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A BICYCLE PILLION SEAT

THOSE of our readers who, after studying the details of a bicycle carrier seat described in Hobbies Weekly dated 28th April. 1943. may have wondered if it would be possible to rig up a seat suitable for children aged from 4 to 8 years old. or more. Such an idea is feasible enough, as we show by the diagrams herewith.

The seat, however, must necessarily be in the form of a pillion seat. with the passenger mounted astride it and with the legs supported in some "safe" manner against the back diagonal fork pieces (see side elevation at Fig. 3). It is imperative, of course, that the legs should be supported for, apart from comfort and ease in riding on the pillion, there is an absence of "swaying" and less danger to the passenger.

A Real Seat

The writer—like many readers, perhaps—has seen little boys and girls getting temporary rides on their bicycles, being seated astride the bare carrier, with their legs dangling awkwardly at each side, while hanging on grimly to the back of the saddle or their father's coat.

A proper pillion seat would have made the ride more enjoyable, both to the youngsters and their fathers, and that is what we have designed. with numerous suggestions for improvements.

The Use of Spurs

We have. for example, taken an ordinary heavy-duty bicycle carrier having a top measuring 14ins. by 5ins. To this is fixed a wooden, upholstered seat, resembling a flattish type of saddle. Now, this arrangement, as it stands, would serve as a simple pillion, providing the passenger could rest his (or her) feet on home-made metal "spurs" bolted to the rear fork pieces at the requisite position.

Alternatively, assuming the fork pieces are not sufficiently low to avoid a cramped position, the spurs could be fixed to the rear wheel axle spindle. This idea, however, is not suitable for machines having a three-

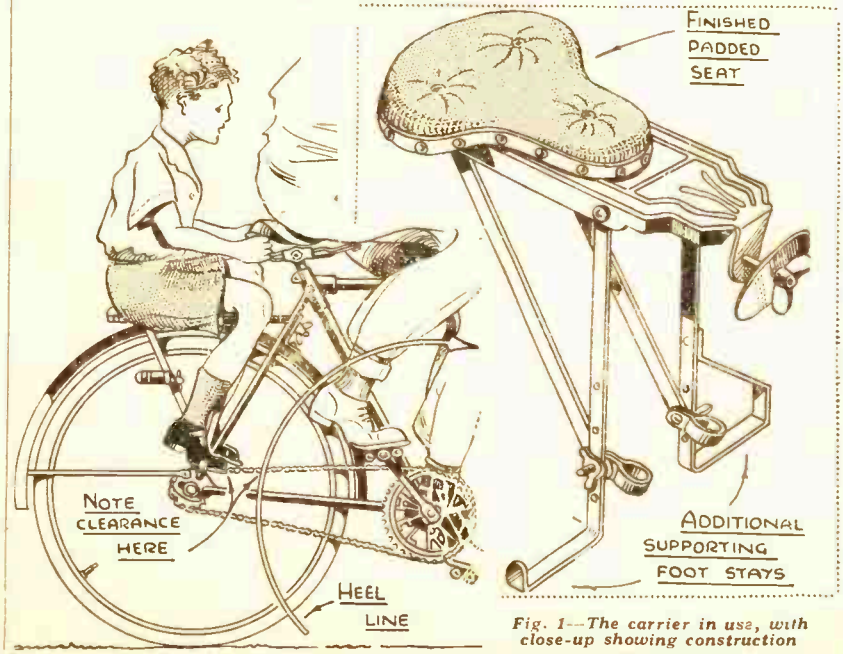


Fig. 1—The carrier in use, with close-up showing construction

speed gear, as the feet of the passenger would interfere with the fine control cable.

It would seem, therefore, that to build an "all-round" form of pillion two additional flat metal bar stays are required, these being riveted to the carrier top, with graded holes near the bent spurs (see Fig. 1) so the extra support bars can be fixed to the original support bars in different positions, using the same nut and bolt that holds the fork fittings to the forks. The advantage of this spurred saddle seat is that it can be used on almost any kind of bicycle, being easily and instantly fitted and removed.

One can have plain spurs (see B, Fig. 2) or a "looped" spur (see lefthand side spur at Fig. 1). The latter type is the strongest and the best. It prevents feet from slipping off sidewise and we highly recommend it.

The Saddle Seat

To make the saddle seat, you need a piece of wood (any sort will serve) 10½ins. long by 9ins. wide by ¾in. or ½in. thick The end of an old box will give you this material. The wood is cut to the shape of a saddle, this being indicated by the dotted lines at Fig. 2, A.

When cut to shape with a keyhole saw or bow-saw, spokeshave the edges neatly, then trim the arris (sharpness) away at the surface side. To upholster the seat, cut a piece of carpet material (old stuff) to the shape of the seat and glue it on or merely attach with tacks. A piece of decent covering material, such as leatherette, is tacked over the carpet and finally set off with suitably-coloured leatherette strapping and tacks (roundhead brass nails or covered ones.)

That is a simple way to upholster the seat. A more comfortable seat can, of course, be made by laying a layer of horse hair, or cotton waste, on the wooden seat and covering it with a piece of linen. The padding is then covered with leatherette or velveteen material, the edging tacks being hidden by the strapping and its tacks.

Padding

The padding, incidentally, must not be too soft and thick. At the outset, you have only to take away the hardness of a plain wooden seat. A couple of layers of cotton wool would, in .fact, suffice for padding. For preference, brown leatherette material should be used for the final covering, seeing that it is waterproof and easily dried.

