removed, the dirt dumped out, and the strainer replaced again, putting the cover J back into place and tightened up with the wing nut.

Strong washing soda, potash lye, or kerosene oil may be used in this vat, though kerosene is to be recommended. The whole device may be mounted in one corner of the shop out of the way, or even beneath one of the large machine tools.

I have spoken above about the various trips which a mechanic would be obliged to make from car to the work-bench for tools. Where the work to be done is extensive, such as the tightening of connecting rods or similar work, the mechanic would be obliged to make at least two trips to the bench for necessary tools, thus wasting considerable time. Each mechanic working in the shop should be provided with two heavy boxes measuring two feet in width, three feet in length, and one foot in depth and mounted upon casters.

In these boxes are placed all of the tools required for the particular job upon which he is working, the necessary new parts and other articles required. He can then wheel the box to the machine and remove the tools, putting them beneath the machine or upon the running boards, as convenient.

Each particular box should be numbered, and if any parts are removed from the engine or the automobile, these parts should be placed in the boxes; never upon the floor. In this way there is no danger of losing anything or mixing the jobs.

As an additional equipment for the mechanic, a board of the same dimensions as the box, measuring one inch in thickness, should be mounted upon wheels. This board may be used for wheeling heavy castings or even units from the automobile to the work-bench or to the machine shop.

Of course not all of the devices and features mentioned can be used in every shop. For instance, the automobile hoist shown in Figure 3 may be too large to be used in a small shop, but the idea itself can be applied to any shop no matter how small. Even an individual car owner can work out a scheme similar to this by fitting the roof of his garage with proper cross boards.

Practical Horse Shoeing

The Horse's Gait and How He Stands or Points When His Shoes Are Not Fitted Properly

WHEN the horny hoof is in place, there are horny ridges which lie in these grooves. There may be as many as 500 or 600 of the fleshy leaves in a single foot. They cover the coffin bone on the outside and extend underneath at the rear and form part of a *bar region there.*

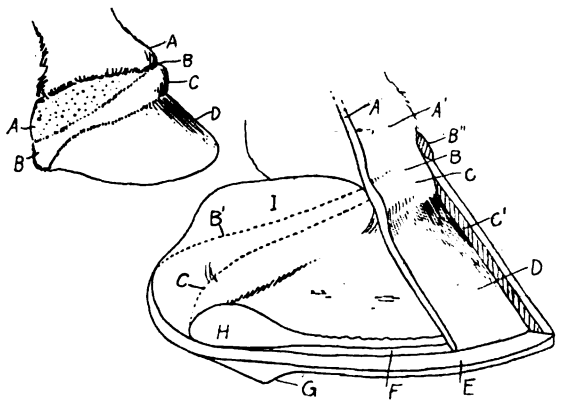
The horny hoof and the hoof-skin are very firmly attached to each other, so that it requires a very great effort indeed to force them apart. The strength of this union is attributed largely to the dovetailing of the fleshy leaves and the inner ridges of the horny hoof. These horny ridges are produced by the fleshy leaves.

(4) The *velvety tissue of the sole* is located underneath the foot. It is part of the hoof-skin. It constitutes the front and side parts of the sole, extending back for perhaps two-thirds of the total length. The two side parts are separated by the wedge-like plantar cushion. The fleshy sole produces the horn-like covering called the horny sole.

(5) The *velvety issue of the frog* is a comparatively soft tissue and underlies the plantar cushion. The horny frog is produced by it.

Review of Hoof-Skin

The hoof-skin is a continuation of the dermis of the ordinary skin of the body. It has no sub-cutaneous tissue, but does have a protective horny covering. There are five parts of the hoof-skin: (1) the perioplic band, (2) the coronary band, (3) the fleshy wall, (4) the velvety tissue of the sole, and (5) the velvety tissue of the frog. The outside shell of the horny wall of the hoof is produced by the perioplic band; the middle layer is produced by the coronary band; and the interior horny ridges, by the fleshy wall. Further, the velvety tissue of the sole and the



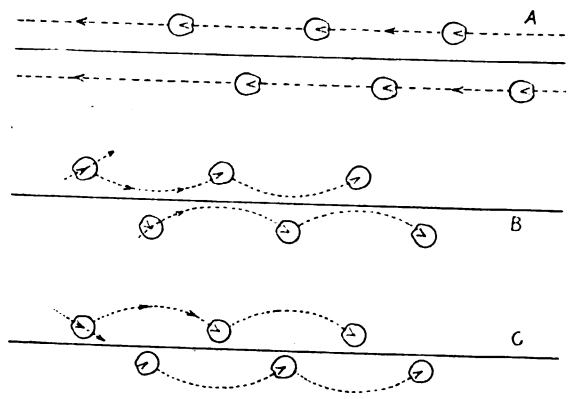
The Small Figure Shows a Foot with the Horny Capsule Removed. *A* is the Corium, on which are Hairs. *B* is the Perioplic Ring; *C*, Coronary Band; *D*, Sensitive Wall. The Large Figure Shows Foot from which Parts of Horn Wall and Sensitive Structure Have Been Removed. *A'* is the Hairless Part of Corium; *B*, indicates the Perioplic Ring, and *B'*, the Upper Border of Same; *B''*, Section of Perioplic Horn; *C'*, Section of Wall at Toe; *C*, Upper Border of Coronary Band; *D*, Sensitive Wall; *E*, Horny Sole; *F*, White Line; *G*, Horny Frog; *H*, Planter Cushion; *I*, Lateral Cartilage.

velvety tissue of the frog produce, respectively, the horny sole and the horny frog.

The Hoof

The hoof of the horse is a part with which the practical horseshoer has to deal not only continually, but in a most intimate way. It is vitally necessary to a proper conduct of his work that he shall understand its principal characteristics. The hoof is a capsule or sheath of horny material whose evident function is the protection of what it incloses. It is a kind of box. There are three distinct parts: the wall, the horny sole and the horny frog.

The *wall* is what is in view when the horse stands at rest. It consists of a thick shell of horny material. There is an outside layer, thin and shiny. This is the *periople.* It is produced by the perioplic band. The upper edge or rim which overlies the perioplic band is called the perioplic ring. The horny ma-



A, Normal Foot Movement in Straight Line; *B*, Movement of Out-Turning Toes; *C*, In-Turning Toe Movement.

terial in this ring is comparatively soft. Both the narrow ring and the extensive shiny layer are products of the perioplic band. We shall probably not be far wrong in viewing the periople as a kind of overflow from the perioplic ring. It flows down—as more is produced by the band—onto the main layer of the horny wall lying below.

Just below the perioplic ring, there is, when viewed on the inside, a groove into which the coronary band of the hoof-skin fits. The wall from this groove down is thick and solid. The thickness is, however, not everywhere the same. Nor is the front hoof identical with the hind hoof in this matter of thickness. In general, whether the hoof is part of a forefoot or of a hind foot, the steeper part of a hoof wall is thinner than the flatter part.

Again, in a front hoof, the wall will, in general, be thicker at the toe than towards the rear. In a rear hoof, the wall will not vary much, when toe, sides and quarters are compared. The wall thickness at the toe of a hoof may be as thick as 5/8-inch or it may be as thin as 3/8-inch. Back at the quarters, the thickness may be anywhere from 1/5 to 2/5-inch. All this is quite important, as it is upon the lower under edge of the horny wall that the horseshoe is set. The variations in thickness of wall depend in part upon the size of the horse and also in part upon the stock from which he comes.

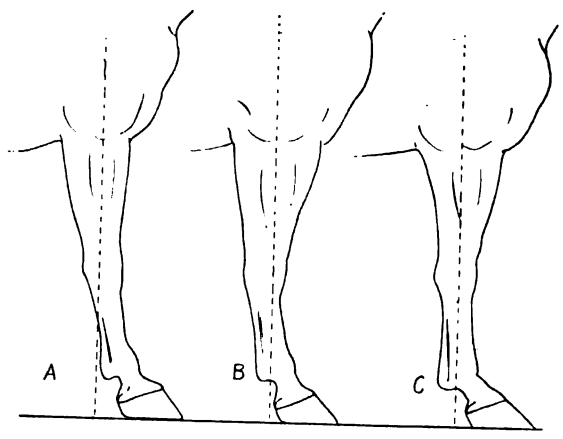
The following table will give some idea as to the wall thickness under various conditions.

Thickness of Horny Wall

	Toe Inch	Side Inch	Rear Quarter Inch
Pure Arab (fore-foot)	0.36	0.28	0.20
Pure Arab (hind-foot)	0.34	0.28	0.24
Well-bred horse (fore-foot)	0.52	0.32	0.28
Well-bred horse (hind-foot)	0.44	0.32	0.30
Common horse (large fore-foot)	0.64	0.44	0.40
Common horse (large hind-foot)	0.52	0.40	0.36
Steep foot (small fore-foot)	0.42	0.34	0.20
Steep foot (small hind-foot)	0.40	0.24	0.22
Average	0.44	0.33	0.27

The *horny sole corresponds* to the fleshy sole. When the hoof is raised in such way as to show the under part, the horny sole is observed included within the wall and is roughly shaped like a circle from which a part has been cut, as one cuts a piece from a pie. The piece not belonging to the horny sole has an angle of perhaps 80 to 90 degrees. The horny sole is, accordingly, a rough circle from which about one-fourth has been taken. The thickness of the horny sole will, after the loose flakes have been eliminated, be of about the same thickness as the wall itself.

The horny sole is not flat. The interior surface is covered by a host of little open-



In Posture *A*, the Supporting Strain is on the Tendons; in *B*, the Knee Curves Backward; *C*, Shows Oblique Pasterns.

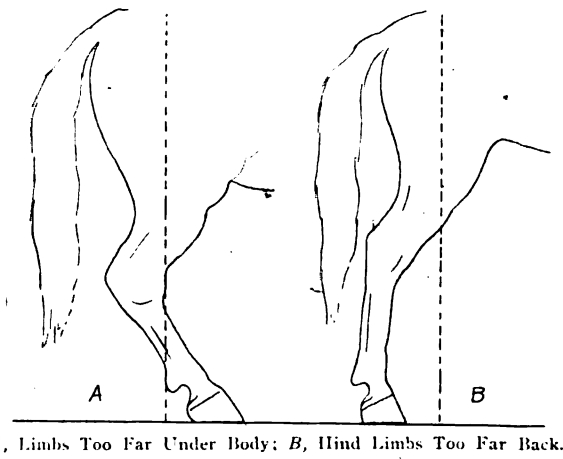
ings of the shape of a funnel. The villi, or hair-like projections of the velvety tissue of the sole extend down into these openings. The under, or exposed, surface of the horny sole is uneven and rough. Then there are apt to be present scales of dead horn. The round edge of the horny sole joins the inner surface of the horny wall through the agency of the "white line."

The *horny frog* is a wedge-shaped covering of horny material which overlies the fleshy frog and is produced by the velvety tissue of this fleshy frog. The velvety tissue itself covers what is called the planter cushion, which consists of elastic and fibrous material. The horny covering acts as a protection. Its material is a very soft and elastic horn. The horny frog, like the fleshy frog, is broad at the rear and tapers towards the front. It is partially split into two parts at the rear. The point is sometimes called the summit.

When a horse's hoof is shod and is in normal condition, the horny sole will form more or less of a valley, looked at with the bottom of the foot held up. This valley will lie between the horny wall and the wedge-shaped horny frog. It will, accordingly, not be a straight valley, seeing that it begins on one side of the horny frog and extends round its point to the other side. However, when the horse is unshod, this valley tends to disappear, thus bringing pretty much all the under parts into contact with the ground.

The White Line

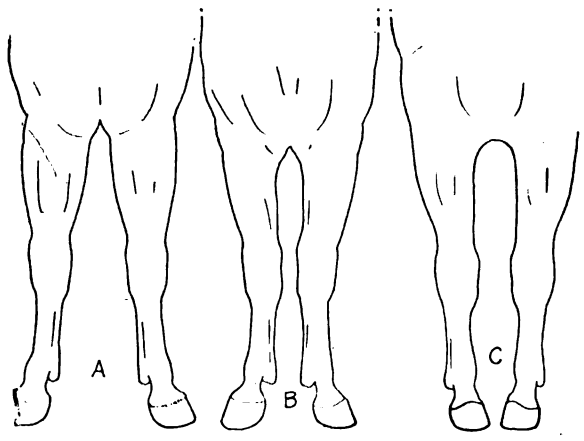
This is a narrow strip of soft white horn running round the under part of the hoof



A, Limbs Too Far Under Body; *B*, Hind Limbs Too Far Back.

and marking the junction of the horny sole and the horny wall. It circles from heel

to heel, thus covering about three-quarters of a full circle, and is also discernible, in the rear of the foot, in the immediate region of the horny frog. The white line is a most important thing in connection with horseshoeing. In the first place, it serves to give a clear indication of the inner surface of the horny wall. It thus serves as a guide to the exact thickness of this wall throughout practically all the region where the horseshoe is to be placed and in fact indicates the

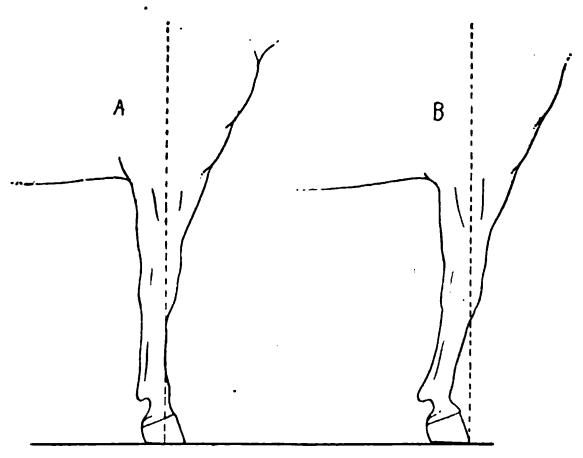


A, Normal Position; *B*, Hocks Turned In; *C*, Hocks Turned Out.

inner margin of this location. Second, the white line is to be pierced by the horseshoe nail.

Sometimes the white line will not be everywhere present. The shoer will then have to judge from what is there. When not freshly cut, the white line is ordinarily not white at all, but of a gray-black color. This color is to be explained by the presence of dirt and the penetration of liquid manure into the soft horn. The white line is the joint production of the horny leaves forming the innermost layer of the wall and of the fleshy leaves. The villi at the bottoms of the fleshy leaves produce short plugs of tubular horn. It is these plugs which constitute the contribution of the fleshy leaves to the formation of the white line.

The horny protective covering that boxes in the lower part of the horse's foot differs in character at different points. Thus, the periople, the white line and the horny frog are all soft horn; while the middle layer of the wall and the horny sole are hard horn. As between wall and sole, however, the mid-



At *A* is Shown Upright Pastern and Limb; at *B*, the Inclining Knees.

dle layer of the wall is harder and stronger than the horny sole.

As evidence of the more friable character of the sole may be cited the regular peeling off of scales or flakes from this part of the horny envelope of the foot. Then horn differs from other horn in that some is of good quality, while other horn is of poor quality. But all horn, whether good or bad, strong or weak, hard or soft, is a poor conductor of heat. We have excellent evidence that horny material does not conduct heat very well in the fact that it is possible to fit a hot shoe up against the bearing edge of the wall.

The Standing Horse

Horses are a good deal like people. Some spread their feet apart, some are knock-kneed, some are bow-legged, and so on. Naturally, the way a horse stands will affect the relative positions of his feet. Standing squarely in front of a horse and observing his fore-legs, one says that his position is normal for this pair of legs, provided a vertical line dropped from the point of either shoulder will divide the corresponding leg into two equal halves, one to the right and the other to the left. The line should reach the earth at the middle of the toe of the hoof.

But there are a great many horses which could not pass examination in this respect. Sometimes, it is the whole leg which is out of line; sometimes, it is merely the lower part. Thus, a horse may stand with his fore-feet spread apart. Both legs may be straight enough, but not vertical—that is, the legs spread regularly from the level of the body down to the feet. Other horses will have the fore-feet wide apart, but it will be only the feet themselves that are much out of line.

Similarly, a horse viewed squarely from the rear will be standing normal, provided a vertical line dropped from the rearmost point of either buttock divides the corresponding leg into two equal halves, one to the right and the other to the left. The line should meet the ground just back of the middle of the rear of the foot. But some will have the legs inclined inward towards each other, while others will have the feet spread apart.

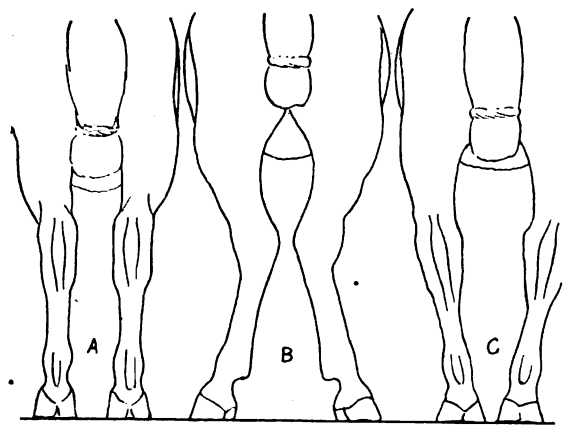
Viewing the horse from the side, one puts him further to the test. The fore-leg will now have normal position, provided a plumb line let fall from the middle point of the shoulder blade will divide the leg into equal forward and rearward halves down to the fetlock joint. The line meets the ground just back of the bulbs of the heel. The front of the foot from the fetlock joint down over the upper pastern, the coronary and the coffin bones should give a line making an angle of 45 or 50 degrees with the ground. An angle of 45 degrees is rather easy to judge, if one remembers that then the angles made with the horizontal and with the vertical are both alike.

It will now be understood, perhaps, that whether the foreleg has a fully normal position or not, it will be necessary to view it *both* from in front and from the side.

Viewing the hind leg from the side, a normal condition will be one where a plumb line let fall from the middle point of the hip joint will meet the ground very close to the halfway point between toe and heel. Hind legs may have the hocks spread apart or bent towards each other. These are similar conditions to knock-knees and bow-legs in front. A horse is not perfect when such conditions exist either in front or behind. Sometimes, the hock angle is too small. The effect is to throw the hind foot too far forward. A horse with his rear limbs thus shaped and set will perhaps be speedier than he would, otherwise, have been. But it is scarcely anything to be desired from other points of view.

Foot Positions

It has already been pointed out, in effect, that the front of the foot from the fetlock joint to the toe is normally a fairly straight line set at an angle of 45 or 50 degrees with the ground. There are horses, however, where the angle is greater and others where it is less. The angle may drop to 35 or 40 degrees. This condition is sometimes expressed by saying that the hoof is *acute-*



A, Toes Turned Out; *B*, the Calf-Kneed Limbs; *C*, Pigeon-Toed Horse.

angled. If the angle is, however, 55 or 60 degrees, the hoof may be called *obtuse-angled, steep-toed* or *stumpy.* The uses here made of the expressions, "acute-angled" and "obtuse-angled" are, from a mathematical point of view, incorrect, but they seem to have the willing or unwilling sanction of educated men.

There is a peculiar position of the foot, called *bear-foot,* or (improperly) club-foot. The line from the front of the fetlock joint down the front of the foot to the toe of the hoof is not straight. The upper pastern is too flat and the hoof too steep.

Movements of Feet

The way a horse stands may indicate, to some extent, the manner in which he will throw his feet when in motion. A horse that stands normally, will likely, when in motion along a level road, swing his hoofs in straight lines parallel to the line in which he himself is moving. The bases of the hoofs will strike the ground squarely and evenly, and will point forward. But, if the horse stands base-wide—that is, with the feet set too far apart—the hoofs will not move straight ahead but in curves bent in towards each other.

When the hoofs strike the ground, they will not strike squarely and evenly but will tend to strike with the other edge of the toe. Besides, the position of each hoof on the ground will be pointed outward. If, however, the horse stands base-narrow—that is, with the feet too close together—his forward movement will be just the opposite of that just described. The hoofs will swing in curves bent outward and at the moment of striking the ground will be pointed inwards.

These two irregularities do not necessarily mean that the horses which manifest them are not fitted for ordinary service, unless the irregularity is especially marked. It should be understood that the foregoing account of the movements of the feet is general. It is not implied that there are no exceptions.

When horses are climbing hills or are engaged in heavy service or are doing anything in which their movements are under constraint, one is to expect considerable variations from the way they move their feet when going at ease.

SUGGESTIONS IN WELDING CUTTING TOOLS

IT has been discovered in connection with welding experiments, that it is practicable to weld high-speed tool-steel bits to common cold-rolled steel shanks for lathe and planer tools, drills, reamers, etc., with very satisfactory results.

Electric welding high-carbon to low-carbon steel is not a difficult operation, although a little care should be exercised, as a slightly different condition exists than where materials of the same analysis are employed.

Experiments have demonstrated that best results are obtained if the thickness of tool steel is from one-quarter to one-third the total thickness of tool at the weld. Where two pieces of the same kind of steel are spot welded together they heat evenly; but care must be taken in welding high-speed steel to common steel, the former heating more quickly owing to its offering greater resistance to electric current.

The high-speed steel should be thinner in order to generate greater heat at the junction of the pieces. As the copper points used in making these welds are subject to very extreme heat and pressure, they will last longer and do better work if cooled by a stream of water passing through them while in use.

When both metals have reached a welding heat, the current is cut off and pressure applied forcing them together. It is not necessary to use any flux in welding, but it is sometimes advisable to apply a solution of borax water, which has a tendency to improve the weld.

If it is desired to temper the tool at the same time it is being welded, it should be plunged while white hot into a bath of good hardening oil. When welding a large tool-bit to a shank, it is advisable to corrugate the welding seats in a perpendicular direction, and keep them free from oil, dirt or rust.

After the butt weld has been made, the stock must immediately be heat-treated or annealed, in order to keep the high-speed steel from checking or breaking.—C. A. Hart in the *American Machinist.*

An Illustrated History of Smithing

Part V—Photographs of Drawings Which Show the First Forms of Foot Protection for Horses

BY H. H. MANCHESTER

THE idea of shoeing horses is so familiar to us that we often fail to realize that it was several thousand years after man domesticated the horse before he learned to nail shoes to its hoof. In fact the invention was really a bold one. No other one in connection with the domesticated animals compares with it, and until recent years it was still unknown in Japan and certain other countries far advanced in civilization.

Although the need of protection for horses' feet was well recognized by the Greeks and Romans, no nailed-on shoes were in use of the classic era. The references of that period which speak of shoes for horses refer to a leather or hemp sandal which sometimes had an iron bottom, but was invariably tied on to the feet.

No horseshoes are mentioned in Xenophons treatise on horsemanship, nor in the later ones of Polybius or Julius Pollux.

Perhaps the earliest known specimens of protective devices for hoofs have been found in an Etruscan grave at Corneto, Etruria, in Italy, and probably date back to about 400 B. C. The Etruscans, it will be remembered, were Greek in race, but settled in Italy, and were powerful there before their conquest by Rome.

These shoes are of bronze, and in shape are like a crescent with a long prong in the center. Various other prongs around the inner edge suggest that they were used to keep the animal from slipping.

They are small enough to be intended for mules or asses, and it should be kept in mind that these animals were more common throughout the whole Graeco-Roman period than horses.

The holes at the ends of the shoes were probably for tying them on to the feet or fastening them to the part of the sandal which extended up the leg.

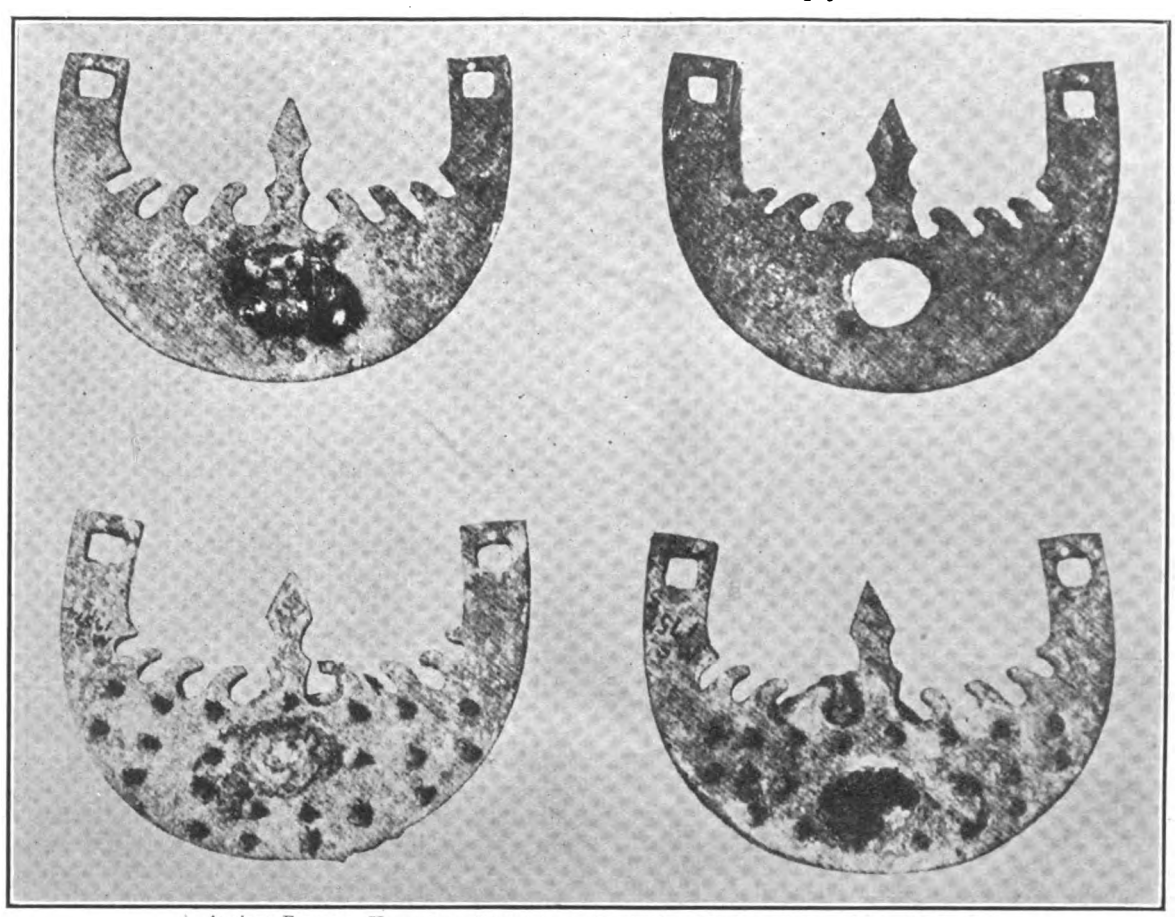
Alexander the Great's cavalry, according to Diodorus Siculus, gave him great concern because the hoofs of the horses were ruined from the long marches.

About this same period, however, Aristotle wrote that camels which were on long journeys sometimes had their feet protected by shoes of ox leather.

In the first century, B. C., according to Appian, Mithridates, who was besieging Cyzicus, had to send his horses to Bithynia because their hoofs were entirely worn out.

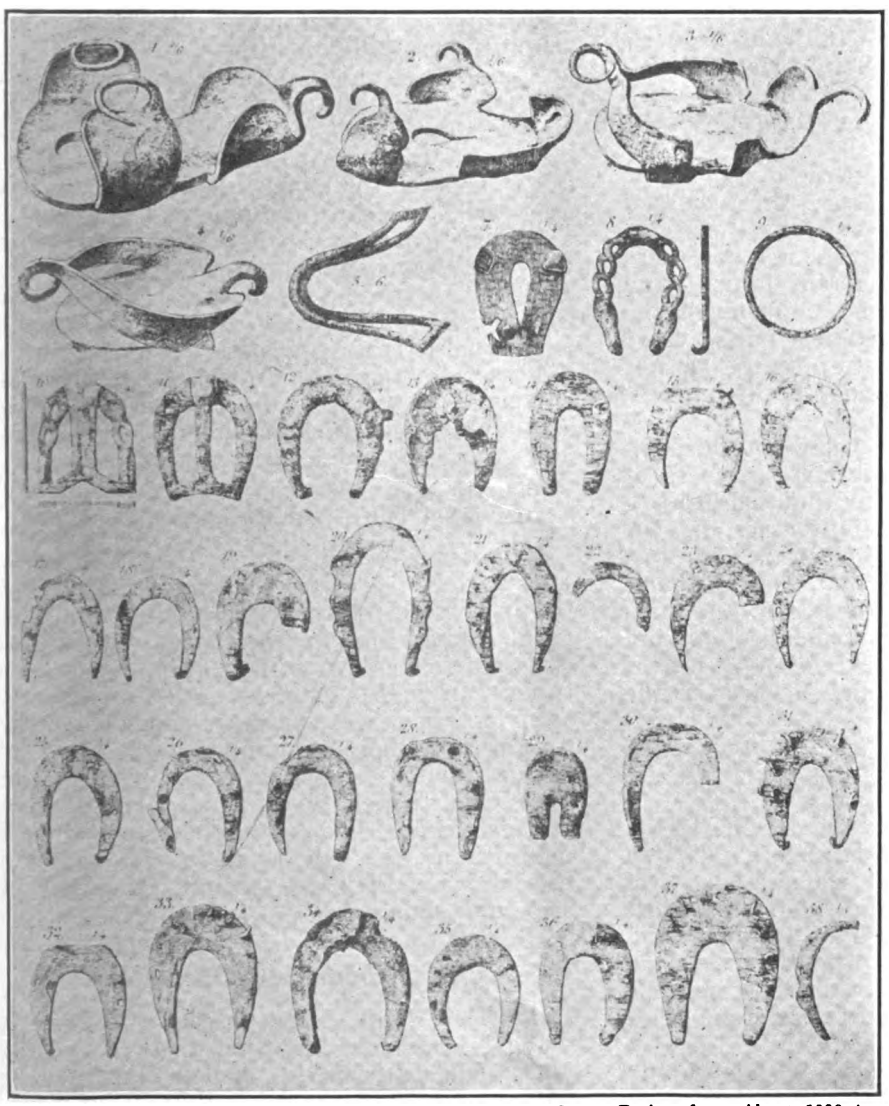
No horseshoes are shown in ancient sculpture, probably because the sandals of the time were awkward and inartistic, and the modern horseshoes were unknown. Graeco-Roman sculpture entered so much into details that nailed shoes would probably have been indicated if in use.

In the early part of the Roman Empire, the extravagance of the time showed itself in silver sandals for Nero's mules, especially when on long journeys, and in still more ostentatious gold ones for the mules of his notorious wife, Poppæa. The coachman of the Emperor Vespasian, according to Suetonius, gave the monarch considerable uneasiness by stopping his carriage to put the sandals on his mules. This in itself indicates that they were still simply tied on.

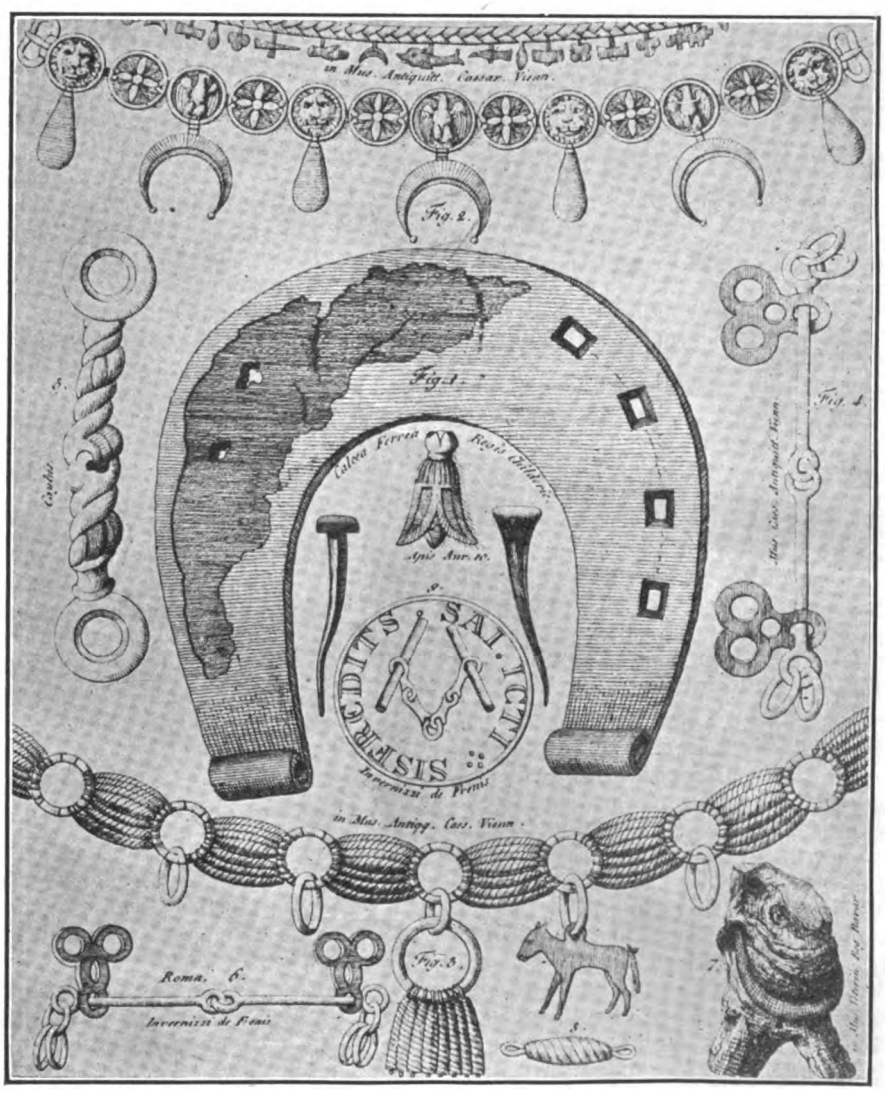


Ancient Etruscan Horseshoes Found in a Tomb Near Orvieto, Italy, About 400 B. C.

At what date horseshoes were first nailed to the hoofs is still uncertain. If an article found in the grave of Childeric, King of the Franks, who died in 681 A. D., is correctly



Ancient Roman Horse Sandals and Early Medieval Horse Shoes Dating from About 1000 to 1400 A. D.



Drawings of Early Horse Furniture. The Shoe at the Center is Probably the First Nailed on Shoe on Record.

identified as a horseshoe, it is the earliest known specimen of one intended to be nailed on. We reproduce an engraving of it from a drawing, but the drawing is more perfect than the object itself was, for this was so eaten by rust that when the rust was scraped away it broke. Nevertheless, if the drawing can be trusted at all, we have here the earliest known nailed-on shoe.

Our picture also shows several bits and other articles of horse furniture of the early French period.

The cavalry of Louis the Debonnaire in the ninth century, according to Daniel the historian, were shod in the time of frost.

In comparatively recent years a number of early shoes for draft animals, both of the Roman sandal variety and of the later nailed-on type have been unearthed.

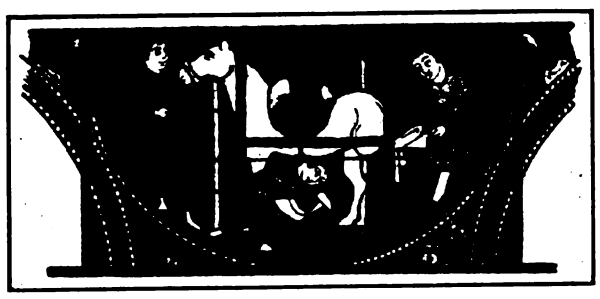
Our plate shows almost forty shoes of different periods. The first seven are Gallo-Roman sandals which were tied on to the foot. The twisted shoe at Fig. 8, and the simple circle at Fig. 9, probably date from the tenth century. The shoes with the straight bars and closed ends are presumably of the eleventh century. The rest of the row as well as the fourth and fifth rows are most likely from the fourteenth century, while the last row seems to be from the fifteenth century.

A poem of 1038 declares that Boniface, Marquis of Tuscany, when traveling to meet his bride Beatrix, had his train shod in silver, and that any silver nails that dropped out were presented to those that found them.

The practise of shoeing horses is stated to have been introduced into England by William the Conqueror, and Northampton was given as a fief to one of his followers in return for a sum to provide shoes for the horses.

Much of the early horseshoeing seems to have been done with the aid of a frame to prevent the horse from kicking. At least the earliest known pictures on the subject exhibit devices of this nature.

The earliest picture of horseshoeing which has yet come to light is probably that in the Cathedral at Chartres, France, in a stained glass window which dates from the thirteenth century. The horse is fast in a frame which holds the head and one hind foot up, and, curiously enough, one farrier is at work on the hind foot still on the ground.



NEW BOOKS RECEIVED

Abrasives and Abrasive Wheels, by Jacobs. With the arrival of high-speed steels, modern cutting tools and finishing methods the subject of abrasives and abrasive wheels has become one of great interest. The book "Abrasives and Abrasive Wheels," written by Fred B. Jacobs, is a complete treatise on the manufacture of abrasives and their manifold uses. The book takes into account different grinding methods and is fully illustrated. It is sold by The Norman W. Henley Publishing Co., of 2 West 45th Street, New York City.

Metal Worker's Handy-Book of Receipts and Processes, by Brannt. Metal working and metal treatment is one of the broadest subjects in science and the average mechanic finds it difficult to keep pace with the advance of this science. The "Metal Worker's Handy-Book," which is compiled by William T. Brannt and published by Henry Carey Baird & Co., Inc., of 116 Nassau Street, New York City, has been written with the idea of keeping the mechanic abreast of the times. It is a collection of chemical formulas and manipulations for the working of all metals and alloys and includes methods for the decoration and beautifying of articles manufactured therefrom.

Old Home Week in New England

Our Correspondent Visits a Shop Where He Worked Many Years Ago

BY JAMES F. HOBART

YES, I've been having "Old Home Week" the past month and it isn't over yet. Reminds one of Old Abner Metcalf, who used to say: "Worked down to the factory *nine* days last week, got home in the morning and worked *all day* hoeing beans and helped the blacksmith shoe horses *all afternoon* and got through at *three* o'clock—" Abner was brought up on the Town Farm, where he said that though he liked the "chow," he did not care for the sudden changes, "they have mush and milk for breakfast and milk and mush for dinner,—I don't like such sudden changes" complained the old man.

There used to be three or four cracking good smith shops in East Pepperell, to say nothing of one or two which *came* and *went* as the days passed. One shop was started by a young man, many years ago and grew to be one of the town's landmarks. He prospered and made money enough to retire on, several years ago. But, in a evil moment, he wanted a little more, as most of us do, and was led to invest in a coal business, down in Panama. Things looked mighty prosperous until suddenly the "bottom dropped out" of the scheme, and our smith was left without a dollar!

But he was "*game.*" He built a little shop close by Old Chub Hole, the once famous town "swimmin' hole," put in a lot of tools and got back many of his old customers and today the 64-year-old smith, together with a helper of about his own age, is holding up horses, tinkering ice-wagons and doing all sorts of blacksmith work, not the least of which is making and mending springs for automobiles and doing forge work in general for "gas" wagons. But, they won't go any further with that class of vehicle:—"no automobile overhauling for mine," said the smith as he started to fit a set of very light shoes for a small horse with delicate hoofs.

"Wish you would be a little careful" said the burly man who brought in the little horse, "she is mighty tender on her feet and I wish you would fix up her feet all you can. I can't see any lump on her, but she is mighty tender all the same!"

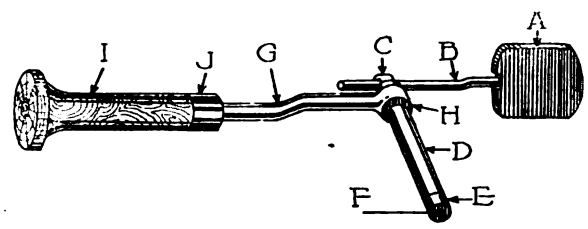
"It's a mean trick," said the old smith as he trimmed the little horse's thin hoofs a bit. "That big lummox has worked this little horse barefoot so long that her hoofs are worn down until there isn't anything to nail shoes to." "It's a shame," blustered the smith. "I'll put in the smallest nails I have in the shop and put a soft piece of leather between hoof and shoe under both forefeet; that will help her a good deal."

It is many years since I saw an old-fashioned "buttress" for trimming the hoofs of horses, but I saw some in that old smith's shop. They not only had buttresses, one for each shoer, but they had hoof-trimmers, too, and good, heavy ones at that, also the hoof knives used so much in the west; and they also had some of the double-ended driving knives for removing thick tough pieces of hoof, said knives being driven through the hoof by hammer blows.

Improved Buttress

I never could figure why the old "buttress" went out of use. It is a mighty handy tool for paring hoofs, especially when a good deal has to be removed. With a shoulder against the wooden handle of the tool and one hand grasping the hoof, the smith is surely in a position to pare a hoof with the least possible exertion, to pare it straighter and smoother than is possible with a hoof-knife (also to slice a chunk off of the ball of his thumb if he doesn't watch out!).

The Buttresses used in this shop were made by the aged smith, Mr. George Jinks, and one of the tools had many years' service to its credit. These tools are about as shown by Fig. 1, but one of the tools is smaller than the other, an attempt having been made evidently, to see how light a tool could be made and still stand up to the work. The tool which I liked best, had the handle *D*, about ¾-inch in diameter. The other tool, had a handle very little over ½-inch in diameter and it was noted that this light tool had been bent or "sprung" in a couple of



The Improved Buttress.

places, thus showing that the lighter tool was not quite strong enough. Therefore, I will give the dimensions of the heavier tool, as shown by Fig. 1.

The cutter *A* is about 1½ of an inch square and ¼ of an inch thick, the cutting edge well rounded, as shown, and by loosening the round nut *F*, the cutter can be readily removed for grinding or for new-laying when worn too short. The shank *B* is about 5/16 of an inch thick and held in the handle *D* by means of the clamp-bolt *C*, which, when nut *E* is tightened, draws down upon thread *F* and clamps *C* firmly upon *B* in exactly the same manner that a nib is clamped upon a scythe snath.

Handle *D* is about ¾ of an inch in diameter and nearly four inches long. The nut *E* is the same size as the handle *D*, and rounded like the handle. In fact, I had to look for some time to see how the device worked for the reason that nut *E* and handle *D* fitted each other so well that I could not tell handle from nut and wondered how clamp *C* was tightened.

Shank *G* is about 9/16 of an inch in diameter and "upset" so as to form a boss at H, which is drilled for a driving fit on handle *D*, after which it is brazed to it. Handle *I*, is made of wood, about eight inches long and 1½ inches in diameter. A ferule *J* is closely fitted to the handle and prevents the wood from splitting. Offsets are made, as shown at *G* and *B*, in the stems of both the tool and the cutter, thus bringing the cutting edge free from possible contact with a horse's gambrel or fetlock. Grinding is easy; the cutter *A*, being removable in two seconds by simply catching nut *F* in a vise and giving the handle *D* a slight turn.

The Old Bellows

I visited another shop in East Pepperell, where there were two fires and the old and the new were figuratively shaking hands in great shape. One fire was fitted with a first class pair of bellows of regulation type—old-timers but well taken care of and apparently as good as they were 50 years ago. The other fire in this shop is supplied with blast by an up-to-date electrically driven blower with a rheostat which gives five or six degrees of blast-force. The contrast between the old method and the new is made very striking indeed since they are brought together in the same shop.

A Second-Hand Tire Job

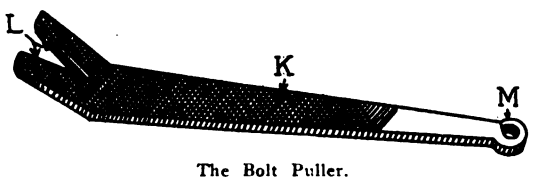
An ice wagon came to the Old-Timer's while I was there; it came on three wheels and a pole, a tire having broken short across. The old tire had worn too thin to be worth resetting and the thrifty Yankee brought an old, but thicker tire to be set in place of the

broken one. The old tire was a foot or more too large for the wheel, therefore it had to be traversed and a piece cut out.

