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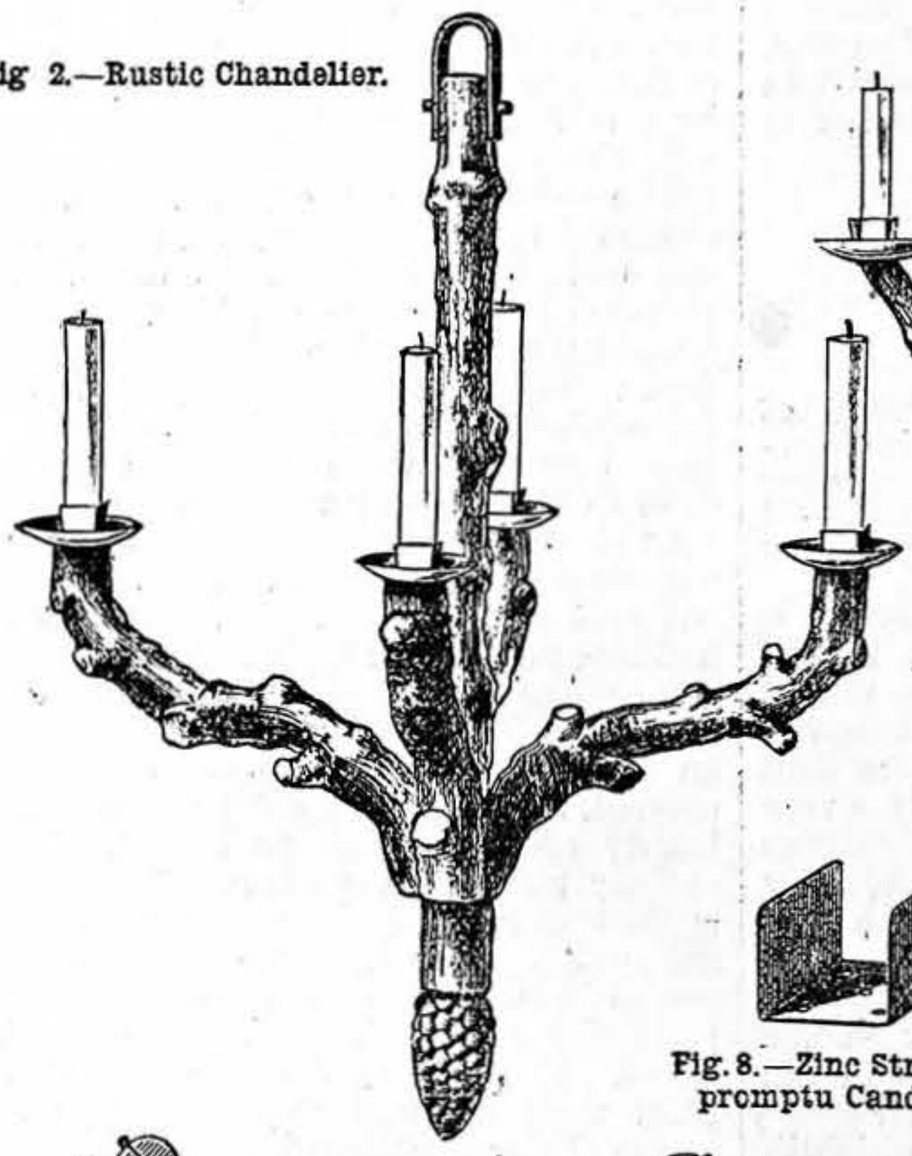
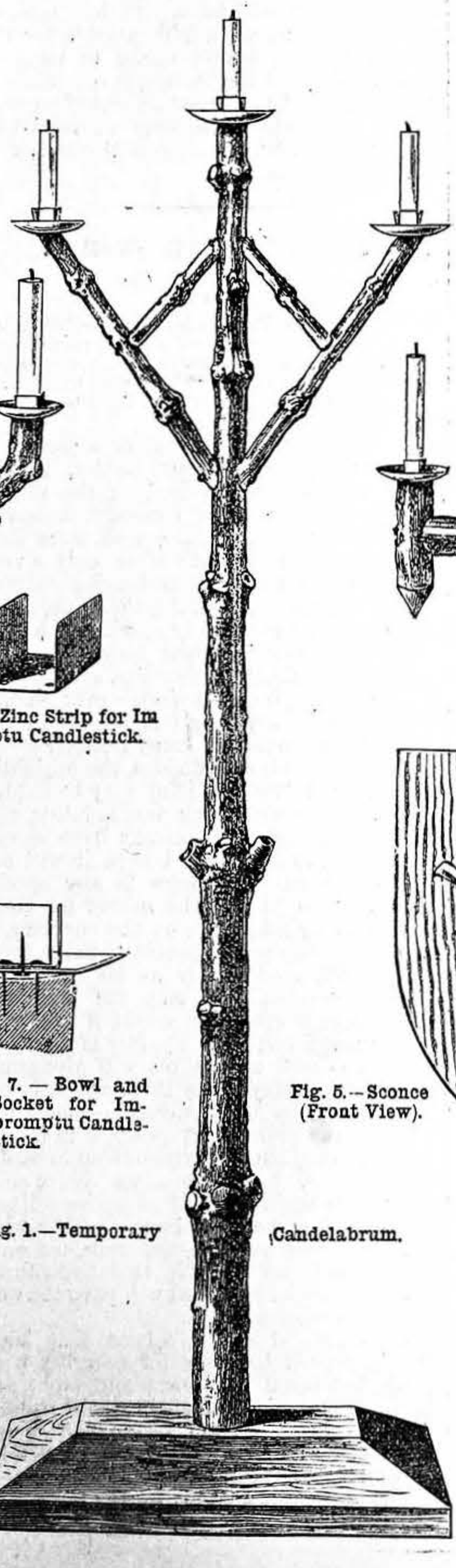


Fig 2.—Rustic Chandelier.



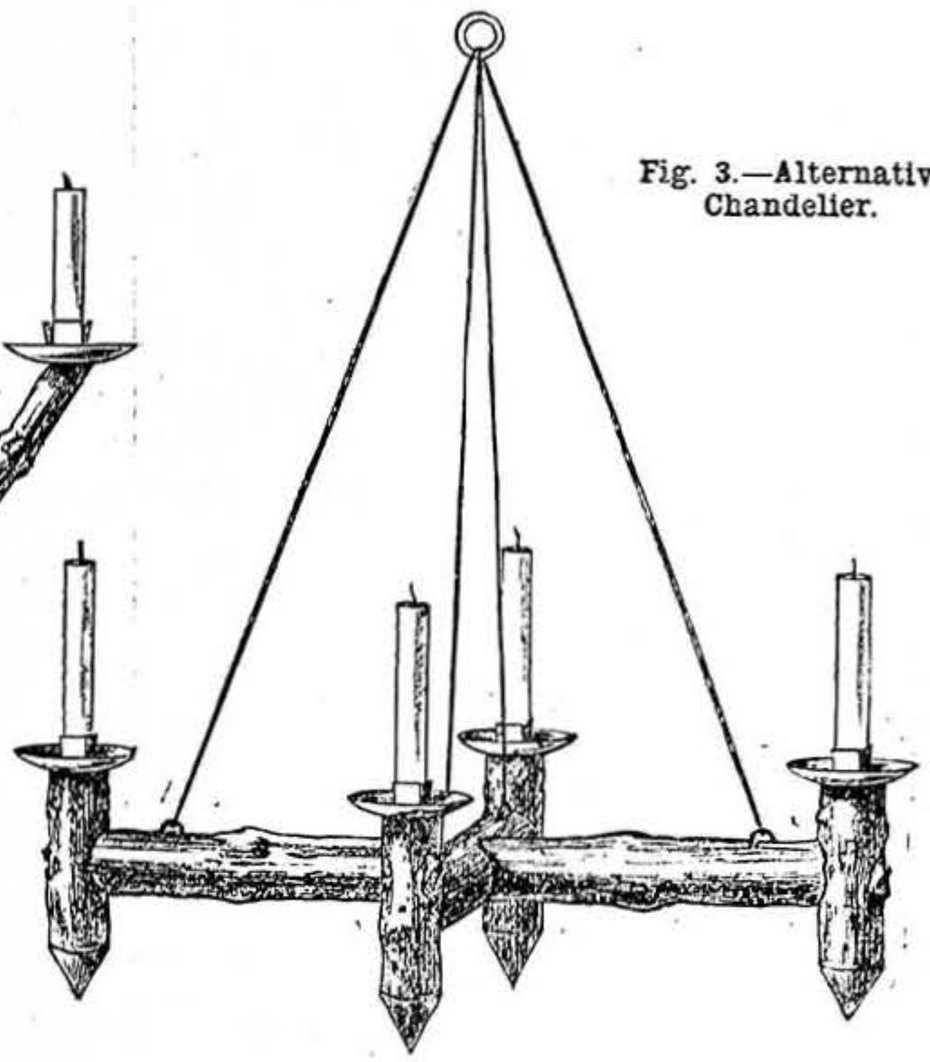


Fig. 3.—Alternative Chandelier.

Fig. 8.—Zinc Strip for Impromptu Candlestick.

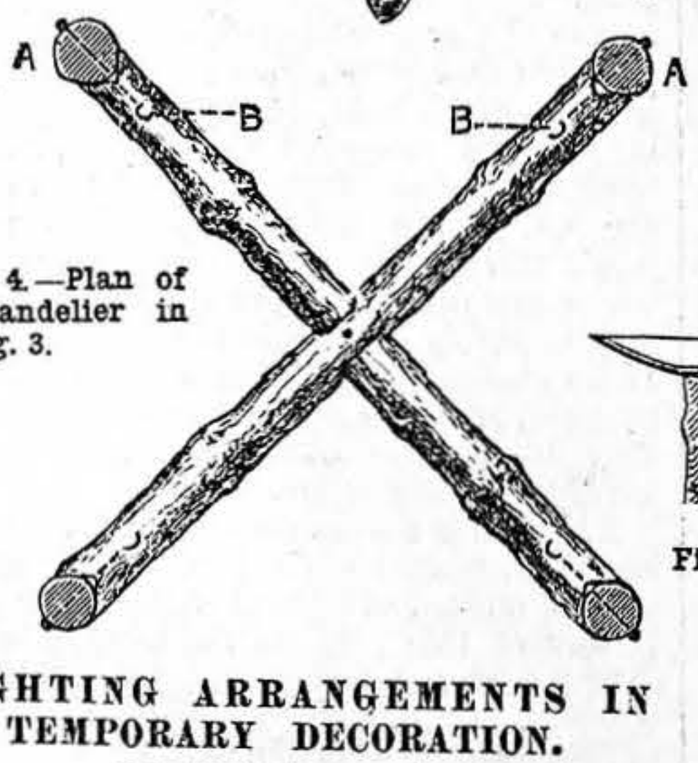


Fig. 4.—Plan of Chandelier in Fig. 3.

Fig. 7.—Bowl and Socket for Impromptu Candlestick.

Fig. 5.—Sconce (Front View).

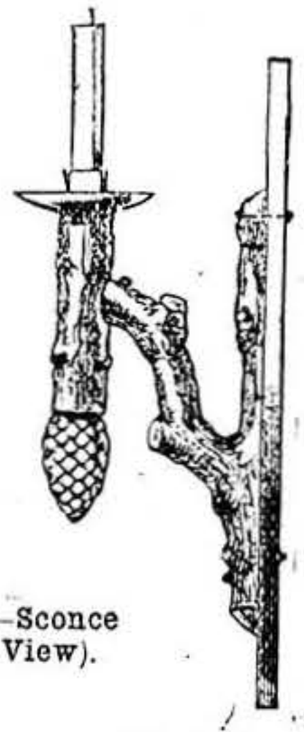


Fig. 6.—Sconce (End View).

LIGHTING ARRANGEMENTS IN TEMPORARY DECORATION.

BY ARTHUR YORKE.

PRELIMINARY REMARKS — A CANDELABRUM — CHANDELIERS — A SCONCE — IMPROMPTU CANDLESTICKS.

Preliminary Remarks.—When, on festive occasions, some ordinary building is under conversion to the uses of a temporary ball-room, concert-room, etc., there is among the resources of the decorator one which might well be more freely employed than it is. The resource alluded to is rustic carpentry, for the production of frames to be afterwards dressed with evergreens and flowers. Such dressings, when judiciously disposed on wood-work covered by its natural bark, have a most happy naturalistic effect, which can scarcely be imagined by those who have not seen it.

Fig. 1.—Temporary Candelabrum.

For mere temporary uses frames of this kind can be quickly knocked together, and in country places, where natural wood is to be procured readily, these things may be made at trifling cost. The purposes to which they can be applied in such decorations are various, but in the present paper it is proposed to deal only with their application to lighting.

The examples given in the illustrations may perhaps be thought to be less ornamental than they might be, but it must be remembered that they are only skeletons

depending for their full effect upon the flowers and greenery with which they will be clothed.

A Candelabrum.—The candelabrum shown in Fig. 1 is an arrangement which may be found useful when the main room is approached by a tolerably wide passage or ante-room. Such candelabra should, of course, be arranged in pairs. The example given shows only three lights, but if there is width sufficient, and it is desired, one or two more branches may be added. The stem is made from the trunk of a young fir or from the top of a larger tree; and to secure a firm base, its bottom is mortised into a heavy slab of wood. The appearance of this slab is of little moment, as it is intended to be covered with evergreens, from which sprays of the small tree ivy should spring and twine spirally round the stem. In decorating the branches above, flowers should be used with the greenery; dried everlasting flowers of various colours are best for the purpose, as warmth will not fade them, and a thin wire run up their stalks will facilitate arranging and keeping them in the positions desired. In this merely temporary wood-work no hesitation need be felt about driving a tack wherever it may be desirable to hold the wreaths, etc., in place, which is a decided advantage to the decorator.

Chandeliers.—Figs. 2 and 3 are chandeliers; Fig. 2—which appears in plan in Fig. 4—is of most simple construction. It consists of two straight sticks (fir by preference) cut half through to cross each other in the centre, and with their ends sawn V-shaped to receive the upright pieces (A, A, Fig. 4), which are nailed to them, and which support the candlesticks. It is suspended by four cords or chains attached to staples driven into the cross-pieces (B, B, Fig. 4). When decorated, a considerable bunch of evergreens—holly, perhaps—will look well hung beneath the middle, whilst small and delicate sprays should be made to twine up the cords.

Fig. 3 is somewhat more ornate. The four pieces which form its branches are such as in general shape it is easy to find among a lot of crooked wood—oak, say, or apple-tree. It is recommended that these should rather be screwed to the upright than nailed in the usual way. At bottom, a fir cone is introduced as a pendant, and will best be fixed on with a couple of wire nails. The branches in this should not be heavily decorated—a little green only, with some flowers—but more evergreens will look well up the central stem; in particular, they may be made to branch out round the ring at top.

A Sconce.—The shield of the sconce given in Fig. 5, and in profile in Fig. 6, is of rough board, and has a hole bored through it at C, by which to hang it up. How rough the board may be matters little, as laurel or other large evergreen leaves should be tacked over the whole of it. The projecting branch should be decorated with a sparing hand.

Impromptu Candlesticks.—The candlesticks which will suffice for use in these temporary arrangements are of a kind which any handy person can readily improvise with no further tools than a bradawl and a pair of zinc shears: which are tools that no handy person is or ought to be without. As material, old meat tins will be found sufficient. Fig. 7 is a section of one of these candlesticks. A disc of tin 3 in. or 4 in. in diameter is cut, and bent to something of a saucer shape; two strips of the same, about ¾ in. broad and 2 in. long, are also prepared, and bent as in Fig. 8. These are then placed crossing each other, and laid on the middle of the disc, and a hole is punched through the three thicknesses. Through this hole a ½ in. tack is thrust, point upwards, as shown in Fig. 7. This forms a spike, which, entering the bottom of the candle, helps to steady it; for it must be remembered that the upturned pieces of tin, though they act as springs and grip the candle tightly, are less strong than a circular socket. The candlestick is fixed down to the wooden support by other tacks round the central one, as shown.

In these arrangements only the simplest and prettiest mode of lighting—that by candles—has been considered; but if space permitted, it would be easy to show how, by the same means, we might provide for the use of paraffin lamps, either to hang or stand. For standing lamps, rustic brackets would have to be arranged instead of sconces. These and other necessary modifications will, however, readily suggest themselves to the ingenious reader.

PLUSH-COVERED FRAMES.

BY D. DENNING.

ADVANTAGES OF PLUSH—MATERIAL—MOULDINGS—ADHESIVES—MODE OF APPLICATION—FOLDING AT CORNERS—DECORATION OF CORNERS—COMBINATIONS OF PLUSH—STUDS—HINTS ON COLOUR—PLUSH-COVERED CHIMNEY-GLASS FRAMES.

To make an ordinary frame for a picture is by no means a difficult matter, though great neatness is required at the mitred joints. To cut these correctly, however, requires some experience, and more skill than the amateur, with often only a very limited amount of time at his disposal, can always acquire. No doubt, therefore, a few suggestions as to the way in which the difficulty may to some extent be surmounted, or perhaps I should rather say, evaded, and a good-looking frame be made—even though the joinery be anything but neat and clean—will be welcomed by many readers.

As the head-line indicates, the unsightliness of a badly-made joint may be hidden by covering it with some textile fabric, and the one the following remarks have special application to is plush. I hope it will not be understood that there is any special advantage in having the mitres for these frames badly made, for, on the contrary, it will be to the worker's benefit to make them as carefully and neatly as he can. The frame, when finished, may not look any better than it otherwise would if the joint were a rough one; but the fact of trying to make it as well as possible will give experience which may come in useful later on. To attempt to work valuable mouldings without any preliminary practice in frame-making would almost certainly lead to waste, and possibly to discouraging disappointments. By beginning with cheap mouldings, and covering them afterwards either with plush or other suitable materials, not only need there be no waste in tentative efforts, but the knowledge gained will pave the way for more advanced work.

I do not, of course, advise that large frames should be made for covering with plush, but small ones for photographs, engravings, etc., may be made in almost endless variety. Even a plain rectangular frame looks well, and great variety can be got by using coverings of different colours.

The plush best adapted for the purpose is the ordinary silk velvet, which is sold by drapers for ladies' dresses, etc., and by upholsterers for draperies, chair-seats, etc. Remnants can occasionally be purchased at a very much lower price than when cut from the piece specially, and, unless the pieces are very small, they do just as well. The coarser velvets—such as mohair—are not suitable for small frames, but if silk plush is asked for there will be no difficulty in getting the right kind. When of the best qualities, it is rather expensive stuff, so care should be taken to cut it to the best advantage, and keep the waste as trifling as possible. On this point, however, it is impossible to say anything definite; but it may be suggested that it is rarely considered necessary to use the best quality for such frames as are referred to.

The foundation or wood-work of the frame being hidden, there is no necessity for wasting much time in carefully finishing it or in having it the best of its kind. Plain beads or flats even do very well, and should they be a trifle rough it will hardly matter, as, unless very pronounced, the inequalities will not be visible under the plush. If a more elaborate moulding is desired, those made and sold at a very cheap rate for builders' purposes do as well as anything. It is not necessary to clean them down with glass-paper. They can be covered just as they are received. Many mouldings which may look very well when uncovered do not show to the best advantage when covered with plush, and when selecting them, some discretion should be used to get those which will look best when finished. Perhaps my meaning may best be explained by supposing a moulding formed of a number of small members. This would look richer than, say, an ogee or a plain bold moulding while uncovered, but the small details in which its beauty consists would be almost, if not entirely, hidden by the velvet. This, though on the back it might adhere to them closely—not at all a likely case with such a moulding as is supposed—would on the front or plush side only partially reveal the shaping below. The chances, therefore, are that a plain moulding will look equally as well as one of a more elaborate character.

