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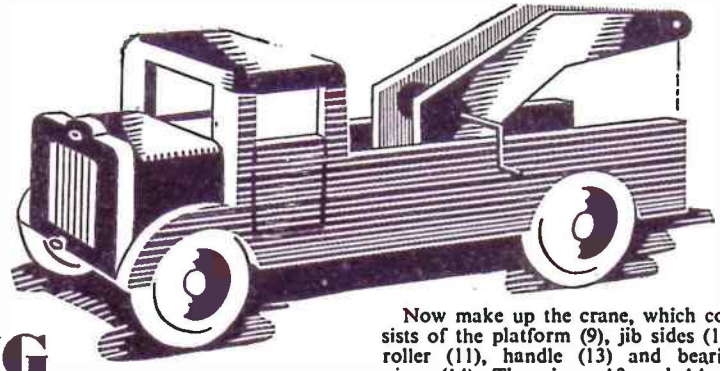
IN THIS ISSUE

	Page
Pull-Along Toy Breakdown Lorry	241
A Pair of Photograph Stands	242
Making Your Own Marking Knives	243
Radio Chassis Construction	244
Replies of Interest	245
A Cake-Board with a Difference	246
The Shipmodeller's Corner	247
How to Construct a Six-Inch Reflecting Telescope	248
Make a Novel Windvane	250
A Small Rake for the Garden	250
A Useful Adjustable Support	252
Patterns for the Windvane	255

Hobbies

★ This week's FREE DESIGN ★



PULL-ALONG TOY BREAKDOWN LORRY

PULL-ALONG toys are immensely popular with young children, and being of simple robust design, they are ensured of a long and useful life. The breakdown lorry illustrated should be certain of a place of honour in any young owner's collection, as it incorporates two firm favourites of the nursery — a lorry and a crane.

It will give hours of delight to any child at little cost—and provide a new lease of life for accumulated oddments in the toy cupboard, which automatically become 'loads' to be lifted and transported round the playroom.

How to Start

The first step in construction is to trace the patterns to the wood (all ¼in.). Then cut out the pieces with a fretsaw, taking care to follow the outlines accurately. Use a fairly fine sawblade (0 or 1) and keep the saw upright. When the parts have been cut, clean them up with glasspaper.

To assemble, use good glue and add fret pins as required to ensure a really firm job. First glue and pin the sides (2) to the base (1), adding pieces 3, 4, 5, 6, 7 and 8, and the axle pieces (12) to complete the actual lorry, less wheels.

SEND FOR A KIT

For making this toy you can obtain Kit No. 3090, which includes all necessary materials, from any Hobbies branch, or post free from Hobbies Ltd., Dereham, Norfolk, Price 4/9

Now make up the crane, which consists of the platform (9), jib sides (10), roller (11), handle (13) and bearing piece (14). The pieces 13 and 14 are fashioned from wire, and the same material, plus a bead, is used to construct the hook (see design sheet).

With the jib pieces glued and pinned to the platform, run the wire-bearing piece into the sides of the jib pieces where shown. If the holes in these pieces are previously filled with glue, a firm fixing will result.

Should Turn Freely

Before fixing the roller (11), bore a hole through it for the purpose of taking the cord which will act as the crane cable. The roller when fitted has,

● Continued on page 252

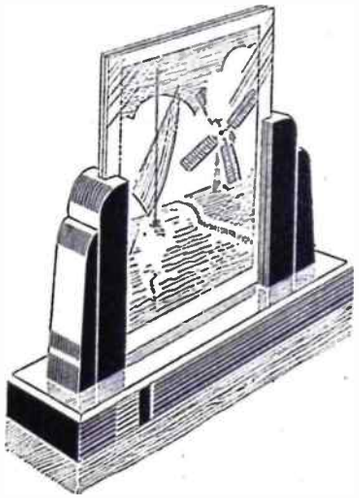
All correspondence should be addressed to The Editor, Hobbies Weekly, Dereham, Norfolk

For Modellers, Fretworkers and Home Craftsmen

4D

A Pair of Photograph Stands

By K. Blackburn



THERE are many possible variations in the design of these photograph stands, and the reader may wish to modify the shape of the uprights to his own design. It should be remembered, however, that excessive elaboration is inclined to cheapen the appearance of an article of this nature. The appeal of the stand which is illustrated is largely due to its essential simplicity.

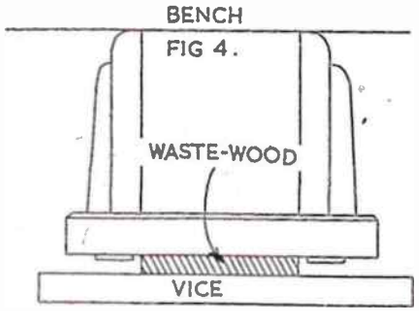


FIG 4.

Instructions are given for making a stand to take a photograph up to 4ins. square. The height may be increased in proportion to the width if a larger photograph is to be accommodated. A mild-grained hardwood should be used.

For the base you will need a piece of wood 7½ins. by 2ins. by 1in. This is trued up to finish 1½ins. wide and ½in. thick. The marking out is shown in Fig. 1. It is the distance between the mortises which determines the size of the glass, in this case 4ins. The mortises are gauged between lines (A) and (B) and between (C) and (D) on both sides of the wood, and they are chopped right through.

The uprights are made from one piece of wood 11ins. by 1½ins. by ½in.

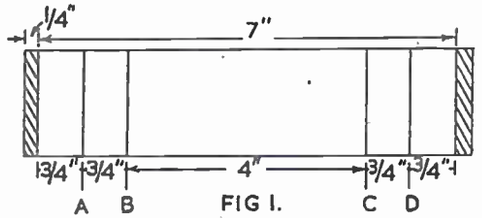


FIG 1.

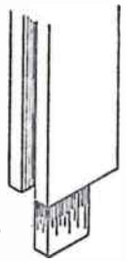


FIG 3.

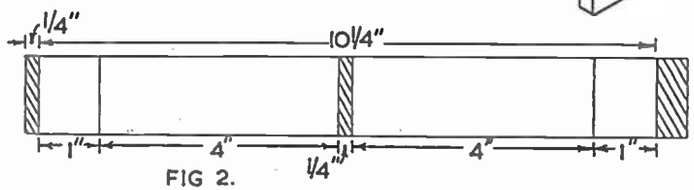


FIG 2.

This piece will later be cut in half to make both sides of the stand. After truing up to 1½ins. by ½in., mark out as shown in Fig. 2. Do not saw off the wastewood at this stage.

The tenons are marked at both ends and sawn down. Before sawing apart the two uprights, the groove must be made to take the glass. Gauge two lines ⅛in. apart on one edge of the wood. If you have a plough plane the groove can be easily worked right through to a depth of ¼in. The groove will, of course, remove ¼in. from one side of the tenon; this is as it should be.

If you haven't a plough plane, the groove may be cut with a ⅛in. chisel. Put the wood in the vice, and, using the chisel with a mallet across the grain, make a series of cuts about ⅛in. apart all the way down the length of the wood. The waste can then be removed by using the chisel with the sharpened side downwards. Another series of cuts is made, and the waste removed again. The bottom of the groove may be smoothed by using the chisel with a scraping action. Don't forget that this groove is taken right through to the ends of the tenons. The sides of the groove on the tenons will be wafer-thin, of course; these may be easily removed by breaking them off with the fingers.

The two pieces are now separated. It will be noticed that the tenons are still ¼in. too wide to enter the mortises. This ¼in. is cut off the tenon on the side opposite to the groove. The joint will then look like that shown in Fig. 3.

The shaping shown in the illustration is carried out as follows. Put a 1½in. countersunk-head screw into the straight edge of a piece of scrapwood so that the top projects ½in. above the surface of the wood. This improvised gauge is then used in the same way as a marking gauge to cut the small V-shaped groove shown in the illustration. The 'gauge' is rubbed against the grooved edge of the upright.

The uprights are then tapered to a width of 1in. at the top. This is best done with a smoothing plane, working from the end carrying the tenon. The top corner is removed by sawing down the V-groove to a depth of ½in., and then sawing across. The curves are drawn free-hand, and are cut by chiselling vertically downwards.

A ¼in. chamfer is marked round the upper surface of the base. The end chamfers are worked first, using a plane or chisel towards the centre of the wood to avoid splitting. A finely-set plane is then used to complete the chamfers down the sides.

● Continued on page 245

Try Your Hand at

Making Your Own Marking Knives

By R. Coleman

A VERY keen edge can be honed upon the blades of the knives described here—an edge which lasts very well. This is due to the hard steel used in the manufacture of hacksaw blades—the source of supply for these knives.