The *new* old tire being originally 3 x ¾ inches, made a good mouthful for the tire roller and the old smith called into action all the loafers who chanced to be in the shop and set them to holding the frame of the rolls, lest the heavy work tip that machine completely over! Finally, the tire was rolled until its ends came together, when they were welded and traversed again after which the tire was very little too large.

Into the upsetter went the tire and the Smith had so much confidence in his work that he upset the tire right in the weld—and it held, too. The bit of tire under compression beginning to "hump up" in the machine, the Old smith seized a sledge and began hammering down the upset portion tight in the machine, when the clamps let go, the tire canted sidewise and caught the smith a nasty cut just at the top of his very high forehead.

But the old man would not stop for a little thing like that. With his helper he grabbed the tire, hustled it upon the anvil and flatted down the "hump" before he even thought of his cut head from which the blood streamed down over his face until he resembled an Indian with his war-paint on!



The Bolt Puller.

As soon as the tire was back into the fire again, I got hold of the old smith and washed off his "war-paint" and found a neat cut about one inch long, but one which had not drawn the edges of the skin apart. He washed out his cap, put on another and went to work again. His only remark was: "drat that tire!"

Some Grindstone!

While looking around the Old Smith's shop, I saw a grindstone which looked strangely familiar, and upon a closer look, found it to be one which I had hung in my father's shop, more than 35 years ago! Then it was a big stone, nearly five feet in diameter. And apparently the stone has not lost more than an inch of radius during all that time. I remember the "time" I had in wedging the shaft into the six-inch square hole in that big stone, and the driving and re-driving of wedges and the fitting of blocks before the big stone was made to run true sidewise and facewise.

The old shop in which the big stone was originally mounted, had a farm connected with it—or the shop *might* have belonged to the farm, I won't be too exact, and father used to grind a whole lot of mowing scythes and felt grieved whenever he had to hold the scythe sidewise to keep from hitting the hands of the victim who was doing the "circular work." To get rid of that sidewise business, father purchased the five-foot stone and I wedged it upon a square shaft so well that it is still tight after at least 35 years!

Pulling and Holding Bolts

Several handy home-made tools were noticed in Mr. Jenk's shop. One, as shown in Fig. 2, was a "Bolt-puller" and had been made from an old hoof rasp without even the hammering or grinding out of the tooth marks—something pretty hard to accomplish when the marks are as deep as they are in a rasp. The body of this tool, shown at *K*, Fig. 2, was, excepting wear, just as it came from the file maker. The end of the file, however, had been split and bevelled inside, as shown at *L*, so as to form nail-pulling jaws somewhat similar to those on some straight-clawed nail hammers. The writer asked the Smith why he did not curve the jaws *L* same as those of an ordinary claw hammer or the jaws of a wrecking bar, but the Smith has not answered yet. Possibly he is looking for some good reason for the straight jaws?

The tang end of the file in question, had been drawn down so the shoulder had disappeared and an easy taper formed, as shown by the picture. Then the tank had been bent around upon itself, as shown at *M*, thus forming an eye by means of which the tool could be hung up when not in use. Another handy little tool, shown by Fig. 3, goes with the bolt puller. This tool is a "bolt-holder" thus making a pair of very handy tools. It evidently was made of tool steel and the fingers *N* and *O* were about ⅜ of an inch in diameter at their junction with each other. The body of the tool was of the same thickness, but the lug *P* was thicker in order to give more thread for screw *Q* which was pointed at the end and evidently had been case-hardened to prevent wear. The screw terminated in the wing head *R*.

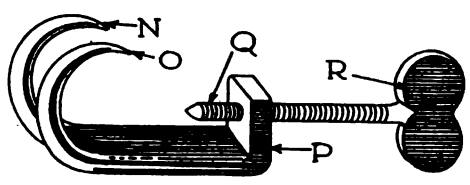
The use of this tool is obvious, but the convenience of the device can only be appreciated to its full extent by actual use when trying to put a bolt through two or more thicknesses of wood or metal, or when a nut is to be started upon and screwed home and the bolt turns around! Then, the little bolt holder is gripped around the work, say the rim of a wheel, and the point of screw *Q* is brought to bear against the head of the obstinate bolt. There is not another wriggle in that bolt, which holds right still until the nut has been screwed home, which usually so loosens the bolt holder that it comes off without having to loosen the thumb-head *P* in the least.

Another "Landmark" Shop

The shop in which the bellows and the electrically driven blower work side by side, has also just changed hands and is now operated by Mr. A. A. Charbonneau, who recently came from South Framingham, Mass., and who is a most enthusiastic reader of THE BLACKSMITH AND WHEELWRIGHT.

"I don't see," he said, "why all the Smiths around here are so afraid to charge decent prices for their work? Why, some of them are shoeing with No. 6 shoes for $2.00, and that will hardly pay for shoes and nails, shop rent and overhead. I don't believe half the smiths ever think of those items of expense and so, go on cheating themselves, month in and month out until they wonder where the profits of the business have gone to! I won't work as cheap as that for anybody. I can't charge what I should receive, but I never will give away work as some of them do, and I simply won't 'scamp' work in order to make a profit out of the cheap shoeing prices."

"Why, just look at that shoe," Mr. Charbonneau continued. "I took that shoe from a horse one of those cheap guys had shod. The shoe had been on only a week and it was ready to fall off. And just look at the way that shoe is made and finished? Some rough, isn't it? And the rest of the job was just as bad. The hoof had not been pared, the shoe didn't fit, and so all the way through. It was a wonder that the shoe stayed on for even a week!"



The Bolt Holder.

"Why don't you get all the smiths together and establish fair prices for shoeing and other smith work?" I asked of Mr. C— "Then you can have right prices all around."

"Right nothing," he replied. "Most of them are afraid to charge decent prices. Afraid if they do, that 'tother fellow will work a little cheaper and get all the work. You can't do a thing with them! And, say," continued Mr. C— "those fellows down in Maine sure ought to wake up. I have been reading in the THE BLACKSMITH AND WHEELWRIGHT the prices for work which they get down there and—why, those prices are worse than they are here and I don't see how smiths live down there even if they get steel and labor for nothing, carry no insurance and don't even pay taxes."

The welcome I got from the old fellows in East Pepperell, was a warm one to be sure, but it wasn't a bit more cordial than what Mr. Charbonneau handed out when he found that I was that particular Hobart who writes THE BLACKSMITH AND WHEELWRIGHT stories. Nothing was too good for me after that, and during our talk about his old shop and other things, he asked: "Say, Mr. Hobart, you have been around the West a good deal and I wish you would tell me if they do the things out there that I hear they do?"

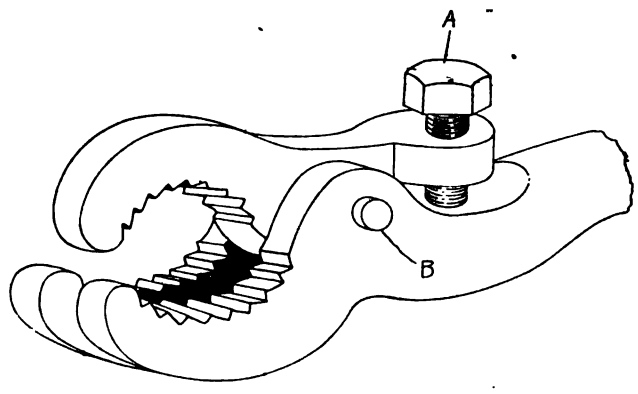
"There was a Government chap who used to come around once in a while. A sort of Inspector or something who looked after shipments and lost goods or something which took him all around everywhere. That chap used to tell some of the all-firedest yarns about how they did things in the West. He would tell of their shoeing horses out there by electricity alone, that doing all the work and in less than fifteen minutes per horse. And he also told how some smiths out there shod 300 horses a day each! I wondered if he was lying when he told the stories, and perhaps you can tell me how they did such things out there?"

But I was totally unable to tell Mr. C— of any "15-minute electrical shoeing" and left him to wonder more than ever, "how, when and where" they did it! I went up into New Hampshire from Pepperell and saw a chap riding a mowing machine along the highway from one job to another. He had mounted the machine upon a little two-wheel vehicle which a smith might make to advantage and sell to occasional mowing machine users. This chap put the machine upon the device in less than two minutes and rode home in comfort upon smooth wheels.

POSITIVE GRIP PIPE WRENCH

By Chas. H. Willey

THIS wrench was designed and made by the writer to meet the need of a positive grip pipe and round stock wrench. Al-



The Pipe Wrench Described.

most all mechanics are familiar with the ordinary style of Stillson pipe wrench and know how it slips when the teeth are the least bit dull. When it slips it becomes useless and also damages the work.

The wrench shown in the sketch is homely in appearance and odd in design, yet indispensable around the shop when one encounters a stubborn pipe, stud, or shaft that the ordinary wrench will not move. It consists essentially of two parts, a moving and a stationary jaw. The moving jaw is adjusted and set up tight by the set screw (A). When placing the wrench on, or taking it off the work, the pin (B) which is made an easy fit, is removed. The drawing gives one a clear idea of its construction and should enable the shop's blacksmith to forge up such a tool easily.

EASY ENOUGH

A CERTAIN newspaper that made a practice of answering queries from readers received this one:

"Please tell me what is the matter with my chickens. They go to roost apparently well. The next morning we find one or more on their backs on the floor, stiff, combs white and feet in the air."

It was the editor's busy day, and this was the answer his reader received:

"Dear sir:— your chickens are dead."—*Du Pont Magazine.*

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Our Editor's Letter

A SHORT time ago I visited a shop where everything seemed to be old and time-worn. The smith must have been about 70 years old and certainly knew his trade for I'm pretty sure that no one else could have accomplished what he did with the tools he had.

After I had talked with the smith for nearly half an hour, he began to "Loosen up" with his ideas and from him I learned many things. Perhaps the reason why he finally began to talk was due to the fact that I was able to help him to a certain extent. I noticed that he didn't have a good pair of tongs in the shop, so I passed along a suggestion from this magazine regarding tongs. He thought that the idea was good and after that he was entirely willing to show me a number of the tools which he had made.

At first, the smith was rather bashful about his equipment. The tools were crude and made mostly from scrap iron and steel. He didn't seem to think that they would interest me in the least, but they did for it seemed to me that many of his tools might save considerable time.

That is one trouble with the blacksmith; he does not seem to think that he has anything of value to any one else. He seems to think that every other smith has the same ability. As a rule, however, the smith is willing to pass along his ideas if he can only be persuaded that they are of value to a brother.

If the smiths would only trade ideas they would all profit by the experiences of others. No idea is too poor to pass along and the man who wants to keep everything to himself is the man who loses in the end. If I find a new way to do some bit of work, a way that saves time and money, I take pleasure in suggesting it to others. In all probability there are many others who have found that way before me, but I usually find some one who is glad to get it.

The general all-around blacksmith who does everything from skate sharpening to horseshoeing may not have time to develop anything new, but among our subscribers we number many smiths who perform a certain task in a certain line every day in the year. These smiths are probably experts in their line and through constant practice have developed a certain method of work. They have, in many cases, invented new tools and time saving devices.

Such specialists should be able to help their brother smiths and for that reason should pass along their ideas. Nothing is gained by keeping things to themselves; just a short letter or a rough sketch to THE BLACKSMITH AND WHEELWRIGHT and your idea is published for thousands of your brothers to read and gain profit from.

Stop and think a minute; ask your yourself just why you read any book or magazine. You read because you can get suggestions from the article, don't you? And yet the average book or magazine contains ideas which the writer alone has learned from his own experience or gleaned from a few friends. One can see that such knowledge is limited and the information is not as valuable as that contained in a department such as our Correspondence Department.

Don't keep ideas to yourself! You owe your brothers something. Every month you profit by a hint from another reader, therefore it is up to you to do your part.

No matter how crude your sketch, no matter whether your letter is the work of a Professor or not, your idea is valuable. We will put your letter in shape for the department and have the sketch drawn by an artist, for we know that it will interest other readers.

Every day I receive many letters which contain suggestions of value, some of them I hold for months at a time simply because there is not room in the paper for them, but never yet have I received a suggestion which was not worth printing.

Keep the letters coming, for the Correspondence Department is yours and its success is in your hands.

Federal Ownership of Public Utilities

FOR the first time in history there is a concerted movement on the part of the public at large for Federal ownership of all public service utilities. The movement, as such, started with the demand of the labor unions for control of the railroads. It owes its birth to the Socialistic propaganda that is spreading over the country and the results are problematical.

On the face of the matter, from theory, it would seem to be a practical solution of the problem insofar as the workmen themselves are concerned. It would simplify the fight of labor against capital. If their demands for more money were not met, then they might strike against the public (their employers) and their demands would be satisfied.

At present we have a fair example of Government ownership in the postal department where Mr. Burleson rules. A letter posted today reaches its destination at some future date which never can be determined—it may never reach its destination. The post office department has never paid for itself, the deficit has always been made up through taxation. The department in the past has been run by the people through the Government, at times, in a very efficient manner, but with every change in politics there has been a change in postal management.

For many months we have had a sample of Government ownership, or management, which amounts to the same thing, in the railroads themselves. The service is consistently poor, the employees dissatisfied, and the rates much greater. Despite the fact that all tariffs were increased, the operating expenses as contrasted with those before the Government took control, have increased all out of proportion.

If this control continues, we may reasonably expect an entirely new management with the next election. We may expect to have a new set of heads with no experience in railroading, with every election and the public will pay for their education. We may expect to have a score of men in charge who are politicians, not business men and the roads will be used by the political bosses as pies from which to gather the plums for their supporters.

As a check against extortion, the people have established an Interstate Commerce Commission which has regulated tariffs and protected the public. Under Government control, this commission has been hampered and their findings thrown aside.

For the past two years practically every business has been under the control of the Government, and under this control prices upon every commodity and service have increased more than 100 per cent. We have maintained an expensive political machine and are now awaiting the acts of a procrastinating Congress to check some of the useless expenditures.

In view of these facts, do we as a public want the Government to continue its control? Are we willing to pay for its mistakes? Will we wait for special sessions of Congress in patience while they settle the grievances of their various employees?

The Transportation Problem

UNDOUBTEDLY one of the factors which was largely instrumental in breaking the Brooklyn car strike was the extensive use of motor vehicles. With the tie-up of practically all Brooklyn car lines, over one million people were put to inconvenience. Anticipating the strike many of the larger business houses arranged to have trucks and automobiles call for their employees in the morning and take them home at night.

A fair percentage of the rest were forced to walk, while taxicabs and good natured autoists carried capacity loads. After twenty-four hours of the strike, however, transportation was had for practically everyone. Motor buses, taxicabs, trucks and automobiles did a big business. As the strike continued, the inconvenience lessened until finally the public suffered but little from the lack of trolleys and subways.

As soon as the public's support was removed, the strikers were forced to temporize and so the strike ended as suddenly as it had begun.

It is true that train and trolley transportation is cheap, but all things considered it would seem that motor vehicles are a good substitute. If one were to figure the cost of automobile operation one would find that an average machine, filled to capacity, may be operated at a less cost per capita than trolleys or steam trains over short distances.

Steam train fares vary between two and three cents per mile over distances of ten miles, while the average five-passenger car costs from five to ten cents per mile for operating. In the latter case, then, the cost per capita is from one to two cents per mile and includes the depreciation of the machine as well as the cost of fuel.

As a means of transportation, the horse has long since been displaced; perhaps in the near future our trolleys, our subways and our short line railways will have been thrown into the discard.

The public always suffers during a transportation strike and such a strike can never be won without the public's support. As soon as the public wakes up to the fact that railroads and electrics are not essential, then again there will be peace. In the country towns where the transportation company's demands are too great, there will be community-owned automobiles or trucks. There is a limit to that which the long suffering public will stand, and the limit is nearly reached.

It is not our purpose in this editorial to take issue either with capital or labor, we merely offer a solution for the public at large.

Old Friends

ON January first of next year THE BLACKSMITH AND WHEELWRIGHT will be forty years old. It was the first magazine ever published which was devoted strictly to the field which it covered. There were other magazines of a general nature, but none of them were written in the interest of the Blacksmith and Wheelwright trade; it was the Blacksmith's first magazine friend.

The idea of the magazine to cover the field originated in the brain of Mr. M. T. Richardson and to him is all credit due. For more than thirty-nine years Mr. Richardson has been, and still is, the sole owner and proprietor of THE BLACKSMITH AND WHEELWRIGHT; by him have its editorial policies been directed and to-day as on January 1, 1880, Mr. Richardson is a firm backer of the ideas which led to the printing of the first issue.

Blacksmiths have come and gone, new names have appeared on our subscription list, old ones have dropped off, but still THE BLACKSMITH AND WHEELWRIGHT retains its old Editorial policy, a magazine for the Blacksmiths and Wheelwrights. It is written with a regard to the interests of this class of workmen only and at present is the only magazine devoted strictly to this field.

We have said that many of our old subscribers, those who remember the first issues of THE BLACKSMITH AND WHEELWRIGHT, have long since dropped from our list, but still there are a few who subscribed in 1880 and are still in the family circle. To these few, we send greetings and that our later friends may know them, we ask them to send us their photographs in order that we may show their pictures in our fortieth anniversary number, January, 1920.

Old friends, subscribers of 1880, join us in our Family Reunion, send us a letter, your photograph, and a brief sketch giving the history of your life and your business, so that we may renew old acquaintanceship and greet new friends among the subscribers of to-day.

To all of these friends Mr. Richardson will send a beautiful autographed portrait of himself, for old time's sake. This portrait was made from Mr. Richardson's best photograph, and is suitable for framing.

Our 1880 subscribers are few in number, but there are still more who have known us for at least 25 years, we want to hear from them also, so that we may publish their names in an Honor Roll.

By all means, then, don't fail to join our reunion by writing us a letter, telling how long you have read THE BLACKSMITH AND WHEELWRIGHT and sending us a photograph if possible.

Keep a Scrap Book

FEW people realize that man is merely an educated animal of the higher order and that he differs from the horse and the dog in that he has an ability to reason and plan. Everything he does is based upon experience, it is absolutely impossible for anyone to be original in the strictest sense of the word.

The brain cells or memory which guide man through life are developed from natural demands. Man learns to talk because speech is necessary. As time passes he obtains ideas and adapts them for himself and for his work as necessity calls.

All modern inventions, the airplane, the wireless and machine gun are evolutions from machines of lower types. In all probability had Marconi been born a hundred years ago, the wireless telegraph would not have been invented by him, but by another, for Marconi would not have had the necessary experience in his generation to have progressed to the extent to which he did.

Knowledge of to-day is the result of past experience, things which to-day are utterly unthought of and impossible an era from now will be actualities because we are slowly building up our science and gaining something new every day.

If man were to forget experiences or did not profit by what has been learned, he would be in a class with the scholar sof Socrates' time. Most of us forget things, facts that matter but little and we are none the worse for it, but often-times were our memory perfect we would gain considerable both in time and money.

Many of us make a practice of keeping memorandum books to help our memories, but such a book is limited in its usefulness. Every workman should keep a scrap book in which could be pasted clippings from books, papers and magazines. Such a book should be indexed so that each clipping could be referred to at a moment's notice.

After a time such a book would be very valuable. A smith, if he kept such a set of clippings, when he desired to make a certain tool or do a certain kind of work, could look under that heading and find just the information he wished. He would not need to rely on memory and would have for reference the best authorities in the country.

The correspondence department of THE BLACKSMITH AND WHEELWRIGHT contains suggestions every month that are of great value to many workmen. It will pay every reader to cut out the interesting items and compile a book for themselves of just the material that interests them most.

One of the wisest men in the country who is worth millions has said, "It is not the man who knows a lot, for he forgets, but it is the man who knows where to find his information who makes a success of life." And this man has hit the nail right on the head.

SALE OF ANVILS

THE War Department authorizes publication of the following statement from the office of the Director of Sales:

The Director of Sales announces that the Surplus Property Division of the Office of the Quartermaster General of the Army is offering for sale under sealed proposals 400 blacksmiths' anvils, located at New York, bids for which will be opened at 10 o'clock on the morning of September 18, 1919, by the Surplus Property Officer, Zone Supply Office, 461 Eighth Avenue, New York.

These anvils are made of steel and weigh from 70 to 75 pounds. The face measures about 12½ inches by 3¼ inches. The length of the blight is 1 3/16 inches and of the horn 6¼ inches. Bids for one or more of the anvils will be considered.

Inspection of the anvils may be made by applying to the Surplus Property Officer, Zone Supply Office, New York, at any time before bids are submitted. Particulars and special bid forms can be obtained from the Surplus Property Officer, Zone Supply Office, in any of the following cities: Boston, New York, Philadelphia, Baltimore, Newport News, Atlanta, New Orleans, St. Louis, Jeffersonville, Ind., Chicago, Omaha, San Antonio, El Paso and San Francisco.

THE TRAINING OF CRIPPLES

HOW many of us realize we are cripples? We have the usual quota of legs and arms, fingers and toes, but we're cripples just the same. Samuel Hopkins Adams made the discovery while studying reconstruction of maimed soldiers at Walter Reed General Hospital, Washington. Describing the incident in the "Red Cross Magazine," he writes:

" 'I suppose you regard yourself as a whole man,' demanded one of the vocational therapy experts.

"Looking myself hastily over to make sure that I had not lost anything in the surgical ward, I replied that I could count the usual number of arms, legs and other appurtenances.

" 'All right,' said the expert, 'but you're sort of a cripple at that. You're atrophied.'

" 'If I am, I've never discovered it,' I assured him.

" 'Of course not. People never do until they're shown. You haven't got anything like the full use of more than four fingers and two thumbs out of a total of ten. The normal man—the man who believes himself normal, I mean—never has. Can you light a safety match with one hand?'

"He handed me the box and the match. After the second abortive attempt the match fell on the floor and the box fell on that match.

" 'That's elementary, that stunt,' remarked the instructor. 'Our one-arms can do that before they get out of bed. You see, your two smaller fingers are really cripples. Now we teach our fellows to do the work with those fingers that you have to use another hand for. There's the whole physical principle of our training in its simplest form—substitution.' "

A significant word "substitution." At the modern hospital for war cripples in Colonia, New Jersey, the word can be applied to the reconstruction work there in the truest sense of its meaning. From the time the crippled soldier begins to convalesce, he is taught to substitute new solutions to the difficult problems that lie ahead of him. If the loss of an arm incapacitates him for his old job, and the old bugaboo depression grips him, he is not allowed to surrender weekly to a mental

A Tire Repairing Class at the Reconstruction Hospital in Colonia, N. J. (Photo Copyright by Western Newspaper Union.)

state of "dependency." The Red Cross and Uncle Sam substitute a new vigorous sane outlook on life, by refusing to baby him, by teaching him a new and more remunerative trade. He has the incentive to make good when he leaves the hospital.

Very seldom does a war cripple "lay down on the job." He may have a shattered body, and worn out nerves, he may be thoroughly depressed and blue, but the will to go on fighting is nearly always there.

One soldier lost both hands at the wrists. For a while he refused to buck up. He talked continually of living on his pension—a life of glorious ease. His Red Cross nurse in charge noticed his dependent attitude with some anxiety, and suggested that he take a walk through the government shops attached to the hospital, where his buddies were learning how to repair automobiles, paint china, make telephones, draw art posters and a hundred other trades. He half-heartedly agreed.

The trip worked a miracle. He couldn't see his pals working busily and happily in the miniature industrial city of Colonia, and remain idle.

"Say," he said diffidently to the nurse, "don't you think I could tie a paint brush on my arm and do a little painting?" With encouragement from his nurse, the suggestion became a reality. For the work he turns out, he receives 50 per cent. profit and 100 per cent. happiness.

Colonia is like a vast clearing house where the debts of the government to these boys are paid in gifts of training and courage. Every

type of man is taught an occupation that will be congenial and profitable when he leaves. The work varies from repairing inner tubes, to learning higher mathematics, and through the encouragement of the Red Cross they go out to face life, renewed in mind, soul and body. They are "carrying on" at Colonia.

THE WAY TO WIN

"Strike" while the iron is heated,
"Pause" and the iron 's cold—
If you strike too late on a hardened plate
The weld will never hold.
"Seek" and success will follow;
"Wait" and it passes by;
Be quick to grasp, then hold it fast
And trust for a better try.
"Work" and the world works with you;
"Loaf" and you loaf alone;
This strenuous world 's a continuous whirl:
It offers no room for the drone.
"Life" is an undertaking;
"Death" is a silent thought.
So let life's light illume the night
With the deeds which you have wrought.
—P. Gordon Mills in Indianapolis *Sentinel.*

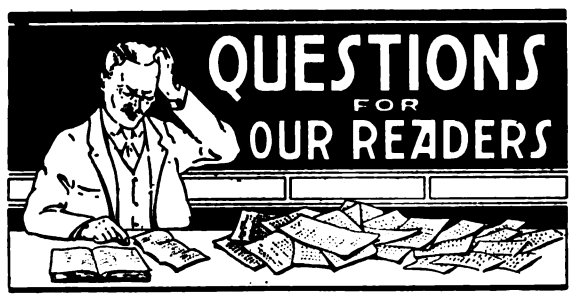
SH!—SH!

Mrs. Blank could find only two aisle seats one behind the other. Wishing to have her sister beside her, she turned and cautiously surveyed the man in the next seat. Finally she leaned over and timidly addressed him.

"I beg your pardon, sir, but are you alone?"

The man, without turning his head in the slightest, but twisting his mouth to an alarming degree, and shielding it with his hand, muttered:

"Cut it out kid—cut it out! My wife's with me."—*Public Service Chat.*



A Saw Table?

From Chas. Jenkins, Canada.—Will some brother be good enough to tell me through the columns of THE BLACKSMITH AND WHEELWRIGHT how to build or make a small saw table or stand for a circular rip saw with tilting table and give full measurements and also how fast the saw should run. How many R.P.M., say, on a ten or twelve-inch saw for use in a small country shop.

Hammer and Sharpener

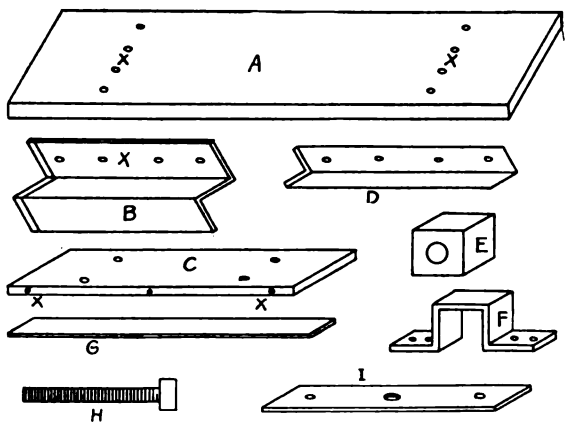
From T. H. Christmus, Texas.—Will some brother blacksmith who has had experience with power hammers give me some idea as to the proper size and type for use in an ordinary blacksmith shop?

I would like to know also about some brother's experience with the Justrite plow blade sharpeners. What type and style are considered efficient and best for sharpening plows and cultivator sweeps? I would be glad to hear from someone at the earliest opportunity.

Grab has long fingers, but sometimes it cracks them, when it gets too much in its fist.

The Belt Tightener

From John Sefcik, Kansas.—I am sending you herewith a sketch of a device for tightening countershaft belts. This device is easily adjustable so that in Winter the belt can be loosened and in summer when the belt stretches, it can be tightened up again. It will save lots of time and prevent consider-



Details of the Belt Tightener.

able bad language. It will also save money, because there is no need for cutting out a piece of belt and putting in a lacing.

I first took a plank two inches thick, 12 inches wide and 36 inches long, and beside it I nailed a second one the same thickness but only six inches wide. The two planks, side by side will make one 18 inches wide and 36 inches long, as shown in the figure at *A*.

Take an old binder sickle guard bar which is bent to a double angle, as shown at *B*, punch the holes through it for three-eighth inch bolts and fasten *B* to *A*. The crosses on *B* and *A* show where the fastening is made. There should be two of these double angle pieces, one at each end of *A*.

Make up angle iron *D* which is one and and three-quarter inches wide inside, and fasten it to the edge of *C*. *C* is a plank measuring two inches by twelve inches by twenty-four inches in length. There should be two angles like *D*, one at each end of *C* and when they are in place the plank *C* will slide in the two angles *B* which are mounted on plank *A*.

Next fasten an old cultivator beam measuring one and three-quarter inches by one-half by twenty-four inches long to one edge of the plank *C*, as shown by the crosses. The fastening should be made with three-eighth inch lag screws.

On the side of the beam fasten the iron piece *I*. This metal piece should be the width of the beam, and at the center have a countersunk place about one-quarter of an inch deep, but there should be metal beneath it. This is to take the pressure from the tightening screw and so protect the beam. This completes the sliding portion of the device.

The portion *A* is mounted solidly to the ceiling while the countershaft hangers should be mounted upon the sliding plank *C*. When *C* is moved in its slides it will tighten the belt.

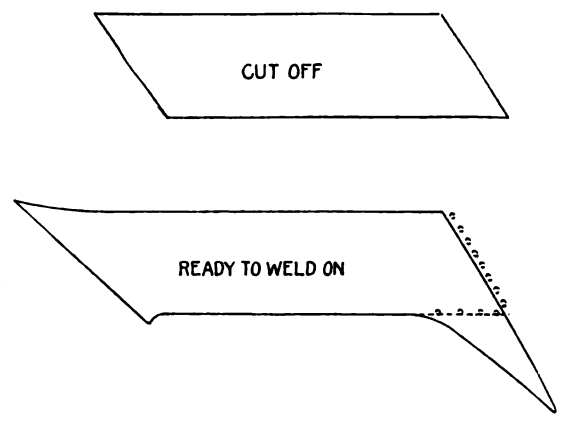
In order to make an adjustment screw, obtain a piece of iron two inches square, as shown at *A*, drill and tap it for a seven-eighth inch bolt. I use a disc bolt. I square up the head and thread it its full length. Then I file off about three threads at the end so that the end of it will fit into the seat on the iron *I*. The clamp shown at figure *F* should be made of heavy iron and its edges should be crimped around the nut *E*.

The set screw *H* should then be screwed into the nut *E* about half-way. The end of the set screw is then placed against the half hole in *I*, and *F* is then screwed to the ceiling. As soon as *H* is screwed up it presses against *C* and tightens the belt.

A Letter From Arkansas

From John O. Lane, Arkansas.—I have been a silent reader of THE BLACKSMITH AND WHEELWRIGHT for many years and have obtained lots of help from it. I think you hit the nail on the head when you said that if the blacksmiths would only do more thinking, they would get along better.

I talk auto and tractor to my customers every chance I get, although there are no tractors in this part of the country now. I obtained my automobile and tractor experience in Colorado. I purchased a car some



How Mr. Lane Shapes Plow-Points.

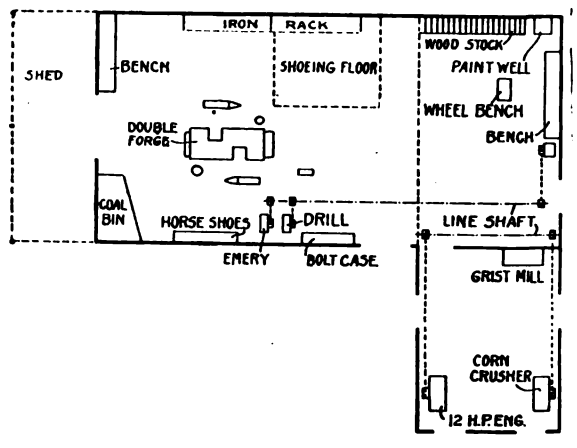
time ago, you know the rest of the story, or can guess it.

I like to read the letters from the other smiths and sometimes I can hardly keep from writing to them direct. Though Mr. Berry (in the February issue) does not say, I think he must have to apply the same kind of tires that I used to put on when I was in California. I used a No. 4 scientific cold tire setter in shrinking on these tires and as long as I did the work, I never had a single tire returned to be reset. I am a firm believer in cold tire setting. I was interested in Mr. Lachman's handy tongs, a description of which appeared in the February issue and am sorry that he did not say what size of stock he used for making them. I have worked in the smith shop about twelve years and I do not think that the smith is paid for what he does. Let me give some of the prices which I charge for work and what some materials cost:

Horseshoeing, all sizes.. $1.50
Resetting 1.00

Shoes cost me from $7.75 to $8.15 in this part of the country. Nails cost twenty-five cents a pound and coal sells for $6.50 a ton. This coal I purchased directly from the mines which are located here.

I am giving herewith a sketch which shows my method of cutting parts or bills



Plan of Mr. Lane's Shop.

to lay plowshares. I cut the steel 12 inches long, using one-quarter by one and one-quarter inch lay steel when I can get it.

For making welding compound, here is my receipt:

1 quart of common sand
1 quart of common table salt
1 pound of table soda
1 pound of borax
1 pound of Spanish brown

to color with. Mix all of these things together and you can weld most anything.

I often find in my travels that there are

many men shoeing horses who should be plowing or making rails. Then the horses would be better off. I have seen some of the smiths pull off the old shoes, then heat the new shoes red hot and burn the hoof until one couldn't stay in the shop. Then when the horse went lame, they would wonder where the trouble was.

I always pare the hoof level and fit the shoe as nearly as I can without putting it against the hoof. Then I heat it and finish shaping it cold, making it fit the hoof instead of making the hoof fit the shoe. My shop is 20 x 40 feet. I was brought up in this place, but spent considerable time in California. Since I returned, I have been here eighteen months. I get lots of work, despite the fact that I am five miles from town.

We have a mill and crusher near the shop. I have done considerable studying and have built a double forge which is shown in the center of the drawing. It is 32 inches wide and seven feet long, and a man can work on each side of the chimney which is located in the center of the forge so as to take both fires.

Moving Van and Passenger Body

A Practical Body Which Will Find Steady Sale in Almost Any Locality

NEVER in the history of the country has there been so much unrest among the laboring people. This unrest has led to strikes and the strikes have added to the cost of products and in fact all commodities. Many of the trolley lines in the smaller towns have been forced to suspend operation for days and sometimes weeks at a time. In some cases the trolley companies have gone bankrupt and the tracks are no longer in use.

This condition has greatly inconvenienced the people living along the lines, particularly in the morning and at night when they travel to and from their work in the various villages adjacent.

There has been a class of automobile drivers which has taken advantage of the conditions outlined and has operated what have been termed "jitney" lines. In the majority of cases in order to make these lines pay, the touring cars have been crowded to capacity on their runs and not all of the people have been served by such lines.

There is a general demand for a large capacity automobile truck, capable of carrying a large number of people during the rush hours, yet a machine which could be used for other purposes besides. In the country towns, such a bus could not be operated at a profit during the day, though it pays large dividends during the rush hours in the morning and in the late afternoon.

Doubtless within the near future many enterprising business men will take advantage of these conditions and establish regular bus lines in the various parts of the country. The blacksmith, if he is inclined to do so, may construct a body for a large chassis such as the Packard truck, which may be used for bus service and for general moving or hauling purposes during the rest of the day.

Such a body is illustrated in our drawing this month and shown mounted upon a Packard truck chasis. The body is designed primarily for hauling work, for carrying furniture or in fact any commodity which may be bulky. The body proper measures 13 feet six inches in length, six feet in width and six feet four inches in height. It is mounted upon seven cross bars which in turn are supported by two bar rails. The bar rails rest up on the frame of the truck.

The bottom of the body itself is a frame, all corners of which are mortised together and strengthened by means of angle irons. To add strength to the floor, two lengthwise sills are mortised into the frame at each end, across the center. A plan view of the frame and body members is shown at B.

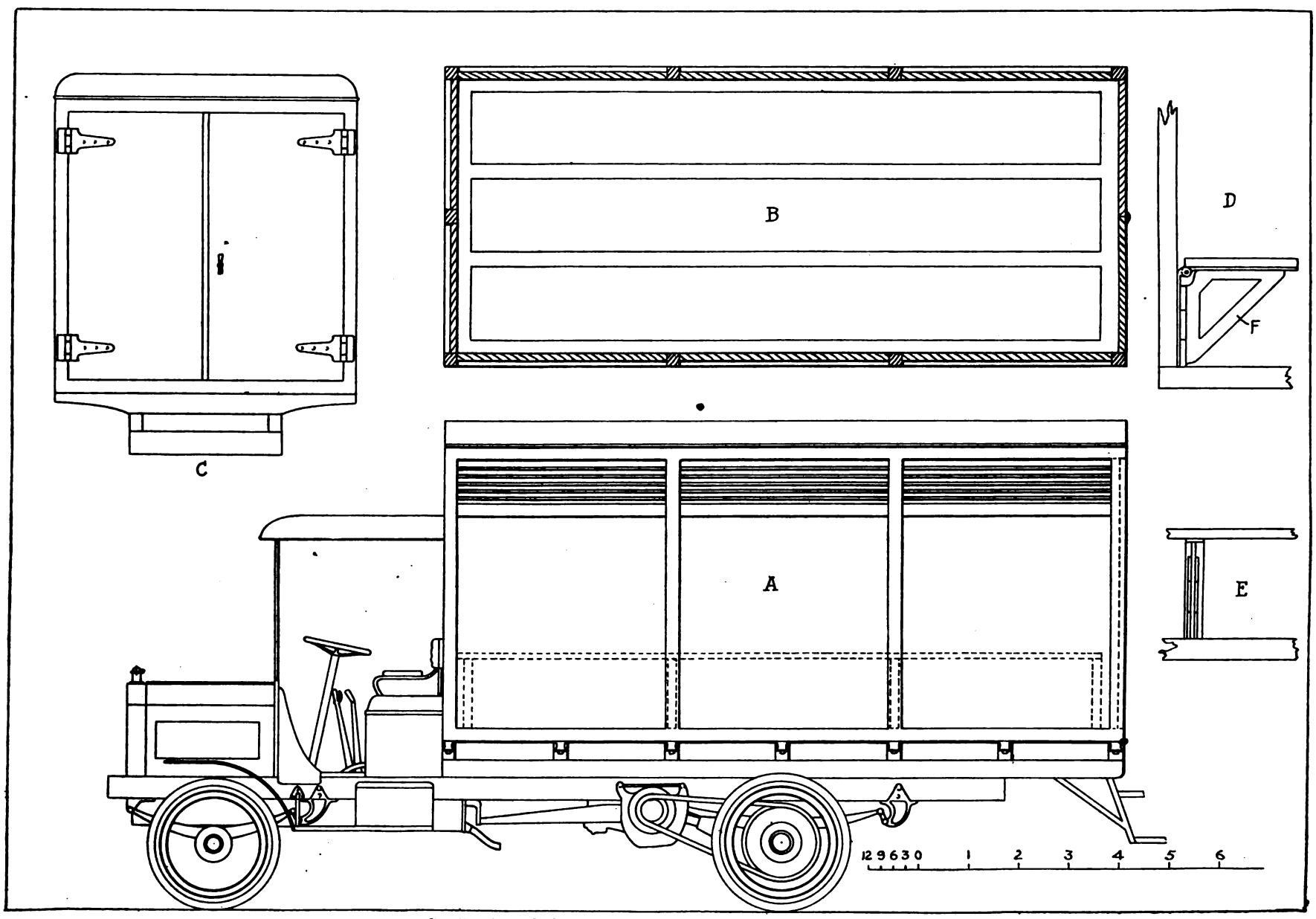
There are nine upright posts, measuring three by three inches which support the roof of the car and upon these posts rests the frame constructed of four top rails. These top rails carry the top or roof bows. The top is constructed from thin wood, canvas covered or heavy wood tongued and grooved and made water-tight.

In order to provide ventilation for the body, the sides are fitted with slat openings. The panels (eight in number), are cut at a distance four feet from the floor and are arranged so that the upper parts may be removed within a few minutes so as to leave the sides open.

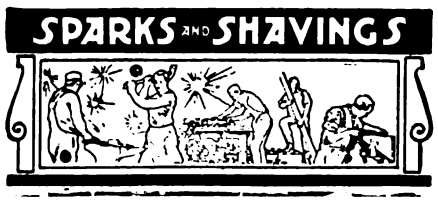
At D, E, and F are shown the details of the seat construction. F is a swing bracket, one of which is hinged to each of the nine uprights. When not in use, it folds against the side of the body and permits the seat board which is also hinged, to drop down against the side or be raised, as is most convenient.

With this seat construction, all of the seats can be raised or dropped out of the way and the van used for carrying large boxes or merchandise of any kind. With the seats in place, and the side panels removed, the machine may be used for carrying passengers. The rear doors are mounted upon large double hinges and the hinges are so arranged that the doors may be swung open and forward so as to fold lengthwise along the body and leave the rear of the body entirely open.

The steps (two in number) are also hung on hinges and can be folded up beneath the car when the machine is used for carrying merchandise. The body, being very simple in construction, can be made by practically any smith within a very short time and should find a ready sale in practically any town in the country.



Details of the Body Described. The Chassis Used is a Packard.



Piston Ring Size Directory.

The Gill Mfg. Co., 351 W. 59th St., Chicago, Ill., has recently published a piston ring size directory. The purpose of this book is to enable the garageman, dealer or jobber to ascertain the correct size of piston rings desired for the particular "job" upon which he is working.

Frequently a car owner fixes a date for the garageman to overhaul his car, but the garageman may not know the size of rings to order. With the assistance of this size directory, however, he can order the rings in advance and obviate the delay.

The directory also contains general instructions for the fitting of Gill piston rings together with a telegraph code to facilitate quick ordering. Copies of this booklet are being distributed free to the trade and can be obtained by addressing a request on a letterhead to the Gill Mfg. Co. at the above address.

Neverslip Shoes and Calks.

It would be wise for our readers to investigate the very complete line of horse and mule shoes manufactured by the Neverslip Works of New Brunswick, N. J. We say "complete," for it is said to comprise a variety of patterns that covers the entire field. Their Red Tip Calks are well known to the trade and there are many types to select from.

The line embraces all styles of Screw Calks, Iron, Steel and Extra Light Steel Shoes, Drilled or Calked; Drive Calks, Sharp or Blunt, Driving, Draft and Mule Shoes and all the necessary tools. Blacksmiths should always have the Neverslip catalog handy, and if they've misplaced it, the manufacturers will gladly furnish a new one.

Automobile Electrician's Guide.

We call the attention of our repair men readers to the book which is being placed on the market by the Michigan State Auto School of Detroit, Mich., and known as "The Automobile Electrician's Guide."

This book is one of the most complete wiring diagram books on the market and contains more than 800 different diagrams, which include practically all of the wiring systems used on the cars since starting and lighting systems were first installed. Some of the diagrams date back as far as 1906. It is divided into two sections, diagrams for 1917, 1918 and 1919 cars in one section and diagrams for cars from 1906 to 1916 in the second section.

The diagrams, which are printed in black upon heavy white paper, are mounted in loose leaf form and arranged in alphabetical order. From time to time new diagrams may be added as required, so that the book can be kept up-to-date indefinitely.

Power Lighting System for Farms and Garages.

A modern electric lighting and power plant for farms, rural schools, and churches, suburban homes, yachts, etc., is to be manufactured by one of the John N. Willys companies, The Electric Auto-Lite Corporation of Toledo, Ohio.

The new system will be known as Willys Light. It will be marketed by the Willys Light Division of The Electric Auto-Light Corporation through distributors and dealers. The formation of the sales organization is now under way. It will extend throughout the United States and eventually, it is hoped, throughout the world.

The new system is said to be the most complete that has yet been placed on the market. It is operated by a Willys-Knight sleeve-valve motor, a motor known for its simplicity of operation and its silence. The engine has been developed to such an extent that it requires practically no attention and is so simple that a child can operate it, according to those who have observed it.