About the actual construction of the frame little need be said, as for present purposes it may be supposed that the intending worker has some knowledge of this part of the work. In most cases plain mitred joints will be the natural ones to use, and where any others are preferable, the worker may be safely left to use his own discretion. If he makes them strong enough for their purpose, and does not overlook the fact that they are covered over afterwards, he will hardly be likely to err.

As plush is a delicate material, care must be taken, when handling it, not to get the surface matted or injured with glue or paste. If any of this gets on the front, it will be difficult, if not impossible, to remove the blemish. Care, therefore, should be taken in this respect. For the rest, plush will bear any reasonable treatment. Some of the lighter and more delicate tints are very easily soiled, but by taking the precaution to have the hands clean, there is no risk on this score. The chief danger the novice should be on his guard against is that of getting the plush matted anywhere by allowing the glue to soak through from the back. If he will do as directed, he need have no fear of this happening.

The glue should, in all cases, be applied to the wood, and never to the velvet. Good ordinary glue can be used, and I know of nothing better, though a mixture of flour,

paste, and glue, or any strong paste—such as used by bookbinders, shoemakers, etc.—is preferred by some. Any good strong adhesive which has not too much moisture, and which does not set so rapidly as to prevent the velvet being laid properly, may, in fact, be used. There is thus plenty of choice; but, as stated, I think there is nothing better than plain glue. It should be of good quality originally, be prepared in the usual way, and be applied, while hot, thinly and evenly to the wood. While it is still sticky—*i.e.*, as soon as convenient without either undue hurry or waste of time—the velvet should be put on.

This is really the only part of the work which requires any unusual amount of care, for if any glue gets on the fingers, and from thence to the plush, a blemish will be caused, which will look anything but nice when the frame is finished. Great pressure is not necessary to cause sufficient adherence. If it were, the plush would be spoiled through the glue being squeezed through the woven backing. A light gentle pressure is all that is required, though possibly the velvet may require a little humouring to get it to fit into angles. When these occur, it is sometimes easier to use a paper-knife or something of the kind to press the velvet neatly into them. Of course, the pile will be somewhat laid or flattened by this treatment, but unless the glue has been forced through, it will be only temporarily so, and can easily be restored to its original condition by brushing lightly with a soft brush.

At the mitres and outer corners of the frame a slight difficulty may occur to the novice in connection with folding the plush over the edges. Special care is necessary—or perhaps I ought to say neatness and deftness—in manipulation at the angles if, on the one hand, a vacant uncovered portion of the wood is to be avoided, and on the other, a wrinkle in the velvet. Both these defects may easily be prevented by cutting the material as far as the front surface of the frame, and cutting away as much as may be necessary to allow of a neat join being effected. As I was on one occasion asked if the velvet was to be sewn at the joints, I may as well say that glue alone is necessary. The velvet is simply stuck to this, and when neatly done, the join is almost invisible, except on the closest examination.

On the inner edges of the frame, if they are only thin, no difficulty will arise, as after cutting the velvet up to the mitre, it easily folds over to the back, when, of course, it can be fastened with glue. The outer edges should also be covered, and the plush be secured behind in the same way.

So far it has been assumed that the frame has been covered with one piece of velvet, from which a portion in the centre has been cut out to correspond with the frame opening. This is all very well for small frames, but if these are of any considerable size, there must obviously be a waste of plush, which would not occur if the frame were covered by pieces cut to fit each portion. This can easily be done by cutting the plush into strips of sufficient width to cover the front of the moulding, and having enough margin to turn over and secure behind. One strip will, of course, be used for each side, top, and bottom of the frame, for a join anywhere, except at the corners, is out of the question.

At the corners the velvet must be cut to correspond with the mitres, and if this be neatly done, the join will hardly be more perceptible and not more unsightly than a properly made joint in the wood. To cut the pieces of velvet so that they join with such accuracy as is implied may not, however, always prove an easy task, but if they do not meet, there is always a simple way out of the difficulty, and the means used, instead of being a disfigurement, may often, with a little taste, be rendered a further source of ornamentation to the frame.

The simplest means of covering the join is using a piece of fancy cord, such as is used by upholsterers for trimming purposes. Its ends are fastened behind, and if the moulding is a plain one, it is merely carried over the joint, which of course it covers. If the moulding is a large one, and has any decided hollows, there will be a little more difficulty, but not much. Sufficient adherence can be given to the cord by touching it here and there with a little strong glue, or if this is not sufficient, by means of a few gimp pins driven through it into the wood. The heads of the gimp pins, being small, can be concealed by a strand of the cord.

In a similar manner the joints can be covered with narrow bands of plush or any material which will look well with it. The ends, as before, are fastened on behind, and the edges, being turned under the band, can be fastened down with glue. It is not necessary to have these small covering pieces of the same colour as the other plush, or, as has been hinted, even of this material, but care should be taken that they are harmonious.

Instead of a plain band to cover, if the moulding is a large one, much taste may be displayed in the arrangement of the pleats which can be given to them. Though it is obviously impossible to do more than hint at this additional method of adornment, there is an immense field open for the worker to display his taste.

Very handsome frames may also be made by the judicious use of plush in a more elaborate style than that which has been referred to. The possibilities comprehended by it as a material for frames are much greater than is commonly supposed for them, for there is no reason, beyond custom, why it should not be used in the construction of frames of an elaborate character much more extensively than it is. We may, for example, suppose a wide frame of the simplest kind—merely a wide flat. This, covered with velvet, would look well enough, and I have nothing to urge against it. Something more elaborate, however, may be wanted than the plain flat surface; and how easily it can be managed! We take a narrow piece of half-round moulding, cover it with velvet of another colour and a suitable one, glue it down on the flat, and there is already the germ of an idea which can be worked on to an almost unlimited extent.

Starting again with the flat, another piece covered with velvet can be fastened to the outer edge, an inner flat can be made to fit within the other, and so on. An almost endless variety of combinations might be suggested, and no doubt will occur to the novice as his experience widens.

Another very simple means of decorating velvet-covered frames is by means of the plain brass or copper studs now so extensively used by upholsterers round chair-seats, etc. The studs can be either driven in close together in straight lines or arranged so as to form simple patterns—such as diamonds, circles, etc.—on the flat surface, and on a velvet of suitable colour look remarkably rich.

Perhaps it may be expected that something should be said about the colouring or combinations of colouring which have been suggested, but if so, I am sorry readers must be disappointed, for the subject of harmonious blending of colour is altogether too vast to be undertaken in the compass of a short article like the present. All that can be done is to throw out a hint or two for the guidance of the frame-maker.

Primarily, a frame is intended to hold something. If this is a coloured picture, take care that the colours of the velvet are not such as to kill the colouring of the picture. If the frame is more striking to the eye than the picture is, there is something wrong. Strong powerful colours in the frame may overpower those in the picture, and if so, the decoration of the frame fails in its purpose.

In the case of monochrome pictures, such as photographs, engravings, sepia drawings, and such like, the same rule holds good. Those who have paid little or no attention to colour from a scientific or artistic point of view may easily try a few variations for themselves on the lines suggested. Black and white placed in juxtaposition, everyone, it may be assumed, knows intensify each other. In a similar manner, other colours may be arranged to "show each other up." This should be the object of the velvet frame maker. Let him select colours which will show up whatever is in the frame.

Due attention should also be paid to the colour of the wall on which the frame is hung, to that of the draperies of the room, and so on. When selected with skill, charming bits of colour may be got without much effort; and by converse, the appearance of a room may be almost spoiled by inharmonious colourings. Whether these be bright or low in tone, the rules which govern them are the same; but, as I have said, the subject cannot be treated of at length here.

In conclusion, it may be suggested that many a chimney-glass frame of the gilt and gaudy kind may be vastly improved by covering it with velvet in a similar manner to that alluded to for small frames.

THE SAFETY BICYCLE: ITS PRACTICAL CONSTRUCTION, ETC.

BY A. S. P.

FINAL RE-FITTING UP—ADJUSTING THE BEARINGS—HANDLE-BAR—FIXING ON THE HANDLES—REAR-WHEEL, MUD-GUARDS, ETC.—ADJUSTING THE CHAIN—ADJUSTING THE SEAT—ADJUSTING HANDLE-BAR AND BRAKE—ADJUSTING FOOT-RESTS—ACCESSORIES—HINTS TO CYCLISTS—CARE OF MACHINE.

EVERYTHING being ready for the final fitting up of our machine, a piece of carpet or canvas should be spread on the floor, so that the enamel or nickel-plating may not suffer damage.

The first thing to do is to fit the spoon on the front fork, then spring in the wheel. Some front fork ends are slotted through, so that the axle drops into its place without springing the forks at all. If the forks are to be sprung in order to admit the axle, see that the latter is no longer than just to come through the outside nuts, because it is quite possible to overstrain the forks trying to enter a long axle. See, also, that the loose or running cone is on the left-hand side. Before springing in the wheel, this cone should be screwed up till it jams the balls—in other words, till it stops against the balls; then it should be turned back, say, one-fourth of a turn, or as much as will allow the wheel to run perfectly free without side shake. While in this position,

put it into the fork, put the mud-guard stay ends on the axle, and screw up the nuts. The wheel, if it has been properly fitted the first time, should run exactly in the middle of the fork space, and directly under the brake-spoon.

The handle-bar comes next: but we have got to fix the handles to it. The handles may be horn, rubber, or cork; in either case they are fixed on with a little of the cement used for the tires. Our handle-bar is ¾ in. tube throughout, so that the handles have ¾ in. holes quite through them. Heat the handle-bar end in a gas-jet, and having melted a little of the cement, give the hot end a thin coat for about two inches of its length, then slip on the handle, pushing it up till the bar just appears at the outer end. When this is hard it will be impossible to take the handle off again without heating. It sometimes occurs, however, that a handle is wanted off; to do this, heat a bit of flat iron to red, and place the handle-bar on it nearly close up to the handle; when the bar is heated the cement will dissolve, and the handle may be easily slipped off.

Leaving the handles to cool, put the two parts of the frame together by passing the steering-tube up through the steering-head, then slip on the adjusting cone; after this, the lamp-bracket. Now the handle-bar is put into the steering-tube; see in setting it that it is square across the wheel, and pinch it, meantime, with the set-screw. The brake-lever and other parts of brake-work are now fitted; then turn the machine over with the handle-bar on the ground, and put the rear wheel in its place, the V part of the frame having previously been fitted to the central part, the upper bolts of the lower tubes put in, and the mud-guard fixed behind the bent tube. Now push the wheel to the inner ends of the slots, put on the four stay ends, and screw up the outside nuts. The bottom bracket bearings being mounted and adjusted on the pedal-shaft, the whole is fixed in the bracket-fork by the two long bolts.

Now the chain is put on, see that the head of the small chain-bolt, or the nut, as it may happen, is quite clear of the spokes, as in some makes of hubs it is not. Now slacken the outside nuts of the rear axle, and push the axle back with the two adjusting screws, taking care that both sides are pushed equally, so that the tire of the wheel may be in the centre of the space allotted to it; continue the adjustment till the chain is almost tight. It should hang curved about half an inch or more. If it were adjusted to tightness a good deal of friction would exist, and the grand object in a cycle is to get rid of friction by all possible means. Having fitted up the L-pin, saddle and spring, and the pedals, you are now in a position to adjust the seat and handles to your requirements as a rider. If you are a cyclist, you will know that when mounted you should be able just to place your foot on the pedal at its lowest point with the leg quite straight.

The saddle-clamp should be midway in the length of the three-coil spring, and the lower plate should be clamped also at its centre by the bracket (Fig. 37, page 436), then the whole is free to move on the L-pin for adjustment to fit the rider. The saddle being placed to proper height, the handle-bar may be raised or lowered till the handles are about three inches higher than the top of saddle, when it is fixed in the steering-tube, and the brake-rod at the same time fixed with the gripping end of the brake lever at its lowest, and the spoon half an inch clear of the tire. The brake-lever requires a spring of some sort to lift the spoon clear of the wheel; steel springs between the lever and the handle-bar are sometimes used, but they are seldom effective for any length of time. A spiral spring is often put on the brake-rod; in our case it can be put on the rod in the space between the lamp-bracket and the top of the rod, at D (Fig. 35, page 436). This spring should be plated. The simplest and always effective spring is a rubber band encircling the handle-bar and brake-lever just at the end above the brake-rod; when one is too weak, two can be put on. If adjustable foot-rests are used, they are put on at a convenient height for the feet to rest without outstretching.

Now we may say our machine is completed, and after it is furnished with a lamp, a bell, and a tool-bag, it will appear as represented in the illustration accompanying this—the closing paper on this subject. The latest style of lamp is known as the "swing-back," the aim of its construction being that it will have a certain amount of spring while the machine may be passing over rough road, so as not to jolt the wick down. These lamps may be bought from 4s. or 5s. up to 15s. Cyclists are compelled to carry lamps after dark by law. The bell is a necessity as an accessory. There are several kinds. The double dome, at 5s., is very good; single dome may be bought for 2s. 6d. The horn is about the latest fad; I can recommend it for ugliness, but for nothing else.

The tool-bag is usually strapped on behind the saddle. It may be had from 2s. upwards. It is furnished with a spanner and oil-can.

We have now to offer a few hints to cyclists in general with regard to the care and keep of their machines; for it is a fact that many are the possessors of safety bicycles, costing from £15 to £20, who are almost totally ignorant of the nature of their mechanism.

The vital parts of a safety bicycle of the first class are the ball bearings. These are entirely concealed, and in many cases the possessor of the machine knows absolutely

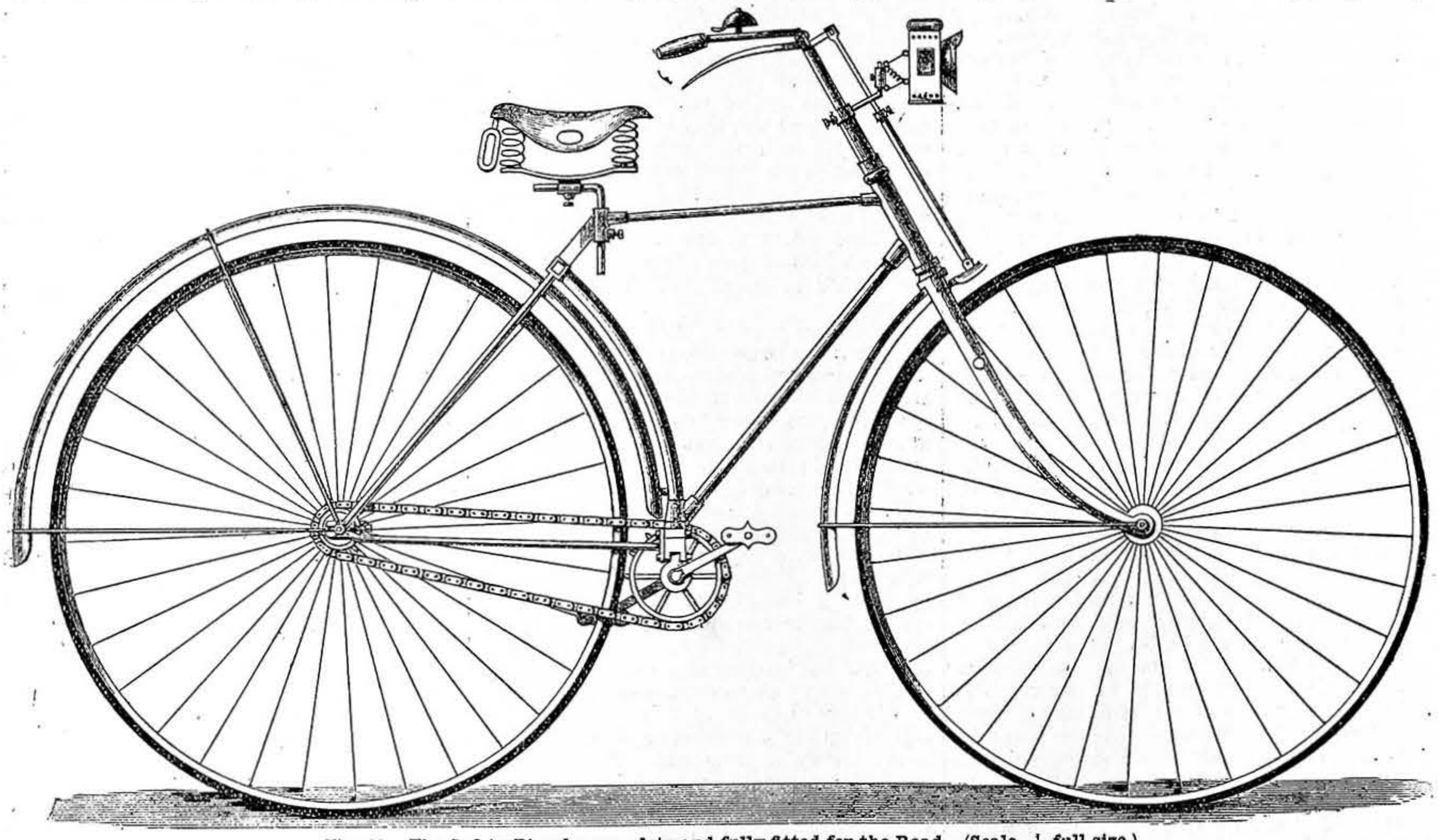


Fig. 44.—The Safety Bicycle, complete and fully fitted for the Road. (Scale, $\frac{1}{10}$ full size.)

nothing of their properties, or of the means to get the best results of their use: whereas if they knew but a little how to adjust their bearings—which is usually a very simple matter—they would be saved many a trip to the repairing shop. To all such I would say, invest a penny weekly on WORK, and read these papers carefully, and you will know all that need be known about the matter, as well as most other matters connected with the machine. I have tried all through to state things clearly, and wherever it is found I have failed, I will be glad to know of it through "Shop."

With regard to the keep of the machine, any mud should be washed off after using. To keep the plating bright, by all means keep it dry, drying it carefully after being out in rain. It may be made to shine by using jeweller's rouge made into a paste with water, and applied with a bit of chamois-leather, then wiped off and polished with a larger leather. If the machine is to be laid by for the winter, or even for a short time, where there is danger of damp, all plated parts, including pins, bolts, and nuts, should be well coated with vaseline. This may be wiped off when the machine is to be used, and the plating will be found to be bright and good.

To clean the bearings of the wheels and pedal-shaft after the machine has been used, the best plan is to take down the bearing, steep the balls in paraffin, and clean out the cases with the same oil. If you do not care to take down the bearings (which means taking the wheels out of the frame), turn the machine on its side and run plenty of paraffin through the bearings, revolving the wheels rapidly. This will wash out most of the dirt. After this, wipe the machine clean, and oil up with good cycle oil. About as good as is going is six parts of best sperm to one of paraffin; the paraffin thins it and prevents clogging.

To clean the chain, remove it from the wheels, and placing it in a shallow flat-bottomed pan, cover it with paraffin; let it remain an hour or two, then wipe with cloths. All chains should be lubricated along with the wheel teeth. Oil is very good if the roads are free of dust; on dusty roads, however, the chain is soon coated with it. A preparation of blacklead is used instead of oil for chains, and does not lick up the dust as oil does, and is, therefore, preferable on dusty roads.

