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Hobbies

2D.

November 1st, 1930.
No. 1828.

Published every Wednesday.

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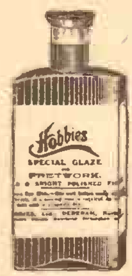

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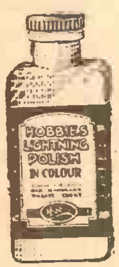

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One reason for this is the fact that Pelmanism brightens and braces the mind and not only increases its general all-round efficiency, but develops a sane and healthy Optimism and Self-Confidence which is an invaluable antidote to the gloom and pessimism too prevalent in many quarters at the present time.

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A Joiner writes : "It has changed me from a pessimist to an optimist." (D32413)

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A Clerk writes : "The Course has greatly improved my memory, my powers of concentration and, above all, my confidence in myself." (P32204)

A Shop Manager writes : "This Course has been a great benefit to me : to have a happier and brighter prospect is something to be thankful for indeed." (S32412)

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A Clerk writes : "Since I started the Course my self-confidence has gradually increased and now I can attend social gatherings, etc., and enjoy them, when formerly I used to keep away from them whenever possible." (K33181)

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A Corporal writes : "I take more interest in life generally. I have more confidence and am less self-conscious. I am happier, more alert, and, I believe, more sincere, having got rid of moods of melancholy and cynicism, which are common to many people who have resided in Iraq for any length of time." (C32585)

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Timidity, Shyness	Indecision
Forgetfulness	Weakness of Will
The Worry Habit	Pessimism
Unnecessary Fears	Procrastination
Indefiniteness	Boredom
Mind-Wandering	Morbid Thoughts

which interfere with the effective working power of the brain. and in their place it develops such qualities as :—

—Concentration	**—Organising Power**
—Optimism	**—Presence of Mind**
—Cheerfulness	**—Courage**
—Observation	**—Self-Confidence**
—Judgment	**—Self-Control**
—Initiative	**—Tact**
—Will Power	**—Reliability**
—Decision	**—Driving Force**
—Originality	**—Salesmanship**
—Resourcefulness	**—Business Acumen**

and a Reliable Memory.

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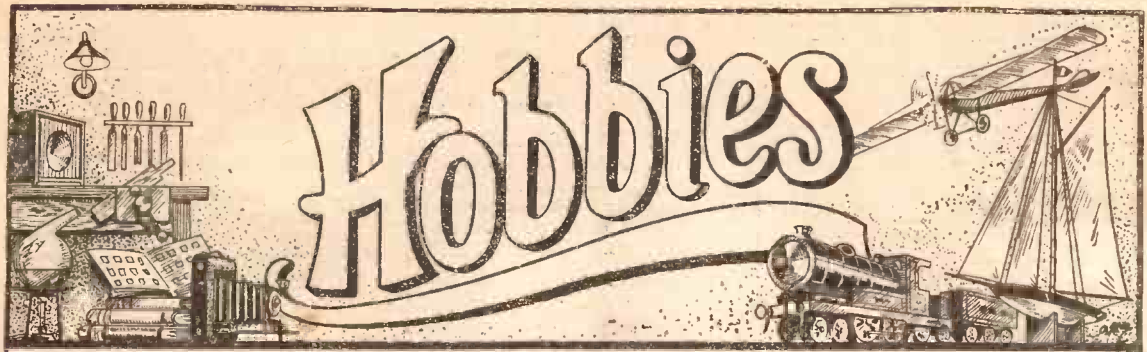
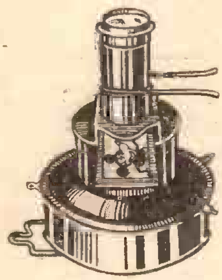


Vol. 71. No. 1,828. Published Every Wednesday. NOVEMBER 1st, 1930.

THIS WEEK'S CLEVER IDEAS.

An Electric Magic Lantern.

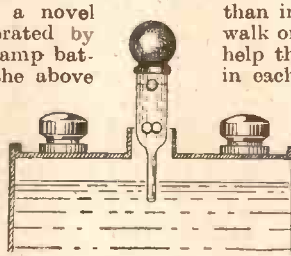
SMALL magic lanterns are usually illuminated by a lamp burning colza oil. This gives forth an acrid smoke, and, apart from unpleasantness for the operator, the interior of the lantern soon becomes coated with soot. The sketch here shows a novel magic lantern operated by means of a flash-lamp battery, and at once the above disadvantages are eliminated. The slides are similar to ordinary magic-lantern slides, and the battery supplied is sufficient for two evenings' entertainment. Focusing is carried out in the ordinary way.



An electric magic lantern.

A Battery Charge Indicator.

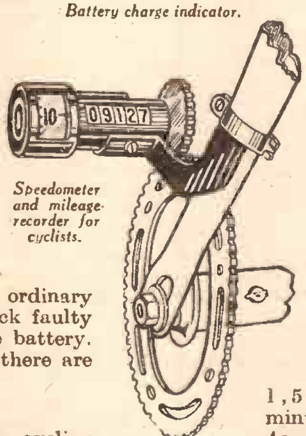
A NEW battery-charge indicator of the hydrometer type can be left permanently on high- and low-tension accumulators of the wet type during discharge, and shows at a glance the state of the charge by the manner in which the three balls of different specific gravities sink or float. These balls are always on view, thus obviating the mess which accompanies the use of an ordinary hydrometer. It is thus possible to check faulty charging, and so increase the life of the battery. It is easy to see, simple to read, and there are no troublesome scales.



Battery charge indicator.

A Speedometer for Cyclists.

OWNERS of what are known in the cycling world as "speed-irons"—to wit, light bicycles of the road-racing type—will appreciate the combined speedometer and mileage recorder illustrated on this page. The speed at which the cyclist travels is registered in a positive way on a revolving disc visible on the extreme left of the device, whilst the total miles travelled are recorded in the ordinary way on a second indicator. It is thus possible to check milestone distances against the speedometer and mileage-recording mechanism.



Speedometer and mileage-recorder for cyclists.

Walking on the Water.

THERE has recently been marketed in Germany some boats, not unlike hollow canoes or the floats of a seaplane, which are attached to the shoes in the same way as skis. Fins provided on the float permit them to move through the water more easily in one direction than in the opposite, so that the wearer is able to walk on the water with them. As an additional help the walker may carry a light bamboo pole in each hand with which to propel himself in shallow water.

Moulds for Lead Toys.

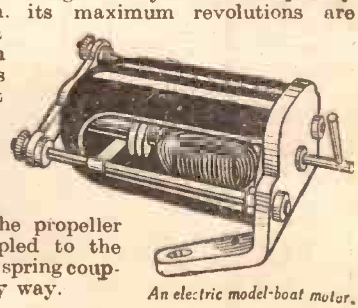
COWBOYS, Indians, animals, Zulus, model farmyard sets, etc., may be made at home from lead by means of simple casting moulds now on the market. Any scrap lead will do, and no experience is necessary in using the moulds.

A Pocket Cinematograph.

AN instructive and amusing pocket novelty enables you to view home cinematograph films without going to the expense of the orthodox projector. Costing only a few shillings, it enables the owner to run a cinematograph show for his own amusement without having to "black out" the room.

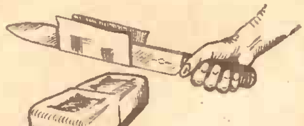
An Electric Model-Boat Motor.

A NATTY little electric motor for model-boats, illustrated below, is fitted with a reversible permanent magnet. The total motor weighs 8ozs., and although it only measures $2\frac{1}{2}$in. by $2\frac{3}{16}$in. its maximum revolutions are 1,500 a minute on 4 volts. Its current consumption is only half an ampere, and it is mounted on a special aluminium bracket for screwing into the boat. The propeller shaft may be coupled to the spindle by a flexible spring coupling in the ordinary way.



An electric model-boat motor.

NOTES AND NOTIONS from our READERS



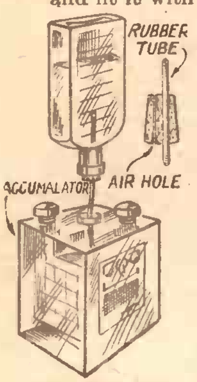
How to cut soap.

How to Cut Soap.

A BAR of soap can be cut with the best dinner-knife if the following precaution is taken. Fold a piece of paper and place it over the blade of the knife. The soap can then be cut, the paper afterwards destroyed, and yet the knife will not have been touched with the soap. It will be found that the knife does not cut the paper.

Distilled Water Container for Filling Accumulators.

GET an old glass chemists' bottle and fit it with a cork. In the cork bore a small air-hole and a larger one to take some rubber tubing. Fill the bottle with distilled water and replace the cork and rubber tubing. To use the apparatus, turn the bottle upside down and place the rubber tube into the vent of the accumulator. When not in use a steel clip can be affixed to the tubing.



A distilled water accumulator.

Sawing Soft Metals.

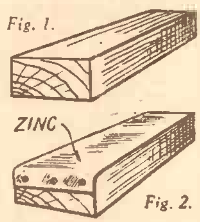
WHEN sawing soft metals with a hacksaw, use two blades instead of one, as you will find that the cutting is done much easier. One of the blades is inserted in the frame in the usual way, while the other blade is reversed so that cutting takes place on both the forward and backward strokes. The sliding movement of one of the blades will prevent the other blade from making too deep a cut. When cutting thin metal tubing it is a good plan to reverse the blades, so that they cut on the back stroke.

File the teeth smaller at the end. The cut may then be started easily.

THAT DODGE OF YOURS!
Why not Pass it on to us? We pay Five Shillings for every item published on this page. Mark your envelope "Notes and Notions."

Method for Sharpening Tools.

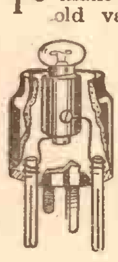
FOR the handyman who is not conveniently near a joiners' shop where he can use a grindstone, the use of an oilstone for sharpening tools, such as plane blades, chisels, etc., often is a slow task. Here is a simple remedy. Procure a block of wood as shown in Fig. 1 and also a strip of zinc 2in. wide by 11in. long. Place the zinc along the top of the wood and bend over the overlap at each end: the block should then appear as seen in Fig. 2. Fasten the zinc with three nails at each end. Place a small quantity of olive oil on the zinc, also some fine carborundum powder (obtainable at any garage), and the "stone" is ready for use. It is used the same way as an oilstone, but cuts very much quicker. A few slips of oilstone are always handy, and if various grades of coarseness are kept by you the touching up of tools is facilitated.



Simple method of sharpening tools.

A Useful Wireless Tester.

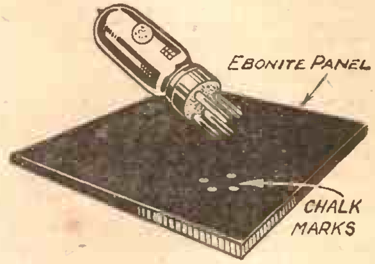
TO make this set tester, take an old valve, remove the bulb and clean out the base, cutting right down the anode and grid wires. This leaves the two filament wires, and these are soldered to an ordinary flashlamp batter holder, price 1½d. This holder is pushed right down inside the base, and paraffin wax (candle grease) poured around the holder.



Useful wireless circuit tester.

Drilling a Panel for Valve Holders.

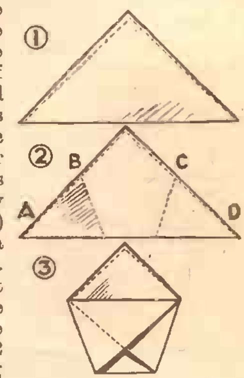
SOMETIMES when it is found necessary to drill a base for a valve holder, or a valve itself, in an ebonite panel, the following method might be adopted. Mark the prongs of the valve, or holder, with chalk and press the holder on to the panel. The marks should be removed when the drilling has been finished.



Drilling a panel for valve holders.

A Cup for Mixing Liquids.