The complete plant consists of a Willys-Knight engine, a directly connected generator, a simple control box and a storage battery. The Knight engine burns kerosene at approximately one-half the cost of gasoline. It is air-cooled, self-cranking, self-running, and self-stopping. The control is semi-automatic.

The noisy poppet valves are eliminated in the Willys-Knight engine. In their place are two cylindrical sleeves, one within the other, which glide silently up and down between the piston and the cylinder wall. The long ports in these sleeves register with each other and with the ports in the cylinder wall at the proper intervals, forming large and direct passages for the intake and exhaust gases.

This engine, with its sleeve-valve construction, improves with use, it has been proven. Carbon instead of decreasing its efficiency, seems to increase it.

The Willys Light generator is shunt wound for 32 volts. It delivers 750 watts. The armature of the generator, the engine fly wheel and crank shaft are constructed in practically one piece, thus eliminating separate generator bearings and reducing friction.

The battery consists of 16 cells with nine plates to the cell. These are enclosed in sealed glass jars. They have a capacity of 160 ampere hours.

With the Electric Auto-Lite, a company long engaged in the manufacture of electric lighting and starting systems for automobiles, producing it, there is no doubt as to the high standards of manufacture which will enter into its construction.

The new lighting system is adapted to an increasing number of uses. In addition to its general utility on the farm, it is available for cotton gins, lumber and construction camps, oil and gas pumping stations, mines, storage, garages, dairies, telephone exchanges in smaller towns, warehouses and stations. It also may be utilized for hospitals, fishing and hunting clubs, country homes, street, store and home lighting in small towns, theatres, military camps, and in summer resorts and cottages.

Well Made Horse Shoes.

The fact that Phœnix Horse Shoes and Bull Dog Calks are in constant demand would seem to prove that the shoes and calks are worthy of the investigation of our readers. They are manufactured by the Phœnix Horse Shoe Co., of Chicago, Ill., and this company is known to manufacture practical shoes made of excellent material.

It is said that Bull Dog calks hold firmly to the shoe, are easy to drive, and never jump out when set. This company will cheerfully furnish a catalog to any of our readers who request it.

The Two Hundredth Anniversary.

Centennial celebrations of the founding of one's business are somewhat unusual as yet. Two hundredth anniversaries of a town's founding are comparatively infrequent. But when you combine them both with a home-coming jollification and a welcoming home of your soldier boys, with a whole borough enthusiastically aroused and participating, and throw in a brand new idea in memorials, you are setting the stage for something decidedly out of the ordinary.

Southington, Connecticut, enjoyed such an event on August 29th, 30th and 31st. The Peck, Stow & Wilcox Co., pioneer manufacturers of tinners' machinery, mechanics' hand tools, building hardware and blacksmiths' tools, was the animating spirit in the celebration. Just 100 years before, Seth Peck, an inventive mechanic of pioneer days, patented a machine for making tin-ware and set up a business in Southington. It prospered. Gradually it expanded into what is now the Peck, Stow & Wilcox Co. The officers today are Lyman H. Treadway, president; L. E. Fichthorn, vice-president, and E. N. Walkley, secretary-treasurer. The reputation of the Pexto products is world-wide.

It was the centenary of Seth Peck's venture that primarily was being celebrated. Incidentally, it was an acknowledgement of Southington's debt of long standing to the firm that was being expressed. And it was a grateful expression of the borough's pride in her soldier boys that Southington joined the company in voicing. For the Peck, Stow & Wilcox Co. made the event more than ordinarily memorable by presenting the city with a $10,000 memorial to her soldier sons of every war, without exception, from the Revolution down to the recent locking of horns with Germany.

This memorial is unique in being per-

haps without duplication in all America, in that feature of carrying the name of every man any given community has sent to the front in the name of Liberty. A magnificent column of granite, 5 feet square by 10 high, and surmounted by a flag pole 87 feet in height, the memorial carries 971 names upon the bronze tablets that ornament its four sides. Not a war in which the United States has participated is missing from these rosters. The memorial sits at the northern end of the village green, and the formal presentation to the city was made by Governor M. H. Holcomb, of Connecticut, on behalf of the company, of which he is a director.

Pexto further gave expression of its appreciation of Southington's loyalty by presenting to each of its employees that had been upon the firm payroll more than 4 years with service medals appropriately engraved with the individual names and records of service. Five of these employees have been for more than 50 years in the company's employ; 18 have seen more than 40 years' continuous service. To all of these gold medals were given. Sterling silver medals were awarded to 53 others who have seen more than 25 years' service, while bronze medals went to all the rest. These service badges were presented personally by President Treadway.

The celebration began Friday, August 29th, with an old-fashioned community basket picnic at Lake Compounce, a pleasure resort a few miles north of Southington. In addition to the usual resort entertainments there was speechmaking and the presentation of the service medals.

Saturday there was a parade of returned soldiers and sailors, fraternal and civic units, and an elaborate pageant descriptive of Connecticut early history and industrial development; the presentation of the memorial, a reception to the public by the officers and directors of the company at the Pexto plant, and dancing at night in the new 5-story addition thereto. An interesting feature was an extensive exhibition of curios, heirlooms, historical objects and early hand-made furniture, together with a display of Pexto products from the earliest hand-made tools to those of latest design and most elaborate finish. Sunday was given over entirely to a union peace and thanksgiving service participated in by the clergymen and congregations of all the religious sects represented in the village.

By reason of the unusual nature of the event it was made a gala occasion for all that adjacent territory and the hardware belt was generously represented.

The Peck, Stow & Wilcox Co. is distributing to the trade a handsome illustrated brochure entitled "One Hundred Years of Progress," which sets down briefly and entertainingly the history of the company since 1819.

The concern is the fruit of the consolidation in 1870, under the present name, of the Peck-Smith Mfg. Co., of Southington, which traced its lineage back to Seth Peck; of the S. Stow Mfg. Co., which had its beginning in Plantsville, Conn., in 1834, through the enterprise of Solomon Stow; and of the Roys & Wilcox Co., which dates back to East Berlin, Conn., in 1840. Samuel C. Wilcox was president of the Roys & Wilcox Co. at the time of the consolidation.

Kerrihard Power Hammer.

No up-to-date blacksmith shop is complete without a power hammer, and it is well to install one that has a reputation of being thoroughly efficient. The Kerrihard Co., Kerrihard Station, Red Oak, Iowa, is the manufacturer of the well-known Kerrihard power hammer. This hammer is claimed to be the last word in efficiency and our readers should thoroughly investigate it. The company will be glad to furnish full particulars of the hammer upon receipt of a request.

Motor Topping.

Blacksmiths will find it easy to make a little money on the side by re-topping automobile or wagon bodies, but naturally they will want to use a reliable make of topping, one which will not fall to pieces in the first storm, and which will remain attractive looking. L. C. Chase & Co., of Boston, Mass., is marketing a top material which we would advise our readers to investigate, for it would seem to entirely fill the above requirements.

Northwestern Horse Nails.

Old-time blacksmiths know full well that a nail which bends, when being driven, is dangerous. They know that many horses have gone lame because the nails that were used were not good.

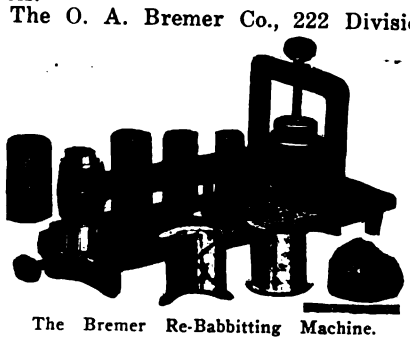
A nail which is claimed to resist bending to remarkable degree is manufactured by the Union Horse Nail Co., of Chicago, Ill., and this company draws attention to the fact that the re-inforced point makes this nail easy to drive and safe to use. Our readers should investigate this line of horse nails, and write for a catalog.

Re-Babbitting Machine.

One of the most common of automobile engine troubles is the wearing or breaking of connecting rod babbitts and as a general rule the repairman purchases replacement babbits direct from the manufacturer or from the service station. It follows, therefore, that the profit in the replacement goes to the manufacturer.

Oftentimes there is a double profit and the second profit goes to the service station. The repairman or blacksmith who repairs automobiles can save money as well as a great deal of time for his customers by re-babbitting connecting rods himself. As every blacksmith knows, babbitt replacement in bearings for line shafts or, in fact, for any kind of shafts, is an easy matter providing the shop is equipped with the proper tools.

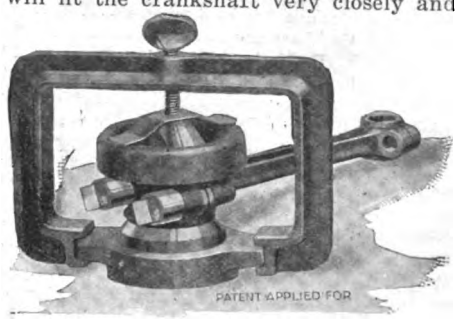
The O. A. Bremer Co., 222 Division St., Burlington, Iowa, is manufacturing connecting rod re-babbitting jigs which are designed so as to fit practically any size auto engine connecting rod. The babbitting jig is provided with a number of mandrels for casting various size bearings. As shown in the illustration, the connecting rod is lined up by means of an adjustment screw at the bottom. It is kept in an upright position by means of a dummy wrist pin held in a "V" block at the end of the machine.



The Bremer Re-Babbitting Machine.

The mandrels at the large end of the connecting rod are clamped into place by means of a set screw, while the casting which carries the set screw is adjustable for different length rods. Where a shop specializes in Ford repairs a special Ford connecting rod babbitter can be obtained.

In this particular case the mandrel is carefully machined so that the bearing will fit the crankshaft very closely and require but little fitting. Smiths who are looking for a side line should investigate either or both of the above tools. The manufacturers are willing to send descriptive literature and prices upon request.



The Ford Babbitter.

Bryden Horse Shoes.

In order to manufacture horse shoes which will give universal satisfaction, it is necessary that a firm study the subject from every angle and that it consider the gradual development of horse shoes, going back to the earliest historical times. This would result in many modifications in shoe structure which ordinarily would not be made.

The Bryden Horse Shoe Co., of Catasauqua, Pa., has done just this. The company dates back to the year 1882, and has been actively in the trade ever since. Every shoe is thoroughly inspected before leaving the factory and any article which is not up to the mark is cast out.

The company has found that this policy pays because this maintains the reputation of the company. They manufacture several special types of shoes, a few of which are "Sideweights," "Bryden 'C' Horse and Mule Ideal Calked," "Toeweight," "Clipped Goodenough." The trade names of the shoes and racing plates are "Boss," "Banner," and "C and K."

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

Perfectfix Products.

The Henry J. Dewitz Co., of Milwaukee, Wis., have recently put upon the market a self-vulcanizing product for repairing tubes and casings. They claim that this repair product can be used by the amateur with excellent results under practically any conditions. To use Perfectfix, one does not need heat or vulcanizers, neither are there any special tools required.

Attachable Auto Curtain Glass.

The Auto Curtain Glass Co., 10 Pratt Court, Worcester, Mass., are marketing an attachable auto curtain glass which can be applied to any kind of automobile top or side curtain.

The device consists of a heavy glass rigidly mounted at the factory in a specially designed nickel plated frame. It is so arranged that it may be put into place on the top in a very few minutes. The device can be obtained in practically any size shape for any model, make or year of car

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

WANT ADVERTISEMENTS

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

will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.

H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, Washington, D. C. Established 1888. I make an examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trademarks registered.

For Sale

FOR SALE

A live blacksmith shop in the Yakima Valley, Washington. Business of 1918 exceeded $6,000. Doing the work myself with the exception of one helper 2½ months. Shop is equipped with up-to-date power machinery, electric power. Large and complete stock. Price $3,200 for stock and tools. Shop can be leased for $12 a month and bought very reasonable. Nearly all cash is required. This is an exceptional opportunity to get in the business and make money. If interested call or write, H. R. Fox, Prosser, Washington.

FOR SALE

14 x 6 Shepard Lathe, $275; 18 x 6 New Haven, $275; 24 x 8, $575; 22 x 12, $575; 28 x 12, $600; Milling Machines, $125, $200, $250; 22 x 20 Iron Planer, $590; 12" Prentiss Tool Co. Shaper, $350; Special Type Shaper, $200; Double End Heavy Emery Grinders, $20; Heavy Buffing Stand, $80; Buffing Head only, $15; 4" Centrifugal Pump, $50; Power Hack Saw, $12; 24" Wood Planer, $175; 8" Sticker, $225; Broom Handle Lathe, $35; Automatic Knife Grinder, $65. Bicknell Mfg. & Supply Co., Janesville, Wis.

FOR SALE

Good blacksmith shop, 50 x 26 feet, with neat six room dwelling. Large lot of land, shade trees, lawn, 168 foot front. Centrally located. Live Kansas town. Shop fully equipped with up-to-date tools and machinery. Fairbanks engine, Skow disc roller, House tire setter, Little Giant hammer, two blowers, anvils, hand and power drills, etc. Doing good business. Only sold on account of old age. Fine bargain if taken quickly. Write now to J. F. Horn, Box 16, Natoma, Kans.

FOR SALE

Hydraulic tire setter, No. 8 extra heavy tire bender, Edwards No. 5 shear, 9 kegs horseshoes, lawn mower grinder, "Wonder" disc sharpener, No. 400 Champ. blower, 5½" blacksmith vise, 4¼" wood vise, oxy-acetylene welding outfit; slightly used; other iron stock. Reece Metzger, R. 8, Olney, Ill.

FOR SALE

An old-established horseshoeing and wagon shop with stock and tools with nine room house and garage, also 1¼ acres land. Will sell at a bargain. Reason for selling, am in poor health. For particulars write owner, J. Alexander, North Main St., Winsted, Conn.

FOR SALE

If you can't get the nuts off from old bolts that turn when taking machinery apart, try one of our Nut Splitters. Splits all nuts three-quarter inch and smaller. Get circulars. Whisler Mfg. Co., Gibson, Iowa.

FOR SALE

Well established blacksmith, horse shoeing, auto and wagon shop. Equipped with machinery and power. On one of Denver, Colorado's principal streets. Owner wishes to retire. L. A. Pfeiffer, 1447 So. Broadway, Denver, Colo.

FOR SALE, GOVERNORS FOR AUTO ENGINES

We make governors for auto and cycle engines when used as stationary. Write today for circulars. C. L. H., Box 582, Dept. C, Taft, California.

FOR SALE

Blacksmith shop and garage combined in good community. Work for two or three men. Building 40 x 60. Electric lights, well equipped. Price $2,000. Address Graham's Garage, Alleman, Ia.

FOR SALE

Horseshoeing and blacksmith shop. Doing all kinds of work. Also six room bungalow. Address Elmer Reed, Wyoming, Ill.

FOR SALE

Garage and blacksmith shop combined. Equipped with machinery, electrical power. Oil and gas station. One half acre land and residence. All kinds of fruit. On main highway San Francisco to Los Angeles. Good business established. Lyon & Sedge, Coyote, Calif.

WANTED

A machine blacksmith for contractor's repair work. Apply by letter to M. E. Grey, Milmay, N. J.

PERSONAL

Brother.—Accidentally discoveed pleasant Florida root that quickly, easily and inexpensively overcomes any tobacco habit. Fine for indigestion. Send address if interested. G. S. Stokes, Florida.

The man who does not advertise simply because his grandfather did not, should wear knee breeches, silk stockings, and a wig.

Tires

Telephone Circle 2460

B. LIBEN & CO.
DEALERS AND JOBBERS
in all Makes of Auto Tires and Tubes
261 WEST 54th STREET, NEW YORK

Biggest Drop in History in

Double Tread Tires

Greatest selection in factory seconds and blemished tires.

Write for information.

Tire Dealers Attention!

REDUCED PRICES ON DOUBLE TREAD TIRES

30 x 3 Plain - $5.00
30 x 3½ NonSkid $6.75

All other sizes on request. 20% deposit on C.O.D. orders required. Write for list to

M. LIBEN & CO.
793k 7th AVE. NEW YORK CITY

PRICE WRECKERS
Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$11.00
30x3½	"	6.50	35x4	"	10.00
32x3½	"	7.25	36x4	"	10.25
31x4	"	7.50	36x4½	"	11.00
32x4	"	8.00	36x5	"	12.00
33x4	"	9.50	37x4½	"	12.25
34x4	"	10.00	37x5	"	13.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE
282 Halsey St. Newark, N. J.

DOUBLE TREAD TIRES

We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

AUTO ACCESSORY

Don't discard your old tires. Use self cured blowout patches. They weld permanently. Extra long and strong. Easily applied. Double mileage assured. The outcome of years of practice. Ben's Big Tire Shop, Dept. H., 378-382 Queen's Blvd., Winfield, L. I., N. Y.

The Mayer Trip Hammer.

The Kaukauna Machine Works of Kaukauna, Wis., are now manufacturing the celebrated Mayer trip hammer which is being manufactured in a number of different sizes to conform with the requirements of either small or large shops. This device is operated in connection with a taper friction cone pulley so that the operator at all times has perfect control of the speed and weight of the blow.

The ram connection is so designed and constructed that a perfect cushion is formed for the recoil at the upper extremity of the stroke and by the same means a downward impetus is imparted to the blow of the ram on its power stroke. The guides for the hammer are "V" shaped and adjustable. They are extra long and have wide bearing surfaces.

The dies are made from high grade crucible tool steel, properly hardened, and may be furnished in either standard flat or rounded faces for plow work. Readers who intend to install any sort of power hammer should investigate this line and write the manufacturers for price lists and specifications.

Adjustable Wagon Tire.

The Adjustable Wagon Tire Mfg. Co., of Oklahoma City, Okla., is manufacturing a patented replacement tire which they claim is so constructed that it will reinforce old wheels that are being repaired and make a repaired wheel better than the original.

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Ekern Portable Grease Gun.

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Every blacksmith should write for the catalog issued by this company, as they manufacture a very full line of grease and oil guns, motor stands, valve tools and jacks, as well as emergency axles, running board, luggage carriers, etc. What the blacksmith will probably regard as very interesting, is the fact that these articles are very cheap, and are backed by prominent manufacturers.

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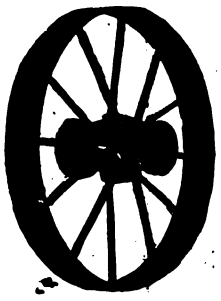

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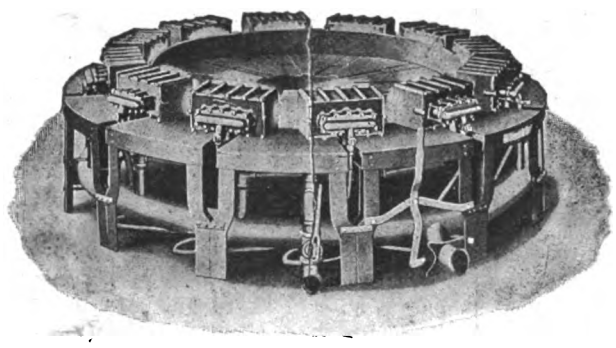

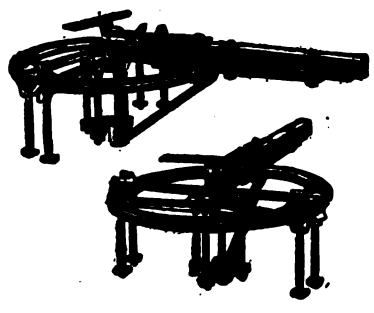

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Registered in U. S. Patent Office
Vol. LXXIX No. 4 Published Monthly
NEW YORK, OCTOBER, 1919

WHY WE PUBLISH IN THIS FORM

For nearly forty years the good old Blacksmith and Wheelwright has appeared, the first of every month, dressed in its well known orange colored cover. It has been of a standard large size and contained an average number of reading pages. We have spared no expense to make this magazine the best Blacksmith's paper on the market and we feel that we have satisfied all of our subscribers.

Circumstances, over which we have no control, prevent us from publishing the October number in its usual form, but as soon as we can arrange it, it will appear in its usual dress, well illustrated and printed upon the press.

On October first, the pressmen and feeders belonging to the local unions went on a strike. Contrary to all International Union laws, these striking union men refused to arbitrate; they demand an increase in pay which amounts to $14 per week and in addition to this, a reduction of hours to 44 per week.

The International union is not in sympathy with these radical demands made by the pressmen and feeders for they realize that if the demands are granted, the printing industry will be ruined. The employing printers have agreed to an increase in wages amounting to $6 per week and are willing to reduce the hours of work to 44 after May 1, 1921.

At present, the pressmen and feeders local unions are at odds with the Internationals, in fact they have seceded, so that they are no longer in good standing. Until such a time as they can

arrive at some sort of an agreement with the Internationals, the employers and the publishers can do nothing.

In view of these conditions our readers will see that a printed edition is out of the question. Meanwhile we intend to furnish our readers with some sort of a magazine and trust that they will give us the same loyal support that they have in the past.

PRACTICAL HORSE SHOEING

Part 6.

It is quite important to know just what is the proper shape of the hoof, so that a standard may be in the mind, with which any irregularly shaped hoofs may be compared and the deviations clearly noted. At the very front, the slant of the hoof should be from 45 to 50 degrees with the ground.

The sides of the hoof will not generally slant at the same angle. That is to say, the slant of the outer side wall of the front hoof will be flatter than the slant of the inner side wall. Thus, for the right hand front hoof, the right side wall will not be asssteep as the left side wall. And similarly, for the left-hand front hoof, the left side wall will be flatter than the right side wall. The outer side will, in addition to being flatter, be more sharply curved horizontally.

Then the bearing edges of the horny wall are cut to form the surface on which the shoe is to be secured, it may be observed that in the front hoof the outer bearing edge is thicker than the inner one. This is perhaps sufficiently accounted for by the flatter inclination of the outer side wall.

It may perhaps be just well to stop at this point and make sure that it is clearly understood why a flatness of it should tend to produce a broad surface for the shoe. Consider an ordinary one-inch board. When it stands exactly upright, the bearing surface where it is in contact with the ground is exactly one-inch wide. If the board is now inclined and the bearing surface suitably shaved to make it bear properly on the ground, it

will be found that the new bearing surface will be wider than the old. Further, the more the board is inclined-that is,the flatter its inclination is with the ground - the wider the bearing surface. Similarly,with the horny wall of the hoof. If the actual thickness-measured perpendicularly through the wall-is the same at one place as another, the bearing surface on the ground will nevertheless be wider at one spot than at another. The steep places will have narrower treads.

The Healthy Hoof

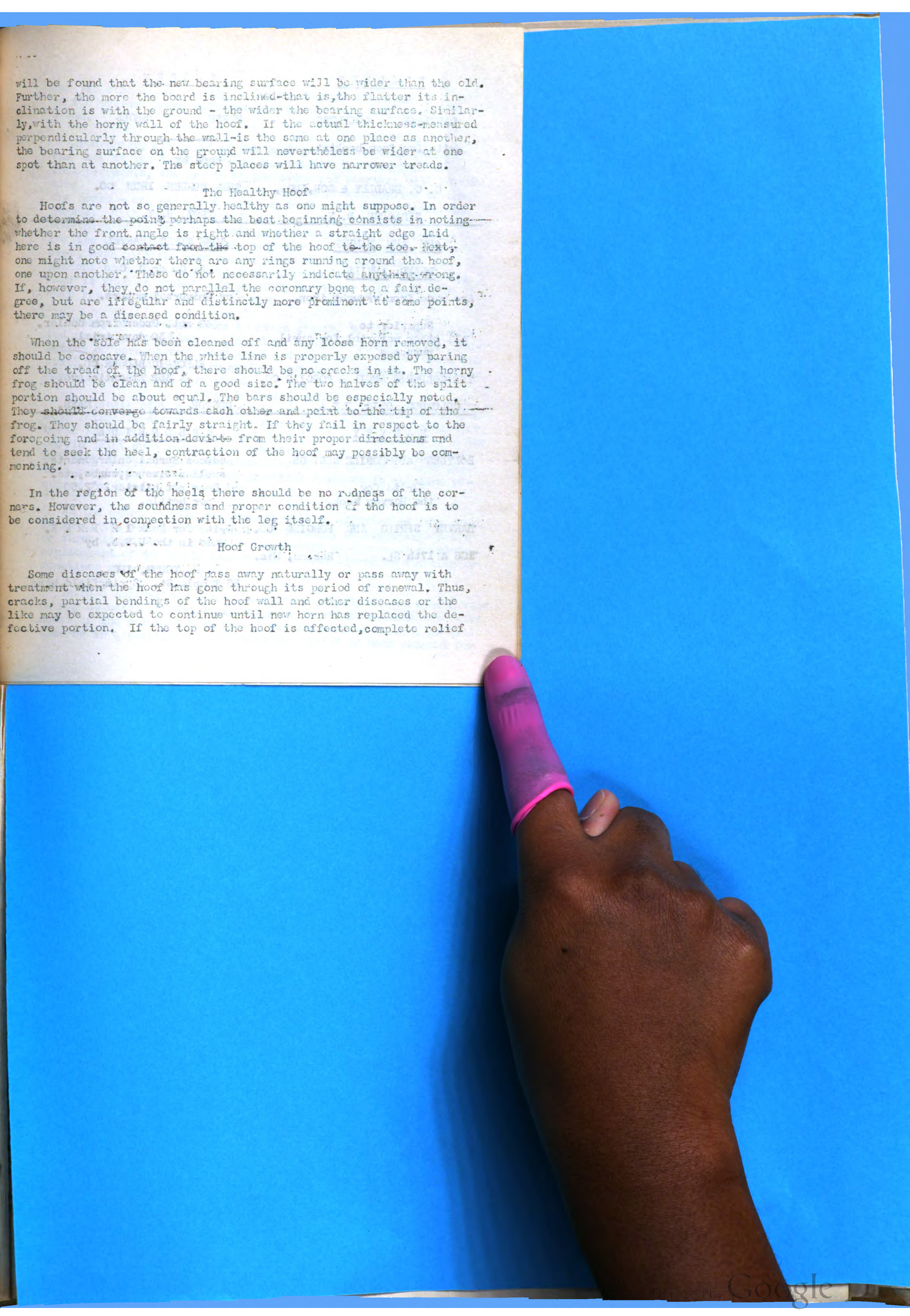
Hoofs are not so generally healthy as one might suppose. In order to determine the point perhaps the best beginning consists in noting whether the front angle is right and whether a straight edge laid here is in good contact from the top of the hoof to the toe. Next, one might note whether there are any rings running around the hoof, one upon another. These do not necessarily indicate anything wrong. If, however, they do not parallel the coronary bone to a fair degree, but are irregular and distinctly more prominent at some points, there may be a diseased condition.

When the sole has been cleaned off and any loose horn removed, it should be concave. When the white line is properly exposed by paring off the tread of the hoof, there should be no cracks in it. The horny frog should be clean and of a good size. The two halves of the split portion should be about equal. The bars should be especially noted. They should converge towards each other and point to the tip of the frog. They should be fairly straight. If they fail in respect to the foregoing and in addition deviate from their proper directions and tend to seek the heel, contraction of the hoof may possibly be commencing.

In the region of the heels there should be no redness of the corners. However, the soundness and proper condition of the hoof is to be considered in connection with the leg itself.

Hoof Growth

Some diseases of the hoof pass away naturally or pass away with treatment when the hoof has gone through its period of renewal. Thus, cracks, partial bendings of the hoof wall and other diseases or the like may be expected to continue until new horn has replaced the defective portion. If the top of the hoof is affected,complete relief



can, in such cases, hardly be expected until the whole of the present horny wall has been out or worn away at the tread.

Apparently, all parts of the hoof grow at the same rate. If the hoof at the front grows at the rate of three-eighths of an inch per month, the growth at the sides and quarters will be the same. But this rule of evenness of hoof growth applies to the one horse - and perhaps to the one hoof - and not to different horses. With some, the growth is more rapid than with others. One-third of an inch per month may be taken as a fair average for the generality of horses, irrespective of their sex. However, even with the same horse, there will be variations dependent upon such things as care, exercise and upon whether the hoof is shod or unshod. In general, an unshod hoof will grow more rapidly than one that is shod.

Plenty of exercise seems to favor growth. If the horn is wetted properly from time to time, this appears to promote the production of horn. A very slow growth of the hoof would be about one sixth of an inch per month while a growth of one half an inch per month is considered very rapid.

Complete Hoof Renewal.

The length of time necessary to effect a complete renewal of a hoof naturally depends upon the rate of growth for the particular horse in question and the length of the front of the hoof from the coffin joint down to the toe. The line at this side is the longest part of the hoof, in the direction of the growth, so that the time required for the horn to grow this distance is the time required for a complete renewal.

At the quarters, the replacement will be effected in less time. In fact, the replacement at the quarters may be accomplished two or three times before the front is renewed even once. A complete replacement of the whole hoof requires from eleven to thirteen or sometimes more months.

Where a horse-shoer gives attention regularly to the same horses he may do well, especially, in the case of valuable animals to make notes of the rates of hoof growth for the various horses. He will then be in a position to determine the period of hoof renewal for

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which comes regularly to his shop. It may be mentioned here that hind hoofs have a more rapid rate of growth than front ones and that the hoofs of stallions grow more slowly than those of mares and geldings.

The hoof sometimes grows irregularly. This may be due to faulty dressing by the horseshoer of the bearing edge of the horny wall preparatory to nailing the shoe in place. He may cut away too much horn on one side of the hoof and not enough in proportion on the other. In consequence, the weight is not distributed evenly over the shoe, but falls more upon the region where too little horn was removed.

This unbalanced condition produces bad effects upon the tendons and ligaments. In cases where the horse runs barefoot,an inequality of the dressing of the hoof will tend to correct itself; that is to say, the portion of greatest length will be worn the most. With the shod foot there is a somewhat similar tendency,but the shoe itself retards the corrective wear.

It will be remembered perhaps,that the fetlock joint is the one of the three joints of the front,that is most like a hinge.That is, the movement is strictly limited to a backward and forward throw, with little or no side play.

It is important,then,that the trimming or dressing of the bony wall be such that when the shoe is secured onto the prepared surface the pressure brought into play when the horse moves will not disturb the true hinge-like action of the fetlock joint.

(To Be Continued in Our Next Issue)

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NEW BOOKS RECEIVED.

We acknowledge receipt of a number of books as listed below.A complete review of each will be published in our regular issue.

AUTOMOBILE ENGINEERING. American Technical Society.6 Volumes.
FORGE PRACTICE. John Wiley & Sons. Price 1.75
TECHNO-CHEMICAL RECEIPT BOOK.Henry Carey Baird & Co.Price 2.50
AUTOMOBILE IGNITION. Harold P. Manly.
THE GASOLINE AUTOMOBILE. McGraw-Hill book Co., Inc.
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THE PRIZE PHOTO CONTEST.

The prize photo contest closed on October 1, 1919 and up to that time we had a number of pictures in this office. It was our intention to reproduce the remaining entries in the October issue, but as this number is in its present form, it is impractical to show any illustrations.

With the next regular issue which we hope will be printed, we we will publish the rest of the pictures in the prize contest and as soon as decisions have been made, the prizes will be awarded.

****

THE C. B. N. A. CONVENTION.

The Carriage Builders' National Association convention was held in the Hotel LaSalle, Chicago, Ill on September 23, 24 and 25th. Naturally it is impossible for us, in our limited space, to give a report of the meeting but we feel sure that our readers will be interested in what was done. For this reason, we will publish in our next regular edition the full report of the conference.

Mr. McLear who has been secretary and treasurer of the organization since 1887 fell and fractured his hip last Spring and has not as yet fully recovered. He was retired on full salary and a new officer, George W. Huston, appointed in his place.

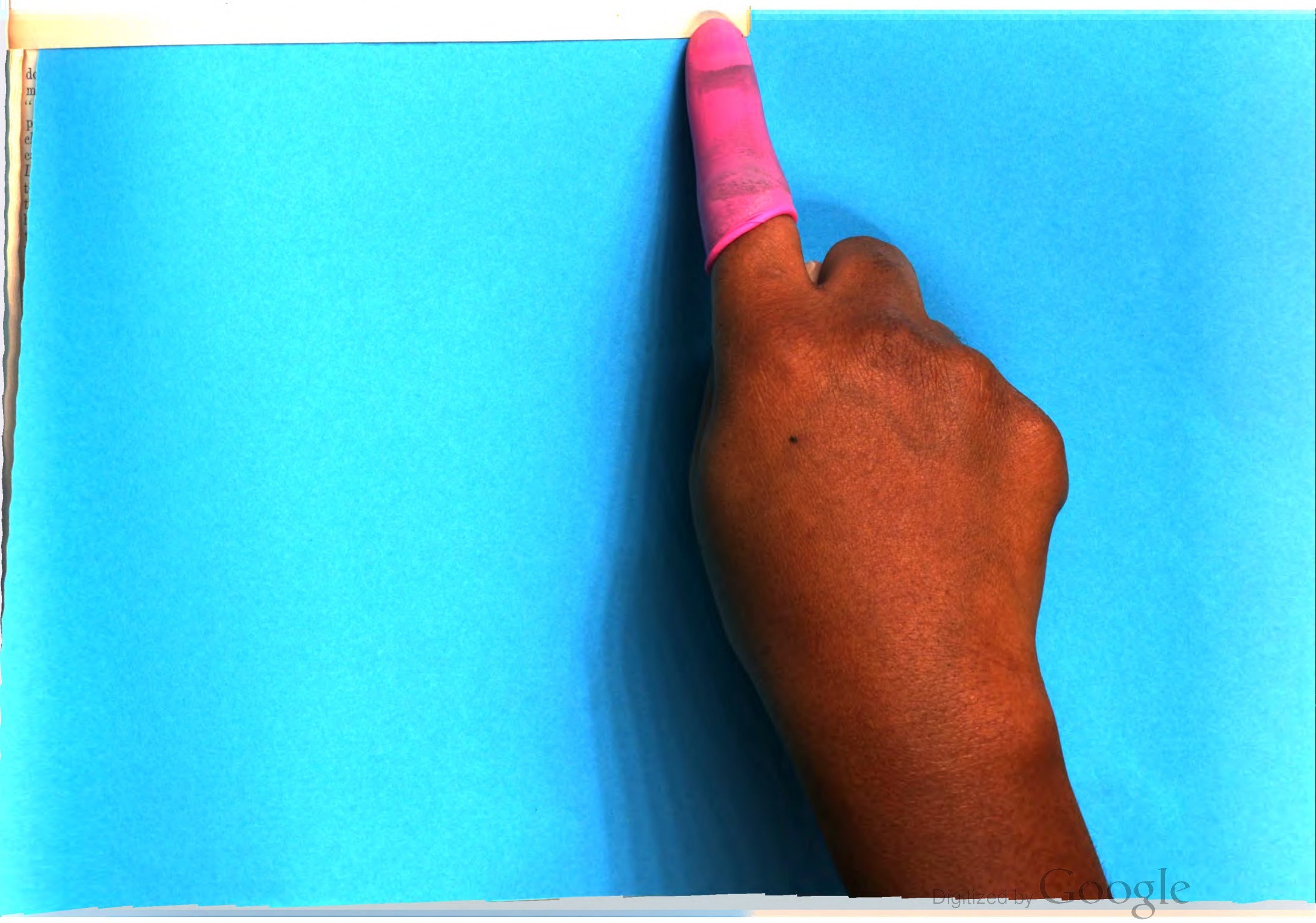
Mr. Frank Dalker was elected as President for the ensuing year.

****

QUESTIONS FOR OUR READERS.

From H.L.Berry, Kansas:-I want to know how I can shoe a horse which interferes (front). I have tried a great number of ways but seem to get no satisfactory results, I have tried toe and heel shoes. First, I used light shoes; then heavy ones; then turned the inside of the heel toward the inside; then pared the inside of the hoof slightly lower than the outside; next with a three quarter shoe; then with a shoe which angled the toe from the outside to the inside; yet none of these methods helped.

The horse is driven by a rural letter carrier and averages to travel about an equal distance over dirt and paved roads. His total trip averages about 26 miles per day. Will some of the readers give suggestions as to shoeing this horse? I would also like to know how the horse may be shod with flat shoes and to keep him from cutting the ankles of his front feet.



From Mr. J. Johnson, Michigan; Will some of the other readers tell me where to obtain sharp toe calks with hard centers? I believe I have seen these advertised at some time or other but cannot locate the manufacturers name at present. I refer, in particular, to the calks which are welded on.

Wanted, a Railroad Track Turn Table.

From Wm. Hatton, New Zealand;-Will some brother reader be kind enough to tell me of some simple, one-man device for lifting and turning the motor "Jigger" used on a rail road track? I find that to do this work, usually four or five men are required.

Why Do Tractor Plugs Burn Out?

From T. L. Johnston, Canada;-I would like to know just why some makes of tractors have a tendency to burn out the spark plug points and to smash the porcelains?

I have tried many of the best kinds of plugs advertised, but when the plugs are used in certain tractors, the points burn rapidly and are frequently destroyed in from six to eight days.

REMEMBER THAT WE CELEBRATE OUR FORTIETH ANNIVERSARY ON THE FIRST DAY OF NEXT YEAR. IF YOU ARE AN OLD SUBSCRIBER-SEND US YOUR PHOTO.

THE

Blacksmith and Wheelwright

Vol. LXXIX. No. 11 NEW YORK, NOVEMBER, 1919 TERMS: One Dollar Per Year

The Car Ambulance and the Patients

The Second of the "Sick Car" Series, Dealing With the Service Truck and Other Important Equipment

IN the last issue of this magazine, I likened the automobile to a person, and compared the garage with a hospital. The idea is not entirely new, for I know of a garage where a sign was posted, "Office hours from 9 A. M. to 9 A. M.," and another where the slogan is "If your car is sick, call us; our phone never goes to sleep."

In the "wee sma' hours" a phone call comes on the line "car disabled, three miles south of Wineville on the Beeville pike." Perhaps if the phone doesn't go to sleep— it gets drowsy and the garageman loses the rest of the message. Like a doctor or a surgeon he doesn't have time to ask for details— he drops the phone and "hustles" for his ambulance and to the rescue.

Away out in the country there is a patient for him; a patient who may be suffering from a broken steering knuckle or a dislocated wheel. A sick car that has been starved nearly to death by lack of oil, or burned by lack of water.

It would never do for the repairman to visit the "patient" prepared only to change a tire or scrape in a bearing; if the sick car were suffering from another "complaint." Like a doctor, the repairman must be prepared to meet every contingency; he hust be prepared to feed the car with gasoline or to take it to his hospital in the ambulance. If the "patient" is able to walk or limp home the garageman must be prepared to give it the necessary assistance in the nature of a tow.

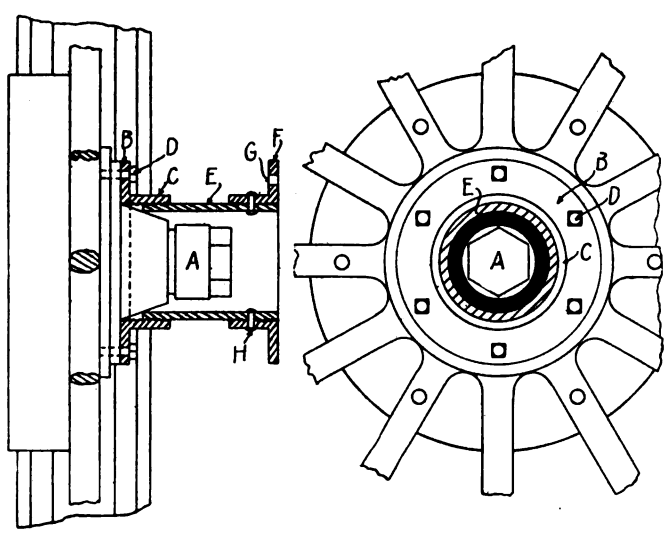


Fig. 2—Showing Details of the Drum Hoist.

The Car Ambulance

The service truck must be an ambulance in every sense of the word. In the "car ambulance" must be carried every possible repair tool, and room must be provided for certain supplies. The ambulance must be so arranged that it is a veritable "traveling garage," else it is almost worthless.

A garageman may build up a reputation upon his service and once his patrons feel that he can be depended upon for every emergency his mechanics may be pretty sure that they hold permanent jobs. I once lived in a small country town where there was one garage. The man in charge of this garage was an excellant mechanic—a man who had "lived with" the automobile since 1901 and who knew these machines from engine to differential.

This garageman did a thriving business and depended mainly upon transients and tourists for his trade. There was one big trouble with this man, however, he was very independent. He had work enough in his shop and seldom obliged autoists by road or service trips. If an unfortunate traveler was forced to leave his machine on the road—no prayers would influence the garageman to tow it in and "wished to be" customer had to "fall back" upon the lowly equus domesticus for motive power.

This sort of treatment began to work adversely for the garageman, and when a rival opened a garage in the same town, our first hero met his Waterloo and shortly thereafter closed his doors.

The rival repairman was dependable and tried to be just as obliging at two o'clock A. M. as at two o'clock P. M. At first, he too had to call upon the horse for towing, but unlike the first garageman, he furnished the horse. He did not expect the autoist to bring all of the work to his doors, but went out after it if necessary. This sort of treatment brought its reward and soon he gained a state-wide reputation for obligingness and ingenuity. He it was who hit upon the slogan of "Call my by phone at night or day— if you can't come here, I'll come your way," and it was this garageman that built the first "car ambulance" that I ever saw.

This ambulance was, and is, a marvel of ingenuity. With it about every sort of road work can be done. I have seen a car lifted from beneath a 40-foot embankment and I have seen the ambulance carry a 90 per cent. wrecked Packard car to the "hospital."

The ambulance was large enough to accommodate a fully assembled car, and whether the machine stood on its "four feet" or was a total wreck it could be taken care of by the ambulance. I well remember the time when an "Elizabeth car" often disrespectfully spoken of as a "tin lizzie") disputed the right of way with a freight engine at a grade crossing.

A Badly Injured Patient

Elizabeth was badly injured, was, in fact, entirely broken up. She lay at the side of the road a total wreck, except for one wheel and the steering gear. An ordinary "Car Surgeon" would have thrown up his hands in despair at the suggestion of getting her to the hospital; yet our friend with his "Ambulance" loaded her into the machine in just 15 minutes after his arrival upon the scene.

This quick work was only made possible by the fact that the garageman had a suitable car ambulance. I will wager to say, that had Elizabeth fallen over a cliff, or anything short of a mountain, her remains could have been picked up and loaded into the ambulance in very short order, as this ambulance or service truck was such an excellent device. In this relation I will endeavor to give a complete description to cover the essential features. For want of a better name I will call he garageman Hagan, simply because this does not happen to be the name under which he is known. In order not to show any favoritism I will forget to mention the name of the truck, which Mr. Hagan purchased originally. As a matter of fact, any two-ton truck chassis may be used, provided the body is made as shown in our drawing.

How the Ambulance Was Constructed

In the first place, the front driver's seat was moved as closely to the wheels and controls as possible, and the cab for the driver constructed of plain boards, having two panels and one window inserted.