Cyclists while on tour should always be provided against tires coming loose. Pieces of string or wire are useful; but there are several sorts of tire binders or fasteners in the market that the cyclist should not set out without.

It is no uncommon thing for a nut to drop off a machine and get lost, and sometimes a single missing nut will disable the machine for the time being. Every owner of a machine should find out the size and thread of all nuts on his machine that are at all likely to work loose and get lost, and provide himself with at least one of each size. They are easily carried in the pocket or tool-bag, and as he always has (or always should have) a spanner—one that will adjust to fit every nut—on finding a nut gone, he has nothing to do but broach his store, replace the nut, and go on his way rejoicing; whereas the fellow unprovided with nuts has, in like circumstances, to trundle his machine, perhaps miles, to the nearest wayside smithy.

Spokes often work loose, especially if they have been rather easily tapped when made. When this takes place the wheel begins to wobble. If cyclists would, therefore, learn the use of the spoke-grip, they would often save their pockets by doing themselves what they have to get done by a repairer. The spokes, in such a case, have simply to be screwed home to their former position. Ample directions are given in their proper place in this series: "How to True a Wobbling Wheel," so they need not be repeated here.

With these remarks on the care and keep of machines, which are meant for all cyclists who may read them, and to whom they may be information, I bring my present task to a close, in the sincere hope that the information sought to be conveyed will be found useful to many readers of this Journal, whether they put it to practical use or not; and I would respectfully ask readers who may find them interesting to draw the attention of their friends and acquaintances to their existence in our excellent weekly, WORK, thereby increasing the usefulness of that already useful publication.

A LAMP FOR A MAGIC LANTERN.

BY THOMASO.

I AM warned that answers in "Shop" must of necessity be brief, and as brevity to meet the needs of "Shop" is not to be achieved in giving the information that "Pedagogue" seeks, I am compelled to put it in the form of a short article.

The querist says his lantern does not give a sharply defined picture using a duplex lamp. Is he sure the light and reflector are in their right places, and that the diaphragm in the front lens is properly placed, and the aperture of the right size? This latter is probably the cause if he made the lantern himself. The lamp might cause an unevenly lighted or dull picture, but I do not see how it could cause a blurred picture—for it is thus I read his letter. However, I assume that he is satisfied it is the lamp in fault, and accordingly give a description of a three-wick lamp. Two wicks are used placed thus: V, with the point of the V towards the picture. Four and, I believe, five wicks are used, but they do not give much more light than three, and the extra heat is a serious matter. "Shop" space is limited, so must my instructions be. Take great pains to get everything true and square, or the lamp, if it burns at all, will either stink or smoke—perhaps both. Cut all holes in sheet-metal with fret-saw, to prevent buckling. Use the "Russian" sheet-iron (ask for best charcoal-iron) and the best tin plates (not "wasters"). Get some $\frac{1}{8}$ in. tinned iron wire, and some a full $\frac{1}{16}$ in.; brass plate, $\frac{1}{16}$ in. and $\frac{1}{8}$ in. Flat brass wire can be got these thicknesses, $\frac{1}{2}$ in. and $\frac{3}{4}$ in. wide respectively. Fig. 1 gives view of lamp complete, with dome raised exposing wicks. Make the dome of sheet-iron, 6 in. long from end to end, and of the other dimensions shown in Fig. 2, which is half full size. Wire ends with the thin wire, bend dome to shape, and then run a wire round bottom and across ends, allowing wire to project $\frac{1}{2}$ in. in front. A hole, $3\frac{1}{4}$ in. by $1\frac{5}{8}$ in., having been previously cut in top, a piece like Fig. 3, $1\frac{1}{4}$ in. high, is riveted in. Upper edges of this are turned inwards and flattened down for strength. Bend another wire same shape and size as that on bottom of dome, and on each side fix a strip of tin of shape shown in Fig. 1 by bending top edge of tin round the wire. The holes in the strips are necessary for ventilation.

Now make burner. Wick tubes $2\frac{1}{8}$ in. long ($1\frac{1}{2}$ in. wick should fit easy), made in two pieces (Fig. 4 is section; observe how ends lap). Cut two holes in one side of each tube, $\frac{5}{8}$ in. apart, and $\frac{1}{2}$ in. by $\frac{1}{8}$ in. for the wheels to wind up wick. Make a piece of tin for each wick tube of shape shown (A, Figs. 2 and 5, complete arrangement). Cut out little wheels in the $\frac{1}{16}$ in. brass like Fig. 6. (*Nil desperandum;* I once made a dozen by hand.) Drill the central hole first, and then file teeth. Cut piece of thick wire any

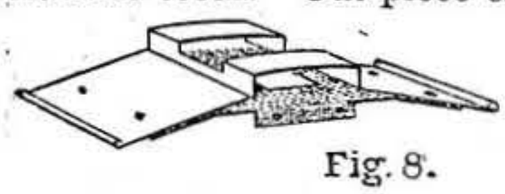


Fig. 8.

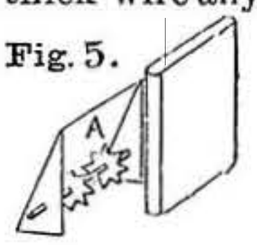


Fig. 5.

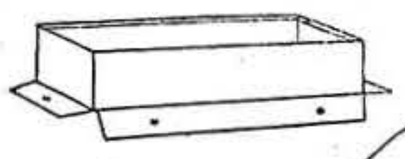


Fig. 3.

Fig. 9.

Fig. 6.

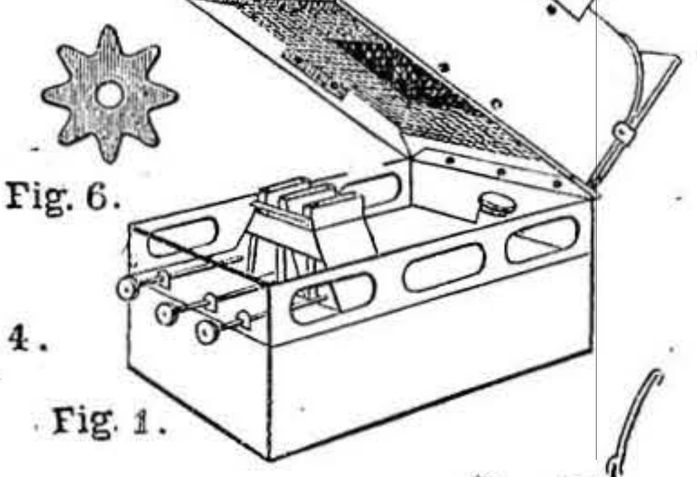


Fig. 4.

Fig. 1.

Fig. 7.

Fig. 10.

Fig. 2

Fig. 1.—Lamp complete. Fig. 2.—Front View of Lamp (half size). Fig. 3.—Support for Chimney. Fig. 4.—Section of Wick Tube. Fig. 5.—Wick Tube complete, separated to show Arrangement of Parts. Fig. 6.—Wheel for Winder (full size). Fig. 7.—Shape of Hole in Top of Tank for Wick Tube. Fig. 8.—Wick Cover to fit in Dome. Fig. 9.—Section of Hinge. Fig. 10.—Section of Reflector in Frame.

convenient length, and thread it through A (Fig. 5) and two little wheels. Solder wheels in place, and the whole thing on to the wick tube, after trying it. Oil tank $6\frac{1}{2}$ in. by $4\frac{1}{4}$ in., and high enough to bring "centre" (Fig. 2) to level of centre of condenser, usually made by cutting square pieces out of corners of oblong piece of tin, bending up sides, soldering corners, and finally the bottom in. A brass screw bottle top is put in front to fill the lamp—1 in. at least. The holes for wick tubes are to be made the shape of Fig. 7, and the wick tubes soldered in on the under side, at proper

angle, etc.; nearest side 2 in. from back of tank. A (Fig. 5) is then soldered on to the tube, it having been left long to allow of trimming the bottom to the proper angle. Solder the tubes in the order indicated in Fig. 2, finishing each one before going to the next. Solder strip of tin (B B B B, Fig. 2) across the ends of wick tubes, and a U-shaped piece of perforated tin (zinc might melt) between the tubes, as shown by dots in Fig. 2. Make Fig. 8 of iron, to fit in dome; length of hole in it, $1\frac{7}{8}$ in. The two ends are turned round the wire which goes round bottom of dome. When properly fixed, the ends of wicks should come exactly in centre of the hole in it. Rivet a piece of perforated tin to Fig. 8, as shown in that figure and in Fig. 2 by the dots, previously making a hole to freely clear the wicks; bend down a part of the sides of the perforated tin, and rivet to the sides of the dome as shown. Hinge the dome on as shown in Fig. 1, and in section in Fig. 9, and solder the strips of tin supporting dome to the reservoir. Make milled edge winders of the $\frac{1}{8}$ in. brass, notching the edge with a file, and drill and solder on to the winding wires, previously having soldered in place little pieces of metal, as shown (Fig. 1), for rigidity. Get square of thin glass, $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in., to close up front of lamp; lay it on piece of iron or copper (latter easiest), turn up edges over glass on three sides, and cut circle out of the centre, $3\frac{1}{4}$ in. (or as much of the circle as you can); centre of circle cut out when all is in position, to coincide with centre of reflector. Rivet little clips each side of dome to hold the glass and frame in position. The reflector is an awkward job. Make a frame for it like the one for the front glass, but with the following variations:—It is to be a square with a semi-circular top (there's a bull!), and the middle is not to be cut out, but hammered concave to fit the reflector. Cut $\frac{1}{2}$ in. hole in centre of reflector and frame, and bulge $\frac{1}{8}$ in. of the metal round the hole in the latter outwards enough to lay a small circle of violet or red glass in (see Fig. 10). Put reflector into place, and close in by bending the metal frame over the edge of the reflector round the top and straight down the sides and across the bottom. A piece of the bottom of reflector may have to be cut away. Fasten to back of dome by clips, as shown; or it can be hinged on to the same wire as the back end of Fig. 8, a part of the latter being cut off the wire to admit of the hinging. The clips method is the easiest. Make chimney telescopic in two or three draws; total height when drawn out about 10 in. Smallest draw at the bottom, and to fit tight on Fig. 3. In best work there are no sharp edges, and no rivets except in the top, where the piece is riveted on to keep the light from shining on the ceiling. To prevent it slipping down when in use, make a little bulge near the bottom edge of one draw to fit into a corresponding bulge in the top edge of another draw. There will be sufficient spring in the metal to allow of telescoping the draws if the bulge is not too great.

To wind up briefly I may say: Chimney made; lamp finished. Further particulars to order. That is to say, if any further particulars are wanted, I hope myself that there may be no asking for more, as such requests will indicate either that I have not carried out my explanation to the fullest possible extent, or that I have not succeeded in making myself intelligible—two horns of a dilemma in which I should be sorry to find myself, and from which I would fain escape.

SHORT LESSONS IN WOOD-WORKING FOR AMATEURS.

BY B. A. BAXTER.

The Saw.

Saws are a difficulty to the beginner, and no small part of his trouble arises from the apparent ease with which a practised hand can divide the stuff. In the first volume of Work there is an excellent description of saws and the form of their teeth, which all beginners should read.

But the use of the saw cannot be acquired by a knowledge of the form of teeth alone. Let me, then, try to give practical advice. Always mark a line for sawing, and, in cross-cutting, let the line be made on two adjacent surfaces, for there are many who can saw a board at right angles as far as breadth is concerned, but if the square is applied to test the edge it will be found that the angle is not that desired. In all probability the first attempt to use a saw results in a quantity of saw-dust, an increased temperature in the operator, and some roughly divided wood. It seems almost absurd, but it is necessary to advise the proper saw to be chosen at first, and to persevere with it, not taking all the saws in stock one after the other to try which is the best, neither try all sorts of positions for the material or for the operator, for if there is anything in which an unstable or vacillating policy is injurious it is in learning to saw. The operator should, as soon as possible, form a habit (of course, if possible, a correct one) and stick to it.

The choice of saws depends on the work to be done. An amateur may need a "half-rip" saw; that is the coarsest he will need. If he works in hard wood a "hand saw" will do instead; a panel saw is indispensable. These saws, which have no backs to stiffen them, form a group which may be said to be generally used on the stools, while the tenon and dovetail saws, which are furnished with a back, are for smaller work, and are used on the bench.

The advice given to square the lines on two adjacent surfaces will be more effective on wood of considerable thickness, say upon one of the pieces of $4\frac{1}{2}$ in. by 3 in. advised for a planing lesson. Let the sawyer stand so that he can see the lines appear as one line, or, in other words, let him stand so that his eye is in the same plane as the lines ruled for the guidance of the saw. In such a position he can, with slight alteration of position, glance at either side of the blade of saw, and can exercise watchfulness to check the slightest tendency to depart from the line. If this care is not exercised quite at the beginning of the cut, it will soon be too late to return to the line at all, and the temptation to try again from the other end of the stuff will become almost irresistible. If possible, however, try to avoid this, and master the use of the saw by means of perseverance and careful practice.

One of the most important items to remember is the position of the elbow. Without wishing to dogmatise, seeing that an expert can do good work in almost any position and with his elbow moving in almost any direction, a beginner ought to make his elbow move in the plane in which the saw moves. Just try an experiment: mark a line on a board, then, with a strip of wood held in the hand, try to move the strip so that it constantly agrees with the line, with various positions of the elbow, close to the side and more extended from it, and then apply the result to the use of the saw.

A FOUR-DRAW TELESCOPE.

BY O. B.

A correspondent, who has adopted the *nom-de-plume* of "Yarmouth," having asked for particulars with reference to the constructing of a small telescope, I purpose in the following paper giving such details as shall enable anyone who has a fair acquaintance with the use of a few tools to construct such an instrument. But here I would say that it is an instrument which requires some skill to make—if finished as it ought to be—and a lathe is indispensable; yet anyone who can use a lathe and chase a screw will find no difficulty.

The conditions specified were as follows: A telescope with 1 in. O.G., and to extend to about 16 in. when drawn out. Whilst for the present I shall work to these dimensions, my instructions will be such that they may be adapted to any size of O.G. or length of focus.

Tubes.—It will be understood that brass tubing may be procured either stout or light. For a telescope of large dimensions—such as for astronomical purposes—a stout tube is required, but for a light hand instrument, the less weight the better. The tubing we require is known as mandrel drawn; it is thin, hard, and smooth on the inside, and may be had in all sizes for about 2s. 6d. per pound from any instrument maker, such as Lancaster, Birmingham; or metal merchants, as Stanton, in Shoe Lane, Fleet Street, London. I have found no difficulty in getting what I wanted from the latter place.

It is possible that small dents or pits from blows may be in the tubing. These must be removed, as, to say the least, they would appear very unsightly in the finished instrument. To remove them, lay the tube with the dents on a piece of hard level wood, and, either with a burnisher or a round piece of hard wood, rub the inside of the tube over the indentations, which will quickly bring up the surface level.

Quantities.—The sizes and lengths of tubes needed are as follows: body, $5\frac{1}{4}$ in. by $1\frac{1}{4}$ in. diameter; first draw, $4\frac{3}{4}$ in. by $\frac{19}{20}$ in. diameter; second draw, $4\frac{3}{4}$ in. by $\frac{17}{20}$ in. diameter; tube to carry eye-piece, 5 in. by $\frac{3}{4}$ in. diameter; for the eye-piece, 2 in. of a size to slip into the last-mentioned tube, and 2 in. of a size smaller still for the erector.

In addition to these, we shall require tubing for collars, which may be made out of the same tubing as the next size larger, thus: the collar B may be made of the same size tube as the body A, and so for the other two collars. In addition to the tubes, we shall require a piece of sheet brass $\frac{1}{8}$ in. thick and about 6 in. square, out of which we shall have to cut rings for the ends of tubes and collars. This, in the main, will comprise all the brass required.

Chuck a piece of hard wood in the lathe, and turn it down as a mandrel 4 in. long to receive the tube A. True off the ends of the tube at $5\frac{1}{4}$ in. long, and chase an internal thread at each end. The mandrel may now be turned down to receive the tube B, which must be cut off $4\frac{3}{4}$ in. An internal thread must be chased on one end, as shown. Tube C must be treated in the same way.

At one end of D a ring must be soldered on, as at *a*; this can be cut off a thick tube—not mandrel tube. Supposing it is not convenient to get a piece the exact size, then one a little too large can be made to fit by cutting a small portion out of it. Place it on the tube, and bring the edges to meet, and bind it in its place with a piece

of wire. Run soldering fluid between the tube and ring, and then with a hot bit cause solder to flow into the joint until the ring and the tube are solid. Chuck the tube as the others, and cut it off to 5 in.; on the collar chase a thread, as shown at *a*, and also chase an inside thread on the other end.

Collars.—We now require three collars, as B, C, D. Fig. 5 shows one in detail, and to describe one is to describe each. Procure or make a tube, 1½ in. long, to fit tightly the draw on which it is to work. If a piece the exact size is not to hand, then, as before described, take a tube slightly larger, and cut a piece out and solder the joint. On one end sweat a ring of thick tubing ½ in. wide, as at *b*. Chuck it in the lathe, and cut off the end of the ring down to the collar, leaving the collar to project ⅛ in. Out of sheet brass cut a ring to fit the end of the collar, and wide enough to project ⅛ in. beyond *b*. This must be now soldered in its place. If due care has been taken, it will be perfectly solid. Replace the whole in the lathe, and turn down the collar as thin as possible consistent with strength. Chase a thread on *b* so as to screw into A, turn down C, and mill the edge. This milled edge must project beyond the tube A about $\frac{1}{16}$ in. The other two collars must be made in the same way—C must screw into B, and D into C. At *a* on B and C, a ring must be soldered as shown, so as to prevent the tubes being separated when drawn out. In each collar four slits are made, as shown (*d*, *d*, in Fig. 5). These are made in a slightly diagonal manner at the diameter of the collar. A slight tap must be given to these two free strips, causing them to spring slightly inwards, so as to press more fully on the tube which slides in them. Thus all shake will be avoided. We can now screw our tubes together, and if our work has been properly done, we shall have a tube perfectly rigid.

Cell for O.G.—This cell may be cast or built up. The latter plan I have adopted myself, and have not found it difficult. It is taken for granted that we have procured our O.G. of 1 in. diameter and 10 in. focus. A ring must be made out of stout tubing of 1 in. internal diameter. Chuck it on the lathe, and turn down the ends true. Cut a ring out of sheet brass, the inside diameter, say, $\frac{1}{32}$ in. smaller than the O.G., and the outer diameter ¼ in. larger than the tube A. This needs only to be done approximately at first. When soldered together, place it in the lathe and turn it up to the size mentioned, chamfering off the outside of the inner diameter as shown, and milling the outer edge. A thread must be chased on it, so as to screw it into the tube A; and on the inside a thread must be chased to receive the collar to retain the O.G. in position (as *b*, Fig. 1). Care must be taken that the inside of the cell is turned true, so that the O.G. beds perfectly. The stop collar, *b*, may be turned out of the solid, or may be built up like the cell into which it screws. The edge must be milled. The cell, when made, should hold the lens without any shake, and yet without pinching it, so as not to set up a strain.