Fitting the Spur Supports

The padded seat is attached to the carrier top by means of ⅝in. by 8 roundhead screws. With the type of carrier shown, two screw holes will already be found bored; the other three holes (see top view at A, Fig. 2) will have to be drilled. Having done so, do not attach the seat until the extra support stays have been fitted to the carrier.

Support Length

The length of these supports stays depends on individual requirements, but two pieces of iron bar 18ins. by ½in. by ⅛in. will suit most needs, there being enough allowed for making "looped" spurs at the ends.

Anyhow, bend the spurs into shape first, the free ends being connected by small nuts and bolts or by rivets. Rig the carrier on the bike temporarily to discover the correct length of the spur pieces.

When found, cut off the surplus, then drill rivet holes in the ends, including similar holes at the sides of the carrier top. Rivet (or bolt) the additional stays to the latter. The saddle seat is then screwed in position (here you need to refer to the dotted lines at Fig. 2).

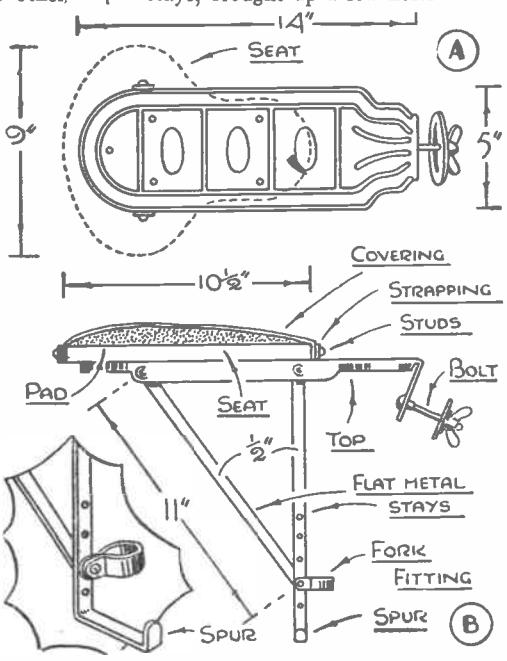


Fig. 2—Top view of carrier (above) and side view details

Attaching the Seat

The carrier is attached to the bike in the usual manner. However, there are a number of things that will have to be observed and considered. For example, the pillion should, normally, rest lightly on the back mud-guard. But, if the bicycle is fitted with rear calliper-type brakes, you may have to raise the carrier up a few inches to clear the fitment and obtain room for the bolting-on plate. If desired, the brake fitment could be fixed on the opposite side of the diagonal fork pieces.

Another point to be considered is the amount of "free" movement allowed to the legs of the cyclist himself. There should, at least, be about 2ins. of clearance between his heels and the toes of the pillion-rider, as shown in the side elevation at Fig. 1.

To bring the pillion-rider's feet away from the heels of the cyclist, therefore, the fork fittings must be, like the diagonal-running support stays, brought up a few holes in the extra supporting stays. When the best position is ultimately found, tighten the bolt screws firmly, making sure that there is no tendency of them slipping loose.

The extra supporting stays can, by the way, be made from lengths of brass valence rail. If you can pick up suitable iron bar, use it, as it is easier to bend and not so liable to snap. Be sure to give the new supports a coat of black enamel paint, including all unpainted nuts and bolts, to prevent rust.

The pillion seat, not being so high up as a "bucket" seat, cuts out any tendency to top-heaviness. The rider holds on to the tool bag or saddle springs.

Cigarette Box—(*Continued from opposite page*)

will do, nailed across. Cut it to the size given in Fig. 4 about ⅛in. of the bottom and top edges are bent up at right angles, and the remainder curved by pressing round a broomstick, as at F.

Punch three small holes each side and nail in place. This covers the open front part and hides the cigarette discharger from view.

An alternative plan would be to cut a piece of 1mm. plywood, if a piece is handy, and glue and nail that across in place of the metal. This plywood will bend to the curve quite easily and might be preferable, but it is scarcely worth while buying a piece especially for the purpose, unless several of the containers are to be made.

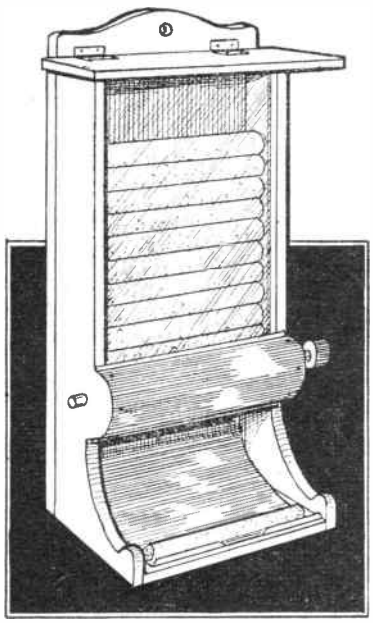
The chute on which the cigarettes drop, is shown in Fig. 5. This should be cut from thin metal. Bend up ⅛in. of the bottom edge punch a few small nail holes near the top edge, and bend it to a slight curve, as at G.

Fix it in the space below the cigarette discharger with a few small nails driven in the back. The lid is a piece of fretwood, 3¾ins. long and 1¼ins wide. Hinge it to the back to cover the top of the container.