The body proper begins just back of the driver's seat and is constructed upon cross mem-

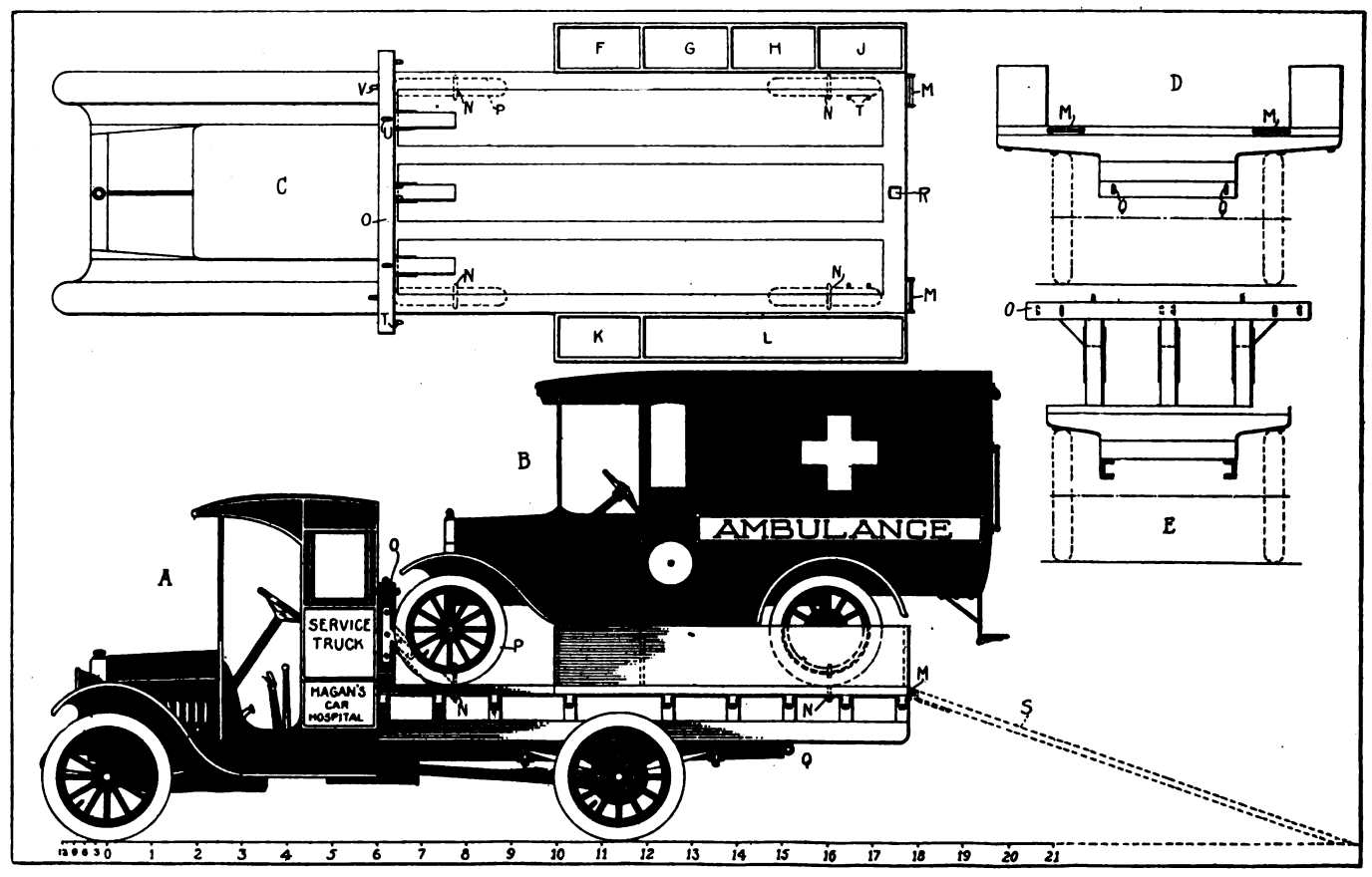


Fig. 1—Details of the "Car Ambulance" or Service Truck, Showing How a Ford Car Could be carried in the Body of the Machine.

bers rather than lengthwise pieces, in all there were nine of these cross pieces. They should be made of two-inch thick oak planks and each fastened firmly to the chassis. Mortised into the lowest edge of these cross members are two lengthwise braces, which carry the last three cross braces, which cannot rest upon the frame.

The cross pieces are so arranged that their topstops come above the truck tires, as shown in sketches D. and E, Fig. 1, and upon them is

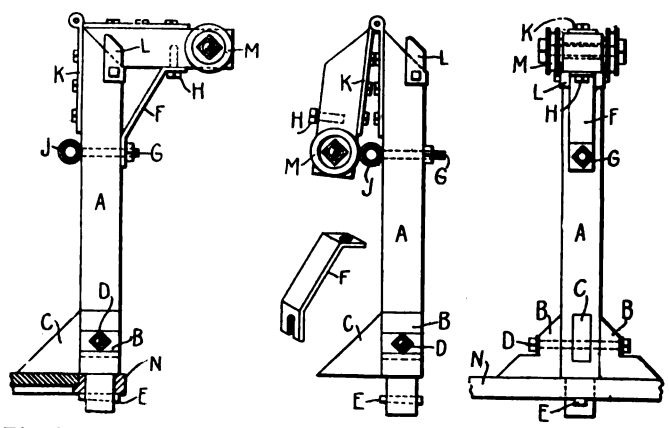


Fig. 3—The Portable Derrick and Its Con struction.

constructed the frame as shown in C. The total width of the frame inside dimension is 62 inches. The two sills at the sides are wide enough to permit the carrying of a standard car, as shown at B.

In the same sketch one will notice that the side boards begin just in front of the fourth cross brace and extend to the back. These sides serve to support the sectional tool boxes, as shown in C, at F, G, H. J. K and L. The depth of these sections may be anywhere from 12 to 15 inches, while the width need not be over one foot. In order to serve as a support for the tool boxes the widened body and the cross members beginning at the fourth from the front, are considerably wider, as shown at D, than are those nearer, and they are shown at E.

In reference to the sketch C, notice the hooks shown at N, which are shaped like the letter L, so arranged that they will fasten a car into place. At the rear of the body the arrangement is similar except that several holes, as shown at T, are provided for the hooks N. These different holes are arranged so that a longer wheel-based car may be locked into place. An important feature of the body is the front of the truck, a detail of which is shown at E in the various figures.

This dash board, if we may term it as such, is built of heavy oak timbers and re-enforced by three diagonal braces. At the top 4 x 4 joist is fastened in place, fittend with a number of eye-bolts, as shown on T, U, V.

At the rear of the body there are hinge fittings, shown at M, which consist of two braces with a bolt passed through them. Two long boards are provided, each with a hook at the end, so that they may be hooked over the members M, as shown at S, in diagram A, by the dotted lines. These boards serve as skids, up which to drag the "patient," and, when not in use, are carried in the body of the truck. A square hole R. is cut in the rear body brace, to carry the derrick, of which we will speak later.

The Drum Hoist Feature

The second feature of the device is shown in Figure 2, and consists of a miniature drum hoist, if we may be allowed to use this expression. In making this drum hoist, for each wheel, a heavy 3½ inch hydraulic pipe nipple is used; upon each end of it is fitted a floor flange. The whole devise is firmly fastened to the wheel by the same bolts which fasten the wheel hub in place.

Referring to sketch, Figure 2, C indicates the flange, which is bolted to the wheel by the bolts D. Into this flange C is screwed the nipple E and upon the nipple is screwed the flange F; F should be riveted or welded to the nipple so that the nipple and the flange form one piece. Through the flange should be bored a hole G, large enough to admit the insertion of a rope or cable. The flange C remains upon the wheels at all times, while the rest of the fittings may be carried in the tool box, until used. The flanges on the left have right hand threads, while those on the right hand side of the car should be fitted with left hand threads.

The Portable Derrick

The second important feature of the truck is shown in Fig. 3, and we will term it a portable derrick. At the left is shown the open derrick, from the side, in the middle the derrick is shown with the arm folded back, so that it may be carried in the tool box and at the right is shown the front view. The member A is made of oak and measures 4 inches square. Its height should be at least 36 inches. At the bottom is cut a small shoulder so that it may be fitted into the square hole at the back of the truck, shown at R in Fig. 1. The end ofthis projection has a square hole cut through it to permit the insertion of a wedge E.

The diagram at the left in Fig. 3 shows how the derrick looks when in place. N shows the cross section of the floor bolts of the truck. The standard of the derrick should be strongly re-enforced by two braces at the sides, B, held in place by the bold D and a single brace at the back C. The swinging arm is mounted upon a large, heavy hinge, K, and held in place at each side by straight iron pieces, L. The eye bolt J, extends 1½ inches beyond the upright, while lagscrew H is screwed into the derrick arm.

A brace, F, of heavy iron is fitted with a hole at the top into which H fits and a slot at the bottom which fits over the eye bolt G. Two wheels, M, are provided upon each side of the cross arm and may be mounted upon a piece of hydraulic pipe, held in place by a long bolt. In order that we may understand thoroughly how these various fittings are utilized let us refer to Fig. 4, which gives a diagram of the rope fittings, eye bolts, and derrick. A and F. represent the wheel hub or drum hoists, shown in Fig. 2, the derrick is shown in the center at V.

The derrick pulleys at G and H and the cross member back of the driver's seat indicated by the dotted lines. In this case arrangements have been made to lift the car from beneath a straight drop. We will assume that the truck has been backed up a precipice as near as possible an dthat the back of the truck with the derrick extends over the precipice.

Lifting a Patient Bodily

The two eye bolts V, shown in Fig. 1, are lettered L and R in Fig. 4, and are connected by length of cable to telegraph posts or pins driven in the ground ahead of the truck, as shown at J and K. These two cables serve as braces to prevent the truck from being carried over the precipice. Four blocks, B, C, D and E, are hooked into the eye bolts back in the driver's seat, while the derrick is fastened to the eye bolts N and Q by the two cables No. 3, fastened to the derrick at T. Cables No. 2 are each fastened to the wrecked car brought up through the derrick wheels G and H, through the blocks B, C, D and E, thence backwards to the wheel drums A and F.

The back of the truck is then jacked up from the ground and the engine started winding the cables, thus lifting the disabled car to the road level once more. As soon as the disabled car has been lifted high enough so that it can be fastened to the back of the truck, through the eye bolts shown at Q in Fig. 1 the truck wheels are put back upon the ground once more and the truck moved ahead.

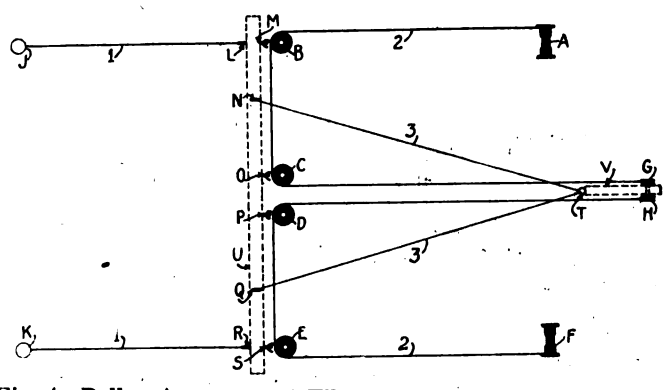


Fig. 4—Pulley Arrangement When Drum Hoist and Portable Derrick Are in Use.

No ambulance is complete unless it carries with it one or more "crutches." If a car is disabled and should happen to lose one of its wheels it may be just as helpless as a man who has lost one of his feet. If the man is given a crutch he can usually get along, while the same thing is true in the case of the wrecked automobile.

The Patient's Crutch

The automobile crutch is illustrated in Fig. 5. The body, or main part of the motor crutch, B, is made up of three planks side by side, these planks are bored through at the bottom and fitted with roller bearings and sleeves, as shown at K. Most any sort of roller bearing will do, for it is not necessary to have a tight fit; most any second-hand bearing will answer the purpose just as well as a new one. The heavy pipe or iron tube is slipped through the bearing and upon it are mounted the two iron wheels F. These iron wheels are held in place by nuts M and cotter pins O. The bearings are retained by a flange, J. As a towing bar a piece of strap iron, E, is used; this strap iron is given a half twist at H, and when in place, is fastened to the back of the motor ambulance, or sometimes to the car itself.

Three holes shown at G are fitted with bolts so that the length of E may be altered to fit the occasion. To fasten the crutch in place two U-shaped bolts, C, are placed on top of the device. In Fig. 5 is shown a cross section of the "patient's" axle, A. D shows the iron strap used in connection with the U-shaped bolts to hold the axle tightly in the crutch.

For a complete equipment two "crutches" should be carried together with plenty of strong rope or cable. The small ordinary repair tools are carried in the compartments F, G, H and J, shown in Fig. 1; the larger tools together with the "crutches" and portable derrick in the compartment L, while the compartment K is fitted

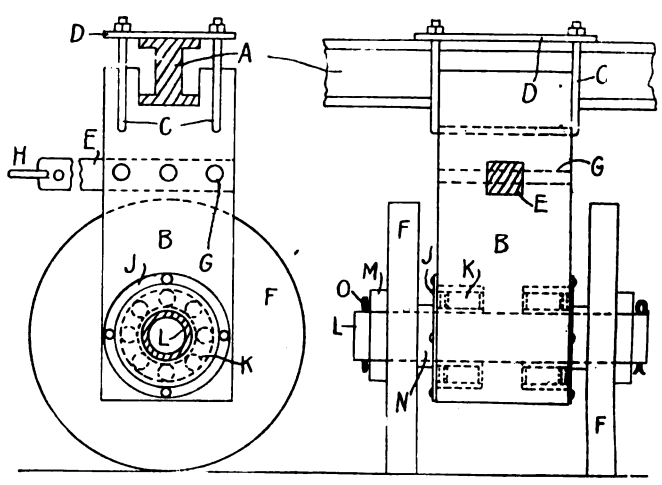


Fig. 5—Details of the Crutch.

with a gasoline tank large enough to take five gallons of fuel.

Of course there is no need for me to describe the regular equipment of small tools carried. There is one point which should be mentioned, however. Hagan never allowed anyone of his mechanics to "borrow" any of the tools from the ambulance, and he adhered to the rule himself. He realized that he owed his business to his reputation for quick service and he let nothing interfere with this reputation. A new helper or green mechanic might have taken a wrench or hammer from the ambulance once—but never twice. Then penalty for breaking the rule was instant dismissal. Hagan paid his men a good salary, was fair and honest, and men liked to work for him.

Hagan was sympathetic with his customers and I think much of his reputation was due to the fact that he was so anxious to help and prescribe for his "patients." Like a surgeon or doctor he seemed to take pleasure in doing good and repairing wrecked cars.

Our readers will recall that the reverse gear position of a Dodge car is in the same location as the second speed position of the change gear leaver of the Hudson. The driver had hurriedly changed his gears one day and backed the car over a ten foot wall. Luckily the driver escaped but the car was a total wreck.

It had landed upon its rear wheels and had turned completely over. I reached the scene about ten minutes after Hagan and found him literally with tears in his eyes. "And to think," said he, "an hour ago that was a new machine, now it's nothing but junk." Hagan did his best but the machine never regained its health again.

One-Man Power Barrows

A Few Ideas Which the Smith Should Be Able to Turn Into Money

By F. L. ALLEN

IT IS an undisputed fact that Nature is the wisest designer. As one notices her handiwork one is impressed by the scientific foundation of design. Note the trees, which often contain many tons of fruit, leaves and branches, subjected to high winds or river inundations. These trees carry enormous weights in proportion to their trunk area, yet stand for many years

One could quote such facts for many pages, yet not exhaust the field. Nature's secret, if such it may be termed, lies in system and unity. Occasionally she makes mistakes, but her errors are few and far between and never so crude as those made by man.

Nature's works are all, or nearly all, symmetrical. By this I mean to say that all parts are well balanced. Investigation would show that practically every growing thing, or nearly every mineral product fits into a certain scheme.

All of us may learn much from Nature and her works, for her laws are the laws of the universe. There is just one example that illustrates best a point which I wish to make in this article, that of the tree. The branches of a tree usually grow at an angle from the trunk which causes them to slant upward. One seldom finds a right angle or downward slant, except when the branches are loaded with fruit.

In practically every case, the weight of the limbs is carried by the trunk at its center, there is no side strain. When trees are grown in the open, they are symmetrical. The weight of the limbs on one side is equal, or nearly so, to the weight of those on the other. A tree might be cut off squarely with the ground and would then balance upon its trunk. This would show that the limbs all rested upon the center of gravity of the trunk.

In carrying burdens, the European peasant follows out the same scheme by supporting the weight upon his head. When he does this, there is no side strain and he can support the maximum weight possible. A person, unused to burden carrying, supports the bundle in his arms and consequently strains every muscle in his body in order to equalize the weight. Obviously the direct support admits of a greater weight carrying capacity.

I have said this much to support my argument that the American manufacturer of wheelbarrows has heretofore ignored all of Nature's laws and has designed his barrows with ancient practices, rather than physical laws, for an up-to-date wheelbarrow is so made that the weight is only partially supported by the wheel. It is the intention of this article to show the reader not only how a barrow should be designed, but to give suggestions as to barrow and cart inovations.

A wheelbarrow or hand cart should be made in such a way that it will carry a large proportion of the load in itself and not pass it along to the person guiding it. If it will carry all of the load, then it is of much greater utility.

There is a big field for the wheelbarrow and the blacksmith is the man best equipped to develop it, for he alone knows the farmer's requirements. During the slack seasons of the year, the smith needs a side line to tide him over. Large wagons or carriages call for a considerable investment of both capital and time and the smith is not always assured of a quick turnover of his money in this line.

Requirements of the farmers vary and the smith should study his field before he starts to work. If he does this, he is assured of patronage, while if he makes only stock designs, then he meets the competition of the large manufacturers.

Before constructing the cart or barrow, the smith should cut a model from heavy cardboard, making it to scale, and see if his design is correct. If, when the handles are lifted to the carrying height, the load comes over the center of the wheel, or ahead of it, the design is excellent.

If the weight falls back of the wheel center, a portion of it must be supported by the person guiding it. The nearer the load is to the center, the better the design of the barrow as regards the amount of material that can be carried.

The artist has made six suggestions for barrows and hand carts and in every case the above rules have been kept in mind. The barrow shown at B, in the sketch, is fitted with extra long handles, and when filled with dirt or crushed stone and lifted to the carrying position, only about one-third of the weight is carried by the worker.

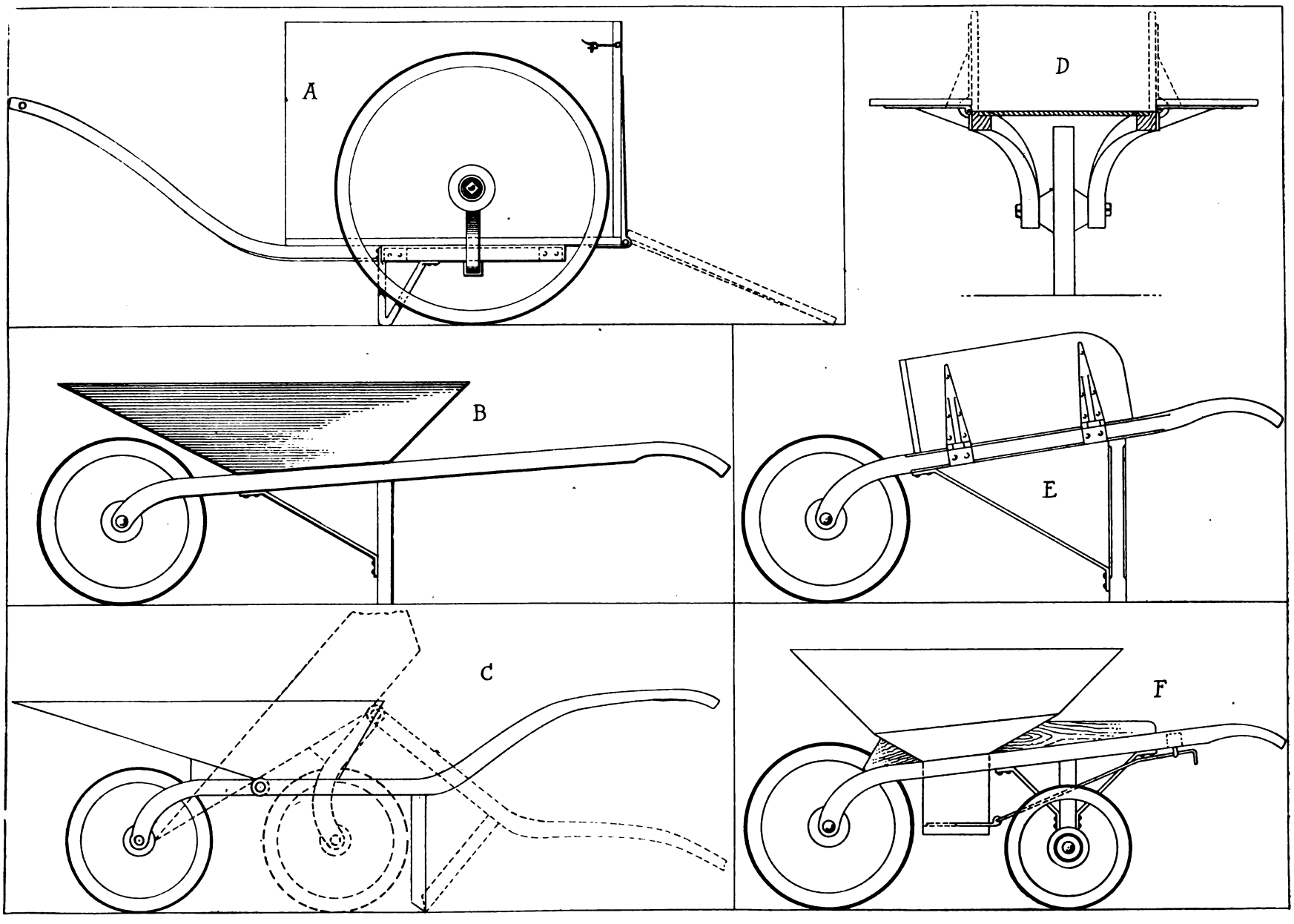
The design shown at C is worthy of consideration for this type of barrow can be used for carrying materials such as concrete or lime and the contents dumped, with practically no effort, at any place desired. The operator simply puts his weight upon the handles and the load dumps itself. While the load is being carried, the weight is practically over the center of the wheel.

Both D and E are of the same construction in that the side boards, instead of being removable, are mounted on hinges in such a way that when they are open a wide flat platform is formed. The difference between the two, is the body mounting. D is mounted practically over the center of the wheel, while E is farther back, on the handles.

At this point, perhaps it is well to consider another phase of construction. We have found that it is advisable to carry the load as near the center of the wheel as possible, but this means that the load must be elevated above the outer rim. If the load is a high one, then there is danger that the whole device will tip over easily for it will be "top heavy."

This is just where it is well for the smith to know his field. If the farmer wishes a barrow for carting fence posts or similar things, then he can safely design it with the body over the wheel as shown at D. If however the purchaser, a florist and landscape gardner for instance, wishes to use the barrow for moving shrubs and trees, then D would not be practical and E would answer the purpose.

Oftentimes a hand cart is of greater utility than a wheel barrow. The one shown in sketch F has a variety of uses, spreading lime or fertilizer, for instance, or it may be used for carting cement and gravel. With a little change in



design the body of this cart may be fitted with a special let-off attachment in place of the sliding gate at the bottom, then it can be used for planting potatoes or even corn.

Personally, I can see no reason why the smith cannot design special planting attachments of this sort. A corn planter for instance would be an easy attachment to make for the barrow shown in sketch F.

In making such an attachment, the lower gate might be punched with three or four small holes and in such a way that the holes would register with the same number of holes in the bottom of the chute. Corn would then fall into the holes but could not fall to the ground because of a second partition below the gate.

The lower partition would extend far enough back so as to cover the holes, but as the gate is pulled backward it would cover the top holes and the corn would then drop from the holes in the gate to the ground. The size and number of holes would determine the number of kernels which would be delivered.

For general all-around farm work, the cart shown at F is doubtless the most practical for it can be used to advantage throughout the year. Just how useful the device can be made, depends entirely upon the ingenuity of the smith who may make several accessories for it depending upon the demands of the farmer.

The cart shown at A can be made for less money than that shown at F, but in its way has just as large a field for usefulness. The road clearance of A need only be from ten to twelve inches for it will be used mostly for carrying milk cans or similar things from the barn to the milk room or house or between barns.

The smith should fit the cart with a large roomy box but bolt the box to the frame in such a way that it can be removed at a moment's notice. The frame is triangular in shape and fitted with a single leg at the front. The axle should be "underslung" as shown for by this means the center of gravity is lowered and it will not tip over, even if the load happens to be tall and heavy at the top.

With the box removed, the frame can be used for carting barrels or kegs. If the frame is provided with a floor, then it can be used for moving rocks and stumps.

A so called "custom built" wheelbarrow or hand cart is worth more money to the farmer than a stock design. The smith or wheelwright will find that he can pick up considerable money in this line for he can give the farmer just what is wanted. He makes the device to fit the wants of his customer and what is more, the device fits the customer himself as regards handle lengths and height of legs.

In closing, let me remark that the smith should understand that his product should fall out of the wheelbarrow or hand cart class and become a "general utility device" practical for hundreds of uses, rather than limited to just one or two.

HEARD AT THE C. B. N. A. CONVENTION

Mr. Charles E. Adams, of the Cleveland Hardware Co. of Cleveland, Ohio, is a modest man. He made a very interesting address regarding the steel situation at the meeting of the C. B. N. A., and prefaced his remarks by a story which will surely bear reepating.

He drew attention to the fact that the president, in introducing him, had said some good things about him, and went on, "The remains of a deceased brother were in an open coffin up in the front part of the church, and the minister was preaching a sermon about him; saying all those fine things that they always tell about a man after he is gone—what a wonderful man he had been in the community, how he was at the head of every great philanthropic undertaking in the town; he was this and he was that—in fact, he was the great man in the town in every way.

"While the minister was extolling the many virtues of the deceased, there was a gentleman away in the back part of the church who quietly got up out of his pew, silently tip-toed up front, gazed searchingly in the casket and then tiptoed back and sat down. Some one sitting next to him whispered, 'What did you do that for?' He said: 'Well you know I thought they were burying the wrong man!'"

Now here's where Mr. Adams' modesty comes in for he continued. "And I have been wondering whether that was not my case, because I confess to you that I think I will have a pretty big job justifying what Mr. Ahlbrand (the president) says I have done for you in years gone by."

From Wagons to Trailers

By JAMES F. HOBART

IN THE wilderness, when a body of men or horses is making its approach, a listener, at a considerable distance, may detect them by placing his ear to the ground. The blacksmith of to-day is in the position of the man who is being approached and like that man, it is up to the smith to listen well, and then act.

The smith who listens, will be informed that the motor truck is cutting into the horse-work which has heretofore been his livelihood. If he heeds he will find that it is right "up to" him, to turn around and make something out of the trucks which are replacing the horses to such an extent.

Sometime ago, the writer saw a fine example of how a smith got in his work in this direction. The smith was employed by a lumber company to do the shoeing, wagon repairing and similar work. One day, the company placed an auto truck upon the grounds on trial. Later, several trucks were purchased and nearly all the horses sold.

The blacksmith thought the matter all over, from every possible angle, and saw that shoeing, on that job, was gone for good for he knew from the work they were doing, that the auto trucks had come to stay. But this Smith was not narrow-minded. He considered that there should be as much work around half a-dozen motor trucks as around a score or more of horses, and time showed that the smith was right, for he is still on the job, but is doing a slightly different class of work now, and work which he figures is a good deal better than shoeing horses.

As soon as the first truck had been turned loose in the yard, the smith started in to convert the forty or fifty wagons into trailers for the auto trucks. He converted two or three of the vehicles in a very simple manner as shown by Fig 1, and the scheme worked so well that the smith kept on converting wagons into trailers and the company kept on adding motor trucks so that at the time of the writer's visit, there were but two horses left around the mill and nearly all the hauling and delivery within ten miles was done by auto trucks and trailers.

It was considered wise to so convert the wagons that they could at any time be used either as trailers or as horse-drawn vehicles. For that reason the smith could not make any radical changes in the wagons and had to be content with making additions for trailer use, said additions being of such nature that they would not interfere with using the vehicles as horse-drawn wagons as well.

The Converting Mechanism

To do this, as shown by Fig. 1, the smith added a part to each wagon, added another part to each

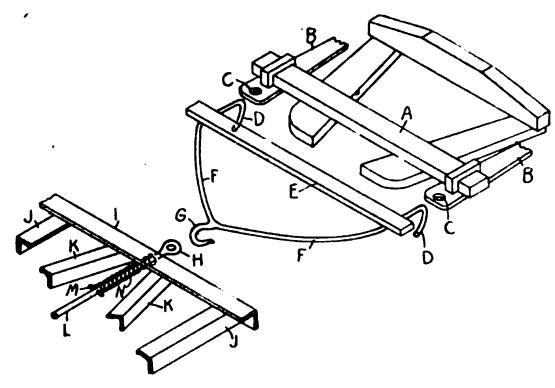


Fig. 1.

truck, and then made as many separate intermediate parts as there were trucks. When the three parts were hooked together, a wagon would be attached to a truck as a trailer. When it was desired to use a wagon with horses, the intermediate part would be detached from both wagon and from truck, the slip-pole placed again in position, with the result that the wagon was all ready for work with horses.

As shown by Fig. 1, a stout wooden bar was bolted on top of the bevel-jaws between which the slip-pole could be placed. This bar was well bolted, the fastenings not being shown in the illustration. Then a couple of stout eyes, C, C, were forged in the ends of two heavy bars, B, B, these bars being Z-bolted to bar A, also firmly attached to the forward axle of the wagon by connections not shown. These parts completed the work as far as the wagons were concerned, the bar A and irons B B and C C, remaining permanently attached to each wagon converted for trailer purposes.

An Intermediate Attachment

The smith then rigged up the apparatus shown at G, the two stout hooks D, D, being spaced at exactly the right distance apart so that they would easily enter holes C C. The spreader, E, was added to secure proper alignment of holes C C and hooks D D, and was securely bolted to the hook bar by means not shown in the illustration. The ends F F of the bars were brought together, welded, and formed into the stout hook G, which was so formed that when connected with the wagon, hook G would lie exactly central with holes C C.

This constitutes the intermediate piece, which was forged from 1 and ¼ inch round iron in bars F F, but the hooks D D were upset until they were about 1 and ½ inch in diameter, and hook G was formed from a 2 inch piece which was welded to the bars F F.

The attachment which was placed upon the truck, consists of the 3-inch angle bar I,

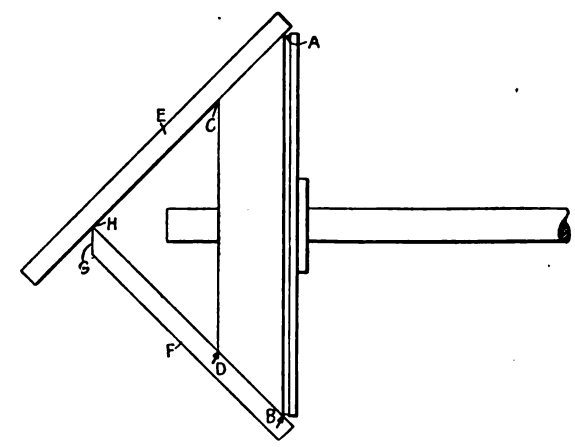


Fig. 2.

through which was placed the I-bolt H, about 1 and ½ inch in diameter, the shank of the bolt L, being slipped into a heavy coiled spring N. After a bit of experimenting, the smith found that this spring should be wound from ½ inch steel, as small as would pass over shank L, and about 14 inches of the spring allowed about the right "give" or "resilience" as an engineer would call it. The ⅝ inch pin M, served to fasten the eye-bolt in the spring.

The manner in which angle bar I was fastened to the rear of the truck, is not shown in the illustration; the smith simply rivited on four angles as shown at J J, K K, and thus made bar I fast to the rear of the truck where said bar remained all the time, no matter whether the truck was hauling a trailer or was carrying only a body load.

First Attachment Too Light

The first attachment, or rather "connection" which the smith made, as represented by E G, he formed from too light material, using only one inch black steel for the bars F F, and making the hooks D D the same size, while hook G was made 1¼ inch. This connector did not stand the strains of use for a very long time; the bars F F straightened out, the hooks were pulled out of shape and gave trouble by unhooking whenever a heavy pull came upon them. After the smith had made up some connectors from the heavier steel, as described above, no more trouble was experienced from the vehicles pulling apart under load.

But one thing the smith had to learn from experience, and that was, to so shape hook G that it could in no possible manner jump out of hole H when the vehicles passed over rough places in road or yard. The smith was troubled a bit in this manner but finally overcame the trouble by making hook G with a long and peculiarly curved "tail" to the hook. It was forged in such a manner that hooks D D must be allowed almost to the ground in order to make hook G enter hole H.

Then that hook could never jump out because of its being unable to swing near enough to the ground while hooks D D were fast to the trailer.

In like manner, the smith found it necessary to make hooks D D long and curved to a radius measured from G. Then, hooks D D could be readily raised after G had been put into H, and hooks D D would fall readily into holes C C, the radius curvature permitting several inches of hook length, so that there would be no danger of these hooks jumping out of their holes during a pull.

Another advantage was gained by the form of connector used, although the smith did not realize the fact until sometime afterwards. He then found that the connection had a three-point bearing in the three hooks D D G, thereby permitting unlimited side and vertical movement of both truck and trailer, and any amount of twisting movement between the two vehicles. He further discovered that, while the trailer thus connected did not "track" exactly with the motor truck, it *did* track closely enough to permit all yard and road movements ever found necessary.

A "Pick-Up" Motor Truck

The smith above noted was working in a saw mill located in one of the southern states, where they cut lumber by the million feet. As the boards and other stuff came from the sorting table, it was pushed by negroes upon the wagons described above and when a wagon had been filled, one of the trucks would hitch to the wagon

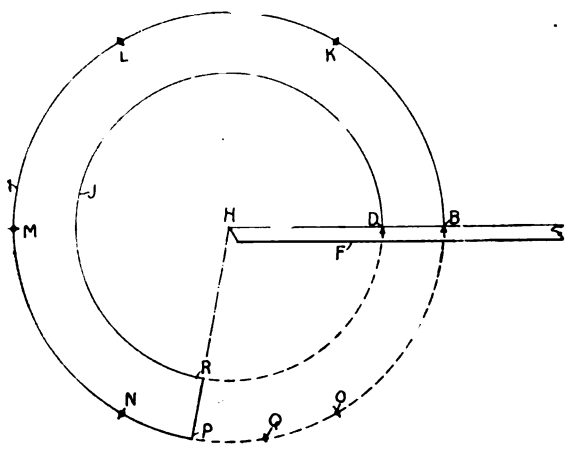


Fig. 3.

and haul it to the yard or to a loading track where the wagon would be unloaded in due time by one of the yard gangs, either directly upon a railroad car, or to be "stuck-out" upon one of the yard piles. This short description shows why the smith had forty or fifty wagons to care for. It required a considerable number of vehicles to have a dozen or more standing at the sorting table all of the time, with as many more standing in the yard or at railroad loading tracks, and several more wagons being drawn to and from the loading table.

An "Up-Stairs" Motor Truck

One day the management tried out a very queer looking vehicle and later, handed it over to the smith to be kept in good order. As the smith once described the queer contraption, it was "A motor truck, built up-stairs with an elevator just inside of each of its four wheels." The "works" of that motor truck were located about five feet from the ground, leaving a vacant space between the wheels of the truck, and under its "up-stairs" body.

The above described contraption was found to do the work of three or four motor trucks and about a score of wagons. The manner of its working was as follows:

A little foundation was prepared at each place along the sorting table where lumber was to be pushed off for the wagons. Upon this foundation —two foundations really, about ten feet apart, —were placed scantlings, one on each foundation and so placed as to overhang the end of each foundation.

Then the lumber was piled carefully and smoothly upon the two scantlings until 1000 to 1500 feet had been arranged thereupon. When the driver of the "up-stairs motor truck" saw a pile of boards on one of the little foundations, he would square off his truck at the pile and run the truck back over the pile of boards and stop exactly with the foot of each of the four elevators directly underneath an end of the two scantlings. Then, power would be turned into the four elevators, the pile of boards lifted, and away would go the truck, pile of boards and all, to lower the lumber close beside a piling foundation, or beside a railroad car as required. The smith found this "beast" a very interesting machine to take care of and he mentioned that he had "rather do that kind of work than to shoe horses and mules."

Cutting Cone Leathers

While the writer was talking with this smith, the latter was busy laying out and cutting a new leather face for a cone clutch. The manner in which he laid out the proper shape for the leather was so very simple that I sketched it while the smith wasn't looking—wouldn't have cared if he had been looking, only I find it sort of worries some men to draw pictures of the work they are doing. So I sketched it "on the sly" and here it is in Fig 2.

After stripping the cone, the smith mounted up two little strips of wood, tested them with his eye to see that they were straight, then placed the sticks against the face of the cone as shown at E and F, Fig. 2. He made sure that the sticks were exactly opposite each other upon the cone, then he brought stick F to exactly touch E at H. The end of stick F had been bevelled as shown at G in order that the "heel" of F might not touch before the "toe" came in contact with stick E.

After he made sure that stick F was in proper position, it was held securely against the face of the cone, stick E was released and two pencil marks made on stick F, as shown at B and D respectively. This completed the measuring, and the lengths H D and H B, were all that the smith required.

Laying Out the Facing

The stick F was laid flat on the bench, a pair of dividers opened until one leg touched point H, the other leg, point B, then a circle was described as shown by Fig. 3, at B I. Then the dividers were partly closed and another circle drawn with the distance H D as radius. This circle is shown by D J, and the space between these two circles contained the width of facing required for the cone.

But one thing remained to be determined, and that was the length of the facing. It is evident that the entire circle, or the area between the two circles would not be required. The smith determined the length required in a pretty "slick" manner. He measured the diameter of the clutch cone, A B, Fig. 2, and found it to be almost exactly 13 inches. Then he measured the diameter of the facing circle, Fig. 3, and found it to be almost 18 inches from B to I. The smith then figured the diameter of the cone is 13 and the diameter of the lay-out is 18. "Therefore I want 13/18ths of the length of that circle for the cone facing."

He might have calculated the circumference of both, and laid off a number of degrees on circle B I to correspond with 13/18ths thereof, but the smith lost no time in that direction. He simply set the dividers back to radius H B, then stepped around the larger circle, making marks at K, L, M and O. The smith knew that this divided the circle into six equal parts, and if he took four of these parts around from B to N. he would have 12/18ths of the circle's circumference. But he wanted 13/18ths, so he divided space N O into three equal parts as at P Q. He added one of these spaces, then from point P, he drew a line P R, straight toward center H, and the area P R, I J, B D, was the pattern of the facing required for the 13-inch cone shown by Fig. 2. That smith sure was a "slick" duck.

A HORSE THAT INTERFERES

From H. L. Berry, Kansas.—I want to take advantage of your question department and obtain advice from some of my brother readers. I often have to shoe a horse that interferes on his front feet.

This horse stands just a little toeing out on his front feet. He hits his ankles on the front feet. His hoofs are in good condition and seem to be natural and level. I have shod him many different ways but with no good results.

I always shoe the horse with toe and heeled shoes. I shod him first with light shoes; then with heavy ones; then with the inside heel of the shoe turned to the inside; then with the inside of the hoof pared lower than the outside; next with a three-quarter shoe on the inside; then with a shoe which angled the toe from the outside to the inside of the shoe; yet none of the methods gave any satisfaction, he kept cutting his ankles.

The horse belongs to a rural letter carrier and travels about 26 miles each day. The roads are both dirt and paved and the horse goes over about an equal distance on each kind.

Will some one of my brother readers tell me how to shoe this horse with toed and heeled shoes, so that he will not interefere? I would also like to know how the horse may be shod with flat shoes to keep him from cutting the ankles of his front feet.

CAR OR WAGON LIFT

From E. C. Hall, New Jersey.—I am giving you ideas for an automobile or wagon lift or jack which may be of interest to the other readers. It is of simple construction and quick acting. It is made from a piece of timber three by eight inches and of such length that when it is placed under the axle of the car, the wheel will just clear the ground. The block is shown in place in figure one.

At the back of each block should be cut a bevel as shown at D. Where these blocks are to be used around the shop, two of them should be provided, one for each front wheel and they may be joined together by a cross piece F.

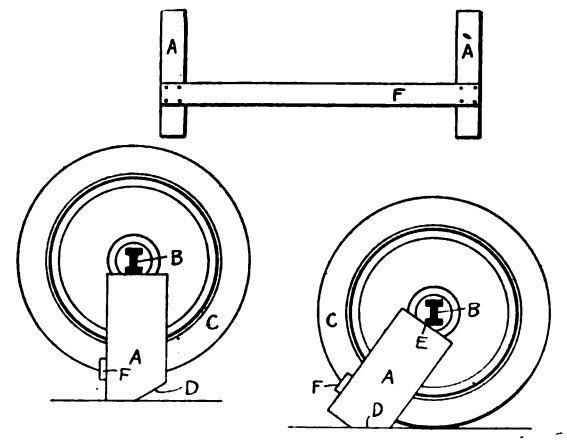


Fig. 1.

Figure one shows how they are put into place beneath the axle so that when the car is pushed forward it will rock over the bevel and when the blocks are on end the car will be supported froee from the ground.

The distance between the blocks should be about 18 inches, then they can be placed beneath the axle between the springs. Figure2 shows a handy support for the rear axle. This block is about ten inches wide and six inches thick. Two of these blocks are used for the rear of the car in the same manner as the block shown in figure 1. They can be fastened together, or better still, a board B can be placed beneath the notch cut in the top, where there is a differential in the car, the board B must be cut out slightly to meet the bulge in the axle.

In order to put the car in place, it is necessary to have some sort of a level such as is shown at C. If the handle is long enough and the lift designed correctly, it is an easy matter to remove the car from the ground with it. When all of the blocks are to be used and the whole car is to be raised from the ground, the front lift is put in front of the car as shown in figure 1 and the car is then pushed forward until the front of it is off the ground, then the blocks shown in figure

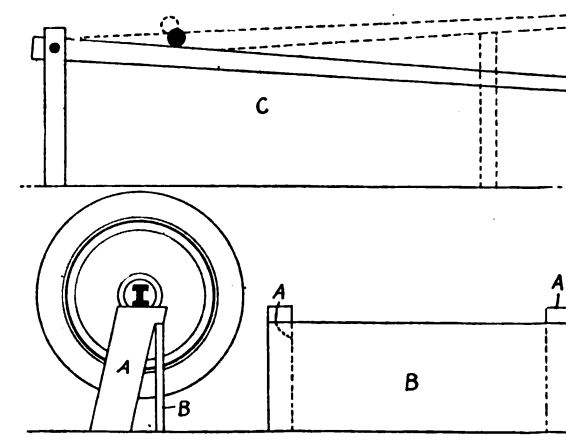


Fig. 2.

2 are put in place, and the rear lifted by means of the lever C.

The back support B prevents the car from slipping backward from the blocks. In order to remove the car from the mounts, all that is necessary is to remove the brace B and give the car a push backward.

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OUR EDITOR'S LETTER

I WISH I could impress all of you with the fact that it is a difficult matter to compile this magazine in such a way as to interest all of the readers. As you look it over, you undoubtedly feel that some of the articles do not interest the trade. You also wish to find material in it of a certain nature, but never do, simply because I do not appreciate your wants.

The value of any magazine depends upon the understanding of the editor who tries to put himself in the place of the reader so as to anticipate the wishes of the subscriber. The editor may be particularly interested in welding or wagon building, therefore he will be very apt to publish articles covering these subjects.

It is impossible for one man to know trade conditions in every part of the country, therefore it follows that one man cannot know the wants of all the smiths, particularly when this class of workmen do such a great variety of work.

The value of this magazine to you depends upon your co-operation. If you want a particular kind of article, write us a letter and you may rest assured that we will do our level best to give you what you ask for.

There is one thing that you must realize. As soon as you pay your subscription money, you are entitled to just as much consideration as any other reader, therefore do not hesitate to make your wants known.

Our readers are our friends and as editor, I feel that you also hold a friendly feeling for me. I want to keep you satisfied so that you will help me make more friends, therefore I will do all in my power to favor you.