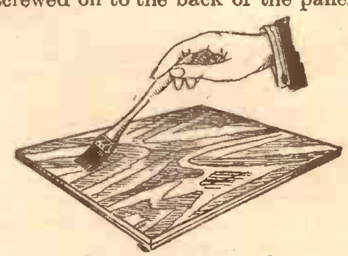
ANYONE wishing to mix liquids, such as paints and varnish, will find the following idea quite waterproof. A temporary cup can be made out of a piece of square grease-proof paper and folded as such. The piece of paper folded across diagonally (see Fig. 1) will form a triangle. Then next fold along the dotted line seen in Fig. 2 by bringing the corner A to C and corner D to B. The paper will then look like Fig. 3 when this is done, and you complete the cup by folding down on either side.



A cup for mixing liquids.

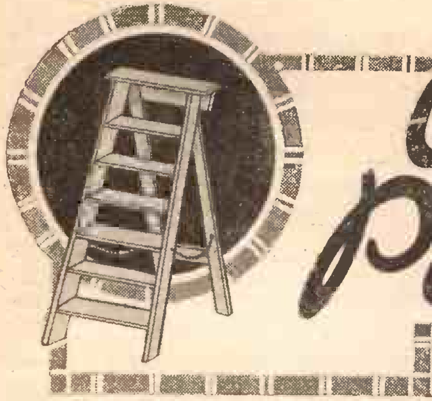
An Artistic Wireless Panel.

THIS wireless panel is made of oak case 3-ply wood, which must first be baked in an oven to remove all traces of moisture. After all the holes have been drilled in it, sandpaper will remove all traces of finger marks. Then transparent varnish is applied with a brush and the panel is left to dry. To correct any warp, ½-in. square strips are screwed on to the back of the panel.



Making a wooden wireless panel.

It is always handy to have—



A Useful Pair of Steps

Easily and quickly made at Little Cost

The Front and Rails.

COMMENCE by cutting out the various pieces from 7in. by 1in. red deal flooring board. All the pieces should be 3½in. wide, so that by cutting each board straight down the middle each will give two pieces from which the several lengths can be cut. A useful size may be made from two pieces 6ft. long as uprights or stiles for taking the steps, two pieces about 5ft. 6in. long as stiles for the back support, six pieces for steps, bottom 1ft. 6in. long, top 1ft. 3in. long, the four pieces to come between being of corresponding lengths; that is the second step will be a shade shorter than the bottom step, and so on upwards, to allow for the narrowing of the stiles. It will be better to have the stiles parallel, in which case all the steps will be of the same length. Now cut out two pieces 1ft. long as rails for the back support, then one piece 1ft. 6in. long and 8in. wide for the top, and another piece 1ft. 4in. long and 6in. wide for screwing or nailing up under the top and to which the back support will be hinged.

Plane all the pieces true on the flat sides and have the edges straight and square, also the ends of the steps square with the face sides, and tapering slightly from the bottom to allow for the narrowing of the stiles. Mark off the positions for the grooves on the stiles for taking the ends of the steps (Fig. 1), having these of equal distance apart, giving enough space at the bottom and the top for the step-up from the ground and the last before the top, respectively, making sure that the better side shall be outwards when the steps are completed. Also for the other pieces have the better side upwards or outwards as the case may be. After one stile has been so marked place the square on the face edge and see that this extends across the marked side, then cut across at the markings. Now put the other stile against this and mark off the positions with the cutting-knife, then cut across as before. Each set of two markings should be spaced apart the thickness of the step which fits into the grooves.

Fig. 1.

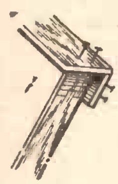


Fig. 2.

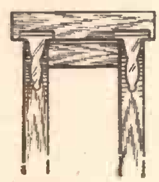


Fig. 4.

Fig. 3.

Fig. 1.—How to cut the stiles.
Fig. 2.—Fixing the top step.
Fig. 3.—Nailing the stiles and steps together.
Fig. 4.—How the hinges are fixed.

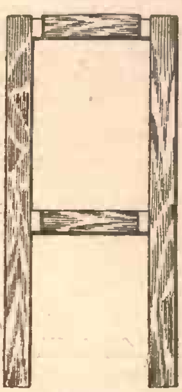


Fig. 5.—How the back is fixed together.

Now set the single-tooth gauge at ½in. and mark on each edge of the stiles from the marked side between the sets of marks just done, then cut across at this side at the markings to the ½in. depth, the lower cut for each groove being slightly deeper to allow for the slight tapering of the stiles. Now, with the mallet, and chisel of the same width as the grooves, carefully knock out the area between the cuts, not forgetting to have the bottom of each groove slightly deeper than the top. Clean up the pieces with the smoothing-plane, then nail the stiles and steps together as shown in Fig. 3, using 3in. oval wire nails, and driving the heads in a little beyond the surfaces with a punch. Now cut off the top of each stile at that bevel, as when the steps are in position the top will be horizontal; then run the smoothing-plane over the tops, next nail on the top step as shown in Fig. 2. then the piece at the back for taking the hinges (see Fig. 2), having the top edge bevelled to fit tightly up against the top step. In Fig. 4 is seen how the hinges are fastened to this piece.

The Back.

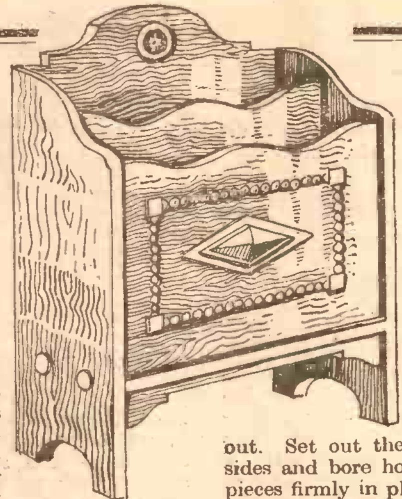
This is made by screwing the rails securely at right-angles with the stiles. For hinging, these rails will be inwards so that the hinges shall rest firmly on the surface of the stiles. The hinges referred to are T type, although butt hinges can be used, and will be screwed on to the rails at, say, 2in. in from each end. If the support is made as shown in Fig. 4 the hinges will have to be kept in clear of the ends of the stiles, as the screws would not hold in the end grain of them. The T-hinges are recommended, however, as these impart stronger support from being screwed to the stiles.

Now bore holes of the same size as small rope at the middle of each stile halfway up, the holes in the stiles for the steps being just under the third step up. Tie strong knots at one end of each piece of rope, pass the other end through the front or step stile from the inside, then through the support stiles so that the knot will be at the back of the steps and out of sight.

Fig. 6.—Alternative construction of the back.

A NEWSPAPER STAND

IN OAK. **1ft. 8in. HIGH.**



THE newspaper stand here shown, combines elementary cabinet work with simple fret-cutting. It could be made up from mahogany or American white-wood and finished with polish, or it could be in oak and finished with Jacobean stain and then brush-glazed. In making the stand we prepare the sides from ½in.-thick material, 1ft. 5in. long by 7in. wide. Square up two pieces to these dimensions. On one describe a semi-circle of 2½in. as shown in the side view at Fig. 1, and draw the gentle curve of the top. Set out the curve at the foot by striking an arc from the centre as shown, and then complete the cutting with a fretsaw, afterwards finishing the edges with sandpaper. Lay this on the other piece and mark round the shaped portion with a sharp pencil so that both pieces will be exact in shape when cut out. Place the two pieces together again and mark 5in. from the foot. On this line bore two holes 3in. apart for the countersunk screws which will secure the floor to the ends.

The Sides and Floor.

The floor is ½in. thick and measures 15in. long by 6⅝in. wide. Square up this piece and lay it on one of the sides, both front edges being flush as shown in Fig. 3. Now mark off the positions of the screw holes already made in the sides on the ends of the floor piece and bore a hole with the bradawl. Erect the three pieces and insert the screws, the heads of which will afterwards be covered with small turned buttons glued over.

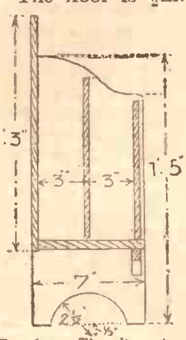


Fig. 1. The dimensions and shape of the side, with positions of the inside parts.

The back measures 15in. square by ½in. thick and is shaped nicely with the fretsaw on its top edge as shown in the front view of Fig. 2. To obtain the curves, set out ½in. squares as shown and proceed to line in, following the squares and shape shown. Cut round with the fretsaw, and glue and screw the back in place. The screws running through the sides must be countersunk and afterwards filled in with coloured stopping.

The Front.

A piece of ½in. wood 15in. long and 9in. wide will be required for the front, and having squared up the piece, set out the waved top as shown in Fig. 2. Cut this out with the fretsaw and clean up with sandpaper. At this juncture the centre partition may be taken in hand. This measures 15in. long by 10½in. wide. Square this up with the front, and then, laying this latter on the partition, draw round the waved portion so that both are exact after cutting out. Set out the positions of these two pieces on the sides and bore holes centrally so that by holding the pieces firmly in place the screws may be driven in. It will be necessary to insert one screw only for each upright in the sides, the other screws are driven up through the floor to give all the strength necessary. The top edges of these two pieces may be left straight, if one so desires, instead of being cut wavy as mentioned.

Adding the Ornaments.

To make a good finish to the front, a shaped shallow rail measuring 15in. long by 1¾in. deep is glued and screwed on. Draw the simple outline given, and cut it with the fretsaw, afterwards gluing and screwing the rail ¼in. inwards from the face of the sides (see Fig. 1).

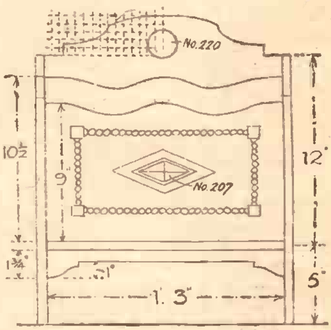


Fig. 2. A view from the front with most of the dimensions required for marking out.

The diamond ornament shown (No. 207) is glued to a plain ⅛in. overlay measuring 6½in. by 2⅜in., also cut diamond shape. Around this, lengths of beading are glued on, the difficulty of forming neat mitres being obviated by the addition of ¾in. square overlays of ⅛in. wood at the corners. Specially prepared wood of suitable thickness for making the Newspaper Stand, with the beading and ornaments may be purchased from Hobbies Ltd. Quote the class and amount of wood, and give the number of the beading and ornaments when ordering. Full particulars of price in Hobbies 1931 Catalogue.

The Wood Required.

Sides	*2 pieces*	*1ft. 5in. long by 7in.*
Floor	*1 piece*	*1ft 3in. long by 6⅝in.*
Back	*1 piece*	*1ft. 3in. long by 1ft. 3in.*
Front	*1 piece*	*1ft. 3in. long by 9in.*
Partn.	*1 piece*	*1ft. 3in. long by 10½in.*
Rail	*1 piece*	*1ft. 3in. long by 1¾in.*

All in ½in. thick.

Plain Raised Diamond (No. 207).
Rosette Circle, 2in. diam. (No. 220).
Four turned buttons, 1in. diam. (No. 218).
Half-round ball-beading (No. 53):
Two pieces 10½in. long.
Two pieces 4½in. long.

For particulars and price see Hobbies 1931 Catalogue.

HOW TO MAKE

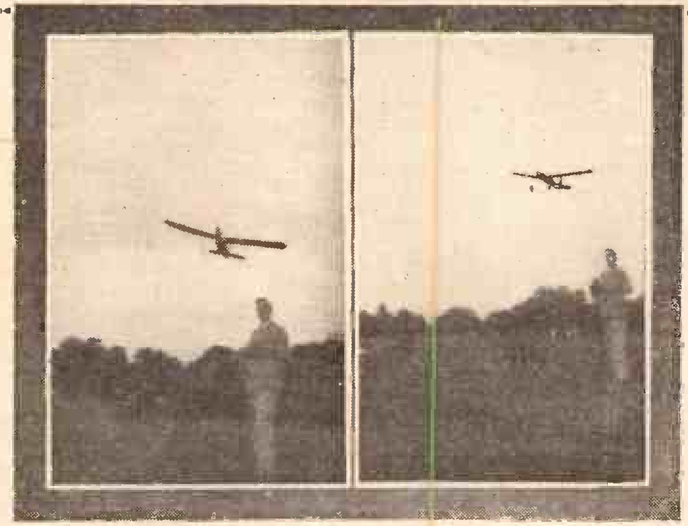
A MODEL FUSELAGE MONOPLANE

By H. AUSTIN

THE model monoplane here described consists of five units, viz., fuselage, mainplane, tail unit, nose-piece with gears, and undercarriage.