This completes the novelty. It should be nicely finished with varnish, or enamel. The metal parts should also be enamelled. It can hang on the wall if a hole is bored in the back, or stand on a table, or mantelpiece, as preferred. It makes and ideal gift for a man or a home.

Here is a popular and simple type of automatic

CIGARETTE DELIVERY BOX



THESE novelties never seem to lose their popularity, and if made for profit or chairty, find a ready sale. The automatic cigarette container illustrated has a glass panel which provides an additional attraction as the cigarettes can be seen and the contents of the box noted.

The automatic action is quite simple discharging a cigarette every time the knob is turned. A view is given in Fig. 1 showing the container with one side removed to reveal the mechanism.

The Simple Action

A compartment is seen which holds the cigarettes, and under this is a rotating discharger into which the cigarettes drop, one at a time. When this is turned the cigarette lying in it is carried round and drops into a chute underneath. It is all quite simple, and reliable in action if reasonable care is taken in the making.

Fretwood, 3/16in. thick, is suggested for making the container, and the measurements given are for wood of that thickness. A panel of 3/16in. fretwood 14ins. by 7ins. (H.3.) will provide enough material to mke the article with careful marking out.

The sides, Fig. 2, A, are set out as follows. First draw the back edge and then the bottom line. On the former, at a distance of 2¼in. up, mark a cross line and on this, at ⅛in. in make a dot with an awl to indicate where the holes for the spindle of the cigarette discharger is to come. On the same mark and with a radius of ⅝in. strike a curve.

Now measure off the bottom and top widths, mark the former down to the curve and shape from the latter up to the curve. Cut out the sides and bore the holes ¼in. diam. for the spindle both together.

The First Parts

Cut out the back piece, B and the bottom, C. Then cut the partition, D, shown drawn inside B for space saving. The partition is to be fixed between the sides, where shown, by the shaded part in A. The thick black line opposite this shows where the glass panel is to come.

Grooves for the glass should be cut in A, and as the position of both this and the partition is important an enlarged cross section of a side is drawn at E, giving the distance they should be apart and from the back edge of the sides. The distance apart, i.e., 5/16in. should be full measurement, in fact it might be a shade over.

Leaving these parts for a while, proceed to make the cigarette discharger, shown at Fig. 3. This consists of two discs of wood, ⅛in. thick, glued to a piece of ¼in. dowel rod as a spindle.

The Discs

If no wood of this thickness is at hand, glue two thicknesses of the fretwood together to make it up. Mark out and cut these discs accurately and in their centres bore ¼in. holes for the spindle. In each a slot is cut out, as shown, a full 5/16in. square. Glue the discs to the spindle the distance apart shown, and take care to get the slots in, both truly in line. This is important, as if they are not the cigarettes may not drop in properly.

The cigarette discharger is now fitted between the sides and then the bottom of the box is nailed across. Nail the partition between and see it is nailed in the right place. Pencil line guides should be drawn for this.

The Glass Panel

The glass panel can be cut from a bit of window glass, or an old photographic negative with the film stripped off. Drop it in its grooves. The action of the discharger can now be tested.

First see that the discharger can rotate without scraping against the glass or partition. If this happens, file the edges of the discs, or, if the glass or partition are fixed too low down then it is better to withdraw them and refix a shade higher up. Get this right.

Now drop a few cigarettes in the container, and give the discharger a turn with the fingers. Unless the slots in the discs are too small, and if they are the remedy is obvious, a cigarette will drop out at once. See the action works smoothly, then no trouble is likely in the future.

All being satisfactory, nail the parts together firmly and fix the back piece on. A small wooden knob should be cut from a scrap of fretwood bored ⅛in. and glued to the end of the spindle to facilitate turning it.

The curved front of the side pieces should have a piece of thin metal, tin

(*Continued foot of opposite page*)

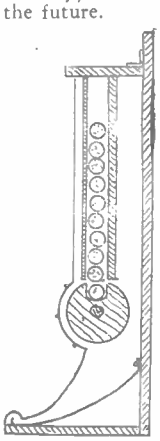


Fig. 1—Section of the model

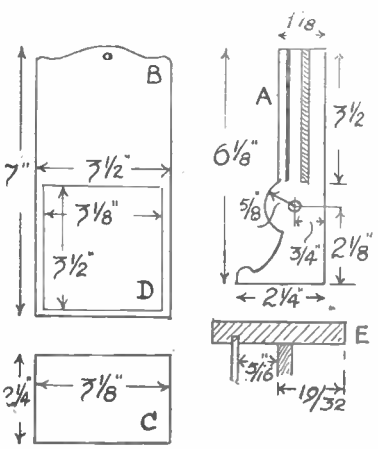


Fig. 2—Detail of the main parts

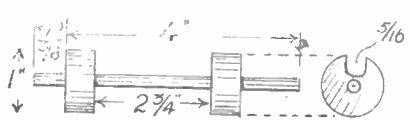


Fig. 3—The cigarette holder and spindle

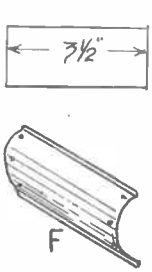


Fig. 4—The curved front cover

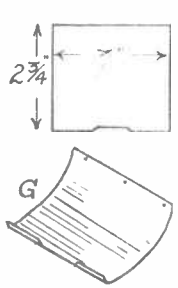
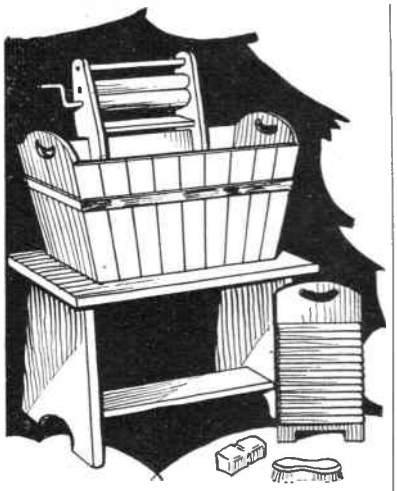


Fig. 5—The metal chute

The handyman can use some odd wood for making this DOLL'S WASHING SET



WHAT more interesting little set of Doll's washing requisites could be imagined than those shown here? And all are of really useful size and quite large enough to use for the largest doll.