THE PRINTING SITUATION

DESPITE the fact that we are able to print our magazine this month, our work is done under rather trying conditions. We have been forced to print this number out of New York City, away from our home office.

For this reason we have not been able to keep everything to its special place. We have been forced to eliminate departments and to use text matter most convenient.

Our December number will be printed in the usual style and carry its regular departments, however, and what is more it will be mailed shortly after the first of the month.

Printing conditions in New York are just the same as they were when we published our October, Mimeograph number. The fight still is on between the unions. Fortunately the International Union is on our side and are giving us their whole-hearted support.

It is to the International Union men that we give our hearty thanks. We feel that they are to be congratulated upon their stand.

This magazine is being printed by loyal International Union men who are true Americans, strong in their stand for right and against the radical elements which are tending to destory all business.

The International Union still stands for honest dealings; for binding contracts between employer and employee. This is our stand, as well.

Practical Horse Shoeing

How the Build and Stride of the Horse Affects the Hoofs and the Wear of the Shoes

THE wear of the hoof is occasioned principally by a relative movement between it and the shoe. If the shoe were an absolutely tight fixture, substantially a part of the hoof, there would be no wear and tear to amount to anything. But, at the inner and outer quarters, there is a degree of movement between horn and the shoe. The effect is to wear away the hoof at these points and to polish the shoe at the ends of its branches.

There should be no bright places on the upper surface of the fore part of the shoe. Such bright places are to be understood as indications of loose nails. The wear of the hoof at the quarters and the polished condition of the corresponding locations of the shoe are normal and to be expected.

The hoof wears, ordinarily, a little more upon the inside quarter than upon the outside quarter. If the horse has base-wide feet, this difference in wear may be accentuated. The wear of the hoof at the quarters may be very trifling. At the most, it will not usually be more than, say, one-quarter of an inch. The effect of the wearing away of the quarters has the tendency to loosen the nails at these locations. This is apt to occur more especially with the fore feet than with the hind feet.

Wear of the Shoe

The wear and tear of the shoe naturally occurs more underneath than on top. It is caused not so much by the mere weight of the horse or by direct flat blows of the shoe upon the ground, but by scraping movements as the shoe strikes the ground and as it leaves it. The wear caused by the sliding blow when the shoe strikes is called *grounding wear;* that which is brought about by the scrape or slide as the shoe leaves the ground is termed *swinging off wear*. For a normal horse, acting normally, the two kinds of wear are pretty much alike. There is always swinging off wear at the toe. The length of the stride affects the wear. Thus, there is apt to be rapid wear of both kinds at the toe when the stride is shortened. Such shortening of the step may occur when a horse prances, is engaged in drawing a heavy load, or the like.

The horse-shoer should seek to shoe a given horse from time to time so that the wear will be as evenly distributed as possible. When he has found a good solution to this problem, it will perhaps be possible to lighten the weight of the shoe. Since he does not need to put on a heavy shoe in order to make sure of enough metal at all points, he has the privilege of conferring a benefit on the horse and his owner.

It is claimed that the nearer any part of the shoe is to the center of the hoof the greater will be the wear at that point. The toe, one of the quarters, or one of the heels may be relatively near to the center and in consequence suffer more than it should. Tere is the horse-shoer's opportunity to shape the shoe so as to give the part where unusual wear has been occurring a position somewhat further from the center. If a shoe is poorly formed, for example; made too long or too short at the toe—there will be apt to be parts disadvantageously situated with reference to the center. Unequal wear will probably result.

An uneven tread of the horse will naturally cause unequal wear on the shoe. His uneveness of tread may also be caused by faulty shoeing. Thus, the dressing of the horny wall preparatory to placing the shoe may leave one part too high or too low. This is apt to make the horse place his foot wrongly and thus lead to unequal wear. Naturally a horse whose legs are on wrong, may be expected to step unevenly and so to promote uneven wear.

When any very marked uneveness of wear of an abnormal kind occurs, the thing to do is to look for the cause. If the horse has properly set and formed legs and feet; if he steps as he should and has no disease, then it will be well to consider the shoeing. The form of the shoe may be wrong. It may be put on wrong or carelessly secured. The tread of the horny wall may have been wrongly dressed.

Shoeing is a Compromise

Shoeing is done largely to prevent the excessive wear and tear of the bearing edge of the hoof on the hard roads and pavements of civilized regions. It does this service almost perfectly, the only wear permited in a properly shod hoof being at the quarters. But this advantage is not secured without some loss. This perhaps needs explanation.

Evidently a hoof in action is alternately subjected to load and relieved of load. This alteration of pressure and no pressure sets up certain movements within the hoof. These result in transient changes in the hoof form, repeated with every step. Thus, as the fetlock joint reaches its lowest point and the maximum pressure comes on the foot, this pressure acts through the coronary joint. This joint, it may be remembered, is formed by the lower end of the coronary bone as the uper part of the joint and by the coffin bone and the navicular bone as the lower part of this joint. The pressure is distributed through the sensitive laminae and horny laminae to the horny wall. In fact, it is understood that the coffin bone under the pressure sinks down and back, the navicular bone accompanying it.

This, with one or more other pressures, results in several things (1) The horny wall is spread at the quarters; (2) the fore part of the hoof, at the coronary joint, is narrowed; (3) the hoof loses something in height; (4), the sole sinks and flattens. It is understood that such movements tend to absorb shock. This is, naturally, of very great importance. Further, the whole limb benefits from the elastic action of the hoof and interior parts, and the circulation of blood is promoted. The shoe doubtless tends to restrain some or all of these, and may thus be viewed as having disadvantages. However, the shoe is a modern necessity. View it as a compromise, if you will. It is still necessary to have it. The thing to bear in mind is the advisability of avoiding everything in shaping, fitting and securing that will add to the necessary evils.

Examing the Horse

When a horse is brought to the horse-shoer to be shod, the smith will do well to seize the opportunity and make practical use of some of the information set forth in preceding articles. For example, he may now ascertain whether the horse's limbs are set normal to his body, whether his feet are normal, how he throws his feet and places his hoofs, etc.

Thus, if his helper leads the horse from him in a straight line on a level surface, turns him and brings him back along the same path, the horse-shoer will have opportunity to note several things.

(1) As the horse walks away, he may note the direction of the hind legs relatively to the body; (2) how the hoof comes to ground and takes off from the ground; (3) how the hind feet are thrown when passing from resting point to resting point.

Similarly, when the horse approaches, he may note the same or similar matters relative to the forelegs. A trot may also be employed in the same way as the walk, and will sometimes settle some point as to which the horse-shoer is in doubt when the animal merely walks. The foot-prints may also be examined to determine or confirm whether the horse uses his feet normally or abnormaly. They should show whether he toes in or toes out or whether the hoofs continually point straight ahead.

With the horse standing quietly, the horse-shoer steps squarely in front and notes precisely the direction of the axis of the foot from the fetlock joint down. The shape of the hoof may now be noted as to whether its appearance is normal. The foot and hoof are now examined, (1) to determine whether the foot-axis is exactly parallel to the front line of the hoof; (2) whether the lines of the hoof from the coronary joint down to the tread of the hoof are straight; (3) whether the foot-axis or the front line of the foot makes an angle of 45 or 50 degrees with the ground. It may now be noted whether the hoof has rings, and if so their character. The front line of the hoof may be compared with the heel lines to see if they are all parallel. All this may be observed from the front and rear, espcially if the horse-shoer uses a short piece of wood as a straight-edge. A view from the side is taken to confirm certain front and rear observations.

The foot is lifted and examined on the bottom. The character and condition of the horny sole and horny frog are noted. Thus, the horn may be rough and flaky. The side grooves of the frog are inspected, as their depth gives an indication of the thickness of the sole. Any cracks or abnormal cavities are to be noted.

The horse-shoer may next examine the old shoe and the manner in which it is set and secured. Its shape and the manner in which wear has affected it are important points. The number of nails and their locations are items that may tell some story.

FINAL PRIZE PHOTOS

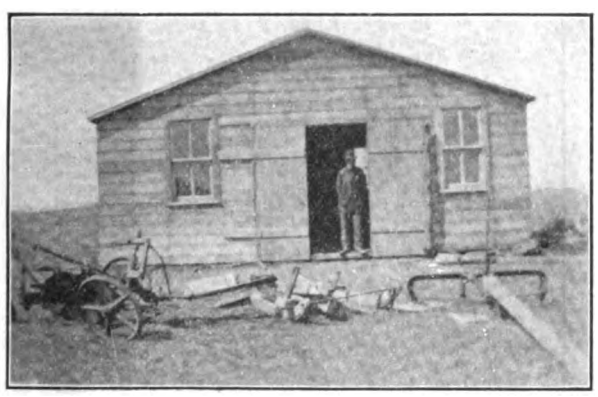
WELL, this is the last of the Prize Photograph contest and next month we will announce the winners. We are sorry that the smiths do not like to write letters, few of them do but these few are always interesting.

Mr. Burnap's photograph came to us with nothing but his address on it. We should think that he would have a lot to say, but judging from the size of his shop and the apparent amount of work before it, he probably has not had much time for letter writing.

Mr. Dickson's remarks were few and we don't blame him. If he averages to keep nine horses ready for shoeing we can see where he can work steadily without wasting time talking abotu it.

A PHOTO FROM MONTANA

From R. R. Tichenor, Montana.— I am sending you a small photograph of my shop which I want to enter in the prize photo contest. This shop has grown steadily although it is way out on the prairie in northern Montana.



Mr. Tichenor's Shop.

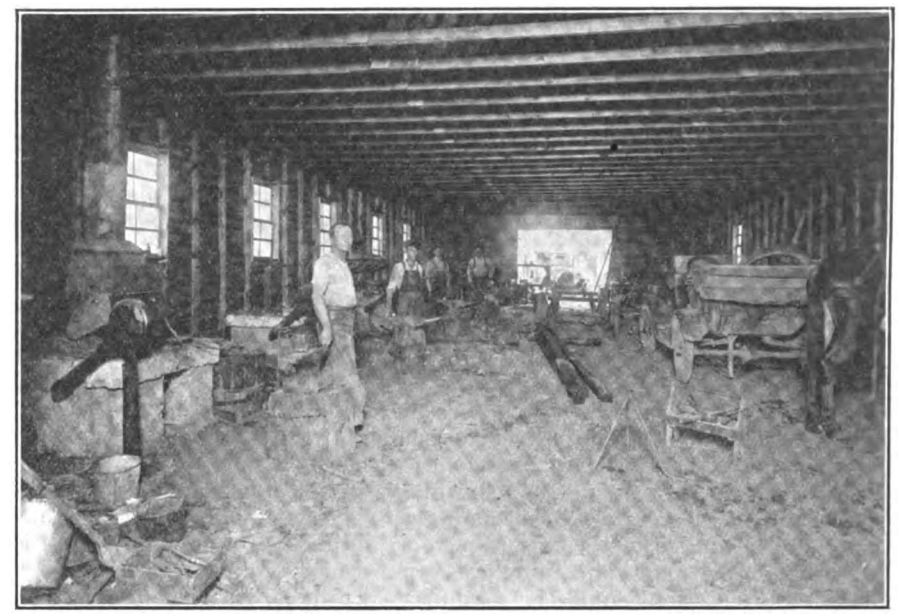
The shop is 24 by 32 feet and has eight foot posts. There are eight windows in the shop; three of them are double windows, so you can see that I have plenty of light. I have a good outfit for hand work, but haven't got any kind of power yet. I shall probably put in some power tools in the Spring as I have more work than I can do by hand.

I have to freight all my goods to the railroad (70 miles away) but prices are good and there's plenty of work as the nearest shop is five miles away. I also get quite a lot of trade from Canada for I am within three miles of the border.

Albert Dickson of South Africa says: "This is a photo of my shop. It is not as dark inside as the picture indicates. The shop is 50 by 22 feet and has six windows. My picture is indicated by the cross. We do shoeing only."

Below and to the right is the picture of W. R. Clepper's shop, located in Texas. Mr. Clepper writes as follows: "In the enclosed picture of my shop, two of my helpers do not appear, nor does the picture show all of the shop for there were four horses in it when the picture was taken.

We do all kinds of work, shoeing and general blacksmithing. We are located in one of the biggest oil fields in the world and work for the best people in the world too. We seldom have anyone complain of our work and my policy is to do the work right even though it takes more time. I have found that this is the kind of treatment that people like. The price does not matter if the work is well done.

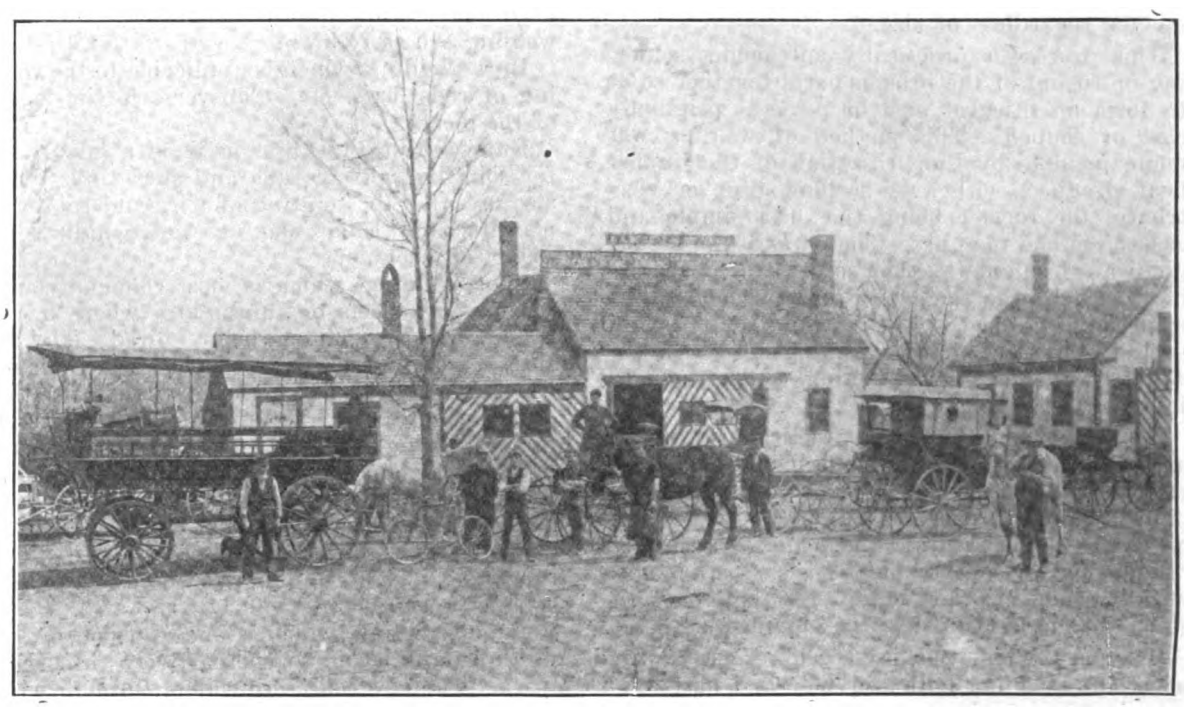


I have been in the business for 15 years, have been working in this place for nine years and own the shop.

I have been a reader of the Blacksmith and Wheelwright for 15 years and think it is a great helper. I have received much profitable information from it.

I will give you some of my prices and wish that the smiths could be more closely combined so as to make personal interests more general and for the good of all. These are some of the prices which I charge for work. Horse shoeing number 2 or under, plain, $2.50; 3 and 4, plain, $3; 5 and 6, plain, $3.50; 7 and 8, plain, $4.50; toeing all sizes, $1; wagon axles, $8 to $10; wagon tongues $7 to $9; wagon reaches, $3 to $10. Spokes, 75 cents; felloes, $1 each. Setting tires, narrow, cold, $1; hot, $2; wide tires from $2 to $5, according to size. I charge $1.75 per hour for labor; $2 per hour for forging, material of course is charged in the bill as extra. I pay my helpers from $8 to $15 per day and do from $100 to $150 worth of business daily.

Referring to the picture, the man at the front anvil is Charley Johnson; at the second one, Will Jorden; and the third my second son; and I am the fourth. One brother and my eldest son, who work for me, do not show in the picture.



Arthur A. Burnap's Shop, Located in New Hampshire Looks Like a Busy Place.

Various Welding Methods

Welding Presents Many Money-Making Opportunities for the Progressive Blacksmith

CONSIDERING the great chances for profit in welding work, it seems odd that so few blacksmiths have taken up this line as a means for expanding the scope of their field and greatly increasing their earnings. Probably their reluctance to become interested is due to the fact that they have only given the subject light consideration thinking that it involves too complicated a process and requires too much extra equipment to prove attractive.

Welding, the fundamental principles of which every blacksmith thoroughly understands, is very simple and when practiced successfully requires painstaking effort and quite a little thought. The demand for such work exists in every community regardless of size, as farmers, factories, railroads, mills and practically all lines of manufacture have work in the welding line.

The fact that the demand for such work in small communities has not been active, is in most cases due to the impression that such work is not done by the blacksmith, consequently the man with a broken machine part or other piece, which could be made good as new by welding, sends off for a replacement part that costs him many times the outlay that would have been expended in repairing the part satisfactorily by the welding process.

Many instances can be cited wherein hundreds of dollars have been saved by users of machinery through the welding of parts that otherwise would have to be replaced at high cost for new parts. When it is known that broken parts can be welded and become as good as new for use, the customer desiring such work done, is ready to pay a very good price for the work as he has no other alternative and often is willing to pay from 50 to 75 per cent. of the cost of the new article to have the welding done.

Welding as formerly done exclusively by the smithy and the only practical method up to within a few years, simply consists of heating the parts of wrought iron or steel until they become plastic under the hammer when they were welded together by force of the hammer or press. In this process the metal was protected from oxidization by the use of some flux that would fuse.

This method was crude as compared with the new methods for it was entirely dependent for success upon the skill and conscientiousness of the operator; even then a good smithy could not be certain that every weld he made was a good one. This line of work was also very limited as only simple shapes and those of comparatively small cross-section could be handled by the smith, except where he was provided with a steam hammer.

The modern process, however, enables one to place together rigidly and permanently broken parts or pieces with the same strength when repaired as the part originally possessed. The work, when done, is lighter and applicable to practically every conceiveable part whether of iron, steel, brass, bronze, aluminum or alloyed metals, regardless of size.

This process is practically autogenous soldering or fusing of the broken parts together so as to form an integral part or piece as originally cast or shaped. This method of welding was made possible by the utilization of the intense heat produced either by a blow pipe or electricity, the former being the most simple and easiest method to apply. The parts of the broken piece are brought together so that the edges are in relatively the same position as when in the whole and the heat applied raising the temperature of the joint to the fusing point when the metal flows together forming a homogenous joint.

The flame blow pipes in practical use consist of arrangements for producing a jet of flame of regular form and size and direction it at the point where the heat is to be applied. The pipes are fitted with arrangements or means of regulating the proportions of combustible gas with air, mixing the two gases so that the most effective temperature may be obtained.

The most extensively used welding gas is oxy-acetylene meaning half acetylene and half oxygen, but in actual practice a little more oxygen than acetylene, which produces a flame with an inner core which has a temperature of 4000 degrees Fahr.

The oxygen is generally supplied in cylinders in a highly compressed form and after passing through a regulator which keeps the pressure constant, it provides the mechanical energy for mixing the gases and projecting the flame. The oxy-hydrogen blow pipe has been used for more than 100 years, but it has been used for welding on a large scale only during the past 20 years, and for about the same length of time that the oxy-acetylene method has been in use.

One of the disadvantages of oxy-hydrogen for welding is that the water vapor produced by combustion oxidizes some fused metals, particularly iron. It is necessary for this reason to use an excess of hydrogen over the proportion required for complete combustion in order to eliminate this excess oxidization. Many advocate the oxy-hydrogen blowpipe for the more fusible metals as the work may be more easily observed in the process of welding. It is superior, however, for lead burning and metal cutting.

Welding by the thermit process is particularly applicable to use on metals of an iron base, aluminum and ferric oxide, when mixed will burn or deflagrate with the formation of metallic iron and alumina. A very high temperature results from the reaction, much above the melting temperature of iron and alumina.

In using this method the parts to be fixed are joined in their proper positions and surrounded with a mold of refactory material in which the space to receive the metal coincides with the jointing line. The process is the same as the old method of "burning for repairing broken cast-iron articles by making a stream of molten cast iron flow over the joint, but the thermit metal is far hotter, attaining a temperature of 5000 degrees Fahr.

This method has been extensively employed in joining rails and for repair work of various kinds where there are no twisting or pulling strains upon the parts so fixed.

Resistance welding is a form of electric welding which is the closest approach to original smith welding. The surfaces to be united are approximately fitted, brought into close contact, and an electric current of sufficient strength is passed to bring the surfaces to welding heat. Then pressure is applied to force them into contact and force out oxide, etc., as far as possible. The heat produced by the passage of the electrical current is much greater at the contact surfaces than in the solid metal. The heat is further localized by using clamping electrodes of low resistance which hold the work as near as possible to the weld.

Owing to the rapidity of the heating and the very small amount of air between the opposed surfaces, very little oxidation can occur. The earliest resistance welding was performed on iron and steel, but it was also found that other metals could be welded together. For resistance welding a large current at a low voltage is necessary. The several methods of resistance welding are as follows:

Butt Welding, which is applicable to the welding of rods, bars, etc., transverse to the length of the pieces.

Butt welding was first used on a large scale for jointing railway rails and steel tires. It is also used for the jointing of wire and tubing in manufacture, cable making and windings of electrical machinery.

Spot Welding, which is most commonly used for uniting sheets or thin plates where a continuous weld or joint is not required. The two shees are p'aced between electrode clamps which press them together, current is then switched on, the surfaces in contact are brought up to welding heat, and the pressure is maintained after current is off until sufficient cooling occurs. The sheets are then moved on to the next spot to be welded, and the operation repeated. Work so welded is therefore united by a line of small welds and may be compared to flush riveted work.

Seam Welding, which is an extension of spot welding, applicable to compartively thin sheetwork. The electrodes are rollers through which the two sheets are passed when current is applied and the rollers revolved. The electric current heats up the sheets to welding points as they pass between the rollers, and they are thus united along the whole of the roller path. This continuous sam joint is stronger than spot welding, is fluid tight, and is comparatively rapid, as it is continuous. The surfaces to be joined must be absolutely clean, either sand blasted or pickled with acid.

A Legal Question

From J. S. Kansas:—I have eight binders standing in front of my shop, and as repair parts are hard to get, someone has take parts from some of these machines. I would like to know if I am responsible for the parts that were stolen from the binders standing in the street.

REPLY

Under the facts stated, which are very meagre, it is a question of fact for the jury to decide whether or not you are responsible for the loss of the parts. As a broad proposition of law, a man who undertakes to repair property for another, must take the same care in protecting the property as a prudent man would take of his own property.

The location of the shop, its size and the number of binders already in the shop are all factors to be considered in determining the question of liability. If there was room in the shop to store these binders awaiting repairs, I would have no hesitancy in saying that the loss of the parts must be borne by the repairman. If the shop was in a locality in which there were many people and boys, it would sem necessary to me that the repairman should employ some one to watch the binders while they were outside the shop on the street.

It is comon sense that a man cannot assume the care of another's property and give it no attention whatsoever, and practically invite the public to help themselves.

In conclusion I might add that if I were called upon to decide the matter upon the facts as stated, I would hold the repairman liable for the loss of the parts.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1919, OF The Blacksmith and Wheelwright, published monthly at New York, N. Y. for October 1, 1919.

State of New York
County of New York } ss.:

Before me, a notary public in and for the State and county aforesaid, personally appeared F. R. Whitten, who having been duly sworn according to law, deposes and says that he is the business manager of The Blacksmith and Wheelwright, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, M. T. Richardson Company, 71 Murray Street, New York City, N. Y.; Editor, M. T. Richardson, 71 Murray Street, New York City, N. Y.; Managing Editor, F. L. Avery, 71 Murray Street, New York City, N. Y.; Business Manager, M. T. Richardson, 71 Murray Street, New York City, N. Y., and F. R. Whitten, 41 Pinehurst Avenue, New York City, N. Y.

2. That the owners are: M. T. Richardson Company, 71 Murray Street, New York City, N. Y. Stockholders: M. T. Richardson, 71 Murray Street, New York City, N. Y.; A. J. Richardson, Ridgewood, N. J.; Mrs. A. Louise Giardeau, Jr., Monticello, Fla.; Mrs. Mildred Ulmer, New Rochelle, N. Y.; Mrs. H. L. Johnston, New Rochelle, N. Y.; W. F. Etherington, 341 Fifth Avenue, New York City, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

M. T. RICHARDSON CO., Publishers,
The Blacksmith and Wheelwright.
FRANK R. WHITTEN, Business Manager.

Sworn to and subscribed before me this 24th day of October, 1919.

[Seal] ROBERT F. W. SCHMIDT,
Notary Public.
(My commission expires March 30, 1921.)

The C. B. N. A. Convention at Chicago

THIS year it was the great city of Chicago that was honored in having the convention of the Carriage Builders' National Association held within its boundaries. The Forty-Seventh Annual Convention of the C. B. N. A. was held at the Hotel La Salle, Chicago Ill., on September 23, 24, and 25, 1919, and if those who are deploring the fact that the carriage building trade is on the wane, could have been there, we know they would have changed their minds.

The forty-seventh annual convention was just as interesting as those held "in the good old days" and the exhibits were in good taste, contained many innovations for the horse and buggy, and reflected the prosperity of the trade.

President Ahlbrand of Seymour, Ind. called the first meeting to order on Tuesday morning. He introduced Hon. Frederic P. Vose of the Chicago Association of Commerce, who extended to all a most hearty welcome. Mr. Vose's address was very humorous and elicited much laughteer and applause. He told of the early history of Chicago, and spoke of the various industries of the city. Mr. O. B. Bannister of Muncie, Ind. responded to the address of welcome and paid tribute to Chicago, Chicago's spirit, and Chicago's citizens.

President Ahlbrand, who spoke next, gave some very interesting statistics relating to the advance in the cost of materials which enter into the construction of buggies. His figures covered the period between 1916 and 1919. Turpentine, it appears has advanced the most, having increased 288 per cent in the three years, and so it goes down the list,—wheels, shafts, lumber, bolts, etc., so that on an average, it costs two and a half times as much to build a buggy in 1919 as it did in 1916. In closing his address, Pres. Ahlbrand spoke of the secretary and treasurer of the C. B. N. A., Mr. Henry McLear, who did not attend the convention this year.

Frank H. Delker, the New President

Mr. McLear, who has been secretary and treasurer of the organization since 1887, and has been identified with it since 1872, fell and fractured his hip last Spring, and sustained injuries from which he has not as yet entirely recoverd. The president, who read a letter from Mr. McLear, paid a spendid tribute to the absent secretary, and Mr. P. E. Ebrenz, chairman of the Executive Committee, who followed President Ahlbrand, read a telegram which had been sent to Mr. McLear urging him to be of good cheer, and regretting the fact that he could not attend the convention.

Nominations were then called for a president for the ensuing year, and Mr. Frank H Delker of Henderson, Ky. was nominated, and the nomination seconded.

The following committees were then appointed by the president:

Committee on Resolutions:
O. B. Bannister, Muncie, Ind., Chairman.
A. L. Black, Norfolk, Va.
E. E. Ebrenz, St. Louis, Mo.
A. T. Jackson, Rockford Ill.

Committee on Recommending Officers for the Ensuing Year:
W. H. Roninger, St. Louis, Mo.
W. G. Norman, Griffin, Ga
Gale B Smith, Henderson, Ky.

Committee on Exhibition:
R. S. Triplett, Owensboro, Ky.
George B. Ogan, Chicago, Ill.
James B. Faler, Columbia City, Ind.

Obituary Committee:
Homer McDaniel, Cleveland, Ohio Chairman.
J Frank Hutcheon, Cincinnati, Ohio.
R. C. Ware, Philadelphia, Pa
E. V. Overman, Cincinnati, Ohio.

On motion, the convention adjourned to 10 a. m. Wednesday.

Wednesday's Meeting.

Immediately after the opening of the meeting by the president, a report was given by the publicity committee which reiterated the fact that the horse and buggy had come back "with a vengeance" and stated that it seemed to have been the almost unanimous opinion of carriage builders that for the year 1919, each would act on his own initiative.

The Executive Committee then gave its report which was greeted by applause.

The President then introduced Mr. Homer McDaniel of Cleveland, Ohio; who spoke on "Accessory Trades." Mr. McDaniel gave some details regarding leather which were very interesting.

In the name of the Executive Committee, Mr. Theodore Luth offered a resolution recommending that Mr. Henry C. McLear be elected as an honorary member of the association for life and receive from the treasury of the association each year a sum equal to his present salary of $1,500 per year, payable in equal monthly installments, in view of the general desire of all members of the association to pay a fitting tribute to the faithfulness of the secretary.

The reading of this resolution was received with hearty

(Continued on Page 20)

applause. In seconding the motion, Mr. Homer McDaniel of Cleveland said in part:

> "I would like, Mr. President, to second that motion, and to say to your Executive Commitee that I know of no act in the thirty years that I have belonged to this Association that reflects as much credit to the soul of you as that resolution ..... Henry McLear is worthy of all we could say and all we can do——— He is the dean to-day of the American carriage-building industry, and no nicer or greater tribute could be paid him than through this action of the Association."

The Blacksmith & Wheelwright wishes to congratulate the Association upon this fine action of theirs, and can assure the members that no man is more deserving of it than Henry C. McLear. No man could give more whole-heartedly than he has given, nor could one have been more faithful.

Two amendments were proposed to the constitution and duly accepted

Mr. Charles E. Adams then delivered a very instructive address on the present steel situation.

The report of the secretary-treasurer was next read and disclosed the fact that the finances of the association were in a healthy condition.

Nominating Committee's Report

Following is a report of the members who

A. H. Ahlbrand, the Ex-President.

were offered for nomination by the Nominating Committee:

For Executive Committee:

C. R. Crawford, Moon Bros. Mfg. Co., St. Louis, Mo.
Clen Perrine, Brown Carriage Co., Cincinnati, O.
P. E. Ebrenz, Reliance Buggy Co., St. Louis, Mo.
R. S. Triplett, F. A. Ames, Co., Owensboro, Ky.
A. H. Ahlbrand, Ahlbrand Carriage Co., Seymour, Ind.

Secretary:

George W. Huston, Cincinnati, O.

For Vice-Presidents:

A. T. Jackson, Rockford, Ill.
J. A. Evans, Griffin, Ga.
John Gummer, Elkhart, Ind
W. T. Shaver, Des Moines, Iowa.
Gayle B. Smith, Henderson, Ky
C. C. Bradley, Syracuse, N. Y.
George M. Hoffman, St Louis, Mo.
N. H. Cannady, Oxford, N. C.
George Gerstenslager, Wooster, O.
August Geissel, Philadelphia, Pa
T. M. Robinson, Nashville, Tenn.
Mr. George B. Shephard of the Eberhard Mfg. Co., of Cleveland, Ohio, gave some facts concerning the saddlery trade which were received with applause.

Next in order was the election of president for the ensuing year, and Mr. Frank Delker was unanimously elected. Our best wishes and congratulations go to the new president

It was announced that the Carriage, Harness

George W. Huston, the New Secretary

and Accessory Traveling Salesmen's Association, which was in session, was holding a banquet, and members of the C. B. N. A. were asked to attend. Folowing a few more announcements, a motion to adjourn was made and seconded and the convention adjourned to September 25th.

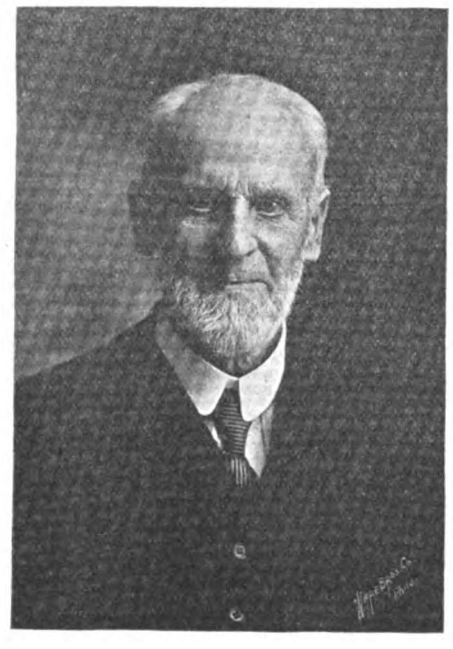
The Third Day's Meeting

After the opening of the meeting by the President, a condensed report of the Statistics Committee was given, and then Mr. John W. Gaver of St. Paul, Minn., who is connected with the Saddlery Association, spoke of the intention of his associates to start an investigation and get facts with which they might educate the public to the use of the horse drawn vehicle, particularly among users of motor trucks.

After Mr. Garver's remarks, the report of the Membership Committee was read, and the carriage builders were urged to secure members to the organization.

Mr. Walter Goodnow of Chicago, Ill., who was then heard from on the subject of "The Horse and Future Outlook" in turn introduced Mr. Walter J. Munro whose remarks were of value to those whom he addressed. He spoke of a survey which is being made by the Department of Investigation, of the Green, Fulton, Cunningham Co., with which he is associated, and the facts he gave were of an interesting character.

The Freight and Classification Committee and the War Service Committee gave their respective reports, the latter Committee being relived from further duty as its work had been completed.



Henry C. McLear, the Retiring Secretary.

The Resolution Committee offered several resolutions among which was one recommending that the railroads be returned to private ownership as soon as practical, another stating that the Association is in sympathy with and heartily supports any movement to further the interest of the horse and its attachments.

Election of Officers

The all-important election of officers followed with the result that those who had been nominated were elected to their respective offices.

The reports of the Committe on Exhibition and the Obituary Committee came next. The latter report showed that the following members had passed away since the last convention:

Active:

E. J. Schlamp, The George Delker Co., Henderson, Ky. Oct. 12, 1918, aged 41 years.

Associate:

O. E. Walker, Queen City Forging Co., Cincinnati, Ohio, November 12, 1918, aged 80 years.
E. F. Alf, Edward F. Alf Co., November 17, 1918, aged 43 years.
Charles A. Willey, C. A. Willey Co., Long Island City, N. Y., October 28, 1918, aged 60 years.
G. W. Leutkemeyer, Union Bow Co., Cleveland, Ohio, December 6, 1918, aged 54 years.
George McMaster, Mutual Wheel Co., Moline, Ill., August 10, 1919, aged 46 years.

Selection of Convention City for 1920

President Ahlbrand read the invitations from several cities to hold the 1920 convention of the C. B. N. A. within their boundaries, and the selection of the location was referred to the Executive Committee. Mr. Charles E. Adams, of Cleveland, Ohio, gave his opinion on the subject as the Executive Committee desired an expression of opinion as to the members' choice for the 1920 convention city to aid the committee in deciding. The matter was further discused, and finally it was decided that the Executive Committee would be able to draw its conclusions

J. F. Hutcheson, Secretary-Treasurer of C. H. A. T.

from the discussion, and select a place of meeting agreeable to the members.

A rising vote of thanks was tendered to the retiring president, and there being no further business, a motion was made by Mr. Clen Perrine for adjournment. The motion was seconded and carried.

Other Matters

Thursday evening the annual banquet of the C. B. N. A. took place in the Louis XVI room of the Hotel La Salle and we are sure the members enjoyed themselves. There was also a reception and dance on Tuesday.

All in all, we can truthfully say that the forty-seventh annual convention of the C. B. N. A. in every way compared favorably with the previous conventions. Everyone was optimistic, and there was a feeling of good cheer which sent the members home feeling as Mr. Charles E. Adams said:

> ".....brighter and happier and rejoicing that we have twenty-five million horses and mules that can haul a buggy to smash."

We are indebted to the "Spokesman" Publishing Co. for a number of the cuts used in this report.

THE

BLACKSMITH AND WHEELWRIGHT

Vol. LXXX. No. 6 NEW YORK, DECEMBER, 1919 { TERMS ONE DOLLAR A YEAR

Sick Cars and the Diagnosis of Trouble

How One May Find and Cure the Various Engine Troubles Commonly Occurring. The Last Article of the Sick Car Series

EVERY time I take a walk in the street and see abused automobiles limping along, I am prone to think of them as people. Every time I ride in an automobile, hear its grumbling and its moans, the resemblance is brought home to me strongly.

I have a neighbor who is a God-fearing man and looks as though he might be extremely kind-hearted as well as benevolent. The dogs on the street are his friends and I seldom hear him speak a harsh word to his nearest relative, his wife. At the same time, however, I will admit that I am a bit prejudiced against the gentleman. If there were a society for the prevention of cruelty to automobiles, my neighbor would soon find himself caught in its toils.

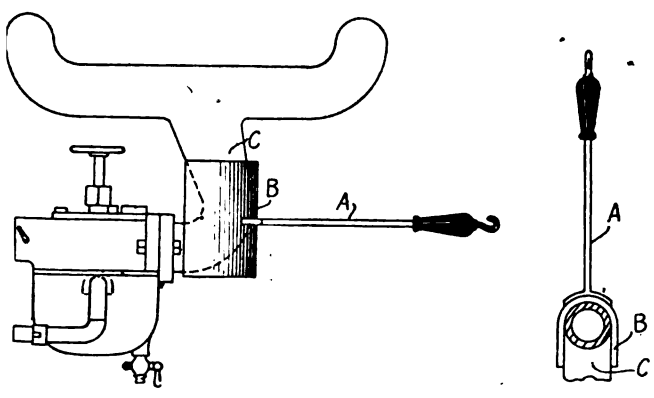
He has no mercy for his machine and I really believe if his automobile happened to lose three wheels, he would try to get home upon the fourth. I often wake in the middle of the night, my hair standing upright and a chill running down my spine, cold sweat on my brow, all from horror at the fearful moaning and wailing of his machine which he is enticing into his garage.

An automobile is very much like a person. Its years of life are short, but into these years are often crowded much kindness and usefulness for man.

Automobile sickness and ills may be divided into two great classes, nervous disorders and stomach trouble. Stop and think a minute and see if you can make any other classification than this. If an automobile engine stops it stops either because the ignition system has gone wrong or because it is not getting a sufficient supply of gas.

Now don't misunderstand me. I said automobile sicknesses. I didn't say automobile accidents, for it is not my intention to take up all of the accidents that an automobile might undergo.

An automobile's stomach is its carburetor. The carburetor is obliged to chew the food, if we may use this expression, mix it with the correct amount of air, or digest it, and pass it along to the engine in a digested condition. If the carburetor does not vaporize



A "Stomach Warmer." A, Handle; B, Iron Casting to Fit Manifold; C, Intake Manifold.

or chew its food completely, the engine acts sluggish or possibly does not run at all.

This trouble is noticeable particularly in the cold weather. The engine has a "stomach ache" and needs a hot-water bottle.

At the end of this month many motorists will be arming themselves with suitable medicines and paraphernalia to cure or prevent this disease which I call engine stomach trouble.

There is one medicine which can be carried in the tool kit very handily. Its action is immediate upon application. The medicine I speak of is ether. The dose ordinarily is about one spoonful. Divide this liquid into four portions and pour one portion into each priming cock. It is a predigested food and the engine usually starts off with a "bang" immediately.

Now ether for an automobile is like morphine for a person. Don't use it too much. Its affect may be lasting if it is used in quantities. Don't use it unless it is absolutely necessary.

A hot-water bag on its stomach often solves the problem. Let me tell you how to make a handy hot water bag for it. Take a long stocking and fill it with sand, or make up a tube two inches in diameter and twelve inches long and fill this with sand. On a cold winter's morning put this bag in the oven or near the furnace and let the sand warm through thoroughly. Then when you get ready to start your machine, wrap the bag around its "neck." I mean around the intake manifold just above the carburetor. In about two minutes the manifold will be warmed through and the engine can be started very easily.

Luckily, an engine does not mind extremes of heat and cold like a human being. This being the case, you don't need to worry about whether the sand is too hot or not. You can use a horseshoe around the manifold or most any piece of iron will answer the purpose if it is heated through before it is put in place. When an engine's stomach is warmed it digests the food much more easily than when it is cold. Just remember that, or in fact, if you know anything about physiology or anatomy, when there is something the trouble with the engine, compare it with a person and see if you cannot think of the remedy.

A few paragraphs back I suggested that automobile illnesses may be divided into two classes, stomach and nervous troubles. Let us see just what I mean by these two divisions. If an engine stops or will not start at all, it is because it is not getting an ignition spark or because it is not getting the fuel. Suppose you are out in the country and the engine refuses to exert itself, or in other words, "goes on a strike." First look and see whether it is getting anything to eat or not. That is, be sure that there is fuel in the tank. Then see if the pipe line is clear between the tank and the carburetor.

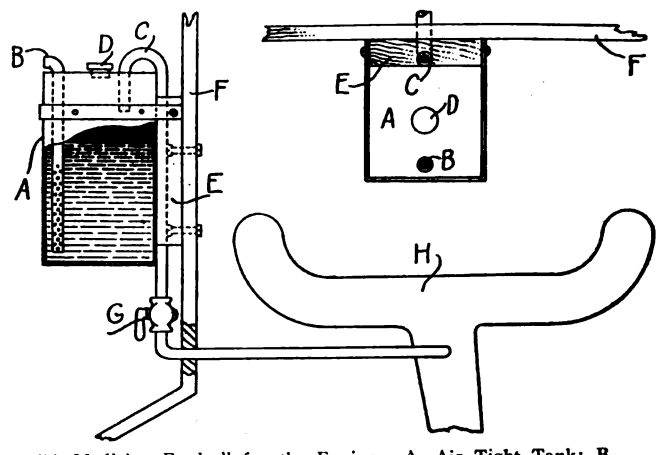
It is an easy matter to find this out if the carburetor is fitted with a drain cock. All you need to do is to open the drain cock and if gasoline flows from it, you can assume that there is gasoline in the carburetor. If, however, the carburetor is not fitted with a drain cock and there is no means for you to tell whether there is gasoline in it or not, try the following experiment:

Fill each pet cock with gasoline or if there are no pet cocks opening into the engine cylinders, remove the spark plugs and pour about half a teaspoonful into each cylinder. Close the pet cocks or replace the plugs, throw on the ignition switch and start the engine. If the engine runs a few explosions and then stops, the trouble is probably in its stomach.

It may be that the needle valve of the carburetor is stopped up, or it is very possible that there is dirt in some of the small gasoline passages in this device. Remove it from the car and clean it thoroughly. Before removing it, however, be sure that there is no trouble in the fuel line between the tank and the carburetor.

If after priming the engine still refuses to run, the trouble is probably in the ignition system. Some of its wires may be broken or some of the electrical units may be out of order.

You know that if the main nerves leading into your hand were cut, you could not move your hand. To a certain extent, the same thing is true of the engine. If any one of the wires is cut or broken between the ignition system units and the magneto or battery, then the engine cannot be made to operate



"A Medicine Feeder" for the Engine. A, Air Tight Tank; B, Inlet Tube; C, Tube to Manifold; D, Filler Vent; E, Bracket; F, Dashboard; G, Valve; H, Intake Manifold.

until the wire is repaired or replaced. There are two kinds of "nervous systems" installed on automobiles: single coil and multiple coil systems.

The single coil ignition systems are fitted with a device in the primary circuit called a breaker box and a device in the secondary circuit to distribute the current to the proper cylinder called a distributor. The multiple coil systems are provided with a coil for each cylinder and a device called a timer which automatically brings into action or completes the circuit for each coil in succession.

The coils are connected so that the timer will bring them into action in the firing order of the engine. Either type or coil system is easily tested.