Fig. 1 illustrates the development of a typical marking knife blade. A length of hacksaw blade, about 4ins., with the hole in one end, should be marked out and ground down with coarse and fine carborundum wheels to the shape as at (C). (D) shows the sections of the blade

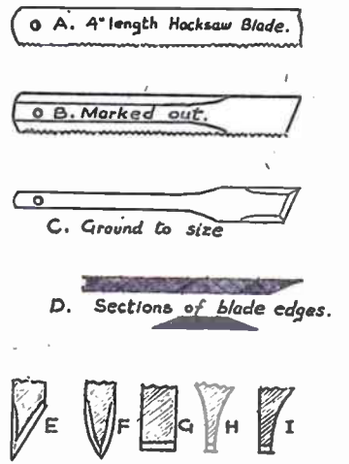


Fig. 1

at the cutting edges. Note that the one side of the blade is kept flat in the same manner as a chisel. The ends of blades may be made in various shapes for various purposes as at (E), (F), (G), (H) and (I). (E) and (F) are for fine modelling work such as the cutting of balsa wood parts for model aircraft, while (G), (H), (I) are forms of chisels. (H) and (I) are very useful for cutting out stringer slots in model aircraft formers, etc., and for detail work on cardboard models. The blades are sharpened after grinding to the correct angles in the same manner as the sharpening of woodworking chisels. Use a fine oilstone. The blades will be found to flex very slightly—a useful asset in modelling work, whilst the marking knife blade, used for marking and scribing woodwork joints, being broader and with only a small angle at the end, will be somewhat stiffer, allowing a deep and strong cut to be made.

Handles for the blade should be made of hardwood—straight-grained mahogany, walnut and beech being very suitable. Use two strips about 6ins. long, ¼in. or ⅛in. thick and about 1in. wide. Pin both strips together temporarily and cut with a fretsaw to a shape suiting individual taste—see Fig. 2, which is a suitable shape for a marking knife. One piece, after cutting to shape, must be recessed by the thickness of the blade being used, so that both pieces may be glued together, sandwiching the blade tightly between. A single small woodscrew, say, a No. 4 countersink, ½in. or ¾in. long, is used to fix the top end of the blade (through the hacksaw blade anchor-pin hole) and pull both strips together. Use a casein or synthetic resin glue if possible, and whilst setting be sure to cramp together, using three or four small G cramps and two protection strips of wood as at Fig. 3.

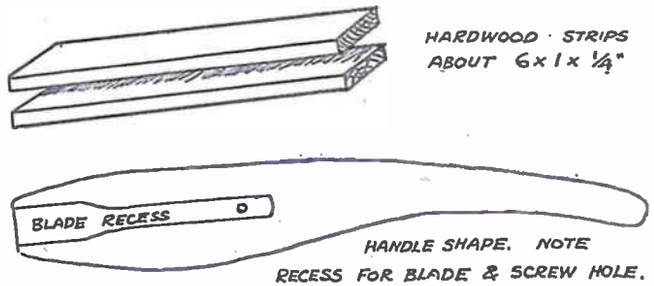


Fig. 2

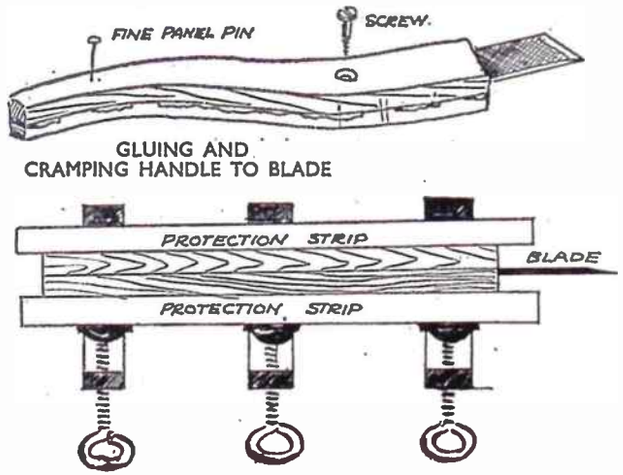


Fig. 3

When the glue has set, the handle may be shaped as required. All sharp corners will, of course, need to be removed; it is useful to try and discover where the handle may best be thinned to suit individual purposes. Especially the broad flat sides of the handle may be conveniently thinned down to about ½in. thickness immediately above the blade. Use chisel, wood file and coarse glasspaper to shape the handle. Finish off with fine glasspaper and varnish or french polish to protect the wood.

Some useful Information about

RADIO CHASSIS CONSTRUCTION

By A. Fraser

THE radio chassis, for the benefit of the newcomer, is the base upon which all the radio parts are assembled, and in modern sets it is, almost universally, made of metal. In view of the fact that it is the indispensable prerequisite to any radio construction, a few words on the making of a chassis should be helpful to readers.

The chassis is an expensive item to buy and it is hoped by this article to encourage the constructor to make his own and so cut down costs appreciably.

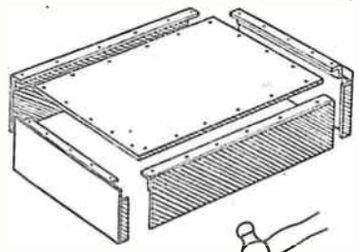


Fig. 1

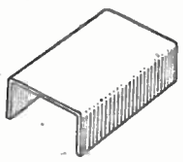


Fig. 2

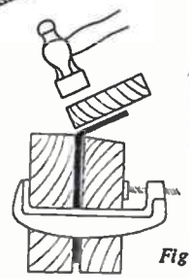


Fig. 3

First, the material used. The two most widely used are cadmium surfaced steel, and aluminium or aluminium alloy, sheeting. The thickness varies usually from 16 gauge to 20 gauge. 18 gauge is popular. Steel, being stronger, can be used thinner than aluminium, but of the two, aluminium is recommended, because it is much easier to work. Moreover, its highly polished surface, akin to a mirror, is most attractive and adds considerably to the appearance of the finished set.

Use of Angle-bar

Chassis, of course, vary in size and shape according to the requirements of the set, but they are rarely more than 16ins. long and 8ins. or 9ins. wide. They are usually 2½ins. deep, sometimes 3ins., to allow sufficient room for the under-chassis parts. They are mostly bent to shape, but before going into this process, it can be pointed out that a chassis can be made without bending being resorted to. This is done by the use of angle-bar. The method is shown in Fig. 1. Five rectangular pieces of sheeting are sawn out (top, two sides, and two end pieces). (Incidentally, use ruler and set-square to draw out the shapes, and score the lines with a sharp metal point.) These parts are then joined to each other by the use of angle-bar, the appropriate holes being drilled and either rivets or nuts and bolts used to secure the parts. A file can finally be used to clean up any rough ends. A sharp clean-cut angular effect is obtained by this method of construction, and although it takes time and a little extra expense, the results are well worth it. Chassis formed by bending can never attain this quality.

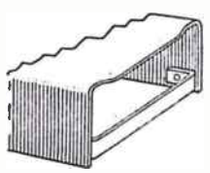


Fig. 4

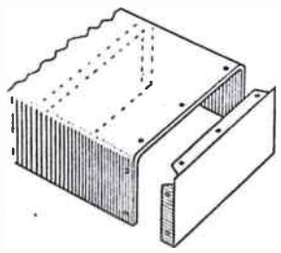


Fig. 5a

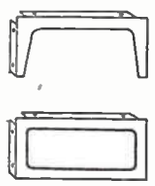


Fig. 5b

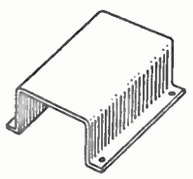


Fig. 6

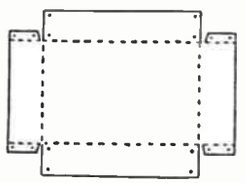


Fig. 7

However, bending methods are cheaper and quicker, and may be preferred in consequence.

The simplest form is illustrated in Fig. 2. One single piece of sheeting is bent twice, to form a top and two long sides. First, draw out the shapes in the flat, using ruler and square, and scoring the lines with a sharp metal point. Then clamp the sheet between two flat boards, leaving one side projecting, the scored line coinciding with the edge of the board. (Alternatively, the boards and sheeting may be held in a bench vice.)