For the stool, wood ⅜in. thick is used throughout and the make-up is shown in Fig. 1 with all dimensions for cutting. The top is squared up and cut round with the fretsaw.

At distances of 13/16in. from each end draw lines across and upon these bore holes to take the screws which will be run through to hold the legs. To get the legs correctly shaped, square up a piece of wood 9ins. long and 9ins. wide and draw in the centre line.

Fixing Stool Legs

Now set off 3¾ins. each side of this centre line at the top of the board and connect these points with the corners at the lower end. This will give the proper taper, and it will now only be necessary to draw in the curves at the lower corners before cutting round the outline with the fretsaw.

Lay this cut piece on the corresponding wood for the other leg and draw round in pencil. Saw this out in a similar way and then clean up both pieces with glasspaper. A little character may be added to the legs by cutting out the shaped pieces shown at the bottom.

Get the two legs centrally on the top and put in some brass countersunk screws. The work is strengthened by adding the board shown between the legs. This is fixed by screws through the legs.

Round off all sharp edges and corners with glasspaper so that they do not cut the hands, and then lay the stool aside for varnishing until the other articles have been made.

The Wash Tub

The wash tub is of simple construction, made of five pieces, as Fig. 2 shows. To get a realistic appearance the two ends are sloped outwards, and they are shaped to a gentle curve at the top, with a hand-hole made in each.

The overall sizes of the ends are given, these ends being fixed between the sides. For the sides, which again are tapered, proceed to work in a similar manner as for the legs of the stool. The sides should be screwed or nailed to the ends, keeping flush surfaces all the way along the sides.

The floor of the tub is a plain piece of wood about 9ins. long by 7¼ins. wide, but it would be best to get the exact measurements direct from the made-up part so as to ensure a good fit. The lower edges of the sloping ends, be it noted, must be planed off slightly to a bevel to meet the floor evenly, which is simply screwed.

The top edges of the sides should be rounded with coarse and fine glasspaper, as should also the shaped top edges of the ends and the hand-holes.

The Wringer

The realistic little wringer (Fig. 3) is intended to fit on to the sides of the tub by means of the slots in each of the uprights. The details in Fig. 3, show how the ends or uprights are set out and how the wire handle is made. The article does not require to be made of such thick wood as the previous ones and therefore 3/16in. or ¼in. stuff is being suggested with pieces of 1in. diameter dowelling for the rollers.

Cut the two ends first, according to the measurements given, the tops being slightly tapered and the heads rounded with the fretsaw. The slots are cut the same width as the thickness of the sides of the tub to fit easily. Unite the two ends by means of a piece of dowelling at the top glued in as shown, and by a narrow board lower down just above the slots.

Roller Fitting

The upper roller will simply rest upon the lower one and will thus revolve when the latter is turned by the handle. The holes for the wire pivots therefore, must be slotted slightly as shown to take up any little inequalities in the rollers. Bore the holes for the lower roller and an inch above these bore two more, one in each upright, of course.

Now, with a round file, form the slots by filing first upwards from the holes and then downwards. Clean the slots and make the edges smooth so that the wire pivots which are driven into the ends of the rollers, may move freely up or down. Two wire nails would take the place of the wire if desired. The rollers are 6ins. long or even longer if desired. The lower roller will have one pivot of wire, or a nail as in the roller above, and at the other end a wire handle as in the detail Fig. 3.

Washing Board

The washing board is simply a piece of wood shaped top and bottom as shown in the diagram Fig. 4. Wood ¼in. thick, will be cut round with the fretsaw. Cut a hand-hole at the top also, and clean up all edges with glasspaper.

Now, cut off a number of pieces of ⅜in. or 3/16in. half-round beading, and prick in about three holes in each length. Nail them on with fine fret pins. Glasspaper the ends of the beading when fixed on and make all smooth for handling.

The beading can be fixed on projecting and then cut all at once level with the edge of the board.