If after priming the engine it cannot be started, remove all the spark plugs, leaving them connected with their respective wires. Put them on their sides against the cylinder head and crank the engine. A spark should appear at each plug in succession if the ignition system is in condition and should the spark not appear, then remove each secondary wire and while the engine is being cranked, hold it about one-quarter inch away from the metal of the engine. If the ignition system is in condition a spark will leap from the wire to the engine.

If a spark is not obtained at the plugs, while the engine is being cranked, the trouble is at some other point in the ignition system. In order to explain the method for finding ignition troubles, let us consider the various types of ignition systems.

The Single Coil System

First, the single coil system which employs a battery for the source of current. Remove the distributor cover and examine the breaker contact points. Upon turning the engine

over, these contact points should touch each other just as the pistons reach the top of their stroke, or shortly thereafter. If they do not touch, adjustment should be made so that they will touch at the proper point.

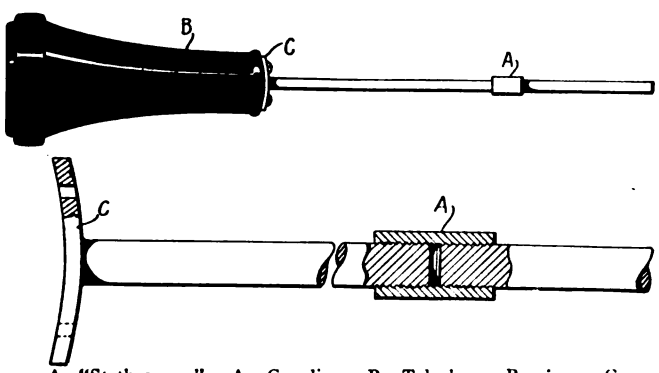
With the spark fully retarded the points should spring apart just as the piston has reached the top of its stroke, in some cases; in other systems they are together at the top of the stroke, and separate after the piston has traveled one-eighth of an inch downward. In every case they should snap apart after the piston has started on its down stroke. Adjust them so that when they are fully separated the clearance between them is approximately the thickness of a piece of paper or about .025 of an inch.

These contact points should be smooth and parallel with each other so that when they do come together, they touch across their full face. Turn the engine over until the contact points are together and remove one of the wires from the battery. Throw the ignition switch on and make a quick contact with the battery and the ignition wire which has been removed.

A spark should be had at this point. If not, indications are that the wiring is broken or disconnected between the battery and the coil or breaker box. It may be that the contacts are poor or that the wire is broken inside the insulation. Remedy this trouble.

There is one other possibility, however, and that is that the battery is not furnishing current. Take a short length of wire. Connect one end with one terminal of the storage battery and snap the other one across the other terminal quickly. Do not leave it connected as it will short-circuit the battery. The spark should be had when contact is made; if not, the battery should be replaced with a new one.

If in the first test a spark is had when the ignition wire is connected with the battery,



A "Stethoscope." A, Coupling; B, Telephone Receiver; C, Base of Rod.

put a piece of paper between the breaker points and try the experiment over again. In this test there should be no spark at the battery. If there is, it is an indication that there is a short-circuit in the line or one of the wires has been grounded. This short-circuited wire should be repaired or the break in the insulation covered to prevent grounding.

If it is found that the ignition system is all right from the coil to the breaker box, locate the secondary wire which leads from the coil to the center of the distributor. Remove this from the distributor and hold it about one-eighth of an inch away from the engine base.

Remove the piece of paper from between the breaker points and allow the points to come together. Snap them apart quickly and you should obtain a spark between the secondary terminal and the engine. If not, there is evidently trouble in the coil itself. Either repair this trouble or obtain a new ignition coil. If a spark is had, there is evidently trouble in the distributor. Clean this unit thoroughly with a cloth moistened with lubricating oil and wipe it dry.

See that the distributor brush functions properly and that all of the secondary wires are properly connected. After having made sure of this, make the first test again, when a spark should be obtained at all of the secondary terminals. If not, then the indications are that there is trouble in the plugs themselves.

Remove the porcelain and clean the plug with kerosene oil. Examine the porcelain for small holes or cracks.

If the system is of the multiple coil type, test the battery to make sure that is is furnishing current. Remove each wire in succession from the timer and touch it to the engine base. If any one of the coils does not vibrate, adjust the vibrator. If no current seems to pass through the coil, trace the wiring from the coil to the battery and also from the coil to the timer. Remove each of the coils that does not function from the battery box and see that the spring contacts touch the coils properly.

Make a secondary wire test as directed in instructions for single coil systems.

Magneto Systems

There are two types of magneto systems, low and high tension. The low tension magneto systems are divided into two classes. Magnetos of the ordinary magnet type driven through gearing or by belts from the engine, and the Ford magneto. The latter is different from any of those and perhaps the easiest tested of all. Remove all of the spark plugs so that the engine may be turned rapidly. Disconnect the wire leading from the magneto terminal to the coil box at the coil box terminal. While the engine is being turned over, touch this wire to the engine base. A spark should be noticed, and if not, there is trouble in the magneto. Remove the plug at the top of the magneto and clean it with a piece of waste and sandpaper. You will note that this plug is fitted with a point and a spring. The point rests upon the magneto terminal plate inside the housing. Clean this plate by means of a screwdriver or a chisel and replace the plug.

Be sure that the spring is drawn out enough so that it forces the point down upon the magneto terminal plate. Try the first test again and see if the spark can be had from the brush wire to the engine base. If not, it is best to have the magneto repaired by an expert.

There is little that can be done with the second type of magneto. If the magneto is of the low tension type and a coil is used, make the same tests as you made with the single coil system. In any type of magneto always examine the breaker box first. Be sure that the contacts are clean and that the points come together across their full surface, and that they separate approximately 1/50 of an inch when the breaker arm is riding upon the cam.

Distributor boxes of magnetos require the same attention as a distributor box of any coil system. If the above procedure is carefully followed, one will have no trouble in finding out the reason for ignition line failures, and though one cannot always remedy the trouble one's self, it can usually be located.

Cleanliness Is Essential

Cleanliness is essential. Always remember that the secondary current, that is, the current which supplies the spark plugs, is of very high voltage and that it will travel across any oil or water-soaked surface. All contacts in the primary circuit must be cleaned and tight. Remember that a primary wire may break inside the insulation and the break go unnoticed. In testing out the primary system, replace each wire in turn by one which is known to be good.

If you find that the engine will run, but will not run on all four cylinders, but you cannot locate which of the cylinders is missing, short-circuit each plug in succession. You can do this with a screwdriver. Touch the end of the screwdriver to the cylinder head and bring the metal part of the screwdriver against the top of the plug. Note the action of the engine when this is being done.

If the action changes, you can well assume that the particular plug which is being short-circuited functions properly when the screwdriver is removed. One cannot always locate a missing cylinder by short-circuiting one plug, and if such is the case, short-circuit two of the plugs at one time. In this way, one can eliminate various sets of cylinders until the cylinder is found which is missing fire.

Spark plugs usually fail from either of two causes. Either the electrodes are separated too far or the insulation is broken down. The distance between the electrodes on a coil system should be approximately 1/16 of an inch or slightly less, while the distance between the electrodes on a magneto system should be between 1/32 and 1/16 of an inch.

Bear in mind that a spark may leap across this space when the plug is removed from the cylinders, but may not have strength enough to jump across when the plug is in place and subjected to high compression. Examine the porcelain very carefully for breaks or holes.

A Stomach Pump

I have spoken of feeding an engine with medicine and herewith is illustrated a device which most any automobile owner can make and use for feeding his engine with any sort of liquid, either for removing carbon or for starting it in cold weather.

Obtain a tin can such as is used for containing chocolate or cocoa, which is fitted with a tight fitting top, and in it punch three holes. Fit one of them with a short length of tubing which is punched through with a number of holes at its end and solder this tubing into place so that it extends nearly to the bottom of the tank. Provide the second opening with a tight-fitting screw cover, while the third opening should be provided with a long tube which leads to the intake manifold. This tube should be provided also with some sort of a shut-off arrangement such as a pet cock. This second tube should not extend into the tank, but should be soldered to the cover only. The whole device should be made air-tight.

If it is filled with water to within about one inch from the top and the engine started when the pet cock is open, moist air is drawn into the manifold and the engine action improved. Water if used in small quantities has a tendency to drive off carbon and often increases the power of the engine. Kerosene oil or carbon remover may also be placed into this feeding arrangement to great advantage.

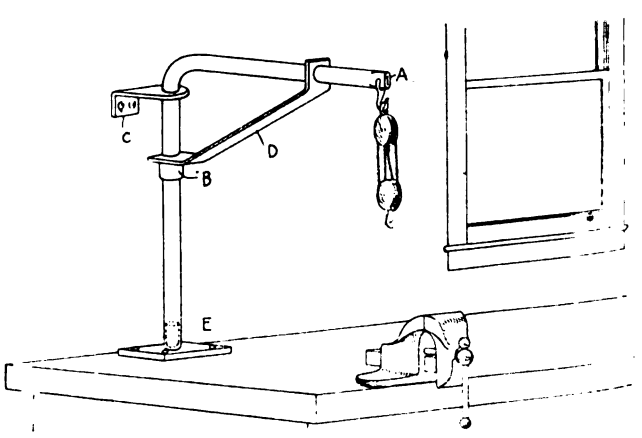
If your automobile has stomach trouble, one of the first indications is extreme carbonization. If you are feeding it too heavily the carbon will stay in the cylinders and cause lack of power. The engine will protest against overfeeding and voice its anger by emitting a sharp knock after it has been heated. This knock is caused by preignition and the overheating of the carbon on the piston head.

Knocks can usually be located by means of what I will term a stethoscope made from an old telephone receiver and a number of lengths of steel wire fitted together by couplings. A drawing of this device is shown herewith.

VISE BENCH CRANE

By Charles H. Willey

Garage owners and repair men in general would do well to follow the example of the manager of one of the local repair shops by procuring, as he did, several lengths of old



The Bench Vise Crane.

steel pipe and some flat iron bar stock at the junk dealers, and converting the material into several jib bench cranes for lifting heavy work from the floor to the bench and vise. The sketch plainly shows the manner in

which they were constructed.

The crane upright and horizontal arm were made of two parts from two-inch pipe, the upper section being bent at a right angle and the end *A* flattened and drilled for the tackle hook. The other end *B* was threaded for a pipe coupling. A wall bracket *C* and a brace bar *D* were made of one-half by three-inch bar iron and these put on the crane.

The coupling provided a shoulder for the brace to rest on, the *Y*-shaped foot slipping on over it. Another piece of pipe screwed into the coupling formed the lower section of the upright. A piece of one-half-inch boiler plate *E*, with a short piece of one and one-half-inch pipe screwed in its center, formed the pedestal base, the crane setting on this and swinging around on the pipe.

By installing the cranes at the end of the benches they swing around the end and clear the bench and swing back directly over the center of the bench vise. When not in use they swing against the shop wall out of the way.

Up In Old New Hampshire

How Blacksmithing is Done in Some of The Little Old New England Villages

BY JAMES F. HOBART

"WISH you would make those forward shoes very long," said a New Hampshire Farmer as he led a rangy looking horse into a Hampton Center shop. "I never saw a horse reach forward so far with his hind feet as this one does and when he runs, he sure reminds me of pictures in the Sunday Comic Papers, where some dogs and 'mule Maude'

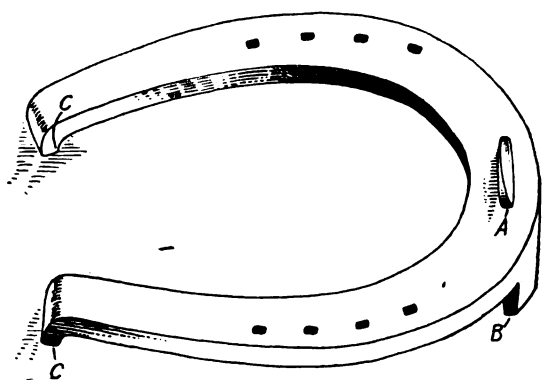


Fig. 1. How the Toe Clip Was Applied.

are shown going fast and strong, with their hind feet away in front of their forward hoofs!"

"The longer the shoe, the quicker she picks up her feet, eh?" said the Smith. "Well, I'll make the shoes as long as I can and the clip in front, instead of forging up the edge of the shoe. For that, I'll just stick on a light toe-calk on the wrong side of the shoe and forge it thin for a toe-clip."

"That will do first rate," said the Farmer, "but don't make the forward shoes too long behind, or she will pull them off for fair—by hickory she will, every time!" (See Fig. 1, for the manner in which the toe-clip was put on and where it was located at A, the high toe-calk at B, and very low heel calks at C. C.).

"There," said the Smith as he finished the funny looking toe-clip, "that shoe ought to pry up old Dobbin's front feet for him! The shoe sticks out in front nearly a half inch and the heel calks are clear back as far as any hoof goes. The heel calks are very short, the toe-calk long, and when he lifts up his foot, it rolls over the far-ahead toe-calk and the heel can't help lifting fast and high from the ground."

"Yes," said the Farmer, "that heel will come up, when Dobbin steps, just like cracking a whip and when the hind foot gets where the front one was, his heel is away up in the air, safely out of the way of those far-slinging number sixes!"

A "Slick" Shop

It surely is a "Slick" place, that Hampton Center shop. It has two fires, one driven by a modern electric blower, the other fire being operated by a hand-blower. The owner, being asked why he did not put in another electrically driven blower, said he "reckoned" he would, as soon as he could find one. He said: "I bought that electric blower several years ago for eighteen dollars and I've been looking out ever since for another one just like it but I haven't found it yet!" and the writer thinks he will not, yet a while, not at the same price; for the blower is a good one and the rheostat is never pushed more than half way over, even for the heaviest blast needed on the forge.

"I thought a whole lot of setting that blower to drive both forges," said the Smith. "It will give plenty of blast and I could put in a pipe to each fire, rig a gate at each forge, then let the blower drive into the pipe all the time that either forge fire was a-going, regulating the blast at each fire by a gate, same as they do in big shops where one blower drives all the fires. But the blower-makers advise against that sort of thing and I wonder why? I can't see a thing against it except that if I make one fan run two forges, the fan manufactures lose a chance to sell another fan!"

Electrically Driven Drill

In this shop there is also a fine electrically driven drilling machine which is attached to a post at one end of the shop. The drill is no light "post drill," as usually designated by that term. The machine is a fine back-geared drill, evidently made for machine shop use, with the motor coupled direct, giving power through a worm and gear, right to the shaft-spindle of the drill. In addition, the drill spindle is back-geared, with two changes of speed available by simply shifting the transmission gears.

The charges for electric current in this shop, are about $1.50 per month, and the owner said that it might be divided between the two motors in about the ratio of $1.00 per month for the forge blower motor, and 50c for the drill, as that machine was run but little compared with the forge motor, which "Ran about all the time and then some!"

Hand-Sharpening Rock Drills

"Cling-ling-clan-clingle" rang out from the front of the shop and the writer arose from a comfortable empty horse shoe keg in time to see a man dump on the shop floor the last of a lot of rock-drills which had been sent in to be sharpened.

"That's my job," remarked one of the smiths. "I have a lot of drills to sharpen every day. They are putting in a new hotel at Rye Beach, about six miles from here, and they bring all the drills here to be sharpened. They have to come over to Hampton every morning with a motor truck to get the workmen, so it don't cost them anything to bring the drills over to me to sharpen. They are excavating a big cellar for the hotel and as it all must be blasted from solid granite, I have something of a "chore" keeping the drills in shape."

The drills were of modern type, with a hole through their entire length. The smith had an end-swage fitted with a handle, the swage to be struck with a sledge in the usual manner. This swage came with the drills, but as the smith placed two of the dull drills in the fire, he placed upon the anvil, a tool something as shown by Fig. 2. He called it a "Rock Drill Swage." It fitted snugly into the hardy hole of the anvil and was used without any fastening whatever.

The lower member D, was evidently a very large "dead-head" which had been forged to fit into the hardy hole but which had not been drawn down to a cutting edge. A spring F had been fastened to swage D, by means of a bolt through the tool and through the yoke G. By means of a close fitting shoulder at H, the spring F was prevented from swinging downward under stress of hard work and hammer blows.

The upper end of spring F, had evidently been squared, shouldered and nut-fastened firmly into top-swage E, which had been so placed and fitted as to member fair with the top of swage G. The business edges of both these swages were almost a right angle, but rounded a bit so as to avoid an actual sharp corner. This swage was used for "splitting" and "drawing" the body of the drill just above the four-cornered cutting edge. This and the end-swage, were the only extra tools used in sharpening and re-sharpening, from day to day, all the rock drills required in excavating a big cellar from granite.

Welding Vehicle Springs

One of the smiths in this shop has quite a reputation for repairing vehicle springs—the same smith, by the way, who sharpens the rock drills. Wagon and automobile springs of all kinds find their way to the Hampton shop for repairs, and it is to the credit of this smith that when possible, he makes a new leaf for the broken spring; but when this is impossible, he welds the broken leaf and is not afraid to guarantee it to "hold!"

One day, while sitting in this shop, the writer saw a spring welded for a driver who had broken down a mile from the shop. A passer-by told the driver of the spring-mender, so the driver and a friend, removed the broken spring from the auto and "packed" it to the shop. It was a very long spring, the longest the writer ever saw under any automobile. It was from a car made somewhere near Syracuse, N. Y., and evidently was assembled from parts bought in the market.

The spring was all of six feet long. It was the outside leaf which had broken, with both ends rolled up to receive a bolt. There was no material in the shop from which to make a new leaf, so the smith started to weld the broken one. He scarfed the broken

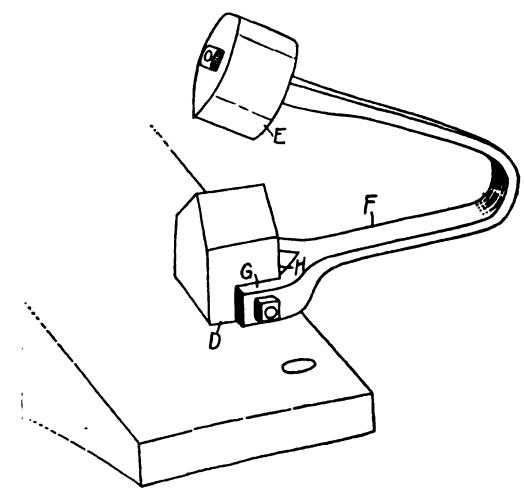


Fig. 2. A Handy Rock Drill Swage.

ends same as if he was welding a tire or any other piece of steel, upset both pieces a bit, then plated them out under the hand hammer, no flatter being used, and no striking at all being done on the job. The ends were scarfed or bevelled about one inch, or about one-half the width of the spring-leaf. The scarfed ends were heated to a dull red, then rubbed with a bit of stone and all the oxide removed from the steel, after which some "E-Z weld" powder was sprinkled upon both sides of each piece and they were placed in the fire to heat for the weld. The heating was quite slow and the smith made sure that the heat was well diffused and that no hot or cold spots existed in the steel when they were pronounced hot enough.

A little more E-Z Weld powder was dusted into the fire during the heating and when the two parts of the spring were hot enough to suit the smith, he called the other smith to hold one of the pieces while he "stuck" them

together. Both pieces were lap-down in the fire. The assistant took the piece next to him—the shorter piece, gave it a rap on the anvil, turned it over and held it in place while the smith who was doing the job, cut off the blast, raised the longer piece of spring from the fire, gave it a tap on the anvil to dislodge dirt, etc., then placed it quickly and fairly upon the other piece of spring and simply *rained* light hammer blows upon the lapped part. "Like an onery wood pecker" observed a bystander, so quickly were the blows struck.

The degree of heat at which this weld was made seemed very low indeed to the writer. It was *not* a yellow heat. There was a total absence of any sparks flying from the metal when the weld was struck with the hammer, or even when the parts were removed from the fire. The heat seemed to be no more than a good bright red—not a trace of yellow about it—and the writer wondered how the smith could make the metal "stick" under that degree of heat.

But it did unite, and to all appearances, the weld was a good and perfect one. The smith did not hammer the weld very much. A half dozen light blows from his hand-hammer and he sprinkled some more E Z Weld powder upon both sides of the spring and replaced

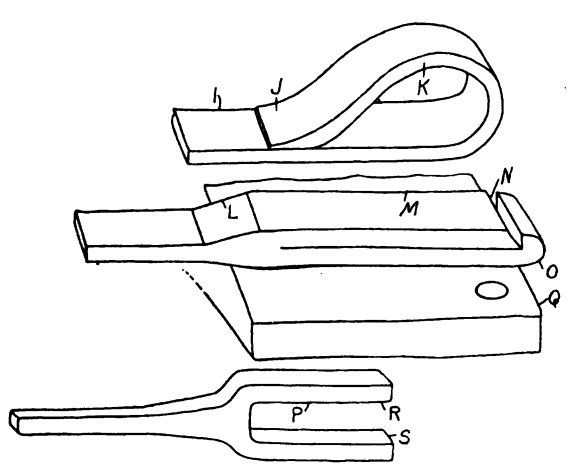


Fig. 8. The Three Steps in Forging the Strap Connection.

it in the fire. Another heat was taken, to exactly the same degree as the first, and the weld was hammered lightly but with very quick blows and it was not struck at all after the bright red had died out of the metal. Again the welding powder was applied and reheating and more hammering followed and still another followed, making three times reheating and hammering after the "sticking" of the pieces together with its attendant hammering. The last hammering reduced the slight bunch in the spring until it was of same thickness as the rest of it. He took care, by judicious edge-hammering, that the spring was kept down to the proper width. Indeed he was very careful not to let the spring get a bit too wide from the time the weld was first "stuck" until the weld had been fully flatted down and was ready to be filed and the edges smoothed, ready for reassembling the spring again.

There was another point which the smith looked after very closely during the hammering out of the weld. This was the alignment of the spring. Twice, between reheatings, the smith tried the next longest leaf, against the mended spring, to see whether the welded one was coming out straight. And twice he led the short end of the spring a bit sidewise by judicious hammering upon one side of the spring more than upon the other side, thus straightening the spring and keeping it straight when finished.

When the spring was taken down the smith noted in which direction the short piece of the spring chanced to come. Then, upon putting the spring together again, the weld was placed in the direction that the short piece had laid, so there was no danger of getting the spring put together wrong. The two men paid the smith $1.25 for his work upon the spring, which might have been a very little shorter than it was before, but no one could detect any appreciable difference—the men carried away the spring, put it in place themselves, with their own tools and went on their way. The weld had not broken apart at last hearing from its owners.

Forging a Strap Connection

A chap who was making up a machine for driving wire hoops upon apple barrels at the time of manufacture, came into this shop in quest of a connection to be made from 1½" x ⅜" soft steel, something as shown by Fig. 3, at P. The owner of the Hampton Smithy selected a piece of steel, I, scarfed one end, J, and bent the steel around upon itself as at K, leaving the bend open so the weld would not extend too far along bar I.

Once the weld was finished, the loop K was flattened down as shown at L and M, after which the end of the bar O, where it had been doubled over, was cut as shown at N, the place where cut, being laid upon the anvil, fair with edge Q and the cut made with a handled chisel, the smith calling upon another person to strike for this bit of work. The steel was then turned over and the other side cut, after which the double portion of M was pried open and finished as shown at P.

To make the shape shown, piece M was caught in the vise, the jaws clamped tightly against weld L, then the double ends of the shape were separated and hammered flat against the vise jaws, after which they were bent back again, but this time, with a piece of metal between R and S, and forging closely against that piece of metal, gave the finished and pleasing appearance shown at P. Later, a hole was drilled through both arms of the piece and the corners of R and S rounded off on a grinding wheel.

Storing the Horse Shoes

When kegs of horse shoes were received in this shop, they were unpacked from their kegs by a young son of the owner, a lad of not more than eight years of age, who took care of all the horse shoes. A piece of timber about eight feet long and six inches square stood on end in one corner of the shop. A square hoop of band steel had been shrunk upon each end of the timber, close to the ends, and a gudgeon, of one-inch round black steel, had been bored and driven into either end of the timber. The gudgeons were mounted in bearings, a metal lined hole in the floor for the lower one and a short sleeve, brace-attached to the sides of the shop, held the upper gudgeon firmly, yet loosely enough that the timber could be easily revolved. Three-quarter-inch rods had been driven into the timber and allowed to project about a foot on either side.

Upon these steel pins, the young lad hung the new shoes after he had sorted them into various sizes. The pins were placed just far enough apart that the several sizes of shoes could be put on and taken from the pins easily, the pins where the smaller shoes hung being placed closer together than where the No. 6 and 7 shoes were placed, and these large ones were located as close to the floor of the shop as possible. The lad had to use a step-ladder to hang away the small shoes on the upper pins of the "hedgehog," as the device was very quickly named by the shop loafers.

And say! you ought to see the shoes that they throw away in that New England shop! I tried to find some shoes heavy enough to pitch quoits with, but when through with shoes now-a-days, they are like "ciphers with the rims off!"

SERVICEABLE TO PAPA

A Red Cross Public Health nurse in a southern town has found the latest novelty in names for babies. She was weighing a little black youngster.

"What you you call your baby," she asked the grinning young mother.

"Weathah-strips," replied the parent.

"Weather-strips," exclaimed the nurse. "What's the idea, Mandy?"

"We done named her Weathah-strips 'cause she kept her papa outa de draft."

Prize Photo Announcement

WITH the November number of the BLACKSMITH AND WHEELWRIGHT we finished the prize photograph contest. In all, there were 17 photos entered and in each case the selection for prizes was easy.

The first prize goes to the reader submitting a picture in which is shown the most automobile work being done. We feel that everyone will agree that The Correll Shop and Store entry number 9, which appeared in the May, 1919 issue shows the most automobile work going on.

The second prize goes to the reader who submitted a photo of the best looking shop. We defy anyone to criticize our judgment in selecting the photograph number 10 of Mr. C. J. Johnston's shop which appeared in the May, 1919 issue. You will recall that this picture was of a concrete building, the doors and windows of which were in the shape of giant horseshoes and the general scheme of decoration was suggestive of the class of work being done.

Mr. H. F. Towner's letter in the April, 1919 issue really deserves the third prize for he evidently is going in strong for his portion of automobile work.

We have a surprise for Harry Babcock of New York, for we are sending him a prize in the shape of five dollars. He deserves it because his letter is both interesting and helpful. His system of shop arrangement and care in locating the machine tools should be considered by every smith. We venture to say that after ten hours of work, he will have accomplished more than many smiths after a twelve hour day, and be less tired. With his tools arranged conveniently he does not walk so far, waste so much motion, or use so much coal as does the smith whose tools are thrown in the shop "helter-skelter."

Mr. Babcock is a horseshoer, and a good one, too, if we can judge by the way he is making efficiency the key-note of an old-established, time-honored profession.

Mr. Littlefield of Montana has the right idea and deserves honorable mention because he is looking into the future. He is educating himself along broader lines and doubtless by this time has a shop full of automobiles.

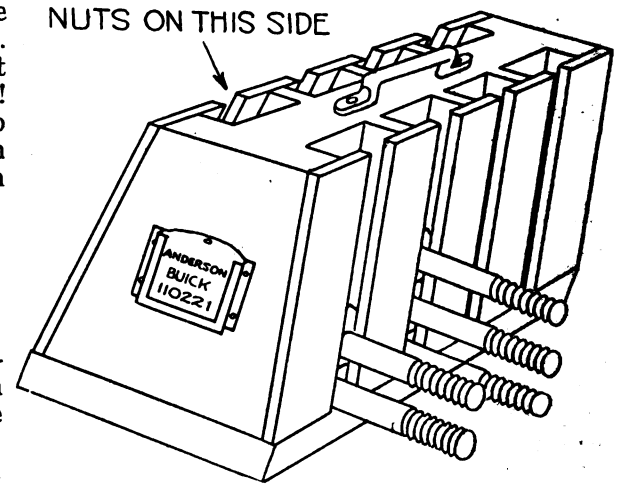
Mr. Littlefield writes that he still has plenty of horseshoeing, but there is lots of auto and tractor work to do, besides.

NUT AND BOLT CARRIER RACK

By Chas. H. Willey

I was chatting with the foreman of one of our local garage repair shops about the work being done on a nearby car, and I watched the mechanic who was working on the car as he removed the cylinder head. As he took out each cap bolt, he put it in a rack or carrier, and when he removed a nut of a stud, this, too, went into the slots of the rack.

I asked the foreman whose idea it was and he said, "Why, that's a scheme of mine. I had a lot of trouble with boys getting the



bolts and nuts mixed and lost until I had a bunch of these carriers or racks made."

I secured the foreman's permission to sketch the contrivance and pass the idea along to readers of the Blacksmith and

Wheelwright. The sketch conveys to you the idea better than a lot of printed words, but, however, I will say that the slots are of different widths to suit the various sizes of bolts and nuts, and are cut in a block of wood, and battons or strips of wood or iron are secured on, making each slot T shaped.

The bolts are slipped in the slots by their head ends and held thus. A handle is secured to the top for carrying it about the shop and a card holder tacked to one end to identify the car on which the bolts and nuts belong. The advantage of having each size bolt and nut kept together needs no argument.

The Pipe Hanger Business

One Blacksmith Has His Entire Time Occupied in Making Pipe Hangers

BY H. C. RIDGELY

SOME blacksmiths select one thing for which there is a demand and specialize on it. In that way, the work is systematized and can be turned out rapidly. There is no waste effort. Every blow struck and every movement made are just right, because the acts are performed so often that they become a habit.

In the pipe hanger business there is sufficient similarity in the different parts to reduce the work to a system, while at the same time there is enough variety in the shapes to prevent monotony. A man does not like his

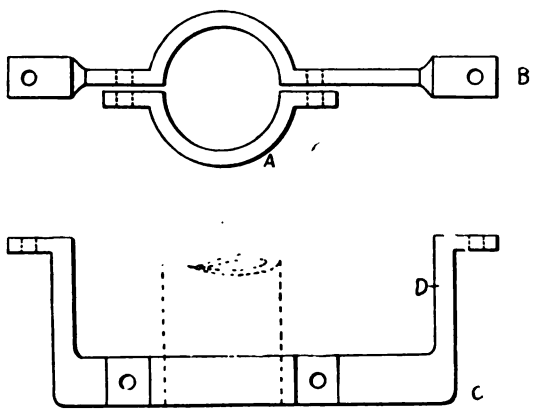


Fig. 1. Above, Plan View of Hanger; Fig. 2, Below, Shape of Hanger.

work to be too monotonous, for he would soon grow tired of it and want to stop.

The blacksmith referred to in this article went to great pains to explain how he had worked up his specialty to a point where it is a paying business.

"It was this way," he said. There was a long pause while he lighted his cigarette with a red hot iron. He always kept a heated poker handy for that purpose.

"It was this way," he began again, after taking a couple of whiffs from his cigarette. "I got acquainted with some plumbers and pipe fitters and a few of them came to my shop to have special hangers made. Then a few more came, and still more, until the business began to get red hot. You see, it isn't always easy for pipe fitters to make the hangers where they are working. They can't carry a blacksmith shop around with them, and if they could, it would be in the way all the time. Well, that is where I come in handy. My shop is easily reached by the men who know me and business simply comes my way."

Constructing the Hanger

An iron which had been heating while the man was talking was now at the right temperature and was removed for further manipulation. A hanger was being made like that shown in Fig. 2. There were two parts to it, and later these were to be bolted together about a pipe to hold the same firmly. The holes in the ends or feet were made for screws or bolts to attach the hanger to some suitable support.

The semicircular portions were shaped by heating and hammering about a piece of piping pinned to the anvil as seen in Fig 3 at *A*. Lengths of piping like this, with various diameters, are kept on hand in large quantities so as to make possible the construction of hangers with a wide range in sizes.

The feet A and B of Fig. 1 are bent on the anvil by hammering. The shoulder *C*, however, is made by fastening the heated metal in a vise and giving it a right-angled twist before bending the upright portion D. The parts are then shaped up a little on the anvil.

"If I am making several hangers of the same size and shape, I make them all at once," the blacksmith explained. "I mean by that, that I cut off several lengths of metal for the entire number of hangers and then perform similar operations on each in turn. I make the semicircle on several pieces before going on to another operation. That is one place where system comes into the work."

Need of Mechanical Drawings

"What is the hardest part of the work?" the man at the forge was asked.

"The hardest part is to read some of the drawings which my customers make," was the reply. "The men who bring work to me are not artists at all. Most of them have never done any mechanical drawing either. The result is that freehand sketches are made on bits of greasy paper taken from lunch baskets and are difficult to interpret. I make my own sketches in a note book after a customer has explained what he was trying to draw."

Some of the customers' artistic attempts were exhibited as proof that the interpretation was one of the difficulties to be overcome. The blacksmith was right in his estimation of the drawings as works of art. Not only were they made on lunch papers, but portions of the lunch were often thrown in for good measure. A little butter and egg here and there made the pencil marks look anything but clear and legible.

Still, the men did their best, and when that has been done there is little reason in complaining. After the final sketch has been made by the blacksmith, the result is at least workable, and that is really what is wanted. Practical results are what are required and not neatness in drawings, al-

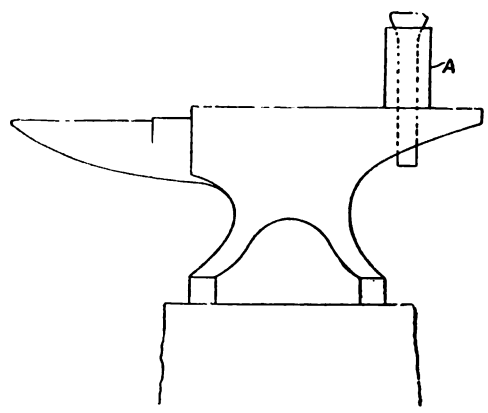


Fig. 3. Bending the Hanger Around a Pipe.

though it would be a great thing if a number of the customers described could teach themselves a little of the drawing art.

Trade Conditions

"Most of the jobs lately have been small ones connected with repair work," volunteered the blacksmith. "The big building operations have been held back for a good while. The big operations are the ones which pay, and when they get started again my business is going to be a paying proposition."

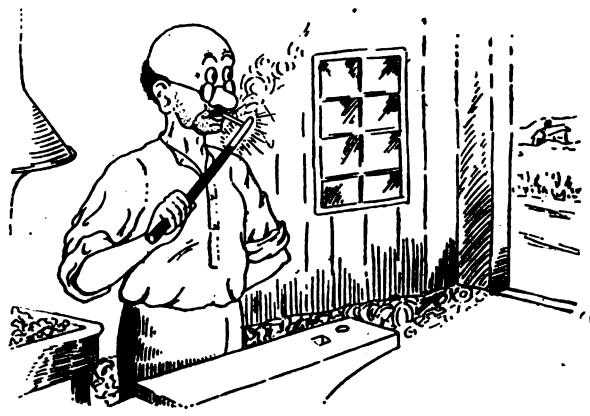
The blacksmith went on to explain how he and his father had built up the business together. It is the work of two generations, so that the son has had the advantage of his father's experience and has taken up the work where his father left off. Undoubtedly this has been a great help to the younger man. A business like his cannot be built up in a day. It takes time to put theories into practice. There is usually a little difference between theory and practice and it takes time to straighten this out and make allowance for it.

An interesting feature of this business is that it has been built up without advertising. That is rather unusual when we consider the fact that a specialty is being marketed. Ordinarily, the sale of a special commodity is preceded by an extensive publicity campaign. Often an advertising agency is made use of for the purpose, and the combined talent of the copy writer and the artist as a rule play an important part in securing customers and keeping them.

Advertising Might Be Applied

It might be interesting to speculate upon the effect which advertising would have upon such a business. How would the advertised business differ from that built up by personal contact among friends? That is an important consideration to the blacksmith who is thinking of marketing some specialized commodity. Usually a person wants to study very carefully the problems involved before he launches out into such a business.

Probably one effect of advertising would be that the man would do business with strangers instead of with friends. In other words, the business would be extended outside the immediate circle of acquaintances. Many persons consider the stranger a de-



The Smith Lights His Cigarette with a Hot Iron.

sirable customer—in fact more desirable than the friend, as the latter often wants the reductions in price accorded old cronies.

It is probable also that the broadening of the business would result in better drawings and more up-to-date methods. If the volume of trade warrants it, a special draftsman could be assigned to the work by the blacksmith. A plumber or pipe fitter who is doing an extensive business, should be able to have a drafting department also. Blue prints could then be made for the hangers and orders for the forgings given more readily.

TRACES OBLITERATED

Into Mr. Toddles's study marched the detective.

"You sent for me, I understand," said he gravely, "to investigate a burglary that was committed here last night."

"Of course I did! Of course—of course!" fussed Mr. Toddles.

"What is missing?"

"Several odds and ends, and three complete sets of harness—brand-new, too!"

"Ah!" murmured the detective, making a note in his little book. "And have you any idea how many thieves were in this robbery? Did the thief or thieves leave any clew—any traces behind them?"

"Traces—traces!" said Mr. Toddles. "No; they took those, too!"—Answers.

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Our Editor's Letter

IF YOU have ever been away on a long visit or made your home under a canvas tent you will know just how we feel to get back home again. Our last issue of the BLACKSMITH AND WHEELWRIGHT was printed in Harrisburg, Pa., and as you all know, was somewhat of a patchwork affair. We were forced to leave out our Workshop Experience Department and a large part of our Editorial page, but at least it was a magazine and contained its regular articles.

The printers willing, we will continue to publish in New York, for, after all, there's no place like home. We, the publishers, have been through a trying period in the past two months. There have been times when it did not look as though it would be possible to print a magazine again. The printers demanded, at first, an increase in wages that would have rendered publishing an impossibility, for to pay them these wages would have meant an increase in the price of both subscriptions and advertising rates, neither of which we care to do.

The printers have finally been able to see our side of the situation and have put their case before a committee of arbitration. We have conceded that they deserve more money and have made them an offer and feel sure that the matter will soon be adjusted satisfactorily.

Labor, in this case, is at present adopting what we consider is a fair attitude—it is waiting for an adjustment, but during this wait it is working for it knows that when the award is made it will receive its money.

Perhaps we have made a statement that will bear further elaboration and in which there is a hint regarding present high prices.

There is a law which cannot be broken, that of supply of demand. If the supply of coal, for instance, is limited, then its price will go up. The reason for this is that there are always people who have money to spend and are willing to pay a premium for the filling of their orders. The same thing is true of any commodity from coal to collars, from matches to machinery.

It follows, therefore, that the price of food, clothing and other necessities is governed largely by the demand and the supply on hand to satisfy this demand. To lower prices but two things are possible, either the demand must be lessened or the supply increased. To a man dying of thirst in the desert a drink of water would be worth his entire fortune, yet that same man would not squander much of his money on water if he were immersed to his neck in a well on his farm.

Obviously, it is impossible for us to regulate "demand," but we can increase the supply. The coal miners in their strike did their part in increasing the cost of living because they stopped production of soft coal at a time when every industry in the country needed it.

The strike of any labor organization has its effect upon the community at large and tends to increase the cost of living. Even our own strike by the printers has helped to increase the cost of your food and clothing, for it has increased the cost of printing and advertising; sooner or later this increase will be passed along to you by the advertisers and manufacturers.

Production MUST not be stopped if the cost of living is to be reduced. There is but one way to settle grievances and that through a board of arbitration, a board of men who can consider both sides of a question and give an unbiased report and finding.

While the questions of labor and capital are being decided, labor cannot afford to lie idle. To do this is just as foolish as for a fire department to argue about the size of hose to use while the house burns down.

Our Anniversary Number

WE don't want our readers to forget the fact that our next number is the fortieth anniversary number of the BLACKSMITH AND WHEELWRIGHT. We have mentioned this fact before, but evidently many of our older readers have overlooked it.

We want to make this issue a sort of a "Family Reunion" number. All of our older subscribers, those who have read the magazine for 15 years or more, should send us their names so that they can be placed on our ROLL OF HONOR. If you have time to write a short letter, telling about your shop and the length of time you have been in business, so much the better, but don't forget to tell us how long you have been a reader of this magazine.

Buy!

PROBABLY never before in our recollection has the word "Buy" been brought home to us as it has in the past few years. First it was the opening Liberty Loan, "Buy bonds"; then the War Savings Stamps, "Buy them"; then another Liberty Loan, and more Savings Stamps—and we bought.

We bought bonds and stamps, watches and shoes, automobiles, machinery, jewelry and diamonds, yes, thousands of diamonds at prices that would have made a Shylock blush a few years ago—and we wondered what it was all coming to—and kept on buying.

We are still at it.

But now there are lots of things we can't buy; not for love nor money; simple little things of which there seemed, once, to be an inexhaustible supply. That is, we can't buy them immediately, or we must go further for them.

And we start wondering again, "What is this leading us to? Has it all been a big mistake? If we hadn't bought so freely, would conditions be better now? Or if we stop now, will things right themselves? Oh, why didn't I buy that motor?" Or that lathe. Or those tools. Or that stock. There are still many things you need and haven't bought. And if you can buy them now they will cost you double the price you could have bought them for when first needed. But you need them more than ever now—need them, because *for every buyer there is a seller*, and you have been selling more. It may have been selling labor, repairing, merchandise, ideas, or a hundred different things, but you have been selling more unless you belong to the minority. Just as you have been paying more for what you bought, so you have been receiving more for what you sold, unless you still belong to the minority.

This country has just been through a war the destructiveness of which has been enormous, so great that it can hardly even be estimated. The resources of the world have been diminished and wasted. The United States has borne a share of this loss, but also marketed, at a big profit ,a part of her tremendous natural resources. The other countries had to buy, buy, buy; mostly from us. Our ingenuities were taxed to convert our resources as rapidly as possible into munitions and supplies for ourselves and our allies.

Naturally, efficiency in production, manufacture and transportation was brought to a point never before attained, and was directly responsible for the success of the Allies in November, 1918.

We put forth a mighty effort, and the natural tendency now, with the war over, is to relax. But war conditions are still here, to a large extent, and work must continue. Premier Clemenceau made "work" the keynote of his speech of reconstruction to the French people. He did not need to say "Buy." The French, noted for their thriftiness, are buying as far as their weakened credit will allow. And England, Germany and Italy—all are buying.

Business and living conditions that confront the people of this country now are not very reassuring at first glance. Labor is dissatisfied and demands more pay. Strikes ensue, and everybody is affectd more or less. Capital is dissatisfied and raises prices, and we all feel it. Production is curtailed, and we suffer. But the strikes are finally settled; the goods are sold, and we do manage to buy what we want, sooner or later.

The fact of the matter is that the country is prosperous and actually getting more so. But great changes have taken place, more are in the making, and still more will come. The adjustment period we are going through is natural and necessary, and the wonder of it is that these changes are taking shape so smoothly. There is work for everybody for a long time to come, and nobody is starving.

Prices may keep on going up, or they may go down. We do not know. Wages may continue to rise, or they may not; it all makes little difference, as long as the relative value of things tends to keep pace, one way or the other, and we are willing to work, and produce, and buy.

We have confidence in American goods, American methods, and in the American people.

Buy!

The Prize Photo Contest

ANNOUNCEMENT of the winners of prizes in the prize photograph contest is made in this issue, and after careful consideration we feel that the judgment made is correct beyond question.

In this contest it was our desire to bring out the fact that automobile work was a possibility for the smith. We wanted to impress upon our readers the fact that they had a future, regardless of the trend of horsedrawn vehicles, but we are not satisfied with the result. It is our intention to start another contest early next year and we want our friends and readers to support us in our search for side lines for the smith.

We want to know just how the various smiths in the country are keeping busy, what work they are doing to take the place of shoeing. We know that they are not idle, and feel that an interchange of ideas along this line will be valuable to everyone.

In all probability our next contest will concern various side lines and we want to get all photographs possible. Let's all get busy now and pull together.