Beat with Hammer

The side which projects is then pressed down partially with the hands, being careful to press mostly where the metal issues from the boards. Next, a thick board, or block of wood, is placed against the metal, keeping its edge along where the sheeting comes out of the boards. The wood is then beaten with a hammer along this edge. Finally, with the board or block lying flat on the turned-down side, the hammer is used all along the length and breadth of it. This is to make the metal side perfectly flat. The metal can then be released from the boards and the other side treated in the same way.

If precision is wanted, a set-square can be used to gauge if the side turned down is truly at right angles with the top.

If the metal is fairly tensile, it will be found that although the edge of the clamping board is rectangular, the metal side can never be made to turn down exactly at right angles. This obstacle is easily overcome by planing down the edge of the clamping board beforehand to something less than a right angle. This chamfer will enable the metal side to be turned down further and bring it truly at right angles with the chassis top. The illustration in Fig. 3 will make this clear.

Rounded Angles

There is another point. If the clamping board is very hard wood, then the edge over which the metal turns should be rounded off slightly. If it is left sharp, thus forcing a sharp angle in the metal, the latter will probably tear. All angles in the metal sheeting should be rounded ones. (See illustrations.)

● **Continued on page 249**

Bad Stain on Tent

OUR white fabric ridge tent has had motor oil poured on it, resulting in a bad stain. As it cannot be covered with a tent paint, I would be pleased if you would tell me how to remove the oil.—(M.B.—New Thundersley).

YOU should lay down a pad of newspapers on a flat surface, placing a sheet of blotting-paper on the top. Place the stained area of the tent on this. Saturate a rag in carbon tetrachloride and work towards the centre of the stain. Continue this treatment until most of the oil has passed through to the blotting-paper. Then apply carbon tetrachloride more liberally until the oil disappears. This treatment is intended for clean oil. Dirty engine oil nearly always leaves a mark after the oil has been removed and is very difficult to remove even with ordinary laundering. The cleaned area should be proofed. It will hardly be worth while to make up a proofing solution, and we, therefore, recommend the purchase of a small quantity of proofing solution ready-made from a sports outfitter. Two coats of this brushed on should be ample to reproof.

* * *

Second-hand Books

HOW can I clean the cloth backs of some second-hand books, and fumigate them as a precaution against germs, etc.? (R.C.—Liverpool).

A VAPOUR of formalin is recommended for disinfecting books. Open the covers and tie back to free the leaves, place in airtight box and direct the vapour in the box for about 15 minutes. The covers can be cleaned by washing over with glair. This is white of egg, beaten to a froth and left standing overnight, when the clear liquid can be poured off for use.

* * *

Finish for Cabinet

I HAVE made a bedside cabinet—I have stained it and would now like to get a very high polish such as on new furniture. Could you tell me what material I shall need, and the way to do it? (C.B.—Cove).

FOR a bedside cabinet, a finish which is proof against hot water, etc., is desirable. We do not think you can better Valspar for the purpose. As you have already stained the cabinet, the clear variety would suit nicely. Make sure the surface is glass smooth and apply the Valspar with a clean varnish brush, as many coats as considered necessary, allowing each coat to dry before applying the next. The work should be done in a moderately warm room, and dries very quickly.

* * *

Not Recommended

I HAVE an A.C. mains dropper of a type used in radio sets, and would like to use this to give me the supply of 12 volts for running a small model electric motor. Could you give me details of any other accessories needed, and also the way in which to carry out this job? At the present moment, the model is running off two 6-volt batteries, of a type used in hand lamps. (D.D.—Kidderminster).

THOUGH a mains dropper resistor may be used for the purpose you mention, it is not recommended. The motor will have to be connected directly to the mains, where one lead is concerned. Should a fault arise in the motor wiring, the full mains voltage would be present at the motor terminals. These facts make such an arrangement dangerous, and it should only be employed if the motor is used in circumstances where it may be enclosed, with all connections. A transformer is recommended for A.C. mains. It should have separate primary and secondary windings, and the secondary will then be isolated from the mains, so that the motor and motor connections are safe to touch. The transformer core and frame, and one secondary tag should be wired to Earth on the usual 3-pin mains plug. A transformer of this kind would cost about 15/-. It should be noted that some motors (those having a permanent field magnet) will not operate from A.C. It is then necessary to use a rectifier in addition to the transformer.

* * *

Making an Undercoat

I HAVE bought 1lb. of white lead powder, and wish to make it up into an undercoat. Please instruct as to the method. (F.W.—Portsmouth).

YOU should work the white lead to a stiff paste with linseed oil, then thin down to working consistency with equal parts of turps and gold-size. As little driers as possible should be added to this, about one-sixth of an ounce of paste driers to each pound of made paint will be ample.

* * *

Waterproof Paint

I WANT to build a dinghy with sides of hardboard; can you tell me the best paint to waterproof same? (C.C.—Poole).

THE makers of hardboard recommend varnishing boats built of that material. Use a marine quality varnish, such as 'Cerrux' or 'Spinnaker', and give the surface three coats. If you prefer paint, use a good quality household or marine paint, using the correct undercoating, followed by two coats of top coating, with the middle coat rubbed down before the other is applied.

● **Continued from page 242**

Photograph Stands

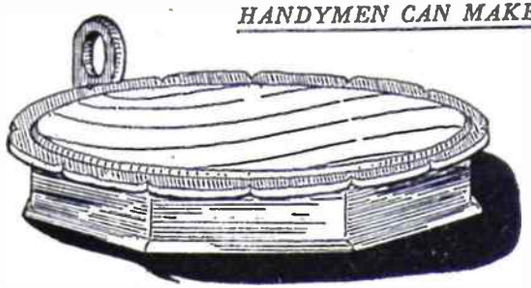
A much better result will be obtained if the pieces are polished before assembly. Clean up with fine glasspaper, and apply a coat of french polish with a brush. The polish must not be allowed to go on the joints, as this would prevent the glue from penetrating properly. A lighter effect may be obtained with bleached french polish.

When this coat is dry, rub lightly with a piece of flour-grade glasspaper before putting on a second coat, and repeat this operation until three or four coats have been applied. Each of these coats of polish should be as thin as possible: the brush should be rubbed almost dry on the side of the container before being used.

If you prefer a high polish, this operation may be followed by further coats applied with a rubber. A piece of cotton-wool is soaked in the polish, squeezed to remove the surplus, and put inside a piece of non-fluffy material. A spot of linseed oil on the rubber will prevent it from sticking.

The stand is glued, and put in the vice as shown in Fig. 4 until the glue is dry. As soon as the vice has been tightened, sight along the two uprights so that any twist may be corrected before the glue is chilled. A twisted stand will prevent the glass from going right to the bottom of the grooves.

You will find that the dry glue will easily flake off the polished surface. The last job is to remove the projecting ends of the tenons with a plane.



A Cake-Board with a Difference

By W. J. Ellson

THE common plate, with its raised rim, is not the ideal article on which to cut a cake, especially a soft one, inclined to crumble. The cake-board illustrated, provides a flat foundation for the cake to rest upon, and renders the job of cutting it into slices an easy one. As the board can be rotated by the fingers, it is not necessary to keep turning the cake itself to find a fresh portion to cut, it comes to you. Nicely finished, the article would make an attractive table feature as well.

Making the Baseboard

Construction includes a baseboard, on which the cake-board can be rotated. For the baseboard, on a stout piece of wood not less than ¾in. thick and free from knots, strike the circle shown in Fig. 1. Step the radius round the circle, which will divide it into six equal parts from which the hexagon (D) can be pencilled in. Cut this out, and in the centre, indicated by the compass point mark, bore a ¾in. hole. Turn the base over, and where shown by the dotted lines (E), saw and chisel out a groove ¾in. deep and wide and 1in. long, for the handle to subsequently fit in.

Clean the board up with glasspaper, especially the edges, lay it on a piece of ¾in. plywood or solid wood (the latter would be better) and pencil the hexagon shape on to it. Draw a pencil line ¾in. outside each face of the hexagon to enlarge it, and then cut it out. This is glued and nailed under the baseboard, but before doing so it will be necessary to cut out and fit in the handle for carrying the cake-board about.

The handle is shown at Fig. 2. It's shape can be easily drawn direct to the wood, which should be a piece of ¾in. hardwood. The finger hole is 1in. diameter, and a portion of the handle at the end, 1in. long, is reduced to ¾in. thick to fit the groove already cut in the baseboard for its reception. Glasspaper this part up, and be careful to smooth away all sharp edges at the finger hole to provide a comfortable grip. Glue the handle in its groove, and fix securely with a couple of well-countersunk screws, as in the diagram. Now glue the base to its plywood underpiece, and lay under pressure until the glue is set hard. Then the edges of the underpiece should be neatly filed quarter round, and well glasspapered.