Fuselage.

This consists of a framework made up of four strips of silver spruce $\frac{1}{8}$in. by $\frac{3}{16}$in. in section, called longerons, running from end to end and given shape by formers or bulkheads spaced at intervals. At the front end is a former cut from three thicknesses of $\frac{1}{16}$in. birch three-ply glued together, into which fits the nose-piece; and at the rear a stern post of $\frac{1}{4}$in. by $\frac{1}{8}$in. birch takes the pulling strain of the rubber motors.



The model fuselage monoplane in flight.

The construction of the fuselage is illustrated, Fig. 1. The bulkheads are cut with a fretsaw from three-ply birch $\frac{1}{16}$in. thick, with the grain running upwards, and the centres cut out, leaving verticals and horizontals $\frac{3}{16}$in. wide. A piece is cut from each corner $\frac{3}{16}$in. by $\frac{1}{8}$in. to take the longerons. The top pair have their $\frac{1}{8}$in. edge on top, while the bottom ones have this edge at the sides. When all the frames are cut, pieces of $\frac{1}{8}$in. square spruce are pinned and glued to them, projecting slightly at each end. The ends are afterwards cut off clean with a safety-razor blade. This makes a neater job than cutting with a saw; and allowance can be made for the angle at which they butt against the longerons owing to the curvature of the former.

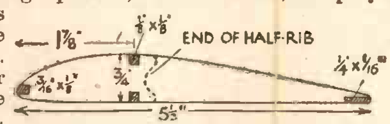


Fig. 2. How the ribs are cut and assembled.

The longerons are cut about an inch longer than the finished fuselage, and the two bottom ones are then steamed to slightly more than the curve required, as they tend to pull back when drying. The top longerons are then steamed slightly downwards from the position of the same former. Pieces of $\frac{1}{16}$in. copper tubing to take the undercarriage, $2\frac{1}{16}$in. and $2\frac{3}{16}$in. long respectively, are securely bound with thread and glued to the bottoms of Nos. 2 and 3 formers. These take the wire legs of the undercarriage.

Assembly may now be commenced. Pencil marks are made on each pair of longerons showing exactly where the bulkheads will come, as unless they are fixed in true positions the fuselage will be warped. The two top longerons are placed upside down on a flat surface and the bulkheads glued and bound in position at right-angles to them. The latter are pinned with $\frac{1}{4}$in. brass pins and glued to the nose former, the projecting ends being cut off after the glue has set. When pins are used, holes should always be drilled first to prevent the wood splitting. The bottom longerons are then glued and bound in the same way, the nose former being pinned in position last, exactly at right-angles to the straight parts of the top longerons. To strengthen the attachment of the stern post to the longerons, two plates of $\frac{1}{16}$in. three-ply are pinned and glued as shown in Fig. 4. A tail skid of 18-gauge piano wire is bound to the stern post. Two diagonal pieces of spruce are glued behind the nose former as shown, and this completes the fuselage framework.

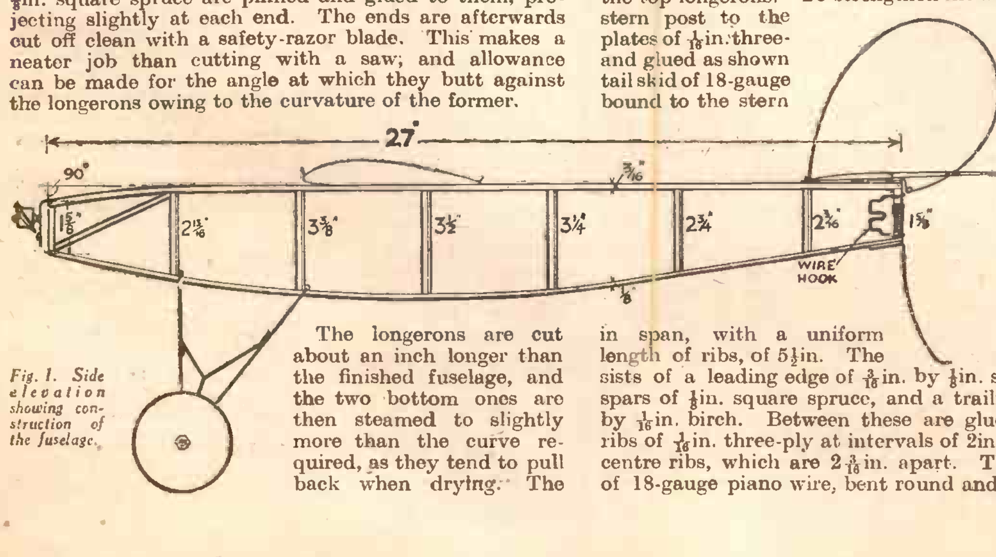


Fig. 1. Side elevation showing construction of the fuselage.

Mainplane.

This is 46in. in span, with a uniform chord, *i.e.*, length of ribs, of $5\frac{1}{2}$in. The framework consists of a leading edge of $\frac{3}{16}$in. by $\frac{1}{8}$in. spruce, two main spars of $\frac{1}{8}$in. square spruce, and a trailing edge of $\frac{1}{4}$in. by $\frac{1}{16}$in. birch. Between these are glued ribs and half ribs of $\frac{1}{16}$in. three-ply at intervals of 2in., except the two centre ribs, which are $2\frac{3}{16}$in. apart. The wing tips are of 18-gauge piano wire, bent round and slotted into the bottom spar, and bound to the leading and trailing edges. The top spar is cut off flush with the last ribs. Fourteen full and eight half ribs are cut according to the outlines in Fig. 2, and the edges sandpapered smooth. Notches are then cut to take the leading edge, spars and trailing edge. The centres are fretted out for the sake of lightness. The leading edge is rounded off with sandpaper. The spars, and leading and trailing edges are then steamed upwards from the centre section so that the tips are 2½in. higher than the centre. The angle made here is called a dihedral angle and makes for lateral stability.

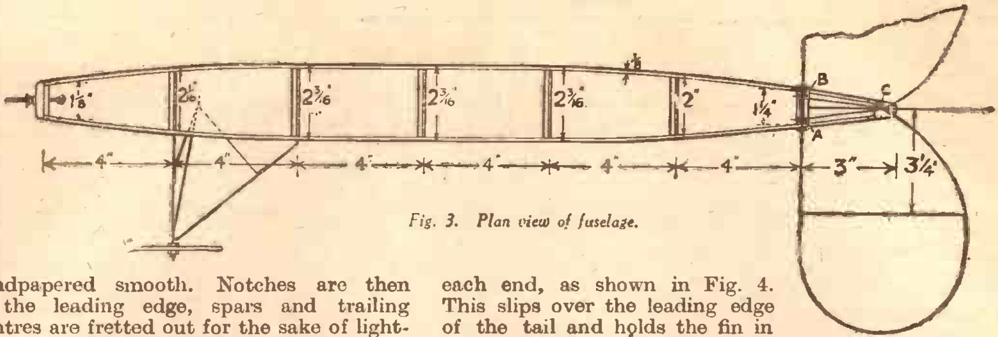


Fig. 3. Plan view of fuselage.

In assembling the wing, the ribs are first glued along the bottom spar and trailing edge according to Fig. 5. The top spar is then glued in position and the leading edge last. The wire wing tips are added, and the two centre ribs have a length of wire secured to them so that a piece projects upwards each end from the leading and trailing edges. Small rubber bands are afterwards slipped over these and under the fuselage, holding the mainplane in position.

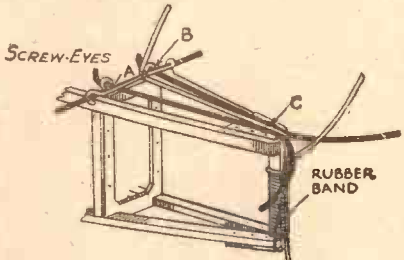


Fig 4. Method of fixing the tail.

Tail Unit.

The tail and fin are made separately of 18-gauge piano wire. The tail is formed of one piece of wire bent round and soldered as shown in Fig. 3 at points A, B and C. The two ends which project in front are bent slightly upwards and are parallel. Two pieces of 20-gauge wire are soldered across where shown, being given a slight camber as is seen in the side elevation. Care must be taken to keep the tail perfectly flat without warp. The fin is also made in one piece, and across the bottom front edge is bound and soldered a piece of wire, bent round at each end, as shown in Fig. 4. This slips over the leading edge of the tail and holds the fin in place, while the rear end is attached by means of a rubber band passed through the angle formed at the back of the fin, and under the tail skid.

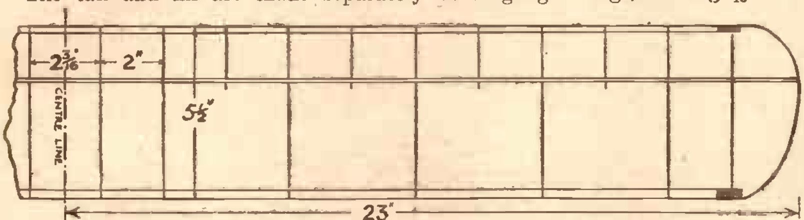


Fig. 5. The main plane.

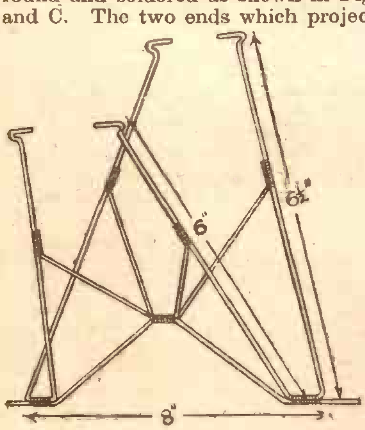


Fig. 7. The chassis.

Nose-Piece With Gears.

This consists of four pieces of three-ply birch glued together under pressure. When dry a piece is cut to the size of the nose former and shaped off to continue the lines of the fuselage. Two holes with centres 11½ mm. apart are drilled as shown in the sketch, to take brass bearings for the gear shaft. The top (propeller) shaft is of 3/32 in. silver steel, while the other one is 1/16in. silver steel. Two ½in. diameter brass gears are soldered to the shaft. The top one must have the hole enlarged to take the 3/32in. shaft. A small cup washer is soldered to the bottom shaft outside the bearings, leaving 1/16in. between the back of the nose-piece and the gear wheel. The operation is repeated with the thicker shaft, with the addition of a brass bush with a spike, which prevents the propeller from revolving on the shaft. Two pieces of wire are let into the nose-piece, so that they fit against the sides of the aperture in the nose former, preventing the nose-piece from twisting. A 13in. propeller of 18in. pitch is used.

Undercarriage.

This is made of 18-gauge wire as shown in Fig. 7. The front and back legs of each side are in one piece and the axle is soldered to them. Two wheels of plywood 3in. in diameter, with brass bearings, are fitted, and a cup washer soldered on to the outside of the axle to keep them on.

Covering With Silk.

When the whole of the framework is finished, the fuselage, mainplane and tail unit are covered with fine Japanese silk. Firstly, the silk should be kept damp during the process of covering; secondly, the threads should be kept as straight as possible; and finally, it should be stretched fairly tight so that kinks and creases will not develop when the dope is put on. This can only be done if the glue on

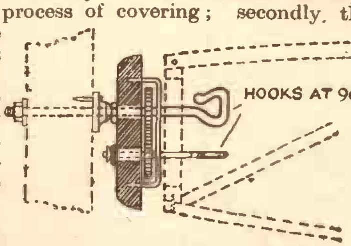
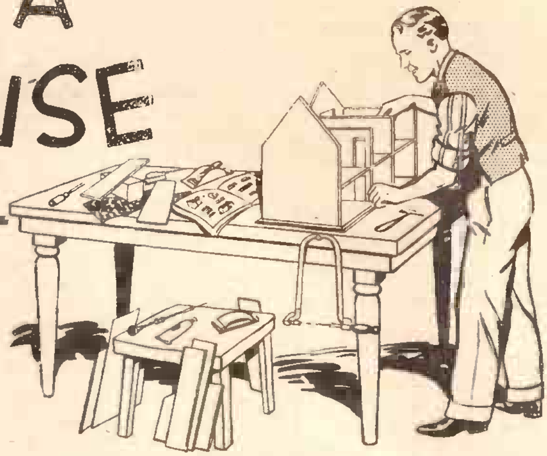


Fig. 6. The nose-piece and gears.