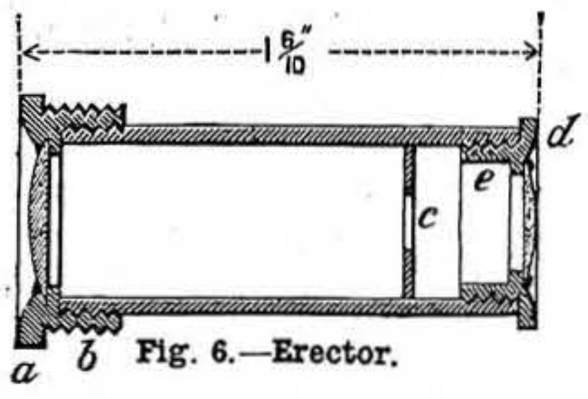


Fig. 6.—Erector.

Eye-piece.—For this we shall require a field lens $\frac{6}{10}$ in. diameter and, say, 2 in. focus; eye-lens $\frac{4}{10}$ in., and the focal length one-third that of the field lens. Add the combined focal lengths together, and divide by 2; this will be the distance which must separate them. They must be plano-convex, with their plano sides towards the eye. The better plan for a novice to adopt is, when purchasing them from such an optician as, say, Lancaster, to say what they are for, and ask the distance they are to be separated.

Procure a piece of tubing that will fit nicely into the tube D; cut off, say, ⅜ in.; turn out one end to the extent of $\frac{1}{16}$ in., so that the field lens will bed on it. The other end must be turned down, and a thread chased on it, as shown. Now place this cell in a chuck, with the end to receive the lens at the right. Place the lens in its position, keeping it steady with a finger of the left hand, and with a burnisher press the bezel over the lens, which will hold it securely. For the cell of the eye-piece turn away the metal on the outside to form a bed for the lens, as shown, and then pierce the centre, leaving a narrow flange. Now cut away the metal at an angle, as in Fig. 7, leaving a bezel around the hole which has to be turned over on the lens, as in the other case. A thread has to be chased on the cell, as shown. A tube must now be cut, of such a length that when the two cells are screwed in their places the lenses shall be separated the required distance. A stop must be placed, as at *b*, to cut off marginal rays. If we were constructing an astronomical telescope, our work would be practically complete; but the youngest tyro in optics will know that the instrument, as it now stands. will invert the objects seen, and thus, for all terrestrial observation, is practically useless.

Erector.—For this we shall require two lenses. The one nearest the O.G. may be either plano-convex or double-convex; but if the latter, the greatest convexity must be nearest the O.G. This should be ½ in. diameter and 1¾ in. focus. The other is a plano-convex, with the plano side nearest the eye; this may be ⅜ in. diameter and 1½ in. focus. They must be separated one-half of their combined focus.

After what has been said on cell-making, the diagram (Fig. 7) will be sufficient to show how they are mounted. A stop with a small hole must be placed as shown. The milled edge at *a* must project a little beyond the diameter of the tube D, so that the collar shall prevent the tube from being pulled out.

We now need to make the eye-cap (as Fig. 8); this needs no further description.

A thumb-piece must be taken out of tube D, as shown at *c*, to afford facility to remove

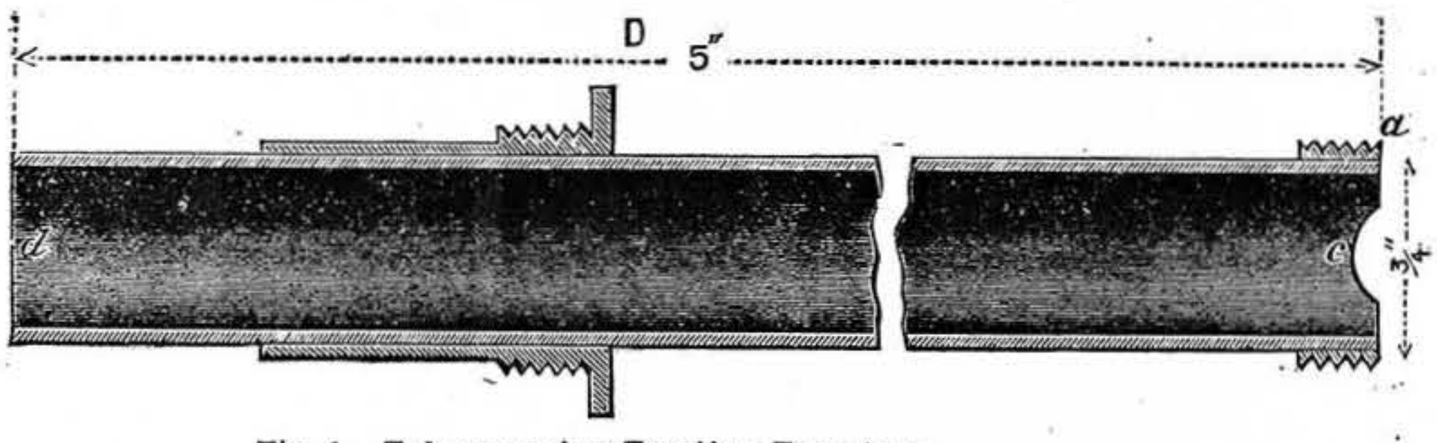


Fig. 4.—Tube carrying Erecting Eye-piece.

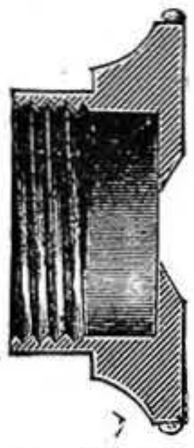


Fig. 8.—Eye-piece Cap.

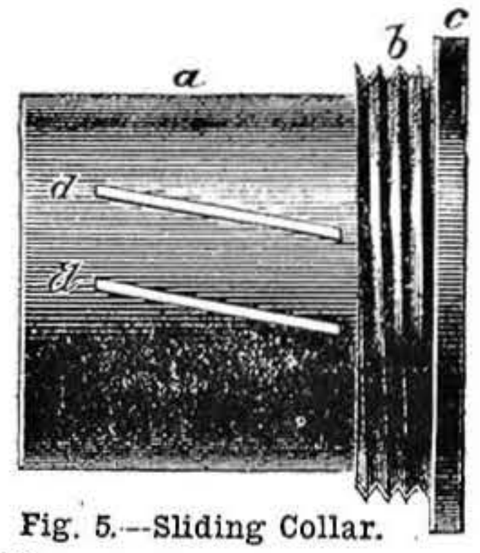


Fig. 5.—Sliding Collar.

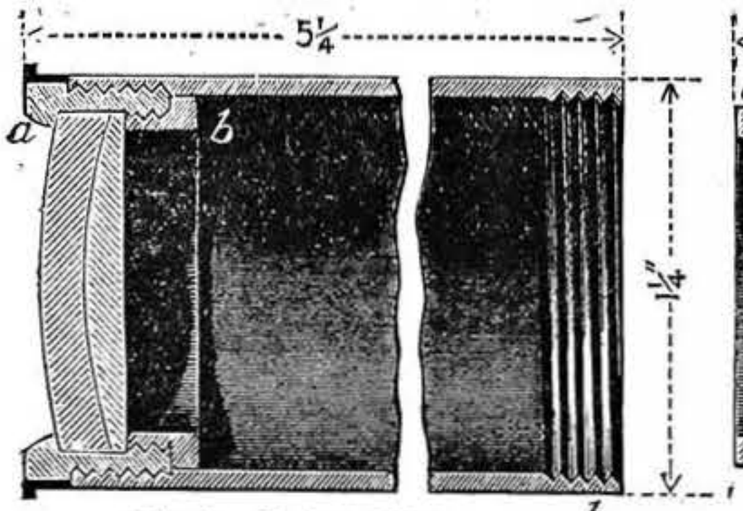


Fig. 1.—Body of Telescope.

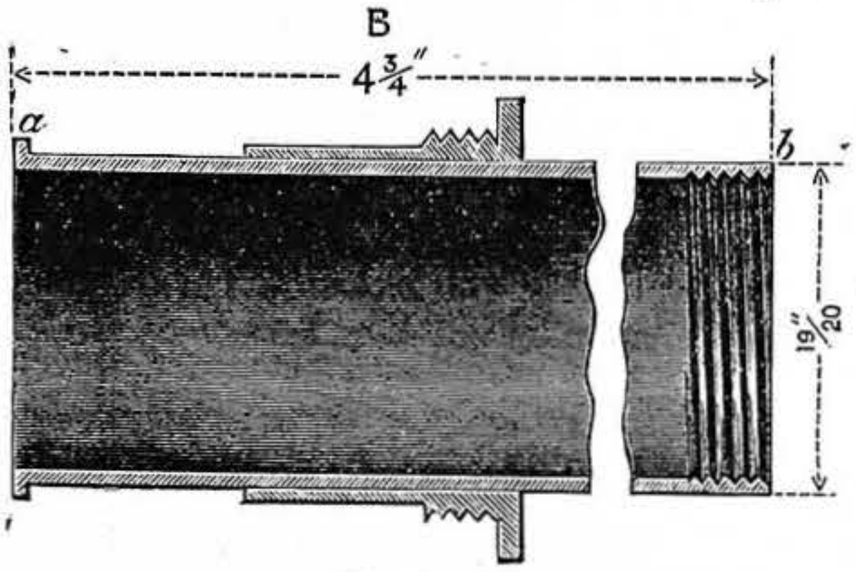


Fig. 2.—First Draw.

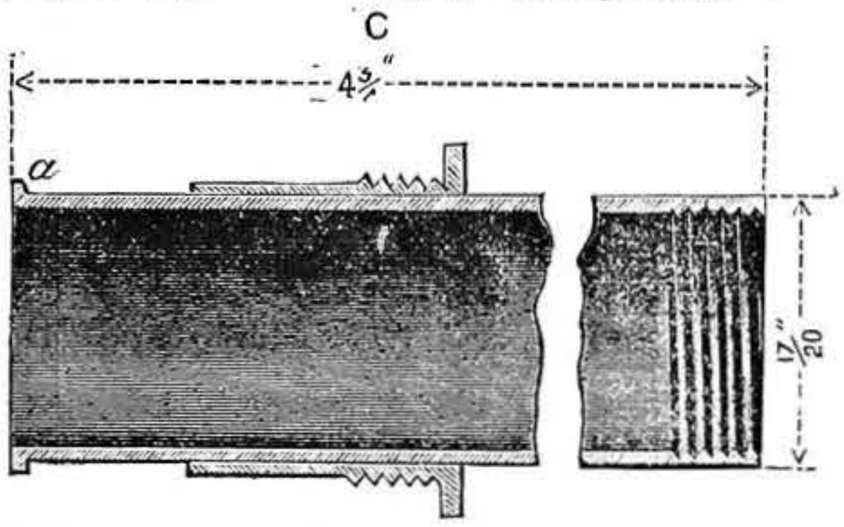


Fig. 3.—Second Draw.

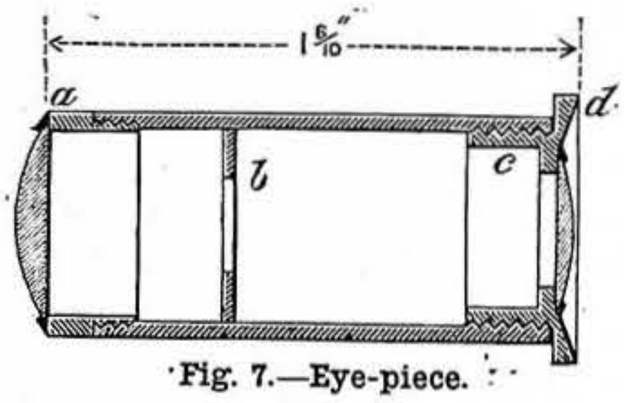


Fig. 7.—Eye-piece.

the eye-piece when needed, seeing the flange, *d*, of the eye-piece is flush with the tube.

Sunshade.—It is usual to have a sunshade to draw over the O.G., with a cap to prevent damage. If this be desired, then a ring, say, 1 in. wide, must be soldered to body tube at *b*; then a collar must be made to slide over the tube, and the sunshade screwed to this, and a cap or cover fitted to the end. These arrangements will be so simple, that anyone who can master the foregoing details will find no difficulty in working them out. When all is so far finished, the inside of all tubes must be made a dead black, and all the exposed parts of the tubes burnished and lacquered.

WIRE-WORK IN ALL ITS BRANCHES.

BY JAMES SCOTT.

FIRE-GUARDS—BODGING—THE BODGE—THE BODGING-RING—STAY-BARS—EYE-WIRES—HOOKS.

I HAVE no hesitation in saying that the manufacture of a fire-guard such as I show in Fig. 119 must be numbered among the most difficult tasks a wire-worker is called upon at different times to perform. My earnest advice to my amateur friends is that they should leave fire-guards alone until they thoroughly understand details in other directions, and have become comparatively efficient in handling wire in a practical manner.

I have tendered this counsel because I am aware that a fire-guard is an extremely useful adjunct to a household, and that the fact might induce some of our amateur friends to try their hands at such articles before they had thoroughly grasped the instructions previously given. However, if any are determined to endeavour to accomplish making one, they will find these notes accurate and "plain sailing;" for I have dotted them down roughly while observing the process through which a fire-guard passes, and have, just before penning these lines, experimented personally.

These articles are not separately made and finished complete, nor, indeed, are many things so made, but a quantity are put through one stage previously to passing through another. However, it will serve no useful purpose for me to name the different processes. I will begin and end with a single guard.

They are made in various sizes, and are usually proportioned to the height; but I shall not give *all* the dimensions, as there are so many, and I do not see the need of my doing so. Should any reader, however, desire fuller particulars, I shall be pleased to give them to him, although I have endeavoured to obviate the necessity of any such action on his part in the course of my following remarks.

Supposing a certain height is agreed upon, the first proceeding will be to bend a wire as in Fig. 127, the top being half-circular. There will be a bottom wire (indicated as A B in Figs. 119, 122, and 123), which will finally be nearly half-circular in shape, but will be used in the straight until a point is reached of which I shall say more later on.

A little extra should be allowed upon this for the purpose of twisting the corners where the wire, A B, comes in contact with the upright arch.

A piece of work should now be laid out on the bench, of a mesh previously decided upon, the width of it exceeding by a trifle the length of the bottom wire, A B. The upright arch should now be placed upon the work, one corner of the former touching one end of the bottom wire, A B (Fig. 126), and the length marked off, giving a very considerable excess over the length of the upright arch, for the reason that sufficient must remain to be bent dome-shaped, as in Fig. 119.

When the piece of work is cut out, should it be found correct in size to fit on to the frame (which I have designated upright arch and bottom wire, A B, for convenience' sake), if more than one guard of these dimensions is required, it will be preferable to cut all the necessary pieces of work ready according to the first piece.

When this stage is reached, the work is ready to be turned over on to the bottom wire, A B (before that wire is bent arc-shaped, bear in mind), and will then be as in Fig. 122. Parallel to the bottom wire, A B, at a certain distance from it (which distance will depend upon the height of the guard), will be another wire (C D), temporarily secured in position by being tied at odd intervals. Between these two stay-bars will be a pair of eye-wires (Fig. 125), one towards each side of the work, in order that the movable hooks (Fig. 132) may be fastened to them in such a manner that sufficient space is afforded for them (the hooks) to work freely and be attached to the bars of a grate to hold the guard in proper position. The wire, C D, will then be laced to the work.

What requires to be done when the work is thus far ready is to bend the bottom wire, A B, and the wire, C D, to their requisite arc shape, which is done by means of the bodging-ring shown in Fig. 120 (of which more anon). The appearance of the job will now be as a piece of netting bent, being really an arch whose both openings are the same size as each other.

When this point is attained, the upright arch wire should fit properly in between the wires along the part which forms the bottom edges of the arch of bent work. The latter wires must be temporarily tied to the arch wire, preparatory to being turned over it. It will be found that the wires can only be turned over on to the arch wire along the straight sides of it, thus leaving loose ends all round what will afterwards be the arc-shaped portion.

The all-important work of bodging takes place at this period, but before describing it I must return for a short time to the eye-wires. As before said, one is shown in Fig. 125. A straight wire has its ends bent as shown, either by means of fingers, pliers, or something as convenient, and is then again bent, at a short distance from each end, round pegs, the holes or eyes being thus formed (Fig. 124). When fixed in position, by placing one end over the bottom wire, A B, and the other end over the bar, C D, they are there squeezed down as tightly as possible by the aid of the nippers. Of course, these eye-wires will be upon the inside of the job, as also will be the wires, A B and C D.

Now for the bodging—by the way, a peculiar but appropriate term. First, there must be a bodge. This is shown in Fig. 121, and will be turned from hard wood. An idea of its most suitable proportions can be gleaned when I say that the narrowest part shown in my sketch is intended to serve as a handle. The next accessory will be a metal hoop about four or five inches deep, and about the same diameter as the width of the guards. The work is placed upon it in such a manner that that end which is to be dome-shaped partly covers the orifice of the bodging-ring. A few gentle taps are given with the bodge, the work meanwhile being shifted regularly with the left hand, but never having any other part over the bodging-ring than that which is to be dome-shaped. The consequence of these actions is a depression of the wires so tapped or bodged, and if these operations are continued systematically, a dome top will be the result. Many more words concerning the bodging will be superfluous, for I am certain that neither myself or anyone else could possibly describe the details clearer if confined, as I am naturally compelled to be, to pen and pencil. To give more diagrams would be useless, as wire is such open work to represent that an idea of it cannot always be conveyed in drawings, and my only fear is that those I do give, although drawn correctly, may not be instantly intelligible in every case. The wires will then be turned over the half-circular portion of the upright arch.

Another difficult part in connection with fire-guards is the accomplishment of a pair of hooks for purposes previously mentioned. To me the task of describing the routine through which a piece of wire passes before it can be called by the name under consideration, is indeed a difficult performance; but to show that I have at heart most earnest wishes that the knowledge which I have gleaned from my practical friend should be imparted to all who feel desirous of becoming properly acquainted with it, I have decided upon a scheme by which I consider I shall benefit my readers and also satisfy myself, of which I must postpone explanations until I have completed a few more descriptive paragraphs.

These hooks are bent by means of pegs driven into the bench at stated distances apart, the distances depending upon the size of the hooks required. There will be six pegs, placed in relative positions shown by Fig. 128. In that diagram the whole lot are shown complete, and I have lettered them—the letters in the companion diagrams illustrating a correspondence of parts.

First, a straight wire has a hook formed at one end, which is held to the left in beginning the after-bending. This end hook is fixed on the extreme left-hand peg, A, and the wire is bent round the extreme right-hand peg, F (Fig. 128). In this state it is taken off the bench. In the next bending it will not lay flat, as it unavoidably appears to do in the sketch (Fig. 129), but one bent half will be exactly above the other, as I have endeavoured to explain in Fig. 133. In that diagram it is intended that only what is the lower half in the drawing shall touch the bench. This being understood, then, I will proceed.

The wire is, in this position, placed by the sides of pegs D and F, in such a manner that the bend, G, does not project beyond the peg D, and is then bent round as in Fig. 129. Then at point G each half is squeezed close together. It is again taken from the pegs and replaced against them, as in Fig. 131, the longer portion being exactly above the shorter, and the *longer portion only* bent as in that diagram. In the next bending, the hook (so far finished) must be turned upside down and fixed in contact with the pegs, as in Fig. 130, and the longer portion again bent round peg F. The hook will be finished when the remaining straight end is formed into a bend similar to that at the other end, and will then present an appearance similar to that represented in Fig. 132.

An examination of the arrangement of the pegs will show that any number of hooks may be made of all exactly the same size as

each other. The pegs form a gauge for them. When the first piece of wire is formed into a hook, it will naturally be desirable to know what its length is if any more than a few pairs are required. To arrive at this conclusion, it would seem that it would be necessary to straighten out the hook again in order to measure it; but if my following hints are accepted, no such toilsome course need be resorted to.