For the rotating cake-board, strike circle (A) Fig. 3 on a piece of ¾in. ply-

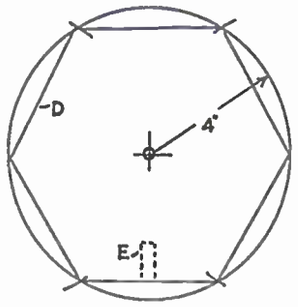


Fig. 1

wood and divide into twelve equal portions. You can do this easily enough by stepping the radius round it, to divide it into six parts, and then bisecting each part. Readers owning a 60-30 degree set square can set out the division with that, as they doubtless know well. At each point saw out a notch ¾in. deep. These notches enable the fingers to grip the board easier when rotation is desired.

On a similar piece of plywood strike the circle (B) and saw out. File the edge to a quarter-round shape. Glue this to the larger disc in the exact centre, and lay under a weight for the glue to harden. Then, at the middle, already marked by the point of the compass, bore a ¾in. hole through the two discs, and glue therein a 1¾in. piece of ¾in. round wood rod. Let this extend below the discs as at (C), a side view of the rotating cake-board.

Lay this board on the base part, with the pin in the hole, and give it a twist with the fingers. If it is inclined to work stiffly, glasspaper the hole well, also the pin, but not so much. A free movement is very desirable and the glasspaper should effect this, but don't overdo the job, and make the cake-board loose on its base. A final glasspapering of the whole, using the finest grade, and then the completed job can be stained, or enamelled, as preferred.

The best and most effective method would be to paint with an undercoat (two applications) followed by a light rub over with a piece of worn glasspaper, grade O. On this ground a coat of coloured quick-drying lacquer could be given, or an application of aluminium

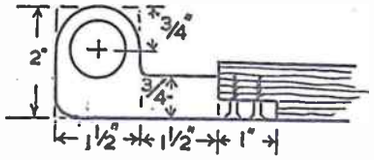


Fig. 2

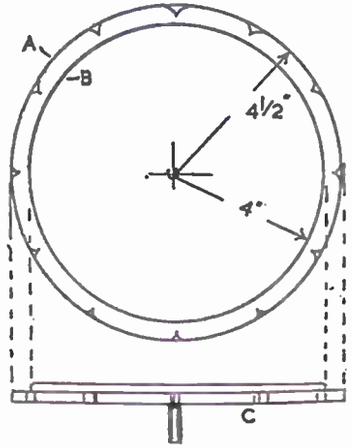
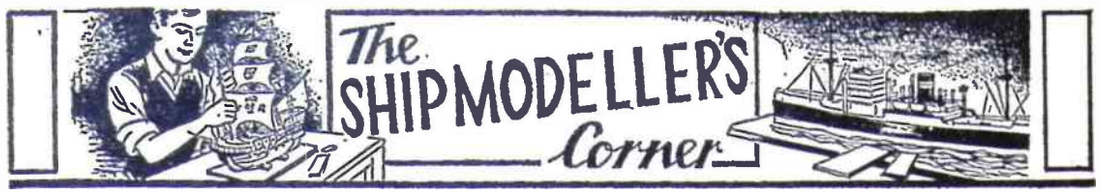


Fig. 3

paint. Treat all parts, except the raised part of the board on which the cake will rest. This should be left in the white or just varnished.

A two-colour effect would look attractive, and those with artistic tastes might like to colour the edges of the cake-board and underpiece of the baseboard, to contrast or tone with the remainder. Another hint would be to treat the edges mentioned with gold paint. This would look very attractive if the remainder were lacquered a brilliant red or green.



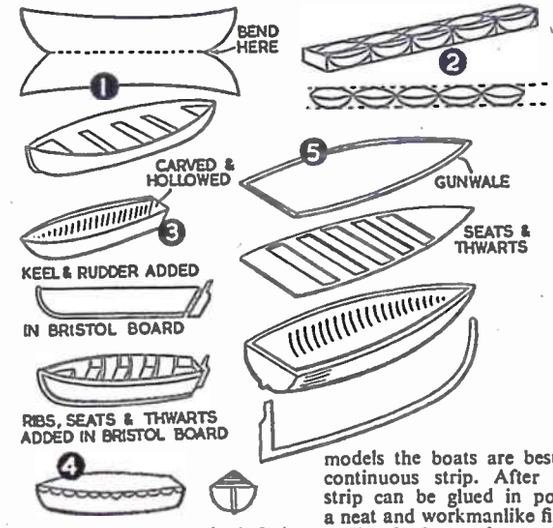
Making Ships' Boats

By 'Whipstaff'

IN the making of ship models there is always the job of making realistic ships' boats, a task which varies in difficulty and interest according to the period, type of boat, and the scale to which we are working.

Model ships' boats add to the effect and realistic appearance of the models. They range from the simple little block model to the fully detailed scale model. In this article we will deal with the simpler methods of making tiny boats.

The first simple method is illustrated in Fig. 1, and is suitable when a number



of small open boats are required. It is only recommended, where the model-maker is doubtful about being able to carve and hollow them from the solid, and is included only to enable the beginner to make a model of a small open boat that will give an in-scale appearance.

On a sheet of Bristol board sketch out a blank, as in the sketch, to give the required shape for your particular type of small boat. Bend down the centre and glue the edges together. Strengthen the bow and stern with small strips of paper and add a keel and rudder of Bristol board. The transom, seats and thwarts are also of Bristol board and, if desired, oars can be made of the same material or carved from matchsticks. Paint your boat in the required colour, having first given a coating of shellac to toughen it.

The next type of ships' boat is for use with waterline models of liners, etc. In these we have a line of ships' lifeboats along the upper deck. If the scale is large enough they can be carved individually, but usually the scale is 50ft. or 100ft. to the inch, and for such models the boats are best carved in a continuous strip. After painting, the strip can be glued in position, giving a neat and workmanlike finish.

Fig. 2 shows the method. Take a strip of wood of a size to suit the cross-section of your little boats, and mark out the section to take each boat. Next mark the deck shapes and profile shapes and cut away the waste wood between each boat, finally filing to the finished shapes and leaving the boats in one continuous strip, each connected to the others at bow and stern by a thin particle of wood. In small-scale work this will give the right effect, for if you look at a photograph of a similar ship to your model, you will see that, due to the photograph's reduction, the ships' boats appear to actually touch one another.

Here is a tip for waterline and miniature work. Obtain a photograph of the ship you are modelling, and as near the size of your finished model as possible. If you show only the detail that can be seen clearly in the photograph, you will obtain a true-scale appearance in the model. The art of small model-making is knowing what to leave out and the above tip will help you to decide what detail to include and what to leave out.

For larger scale work, we can make our ships' boats in two ways, the first being the carved boat. For this, take a block of wood of the size overall of your boat and mark the deck plan and profile plan. Carve the outside first to its finished shape and smooth off nicely. Next proceed to carve out the interior by using small carving tools. On small models, with practice, you can carve the hull to the thickness of paper.

For these small models the ribs, thwarts, seats, etc., can be added in Bristol board or thin veneer. See Fig. 3. On larger models, the ribs can be made of slivers of bamboo or very thin veneer, and again, when painted, you will have a realistic looking model.

For those who prefer to show the boat with its canvas cover, the boat needs only carving in the solid block. The cover can be added by cutting to shape a piece of ordinary sticking-plaster. This is simply stuck in position and then painted black. Next, the hull is painted white and fastenings added with a fine mapping pen and indian ink (Fig. 4).

The next method (Fig. 5) is very accurate for model ships' boats from about ¾in. in length upwards to 3ins. The method is the well-known bread and butter method. In the sketch is shown an exploded view of the model boat. The thickness of each part will depend upon scale. For small models the seats and thwarts can be cut from Bristol board; in larger models, use thin wood.

Cut out the separate shapes and hollow out the lower part of the hull, afterwards gluing the parts together to make the complete boat. For adding rowlocks, etc., on the small models entomological pins are excellent and easy to fashion to shape.

For all the constructional methods mentioned home-made tools, such as have been described in previous articles can be used, and also the excellent range of X-Acto knives and gouges.

The above methods are only a few I have tried and found practical, and I hope they will help modellers to add to the finish of their many models.