(*Continued on page* 165.)

MAKING A DOLL'S HOUSE



Look at this top-hole model. Any fellow with a set of Hobbies Fretwork Tools can make it. Quite straight-forward—particularly as full-size patterns are given with this week's design.

ISN'T it just a top-hole Doll's House that we show you here? Wouldn't it be a fine thing to make up for any youngsters that you know, as a Christmas present? It isn't a bit too early to start, and as all the requirements are supplied, the fellow with a set of fret-work tools can pass away several jolly evenings building up the house for his little friends. It is a real house, too, not a tiny model too delicate to handle. The house is nearly 2ft. high and stands on a base 2ft. 1in. long and 16in. wide. Moreover, it is useable, because the whole of the back takes out and the inside is provided with a floor, ceilings and a staircase, so that real model furniture can be added as desired.

The Interior.

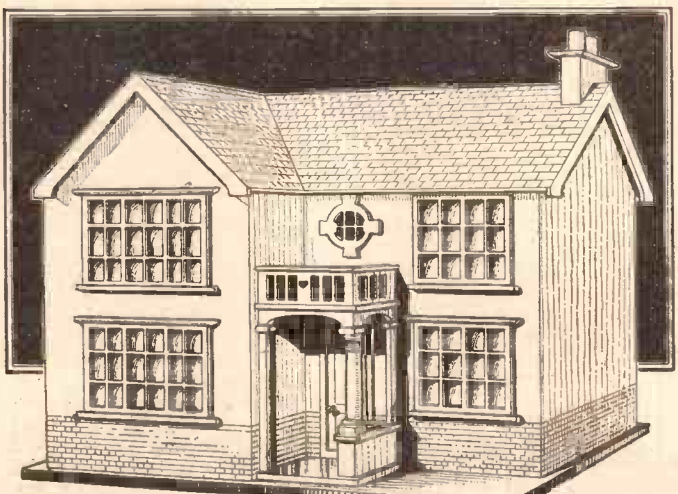
Inside, we have two downstair rooms and a hall, whilst upstairs there are two bedrooms and a landing, all of which can be seen in the illustration at Fig. 1. The house really looks too good to be true, but it is so planned that any fretworker or woodworker can undertake it and complete it from the particulars and patterns on the design sheet given with this number, and a parcel of wood with all the parts needed is supplied by Hobbies, Ltd. Particulars of this parcel are given on the next page and, of course, before we start, we must actually have it at hand to check off the numbered pieces in conjunction with the corresponding number on the chart. The general parts of the doll's house are in plywood, because that is quite cheap material, and strong enough to take all the rough handling of the youngsters.

The overlays for the window, the chimneys, etc., are, of course, in fretwood to add distinction of colour. The house is finished off realistically with brick paper and tile paper for the roof, a matter which will be dealt with more fully later. Most of the parts on the design sheet are shown to scale only, and our first work is to measure off and cut out all the parts exactly as shown. Some have rounded edges, and these are completed now before we start to put the parts together. The work of cutting can be undertaken easily with a fretsaw, and various dotted lines are given to indicate adjoining parts to simplify the building. Where duplicate parts are required, they can be cut out together to ensure being alike. Have all the wood thoroughly cleaned up and pencil lightly the number of the part on the back. A good plan is to have a duplicate design at hand, so that we may check these numbers during construction.

The Foundation Parts.

The baseboard is a plain piece, 25in. long and 16in. wide. On it set up the two ends of the house, two pieces with the windows and the right-angle piece by the side of the porch. All these parts must be complete, with their various overlays for the windows, etc. Before gluing on the window overlays, a window-sill is added, flat to the edge cut in the front, so that the overlay actually stands on this window-sill (see Fig. 2). This applies to all four windows. Above the overlay is the shaped window head with its curved side underneath.

The door, also, has to be cut and fitted. Two pieces are cut to form the door and fanlight, the piece which comes out of the former being used as the door itself. This is hinged by means of a strip of linen, glued inside after the panels have been painted on the front, and one of the small erinoid knobs added. The door is hinged on the right side nearest the window. A



Design No. 1,828.
A DOLL'S HOUSE

Stands 22in. high, on a base 25in. by 16in. Two rooms on each floor, besides landing and hall.

small light is provided above the porch, and here again an overlay is cut and glued on. Glass is supplied for all these windows and the fanlight. It is fixed behind the overlays with match-like strips of wood, glued inside. The back of the house must be ready at the same time as the sides. This part fits between the two ends and is there held by the addition of strips glued on with a projection of ¼in. beyond. This acts as a stop against the ends of the house, and allows the fitting of hooks and eyes to hold it in place (see Fig. 3).

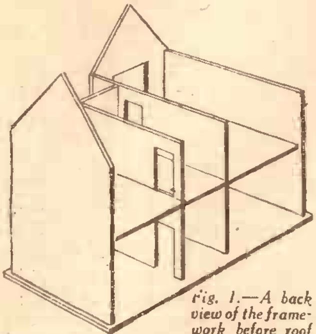


Fig. 1.—A back view of the framework before roof and back are added.

Next, take out the parts forming the floor and the ceilings. These are plainly marked on the patterns where they belong and should fit up between the walls of the house already fixed.

The Ceiling Pieces.

Mark up on the walls 7¼in. all round. This denotes the position of the floor, and when that is in place a further 6in. above denotes the position of the ceiling. In both instances the parts in the larger room and the smaller room are glued, and then screwed from outside. Finally, the floor and ceiling in the hall are glued between the partitions and strengthened, if necessary, with small corner fillets beneath. These floor and ceiling parts, of course, must fit tightly between the walls and be quite rigid. They help to hold the whole house firmly. The upper face of the ceiling piece comes flush with the top edge of the walls all round. This completes the framework (see Fig. 4).

The Two Roof Portions.

The roof is built in two parts, each part consisting of two roof slopes. The two parts for the roof slopes of the front gable (No. 14) are fitted together at a right-angle, with blocking pieces on the inside. The edges, joining together at the top, are chamfered to 45 degrees each to make this right-angle. Barge boards cover the front and back edges. One side overhangs above the porch, but in order that it may rest on the ceiling above the landing, a small piece has to be cut out from one side. This indentation is 11½in. long, starting ½in. from the back edge. The underside of this piece cut out, must be chamfered to an angle of 45 degrees to allow the part to rest flat. The front end of this roof will rest on the gable front of the house. At the back, however, there is no gable to the structure, so that we must add an imitation one (part 16). This is glued behind the barge boards, so that when the whole roof is in place the part comes immediately above the back. Fillet pieces should be put behind to strengthen. The picture at Fig. 5 is of the roof complete, shown upside down to make the position of the blocking pieces clear. The other portion of the roof is built in a similar manner (No. 15) from two pieces of plywood, glued with blocking fillets inside and covered at one end with barge boards. See that it rests on the gable end of the house, comes straight along, and then fits on to the roof part previously added.

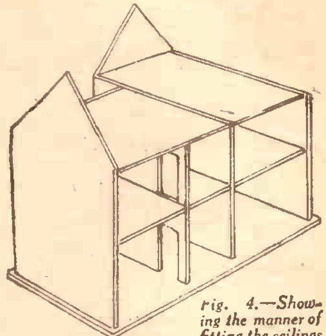


Fig. 4.—Showing the manner of fitting the ceilings to the rooms and framework.

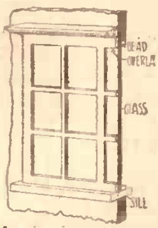


Fig. 2.—The window broken away to show the various parts in it.

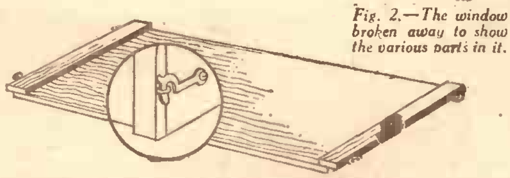


Fig. 3.—The back, with its end strips, forming stops, and an enlarged view of the hook and eye on each end.

WHAT IT COSTS TO MAKE

The Wood.
A complete parcel of the planed boards, numbered as on the design sheet, with chimney pots, porch column, etc., is supplied for 17/6, carriage forward.

Fittings.
The door knob (No. 26), two pairs of hooks and eyes and six pieces of glass for windows and door for 1/6, postage 3d.

Paper.
Suitable Doll's House paper, sheets of 20 x 30, 3d. per sheet.
All obtainable of Branches of Hobbies, Ltd., or by post from Dereham, Norfolk.

The chimney, of course, is added to this piece of the roof. It is made of two ½in. block pieces, glued together (part 35) with a capping piece (part 36) and two pieces of ¾in. dowelling (part 22) glued ¾in. from the ends (see Fig. 6). Glue the whole to the roof from the right-hand end, level with the end wall of the house. All these completed roof parts are fixed by screwing down carefully to the walls and ceilings.

Building the Porch.

The porch is made up of a number of small pieces, glued between an oblong top and base piece (part 17). Glue the base right in the corner first. Build up the plinth for the column from parts 39, 40 and 41 (see Fig. 7). The front covers the edge of the sides, and the top lies above, projecting slightly over the edges all round except the back. Glue this plinth to the base of the porch ⅛in. inwards, and glue also to the front wall of the house. Now get out the pillar strips from ¼in. wood (Nos. 37 and 38), and glue the longer one to the side wall of the house, ¼in. inwards from the front. The shorter one is glued immediately above the plinth on the opposite side, and both are fitted with small capping pieces (No. 31). Now take the top of the porch and fit beneath it the two arch pieces (29 and 30), the longer one in front covering the shorter one at the side. Their position is such that the end of the arch rests on the capping piece just added to the columns, and when this is settled the whole piece is glued in the corner (see Fig. 8). It will be found that the shaped column supplied with the parcel (No. 33), just fits between the plinth and this porch overhang. Above the porch two

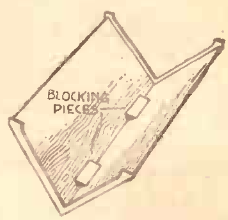


Fig. 5.—The roof-piece of the gable front, turned upside down to show the strengthening blocks.

(*Continued on page 156.*)

A SAND MOTOR TO DRIVE YOUR MODELS

We recently described how to make a windmill worked by sand. This article explains how to make a sand motor to drive models.

By Henry Greenly

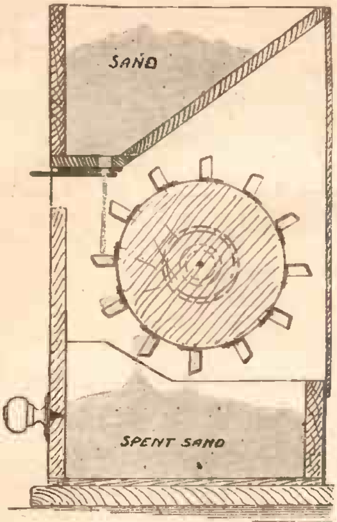


Fig. 1.—Front view of the sand motor.

THE sand mill in which the weight of falling silver or seashore sand is employed to turn a wheel and provide power is a convenient method of driving simple toys. This "prime mover" is an engine which can be given to the youngest child to operate without any danger, and the mess he or she may make in using it can readily be cleared up.

The three main features of a sand mill should be the hopper, the wheel and the receptacle for spent sand. Wood, metal or cardboard may be used in its construction, and the chief points to be considered in the attempt to obtain the best results include the size of the wheel and the number and also shape of the buckets. The sand should fall cleanly, the jet not being unduly disturbed and wasted by the oncoming buckets. The amount of power obtainable is, of course, small. Therefore, while friction cannot be entirely eliminated, it should be reduced to the minimum, by the use of small diameter shafts and avoiding any side rubbing in the wheel itself or in the bearings.

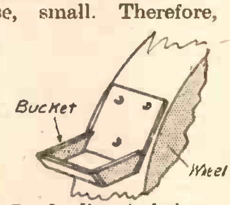


Fig. 3.—How the buckets are attached.

The Wheel.