Farmers' Utility and Live-Stock Body

A Large, Roomy Body for General Farm Hauling, Adaptable for Live Stock

A FARMER'S use of an automobile truck is varied and very exacting; more so than is usually met with in other lines of business. He needs a truck that will cart his fertilizer from, and take his crops to the markets; sometimes a heavy load of potatoes and other times, perhaps, a bulky load of cauliflower—and for many other uses that he couldn't even tell you of himself, until the need arises.

It must be a heavy duty truck. One that will do very satisfactory service on the well-paved streets of the city, may be quite unsuitable for the rough work, over rough roads, that the farmer demands of it. He knows this, usually, and looks about for a chassis and body that will be strong enough to keep going, and adaptable enough for the various uses to which he must put it.

There always comes a time when the farmer must use his truck to carry livestock, of one kind or another, and there are many who do it regularly, as a large part of their business. The ordinary body is not suitable for this work, and a body that can handle it, in addition to doing the other work well, should be very acceptable.

The body illustrated below is one that has several features particularly fitting it to the farmer's needs. It is shown mounted on a standard chassis, and the dimensions are intended for a three-ton body, though they can be reduced to fit a smaller chassis with good results.

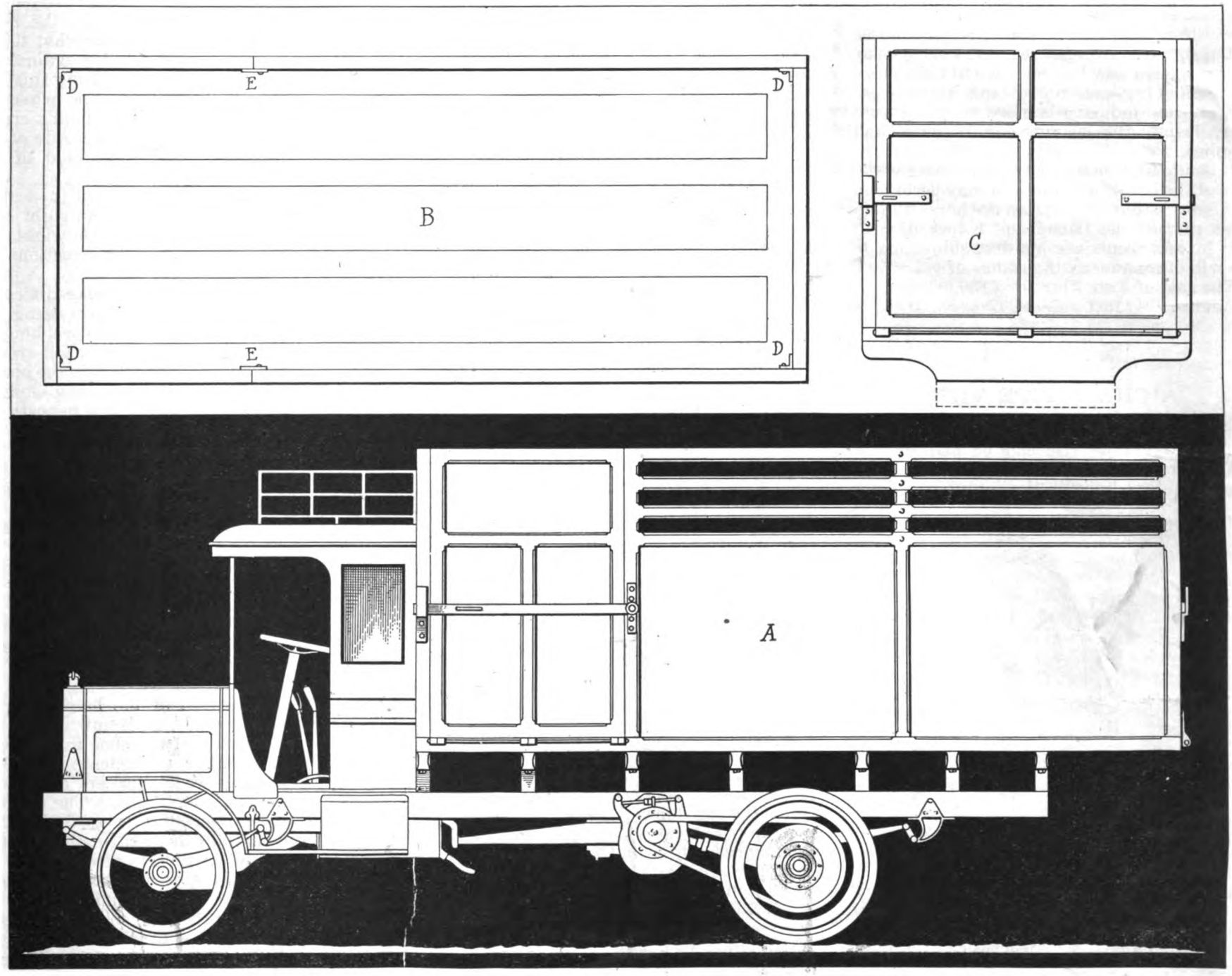
The body is 15 feet long, 6 feet 6 inches wide and 6 feet high; mounted on seven cross bars bolted to the chassis in the usual manner. Figures A, B and C show the side, plan and rear views, respectively. There are three doors in the design shown, all six feet high and dropping from the body on bar hinges. The rear door is the full width of the body, while the side doors are 3 feet 9 inches wide. Four angle iron door stops, D, are at the corners, and flat iron stops at E. Two swinging latches lock the rear door, and one large swinging latch goes clear across the side doors.

It is a simple box body, with ventilated opening on the sides as shown in the illustration, and the details of construction may be left largely to the shop constructor, remembering that a strong body is needed, for heavy duty work. The doors, both the paneling and the frame, must be of fairly heavy construction too, in order to stand the weight of entering animals; and should be cleated on the inside to prevent slipping. Three cross-bars should connect the body sides at the top. They may be made removable, if desired, but a six feet high loading space will ordinarily be ample for animals, and the bars will not materially interfere with other loads rising above them.

The advantages of this style body, especially for stock, can readily be seen. The dropping of these high doors makes a runway from the ground to the body, and does away with the necessity for a loading platform. A six or eight inch block placed under each corner of the door, when let down, will put the runway on an angle that any small animal, or a horse, will negotiate with ease, and that cattle should be able to take without much trouble. Loading platforms are not very plentiful on farms, and this ground-loading feature should recommend itself strongly to farmers.

Another innovation is the loading accessibility,—three separate entrances, all of which can be used at the same time to load or unload quickly. The inside can be penned off very easily into three pens, each with a door to it, and pigs, calves or even full-grown cattle can be carried in groups, and singled out for unloading without disturbing the whole load, where different deliveries are to be made. Or three different kinds of farm products can be loaded, loose, into the truck without mixing.

This is a really practical truck body, and even disregarding the adaptability for different kinds of work, explained above, it will do the farmer's work day by day in the capacity of a regular truck body. It will carry a loose load of small stuff right up to the top, and its size enables it to carry bulky, light loads equally as well as the heavier loads of potatoes, fruits, fertilizer, etc.



YOUR NEIGHBOR—THE RED CROSS

With a few hours' notice to collect his belongings and start for the U. S. A., the doughboy abroad didn't have any too much time to wind up his affairs.

Recently the Red Cross received a letter from a demobilized soldier inclosing an affidavit showing he had 3,000 francs on deposit somewhere in France, and asked the Red Cross to get it for him. His bank book had been lost in action, and he had forgotten the name of the bank, remembering only the name of the town.

That was all the Red Cross Home Service had to work on. Finally the bank was located and money sent to the doughboy.

The Home Service had its beginning in service to the American fighters. It helped

solve their problems—mental, financial and family. It will be your friend, too, for the true meaning of Home Service is neighborliness.

Go to the Home Service with your worries. The soldier did. No business tangle is too complicated, or any question too trivial, for the Home Service worker.

Many of the 30,000 men and women, most of them volunteers, who helped the men in khaki and in blue will continue their work in its broader peacetime meaning of service to all. Make a neighbor of the Red Cross.

A $130,000 HORSE

The purchase by Gifford A. Cochran of Major August Belmont's stallion Fair Play for the equivalent of $130,000 the other day is an interesting answer to the question, "Is the horse becoming extinct?" The answer is "No" to the extent of what is probably the highest price that ever has been paid for an American-bred horse.

Racing is not the sport it used to be. Anti-betting legislation has reduced in considerable measure the financial inducements for the raising of swift horses. But there are still hundreds of thousands of persons of both sexes in New York and in many other communities in America who consider an afternoon spent on the race track as a delightful and exhilarating occasion. These hundreds of thousands, even with the stimulus of money bets eliminated, are still worth catering to, and the lively scenes on every race track during the season show that they are being catered to.

But there are signs that the race horse interest is no longer the principal motive back of the promotion at heavy expense of great horse-breeding establishments. Despite the almost phenomenal development of the automobile industry, the horse still retains its position as the main tractive power for short hauls. During the war the race of horses suffered even more severely than the human race. It is estimated that the life of a horse in the fighting armies averaged twenty-four hours. It will now be necessary to raise large numbers of horses to replace this heavy wastage, and the industry is more lucrative than ever, despite the heavier cost of labor and supplies.

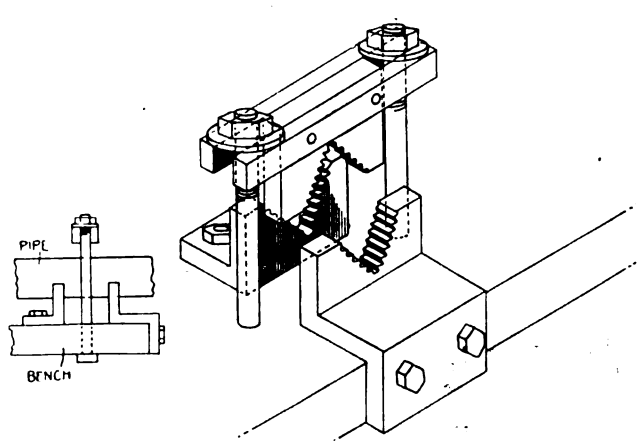
It would be safe to say that, however widespread the use of automobiles may become in this age of stimulated speed, the horse will always remain the friend and helper of man that he has been since his first subjection to the will of man many thousands of years ago.

The sale of Fair Play for $130,000 is a reminder of this fact.—*N. Y. Evening Mail.*

A CHEAP PIPE VISE

By Chas. H. Willey

AN extra pipe vise can be had for the shop bench quite cheaply from the odd pieces of stock lying in the junk bin. I have made one with no other expense than that of a couple of hours' time when things were going smoothly.



Details of the Pipe Vise.

It is so simple to construct that I am passing the idea along in the sketches which show both the detailed and assembled parts. The jaws are made of ½-inch stock, a V-piece being cut out of each jaw and teeth filed into them. The lower jaws are bent to the shapes shown for securing to the bench. The top jaw is riveted to two cross pieces and long bolts are used for operating it.

Practical Horse Shoeing

The Right Way: Fitting the Shoe to the Hoof, Not Fitting the Hoof to the Shoe

THE wear of the old shoe will often tell a great deal. Thus, if the shoe shows distinctly more wear on one side than on the other, there is probably something wrong either with the form, the dimensions, the manner of placing the shoe on the hoof, or else in the way the bearing surface of the hoof was prepared.

The side of the shoe that is heavily worn away may be too narrow relatively to the other side. If this is the trouble, then one considers which of several remedies to apply. The heavily worn side may in the new shoe be broadened. There may, however, be some objection to this remedy. Thus, the side may already be as broad as the thickness of the horny wall renders advisable. A second remedy consists in narrowing the side which showed the lesser wear. And a third remedy consists in combining the widening and narrowing. But one-sided wear may be caused by wrong trimming of the bearing surface of the horny wall.

If the wall has been left too high on one side and too low on the other, the one side will naturally strike the ground first or with greater force and bring about excessive wear. The remedy consists in paring off more horn on the side of excessive wear, so as to bring about a more even placing of the shod hoof on the ground. The unequal wear may, however, be due to the fact that the excessively worn part of the shoe is unnecessarily located too close to the center of the hoof. This is corrected, naturally, by attending to this matter when shaping the shoe.

Handling the Horse

The lifting of the horse's foot for shoeing or other purposes is general, in the United States and England, since in these countries horses grow up accustomed to it. There are exceptions to the general rule, especially where the horse is timid or vicious or quite young. An assistant may be needed to hold a horse. In cases where the horse is to be tied, it will ordinarly be well to loosely secure the halter rather than tie it with a firm knot. That is, pass the free end of the halter through a ring and then wind it round the other part, using several turns. The idea is so to arrange affairs that if the horse "hangs back," the halter will give.

In general, but not always, it is best to handle a horse's leg more or less before grasping the foot and lifting it. There are cases, however, where the horse-shoer will probably do better by taking a firm hold at once. Thus, this treatment may seem preferable with ticklish horses. It is well, as a general rule, when dealing with the usual horse, to get him accustomed to standing on three legs before going on with the shoeing. Sometimes, especially with young horses, it will be well not to keep the foot in a raised position too long at a time, but to allow a short rest.

If the horse is old and stiff, one may make a mistake in lifting the foot too high. If a horse's hocks seem stiff, one does well not to draw the leg forward, but to shift it back and up. The horse is, naturally, not to be unbalanced when the leg is moved in this manner; otherwise an accident may occur.

An approved method of lifting a fore foot is as follows. The horse-shoer stands facing the horse but to the left side, in case it is the left fore foot that is to be raised. After speaking to the horse and reassuring him thus in a quiet way, he places his open right hand flat on the horse's shoulder. Simultaneously, he uses his left hand to stroke the limb downward to the cannon bone. This is the long bone above the fetlock joint. The bone is now grasped from the front. The right hand is kept in place on the shoulder, but is exerted to push the animal gently to the right. The object is to get the weight off of the left leg.

The left hand, still grasping the cannon bone, now lifts the leg, the right hand being moved at once to grasp the upper pastern—the bone just below the fetlock joint—on the inside. The left hand is shifted from the front of the cannon bone to the upper pastern on the outside. The horse-shoer now turns somewhat to the right and supports the horse's leg on his own left leg.

Similarly, the left hind leg. The horse-shoer smooths or strokes the horse gently towards the rear, until he reaches the angle of the hip. The left hand is placed against it, while the right strokes the leg downward until the middle of the cannon bone is reached. This bone is then seized from behind. The left hand, still on the hip, is now exerted to press the horse gently to the right in order to relieve the left leg of load.

The right hand is next exerted to lift the foot forward and outward from the body. This movement bends the leg at the hock. The horse-shoer now turns somewhat to the right and places his own left leg against the front of the fetlock joint. In doing this, the horse's foot is to be shifted back, while his left arm is passed over the animal's croup, and also "above and to the inner side of the hock." Then both hands get hold of the upper pastern bone.

Similar methods are employed in dealing with the right fore foot and the right hind foot, with proper reversals of the right and left hands, etc. The foregoing directions are from A. Lungwitz.

Troublesome horses may create difficulty. The following is a method for raising the hind foot. A broad band of webbing is knotted into the tail. It is then looped around the fetlock and the free end held in the hands. The man takes hold of the webbing close up to the fetlock and draws the foot beneath the body towards the front and holds on to the end. The object is partly to support the horse and partly to compel him to assist in supporting himself. There is also the purpose of hindering kicking. When this method is to be used, the fore foot on the same side is to be lifted prior to making any attempt to put the band around the hind fetlock.

Getting Old Shoes Off

Old shoes may be taken off in three or more ways. One begins as follows: (1) the clinches are all cut, care being taken not to injure the surface of the hoof. A pair of pincers with broad bills is now used to encompass the branch of the shoe in such way as to come together underneath the shoe. Then the handles of the pincers are moved in the direction of the branch. The effect of this lever-like operation is to loosen the branch and partially draw the nails. Or (2), instead of using the pincers after cutting the clinches, the nail-cutter may be driven from behind in between the hoof and the shoe. In this way, the branches are somewhat raised, carrying the nails with them. After the nails are loosened and started by either of

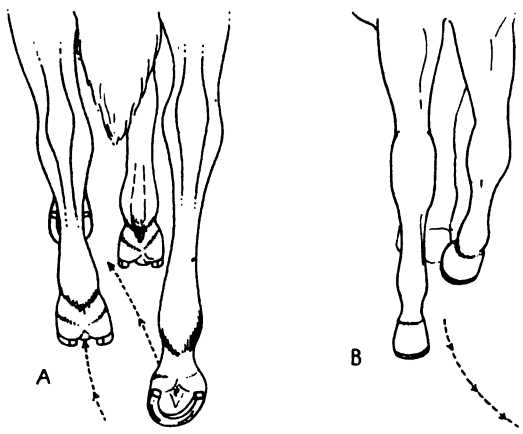
the foregoing methods, there will be little or no trouble in drawing them singly. The remaining method (3) consists in driving out the nails, one by one, from the points where the clinches are cut off. The first of the three procedures is perhaps the best. The last is suited to troublesome horses or to cases where the shoes have recently been put on, or to cases where the hoof is brittle.

Prior to the removal of the shoe, it will be well to make sure that the hoof is thoroughly clean. If it is encrusted with dirt, a stiff brush will usually be an adequate means for its removal.

Getting the Hoof Ready

Naturally, the hoof grows when it is protected from wear by the shoe. In consequence, after the old shoe has been gotten off, it will be necessary to pare it down to a proper level. This operation is probably the most important of all that the horse-shoer has to perform. This will be clear, perhaps, to those who have read with care the preceding instalments of this account. Upon the proper paring (dressing or trimming) of the hoof will often depend the correction and prevention of strained tendons, retarded circulation, irregular growth of the horny parts of the foot, etc., etc. The cutting down of the hoof should be done in the course of every three or four weeks. Neglect of this for six or eight weeks will ordinarily result in a change of the relation of the hoof to the fetlock. "The gait loses in freedom and certainty, the toe grows too long, an increased strain is thrown on the flexor tendons which favors stumbling, the shoes become relatively too short and too narrow, and are overgrown by the hoof, while corns may be caused by pressure on the angles of the heels."

The *hoof knife* and the *rasp* are necessary tools. If the hoof is quite big and hard, it may seem advisable to use a sharp *hewing knife* whose sides are flat and smooth, and which is fitted with a broad handle. First, one gets rid of any dirt previously left and removes loose flakes of horn. Such flakes may form in consequence of repeated bendings of the lower border of the wall. Then,



Two Kinds of Gaits: A, Feet Swing In; B, Feet Swing Out.

on the horny sole of the foot, there may be more or less dead horn. These pieces are removed. The trimming proper may now begin.

The tools used in taking off old shoes and in cutting down and paring the horny parts of the hoof are more or less familiar. At the same time, it may be best to avoid all misunderstanding by adding a word or two on this head. The *buffer* and the *shoeing hammer* are employed together to cut the clinches and in driving- and turning-down new nails. The former is made from high carbon steel—a piece of an old rasp will answer. The cutting edge is hardened and tempered. The buffer requires a pretty accurate degree of tempering, so that it will not be brittle and yet will cut the metal of the nails. The temper used for hacksaws will be about right. The hardening may be done as usual—that is, the piece is heated up, say, to a *bright cherry red* and then quenched in water or oil, preferably oil. The tempering may properly be done by using a slab of metal to impart the heat. That is, after the hardening operation, the slab is heated, say, to a black heat which is about to turn to a dull red. The cold work is laid on the hot slab, a working spot being selected where there will be no drafts and where the changes of color will be readily watched. When the color has deepened to a *light purple,* the work is quenched quickly in oil or water, preferably oil.

The *drawing knife* is another important instrument that may be made from an old discarded tool. Thus, an old file may be used as the basic material. Several sizes are to be provided. The hardening and tempering may be carried out along the same lines as set forth in connection with the buffer. A *toeing knife* may also be made from file metal—an old rasp, for example. Such a knife is, however, not to be put into the hands of a careless or ignorant man, as he can cut away horn material too easily. Once cut away, it cannot, of course, be restored. The toe knife may be omitted altogether, if desired.

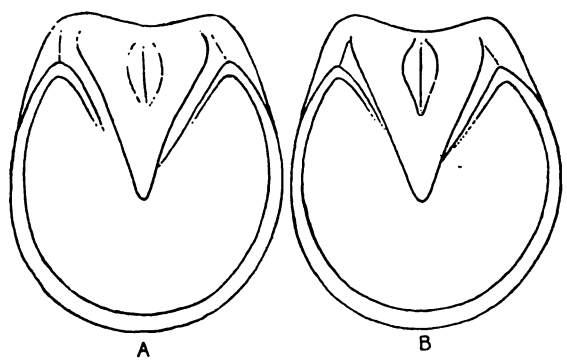
There are cases where the hoof is quite weak, and the horse-shoer may feel that, if anything, he should add horn rather than cut it away. He will do well, then, to proceed cautiously in such cases. As to loose horn, this is to be cut away under any circumstances, as it would not sensibly help to provide support, if left in place. The *white line* is now of importance. The horse-shoer aims to supply himself with a clear view of the white line all around. The workman then notes the condition of the white line itself, and observes the thickness of the horny wall by its aid. The wall is cut to the level indicated by conditions. This matter has already been gone into pretty well. The horny sole should be relieved of any horse material. Ordinarily, nothing more should be done to the sole, at this juncture, except as provided in the next few sentences. In general, the bearing surface of the horny wall is to be cut down until the sole is involved in the cut. That is, the bearing surface is pared down until there is included in it a very narrow border of the sole. This narrow border will lie next to the white line and within it. Its width will properly be about that of a wheat straw. The paring should generally stop when this narrow margin of the sole is brought into the bearing surface. The whole bearing surface will now consist of three rings of the general shape of a horseshoe. These are, (1) the bottom edge of the horny hoof; (2) the white line; and (3) the outer margin of the horny sole. The bearing surface is now leveled off to suit conditions, the leveling being done with the rasp alone. Sometimes, it will happen that little or nothing is to be removed at various points of the horny wall, because it is already down as far as it seems safe to cut or file.

The sole may be rather thick or it may be quite thin. A thick sole is indicated by a dull color, small cracks in the horny material, and deep lateral grooves along the sides of the horny frog. The sole loses material through natural causes, such as the growth of the sole itself, the alternate dryness and wetness of its substance, the elasticity of the sole, and the movement when the horse is in action. All these combine to loosen horn and to break it off. In fact, the loss of material from a sole will frequenly, or usually, be enough to reduce and weaken it—"a strong sole is rare." On the other hand, if the foot is upright and the horny wall steep, the sole will tend to strength.

Ordinarily, the bars should not be cut. They should always have connection with the wall at the quarters, and this connection should not in any case be cut through. They may be left level with the bearing surface of the wall, or else a trifle lower. The extreme rear parts of the sole should be trimmed, say 1/12 inch.

The frog is left prominent. It may be allowed to project beyond the bearing surfaces of the quarters an amount about equal to the thickness of a flat shoe. It is an error to weaken the frog by any unnecessary paring; as such weakness tends to make it less active. Shrinkage ensues and the hoof narrows. This last is not wanted, ordinarily; and so, one must not unnecessarily weaken the frog and bring it about. If, however, the frog is entirely too prominent, one necessarily has to trim it a little. Where the foot has contracted the diseased condition known as *thrush,* it is proper to pare away diseased pieces of the horny material of the frog. The foregoing is not to be understood as cautioning against the removal of loose material. The thing to bear in mind is to provide, as far as possible, for a strong frog. It may then be frequently left to wear to precise dimensions.

The extreme margin of the bearing surface is to be narrowed by rounding the inclined outer surface of the hoof next the bearing surface. Let this point be thoroughly understood. The bearing surface itself is not rounded; nor is it now tampered with further than narrowing it by taking off material from the outer margin. This taking off of material occurs in the rounding, but does not affect the flatness of the bearing surface. The proper amount of rounding is partially indicated by the following requirement. The narrowed bearing surface of the horny wall



Steps in Trimming Hoof.

is to be just about as wide as the hoof wall is thick, when the thickness is properly measured perpendicularly through the wall. A bearing surface, prepared by simply trimming it horizontally, will be wider than the true thickness of the wall. This is due to the slant of the horny wall, and has already been explained in a former instalment of the present series of articles. The rounding narrows the bearing surface of the horny wall to some extent. The amount left is to be as wide as the horny wall is thick (the thickness being properly measured). In short, the rounding is done until the apparent thickness and the true thickness are just alike.

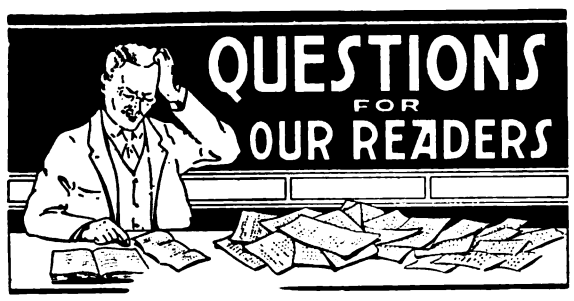
Some special points need to be noted. If the toes are turned out, the outer wall of a hoof will appear longer than the inner wall, if the hoof is viewed from a point in advance. Similarly, if the toes turn in, the inner wall will be the longer of the two. The horse-shoer will do well, then, to note such conditions, and observe just how the true axis runs, before he begins trimming. The authority of Goyau is understood to be back of the following suggestions. First, seek to imitate the effects produced by natural wear. "Natural wear produces a flat foot of a form best suited to the conformation of the limb it terminates. It shortens and rounds the toe, lowering it to a greater extent than the heels; removes horn only from the anterior part of the sole, leaving the connection between walls and sole of full strength; rounds off the outer edge of the wall more than the inner, and spares the sole, frog and bars, which shed their superfluous growth naturally. Natural wear gives to the foot the form best suited to the animal's action, and produces a perfectly flat bearing surface from the quarters to the heels." Goyau states that the equilibrium of the limb should result, in so far as possible, from the preparation of the hoof rather than from a shoe providing varying thicknesses of metal.

A Tailor's Sign

The tailor's sign in a little inland town was an apple, simply an apple. The people were amazed at it. They came in crowds to the tailor, asking him what on earth the meaning of the sign was.

The tailor, with a complacent smile, replied:

"If it hadn't been for an apple, where would the clothing business be today?"



Brake Testing for Horse Power

From J. T. Gayton, Georgia.—Will you please send me plans for making a Brake Test for engines?

Have any of our readers actually worked this out practically? We should like to publish working plans for a simple brake test on gas engines for Mr. Gayton and other of our readers who would like to test their engines and actually know, in horsepower, just what power they are delivering. There are several simple ways of doing this; perhaps some of our readers have done it. For the information of those who would like to work it out, one horsepower is the energy required to lift 33,000 lbs. one foot in one minute; or, any like proportion, as 3,000 lbs. eleven feet in one minute.

Wanted—A Tire Shrinker

From Frank Morris, Washington.—I would like to obtain a second-hand, number 3 Ayres Tire Shrinker, or if not, a Number 1 or 2 Champion Star Shrinker would be just as satisfactory. I think that it is very probable some one of the readers of the B. & W. may have such a machine in good condition and be willing to part with it.

If any reader has such a device they can get in communication with me through the magazine.

HARD ON THE HORSE

There are many different kinds of shoes for horses, but our printer evidently has his own ideas on the subject. Mr. Springer, in his interesting article on horseshoeing, running in these columns, advocates a thin shoe, where possible. When the manuscript was returned by the printer, set up in type, our proof-reader, though not a veteran horseshoer, was surprised to read *"A tin shoe is advocated."*

NEW BOOKS RECEIVED

Techno-Chemical Receipt Book.—Sold by the Henry Carey Baird & Co., of 116 Nassau Street, New York City, at $2.50. This book is really a general encyclopedia of formulas of use to everyone. It will be of interest to the manufacturer of alloys, of explosives, of earthenware or leather;—to the confectioner, to the engineer, to the painter and to the housekeeper. It is more than worth its price in the money that it will save.

Forge Practice.—This is the third edition of the book written by John Lord Bacon and sold by John Wiley & Sons, 432 Fourth Avenue, New York City. This book describes in detail the forge and tools, then gives directions for doing practically all kinds of forge work. It has a chapter devoted to welding and one devoted to tool forging and tempering. It should fill a big want among all workers of iron and steel. Its cost is $1.75.

Automobile Engineering.—The six volume set of automobile engineering books which is published by the American Technical Society, Dept. A-67, Chicago, Illinois, is without doubt one of the most complete instructional automobile references on the market. This set is so written that the amateur can understand it fully and by careful study acquire a working knowledge of automobile mechanics. The books are written for the man who has not had the opportunity to educate himself.

In volume one the power plant is taken up and the parts described. This volume takes up in detail the troubles common to engines, carburetion and lubrication. Volume two takes up clutches, transmissions, running gear and chassis. Volume three is devoted to ignition, starting, lighting and wiring diagrams. Volume four continues the electrical system with a special emphasis upon the Ford system and on storage batteries. Volume five is a treatise upon welding and repair shop practice. It also includes the subjects of motorcycles and steam cars. Volume six is devoted to tractors, electric, and commercial vehicles. It also contains the general index.

The whole set of six books is sold upon an easy payment basis. Should our readers be interested they may obtain the set for a seven-day's examination.

Freight Haulage—Rail or Motor?

The Results of a Careful Comparison by a Large Company with Fifteen Trucks

Increased haulage is creating a demand for trucks and wagons which ought to make the business hum, and the wheelwright and blacksmith will get their share of the business from all appearances. Haulage is a paying proposition today. No distance seems too long for the modern truck with its special body adapted to the particular needs of the shipper.

Careful comparison of the cost of shipping by motor truck and by rail, as made by the Fisk Rubber Co., of Chicopee Falls, Mass., shows that it is cheaper to make shipments from the factory to New York and Boston by motor truck than by railroad express or freight.

The analysis made by the company's road transportation department, which has been in operation for some time and has greatly developed, is based on the operation of fifteen motor trucks, including trucks of ¾, 2, 3, and 5-tons capacity. No trailers are operated with the trucks as yet, but the company has been considering the use of trailers as a means of still further reducing its haulage costs.

Comparative figures are as follows:

This table emphasizes strikingly the economy and importance of operating trucks at as nearly as possible their full capacity, and also the superior economy of the larger trucks over the smaller units.

Outgoing shipments from the factory consist of automobile and truck tires and sundries, and incoming shipments of tire fabrics, litharge and valves. Following is an analysis of the freight and express costs, including haulage at both ends in the case of freight shipments and war tax on both freight and express shipments:

ITEMIZED FREIGHT RATES

Outgoing	New York Cents		Boston Cents	
80% Tires @ 63c per cwt.	50.4		50.4	
20% Sundries @ 42c per cwt.	8.4		8.4	
War Tax @ 3%	1.8		1.8	
Hauling per cwt.	45.0		40.0	
Total		10.56		10.06
Incoming				
50% Fabric @ 30.5 per cwt.	15.3		30.5	
30% Litharge @ 23 per cwt.	6.9		..	
20% Valves @ 36 per cwt.	7.2		..	
War Tax @ 3%	0.8		0.9	
Hauling per cwt.	20.0		20.0	
Total		50.2		51.4
Average per cwt.	77.9		76.0	
Cost per ton-mile (rate × 20 ÷ mileage)	10.4		15.2	

ITEMIZED EXPRESS RATES

Outgoing and Incoming	New York	Boston
Express rate per cwt.	126.0	99.0
War Tax @ 5%	6.3	4.9
Total	132.3	103.9
Cost per ton-mile (rate × 20 ÷ mileage)	17.6	20.8

Thus, it is cheaper for a company in or near Springfield, Mass., to do its hauling to Boston with its own motor trucks of 2, 3 or 5 tons capacity than to ship by freight, provided full loads are carried by the 2 and 3 ton trucks and loads of 2½ to 5 tons are carried by the 5-ton trucks, and is cheaper to haul to New York with its 5-ton trucks, loaded with 3½ to 5 tons, than to ship by freight.

To ship to Boston by express costs more than to ship by trucks of 1 to 5 tons capacity, provided the 1-ton trucks are loaded to capacity, the 2-ton trucks carry ½ to 2 tons, the 3-ton trucks carry more than 1½ tons and the 5-ton trucks carry 1¾ tons or more.

COST PER TON-MILE

	To Boston or New York by Motor Truck. Full Load. Cents	TO BOSTON Express Cents	TO BOSTON Freight Cents	TO NEW YORK Express Cents	TO NEW YORK Freight Cents
5-ton truck	6.9	20.8	15.2	17.6	10.4
3-ton truck	10.5				
2-ton truck	13.82				
¾-ton truck	17.15				

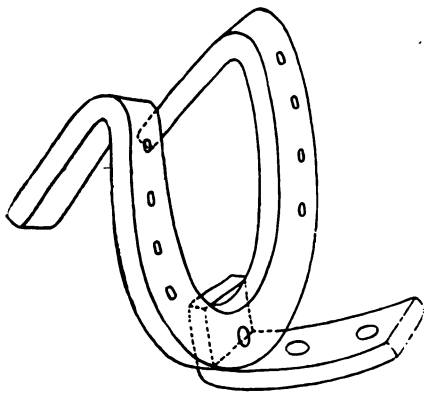
COST PER TON-MILE BY TRUCK WITH VARIOUS LOADS

Load	5-ton Truck Cents	3-ton Truck Cents	2-ton Truck Cents	Cents	¾-ton Truck Cents
5 tons	6.9				
4 tons	8.6				
3½ tons	10.0				
3 tons	11.5	10.5			
2 tons	17.25	15.75	13.5–14.15		
1½ tons	23.0	21.0	18.0–19.0		
1 ton	34.6	31.5	27.0–28.3		17.08
¾ ton	51.0	42.0	36.0–37.5		22.75

A Peculiar Case

From Theo. Anderson, Nebraska.—I am sending some pictures of a horse's foot which I shod. This horse was born with a club foot (he walks on the front of the foot instead of the bottom) and now works fine with the shoe I put on.

I turned the heels at the nailholes on a slant and welded a piece of steel on the toe four



A Sketch Showing Construction of the Shoe.

inches long and one and a-half inches wide. The shoe used is a No. 4 in order to leave stock enough to bend into a four inch high heel.

* * *

We feel that our readers are interested in peculiar problems like that which Mr. Anderson has brought to our attention and so we have reproduced on this page all of the pictures which he sent us.

In addition to the photographs which he sent, our artist has sketched the shoe itself which appears above and how the shoe looks when it is applied. The latter sketch is shown in the lower right hand corner of this page.

Undoubtedly there are many horses in the country which have deformed feet and unless some method is used whereby shoes can be applied, the horse cannot do a great amount of work. There must be, as in the case of which Mr. Anderson speaks, a method of shoeing in practically every case.

This is a good opportunity for some of our readers to tell us about "Strange Cases they have Shod." It would be interesting to know if any brother readers have treated similar cases and if their methods have differed. We cannot see why it would not be possible to make a combination metal and leather or metal and wood shoe which would even off the bottom of the foot and bring the strain more in line with the center of the leg.

(EDITOR.).

Pointing Plows

From John Newman, Kansas.—A great many blacksmiths do not know how to weld plow points on, well enough to take more than one or at most two sharpenings, then the welding has to be done over again. There are several reasons why the work is faulty. The main one is that they want to get the work done in a short time with one heat, whereas two or more welding heats would make a much better job.

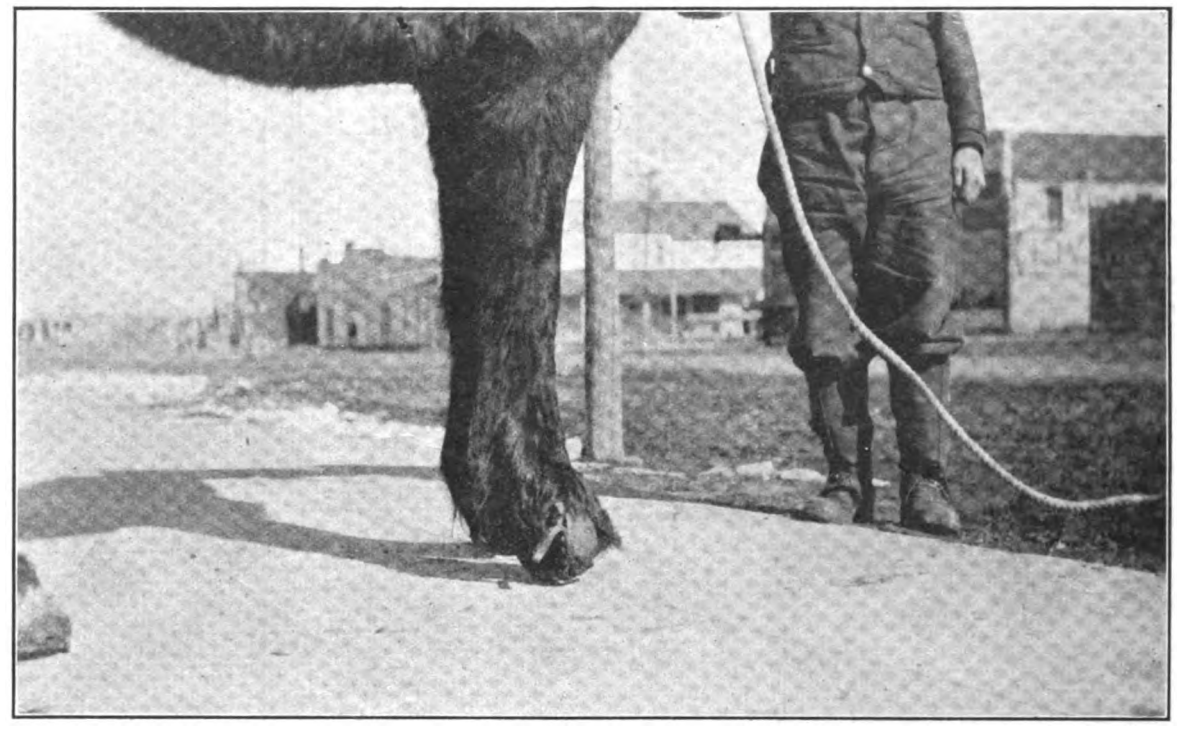
When one smith puts on a poorly welded point, the next blacksmith, who gets the work to sharpen, has a job—the job of re-welding and the customer usually makes a kick about paying for the extra work. The writer has done hundreds of such jobs without any pay.

When I first came to my present location, an old blacksmith used to drop into the shop very occasionally and watch my work. He was 82 years old and of course had retired from business, but though he seemed to think my way of pointing shares was very satisfactory, he said that it took me too long and that I made hard work of it.

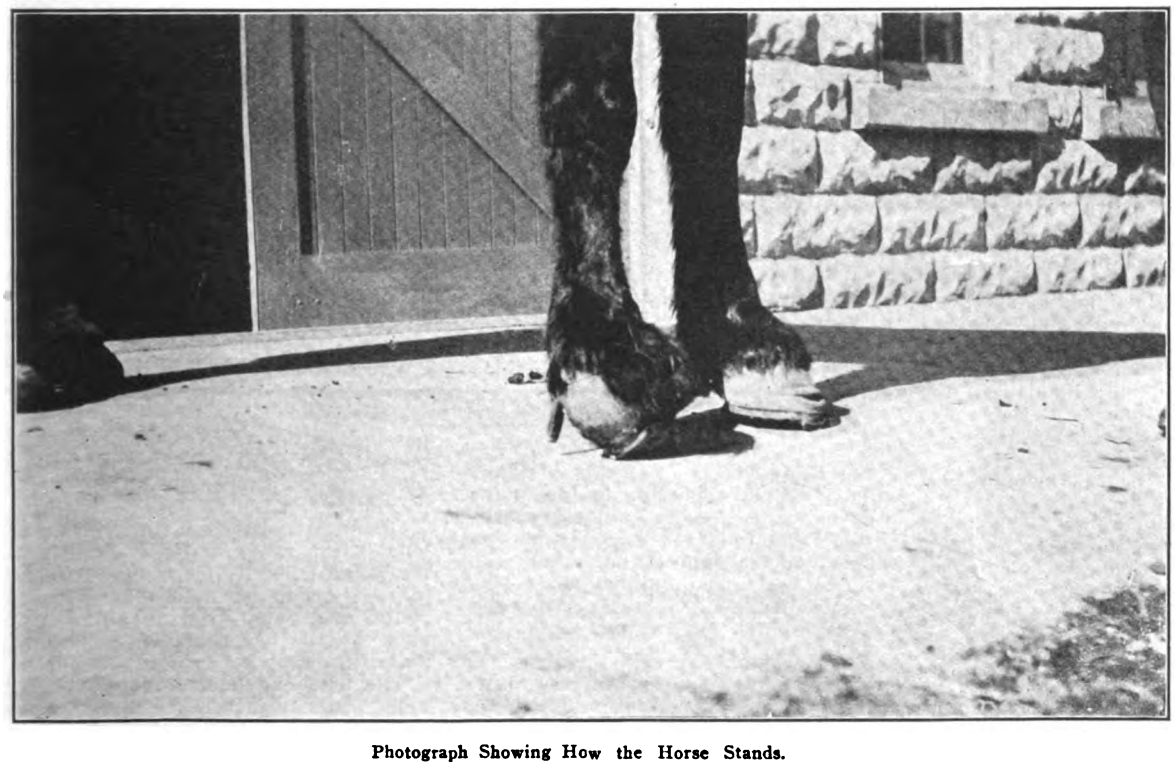
One day when he came in, he suggested that he would like to show me how he made his points. He thought that it was a much easier way than mine, and in fact thought that it saved about half of the work. I told him that the next plow I had, I would call upon him to do. At that time the old man told me how he came to learn the trick.

It seems that when he was in business in Iowa a long time ago, one noon hour his helper, while the old man was at dinner, pointed a share in his own way. When the

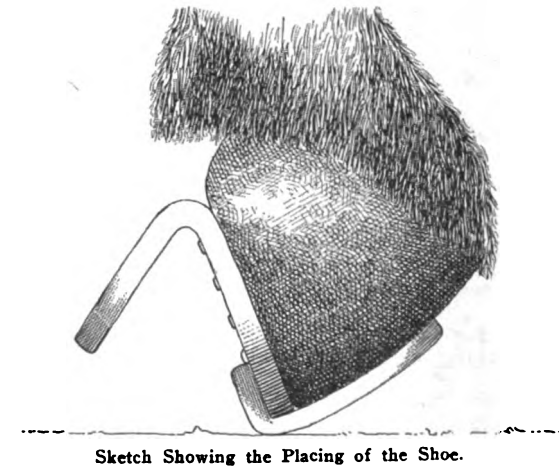
A Photograph Showing the Shoe in Place with the Foot Lifted to Give a Better Idea of the Construction and Application.



A Rear View of the Shoe in Place and the Horse Standing On It.



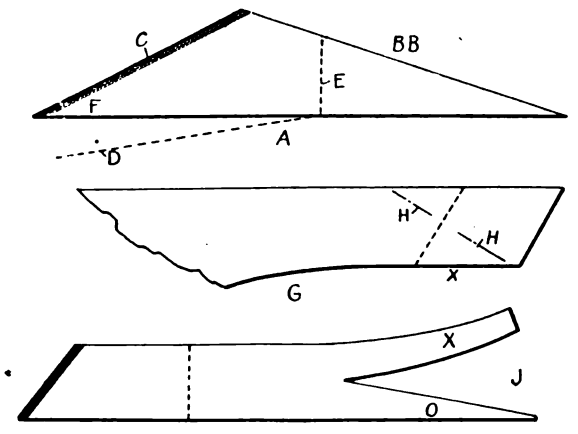
Photograph Showing How the Horse Stands.



Sketch Showing the Placing of the Shoe.

old man saw the work, he realized that it was done in a better way than that which he did it himself. The old man said that the helper was not of much account in other work, but this was the only useful thing he could do.