Have a length of wire a few inches in excess of what it may be roughly estimated will be required. Measure it, and then make the hook. It will be seen that by subtracting the length of the surplus piece from the whole, the remainder will give the proper length occupied by the hook. I believe this explanation is clear enough, and my readers who properly understand must not think I am doubting their intelligence by an example—which I give for the benefit of those of my younger readers who may not quite understand what I mean by what I have said above. Supposing the original piece of wire is ten inches long, when the hook is formed there will remain a portion at the end which will have to be cut off. If this latter measures two inches, then the remainder, eight inches, will be the length of the piece of wire necessary to form the hook.

Each hook will be secured to the guard by having its ends passed through the holes in the eye-wires and squeezed down so that it may swing to and fro. The corners, where the upright arch wire comes in contact with the bottom wire, A B, should be slightly twisted. A handle will be required. This is simply a piece of bent wire squeezed down upon the dome part of the guard.

Sometimes these articles are mounted with brass. This is done by having a brass tube, which is slit its whole length along one side, and then bent round to the shape of the guard, and, finally, hammered down over the frame of the guard. Another tube will be necessary for the bottom.

Now I will speak further of what I proposed doing, so that myself and my readers might be satisfied. Should any of the latter not quite grasp the purport of my previous remarks, I will be pleased to supply him with a card upon which I would draw in plan the exact relative positions, full size, of hooks of any dimensions he desires. He must tell me the length and width he wishes it to be *when finished*. The one thing that I stipulate for on his part is, that, when writing to me, he shall enclose sufficient of the requisites to cover postage, of which any balance remaining would be returned. I shall be glad to assist my readers in this way in any direction in which they may require enlightenment.

I have said that articles with brass or other mountings would be dealt with in future papers; but such an enormous number of fire-guards are made quite plain, that I consider their description rightly belongs to this section, and I have included them in this section accordingly.

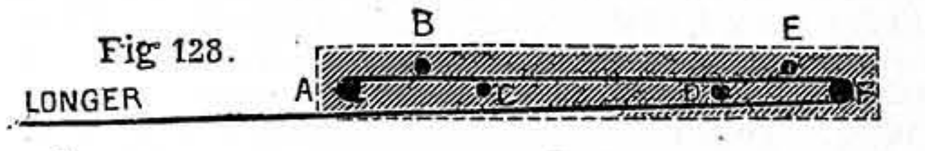


Fig. 128.

Fig. 133.

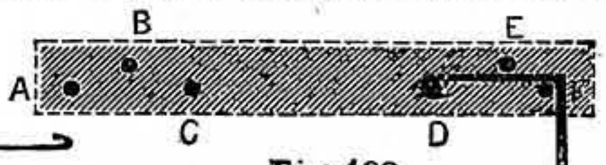


Fig. 129.

Fig 132

Fig. 120

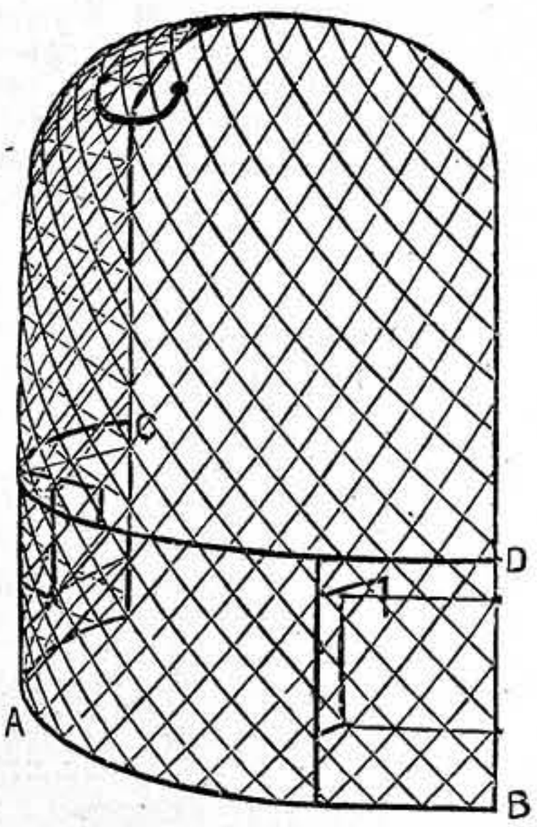


Fig. 119.

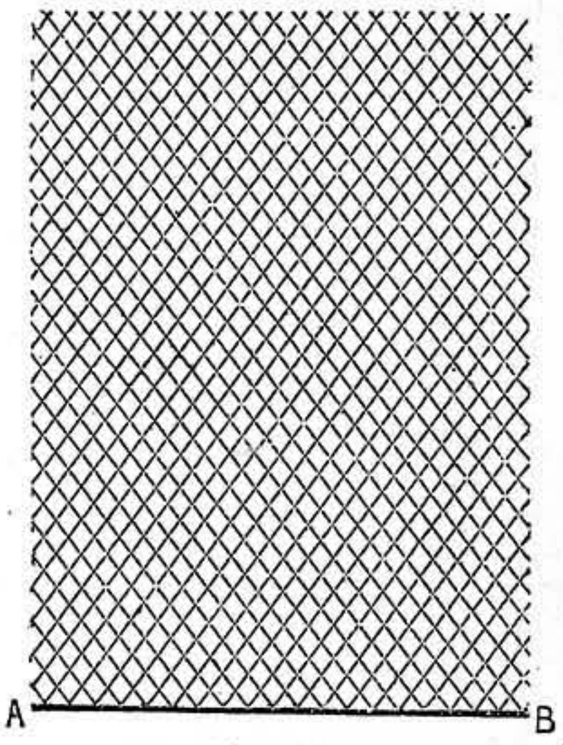


Fig. 122.

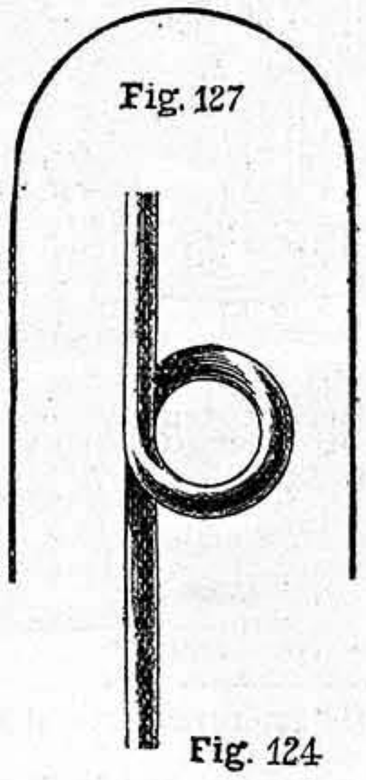


Fig. 124

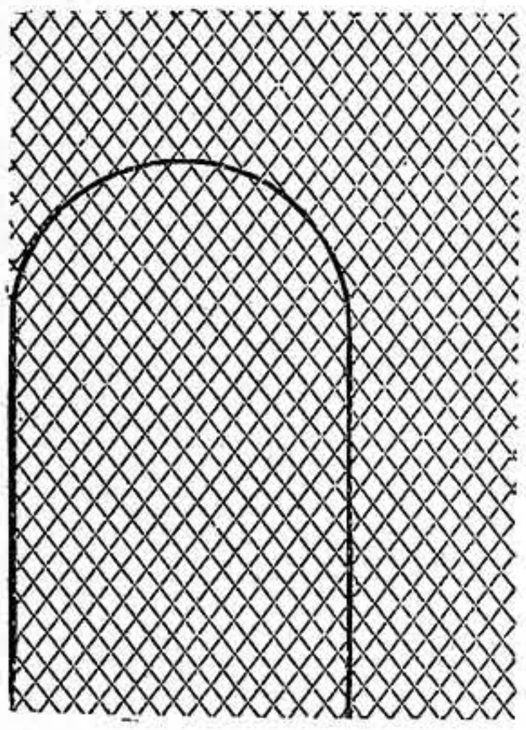


Fig. 126.

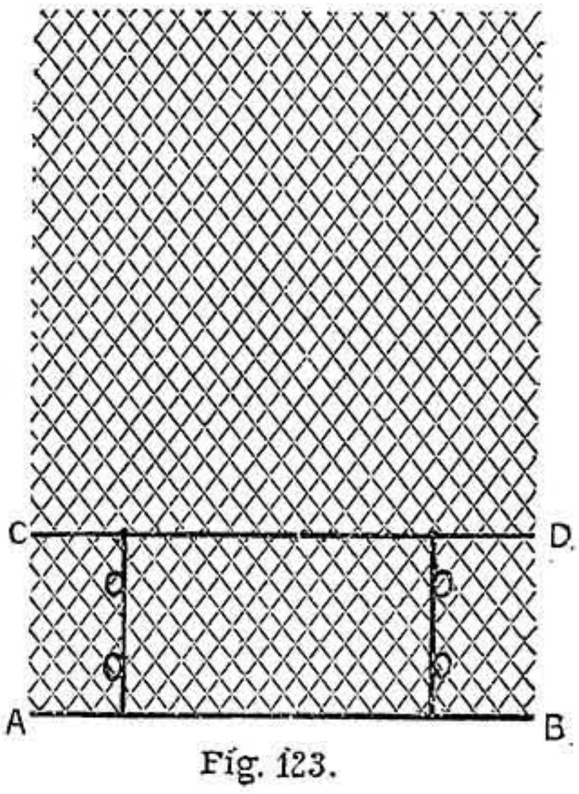


Fig. 123.

Fig. 119.—Fire-guard complete. Fig. 120.—The Bodging-ring. Fig. 121.—The Bodge. Figs. 122, 123, 126.—Progressive Diagrams illustrating the laying out and fitting of Various Wires. Fig. 124.—Eye-hole (see Fig. 125). Fig. 125.—Eye-wire (see Fig. 124). Fig. 127.—Upright and Wire. Figs. 128, 129, 130, 131.—Progressive Diagrams showing how Hook (Fig. 132) is formed. Fig. 132.—Hook. Fig. 133.—Diagram in further Explanation of Figs. 129, 131.

MEANS, MODES, AND METHODS.

BLACK STAIN.

A SPLENDID black stain for wood-work can be made and used in the following way:—Take out the burner of a gas-jet and suspend a piece of iron or tin above it, and allow it to smoke on the tin; in a few minutes a fine black powder will accumulate. This should be collected by scraping it off with a knife. If a piece of wadding or flannel, moistened with French polish, be dipped in the black powder, and rubbed on the article to be stained, it will be found to stain (and polish at the same time) a beautiful jet black.—H.H.

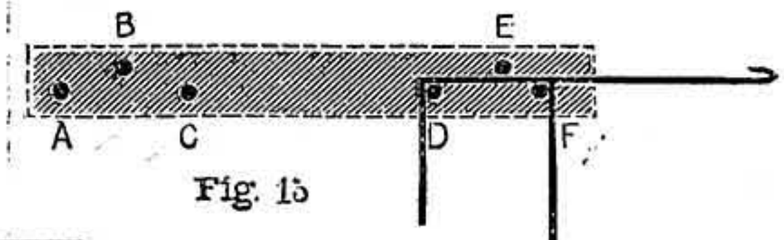


Fig. 15

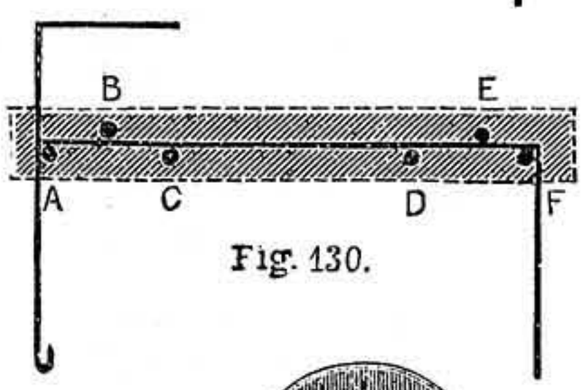


Fig. 130.

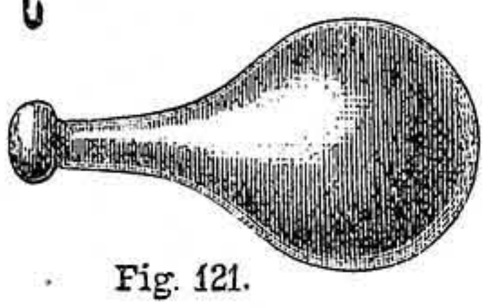


Fig. 121.


Fig. 125.

A CHEAP AND USEFUL "GRAPH."

The following directions for making a cheap and useful "graph," or copying materials, are based on a recipe given in the *Papier Zeitung*:—Soak four parts of best clear glue, preferably Scotch, in a mixture of five parts pure water and three parts liquor ammonia until the glue is thoroughly softened. Subject it to gentle heat until the glue is dissolved, and then add three parts of granulated sugar and eight parts of glycerine, stirring well and letting it come to the boiling point. While hot, spread the mixture upon clean white blotting-paper with a broad brush until the blotting-paper is thoroughly soaked and a thin coating remains on the surface. Then put it aside to dry for two or three days, when it will be ready for use. The writing or drawing to be

copied is done with the usual aniline ink upon writing-paper. Before transferring writing to be reproduced to the blotting-paper, wet the latter with a sponge or brush and clean water, and allow it to stand one or two minutes. Place the written side down, apply gentle pressure to get rid of any air bubbles, and submit the whole to gentle pressure for a few moments. The written paper must then be removed, and impressions taken in the ordinary way. When the impressions begin to grow weak, damp the surface of the "graph" a second time. This "graph" does not require the writing to be washed off; all that is necessary is to put it aside for an entire day, or a day and a half; or, in other words, from twenty-four to thirty-six hours, when the surface will be ready for a new impression.

A Hard and Fast Cement.

The introduction of the following cement, that is said to stick on anything, is attributed to Professor Alexander Winchell:—Take of clear gum arabic, 2 oz., of fine starch, 1½ oz., and of white sugar, ½ oz. Reduce the gum arabic to powder, and dissolve it in as much water as the laundress would use to render 1½ oz. of starch fit for use. Dissolve the starch and sugar in the gum solution. Then place the mixture in a vessel and plunge the vessel itself in boiling water, and let it remain there until the starch becomes clear. The cement should be as thick as tar, and remain so. It can be kept from spoiling by dropping in a lump of camphor, or a little oil of cloves or sassafras. This cement is said to be very strong indeed, and will cause glazed surfaces to adhere perfectly. It is useful for repairing specimens of rocks, minerals, or fossils that may have been accidentally broken.

How to Imitate Old Bronze.

An excellent method of imitating antique bronze has been lately introduced in some of the art work of that class. It is well known that repeated applications to copper or brass of alternate washes of dilute autic acid, when subsequently exposed to the fumes of ammonia, result in giving to the metal the colour of antique green bronze; but workers have long been on the look-out for a more rapid method of obtaining this appearance. It has been found that the desired result may be obtained by immersing the articles in a solution of one part perchloride of iron to two parts of water, the length of the immersion regulating the depth of the tone. A similar result may also be obtained by boiling the article in a strong solution of nitrate of copper, or by dipping the articles to be coloured in a solution of 2 oz. of nitrate of iron and the same quantity of hyposulphite of soda in a half-pint of water. The article must then be dried and burnished.

A Wrinkle for Bookbinders.

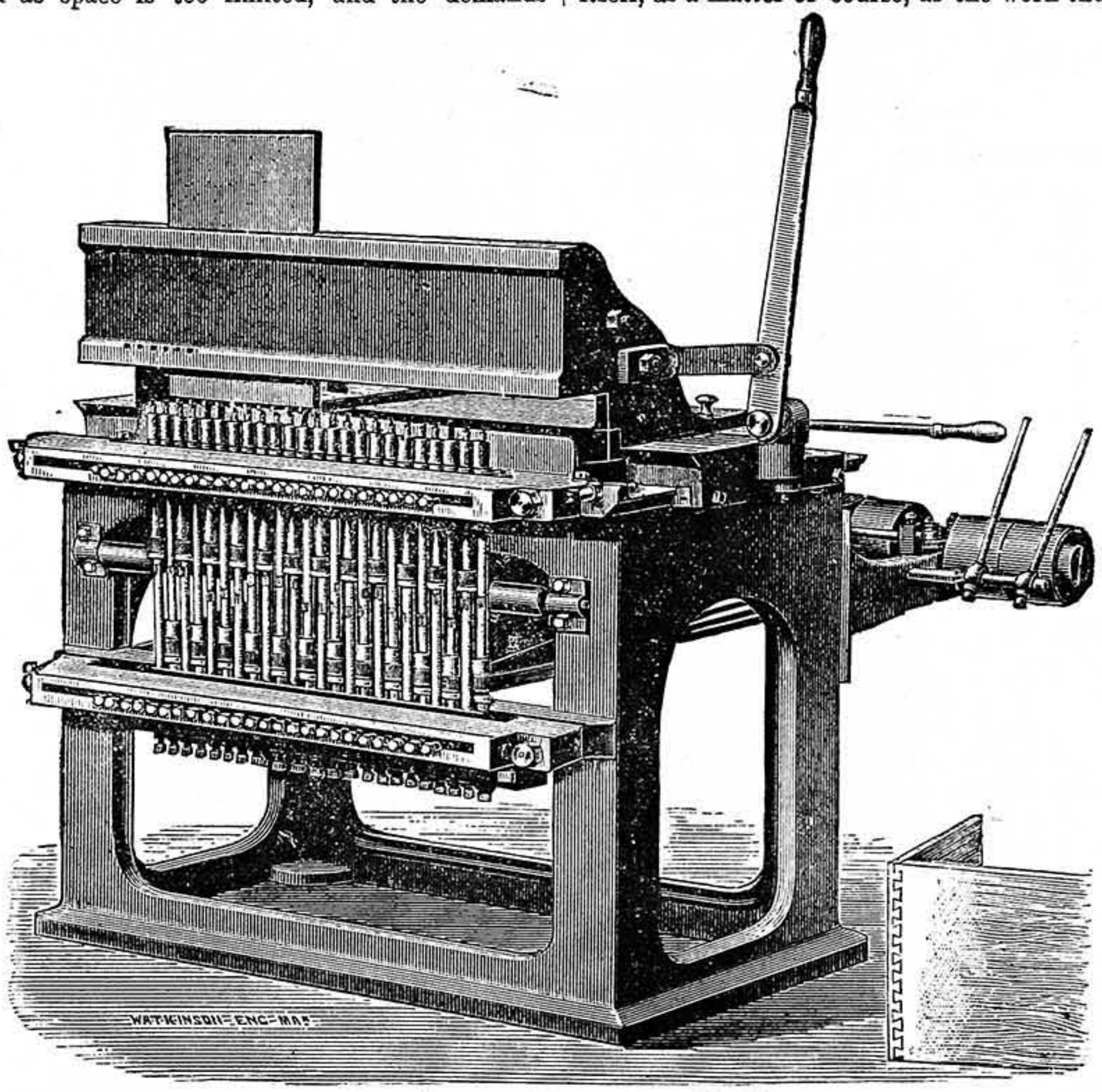
In gilding the edges of books, trouble sometimes presents itself in the gold cracking off and spotting, especially in works of art whose plates have been worked on thick and pulpy paper of a greasy nature. This can be remedied by adopting the following process:—After the edges are well scraped, wash with a solution of about five drops of muriatic acid to 2 oz. of oxalic acid; this will destroy the grease. Then paste, wash, and when dry polish with a round agate burnisher; this will give the edges of the plates a hard surface. Now apply the gold with size in the ordinary way, and the result will be a bright, solid edge.