A wheel of less than about 4½in. diameter measured on the jet line is hardly worth consideration, and for this size of wheel not more than twelve buckets are necessary. One bucket should be loaded with a reasonable amount of sand just as the other one cuts the falling jet, and also it should do this quite cleanly.

The buckets can be made out of tin plate and they should be bent up cup fashion, as shown in the sketch, Fig. 2, so that they hold the sand. A flat blade would, of course, work, but the potential energy in the falling sand would be lost owing to the stuff bouncing or running off the blade in its downward path. The buckets need not be too wide—roughly square will do very well.

The Frame of the Mill.

The body of the mill may take the form of an open frame, the top of which is made into an open sand hopper. The lower portion is fixed on to a base board and in it a loose tray or drawer, shaped something like the sketch, Fig. 4, herewith, may be fitted as a separate unit so that the spent sand may be tipped into the top hopper by removing the tray.

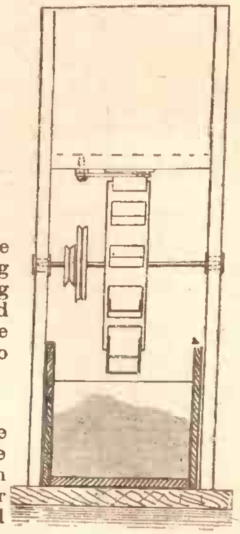


Fig. 2.—Side view of the sand motor.

Of course, if a "continuous performance" is required, then the lower tray may be enlarged and extended, if thought fit, beyond the upright frame, so that a sugar scoop may be laid in the tray. The spent sand can then be dug out and transferred to the top hopper while the mill is working without any spilling of the sand round about the mill or over the model being driven by it. This scheme is sketched in Fig. 5 and 6.

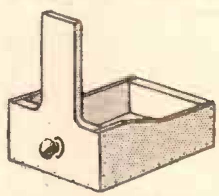


Fig. 4.—The sand drawer.

The bucket wheel can be made out of any lightweight wood, and as a perfect balance is desirable this should be turned up as truly as possible in a lathe. The alternative method is to make the wheel of two tin discs, fitting bent strips of tin between the side plates to form the buckets. In any case the shaft must be of small diameter. The power obtained is fractional and nothing should be wasted by stiff bearings. A knitting needle will make the best shaft, and it should be arranged to run in a pair of thin sheet metal bearings—brass is best—fitted over a larger hole in the side frames of the mill. The shaft ends should be ground down to a point, as shown in Fig. 7, and also be quite smooth. To reduce the end thrust, and the attendant friction, to a minimum bearing plates

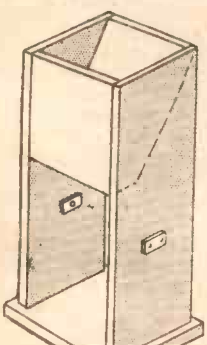


Fig. 5.—The hopper.

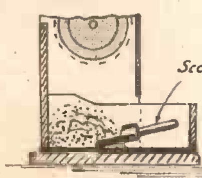


Fig. 6.—Alternative arrangement of sand drawer.

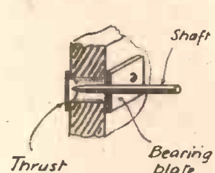


Fig. 7—The sand wheel bearing.

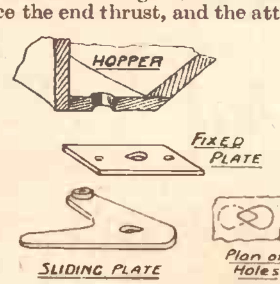


Fig. 8.—Various details of the hopper.

(Continued on page 160.)

A TOY ANTI-AIRCRAFT GUN

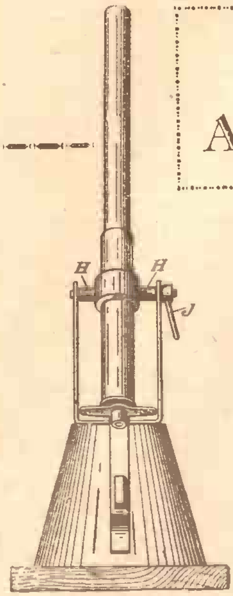


Fig. 1.—End view of the model anti-aircraft gun.

HERE is an interesting toy which is not difficult to make if the instructions are carefully carried out. A slight knowledge of soldering will be necessary, and a few ordinary tools such as most amateurs possess.

Gun Barrel.

You will require two pieces of brass tubing for the barrel of the gun, one piece being 7in. long and $\frac{3}{8}$in. *outside* diameter, and the other piece 3in. long and a little over $\frac{3}{8}$in. *inside* diameter, so that it just fits nicely over the longer tube. For the latter, the plunger tube of a discarded cycle pump would answer the purpose quite well. Clean the two tubes with fine emery cloth, and, after slipping on the outer tube, neatly solder it, at the top and bottom, to the inner tube. Remove all superfluous solder with a small file, and see that the lower ends of the tubes are quite flush.

Firing Mechanism.

The " firing " mechanism consists of spring, plunger, spring-rod and trigger-plate. For the spring-rod a piece of brass or steel rod $\frac{1}{8}$in. diameter and $4\frac{3}{4}$in. long will be required, and on one end of this rod the plunger has to be soldered as shown in Fig. 3. A brass collar about $\frac{3}{16}$in. thick will do for the plunger, which must be an easy sliding fit in the barrel. The catch-plate A can be fashioned to the shape shown out of an odd piece of sheet brass $\frac{1}{16}$in. thick. A $\frac{1}{8}$in. hole can be drilled in the middle of the plate so that it can be slipped on to the plunger-rod. The stop B may consist of a piece of brass tube about $\frac{1}{4}$in. long, and this together with the catch plate are to be soldered on to the end of the plunger-rod, after the other parts of the mechanism are assembled.

For the end-plate C of the gun barrel, a thick brass washer can be used. This should be slightly larger than the outside diameter of the gun barrel, and the hole in the centre must be an easy fit to the spring-rod. The joint between this plate and the end of the barrel must be well soldered, and after this is done the end of the trigger-plate D can be soldered to the barrel as indicated in Fig. 1. The trigger-plate can be bent to the shape shown from a strip of thin, springy sheet brass $\frac{1}{4}$in. wide and $3\frac{1}{2}$in. long.

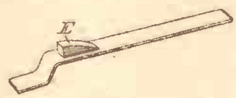


Fig. 4.—The trigger-plate.


Fig. 5.—The trunnion fitting.

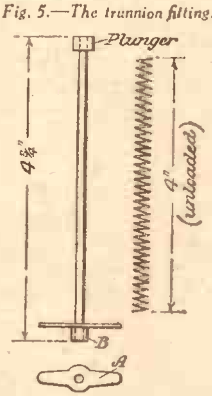


Fig. 3.—Spring-rod, catch-plate and spring.

A piece of steel or iron plate $\frac{1}{2}$in. by $\frac{3}{16}$in. by $\frac{1}{8}$in. thick can now be filed to the shape shown at E for forming the stop for the catch-plate A. Solder the stop on to the catch-plate in the position indicated in Figs. 1 and 4.

Pass the spring-rod through the spring, and insert them in the gun barrel, then with the aid of a round, wooden rod, push the plunger down till the end of the rod passes through the end C. Now slip on the catch-plate and the piece of tube B and solder them in position.

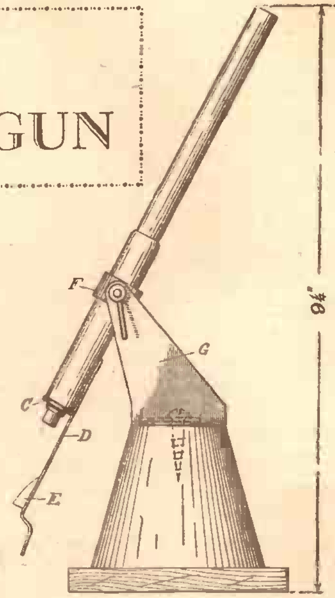


Fig. 2.—Side view of the anti-aircraft gun.

Trunnion Fitting.

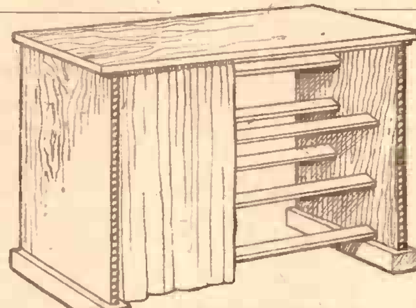
The next part to be made is the trunnion fitting F, by means of which the gun is pivoted in the cradle G. A slightly enlarged view of the trunnion fitting is given in Fig. 5. A piece of thick brass tubing about $\frac{7}{16}$in. long is required, having an inside diameter that just allows it to fit nicely over the outer gun barrel. A $\frac{1}{8}$in. diameter hole can now be drilled through the piece of tube, to take two pegs, which must come exactly opposite each other. Two pieces cut from a French nail of suitable size would answer very well for the pegs, one of which is $\frac{1}{2}$in. and the other $\frac{5}{8}$in. long. The longer peg should have a thread cut on one end to take the clamping nut, as shown in Fig. 2. The thread can be cut by means of a small screw-plate if one is available, or, failing that, a friend who has one can be approached in the matter. The pegs can now be pressed into the holes made to receive them, and well soldered in position; after which the complete trunnion fitting can be soldered to the gun barrel. Make sure before soldering that the pegs or trunnions are in the correct position in relation to the trigger-plate, and that the centres of the trunnions are about 2in. from the end of the gun barrel. (See Fig. 1.)

Gun Cradle.

For the cradle G we shall require a piece of sheet brass about $\frac{3}{64}$in. thick, cut to the shape given in Fig. 6. After carefully marking

(*Continued on page* 164.)

MAKING A BOOT RACK



The completed boot rack.

INSTEAD of having an untidy corner in the kitchen with all the boots and shoes standing about, why not build this simple boot rack to keep them neatly in place and easily accessible? A few odd pieces of wood from Hobbies, Ltd. at quite a small cost are all that is needed. Its construction is as follows—

Build it in Oak.

Light oak, ½in. thick, is suggested as the wood to be used throughout. First cut and plane the top—a board 3ft. 4in. by 14in.—then deal with the sides—each 2ft. 7in. by 12in. Choose the side of the top which will come underneath and mark a point 2in. from either end (see Fig. 1). Another mark is made

Fig. 1. The layout of the piece which forms the top, looking at it from the underside.

¼in. farther in from the 2in. marks at each end, and with a square, rule all points across the board. One inch in from each side cut the two lines to a depth of ¼in. This is done with ½in. bit and cleaned up with a chisel. These grooves take the sides.

The Feet and Rack Strips.

Next make two blocks for the feet out of 2in. square wood 14in. long (see Fig. 2). Similar grooves to those in the top are cut in them, except that they are ¾in. deep.

Fig. 2. Particulars of the two blocks forming the feet.

The next step is to make the strips for the racks. Six are cut from ½in. by 1½in. stripwood, 2ft. 11½in. long, to be sunk to a depth of ¼in. each end into the sides. Take care that they are all the exact length, or the sides will be thrown out of true. Having prepared these strips, return to the sides.

The Two Side Uprights.

To mark off the position of these racks on the side pieces, choose the best grained for the outside, and mark on what will be the inside. Measure 4in. in from the rear and carry the line down the whole length of the wood. Along this line, commencing from the top, mark three points, the first 6in. down and the others 6in. apart (see Fig. 3). The rear strips are fitted here, and as they slope at 30° to the front, mark this angle, carrying the line for 1½in. Draw a parallel line the whole length of the sides and the angle will be correct for the other two strips. The grooves will be 1½in. long by half an inch wide, and ¼in. deep. Chisel these grooves out to their correct depth. The front strips are fitted in 3in. lower than the corresponding strip at the rear in each case. Also they finish 2in. from the front, and are marked up in the same way except for the different measurements. Chisel the holes out to a depth of ¼in.

Testing the Parts.

All is now ready for a trial fit, so assemble the parts to see no errors have been made. Take the rack to pieces again and sandpaper the whole of the work. If it is intended to stain the wood, do so now whilst all points are accessible. A further coat and polish can be given to the outside, if necessary, when the rack is assembled. Glue all the parts together and drive two thin nails through the sides into the strips in each end. Treat the top and the feet in a similar manner, afterwards punching the heads well home and filling with plastic wood.