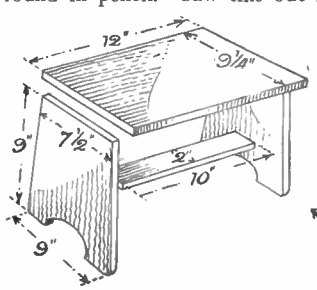


Fig. 1—Details of the stool

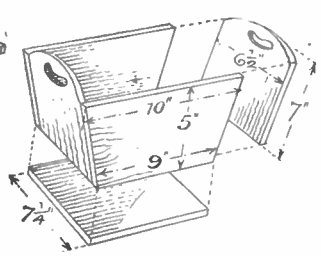


Fig. 2—Parts and sizes for washtub

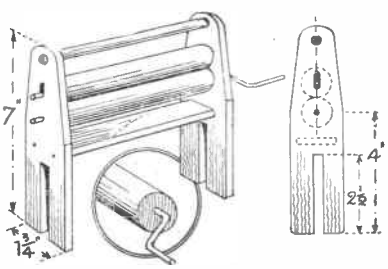


Fig. 3—How wringer and rollers are fitted

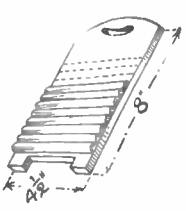


Fig. 4—Washing board

For outdoor or indoor sport you certainly should

MAKE A QUOIT GAME

QUOITS is one of the oldest games in history, and still survives, though not usually in the strenuous form of the Grecian type. In fact the most popular form today is of the drawing room kind, using rope quoits instead of the heavy iron quoits that used to be associated with the game.

Some readers may have seen a copy of the ancient statue "The Quoit Player" and can realise that throwing a heavy quoit some distance was a real athletic feat.

Deck quoits, as the name implies, is a favourite ship's pastime, and as it can be just as well played in a room, or on a lawn in the garden, readers may care to make the game for themselves.

The Board

The board, Fig. 1, can be made of deal, screwed to battens underneath. The screws should be driven through the battens into the board not vice-versa, so that no screwheads will be visible above. Countersink the screws well so that no heads left can scratch the floor of the room. Note, these battens are cut to run diagonally across the board, underneath, as shown by dotted lines.

In the centre, and at each corner, bore holes for the pegs. These pegs, Fig. 2, can be cut from ¾in. dowel rod, or broomstick. Cut them to length given, plus the thickness of board and battens, and glue them in. A tight fit is wanted here, as the pegs may work loose and pull out. Varnish the board and pegs and paint the numbers neatly on in white, or black paint.

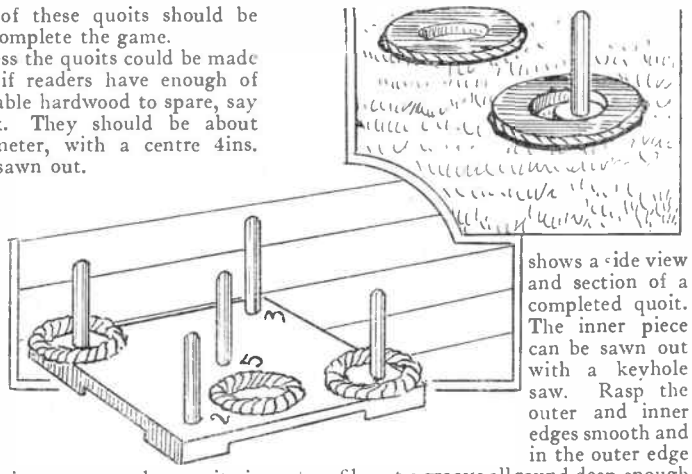
Rope Quoits

For the quoits, a moderately thin rope may be used. They can be made in this way. Fray out about 2ins. of the end of the rope and bend the rope to a ring of a diameter given in Fig. 3 A. Tie the frayed end to the rope, avoiding as much as possible a bulge, with fine twine.

Now twist the rope round and round the ring until it is covered and forms a firm and shapely quoit. Cut off and fray the end, as before, and tie with twine a second time, as at B.

About 5 of these quoits should be made to complete the game.

Doubtless the quoits could be made of wood, if readers have enough of some suitable hardwood to spare, say ½in. thick. They should be about 6ins. diameter, with a centre 4ins. diameter sawn out.



shows a side view and section of a completed quoit. The inner piece can be sawn out with a keyhole saw. Rasp the outer and inner edges smooth and in the outer edge file out a groove all round deep enough to allow a sash cord to lie in halfway.

The detriment to wooden quoits is they are rather noisy in use, and the unavoidable clatter may be unpleasant to hear. This can, to some extent, be obviated, or at least lessened, if the quoits are bound round with string, or cord. The game can be 100 up, the player getting the number first being, of course, the winner.

Wooden Quoits

For those readers who may care to try the original quoits game, a simple and easily made substitute for the heavy iron quoits usually used, is given. The peg, one only being required, is shown at Fig. 4.

It is a piece of broomstick, with a hardwood disc, cut from fretwood, at the bottom. In the centre of the peg, bore a hole for a metal pin to enter. The pin should be 9ins. long and be pointed at both ends. A length of ¼in. iron rod would do for a pin, or perhaps a piece of old stair rod would serve.

Drive the pin into the peg tightly, but take care to get the hole bored the right size and do not drive the pin in too far or the peg may split. Paint the peg and disc white so that it is conspicuous when stuck in the ground.

The quoits are made of wood, hardwood ¾in. to 1in. thick if possible, but if not then deal 1in. thick can be substituted.

Cut two of each for each player to the diameter given in Fig. 5, which

Cord Edging

The sash cord edging can now be fixed in the grooves. This edging is to protect the edge of the quoits from damage by rough contact with the ground, or peg. Measure the cord by passing it round in the groove and cut it just long enough for its ends to butt neatly together, and not overlap.

Press it tightly in the groove, and fix it there with 4 nails driven in through the cord.

In playing this kind of quoits, each player uses his own pair of quoits, and standing some distance away from the peg endeavours to "ring" it, in non-technical parlance, get his quoits over it, his opponent following suit.

A "ringer" counts 2 points, and 1 point to the quoit or quoits nearest the peg.