OUR GUIDE TO GOOD THINGS.

**** Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

90.—Pickles' Improved Dovetailing Machine.

The accompanying engraving is an illustration of a new and improved dovetailing machine recently introduced by Messrs. John Pickles and Son, Saw Mill Engineers and Wood-cutting Machinists. Those who are acquainted with machinery will readily recognise its construction and action from the illustration itself; and as space is too limited, and the demands on it too great, to deal with these points in as complete and satisfactory a manner as I could wish for the instruction of the uninitiated, I will merely take occasion to point out that the machine is of the most modern design, and is specially adapted for dovetailing furniture and all parts of furniture in which dovetailing is desirable, and, indeed, absolutely necessary, as, for example, in all drawers, boxes, etc.; and it is also most useful in packing-cases, and for all kinds of cases in which goods are sent out, whether on a large or small scale, and in which the dovetail joints are for the most part numerous. Messrs. Pickles & Son write to say that they have been led to submit the illustration to the notice of the readers of WORK in consequence of "an admirable paper on dovetail joints" which appeared in page 389 of the current volume, an expression of opinion which is valuable in itself coming from the source from which it does, and which shows that WORK finds its way into the offices of men of experience and sound judgment, who are able to appreciate the information contained in its pages at the proper value. They proceed to say: "We have just made a machine for the largest cabinet factory in London as per illustration enclosed" (that is to say, the illustration that I have been enabled to give here). "This machine will dovetail work up to 30 inches wide, all in one operation, making both pins and tails, and not only that, but rounding the pins off to fit the dovetails. Different pitches of dovetails can be produced on the machine." The rounding off of the pins to fit the dovetails is of the utmost consequence, particularly in all hard woods, as it requires no undue amount of cramping up to get all the pins fairly home. A very important feature in this machine is that the distance between the cutter spindles can be varied so as to produce different pitches of dovetails and pins by having different sizes of cutters. The machine is easily and expeditiously worked, and is made in three sizes—namely, No. 1, to take 30 inches in width; No. 2, 24 inches; and No. 3, 18 inches. It is well worthy the attention of all who are engaged in the furniture trades and packing-case making of every description. To amateur wood-workers it will not commend itself, as a matter of course, as the work they do in dovetailing is by no means so extensive as to induce them to proceed beyond careful work with the tenon or dovetail saw, or such simple machinery as may be devised for home use, in which there is but one cutter, and the work is made to travel laterally until the work of dovetailing is completed. I do not say that such a machine exists and is purchasable, but that by the exercise of a little thought and ingenuity such a machine may be contrived, even as machines for mortising and tenoning have been made for home use, and have proved of considerable assistance to the maker and contriver.



Pickles' Improved Dovetailing Machine.

91.—Serial Publications and New Editions.

I have received the current numbers of "The Machinery Mart" for August, September, October, and November; "The Amateur," published by Messrs. Henry Zilles & Co., for September, October, and November; and the fourth and enlarged edition of "Photography in a Nutshell," by the "Kernel." As the merits of these have already been noticed in "Our Guide to Good Things," it is unnecessary to do more on the present occasion than to acknowledge their receipt.

THE EDITOR.

SHOP:

A Corner for Those who Want to Talk It.

*** In consequence of the great pressure upon the "Shop" columns of* WORK, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of WORK *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

Testing Accuracy of Framework.—G. P. (*Elgin*) writes:—"I notice that no figures are attached to the second of the two diagrams which accompanied my communication on 'Testing the Accuracy of Framework' (see WORK, p. 523, Vol. III). In Fig. 2 referred to, the top left-hand corner should be marked 'A,' the top right-hand corner, 'B,' the lower right-hand corner, 'C,' and the lower left-hand corner, 'D.'"

Hand Saws.—A. R. (*Scorrier*) writes:—"In No. 137 of WORK, p. 523, letters appeared from myself and CHOPSTICK criticising M. Powis Bale's article on 'Saw Teeth' (see p. 421). I would like to call the attention of the readers of WORK to the criticism on p. 523 by CHOPSTICK, which any practical saw-sharpener will deem absurd. If CHOPSTICK means what he wrote on p. 523, I can only say that his practical experience in saw-sharpening must be very limited. CHOPSTICK said the form of teeth shown in Fig. 1 is the best for cross-cutting. I understand that Figs. 1, 2, and 3 were represented as rip-saw teeth. CHOPSTICK further said that Fig. 2 was the best for ripping, and Fig. 3 the right shape for cross-cutting logs. If the readers of WORK will refer to the article on p. 421 by M. Powis Bale, they will notice that the rake of teeth (Figs. 2 and 3) is much the same, and the angle is about 50°. Now, I ask, what man can work a hand saw with teeth at such an angle? Again, it is well known that the rake of teeth for cross-cutting should not be as much as for ripping. The teeth in Figs. 2 and 3 have too much rake even for ripping, and CHOPSTICK will actually say that Fig. 3 is suitable for cross-cutting logs! CHOPSTICK will please allow me to tell him that for cross-cutting logs there should be but very little (in some cases, not any) rake in the teeth. It would be impossible for two of the strongest men I know (and I have had to do with some strong men, especially above the shoulders) to work a two-handle cross-cut saw in cutting logs with rake in teeth as in Fig. 3 (p. 421). Again, in reference to everyone sharpening a saw to cut any kind of wood: I know many men who have tried to sharpen saws, but the saws have been made a deal worse by the so-called sharpening. I would not advise anyone to practise sharpening a good saw, but to follow some of the instructions in WORK, practising for some time on an old saw or pieces of saws. In reference to a needle running down the saw teeth, CHOPSTICK may sharpen a saw that a needle may run the whole length of teeth before it falls off, and another saw may be sharpened even better, and the needle will fall off before it runs half-way down the teeth. In fact, a saw may be improperly sharpened and a needle run the whole length; while in another saw, that is properly sharpened, it would not do so. If CHOPSTICK can give no better proof than that of the needle, allow me to tell him, as a practical man, there is more than that required to convince me that his saw is properly sharpened. I might add that from five to seven teeth in a hand saw will be the most suitable for cross-cutting, and for ripping, four teeth or points to the inch will be far better than three points to the inch, and if teeth are properly sharpened, 3 in. deal can be easily ripped with it."

Splicing a Mast.—L. L. H. (*Falmouth*). — My reply to NAUTICUS (see No. 137, p. 523) was not quite explicit enough; I will therefore supplement it. Into the two nicks in the mast to be cut (shown at A and B in the drawing) nail two narrow strips of wood, or battens, perpendicularly—*i.e.*, at right angles to the mast. They must be sufficiently long to stand *well* above the spar as it lies on the ground. If a straight-edge is laid on the mast against these strips and moved up and down like a see-saw, always touching the strips, it will be found to be very easy to scribe a straight line on the mast, which, when sawn upon, will make a true mitre of the end of the spar. This is the method invariably used by mast-makers. A mitre-box as suggested by the Editor would not be practicable for the very large and heavy spars with which a mast-maker has to deal."

Sheet Metal Work. — ERRATUM. — TINKER writes:—"In my letter which appears in page 523, No. 137 of WORK, there is a slight misprint. Instead of half a middle plate being 15 in. by 15½ in., it should read 15 in. by 5½ in."

"Work" Certificate Frame.—W. W. (*Elswick*) writes:—"I forward this to you as a design for Certificate frame. It gives your readers an idea as to how I intend to frame my certificate, as I am proud to think that I was a successful exhibitor in your late Exhibition. This frame is intended to be turned in the lathe out of two pieces of mahogany, which will be suitable to the dimensions given in the design. The long columns are turned with a ball at each joint, and a ⅜ in. hole put through each ball, with the ends finished as shown. Then they

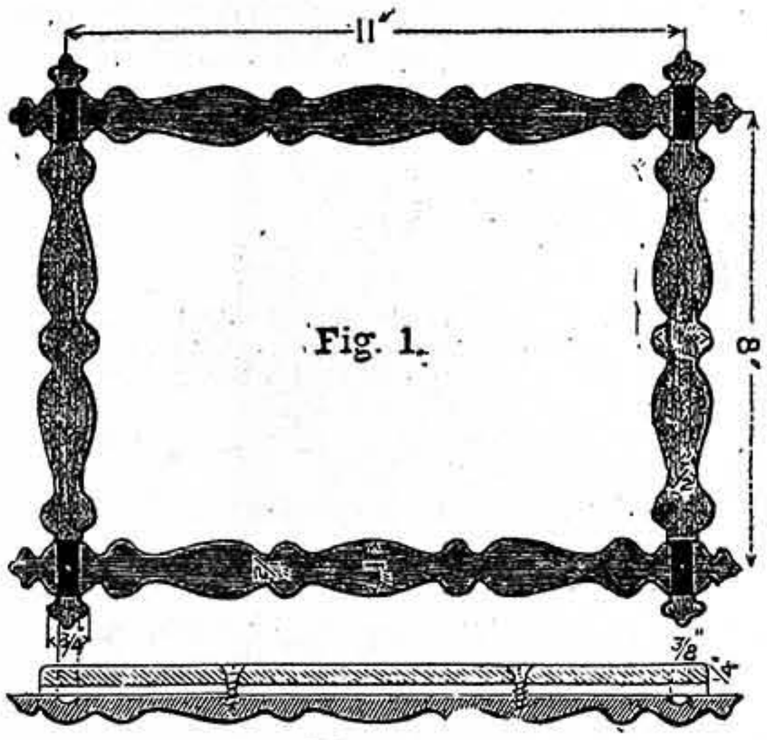


Fig. 1.

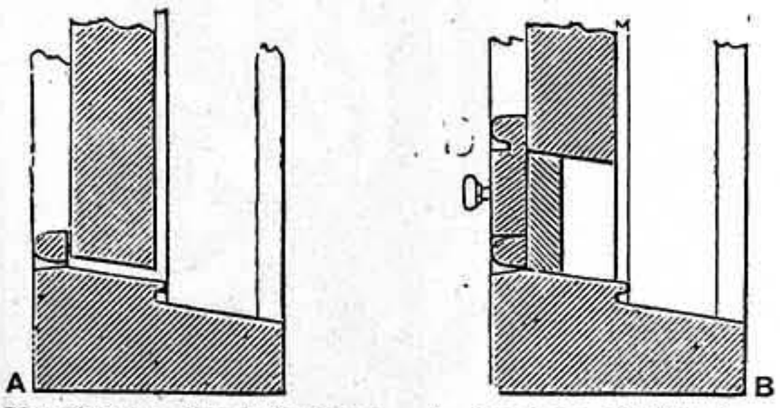
Fig. 2.

"Work" Exhibition Certificate Frame.

are carefully sawn through the centre, and form the two sides of the frame. The short columns are turned with joints made to fit the hole in ball, and ends turned as shown. These sawn through centre as in long columns form top and bottom of frame. Fig. 2 is a section showing edge, and how to fasten backboard to frame."

Draught Excluder for Doors.—THE REV. H. H. (*Burton-on-Trent*) writes:—"I found the following simple plan very effective last winter for excluding draught from the bottom of a door: Roll up a sheet of brown paper the length of the door; the roll should not be solid, but hollow, to make it springy. Fasten a piece of elastic to a button, and pass the end of the elastic through the end of the hollow, and then through the thickness of the paper: the button will form a stop; then pass the end of the elastic under the door and neatly tack it to the other side. Treat the other end of the roll in the same manner. The elastic and springy roll work comfortably together over edges of carpets and other inequalities, and always clip the door and floor with an easy but sufficient pressure. The roll can be placed either inside or outside the door, and can be covered with carpet, oilcloth, etc., according to the requirements of taste. Another simple and effective plan is to fasten elastic to the under ends of the door-mat and floor or jamb of such a length as to keep the edge of the mat always gently pressed against the door. Draughts to the feet are not only a nuisance, but dangerous."

A Ventilator for Windows.—T. S. (*No Address*) writes:—"It is sometimes rather too cool to have the windows open, and not cold enough for a fire to be necessary, and our rooms are stuffy and unpleasant, so here is a mode of ventilating that perhaps may be useful to some of the readers of WORK. Procure two pieces of wood, 2 in. wide by ¾ in. thick (the one before me now is of yellow deal, varnished); the length of one of the pieces is about ⅛ in. less than the distance between the pulley stiles of the window, or the length of the bottom rail of the sash; the other piece should be cut to fit loosely in between the beads of the sash-frame, or about 1½ in. less than the first piece, and should be beaded



Ventilator for Windows.—A, Section of Window without Ventilator; B, Section of Window with Ventilator.

or chamfered on one edge. Now put the first piece on edge on the sill of window, and shut the sash down on it, and put the second piece against the sash, to hide the first piece. If the two could be screwed, nailed, or otherwise fixed together as they are so placed, the ventilator is complete. Of course, as one side shows in the room, screws and nails should be put in from the outside, so you had better mark where they should be fixed together, and take them out and complete. The advantage of this construction is that there is in no place a straight joint. There is a rebate all round top, bottom, and both ends. No bolts or other fastenings are required. A small knob is perhaps useful to hold it in position while shutting the sash, or without the knob you may pinch your fingers."

Lamp Explosions.—W. G. (*Sherborne*) writes:—"After what we have heard about the death by burning of Lord Romilly and the fearful lamp accidents at Liverpool and in Wiltshire, people would do well to use the Maguay electric lamps, which cannot explode even in a coal mine. They are made complete with batteries for hanging on a wall, or the battery can be placed under the dinner-table and light a table lamp; they can also be used to drive motors. A few days ago a single firm is known to have ordered £260 worth of these electric bicycle lamps, which cannot be blown out in the storms."

II.—Questions Answered by Editor and Staff.

Cocoa Fibre. — DON. — I cannot give full particulars to describe the process of preparing fibre for weaving into mats; and, if I could, DON would have to see it done, and ask numerous questions on the subject to be enabled to do it himself. I recommend him to get an order to view some prison where this sort of labour is carried on, when, no doubt, he could pick up many "wrinkles."—J. W. H.

Burnishing Machine.—W. A. H. (*Haworth*).—A machine for this purpose consists of two iron cylinders, the upper one polished, geared together with tooth-wheels working in headstocks, just like one of the ordinary clothes-wringing machines, which you may take as a model, with a top bar, strong coach-spring, and screw to put on the pressure, as in the wringer. Now plane a piece of iron about ¾ in. thick, the width of your rollers and rather longer, polishing the upper surface; and on your side frames cast a rib on which the end may slide, exactly on a level with the top of the lower roller. Have a small atmospheric gas-burner fixed under the plate, so that when it is drawn out to the full extent it may be heated. You may have a stop, to prevent its going too far, if you like. This plate, when between the two rollers, will move when they are turned, like the box of a mangle; but it is, of course, better to fix a rack and pinion of the same pitch as the wheels under the plate or table, and gear a small pinion on the same shaft into the tooth-wheel of the bottom roller; and having outside that a handle keyed upon it to turn the machine with. This table must be oiled when not in use, and all oil and rust polished off with dry whiting when about to be used. Lay your photos, face down, on the table, which should be heated just so that you can bear to lay your hand upon it; and adjust the pressure gradually, putting a little more on as the mount and paper get thinner with the rolling, until the gloss is satisfactory. If you have no gas, a paraffin lamp will answer, if you do not put it too near the table; as, if you do, it will cover the underside of the table with thick layers of lamp-black. If you cannot work to this description, we will, if you write again, give working drawings and dimensions, size and pitch of wheels, rack, pinions, etc.—J. W. H.

Medical Coil. — ACHLUM. — From your rough sketch of the apparatus, I gather that you have made a medical coil of two powers, although in your letter you describe it as an "electric battery." A coil and an electric battery are two separate things. The right way to connect the wires is as here directed if you have two secondary coils: Connect one end of the primary wire to one of the terminals, marked on your sketch "to battery;" connect the other end of the primary wire to one end of the electro-magnet wires; then connect the other magnet wire to the contact screw pillar, and run a wire from the contact to the other terminal, marked on your sketch "to battery." This will complete the primary circuit. Now for the secondary circuit: First, connect the commencing end of the first secondary to one of the studs marked "to handles;" connect the other end of this wire to the stud of the switch marked "No. 1," the other stud of this being connected to the opposite "handle terminal." This will complete the first power. The second coil of wire will start from the same stud as the first, and will finish off at a stud on No. 2 switch, thus forming the second power. All connections made beneath the base.—G. E. B.

Unanswered Letters.—E. D. R. (*Camberwell*).—A reply to your first letter was prepared in due course, and was awaiting space for publication in "Shop," when your second letter came to hand. There is great pressure upon "Shop."—G. E. B.

Battery for Electric Light. — IGNORAMUS. —The cheap electric light battery described on page 428, Vol. III. of WORK, in reply to F. G. (*Paddington*), will furnish enough current for two 2½ candle-power 8-volt lamps. The charge will run for about six hours, and then will have to be thrown away, the battery plates cleaned, the zincs re-amalgamated, and the cells charged with a fresh solution just before starting the battery again. This must be done every evening, if the light is required for a period of from four to six hours. In any case, the plates should be lifted out of the solution when the battery is not at work. If this is not done, the zincs will waste away. For these reasons the battery is not suitable for electric bells.—G. E. B.

Electrical Engineering.—A. T. (*Horwich*).—I do not know of a "Guide to Electric Engineering, Mechanical Engineering, and all other Engineering Trades;" nor do I know of a book containing the Board of Trade examination questions on these subjects. Several good books on electrical engineering and mechanical engineering have been published, among the best being "Electrical Engineering for Electric Light Artisans and Students," by Messrs. Slinger & Brooker, price 10s. 6d. "Questions on Magnetism and Electricity," by F. W. Lavender, price 3s. 6d., and "Exercises in Electrical and Magnetic Measurement," price 3s. 6d., are books which may be useful to you. By writing to the secretary of the City of London Guilds Central Institute, South Kensington, S.W., you may get information respecting the latest examination papers of this Institute. Copies of such papers are sometimes on sale.—G. E. B.

Battery for Lamp and Coil.—T. S. (*Caledonian Road*).—The small lamps mentioned by you (under the name of "Aladdin Electric Watch Stand") may be worked with current from a small ebonite accumulator, a small lithanode battery, a chloride of silver cell, or a small battery, with zinc and carbon elements; the cells being charged with bichromate of potash, or chromic acid solution. If you had described your battery, I would have told you how to make a suitable solution. Bichromate or chromic acid solutions are made by dissolving 3 oz. of either salt in 1 pint of warm water, allowing this to cool, and adding a large wineglassful of sulphuric acid in drops at a time. This is the most lasting solution for a small cell with carbon and zinc plates, whether used for small electric lamps or for working street coils; but even this will only last for a six hours' run with lamp or coil. A 25-volt 16-candle power lamp will require a battery of thirteen half-gallon bichromate of potash or chromic acid cells, connected in series, to light it properly; and this battery will have to be cleaned and re-charged after a run of from five to six hours.—G. E. B.

Gas Engine.—AMATEUR.—What I should advise you to do is to decide what kind of engine you want to make, and then an advertisement in WORK would bring forward some reader who had a set of drawings. These I should advise you to study thoroughly, making yourself as complete a master as possible of all the details, meanwhile making notes of what you do not grasp; then write again, stating definitely what it is that you do not understand, when, I have no doubt, someone will be able to help you, and that willingly.—P. B. H.