Made to Suit the Sizes.

The angle and measurements may have to be varied in some homes—if father has a very big foot, for instance, then the angle and drop from the rear strip to the front will have to be greater. Some people may prefer to push the boots in heel first, the higher strip at the back fitting in the instep whilst the sole rests on the front strip lower down. Then the side with higher strips will be the front. Others may prefer to push the

Fig. 3. A plan of the sides giving the position of the racks and the various dimensions to mark off for cutting.

heels in first and lodge the boots on, so the lower strip will form the front, as in the sketch. The front in either case is fitted with a curtain of light material strung on dowel rod or strong, thick string between two screw eyes (Fig. 4).

All the Materials Supplied.

All the materials can be purchased from Hobbies, Ltd. The light oak can be cut to your requirements; the stripwood is already listed to the exact size and length required; stains are there in all shades, and the numerous designs of beading make a good finish to the rack by fitting down the edges.

Fig. 4. The fixing which holds the curtain in place, on a rod in a screw-eye.

FUN ON THE FIFTH

How Your Fireworks are Made

By Alan St. H. Brock

I HAVE been looking at an interesting volume, of which a section is devoted to the manufacture of fireworks. The writer warns his pupils not to attempt making fireworks by candle light, and "to keep away from fire, or from a light, or from flames, steel, iron or any other matter likely to cause a spark"; but a spark or fire are not the only means by which firework mixtures may be caused to catch fire. Indeed, one could almost guarantee an explosion or at least a fire with a number of the firework mixtures frequently recommended. So dangerous are those which include in their ingredients sulphur and potassium chlorate that they have now been prohibited by law even in firework factories, where every possible safeguard against accident is adopted.

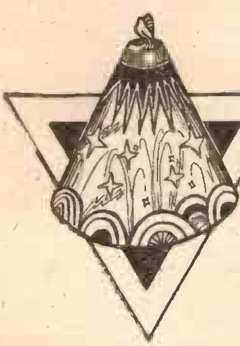
How Sparks are Made.

Even if I had at my disposal enough space to give instructions for making the simpler form of fireworks, I should hesitate to do so for several reasons, the most important being that the making of fireworks without a licence is illegal. In other words, my advice to the reader who wishes to make fireworks is "don't."

At the same time, many readers, particularly those studying chemistry, will be interested to learn something of the principles on which fireworks are constructed.

A large jumping cracker. When ignited it leaps about, giving off a series of tremendous reports.

Those of you who know something of chemistry will already know that when some object, as for instance a piece of paper, is burnt, what really happens is that it takes up oxygen from the air. If we drop the paper alight into a box and cover it over so that no more air can enter, the flame goes out. This is because the oxygen in the air contained in the box is used up.



A Vesuvius. When ignited this produces the effect of a miniature volcano.

If a piece of iron wire is made red hot and introduced into a jar containing oxygen, the wire will take fire with a bright flame; there is sufficient oxygen present to enable even iron to burn. If what we call firework mixture is lighted in a closed vessel, it will continue to burn even if the vessel is covered; in other words, it is able to supply its own oxygen quite independently of the air. Such a mixture is possible because some substances have a large supply of oxygen which they readily give up, and others are equally ready to take up.

A jack-in-the-box. When ignited it goes off with a bang, throwing a shower of sparks into the air.

The first oxygen-bearing substance used in firework making was undoubtedly potassium nitrate, or as it is more generally called, saltpetre. The other early ingredient was charcoal. Such a mixture was perhaps used in early times as tinder, or as a primitive form of "fire-lighter." It was quite natural that, as it burns quite readily in the air, sulphur should suggest itself as an addition.

These are the three substances used in the manufacture of gunpowder, and in varying proportions in several forms of fireworks, perhaps the best known being the rocket, which is driven into the air by the rush of gas produced by the rapid burning of the composition contained in its case.

Another firework containing these ingredients is the gerb, or fountain: this has an addition in iron filings. This mixture, which was at one time known as Chinese Fire, is supposed to have been introduced into Europe from China some two hundred years ago by Jesuit missionaries.

The Production of Coloured Fire.

With these mixtures, even with such additions as were made from time to time, it was only possible to produce golden sparks or bluish-white or flame-coloured fire, and it was not until another oxygen-producing substance, potassium chlorate, was introduced, early in the last century, that it was possible to make the beautiful coloured fires and lights we now see at firework displays.

In these coloured fires, various salts of metals are employed. Barium to produce green, strontium red, sodium yellow and copper blue—not green as you might be led to suppose. If you remember having seen a piece of copper, such as a soldering iron, heated over

(*Continued at foot of page* 156.)

WOODCRAFT WITH A FRETSAW

A further interesting article full of hints on the cutting out of our weekly gift design charts. Written by an expert for the beginner.

We have already dealt with the question of the necessary tools, and no doubt every reader already has, or is going to purchase immediately, one of those complete Fretwork Outfits, so he can get to work at once. A word, then, about the tools will not be out of place. The fretsaw frame is the most important, and with it comes the tiny blade which does the actual cutting. It is obtainable in various grades—from fine to coarse—known by the reference of 00 up to No. 4 or 6. The finest are for delicate work—the coarsest are only used on very rough work. A medium blade is most generally useful, but a few finer and coarser ones should be included in the worker's stock.

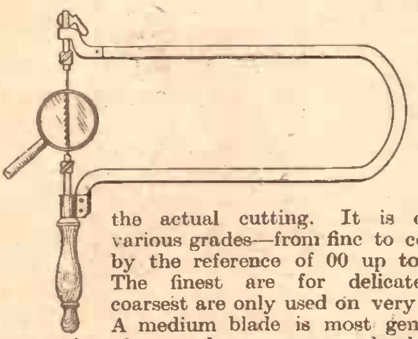


Fig. 1. The principal tool—the fretsaw handframe. Note that the tiny teeth of the saw point downwards.

Note These Cutting Hints.

The saw is held in the frame quite tightly, so that the arms are parallel and with the teeth pointing downwards (see Fig. 1). The cutting is thus done on the down stroke, and the beginner must practise so he can do the up-and-down motion without sloping the frame at all. If the saw is not held vertically, it will soon bend or break, and most beginners worry at breaking so many saws in consequence. The trouble, however, is soon overcome after the first one or two trials, but no worker should begin an actual article until he can use a saw easily and without damaging the wood.

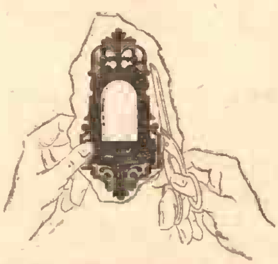


Fig. 3. Showing the way the paper pattern is cut out to paste on to the wood.

The wood to be cut is laid on a special cutting table with a V-opening (two examples are given at Fig. 2), so the saw works in the opening whilst the wood is turned as required. At first the work seems liable to jump, but one soon learns the amount of pressure required to hold it firmly with the left hand to prevent this trouble. Another reason for the "jumps" is that the saw is not cutting vertically or is being forced into the wood quicker than it can cut.

A word may be given here about the actual designs to be cut. The patterns on the chart are usually full size, so they may be pasted to the board to provide the cutting shape. Cut the pattern from the sheet a little outside the edge of the shape (see Fig. 3), and then apply the paste to the board (see Fig. 4). The paper is not pasted, because it is liable to stretch and go down out of shape. Put the pattern on the wood and pat it gently with a clean cloth to get out all air bubbles. Rub lightly from the *centre*, working outwards to each edge, and then leave the whole thing to dry before commencing to cut.

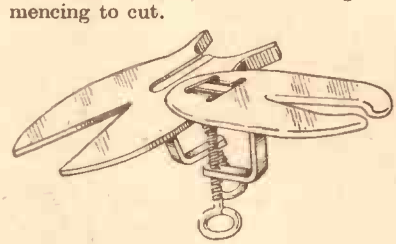


Fig 2. These are two modern tables used in conjunction with the fretsaw. Both are of metal and supplied quite cheaply by Hobbies, Ltd.

Paste Your Patterns Down Economically.

A good deal of economy in wood, and a saving of labour in cutting, is effected if the design is laid down with a little forethought. Where the pattern has a straight edge, cut the paper carefully and exactly along this line, and then paste the pattern down close to the edge of the board (see Fig. 5). This saves cutting that line out with the fretsaw. Or, again, don't put the patterns down haphazard all over the board. Get them as close together as possible (seeing that the grain runs in the right direction), and fit as many as you can to one piece of timber (see Fig. 6). In this way you save much wood, and can always cut the parts out roughly to provide a smaller piece to handle in the actual cutting.

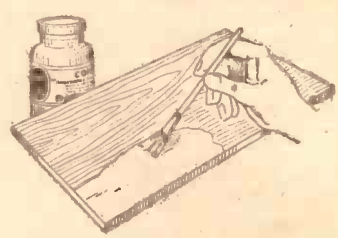


Fig. 4. Apply the paste thinly to the wood, and not to the paper. This prevents the pattern stretching and becoming mis-shapen.

In some of the larger patterns of these woodcraft designs, it will be found that space prevents the whole part being shown, and one comes against a piece shown like Fig. 7. The jagged line across the middle is to indicate that the pattern has been broken off (for lack of room), whilst the dimension against it represents the

Fig. 5. Paste the straight line of a pattern along the edge of the wood to save having to cut it. A very useful hint.

length which that pattern should actually measure. At Fig. 8 we have the same piece of paper pasted to the

Fig 6. Above is an example of wasting wood by putting the designs on anyhow.

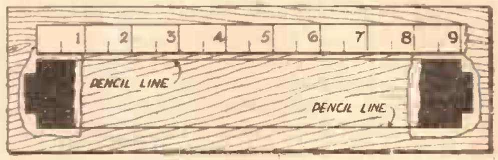
Fig. 6. Below you see the way to paste patterns as closely together as possible to save wood.

wood—the two parts being carried out to the required distance with the straight edges connected up with pencil lines. In doing this, paste one piece down and carry out the lines along the wood. Then paste the other part down so that the pencil lines connect up again—carefully measuring the distance between the points of the two arrows to see the dimension is right.

On some of the patterns, too, there is a sectional drawing which may not be quite clear at first sight. A sectional view, however, is merely a side view of the part or parts shown in outline to indicate their position or the shape of the edges (see Fig. 9). At A we have an ordinary view of four layers of wood forming a complete part, whilst at B is a sectional drawing of the same thing.

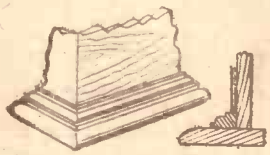
Fig. 7. A reduced pattern as printed to take up least room on the sheet.

Fig. 8 (Below). The same design as it is pasted to the wood. The two parts are stretched to the dimension printed and joined by pencil lines.



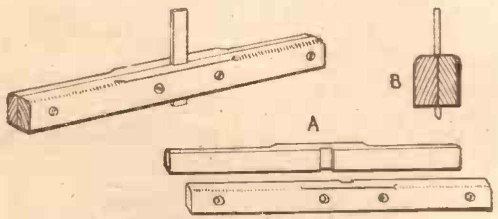
Here you have an outline of all the same parts, from a side view. The exact thickness and shape is here shown.

Fig 9. A perspective view of work, and at its side a sectional drawing.



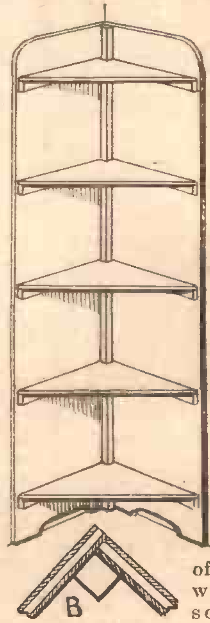
Easily Made Router

THE woodworker often requires a tool which will level grooves, recesses, and similar joints, and that shown by the accompanying drawing is a very useful home-made tool for this purpose. It should be made from hardwood, two pieces being screwed together, and the cutting iron is fitted between them. The pieces of wood should be from 8in. to 12in.