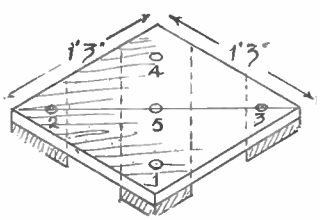


Fig. 1—Details of baseboard

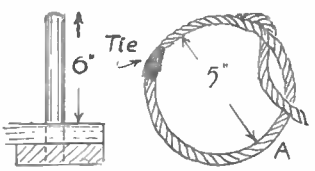


Fig. 2—The peg

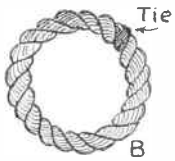


Fig. 3—How rope quoits are made

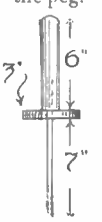


Fig. 4—The pinned peg

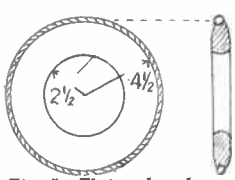


Fig. 5—Flat and end section of disc, corded edge

The way to the best results is shown in these

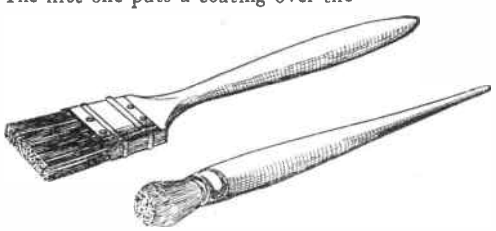
HINTS ON VARNISHING

FOR ordinary carpentry and woodwork about the home, there is no doubt that the amateur finds varnishing the most simple. Unfortunately this simplicity often brings about bad workmanship in rough application and inattention to procedure.

Varnish, it is true, is easily applied under correct conditions, and brings a pleasing effect to the finished result. Not, however, unless it is done properly.

It always seems such a pity to spoil a nice piece of work by the final process, and after all, it is just as easy to do a thing properly as it is to ride rough-shod over any of the operations necessary.

To start with, there are two forms of varnish—clear and stain varnish. Their names make their types obvious. The first one puts a coating over the wood or the work, but leaves the grain in its natural state and the wood in its natural colour. A varnish stain, on the other hand, colours the wood at the same time as it covers it with a film.



The two types of brush needed

The colour of course, should match the wood being used, although one can get up an imitation of another kind in the same way. Remember that varnish hardens quickly and should be worked out as soon as possible. The usual trouble is that it shows tacky and streaky. This is possibly due to being used too cold and not applied with a suitable brush.

Room Temperature

The room in which you do the work should be reasonably warm, and the brush required is the flat wide brush such as illustrated, whilst the mop brush also shown, is for the smaller and more intricate work such as moulding.

The brush should be of good quality so it can be splayed out in a rapid even stroke down the wood as also shown in the details here. The varnish is laid on with the grain in straight even strokes, then lightly dragged across once, and finished with the grain again. The last time it is very lightly drawn.

If you are dealing with a large piece of work you will not, of course, have time to go across the grain before the varnish has commenced to harden, so this operation should be omitted.

Work before Varnishing

Of course, there is a certain work to be done before the varnishing begins. For instance, the wood must be thoroughly cleaned with glasspaper and an examination made for any holes which can be filled with plastic wood.

If you are going to stain the work separately this should be undertaken first and allowed to dry thoroughly. If the grain has become raised in this process it must be rubbed down very lightly with a worn piece of glasspaper, then the whole thing is dusted to clear all particles of wood away.

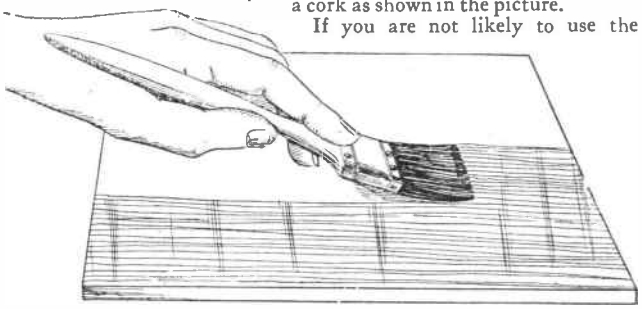
It may be that the wood is soft in grain, and in this case, the varnish is apt to sink at certain places and become patchy in the finished result. To prevent this, the woodfiller must be used to fill in the pores of the grain. This woodfiller is of creamy substance, rubbed well into the wood and allowed to harden before being finally smoothed down with glasspaper.

Another great trouble which spoils the finished result is dust. This has a habit of settling on the sticky surface, and seems to show up very badly afterwards. The work should be done with doors and windows closed, and where a great deal of movement can be avoided.

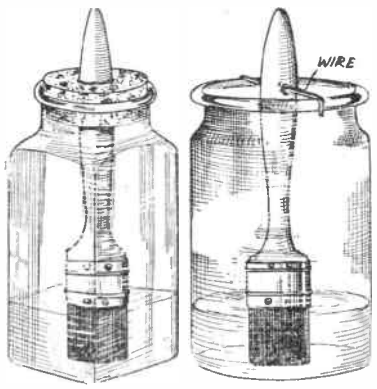
If you have other people moving about with newspapers or books, dust is almost sure to float along and settle in a disheartening way on the work. When you have dusted the work after glasspapering, allow that to settle before you begin varnishing.