Indiarubber.—OLLGARTNY.—The arrangement sent us by our correspondent is not new, having been used by the Fabers some years since, and was, we believe, introduced by them. There is no doubt that it is an improvement on the plan named by our correspondent; but any patent would have to be confined to the exact thing shown, and this modification would most probably have been covered in some prior patent. But this could only be satisfactorily ascertained by a search for and examination of such patents as have been already taken for this object.—C. E.

Picture-Frame Gilding.—EUSTACE.—It is impossible to re-gild picture frames without experience, being a trade in itself. If the frames are really English gilt—*i.e.*, not lacquer, or German gilt—they can be cleaned by being delicately sponged with lukewarm water, to remove the dirty size, and, when dry, re-sized. Black-stained frames are best polished, egg-shell finish.—F. B.

Lantern Lens.—F. J. K. (*London, W.*) has a set of lenses from wet plate camera, and wants to know if he can use them to an ordinary lantern to show photographs and paintings on glass, which he has been trying his hand on, and says:—"Of course, if I have to add another lens I don't mind;" and, further, that the lenses he has are 1¾ in. diameter. It is hardly clear what F. J. K. means, but he must know that in a lantern, in addition to the front lenses, for which, no doubt, his present lens would be available, he will require a pair of condensers, from 3½ in. to 4 in. in diameter, and of about 6 in. focus. These elementary facts must be grasped before a lantern can either be made or used. And then as to the photographs, etc., referred to, it is not clear whether he means ordinary photographs or transparencies made purposely for the lantern. The former can certainly be shown, but not by an ordinary lantern. I should advise F. J. K., in the absence of a more instructive manual on the subject, to get a catalogue from some optician who makes lanterns a speciality—and there are many—where he will find much useful information. At present it seems he does not know the elementary optical conditions required. If he can state his wants more definitely I shall be glad to help him.—O. B.

Tin Can Ear.—APPRENTICE.—The ear which you send as a sample is called a canteen ear, and you can obtain them from Messrs. Hopkins & Sons, Granville Works, Birmingham; Perry, Son & Co., Temple Street Works, Wolverhampton; T. Paul Lomax, Moor Street, Birmingham; or any other maker of tinmens' mountings.—R. A.

Sheet Metal Work.—I. J. W. (*Farnworth*).—You will find articles on the above as follows: Vol. I., Nos. 17, 23, 32, 42; Vol. II., Nos. 67, 71, 78, 93; Vol. III., Nos. 127, 134. There are several more to follow.—R. A.

Oval Chuck.—A. W. D. (*No Address*).—The sketches show an alternative guiding ring which may suit A. W. D.'s lathe, though it is very difficult to prescribe for an unseen patient. The principle of the oval chuck is, of course, rotation, combined with a definite reciprocating motion. Any means which will secure this end may be adopted. If the tool could be made to advance and withdraw twice in a revolution, no complicated chuck would be necessary, though the arrangement would be very difficult to obtain. Yet A. W. D. will see, on consideration, that it would be possible. One great difficulty would be to turn various diameters with travel of tool thus fettered. The alternative to this travel of the tool is the travel of the work, and the oval chuck secures this. A. W. D. is aware of the fact that this oval chuck is suited for work which is *wholly* supported by it, without any help from the

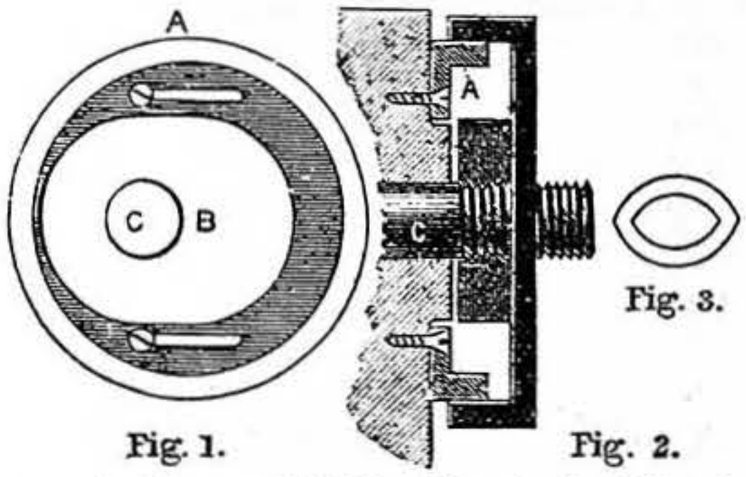
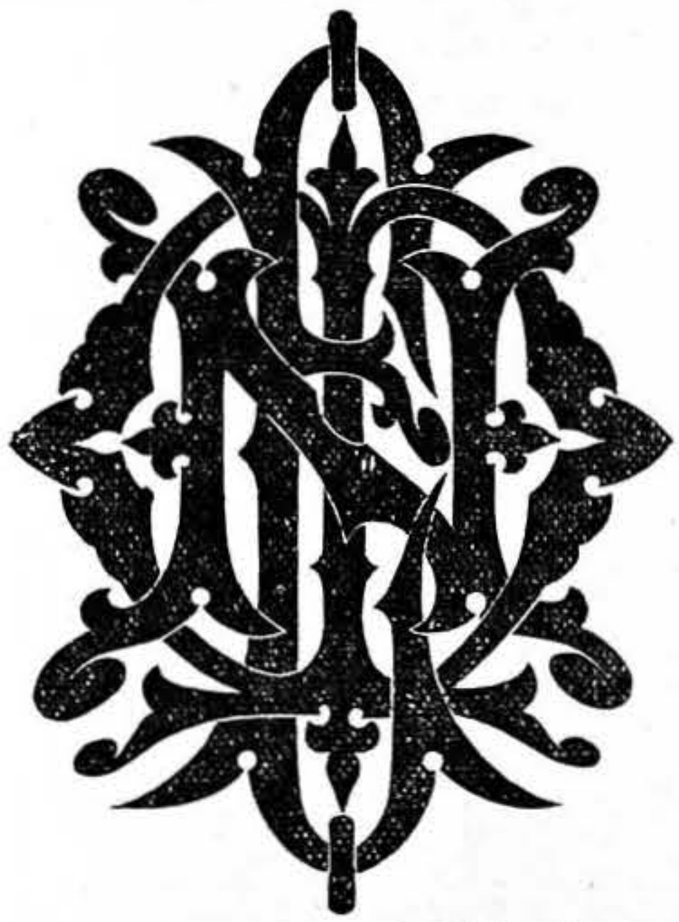


Fig. 1. Fig. 2. Fig. 3.

Suggested Form of Guiding Ring for Oval Chuck. Fig. 1.—Front View—A, Guide Ring; B, Centre, cut away to allow it to be set eccentrically; C, Centre of Mandrel, to be fixed with Screws in the Slots marked. Fig. 2.—Section. Fig. 3.—Section of Hammer Handle, showing Centres.

shifting centre or poppet. If used with poppet, the eccentricity of the work will diminish from the chuck to the poppet centre, where the work will be circular. This is of use at times, but not always. If an elliptical object having both ends equally elliptic is needed, and both ends need support, as in turning between centres, then something similar must be adapted to the poppet end. This has been done, but anything free from mouldings would be more readily planed than turned. A. W. D. mentions hammer shafts. These are usually turned in an ordinary lathe, shifting one or both centres, and turning again. The section would be like Fig. 3, which shows a section and the centres from which it is struck. The size of chuck suitable for a 3½ in. lathe depends partly on the form of rest. Measure from centre to horizontal part of stand of rest, and double the measure for size of chuck, or, in other words, as large as the largest work the lathe will turn.—B. A. B.

Monogram for Fretwork.—E. McN. (*Gateshead*).—In this design the "N" being the surname initial, it should be bolder than the E. and M. In order to render it so, it would be desirable to make it tall and central; but in this arrangement of lettering, which is both symmetrical and legible, the exigencies of designing preclude the use of an elongated N., so the prominence which cannot be obtained in height must be by breadth: hence an



E. M. N. Monogram for Fretwork.

expanded "N." becomes indispensable. Our correspondent would do well to devote a little extra time and attention when piercing this particular letter, and by keeping the saw clear of the edges, leave the face of it as broad as possible, thereby making it stand out just as bold in wood as it does in the pattern. With careful handling (which no doubt it will receive) the result will be highly successful and pleasing.—A. C.

Magic Lantern.—FOCUS CRIBUS asks two definite questions—first, where he can buy a magic lantern suitable for conducting a good Mission during the winter. To give a full answer would be to waste space, and a limited one seems invidious, the number is legion. If FOCUS CRIBUS can get a copy of the *English Mechanic*, he will find many advertised. One or two must suffice. Lancaster, Colemore Row, Birmingham; Riley Brothers, Bradford; Hughes, Brewster House, Mortimer Road, Kingsland Road, London; Noakes, South London Optical Works, Greenwich. From any of these he can get what he requires. Secondly, is it necessary to wet the screen when showing the lantern behind it, or what is the purpose of wetting the sheet? By wetting the sheet it becomes more transparent, the reason being the interstices between the fibres being filled, it becomes more homogeneous, so that less light is absorbed and more transmitted. When shown in front of the sheet it must not be wetted. A hard, even surface is required, which shall reflect as much light as possible, and transmit as little as possible. This latter plan is best, and is now generally adopted. Space is also utilised, which in a small room is always of importance.—O. B.

Ink.—S. W. (*Blackburn*).—Ink is theoretically tannate of iron dissolved or suspended in water thickened with gum. Inks, as now made, vary very much in their composition, and the gum generally used is dextrin, or "British gum," but for this sugar or glycerine is sometimes substituted. To test for the latter proceed as follows: Take a fair quantity of the ink, dilute it with water, and add basic acetate of lead solution, when a copious precipitate will fall, and must be filtered off. The filtrate will be yellow or nearly colourless, and contains the sugar or glycerine, if present; whilst the dextrin, tannin, and most of the other bodies are left in the precipitate. To the filtrate add a few more drops of basic lead acetate, and if there be no further precipitate, add carbonate of soda, which will precipitate the excess of lead used, which must be filtered off. The filtrate will contain the sugar and glycerine if either or both be present. Evaporate nearly to dryness, then shake up well with a mixture of two volumes of absolute alcohol and one volume of ether, and filter. Any sugar present will be left undissolved on the filter, which stand aside for a while. Any glycerine present will be in the filtrate, from which evaporate off all the ether and alcohol, when the glycerine will be left as a dense viscous liquid of intensely sweet taste. If a few drops be kindled they will burn with a blue flame and leave no residue: or, if a few drops be heated with acid sulphate of potash (bisulphate of potassium, or potassium hydrogen sulphate), vapours of acrolein will be given off, and can be recognised by their penetrating odour like that of burning fat, and their property of causing a flow of tears. Now return to your residue containing sugar, if present. Dissolve it in water, filter from any insoluble matter, and call the filtrate "Solution A." Put a few drops of an alkaline solution of copper sulphate into a test-tube, dilute with water, boil, and, when boiling, add a few drops of "Solution A." If there be any yellow or red precipitate of cupreous oxide on heating again, then sugar, in either of the forms called "glucose" or "invert sugar," is present; but if there be no precipitate, test for cane sugar as follows: Boil for a few minutes some of "Solution A" with one or two drops of hydrochloric (muriatic) or sulphuric acid, which will turn any "cane-sugar" present into "invert sugar," cool and neutralise the acid with carbonate of soda, and, as before, add a little of the solution thus prepared to some boiling dilute alkaline solution of copper sulphate. A yellow or red precipitate will prove that cane sugar was originally present. To make basic acetate of lead solution: Grind up in a mortar 1 oz. of litharge and 2 oz. lead acetate, with sufficient water to make the whole pasty. Now well boil the mixture with half a pint of water, filter, and keep the solution in a well-stoppered bottle. To make an alkaline solution of copper sulphate: Add an excess of potash to a few drops of copper sulphate solution, and then add a solution of tartaric acid until all the precipitate formed has re-dissolved. A little of this solution, diluted and boiled, should give no precipitate; if it does so, add more tartaric acid and potash, but take care to leave the resulting liquid considerably alkaline. Write again if you are not successful with your testing.—F. B. C.

Makers of Bicycles.—NIL DESPERANDUM.—There is no *best* maker of bicycles. Some of the best are: Singer & Co., Coventry; Premier Cycle Co., Coventry; St. George's Foundry Co., Birmingham; Humber & Co., Coventry and Wolverhampton. Any one of the above will supply a machine than which no better need be desired.—A. S. P.

Ticket-Writer's Ink and Sable Pencils.—G. R. (*Camberwell, S.E.*).—You can get all you require from Brodie & Middleton, Artists' Colourmen, Long Acre, W.C., who will procure you anything they may not have in stock, especially if you mention WORK.—H. L. B.

Clincher Tires.—G. A. P. (*Birmingham*).—The address of the makers of the Clincher Tire is Edinburgh. They can be had through any cycle maker or agent. Try St. George's Cycle Co., Upper Street, Islington, London.—A. S. P.

Paper.—W. H. (*Birmingham*).—Neither heavy or light carburetted hydrogen, nor hydrogen, which are the chief constituents of coal-gas, will affect prepared papers hung up in your offices sufficiently

for your purpose; but coal-gas generally contains a little sulphuretted hydrogen and carbon disulphide, which would turn black paper which has been soaked in an alkaline solution of oxide of lead. Boil up some litharge with potash, dip some blotting-paper in it, and hold it over a gas-jet to see if the gas supplied to you contains sulphuretted hydrogen or carbon disulphide. If it turns black, it will do for you; but always keep it moist.—F. B. C.

Dutch Clock.—AMATEUR.—After you filed up the 'scape teeth, the escapement was made shallower, and so you are unable to regulate it. Take out the 'scape wheel and put it in the "turns" or lathe, and file the teeth all the same length by holding the file steady while the wheel is revolving. Then make them all the same thickness at the tops, and replace the 'scape wheel. Now you will see the front hole of the pallets is in a strip of brass; move this round so as to put the pallets working deeper in the 'scape wheel. Have it as deep as it will go without catching on the tops of the 'scape wheel. You will then be able to regulate it with the ball and nut in the usual way.—A. B. C.

Match-Lighting Clock.—CLOCK.—I think I should try the old-fashioned lucifer matches. Have an arm to hold one, and fix up a piece of glass-paper, so that when the arm falls with the match on the end, it shall drag on the sand-paper, and so light it. Put a small weight so as to bring the arm and match down sharp. As regards the chemicals, I cannot help you, being very ignorant in that line. As to who would make them, I should advise you to try any of your local clock-makers, as, unless you wanted a quantity, it would not pay a big maker to make them. As it is, I have found making these curious clocks, etc., does not pay anyone. I have made several "fads" for amateurs, but find it neither pays them nor me.—A. B. C.

Scene Painting.—E. F. (*Hereford*).—I know of no instruction books on the art of scene painting. The only work I ever have known is one published about eighteen or twenty years ago by Mr. Lloyd, with coloured plates, price half-a-guinea; but I believe the edition is long since run out. If you have any taste for the art, you have only to follow out the simple instructions laid down in WORK. Study them well; you will soon overcome all difficulties. Should you require any aid to do anything you cannot master, if you will write, I will do my best to assist you.—W. C.

De-magnetising Watches.—DYNAMO.—Neither my friends nor myself know of the method mentioned by your friend. From your description of the process, I cannot understand how it was done. There may have been a small electro-motor in the box. One of my friends undertook to clean a lady's gold watch, and wore it for a few days to see how it would keep time. In attending to a strong magnetic machine, he got the watch magnetised, and came to me in a troubled state of mind about it. I advised him to place the watch on a rug and spin a powerful permanent magnet over it for a few minutes. This he did, and de-magnetised the watch. Watches may be de-magnetised by spinning them rapidly near a powerful dynamo, and withdrawing them gradually from its influence. Mr. Bottone undertakes to de-magnetise watches at a charge.—G. E. B.

Connections of Electric Bells.—ELECTRO.—Your sketch of connections for an electric bell and a three-hole indicator is quite right. One return wire will do for all of them; but a separate wire must go from each push to each indicator. Whenever in doubt, always sketch each circuit on paper, as you have done now, before you put up the bells. Our rules do not allow of a reply by post.—G. E. B.

Hot-Water Fittings.—R. J. (*Gainsboro'*).—The best books on hot-water fittings that I know of are published by Messrs. E. & F. N. Spon, 125, Strand, London. They will send you a list of them on application.—T. W.

Electro-Magnet.—STUDENT.—To ascertain the best magnetic results obtainable from your twenty half-pint Leclanché cells, connect them in series, and find the total internal resistance of the battery. Select a wire for the magnet which shall have a resistance equal to the resistance of the battery, and yet be long enough to place a large number of turns around the magnet core. By dividing the total E.M.F. of the battery by the total resistance of the battery and magnet circuit, you will find the ampèrage of the current flowing in the magnet coils; and, if you multiply the strength of the current by the number of turns of wire wound on the core, you will get at the magnetic strength of the current. You will, probably, get the best results from a pound of No. 26 silk-covered wire, wound on a ½ in. core of iron, 8 in. in length, bent to the form of a horseshoe, having limbs 2½ in. in length, half a pound of wire on each limb. You will get very poor effects with this on a solenoid having an internal diameter of 3 in. Such a solenoid will require a very powerful current from a large Bunsen or Grove battery through many turns of No. 18 wire. To get alternating currents from a battery, you will need an automatic current reverser, worked by an electro-magnet.—G. E. B.

Spoon- and Salt-Boxes.—A GLASGOW BOY.—As a rule, I am particularly fond of receiving queries of such a nature as will tax my ingenuity to a noticeable degree, and would relish questions asking for anything short of perpetual motion and the philosopher's stone. Spoon- and salt-boxes certainly do not leave much scope for the display of talent; but as these articles are what you require, I must try and please you. The mention of spoons and salt brings up before my mental vision basins of porridge, disappearing as quickly as motion will allow down an accompanying throat. Do not think I am poking a bit of fun at you; for I am told that Scotch blood—of course, partly manufactured from porridge—runs in my veins. Indeed, the dearest relation I possess will try to convince me that I am related to the great Sir Walter! That troubles me little, for I trace my pedigree further back, and start with Adam; and thus claim relationship with the greatest men and women, dead or alive. Now to business. As you say you wish there were more designs of fretwork (although I am sure those given are numerous), I intend this article to be fret-cut. Now, it requires very little intelligence to see that salt would hardly contain itself within merely fret-cut boards; so (one way) rebate your side boards to a certain depth, leaving a narrow margin all round, and into this rebate sink your fretwork. A bottom board will complete the salt-box. The spoon-box will consist of four narrow boards, treated similarly

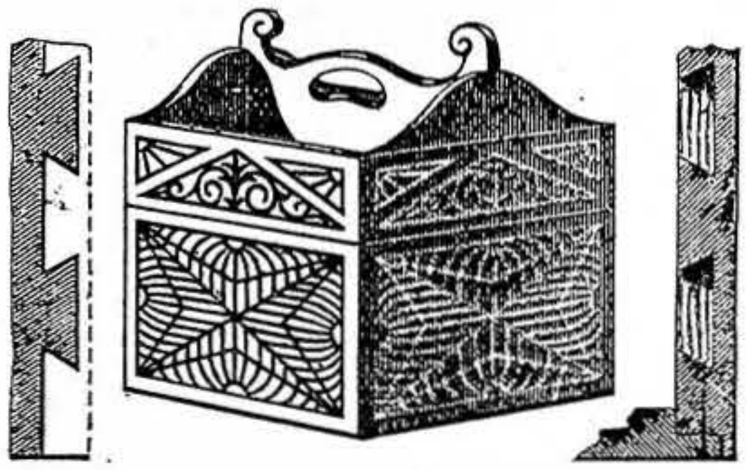


Fig. 4. Fig. 1. Fig. 5.