THE FIRST OF TWO ARTICLES

How to Construct a Six-Inch Reflecting Telescope

THE reflecting telescope, as compared to the refracting, has one great point to recommend it. It can be made by an amateur at considerably less cost, which is comforting to those whose pocket money is somewhat limited. In place of the object glass of the former telescope—the expensive item—a home-ground concave mirror is employed, and the grinding and polishing of this important item is a work of novel interest. As it is the most important item of the whole assembly, it will be described first, but to give an understandable idea of the complete instrument, a section is drawn in Fig. 1 with the component parts named. This should be studied before commencement.

The Mirror

For the mirror, a cast glass blank can be purchased, but as this may be too steep for the pocket, two or three 6in. discs of thick plate glass, cemented together with Canada balsam, may well be substituted. Any good glass merchant could cut the discs. The total thickness must not be less than ¾in. One extra disc should be ordered, this is for the tool on which the mirror will be ground. Smooth the edges of the mirrors with a carborundum stone.

Fix the tool to a suitable bench with Durafix and smear the tool with No. 80 carborundum powder and water. Grip the mirror between the fingers and rub it to and fro over the tool, using a long stroke to hollow the centre, slightly turning the mirror with the fingers each time, and also walking slowly round the bench during the whole grinding operation. If a cotton reel is cemented to the mirror with the Durofix, it will be helpful in gripping it. Try to keep the strokes level and even the whole time.

After two hours or so of this rough grinding, a test should be made to see what progress has been made towards the focal length, which should be about 48ins. Swill the mirror with water, and

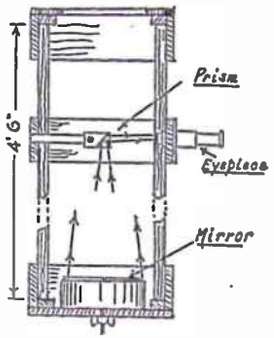


Fig. 1

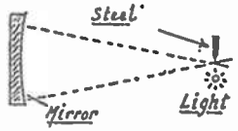


Fig. 3

stand it on edge. To keep it in that position while testing, a makeshift stand as shown in Fig. 2 will be helpful. Now swing a light (an electric torch would do) in front of the mirror. If within the focus the light will move in the mirror in the same direction as the torch; if without the focus, the reflected light will move in the opposite direction. By moving the light towards or away from, the mirror, the approximate focus can be estimated.

Fine Grinding

Continue the grinding, as may be necessary, and be sure to replenish the carborundum powder and water from time to time. When under test the focus is but a few inches longer than that desired, fine grinding can be commenced. The carborundum powder for this is No. 200, and it should be washed and graded beforehand. Provide a basin of water, and into this sprinkle a quantity of the powder. Let it stand for, say, 15 minutes, then decant into another vessel and bottle the sediment left. Call this No. 1. Let the decanted remainder, after a stir up, stand for another 30 minutes, then decant that and bottle the sediment. Label this No. 2. Repeat the operation, for 45 minutes this time, and bottle. This is No. 3, the decanted remainder being labelled No. 4.

Fig. 2

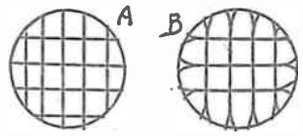


Fig. 4

Now fine-grind the mirror with each of these in turn, for about ½ hour for the first three, and 1 hour for No. 4 with about three replenishments of the powder and water to each period. Use a short stroke mostly for Nos. 1, 2 and 3, and a long stroke predominately for No. 4. During these operations take great care when changing from one grade of powder to the next, to remove all traces of the old powder each time. Now test both for focus and even grinding.

Bore a hole with a darning needle through a piece of tinfoil, wrap this round the top of an electric torch, and fix the torch to a block of wood for a stand, so that it can be moved at will. Swill the mirror with water, and place on its stand. Move the light to and fro until the focus is found, as before. Get a strip of steel, and fix this upright in a block of wood. Place it opposite the light, then move the light a shade sideways to the left of the mirror axis. Move the stee across laterally to cut the beam from the mirror. If it cuts inside the focus the shadow of the steel in the mirror will move in the same direction, if it cuts outside the focus, it will move in the opposite direction, but when it cuts exactly at the focus as in Fig. 3 no shadow will be seen. Measure this distance to ascertain the focal length of the mirror. If the mirror is not spherical, shadows will be seen, some crossing in one direction and some in another. All being satisfactory so far, the mirror can be polished.

Rouge and Water Paste

Wash the tool and dry it. Smear it with turps, and then pour melted pitch (with a little beeswax added) over it. Paint the mirror with a paste of rouge and water, and press on the tool. Lift mirror and cut vertical and horizontal lines on the pitch, as at (A) in Fig. 4, pressing the mirror on the pitch between cutting each line. A good tool to use for cutting the lines is a wheel glass cutter. Note that no line must cross the centre of the tool, and the centre of the tool must not appear in the middle of any square formed by the cuts. Ensure a close contact between mirror and tool before polishing.

Wash the rouge with water to remove any rough grains, then polish on the pitch tool with water added, as for grinding. A good polish may take an hour or even longer. Now test for figure. Cut a disc of cardboard the same size as the mirror, cut out the centre and place over it. Find focus as before with the torch, and move steel until it cuts the focus and the mirror darkens evenly. Without altering the relative positions of torch and mirror, remove the cardboard ring from the mirror and replace with the smaller disc cut out from it. Stick this in the centre of the mirror. This should alter the focus, making it necessary to move the steel back a little before it can cut the focus again. If it is not necessary to move the steel back to cut the focus the mirror must be corrected by repolishing on the pitch tool, the cuts in the latter being widened out at their ends, as at (B) Fig. 4.

For a correct figure it should be necessary to move the steel back a distance equal to the diameter of the mirror, multiplied by itself, and divided by the distance from the mirror to the focus, before it darkens. If it has to be moved back more than this it will also have to be corrected on the tool, the latter having the pitch chipped away from its centre beforehand. The mirror then is ready to be silvered. This is a job which can be done professionally, if

The second article will be published in next week's issue

there is a wish to avoid the trouble, but the process is an interesting one and worth trying out, it also saves expense, as professional silvering is not cheap. The following process is not too difficult for an amateur to attempt, and it is more satisfactory in many ways than some other processes which seem simpler but are not really so good.

The chemicals required are nitrate of silver; caustic potash pure by alcohol; chemically pure glucose; and pure liquid ammonia. Get three small glasses, which must be chemically cleansed with nitric acid. Dissolve 180 grains of nitrate of silver in 3 ounces of distilled water in one glass. When all the crystals have been taken up, ½ ounce of the solution should be set aside in a bottle, chemically clean like everything else used in the process. Dissolve 150 grains of potash in 2½ ounces distilled water in the second glass. In the third glass dissolve 75 grains of glucose in 2½ ounces of distilled water. Don't use common tap water on any account.

Care Needed

A little of the ammonia must now be dropped into the nitrate of silver solution until it turns a brown colour. Add more ammonia, drop by drop, until the solution regains clearness, then a little of the silvering solution (set aside in a bottle) should be added until the whole becomes muddy, and of a yellow colour when held up to the light. Mind none of the spare silver drops on the fingers, as it will take the skin off them. Now add the potash, which will turn the solution a blackish colour. Add more ammonia, drop by drop, stirring the solution until the black precipitate begins to clear up and settles, when the solution can be decanted.

More spare silver solution must now be added, drop by drop, stirring meanwhile, until a slight precipitate appears, when the dropping must cease at once. A dish for the silvering operation is now set upon the table, quite level, and the silvering solution poured into it. Add distilled water to a suitable height. Pour in the glucose, and stir the whole up.

Immerse the surface of the mirror in the fluid, lowering it slantwise to avoid air bubbles, and allow to remain in for from 10 to 20 minutes, by which time it should be completely silvered. When the film on the mirror is dry, it must be polished by gently rubbing with a pad of cotton wool, covered with fine washleather. After 15 minutes the mirror will be found to have a bright black polish, and will be finished. (W.J.E.)

● **Continued from page 244**

Radio Chassis Construction

The simple chassis dealt with is suitable for small sets, but for bigger jobs, strengthening devices must be adopted. An easy way is seen in Fig. 4. Thick metal strip is bent to shape and riveted to each side of the chassis. This holds them firmer, and can be repeated at the other end, and, if necessary, half-way along.

The top end of the chassis can be strengthened by holding the top on a block of wood and hammering down the edge to form a little lip. See Fig. 4.

Best of all, is to make a full end piece, with flanges at top and sides, and rivet this to the chassis. This also helps to keep out dust. The flanges are formed in the same way as previously described. Form the long flanges first, then the shorter ones. The block of wood used as the inner clamping board should be thicker than the depth of the flange. A ¼in. flange should be quite sufficient. Fig. 5a shows this end piece ready for attachment.