Varnish brushes get very hard after usage, and as they are worth keeping, something must be done to prevent this happening. They can be hung in a jar of water with just the bristles in the liquid. A piece of wire stuck through the handle will hold them, or the brush handle can be put through a cork as shown in the picture.

If you are not likely to use the brush again for some time, however, it can be carefully cleaned in turpentine, the hairs smoothed flat and the brush kept laid down. In cleaning in this way, make sure that all the varnish is got from the bristles by the use of different changes of turps.



Run the flat brush along with wide even sweeps



Keeping brushes soft and fresh

For Renovations

One of the uses in which varnish is particularly helpful is renovating furniture which has become scratched or damaged or shabby. This does not apply to real antique furniture, but to the ordinary articles of the home. It is important that the work is thoroughly cleaned before being varnished, for even though it looks clean, there will still be grease and finger marks on its surface to spoil the effect.

A weak-soda-water will clear away all blemishes, and if you go over the article with a soaked rag, immediately rinse the parts down with clear cold water and allow to dry thoroughly before beginning. In cases like this the mop brush shown is usually more helpful and you must take care to get the varnish stain the same colour as the rest of the furniture or piece of work.

It is better to get the shade lighter first because you can then go over it again to bring it down as required.

Electro-Plating

I WISH to electro-plate a small surface, and also to silver a small piece of glass for a mirror. (A.G.—Newbury).

SMALL articles can be electro-plated by placing them in a small glass or earthenware container, two-thirds filled with a silver-nitrate solution. The plating is effected by means of a powerful accumulator, the + terminal of which is connected by copper wire to a piece of pure silver immersed in the solution.

The article to be plated (which may be metal or glass or almost any other material) is connected by copper wire to the — terminal of the accumulator. Directly the article is immersed in the solution, current flows and the silver is electrically conducted from the piece of silver to the surface of the article.

Motor for a Boat

I HAVE built a flat-bottomed 3ft. long model boat, but have difficulty in obtaining power for driving. (W.J. H.—Haverfordwest).

CHOICE of motive power for your model boat is practically limited to either a small electric motor, of about 12 watts power (e.g. 6 volt. 2 amp) or a steam boiler and engine. For the latter you would want an engine with a bore of about ½in. and stroke of ¾ins. with a steam pressure of about 25lbs. per sq. in. It is really a matter of finding something in stock as supplies are very restricted.

Making a Fishing Rod

PLEASE tell me what kind of tool I can get to make fishing rod joints round and straight and to taper the rod in length? (J.W.C.—Bethnal Green).

TO make straight tapering fishing rod joints you need a small block type of plane and a planing block. The latter should be about 5ft. long made of two pieces of smooth straight wood about ¾in. to 1in. thick and 2 to 3ins. deep. Plane off a tapered chamfer on one edge of each piece, make the chamfer 45 degrees and make it range from practically nothing at one end to, say, ½in. at the other. When the two pieces are screwed together you will have a tapered groove, vee shaped, and and in this you lay the wood for your joint. Plane off the piece until it is square and tapered as desired, then turn it round a quarter turn and plane off the top corner, repeating until you have an octagonal tapered piece, then plane off the eight corners and finish by filing, scraping and glasspapering. This is the professional method and works well.

Power Amplification

CAN you explain briefly the principle of a power amplifier? (D.D.—North Tawton).

A POWER amplifier consists essentially of a thermionic valve in circuit with a battery or other source of power such as the A.C. mains. The signals to be amplified are fed into the grid, the outgoing—amplified signals are taken from the plate via a transformer or resistance capacity circuit to the loudspeaker. Full details can be had from any wireless handbook.

Lighting

COULD you let me know how to make a lamp which goes without paraffin, gas or electricity, as we have none of these? (M.G.—Carlisle).

THE only thing we can suggest for a lamp, other than those using oil, gas or electricity, is to use a carbide gas lamp, if carbide can be had in your district. Alternatively you could use "Calor" gas, supplied by most ironmongers, in large cylinders.

BENCH TOOL RACK

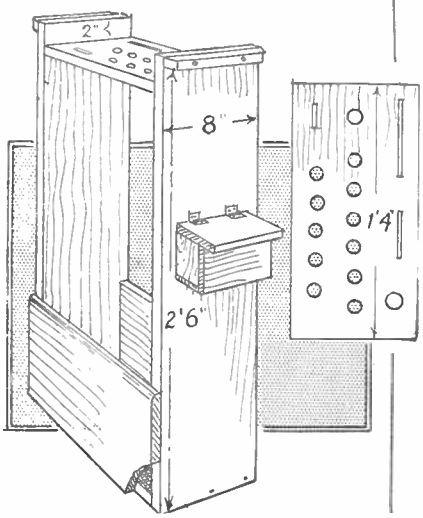
AS a rack to hold your tools is more convenient than a box, the simple design shown is worth the trouble in making if a few feet of suitable timber are available. Some useful dimensions are given, but these need not be adhered to too rigidly if the wood to hand is near the size.

Deal board, ¾in. to 1in. thickness is about right and the same width board as used for the sides, shelf and bottom can also be used for the cross boards.

Bottom and Shelf

The bottom is nailed between, part of the front board being cut away to show it. The shelf also is nailed between, 2ins. down from the top. This shelf is drawn separately in plan view, to show a suggested arrangement of certain tools.

The slots at the back should be cut 1in. from the edge and be long enough to admit hand and tenon saws respectively. On the same line a hole is bored in which the marking gauge can be dropped.