Fig. 2.

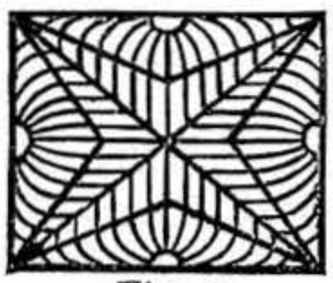


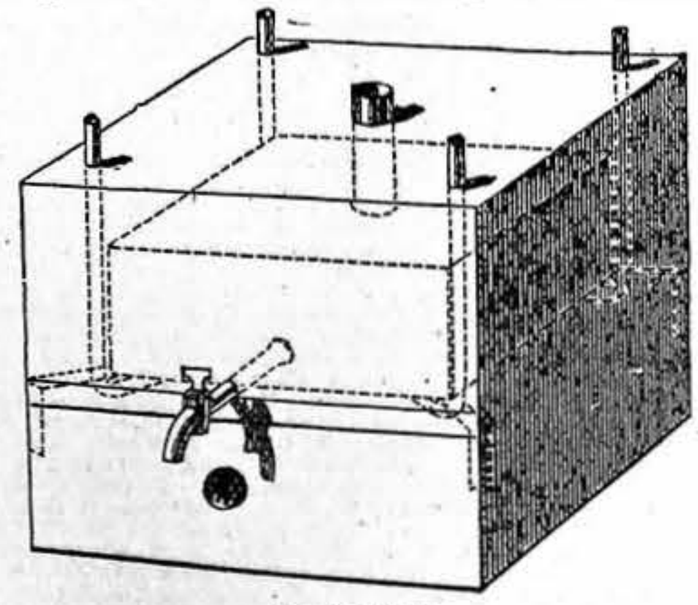
Fig. 3.

Fig. 1.—Spoon- and Salt-Box. Figs. 2 and 3.—Designs of Fretwork for Box. Figs. 4 and 5.—Method of Dovetailing.

to those of the salt-box, and a bottom board, with a division across the middle, shaped to serve as a handle. The spoon-box will be hinged on one side to the salt box, both being secured by a lock or a hook. If you wish for a strong box, dovetail sides together, as in Figs. 4 and 5, and join bottom board, as in Fig. 5. Concerning sizes I can say nothing, as I know not whether you wish to stock sufficient salt for a day or a year. I have given you two or three designs for fretwork, but I make no pretence of their being anything nice, as other pencils can manipulate this branch of art better than mine can. If either suit you, however, and you wish to enlarge them, as you have all the past numbers of WORK, you will find how to do so by reading the Music-Stand articles by O. B. and myself. I cannot reply definitely to your other question, but must advise you, as I have just advised another correspondent on another subject—be patient.—J. S.

Unsoldering of Dynamo Wires.—DYNAMO.—If the wire becomes unsoldered from the segment of the commutator only, there is some fault in that coil which leads to an excess of current through it, and consequent heating of the wire at its junction with the commutator bar. I suspect the insulation of the wire to have broken down. If this is the case, the coil will have to be unwound, the insulation repaired, and the coil re-wound. The unsoldering will sometimes happen through imperfect soldering.—G. E. B.

Incubator.—J. H. (*Liverpool*).—Here is a copy of J. T. R.'s Incubator (see p. 654, Vol. I.), showing the position of four ventilating tubes added.—



Incubator.

B. A. B.

Wood-Block Surface.—ENGRAVER.—The finely polished surface must be removed by the application of Bath-brick, finely powdered and well wetted. This should be vigorously rubbed over the block until the shiny appearance is got rid of. Then clean the surface, and apply, as evenly as possible, with a broad sable brush, a thin wash of white—at first it will be found difficult to apply the paint equally and evenly, but practice will soon obviate this. It may be necessary to pass the now empty brush two or three times over the block, in alternate directions, to distribute the white more equally.—W.

Book on Electric Lights and Electric Bells.—IGNORAMUS.—I do not know where you can get a cheap book, combining information on "electric lights, electric bells, and the fitting up of the same, and explaining the meaning of the technical terms, ohms, volts, watts, ampères, etc." The cheapest source of information on these subjects is this little paper, which you can get for one penny per week. In Nos. 12, 18, 20, 27, 31, and 33, you will find information on electric bells; in Nos. 76, 82, 89, 92, 94, 97, 99, 101, and 104, you will find information on electric lights. The meaning of technical terms has been given several times in "Shop."—G. E. B.

Unbrazing.—T. B. (*Islington*).—It is impracticable to unbraze many articles, as it would certainly spoil them; but you can manage it in the case you mention. You must heat the handle to the melting point of the spelter again, assisting it with a little powdered borax. You can then take it apart. If it is pinned or riveted in any way, the pins or rivets must be drilled or punched out first. The brazing in of a new handle is not a very difficult matter. Get the socket and the handle perfectly bright and clean before attempting to braze, and you will be sure to succeed; especially if you will take the trouble to refer to the indices of Vols. I. and II. of WORK, where you will find that there has been considerable information given on brazing both by myself and others.—R. A.

Drawing.—P. B. (*London, S.W.*).—I do not know of the existence of classes held specially in mediæval ironwork; but if you master freehand, you can easily practise the drawing of ironwork. "Metal Work and Its Artistic Design," by M. Digby Wyatt, is a good book, published by Day & Son, Lincoln's Inn Fields. You can go to South Kensington and draw from actual work, of which there are some very fine specimens, both ancient and modern, in the Wrought Iron Gallery.—J.

Conical Bellows.—R. K. B. (*Woolwich*).—It is not an unknown occurrence for incompetent workmen to find fault with their tools. We cannot be expected to supply brains as well as information. In all cases of merely written directions, much is, perforce, left to the ingenuity of the workman. Those alluded to have been successfully carried out by some of our readers, who were, possibly, more apt workmen than R. K. B. It would occur to most people of average intelligence, before cutting up valuable material, to make a rough pattern in paper in order to practise the folding and the pinching up of the corners, which certainly require a little knack; and which experiments—tried on the leather, etc.—would, in all probability, spoil it. Better try again.—D.

Instantaneous Camera.—G. B. (*Stoke*).—If you refer to back numbers of WORK, you will find information that may be of use. A camera of the kind you require can be purchased at such a low price (21s.), that, considering the probable result, it is almost better to purchase one, with lens, shutter, and all complete, than make one yourself. All of our well-known opticians supply lenses suitable for these cameras; and as to dry plates, any photographic material dealer can supply you; also, many chemists and druggists stock them.—D.

Cold Brazing.—G. A. M. (*Chorley*).—I have never tried to braze a band saw cold, having but little faith in cold brazing, therefore I cannot say whether it would answer, but am of opinion it will not, the strain being so great, and so much bending and straightening of the saw; but will give you receipt for making cold brazing, etc., so that you may try for yourself. Mix in a lead bottle 1 oz. of fluoric acid and 1 oz. of oxy-muriatic acid. See that the parts to be brazed are perfectly clean and free from grease or oil, and put a chalk mark on each size of braze. The above mixture will keep good in the bottle about six months. If any reader who has had experience in cold brazing will write briefly on the subject, I have no doubt but that the Editor will gladly insert it in the "Shop" corner—stating what he thinks is the best way to proceed, and with what success he has met. Such information may benefit more than one of his fellow-readers. I might add that I am of opinion that there is no simpler method of brazing band saws than with bright, hot and black, or dull red-hot, tongs, as described in back numbers, and feel confident no stronger braze can be made in a band saw.—A. R.

Toy Manufacturer.—GAMESTER.—For any new toy, you cannot do better than consult Jacques and Son, Hatton Garden, London, E.C.

III.—QUESTIONS SUBMITTED TO READERS.

*** *The attention and co-operation of readers of* WORK *are invited for this section of "Shop."*

Opal Glass Letters.—RUBRIC writes:—"Would any reader do me the kindness of supplying the information how the above are cut out? Some say they are not cut out at all, as appeared some time ago in your paper. Others say they are cut out by emery powder and iron wheels. As there seems

to be such various opinions, any reliable authority would be gladly welcomed."

Ventr loquism.—DOWLAIS will be glad to know of a good, cheap book on Ventriloquism.

Wooden Monogram.—MUGGINS writes:—"Will any wood-worker show me how to put the initials E. M. C. on a box?"

Panel Gauge.—APPRENTICE writes:—"Will any reader oblige by letting me have, through 'Shop,' a drawing and size of a handy and also a nice-looking panel-gauge?"

Pottery and Porcelain.—T. H. L. (*Dublin*) writes:—"Will any reader inform me what are the best books pointing out general characteristics of the various kinds of china, etc., such as Oriental, Dresden, Spode, Crown Derby, Wedgwood, Worcester, and showing marks and stamps which distinguish same?"

French Medal Glue.—CONSTANT READER writes:—"Will any reader of WORK kindly inform me as to the best methods of: (1) Preparing French glue to use for gluing wood together. (2) Keeping a quantity ready for immediate use where about 28 lbs. are used per day. (3) Also, does glue lose any of its intrinsic qualities by being kept boiling hour after hour?"

Magic-Lantern Oil.—J. D. (*North Wales*) writes:—"Will any reader of WORK tell me the name of the best paraffin oil suitable for magic-lantern use, or if, by the addition of any chemical, a most brilliant light may be had? I should also like to know if there is any other oil better than paraffin for same use."

Gilt Frames.—EDWARD writes:—"I shall be glad of views as to the best thing for cleaning gilt frames that are slightly soiled."

Saw-Hammering.—J. S. (*Keighley*) writes:—"Will any reader say which is the proper pattern for an anvil for saw-hammering? Should the face be perfectly flat or round? Also as to gulleting saws: which is the best method, using emery wheels or stones, or the fly-press, for punching-out? Give advantages of each system."

Launch Screw.—W. L. H. (*Swindon*) writes:—"Will some kind reader answer the following questions in 'Shop?': (1) What is the best size for a screw to drive a small launch at a maximum speed with economy (launch, 22 ft. long and 45 ft. beam)? I should like to know the width and breadth of blades for three-bladed and two-bladed propeller. (2) Where is the best place to buy a small injector, and probable cost thereof, for a 2-horse power vertical boiler?"

Sledge.—W. B. S. (*London, N.W.*) writes:—"Will any reader please tell me how to make a sledge?"

Perfumery.—A. H. K. (*Pendleton*) writes:—"I should be glad if any reader could tell me through 'Shop' whether there is a practical book on perfumery, and where obtainable."

Mandoline.—H. D. (*London, S.W.*) writes:—"I wish to know whether any of your readers could send me a complete sketch and description for making a canoe- or pear-shaped mandoline."

Open Sailing Boat.—G. A. (*Hornsey, N.*) writes:—"Will anyone tell me the proper proportions for a 19-ft. boat—that is to say, the width at the widest part, the depth at the stern, midships, and the stem? I propose to make the skin of pitch pine; the stem, transom timbers, and keel, of American oak. Can I do better?"

Fire Engine.—W. L. (*Dalston*).—If you want to know how to load the L'Extincteur Fire Engine No. 4, you cannot do better than write to W. B. Dicks & Co., London, S.E.

Water Motor.—WATER MOTOR writes:—"Not having seen anything of the sort in the pages of WORK, I should be greatly obliged if any correspondent would tell me through 'Shop' the particulars and dimensions of a water motor to be driven by water from town main to give about ¼-horse power—to use as little water as possible. There is a good pressure of water from main, and I want to drive a small 50 c.-p. dynamo."

Bar Bullion.—G. C. (*Brighton*) writes:—"Can any reader kindly inform me where the 'bullion dealers' buy their silver, or where it can be bought, in bar, at the quoted market price? It is of no use going to the bullion dealers themselves, as, of course, they must have a profit. Is there not a bullion office at the Bank of England?"

Glass Painting.—J. A. B. (*Camberwell*) writes: "I wish to ask any experienced reader who understands glass painting which are the principal transparent colours connected with this art."

Illuminating.—G. S. (*Gateshead on-Tyne*) writes:—"I have lately been attempting some illuminating of letters, but have not been very successful—especially with my monograms. Would it be asking too much of any reader to give me a monogram for illumination of the letters E. H. S? I got a very good E in one of the back numbers of WORK, but I have not made E, H, S, to my satisfaction."

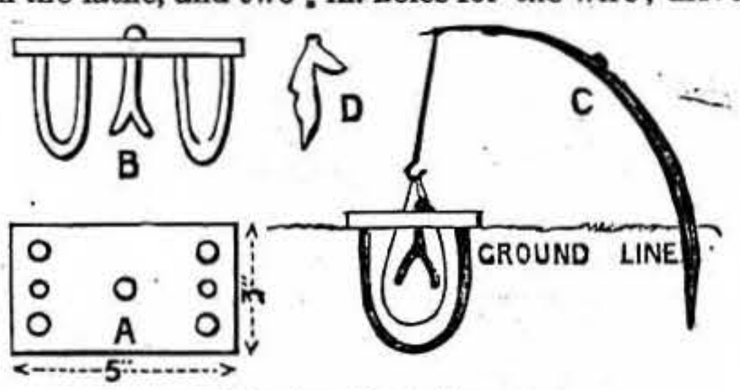
Vacuum Pans.—VACUUM PAN writes:—"Will any so well-informed give me the names of any good English works on Vacuum Pans, and their usage?"

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Inlaying.—C. W. S. (*Sydenham*) writes, in reply to A. E. (*Wandsworth*) (see p. 446, No. 132):—"If A. E., or any other reader of WORK, will call at 33, Stanton Square, Lower Sydenham, I shall be pleased to show him my method of inlaying, with specimens of materials used. Call before twelve noon."

Paraffin Barrels.—J. M. C. & Co. (*Nottingham*) write:—"In reply to PARAFFIN (see p. 526, No. 137), *re* 'Measurement of Paraffin Barrels,' the gross weight is taken, the tare of the cask deducted, and the remainder divided by 8, shows the number of gallons—as, for example, 3 cwt. 2 qrs. 26 lbs. gross; 2 qrs. 21 lbs. tare. Now the gross weight equals 418 lbs. Deducting the tare, 77 lbs., from 418 lbs. leaves 341 lbs. This divided by 8 (the number of lbs. in a gallon) gives 42 gallons and 5 pints. The mark, '120 test,' refers simply to the flashing point of the oil, which may be subjected to 120 degrees of heat before it will take fire, and is the degree of safety prescribed by Parliament. Any oil firing at a lower temperature would not be passed as 'paraffin,' but would come under the term 'explosive,' and be classed with benzoline and such inflammable substances."

Wooden Mole Traps.—E. R. D. (*Sherborne*) sends the following method of making mole traps in reply to J. J. (*Cumberland*) (see p. 492, No. 135):—"Cut out as many pieces of wood, ½ in. thick, with circular saw as at A; bore five ¼-in. holes with drill in the lathe, and two ½ in. holes for the wire; drive



Wooden Mole Trap.

in a wooden staple at each end, made of green hazel or other suitable wood, split flat side inwards; fit a Y piece at B for the mole to push out with his nose, which lets the end of a piece of string attached to the spring stick, C, fly up, and draws the two fine wires tight, and the mole dies. Two hook sticks, D, should be placed on each side to hold the trap down in the tunnel."

Screwing Tackle.—T. B. B., JR. (*Manchester*) writes:—"In reply to the letters of AN ADMIRER, T. S., and other correspondents, I may say that the article in question on 'Taps and Reamers' was intended as the first of a series on screwing tackle generally. Failing health, however, prevented me from continuing them; but I will resume them as soon as possible. I think if T. S. examines his screw-plate closely he will find that the thread on one side has been reduced by slightly enlarging the hole. This side is the proper one with which to start cutting a thread. The threads, too, at all events in the larger sizes, are backed off for clearance, so that they will only cut one way. This will settle which is the starting side of the plate. I cannot tell what all the holes in his screw plate are for without having seen it. Probably there are two holes for the smaller sizes and three for the larger. One hole of each size will cut a full thread. The other hole or holes of each set may have been enlarged, so that they do not cut the full depth, and so are easier to start, and are not so liable to twist the pin, being screwed. Some of the remaining holes may be duplicates of the commoner sizes. I cannot say exactly, but I have made them that way. As for his difficulty in tapping shallow holes (or rather, comparatively shallow), I know it is rather awkward; but if the taper tap will not start the thread, the second one (on which the thread is only backed off a little) should do so. The holes, too, may be opened out a little at the top, unless it is necessary for the thread to come to the top. This would materially assist the starting of the tap."

V.—LETTERS RECEIVED.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—T. E. W. (*Wolverhampton*); L. J. G. (*London, W.C.*); A ZINCWORKER; JACK FROST; T. F. (*London, S.W.*); AMATEUR; W. J. (*Newcastle-on-Tyne*); LLEWELLYN; W. L. (*Wolverhampton*); DULCIMER; C. F. C. (*Oldham*); J. M. (*Derby*); T. R. B. (*Newcastle-on-Tyne*); E. C. S. (*Bickington*); A. C. R. (*Cardiff*); G. A. S. (*Edinburgh*); S. W. N. (*Lonsfield*); A SUBSCRIBER; S. C. W. (*Bristol*); CAB; ANXIOUS ENQUIRER; W. P. (*Dundee*); M. S. (*Bristol*); B. A. (*Scarborough*); G. T. (*Hollinwood*); E. F. B. (*Liverpool*); APPRENTICED LOCKER; T. P. (*St. Leonard's*); G. A. W. (*Holloway*); R. Y. (*Burdett Road*); D. M. S. (*Glasgow*); J. L. (*Wimborne*); H. B. (*Bruntcliffe*); F. M. (*Preston*); FRETWORK; B. H. H. (*New Cross*); A. B. (*Salford*); H. R. (*Blackpool*); MRS. S.; H. B. H. (*Leicester*); A. S. (*Lavender Hill*); E. R. S. (*Gloucester*); M. (*Malta*); E. S. (*South Norwood*); AMATEUR; A. P. (*Shepherd's Bush*); A. B. (*Aberdeen*); E. F. B. (*Whitehaven*); G. C. H. (*New Kent Road*); J. T. P. (*Bow*); J. W. (*London*); G. H. A. (*London, S.W.*); J. B. T. (*Manchester*); INDIA-RUBBER; B. B. (*No Address*); J. R. H. (*Oldham*); RUFUS; A CONSTANT READER; SPIRAL; A. B. (*Glasgow*); APPRENTICE WHITESMITH; FRISKY; J. G. (*Glasgow*); F. G. (*Plymouth*); W. H. B. (*Southsea*); G. G. (*Deptford*); W. D. (*Lynthwaite*); R. J. B. (*Whitby*); DOUBTFUL; W. H. (*Bromwich*); A. M. M. (*Salisbury*); E. W. (*Cupar, Fife*); A. W. (*Caterham*); J. J. K. (*Manchester*); G. N. (*Acton*); G. R. (*Camberwell*); S. B. (*Chelmsford*); A. H. (*Woolwich*); M. T. (*London, W.C.*; F. W. G. (*Glasgow*); F. B. (*Staffordshire*); E. S. (*Upper Clapham*); J. D. (*Glasgow*); R. H. E. (*Blackburn*); WOODPECKER; J. P. (*Sheffield*); R. M. (*Chingford*).

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