Where the chassis is exceptionally big, it may be strengthened further by another piece at the middle cross section. This must allow free passage for wiring, and two shapes are shown which could be used (Fig. 5b). A fretsaw could cut out the second shape.

For securing the chassis to the bottom of the cabinet, a bracket sawn from a piece of angle-bar is useful. Four of these will do. Otherwise, a flange all along the bottom of the side is the ideal thing. (See Fig. 6.)

A chassis may be cut and formed from one complete piece of sheeting, but it will need some care. A drawing in the flat is shown (Fig. 7). The long side pieces are first bent down, then the small flanges, and lastly the end pieces to which the flanges are attached. The chassis is then riveted.

The cut-outs in the chassis for valveholders and so on, can be accomplished in three ways. The best method is to use proper chassis cutters such as the Osmor or Maxi-Q, but these are expensive. Another way is to drill a series of holes with a hand-drill, and then file out. However, next to the proper chassis cutter, there is nothing to beat the fretsaw. A really good job is possible with a fretsaw, finishing off with a half-round file.

Use Your Fretsaw and

MAKE A NOVEL WINDVANE

THE novel squirrel windvane illustrated here makes a good decorative feature for the garden, and is sure to be admired by your friends. For the week-end angler it is particularly helpful, as the wind direction is an important consideration when deciding where to fish.

Full-size patterns are on page 255

The pattern of the squirrel can be used as it is, making a small vane, or it can be enlarged by means of the squares, to almost any size. Transfer the shape to aluminium sheet and cut it out with a fretsaw. You should use a metal-cutting blade for this. The metal will cut quite as easily as wood, especially if you keep the saw slightly oiled by brushing oil along the lines of the pattern.

The whole arrow can be included in the squirrel cut out, or can be built up separately and the letters cut from the waste material. The letters are not shown on the pattern page, but can easily be drawn out by copying block letters from a book.

The method of construction is quite straightforward. The arrow is let into a round metal rod by cutting down with a hacksaw. It can be fixed by means of a rivet. The rod is pointed at one end and a tin lid soldered halfway down. The latter is to keep the rain from running into the tube.

Lubricant for Rod

Insert a hard-wood plug into the tube and drop melted candle grease on top. This serves as a lubricant for the revolving rod. The alternative method is to insert a metal plug in place of hard-wood.

The letters are carried on two metal arms, one letter on each end. These arms are shaped to fit the tube and a backplate riveted to each arm.

The tube is now let into a stout post about 15ft. high. Remember to soak the base of the post in creosote before placing it in the ground.

Note that no measurements have been given in the diagrams, as it is left to the reader to suit the sizes to the diameter of tubing available. (M.p.)

EASY TO MAKE

A Small Rake for the Garden

THIS simple rake can easily be made from wood and a few nails. The head is made from a piece of wood 12¾ins. by 1¼ins. by 1in. Holes are drilled in this piece 1½ins. apart.

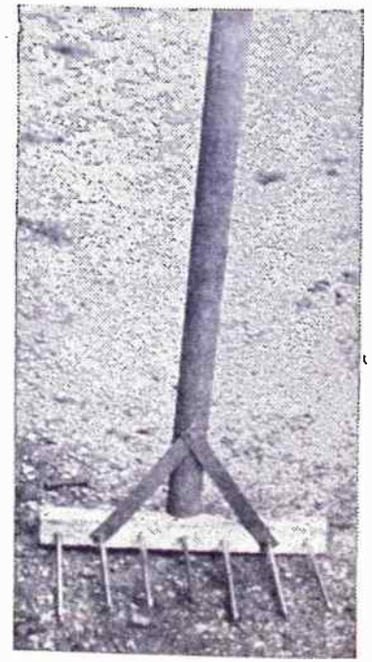
There is still time to enter Hobbies' Grand Fretwork Competition for which prizes valued at over £100 are being awarded. For free details, write to the Editor, 'Hobbies Weekly', Dereham, Norfolk.

These holes should be $\frac{1}{16}$in. less than the diameter of the nails to allow them to be tightly tapped in. Make a ¼in. deep cut, the width of the handle, in the centre of the head and drive a shorter nail in here.

The handle is made from an old brush handle cut to a suitable length. One end is levelled off to enable it to fit in the cut made in the head.

Fasten the handle to the head by two screw nails 1½ins. long. Added strength is given by the two strips of steel; pieces from the bands around packing cases are suitable. Holes large enough to fit over the nails are drilled at one end of each piece, smaller holes being drilled at the other ends to take a ¼in. screw nail. Each piece of steel is fitted over the second nail from each end, and the other ends of the piece of steel are screwed to the handle.

The rake is now complete and ready for use in the flower garden, or as part of a set of gardening tools for a boy. (D.L.)



A Useful Adjustable Support

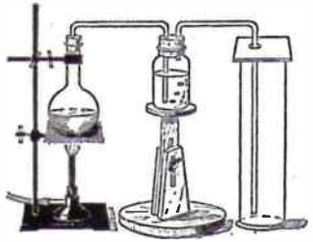


Fig. 1—The support in use

WHEN the general rig of apparatus is high above the bench, the problem often arises of how to connect up some essential part which is too broad for a clamp to grip or too heavy to hang from the rest of the apparatus.

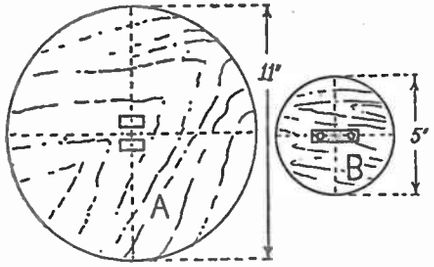


Fig. 2—Marking off the base and platform

In the case of a gas washing bottle, for instance, the problem could be solved by using long lengths of glass tubing. Yet as heights vary from experiment to experiment, it is clear that fresh lengths of tubing will have to be cut and bent almost every time. This is an expensive and time-wasting solution.

The alternative is to raise the wash bottle in some way. Adjustment for heights up to about 8ins. or so can be made by inserting wood blocks, but for greater heights blocks are too rickety and something more substantial is needed.

A Rigid Holder

The support illustrated in Fig. 1 provides a rigid holder for heights from 8½ins. up to 14ins.—ample margin for all needs likely to be met with in the home laboratory. Adjustment is easily and quickly made by loosening the wing-nut, raising or lowering the sliding column between the pillars and then tightening up the nut again.

The Base

Details of base and platform are given in Fig. 2. By marking a broken line across the discs at the widest point and a similar one at right angles, positioning of the slots in the base (A) and the screw holes in the platform (B) is simplified. The base is 1in. thick; its slots lie ½in. apart and are 1in. long by ½in. wide. The shaded rectangle in (B) indicates the position of the top edge of the sliding column. (B) is cut from ½in. wood. The screw holes can be countersunk and filled with plastic wood when varnish should be used, for these may cause sticking of pillars and column when the wing-nut is tightened. Aluminium paint is the best to use, for this gives a smooth non-tacky surface.

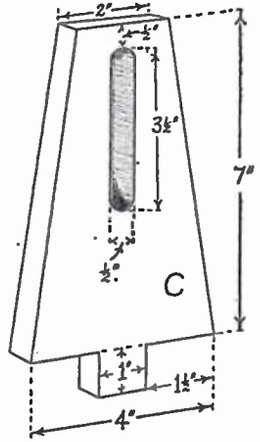


Fig. 3—The pillar (cut two)

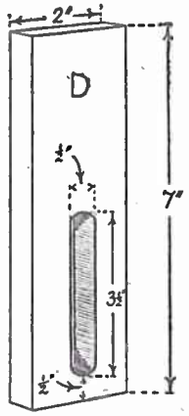


Fig. 4—The sliding column

(L.A.F.)