In the front row a slot is cut for the square. The other holes can be bored to accommodate chisels, gimlets, screwdrivers, etc. A shelf arranged on these lines will hold quite a considerable number of tools.

The front cross boards has its top edge rounded, or bevelled off, and is nailed to the sides and bottom. The back cross-board is cut to fit between the sides and is there nailed. This makes a well to hold plane, brace, and other tools that cannot be well accommodated on the shelf.

At the top of each side piece of the rack a strip of wood about 1in. square is screwed across. Bevel off the ends of these, they make good finger grips for lifting the rack.

Side Boxes

The side boxes, one of which can be seen in the drawing, are convenient to hold such small items as drill bits, etc., so are worth adding. No back is needed to these boxes, the sides of the rack being the back of them.

They are fixed in place with screws, driven in from the inside face of the side pieces. Lids should be provided hinged with 1in. iron butt hinges, as shown. No catches are needed.

Though not shown in the drawing extra tool holders could be screwed to the front cross board and sides, if there are tools still unprovided for.

Another addition, a very useful one too, is to hinge two pieces of the board to the sides, so that they can close together over the front and form a double door.

Racks could be added to the inside of these for more tools. This is, of course, if the wood to spare is available The completed rack is best painted varnished before using.

For home repairs the amateur should know about HARD SOLDERING

HARD soldering is not unlike soft soldering, except that joints made with the latter are comparatively weak. Hard soldering is, in fact, a simple form of brazing. It thus offers much scope to the amateur repairer and handyman about the house, for by its means one can repair broken keys, lock bolts, iron pots and pans, scales, bicycle cables, pivots on grate trivets, screwdrivers shanks and so on, as well as most repairs in copper and brass articles.

With repairs so difficult to get done these days, a knowledge of hard soldering is not only useful, but essential, and money-saving. The process is quite straightforward, for one does not need elaborate apparatus, the main articles being a small blow-pipe, plus a special hard solder and a flux.

The Solder and Flux

The solder is known as "silver" solder. It is an alloy of cheap silver and brass mixed, the latter being incorporated to reduce the melting point. Like ordinary soft solder, it is made in various thicknesses in sheet and wire form, but owing to present conditions, we advise you to try and obtain the solder first before contemplating any repair jobs.

The most likely places are hardware stores and jeweller's and silversmith's shops. In case of failure to obtain it a brass solder—known as "spelter"—can be used as a substitute.

Regarding the flux, this is borax. However, before it is applied to the work, it must be prepared by heating on a clean piece of iron plate over a clear fire until it melts. A Bunsen burner is ideal to use, if you possess one.

A certain amount of water is impregnated in borax. Heating it, as explained will leave only pure borax. In order to use the flux, sprinkle a few drops of water on a pice of slate about 4ins. or 5ins. square; the slate surface must be quite clean, of course.

Mix some of the prepared borax with the drops of water to make a semi-liquid paste or cream. The flux is then ready for use.

How to Solder

The parts to be united must, of course, be thoroughly clean. If the work is small, it is usual to support it on a charcoal block or asbestos block so as to conserve the heat as much as possible.

Having cleaned the parts to be joined, apply the flux and then cut a tiny square of the solder and set it in position on the work. The work is heated by means of the blow-pipe until it is bright red. Avoid playing the flame on the solder, incidentally, otherwise it is apt to melt before the work itself is hot enough.

It should be stressed that the work must be quite hot. If not, the solder will not adhere to the metal properly.

When the solder begins to fuse, more flux and solder is added until the join is well covered. When cool, any surplus solder is filed off and the joint smoothed and brightened by rubbing with emery cloth or on a buffer.

You should make a few experiments prior to attempting to actual repair jobs. If using a brass solder, such as spelter, the soldering comes under the heading of "brazing." In this case a petrol or paraffin blow-lamp will provide the necessary amount of heat required.

How to Braze

There is not much difference between hard soldering and brazing. The usual process is to set the work in an iron receptacle and build pieces of fire-brick or asbestos around it, following which the work is then subjected to the strong jet of flame from the blow-lamp.

A borax flux is used. It should be applied literally to the cleaned work. To get rid of the moisture, direct the flame on the borax for a few seconds. The work is heated to a white heat, but care must be exercised should the work be very thin, as you are liable to burn it.

When heated suitably, dip the end of the stick of spelter in the flux and apply it around the parts to be adhered together. As soon as the solder begins to melt, cut off the heat and leave the job aside to cool.

On the face of things, hard soldering or brazing is very simple. It is simple, even in practice, but behind it all there is a certain degree of skill, just as in soft soldering. This skill can only be obtained by experimenting on various metals until you get the hang of the business. One must crawl before one can walk, so to speak.

Asbestos is mentioned for retaining the heat. Such, in the form of blocks, must be pure asbestos and not the usual "sheet" stuff used for fire-proofing walls. Asbestos-cement sheeting, like ordinary tiles, will fly to bits under the intense heat from the blow-lamp.

Door Key Repair

If repairing the stem of a door key, the broken ends must be laid a short distance apart to enable the solder to "run" between the break thus formed. The parts must be arranged in true alignment laterally. At a pinch, one could tie the parts down true by means of wire, keeping the wire well away from the join.

Another plan would be to make a "bed" for the key in some fire-proof plastic material like pyruma. The mould is then made hard by heating with the blow-lamp, following which the key is set in the mould and the soldering carried out in the manner explained.

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