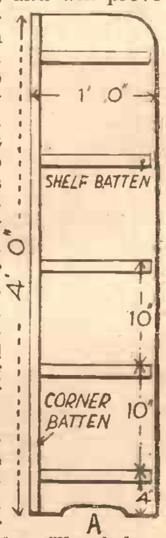


long by about 1½in. wide by ⅞in. thick, and they are fixed together with four small screws. For general light woodworking purposes the cutting iron should be about ½in. wide, and it will be found that a broken wood chisel will answer the purpose admirably. Small recesses should be cut to receive the iron, as shown at A, which must be held quite firmly when screwed together. The centre portion where the cutting iron is fitted through the wood should be left square, but the ends should be slightly rounded, as shown by the section B.

A Set of Corner Shelves



THE set of corner shelves shown here may be easily made by the woodworker, and will prove to be especially useful in the kitchen. They may be made to any size required, and the cost will be quite small as cheap plywood may be used. One of the sides is shown at A, and the dimensions will give a set of shelves of useful size. A corner batten is made of ½in. stripwood, and screwed or nailed to the back edge of one side. The shelves rest on battens ¾in. wide by ½in. thick.



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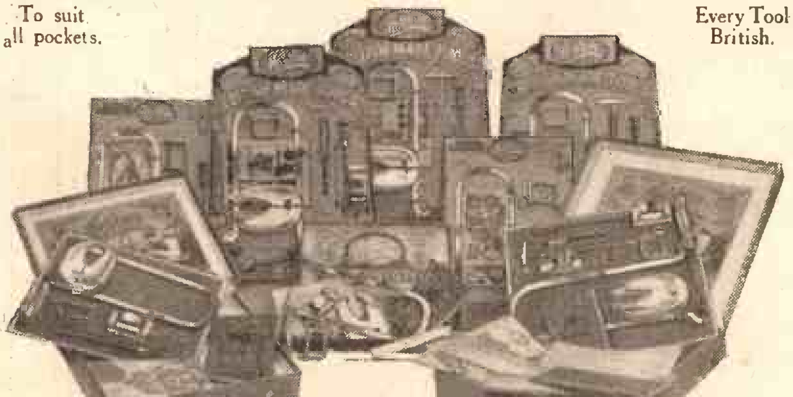

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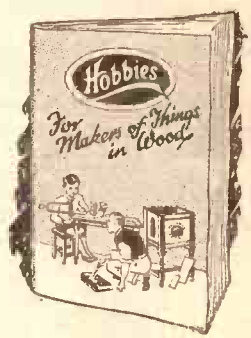

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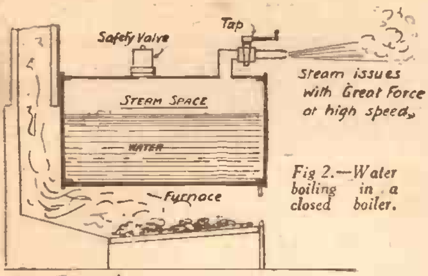


Fig 2.—Water boiling in a closed boiler.

Some facts about STEAM POWER AND THE SAFETY VALVE

By HENRY GREENLY

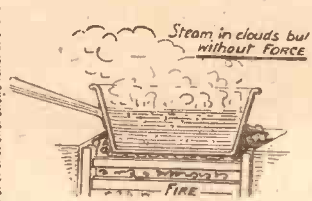


Fig. 1.—Water boiling in the open.

ALTHOUGH we may be said to be living in the age of petrol and electricity, every amateur engineer has in his heart a great love for the steam engine, even in its simplest form. It must not be forgotten that practically all our electric light and power is generated by steam power. The use of steam is therefore not yet a lost art, and it behoves everyone to start his technical education with a study of the steam engine. The best way of imbibing first principles is to make or possess a working model.

Action of Steam in a Boiler.

When you watch the kettle boiling—as I am sure you often do—and notice the steam coming more or less lazily out of the spout, you perhaps find it difficult to realise that this selfsame stuff can be utilised to propel a giant steamship across the Atlantic in four or five days, or develop enough horse-power to move a 600-ton railway train at 70 miles an hour.

Of course, a kettleful of water would be of no use for such a purpose. These larger examples of the power of steam are possible and practical, not only because of the bigger quantities of water employed in them—the larger kettles, so to speak—but to the fact that steam, like the Englishman, won't be sat upon. If you attempt to hold it in and still maintain the fire that produces it, this steam will in the end simply "burst its boiler," that's all.

You may also have noticed how fast the steam comes out of a boiling kettle or from a saucepan if the lid fits a little more tightly than usual. Well, this is what happens in a steam power plant. In a boiler the steam is to a certain prescribed extent imprisoned. Its pressure inside rises until it lifts the spring-loaded safety-valve, or is otherwise allowed to escape. The shell of the boiler must therefore be made strong enough to resist this maximum, or working, pressure. This is a question of plate thickness and proper jointings, and for a full-size boiler all these items of design are settled beforehand by skilled engineers in most intricate calculations.

To every boiler a safety-valve is fitted. This device automatically lets off any excess of pressure, and it is a very necessary accessory to even the simplest steam generator. The power bottled up inside a steam boiler is enormous, and some control is essential. It is not always convenient to use the steam as fast as it is produced by the boiler. The fire cannot be put out every time the driver shuts off the steam. He may, with dampers and by turning on the cold water supply, moderate the rate at which the steam is generated, but he cannot start and stop it altogether.

This valve can be described as a sort of cork in a bottle, held down by a weight or a piece of elastic string. The pressure inside the bottle attempts to blow out the cork, and the weight, or the elastic, as the case may be, on the top is tending to prevent this. The stronger side always wins. When the pressure is too high to be safe it lifts the cork and a certain amount of steam escapes. The pressure, of course, then falls to below the working limit and the weight or spring asserts itself and presses down the cork over the hole, keeping the remaining steam in the boiler ready for future use.

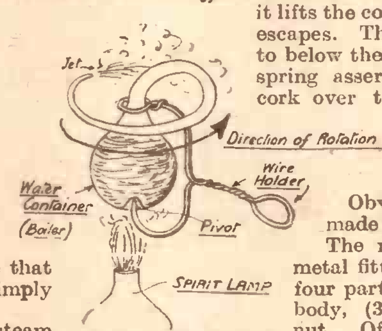


Fig. 5.—A model of Hero's reaction turbine.

Model Safety-Valves.

Obviously, we cannot use a valve made of a cork held by an elastic band. The model safety-valve is usually a metal fitting (Fig. 3), comprising at least four parts, (1) the valve, (2) the valve body, (3) the spring, (4) the adjusting nut. Of course, there are more complex and better types of safety-valves used in larger steam plants, but this sketch illustrates the simple model safety-valve. In some cases, a washer made of a comparatively hard rubber compound is employed between the valve and the steam orifice, to obtain a better degree of steam tightness. It is a little difficult to make a good metal-to-metal joint when steam pressures are very low and the valve is very small. Therefore, the slightly resilient washer between the two surfaces, as shown in the alternative sketch, Fig. 4, is used. The sketches Figs. 1 and 2 illustrate clearly the difference between steam generated in an open vessel and

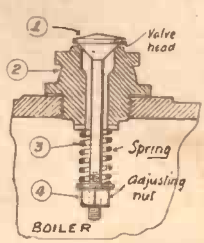


Fig. 3.—The safety-valve.

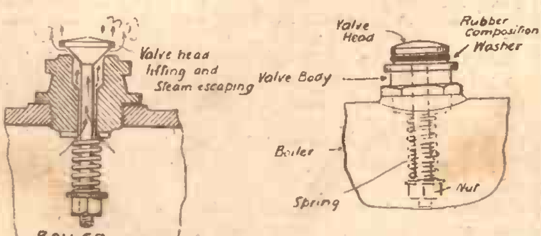


Fig. 4.—The safety-valve in action and (right) a safety-valve with a composition washer.

in a steam boiler. In the one case it drifts slowly off the surface of the boiling water in a cloud, and in the other rushes at tremendous speed out of any tap or valve.

Early Steam Engines.

The force in the imprisoned body of heated water was demonstrated over two thousand years ago by Hero, in ancient Egypt, by a reaction steam engine (Fig. 5), which device may be considered as the embryo of the modern steam turbine. Later on, another type of turbine engine, as illustrated in Fig. 6, was proposed. In this a steam jet was made to impinge on a sort of paddle-wheel fixed above the boiler. It may be termed the forerunner of the impulse turbine.

Both types make excellent working models, and are well within the scope of the beginner's workshop and skill. Of course, such models are of little practical use

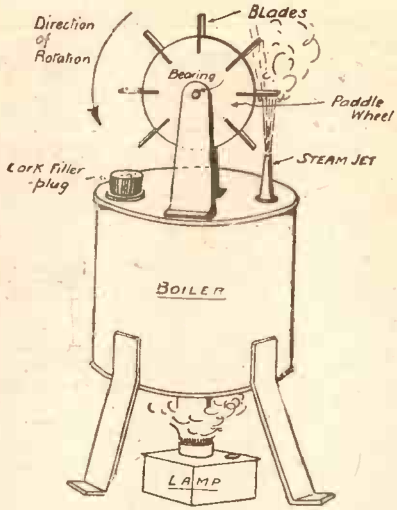


Fig. 6.—A simple steam turbine.

as power-producers. Until quite recent years, when Sir Charles Parsons developed the steam turbine which bears his name—an engine using thousands of blades in one machine alone—both reaction and impulse turbines remained only interesting historical toys.

Test the Safety-Valve.

From time to time in this particular feature more elaborate model steam engines will be described. Users and makers of such models should, however, not forget the importance of the safety-valve and the dangers attending its failure to work. Always test the valve before using a model. It may have, in a period of disuse, "stuck up." A drop of oil and a few movements of the valve up and down off its seating will soon free it and ensure perfect immunity from accident. A safety-valve that does not work belies its name.

HOW TO BUILD A DOLL'S HOUSE (*continued from page* 146).

balustrades are glued into the angle and to the sides of the house.

The model is complete, so far as the outside is concerned, but cannot be left in its rough state. The outside walls can be painted white or covered with thick white paper. A layer of brick paper is put all round, level with the bottom of the windows, or, of course, the brick paper can be added over the whole of the front of the house if preferred. To the roof we paste on the tile paper or slate paper to give a realistic effect

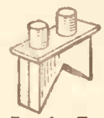


Fig. 6.—The way the chimney is made up.

Fig. 7.—The base of the pillar of the porch.

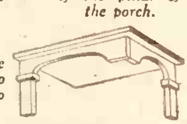


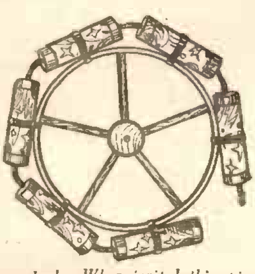
Fig. 8.—The roof and two ornaments to the porch.

there, and the chimney can be either painted white or covered with imitation brick paper.

Those who would like to finish the inside off more realistically will be glad to know that next week we shall be giving particulars of the stairs and the fireplaces for the various rooms.

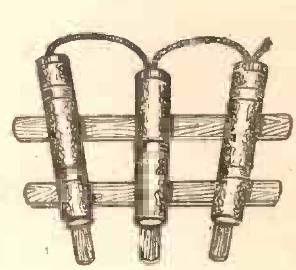
Hobbies Ltd. supply suitable paper for outside, and inside. Illustrated list of various patterns is free on request. A variety of wallpaper for inside—three sheets are required. Brick paper for the outside—three sheets required. Special slate paper for the roof—one sheet required.

FUN ON THE FIFTH (*continued from page* 151).



A large wheel. When ignited this spins round emitting a coloured circle of fire. The first firework, when finished, fires the second one and so on round the circle.

The rocket. When fired shoots into the air to a considerable height where it bursts and emits coloured stars.



By igniting the first the three fireworks are fired producing the effect of a roman candle.

the gas, you will recall that the flame produced is *green*, but in the burning of a mixture containing potassium chlorate, a gas called chlorine is produced, in the presence of which copper burns with a blue flame.

In addition to the salts of metals, pure metals are used. Magnesium, which as you know is used in the brilliantly-burning flashlight powder used in photography, is also employed in making "stars" for rockets, shells and roman candles, and for illuminating lights. Finely powdered aluminium, too, in suitable mixtures, burns with a dazzlingly bright white light.