● **Continued from page 241**

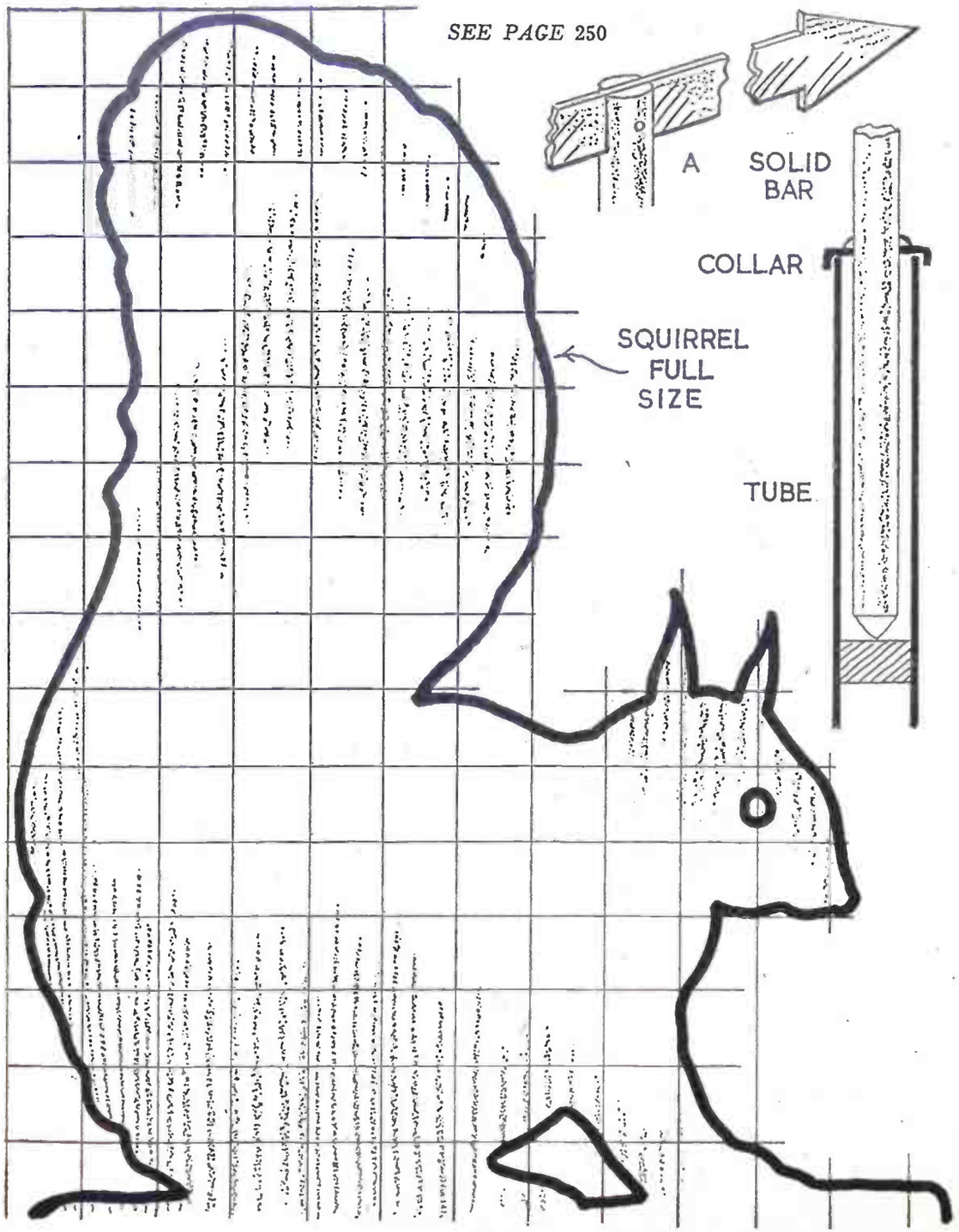
Toy Breakdown Lorry

of course, to turn freely, so that no glue should be used when fitting the handle. Instead, hammer the spindle of the handle to a flat section before driving it home through the side of the jib and into the roller. This will not only provide a firm fixing, but will ensure that when the handle is turned, the roller turns with it. The other end of the roller is secured by a small screw driven almost home.

Before further assembly, clean up the work and paint it. Good quality enamels should be used and a suggested colour is bright red, with a silver or white radiator grille lined in black. The 1½ins. diameter wheels should be black.

When all is dry, screw the crane into position on the lorry, running the screw in from the underside of the lorry as shown on the design sheet and leaving the screw sufficiently slack to allow the crane to be swivelled as required. Screw the wheels into position and add the cord to the crane, and the job is complete.

SEE PAGE 250



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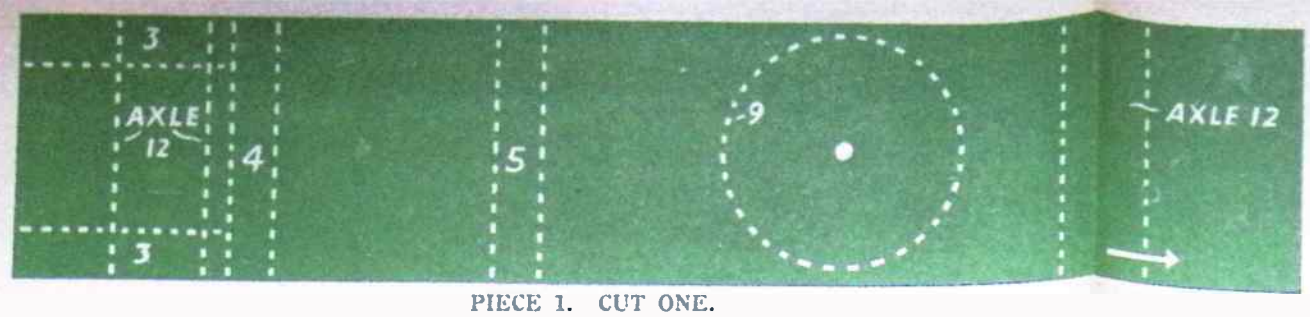
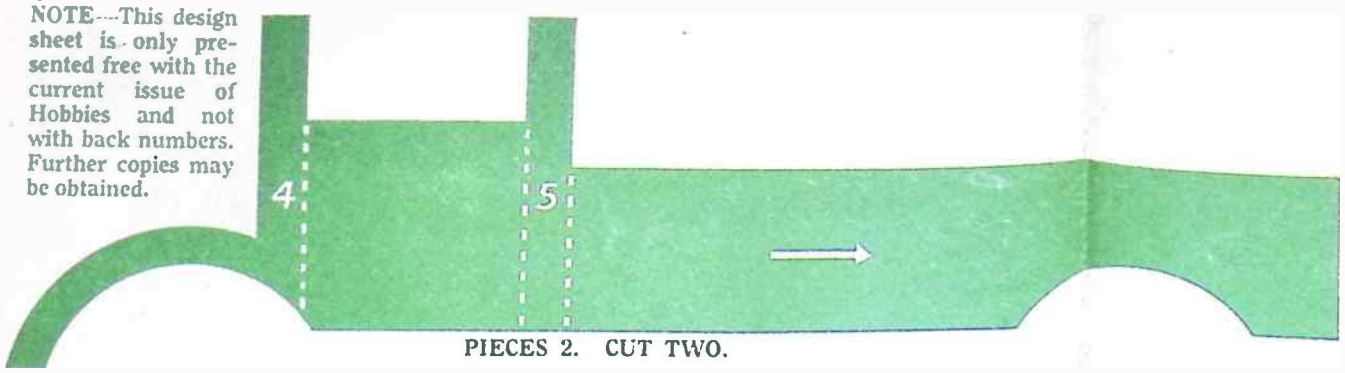


PIECE 1. CUT ONE.

NOTE---This design sheet is only presented free with the current issue of Hobbies and not with back numbers. Further copies may be obtained.



PIECES 2. CUT TWO.

Hobbies DESIGN

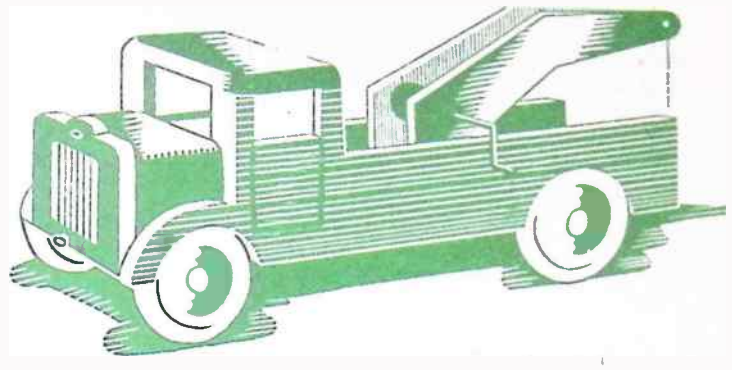
No. 3090 19-1-55

SUPPLEMENT TO HOBBIES No. 3090.

PULL-ALONG

BREAKDOWN LORRY

SIZE: LENGTH 7¾ins. HEIGHT 3½ins.