Now there may be a great many smiths who do pointing in the same way, but I have never seen them. At figure *A* is shown the shape of the steel. A rasp or old file will make an excellent point. If any thinner material is used the points will have to be cut wider and the edge marked *BB* hammered back. The shaded edge *C* is drawn out sharp and in drawing it, that part will shape or curve to fit the share somewhat as shown by the dotted line *D*.



How Mr. Newman Makes and Welds His Plow Points.

The material is next thinned along the dotted line *E* with a fuller or hammer so that it can be bent under and back easily. Then the point *F* in the drawing *A* should be bent downward until it comes to the point *X*, as shown in drawing *G*, where it should be held with a pair of tongs and given the first heat at *BB*. You will be surprised at the easy job this makes.

The two lines *HH* on view *G* show how most smiths point. This way does not give any material in the throat of the share where material is needed. View *J* gives an idea of the method I used for a good many years. It makes a fairly good job, but takes lots of time and requires work. It cannot be done very well without a helper to cut out the material at *O* and *X*.

The points *O* and *X* are welded to the bottom of the share; *O*, on the landside point, *X* on the throat of the share. The shaded upper end is drawn out and welded at the dotted line. It is fullered thin to bend up and back in the proper position of the share. On first appearances one might think that *J* would make a better job than that shown at *A*, but it does not.

I might say a few words about tempering plow-shares. In the first place, never try to temper a solid steel share, for many of them will go to pieces. A soft center share, however, can be tempered fairly easy. After sharpening, one should be sure that the share does not have too much curve where it joins the mold board, but should be shaped so that it will be almost straight.

The share should then be heated red hot all over in order that it may take an even temper. If the heat is spotted, you will get poor results. The tempering liquid that I use is mixed as follows:

Into one-half a barrel of water place about a peck of common salt and a bucketful of hard-wood ashes. Many smiths also add blue-stone (copper sulphate) though I have never tried it.

I wish that more of the smiths would say something about tempering plow-shares for I have an idea that there are many better methods than mine. In this location I do not have to temper them because they are hard steel, but where I used to work practically all of them had to be tempered because they were the soft center type.

I may mention that when the share I have spoken of is first made it will be practically straight before it is put in the tempering bath and the cooling will curve it to its proper shape usually. Once in a while, however, the share curves too much. In such event, the share must be reheated and done over.

In plunging the share into the cooling liquid, it should be plunged in its full length with the mold board edge downward. I always grip the share by the wide part of the land side. Then there are no soft spots in the edge of the share.

SPARKS AND SHAVINGS

The Presto-O-Lite Service

The Prest-O-Lite Company originally started to produce gas for automobile head light consumption and has been in the field for a long time. This company also manufactures gas for brazing, welding and cutting. As the call for lighting acetylene dropped off, this company gradually worked into the welding-gas line and have really grown up in this particular field.

At present the company are supplying gas for welding all over the country and users are fully satisfied with the quality. Our readers who do welding should investigate the Prest-O-Lite service and will find the gas made by this company to be of the best quality.

The New 1920 Model

We wish to call you attention to page 28, the L. S. P. Calking Machine Co.'s advertisement; it is at this time of year they announce their New Model.

We all know that during the War and these War time prices that nearly all machinery and parts have been advanced two or three times the former prices, and in many cases making it prohibitive for some to have the benefit of labor saving machinery when so much needed.

We have been constantly doing business with the L. S. P. Calking Machine Co., Wyalusing, Pa., for the past ten years, and it is with the utmost pleasure we are privileged to give you the following facts:

In the first place, we might mention that the L. S. P. Calking Machine is patented, therefore, there are no strings on this Company; it has a right to charge what it wishes.

We understand that it has no competitors, as it is the only Calking Machine advertised in the trade papers, and being behind with orders from a week to a month, it would be nothing only natural to expect this machine to be boosted in price to the limit, however, the price of this wonderful machine has not been advanced ONE CENT.

When the World War started and help leaving the shops, the L. S. P. Calking Machine Co. said they would do their bit by furnishing the Horseshoers with this labor saving machine at a price that all could receive the benefit.

Many would have had to close up shops without this machine, for they could not get help. This company not only made good during the War, but also are holding to the same price now, and assure us that if they are compelled to advance the price, it will be strictly necessary.

No; they have not cheapened the machine; on the other hand they have strengthened the weak parts, making it more expensive to make.

A few reasons, which has made it possible for this machine to be sold at the same price of four years ago, it has gone through the experimental stage, which is expensive. A great satisfaction to the purchaser to know; he has a perfected machine, not one to be improved the next month: the only change in their Model being the date.

They sell by Mail order and through the Jobbers, no salesmen on the road, one machine selling another, which is the best testimonial that any machine can have.

Hi-Lo Jack

The Rowe Calk & Chain Co., of Plantsville, Conn., are putting on the market a device called the Hi-Lo Jack, which is suitable not only for wagon work, passenger cars and trucks, but is adaptable for railroads and building trades. This device is made in six sizes with capacites from half-ton to 12-tons.

The jack has several features that distinguish it from the ordinary device, the first being its compressibility, that is, it can be closed to within six nches of the ground and at that point will exert a large percentage of lifting power; as the jack extends the lifting power increases, and when fully extended to 17 inches, the power is at its maximum.

It can be seen that this jack has a long lifting range and a low initial lifting point. The device is made from the highest grade of malleable iron, cold-rolled steel and drop forgings. Each pack has a ball-bearing thrust which makes for easy operation.

The load can be raised or lowered a fraction of an inch. The manufacturers claim that they test each jack before it is shipped and each jack is guaranteed to be perfect in every way.

I AM THE FOUNTAIN HEAD OF THE ABUNDANCE OF THINGS

I KEEP the populace awake when otherwise they would slumber—I am the active agent stirring up work for millions of men and women—I keep doors from rusting on their hinges—I make folks think—I compel them to open their purses and buy anything—Everything that is good—I am Advertising.

Oxygen for Cutting

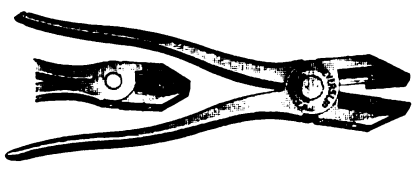
Oxygen is being used more and more by the wheelwrights and blacksmiths, as its value is becoming understood, for cutting and other purposes. The service problem is to make it readily available as it is needed. The Linde Air Products Company, of New York, manufacture it and have kept adding to their distributing stations till now they have sixty-four of them, located in thirty-one states. Their advertisement in this issue states that a mail or telephone order will be shipped the day it is received from any of these stations, and gives a list of the addresses, by states.

The Neverslip Plier

The Neverslip Works of New Brunswick, N. J., have announced an addition to their line of the Neverslip Plier. This plier is the development of a war-time condition,—conservation and the manufacturers are to be commended upon the fact that they have produced a plier which is practically indestructible.

The life of a plier depends entirely upon the life of its cutting blades as soon as the cutting edges are broken or worn, then the value of the tool is reduced to almost nothing for it no longer is of use in cutting but is simply a pinching or holding tool.

The Neverslip Side Cutting Plier, however, is of unique construction for the *cutting edges are renewable.* This means that the plier can be used indefinitely. As soon as the blades are worn, they can be replaced with new for only a few



Above, the Neverslip Plier; at Right, the Plier Jaws.

cents. If, for any reason, the blades should be nicked or broken the plier can be restored to its value by replacing the broken blades.

This feature makes possible the use of selected steel for the blades. Steel which is best adapted for the work to be done. In other words, each part of the plier can be made to do its own part of the work.

The body of this plier is made from drop forged steel with jaws that combine toughness with strength while the jaws are made from steel that is both tough and hard. Our readers should write for an illustrated catalogue.

The A-B-C of Ford Motor Repairing

The manufacturers of the Sioux valve grinders and valve resurfacers have just issued a little booklet which is called "The A-B-C of Ford Motor Repairing," and without doubt this booklet will fill a long felt want on the part of both the car owner and the mechanic who repairs cars.

Primarily the booklet is intended to accompany the Sioux valve grinding and refinishing tools. For the benefit of our readers we will mention that these tools are manufactured by Albertson & Co., of Sioux City, Iowa. The tools consist of a mechanical valve grinder, a valve trueing and refacing device and a valve seat resurfacer.

The valve grinder is hand operated and gives a reciprocating or forward and back movement which is necessary if the valves are to be ground properly.

The valve refacing tool is so designed that the valve can be placed in it and turned with a handle. As the valve is turned a cutting tool removes the rough spots and leaves a true valve face.

The valve seat reamer or resurfacer is really a taper reamer which cuts the valve seat at the proper angle to receive the valve.

In addition to the above tools the outfit includes two boxes of valve compound and a spring which is placed beneath the valve so as to lift it from its seat while it is being ground as the pressure upon the grinding tool is removed.

The little booklet gives not only specific directions for doing all of the work necessary in cutting the valves reaming the seats and grinding them in place but also illustrates every step with clear pictures.

We should advise all of our readers to investigate the Sioux line of tools if they do automobile work.

The Neverslip Line

The Neverslip Works of New Brunswick, N. J., are said to manufacture the only complete line of calks and horse and mule shoes. The calks and shoes produced by this firm are designed along practical lines and are the result of years of experience. Not only are the calks and shoes excellent products but the prices are right.

We should advise our readers to write the above company for their catalog and prices.

Index to Advertisers

CLASSIFIED BUYERS' GUIDE

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

WANT ADVERTISEMENTS

ADVERTISEMENTS of SHOPS FOR SALE or TO RENT, SHOPS WANTED or SITUATIONS or HELP WANTED, will be inserted under this head at 3 cents a word, including the address, for each insertion, payable in advance; but no advertisement will be accepted for less than 60 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

PATENTS FOR INVENTIONS.

H. W. T. JENNER, patent attorney and mechanical expert, 622 F Street, Washington, D. C. Established 1883. I make an examination and report if a patent can be had and the exact cost. Send for full information. Inventors assisted in developing ideas and inventions. Trademarks registered.

FOR SALE

An old-established horseshoeing and wagon shop with stock and tools with nine room house and garage, also 1¼ acres land. Will sell at a bargain. Reason for selling, am in poor health. For particulars write owner, J. Alexander, North Main St., Winsted, Conn.

FOR SALE

If you can't get the nuts off from old bolts that turn when taking machinery apart, try one of our Nut Splitters. Splits all nuts three-quarter inch and smaller. Get circulars. Whisler Mfg. Co., Gibson, Iowa.

FOR SALE

Residence and well equipped blacksmith shop, stock and tools. Fine location; good business; excellent opportunity. Write to A. Edward Clark, Bergen, New York.

FOR SALE

Finished felloes, good dry stock, any height, $3.00 per set.
Log wagon felloes, 3 inches wide, 35c each.
Log wagon felloes, 4 inches wide, 50c each.
Finished wagon tongues, good straight grain oak, $1.75 each.
Finished bolsters, front and hind, including sand bolster, 75c each.
Tongue hounds, finished, 70c per pair.
Rear hounds, 70c per pair.
Wagon reaches, 2 x 4 x 8 feet, finished, 75c each.
Wagon box patterns of good clear gum lumber, 12 inch top, complete with sideboard cleats and 4 sills, 2 bottom boards 14 inches wide with 2 end gates, 2 top boards with endgates, 12 inches wide, with endgate cleats all dressed and cut to fit without bottom, $9.50.
With hard pine bottom, tongued and grooved, $11.75.
The same as above in maple lumber with bottom of pine, $12.90.
Price list of spokes.—
Second growth,
2⅛, $6.40; 2¼, $6.75; 2⅜, $7.00; 2½, $7.25
A grade,
2⅛, 4.75; 2¼, 5.00; 2⅜, 5.40; 2½, 6.00
B grade,
2⅛, 4.25; 2¼, 4.50; 2⅜, 5.00; 2½, 5.50
C grade
2⅛, 3.75; 2¼, 4.25; 2⅜, 4.75; 2½, 5.00
D grade,
2⅛, 2.75; 2¼, 3.25; 2⅜, 3.75; 2½, 4.50
The above is all good dry stock and finished of oak timber.
The above prices are for full sets of 92 spokes, one bundle each hind and front.
Wagon neck yokes, good grade, $2.40 per dozen.
Wagon doubletrees, 90c each.
All prices are f. o. b. cars Biggers, Ark., cash with order. All orders shipped promptly.
J. W. MAYNARD & SONS.

FOR SALE

In Florida. An established blacksmith's shop doing a good business; fine chance for two young men. Little cash wanted. Write for details. J. L. Lucas, Melbourne, Fla.

DOUBLE TREAD TIRES

We carry a full line of new and used tires and tubes. H. GINSBERG & SONS, 236 W. 48th Street, New York City.

A Real Bargain

We call the attention of our readers to the advertisement of F. C. Sturtevant Co., Hartford, Conn., which appears on page 24 of this issue, and it would seem that the special offer should be taken advantage of by many of the smiths who are interested in buying or selling tonics, liniments or hoof ointment.

There is no telling how long this special offer will be open and in these days of rising prices every bargain should be seriously considered.

A Commendable Act

Nearly $1,000,000 in life insurance was taken out for its 1,200 employees by the Peck, Stow and Wilcox Co., in celebration of its centennial anniversary.

Announcement of this was made by President Lyman H. Treadway, following his presentation of gold and silver service medals to employees who had been with the company 25 years or more.

The insurance, which is retroactive, went into effect October 1st.

The plan is to provide a policy of $500 for every employee after he or she has been with the company for three months; $600 after one's year's employment; $700 after two years; $800 after three years; $900 after four years; and $1000 for every one who has been with the concern for five years or more. There may be slight modifications in the working out of this but they will be only minor.

With the long periods of service on the part of so many men and women in the organization, this means an average of between $700 and $800, totaling to something over $840,000.

The Giant Grip Company

Subscribers will probably remember the Giant Grip Shoes and Calks as one of the old-timers. They are still agoing, stronger than ever. A modern factory and methods enable them to keep up with the times and prices. They are making tools now, too, according to their advertisement in these pages.

Tires

Telephone Circle 2460

B. LIBEN & CO.
DEALERS AND JOBBERS
in all Makes of Auto Tires and Tubes
261 WEST 54th STREET, NEW YORK

Biggest Drop in History in

Double Tread Tires

Greatest selection in factory seconds and blemished tires.

Write for information.

Tire Dealers Attention!

Reduced Prices on 5000 Miles Guaranteed Tires

30 x 3 Plain - $ 8.50
30 x 3½ NonSkid $12.50

All other sizes on request. 20% deposit on C. O. D. orders required. Write for list to

M. LIBEN & CO.
793k 7th AVE. NEW YORK CITY

PRICE WRECKERS
Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$11.00
30x3½	"	6.50	35x4	"	10.00
32x3½	"	7.25	36x4	"	10.25
31x4	"	7.50	36x4½	"	11.00
32x4	"	8.00	36x5	"	12.00
33x4	"	9.50	37x4½	"	12.25
34x4	"	10.00	37x5	"	13.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE
282 Halsey St. Newark, N. J.

FOR PROMPT SHIPMENT

40 lb. Bradley Helve Hammer	$300.00
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800 lb. Billings & Spencer Board Drop Hammer	800.00

We have several of these 800 lb. hammers we are overhauling and they are all good buys.

1 Champion Forge, excellent condition...$30.00
2 Millers Falls Power Hack Saws, each.. 47.50

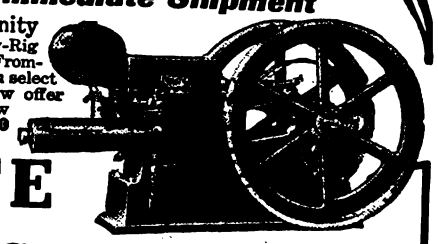
J. L. LUCAS & SON, INC.
3 Fox St., Bridgeport, Conn.

DIRECT TO YOU from WITTE

ENGINE PRICES NOW REDUCED
All Sizes—Immediate Shipment

Don't miss this opportunity to get a WITTE Engine, Saw-Rig or Portable at a Direct-From-Factory price. Before you select **any** engine, get this new offer and new book showing how I can save you **$15 to $200** on engines 2 to 30 H-P.

Buy on Your Own Terms ALL CASH or PART CASH As You Wish



WITTE KEROSENE ENGINES *Use Kerosene (Common Coal Oil) Operate At Half the Cost*

Lifetime guarantee protects you against **defect** of material or workmanship—the **quantity** of fuel required and the **horse-power** of your engine. 33 years of success building engines **exclusively** is **best proof** that you should own a WITTE. I cannot **begin** to tell you everything in this ad, but I **can** tell you **why** the WITTE is **better** than other engines if you will send me your name and address. **Do this today.**

Write For My New FREE Book
"HOW TO JUDGE ENGINES"—The greatest of all engine books—the best illustrated and printed—the most widely read, most talked about, and most extensively quoted. Be sure to read this original, instructive, valuable and free engine factory book. It will open your eyes and save you money. Send postal card or coupon.—ED. H. WITTE, Pres.

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Just Send Name and Address Before you decide on any make of engine be sure to get my latest and best factory book mailed FREE.

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1 1/16 Axles, Fan Tail and Coach.
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Brewster Side Bar Clips, Spring Bar Clips and Saddle Clips.
All sizes Screw Clamps.
Also Light Bobs, Cutters, and Runner Attachments.
AMERICAN CARRIAGE COMPANY
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Blacksmith and Wheelwright
SUBSCRIPTION RATES
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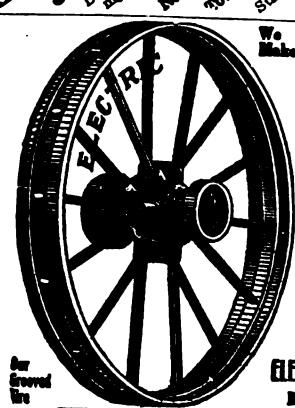

We Make **STEEL WHEELS**
To Fit Any Axle
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A Full Line of Wood and Steel **Farm Trucks**
With Steel or Wood Wheels
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Still carry a stock of Wagon, Blacksmith Materials, Farrier Supplies, as well as Tools, Hardware Supplies and Duplicate Parts for Fords.
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Our Price, Discount Sheet and Supplement is being distributed.
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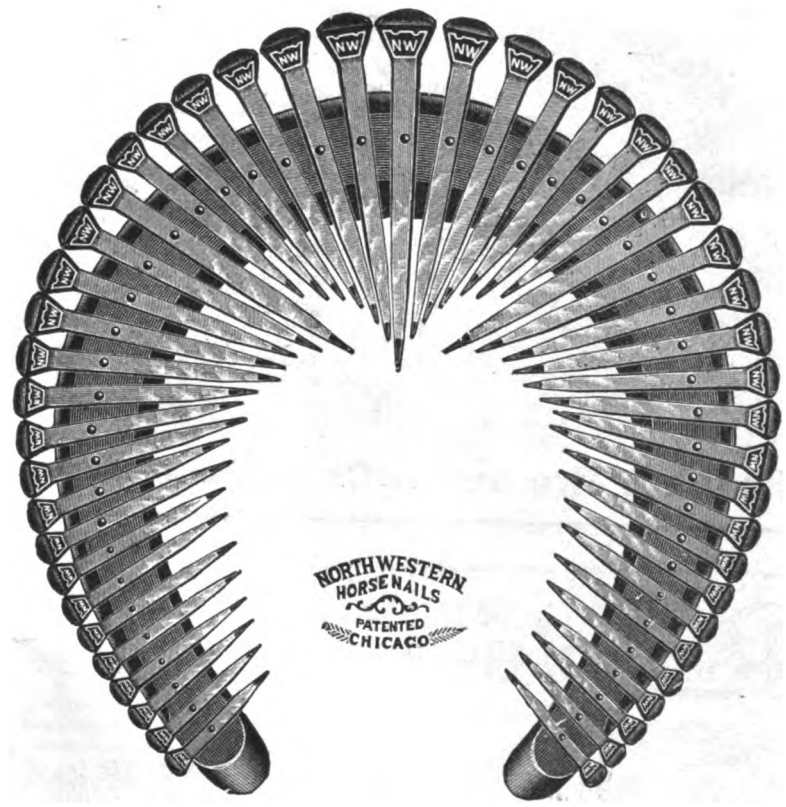


MADE OF THE BEST QUALITY MATERIAL

The most perfect in form and finish and will hold a shoe longer than any other nail made.

THE RE-INFORCED POINT makes it the easiest to drive and the safest to use.

UNION HORSE NAIL COMPANY
Manufacturers
CHICAGO ILLS.

ESTABLISHED 1880 — The Pioneer Journal of its Class

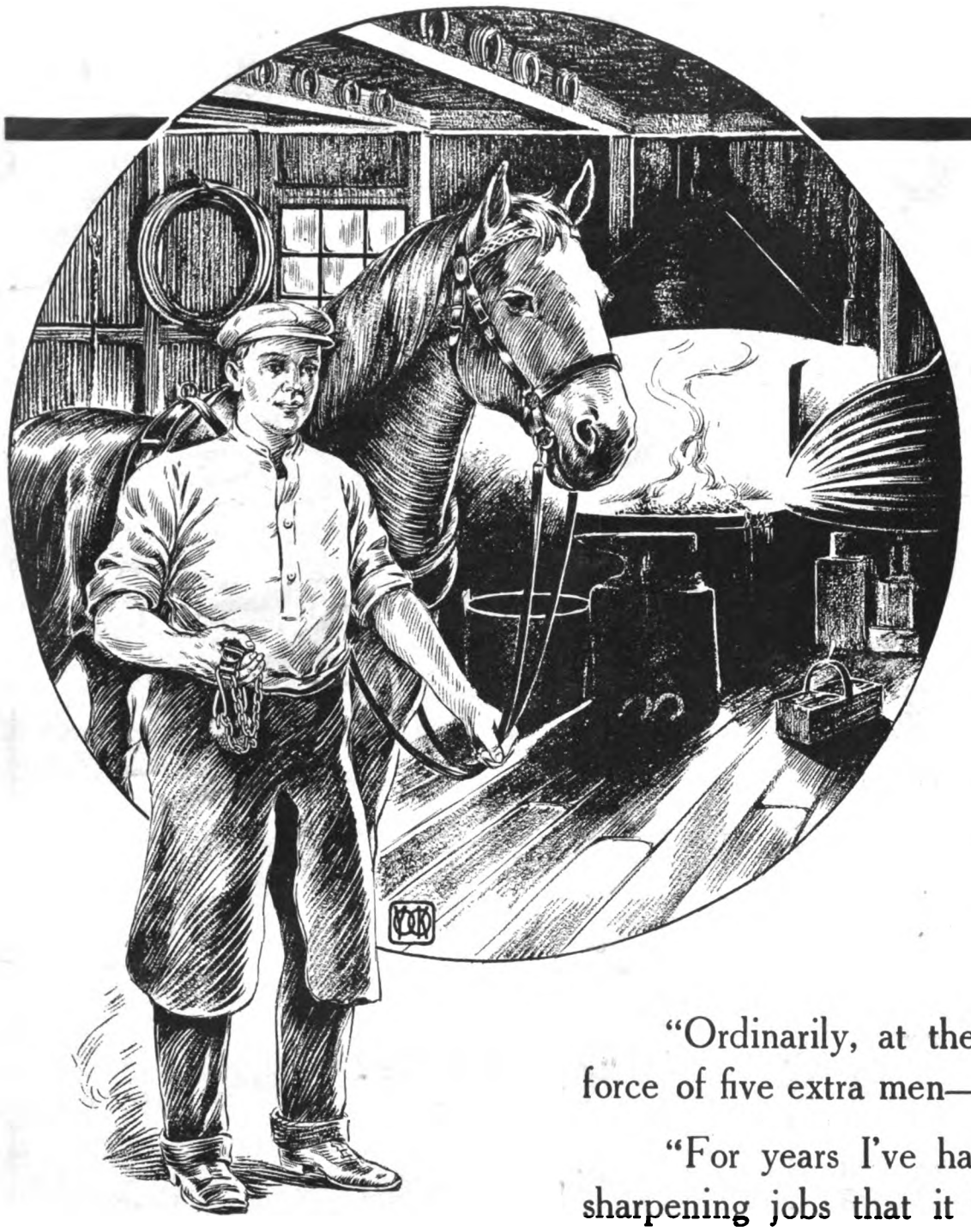
THE BLACKSMITH & WHEELWRIGHT

Devoted to the Interests of Blacksmiths, Wheelwrights, and Wagon Builders.

M. T. RICHARDSON CO., Publishers, 71-73 Murray St., New York. Registered in U. S. Patent Office.

Entered as Second-class Matter March 4, 1880, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Published Monthly.

Vol. LXXX. No. 6 — NEW YORK, DECEMBER, 1919 — TERMS: { Foreign, $1.50. (6s. 3d.) / One Dollar a Year.



Jim, the blacksmith, says:

"Ordinarily, at the first sign of slippery going I'd need a force of five extra men—and I wouldn't get 'em.

"For years I've had to turn down so many of these shoe sharpening jobs that it was nothing short of a crime. It was always that way at ice and snow time; horse owners and drivers swooping down on me with a rush—every man wanting his work done first.

"With only two pairs of hands—my own and my helper's—I was compelled to see good, big money slip away from the shop door—but I do not have to stand for it any more, because I have got something so good that it successfully stops the leak.

"I sell American Chain Over-Shoes to every customer who cannot await his turn for sharpening, and thus I effectually kill all disappointments—hold all my customers, and I make a bigger profit in the bargain.

"I do all this without so much as touching a work tool."

Read full information on opposite page.

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BRIDGEPORT,
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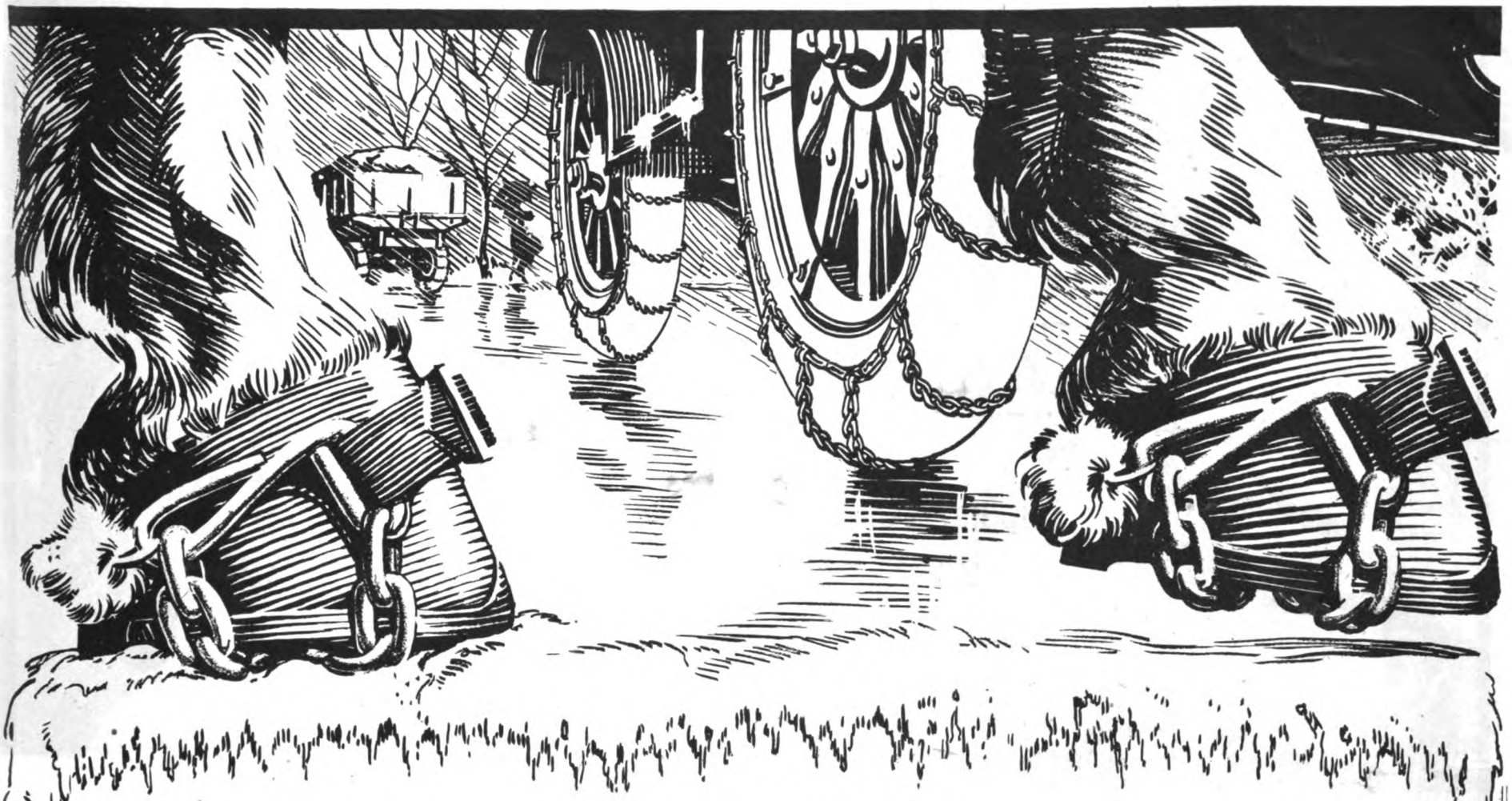
Please Mention "The Blacksmith and Wheelwright" when writing to advertisers

—And now you can "Weed Chain your Horse to Safety"



AMERICAN CHAIN OVER-SHOES

Protected by American and Foreign Patents

The Principle of the Weed Tire Chains for Automobiles and Motor Trucks Humanely Adapted to Horses' Hoofs

American Chain Over-Shoes make horses sure-footed on ice and snow covered roads and pavements. The Chains are so constructed and arranged that they give the animal 48 points of contact—12 under each foot.

Awarded a prize of $500.00 by the American Society for the prevention of Cruelty to Animals—the only one of its kind ever granted. Warmly endorsed by the Massachusetts S. P. C. A. and the New York Women's League for Animals.

American Chain Over-Shoes cannot injure the foot or leg in any way, as it is impossible for the chain or center link to touch the frog. They also prevent the "balling" of snow and ice in the shoe.

American Chain Over-Shoes enable a horse to step out fearlessly on the slipperiest pavements and roads, and thus every ounce of his strength can be used for pulling power instead of being wasted in pitiful efforts to keep on his feet.

It is cruelty to send horses out without American Chain Over-Shoes when pavements and roads are covered with ice or snow. They strain their muscles and tendons, fall and injure hips or knees; and sometimes break a leg which means the use of a pistol and the loss of valuable horse-flesh. American Chain Over-Shoes should be kept in trucks and wagons ready for use at the first indication of slippery going.

DIRECTIONS FOR ORDERING

No. 1	Horseshoe	(4½	in.	across	middle)	takes	No. 3	Over-Shoes
No. 2	"	(4½	"	"	"	)	"	No. 4	"	"
No. 3	"	(5	"	"	"	)	"	No. 4	"	"
No. 4	"	(5½	"	"	"	)	"	No. 5	"	"
No. 5	"	(5¾	"	"	"	)	"	No. 6	"	"

No. 6	Horseshoe	(6⅛	in.	across	middle)	takes	No. 6	Over-Shoes
No. 7	"	(6½	"	"	"	)	"	No. 7	"	"
No. 8	"	(7	"	"	"	)	"	No. 7	"	"
Extra Large Size	.....						No. 8	"	"

The average 1400 lb. horse requires a No. 5 Chain Over-Shoe and the average 1600 lb. horse requires a No. 6 Chain Over-Shoe. American Chain Over-Shoes for Mules are made in small, medium and large sizes, and fit all mules. **Price for any size: $5.00 per set of four for horses or mules.**

For sale by Dealers in Blacksmith, Hardware and Harness Supplies. If you cannot obtain them from your dealer, send us his name and address, with $5.00 for each set of four of any size you require, and we will send them to any point in the United States you designate, all charges prepaid. For delivery in Canada send us $6.50 for each set of four that you require.

Mr- Dealer: Please order from your regular jobber. If he hasn't them in stock, write us and we will see that your needs are supplied.

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From Coast to Coast 65 Producing Plants and Distributing Stations provide an unlimited supply of Linde Oxygen for users everywhere.

LINDE SERVICE means no investment except for oxygen actually received—no expensive overhead or upkeep charges.

Linde Oxygen may be obtained from any of the following Linde Plants and Distributing Stations where a large suppply of charged 100 to 200 cu. ft. cylinders is kept on hand constantly to insure immediate shipments.

Mail or telephone your order to THE LINDE AIR PRODUCTS CO., at the nearest point. Shipments will be made on day order is received.

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Other Plants and Distributing Stations are planned for other industrial centers throughout the country and will be established as fast as and wherever the local demand for oxygen warrants.

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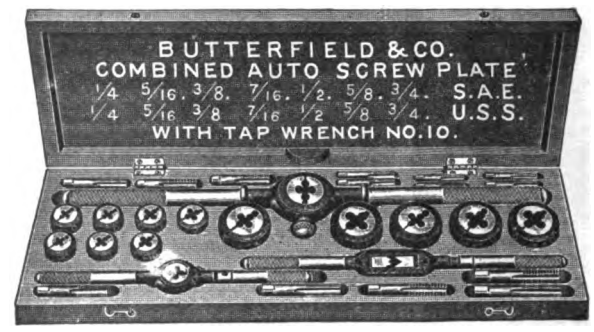
Largest Producers of Pure Oxygen in America
Forty-Second St. Building NEW YORK

Why Buy Two Sets When One Will Do.



It is no longer necessary to buy two sets of screw plates. You have all the sizes and pitches you can possibly require when your shop contains a

BUTTERFIELD Combined Automobile Screw Plate Assortment

No Blacksmith or repair man doing automobile work can be without these screw plates if he would have a properly equipped shop. The assortments are equipped with the ever-dependable Derby Dies. Each die is in a collet with guide attached.

Smiths who are using Butterfield sets write us that Derby Dies are the easiest and smoothest cutting dies on the market. Have you tried them? They are adjustable for tight or loose fits by a simple screw arrangement.

It will pay you to know which one of the several Butterfield screw plate assortments you need in your shop. Write us for complete information and let us help you become better equipped for your auto trade.

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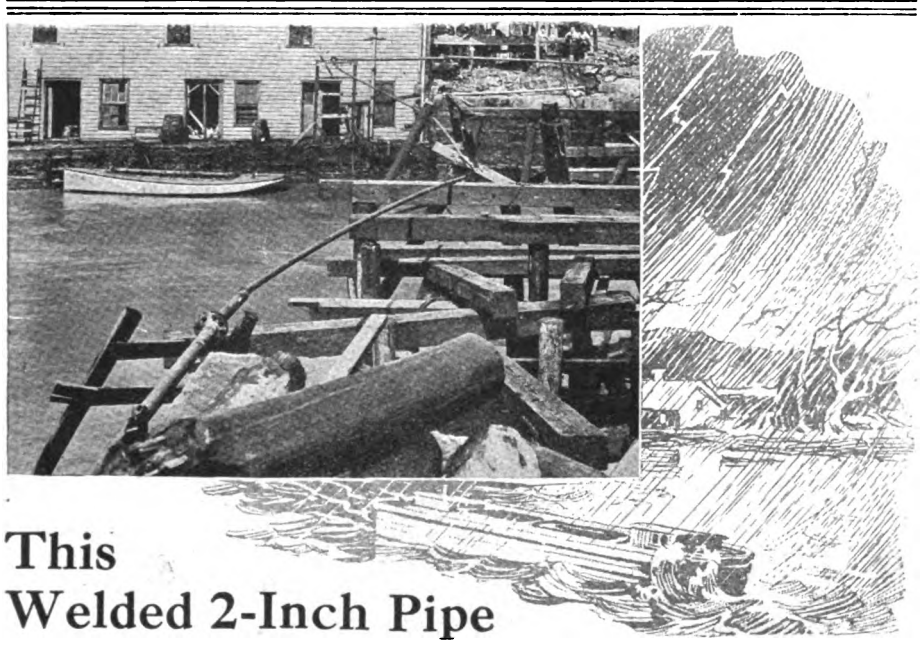
Ask Your Dealer for the *Improved*

HELLER RASP

with keen cutting hard teeth. Made in all patterns and cuts, **"Slim," "Light," "Slim Light"** and **"Fine Cut."** Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial.

New catalogue mailed free on application.

HELLER BROTHERS CO., *Established in 1836,* **Newark, N. J.**



This Welded 2-Inch Pipe Stopped a Flood-Driven Barge —*And Never Sprung a Leak!*

TO meet a temporary situation, the load from a 6″ high pressure gas main was put through this welded 2″ pipe line, laid on temporary piling across a river.

Floods came, washed away the false structure of a new bridge, tore a barge loose from its moorings aud hurled the entire mass down on this slender 2" pipe.

It held them all. Not a single leak developed.

Wherever strength, permanence and tightness are essential, you will find joints are being welded—joined together "for keeps," using

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DISSOLVED ACETYLENE

Nation-wide Prest-O-Lite Service brings straight to the user's hands a single cylinder of highest temperature gas—or hundreds of them.

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BRIDGEPORT CONN., U.S.A. **NEW YORK OFFICE 248 CANAL STREET**

like their products, need no introduction to the experienced steam or gas fitter. To others, our catalogue No. 14 will show why we are so popular.

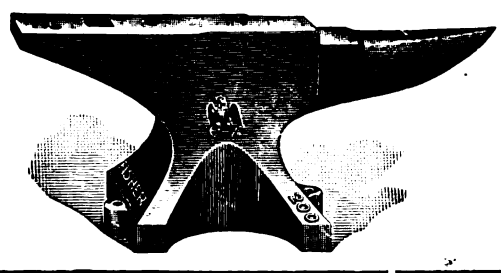
"Makers of the Genuine ARMSTRONG Stocks and Dies."

1843 EAGLE ANVILS 1919 AND "FISHER" VISES

The favorites of thousands of Blacksmiths for three-quarters of a century. Why? Because they satisfy.

Write for descriptive circulars to us or dealer.

FISHER & NORRIS, "Eagle" Anvil Works
TRENTON, N. J.



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THE MAYER POWER HAMMER

Don't think of a power hammer as just a machine that will help turn out your work — look past this to the big vitally important purpose that a power hammer must serve and to the responsibility it must assume.

Will the power hammer you put in stand up so everlastingly strong that it does not have to be watched day in and day out?

The MAYER Power Hammer

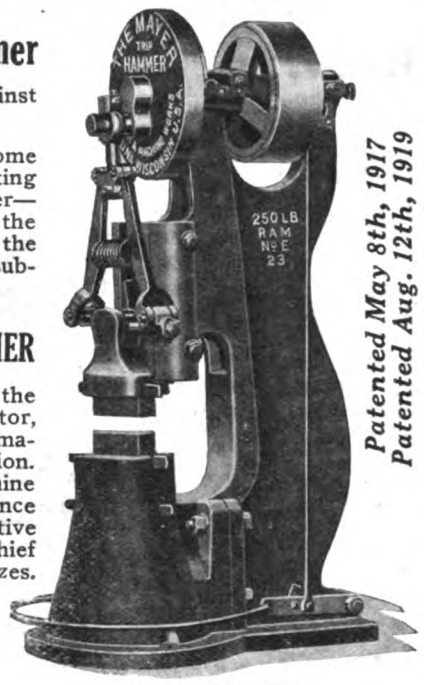
is fortified in exclusive ways against the possibility of trouble.

MAYER supremacy has become an institution — the discriminating buyer is always sure of the Mayer— because he is first, last and all the time sure of the vitals of the MAYER—the parts which are subjected to WEAR.

THE MAYER POWER HAMMER

is being built by experts under the personal supervision of the inventor, and only the best—the very best materials are used in its construction. It is a strictly high-class machine deserving your fullest confidence and recommendation, its attractive price being by no means its chief "talking point." Made in five sizes.

All details of capacity—quality points, advantages and price given by return mail—upon receipt of your letter—write.



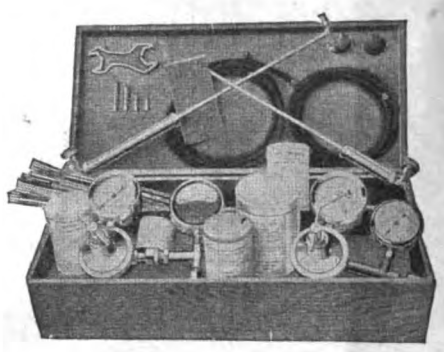
Patented May 8th, 1917
Patented Aug. 12th, 1919

250 and 500 LB.

KAUKAUNA MACHINE WORKS

KAUKAUNA, WIS.

ADMIRAL WELDING EQUIPMENT



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It has been thoroughly developed under actual working conditions. It has been on the market over nine years. Over 10,000 Admiral Welding Equipments in the hands of satisfied users doing all kinds of work.

It will give you the best of satisfaction, and make you more money than any shop equipment you can buy at anywhere near its price.

We sell the highest quality of welding supplies at reasonable prices.

Ask for Catalog.

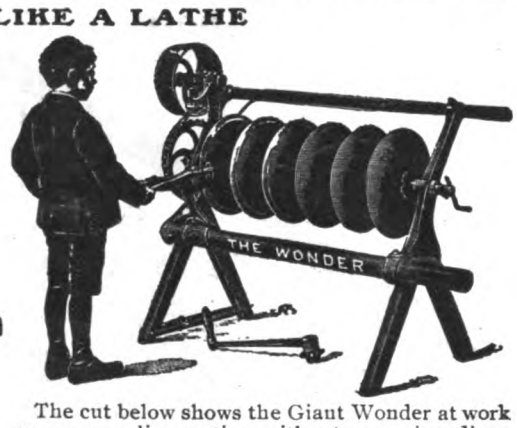
ADMIRAL WELDING MACHINE COMPANY

1603 Locust Street — Kansas City, Missouri

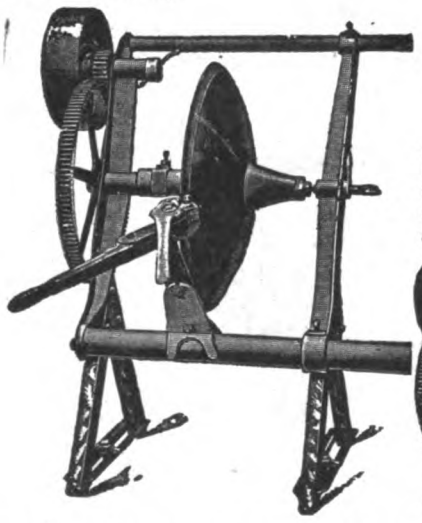
THE WONDER DISC SHARPENERS

BUILT LIKE A LATHE

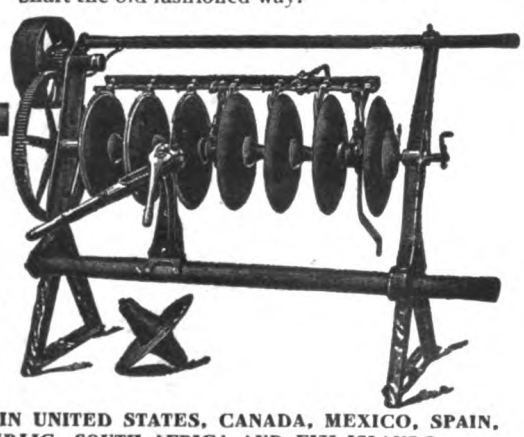
This cut shows the Little Wonder at work on a whole section of discs. This machine is especially adapted for sharpening disc harrows. While the Little Wonder is being successfully used to sharpen plow discs of 22 inches or less, we would recommend the Giant Wonder where disc plows are used extensively.



The cut below shows the Giant Wonder at work on a seven-disc section without removing discs, thereby saving one-half the time and labor, as in many cases you can sharpen a whole section of discs while your competitor is taking his off the shaft the old fashioned way.



The above cut shows the Giant Wonder at work on disc plows. Will sharpen any size from 12 to 32 inches in diameter.



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