PANELS OF WOOD REQUIRED FOR THIS DESIGN

ONE 1/4

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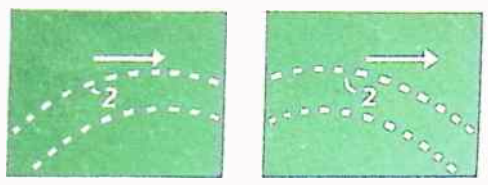
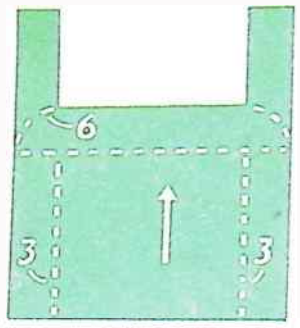
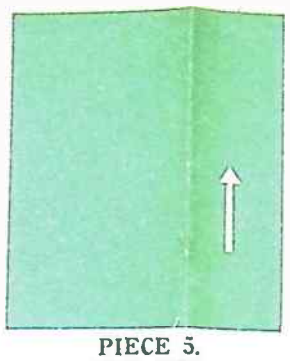
Price on application.



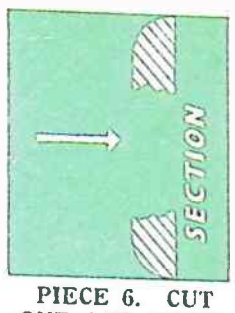
PIECES 3. CUT ONE OF EACH.



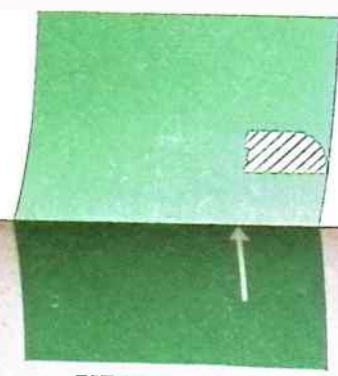
PIECE 4. CUT ONE.



PIECE 5. CUT ONE.

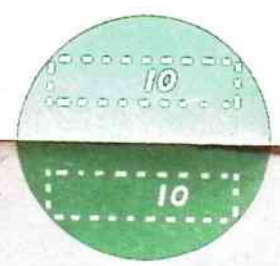


PIECE 6. CUT ONE AND SHAPE TO SECTION.

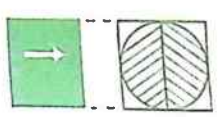


PIECE 7. CUT ONE AND SHAPE ALL SIDES TO SECTION.

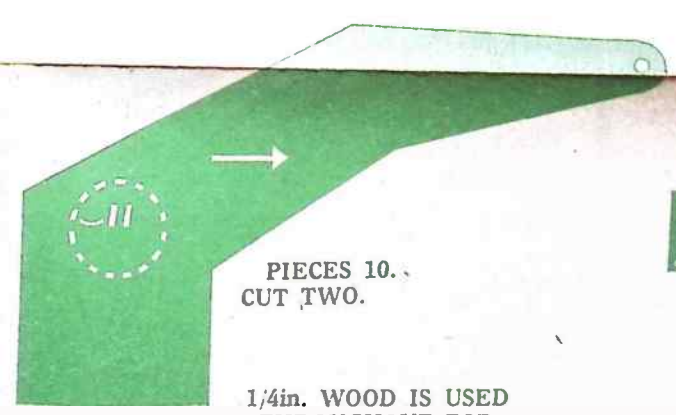
PIECE 8. CUT ONE.



PIECE 9. CUT ONE.



PIECES 11. CUT TWO. GLUE TOGETHER AND SHAPE TO SECTION.

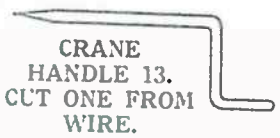


PIECES 10. CUT TWO.

THE ARROWS INDICATE THE DIRECTION OF GRAIN OF WOOD.

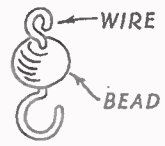
AXLES 12. CUT TWO FROM 1 2in. SQUARE STRIPWOOD.

1/4in. WOOD IS USED THROUGHOUT FOR THIS DESIGN.

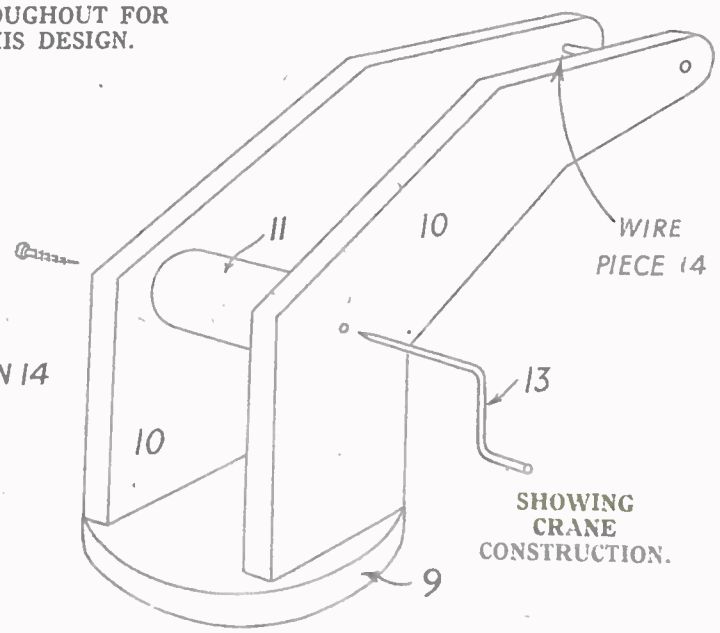


CRANE HANDLE 13. CUT ONE FROM WIRE.

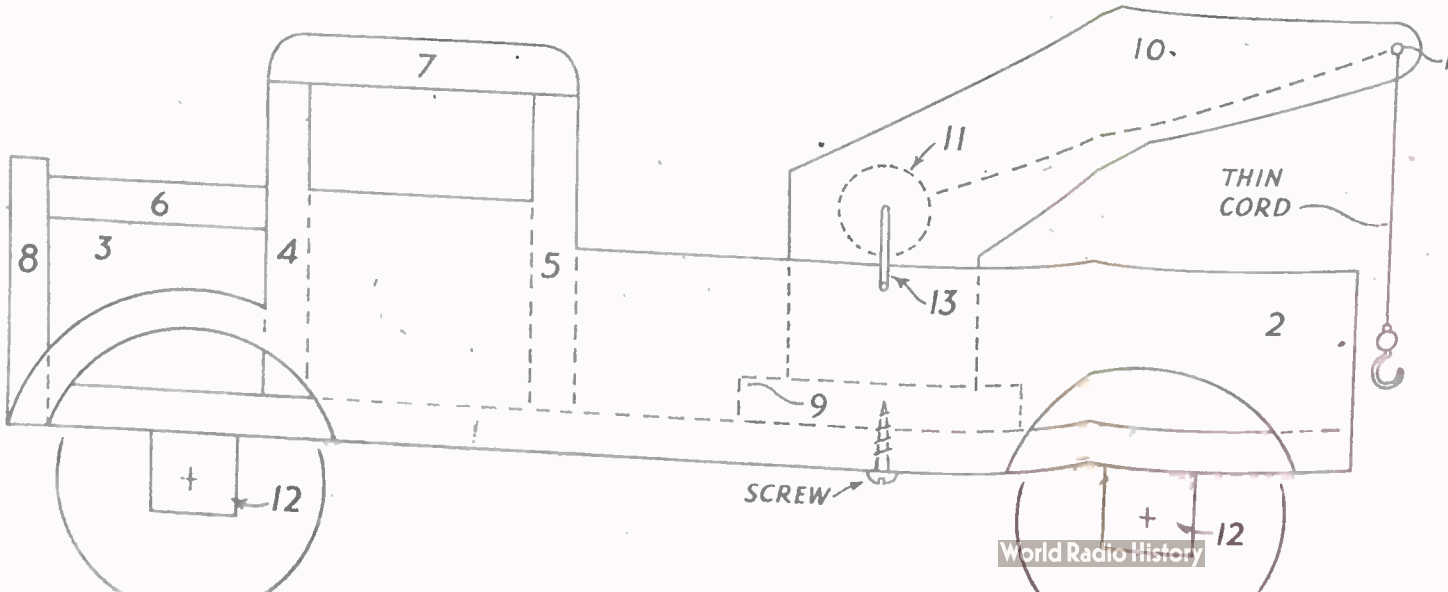
PIECE 14. CUT ONE FROM WIRE.



SHOWING CONSTRUCTION OF HOOK.



SHOWING CRANE CONSTRUCTION.



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