Every type of firework has its own mixture or "composition," as it is called, and in some cases, as for example in rockets, the proportions vary according to the size of the firework. Constant experiments have to be carried out to secure the best results, as there is often a considerable difference in the behaviour of chemicals which are apparently exactly the same. Also, during the year, thousands of fireworks are let off as "tests" of those manufactured in the factory. I expect there would be a rush of applicants if we were to advertise for a reader to undertake this work; but perhaps a successful candidate would soon get tired of the post; after all, "enough is as good as a feast!"

6D. for 3D.

Any fellow with a fretsaw can get 6d. back for every 3d. he spends, if he makes these quaint cut-out calendars. The coloured pictures, wood and calendars are supplied. All he has to do is paste them down and cut out. Done in a few minutes. Easily sold to your friends for Christmas. Or suitable as presents. A wide range of pictures obtainable.

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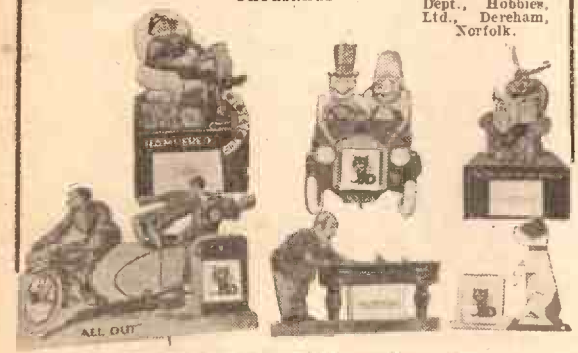

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£100 ONE HUNDRED POUNDS will be paid by the above Corporation to the legal personal representatives of any person who is killed by an accident causing material damage to any passenger train in which the deceased was travelling as a ticket bearing or paying passenger, or who shall have been fatally injured thereby should death result within one calendar month after such accident. Provided that the person so killed or injured had upon his or her person, this page, with his or her usual signature, written prior to the accident, in the space provided below, which, together with the giving of notice within seven days to the above Corporation, is the essence of this contract.

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H.I., 1930.

How to make Folding Chairs

By J. P. Bryant

THE photographs illustrating this article are for making clearer certain points of the principles of the making of folding chairs, and they will serve as a guide for the turning out of chairs of similar design; or for those of your own designs, inasmuch as all the principles are identical.

To make the chair, hard and clean wood is wanted, ash or beech being suitable. Now cut out all pieces to right sizes, then plane true, parallel and square. Pieces for small rods will be cut out a little over ⅜in. square, and those for large rods just over ¾in. square; now plane these to ⅜in. and ¾in. square respectively, then make round with smoothing plane, finishing with a sharp spoke-shave. If you have a small hollow moulding or bead plane, use this instead, carefully making rods nicely round and straight. Fig. 1 shows the positions of mortises for taking top, middle and bottom rails in the two upright rails for back. The length of these mortises is the same as the width of respective rails, also ⅞in. wide. These mortises do not come through the rails, only to ⅝in. depth. Be careful, therefore, when making mortises not to let them come through or in any other way to damage the outer surface. Make mortises so neatly that ends of rails fit into them tightly. In Fig. 2 is shown how the ends of these cross-rails fit into upright rails, and of how the former are fastened with steel brads driven in from the back of upright rails when ends have been glued and driven into position. The top of the top mortise for taking ornamental rail is 2in. down from each upright rail, each mortise being 2in. long. Top of mortise for middle rail is 7in. below bottom of the mortise of the top rail. The top of bottom mortise is 8½in. below bottom of middle rail mortise. Middle rail mortise is 1¼in. long, bottom rail ¾in. long. Top, middle, and bottom crossrails are curved as shown in Fig. 3, holes being indicated for taking rods between the middle and bottom rails.

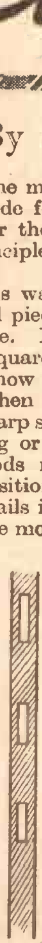


Fig. 1. Positions of mortises.

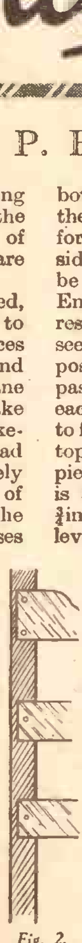


Fig. 2. Ends of cross-rails fitted into uprights.

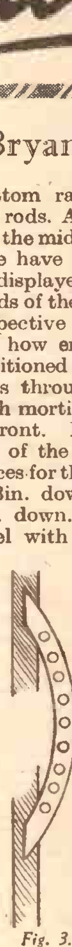


Fig. 3. The curved cross-rails.

Rod Fixing.

For securing these rods, mark out correct positions for holes, then bore these with a ⅜in. centre-bit—that is, a bit which gives a flat bottom, the latter being about ⅝in. down. It will be seen that holes will have to be bored into the lower edge of the middle rail and higher edge of bottom rail, and be on the splay to suit the slant of the rods. A glance at the photograph shows that the hole for the middle rod is bored upright, and that holes at each side have to be gradually inclined. Great care should be displayed in marking out positions and in boring holes. Ends of the rods are glued before driving home before the respective rails are fixed into position. In Fig. 3 we see how ends of these rails, also those of top rail, are positioned in upright rails, Fig. 4 showing how brads pass through from the back of upright rails through each mortise, and a little beyond, but not right through to front. In Fig. 5 we see how the mortise is made in the top of the four legs for taking the tenons of the cross-pieces for the seat. For the front cross-piece, top of mortise is 3in. down from top of each leg, and for back legs ¾in. down. Note position for these mortises as being level with floor. This is necessary for the carpet to bear thoroughly and to take the strain. At the back, however, cross-piece is so mortised that one edge is at the top for taking carpet, the longer or surface width, running straight with leg. This point is made clear by noting position of mortise in Fig. 4. In Fig. 6 we see how end of each cross-piece for taking carpet is shaped to a tenon for fitting into mortise in Fig. 5. In Fig. 7 we have position of hole ¾in. ih diameter for taking the two cross rods at front and back of legs. These holes are ⅝in. in depth, and should be bored 1½in. up from bottom of legs.

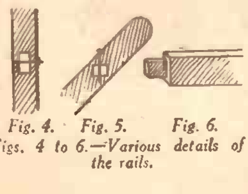


Fig. 4. Fig. 5. Fig. 6.

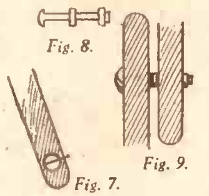
Figs. 4 to 6.—Various details of the rails.

The Fixing Together.

In Fig. 8 we see a steel bolt about 2in. long and ¼in. diameter. This bolt is flat on the inside of the head for good bearing against wood surface, while at the middle is a washer ¾in. diameter and ⅛in. thick, and another such washer at the end, beyond which the bolt is riveted. Because these bolts hold most of the chair together and provide folding movement, great care should be taken in having holes just a trifle more in diameter than that of bolt, so that folding arrangement shall work well, but not so slack that chair is rickety. Care is wanted, too, in boring holes straight, that is, at right angles with surface, and in proper position, not only so that all the parts shall fold correctly but so that the chair shall "sit" truly. Further, riveting must be so done that respective parts are made tight enough to prevent rattling, but not too tight for hard folding. Use a heavy iron or steel weight, say a 7lb. weight, with flat surface, for riveting. Place flat surface against head of bolt, holding firmly, then use a heavy hammer on the *outer* area of the end of bolt, and strike with quick, hard strokes, doing so right around. This will cause the bolt to widen and flatten and make for security. End of bolt should extend beyond the washer, the hole of the latter fitting tightly to bolt. (See Fig. 9.)

Rounding the Edges.

Before chair is put together finally, however, the ends and edges of respective parts should be nicely rounded and smoothed, the surfaces be planed smooth, and everything be put together to see how it fits, adjustments being made where necessary. Now put together finally and rub up well with fine sandpaper, then dust.

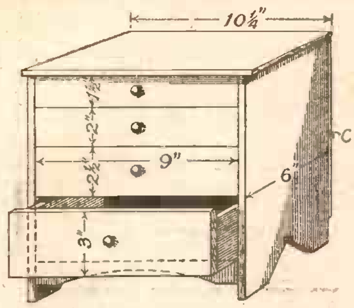


Figs. 7 to 9. Further details of folding chair construction.

The Seat.

Next the space between ornamental cross-rail and middle cross-rail should be filled with carpet. A piece is cut to proper length and width, the ends being folded behind and neatly stitched. Now a piece of attractive braiding is placed across the top and bottom of the carpet, then ornamental brass nails driven through to top and middle rail respectively, care being exercised to have nails regularly and attractively arranged. The same carpet is used for seat, and will extend full width between legs and be well folded in under front and back rails, then be securely nailed. Other material, as plush and the like, can be used provided this will stand the strain. However, no matter what is employed, this should be of pleasing colour and design, and be cut out so that the design shall be balanced. Though some other methods of finishing will do, none beats french polishing.

A SMALL TOOL CABINET



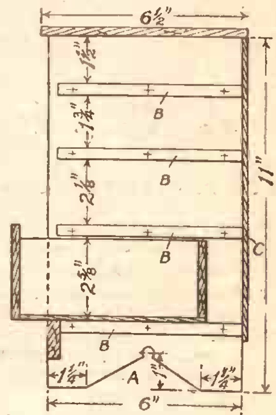
These diagrams show the completed cabinet, and the drawer construction.

THIS cabinet, which has four drawers of varying sizes, will be found very useful for storing nails, screws and small tools. For the sides of the cabinet cut two pieces of ⅜in. deal 11in. long and 6in. wide, and after planing both sides cut away part of the bottom edge of each as shown at A. On the inside of each side-piece are screwed the runners B, on which the drawers rest. These runners, which should be of hardwood such as oak, are ⅜in. by ¼in. and are each 5⅞in. long. Take care to fix the runners the proper distances apart, and see that they are parallel with each other.

The top of the cabinet is 10¼in. long and 6½in. wide, and can be cut from ¼in. wood. Ordinary three-ply wood can be used for the back, C, which is 9¾in. wide and 9½in. deep. Across the front of the cabinet, just below the bottom drawer, is a strip of ⅜in. wood 9in. long by 1¼in. wide, and shaped to a curve as shown. This curved part can be cut with a pad-saw. Use brass screws ¾in. long for fixing the sides, top and back together, and also the curved bottom part.

The drawers are all 9in. wide and 6in. from front to back, but of different depths. The fronts, backs and sides can be cut from ¼in. wood, and 3/16in. plywood can be used for the bottoms of the drawers. The sides and backs of the three bottom drawers are lower than the fronts, so as to clear the runners. The diagram shows you how the parts of a drawer are put together. Fine wire brads can be used for this purpose, except for the fronts of the drawers, and these should be glued on. To strengthen the front corners angle-fillets of ⅜in. wood can be glued in as shown.

To finish the cabinet, a small wooden knob can be fixed in the centre of each drawer front, after which the cabinet can be given a coating of varnish stain.



Section showing the runners for the drawers.

A SAND MOTOR (*continued from page* 147).

may be screwed over the outside of the hole in the wood, at the same time allowing the shaft a little side play. By lubricating the bearing occasionally with a thin grade of machine oil, the resistance to rotation should then be inappreciable. Ball bearings such as are sold for model aeroplanes may, of course, be fitted, but while these would be quite satisfactory under ordinary conditions, the slightest suggestion of sand in the ball races would cause them to fail in their object.

Care must be exercised to get the hole for the shaft truly central in the bucket wheel, and, so long as it is a reasonably tight fit, a little sealing wax or seccotine will hold the shaft and the wheel together. Pulleys of any required diameter may be fitted to the shaft. A stepped cone pulley giving two speeds is shown in the drawing. The grooves should be "Vee" shaped to provide for a cord driving belt, and as to material a hardwood or red-fibre is preferable to metal for this purpose.

The hole in the base of top hopper should be about ⅜in. diameter, and to provide for a certain amount of power regulation it should be covered with a metal plate with a smaller, say 3-16in., hole in it, filed out to the shape shown in the sketch.

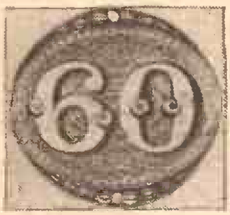
Over this orifice a plate with a similar, but opposite, hole should be arranged to slide. This may be pivoted to the underside of the hopper and have a projection or handle which can be operated from the outside. The sliding of the holes over one another will start, stop, and regulate the movement of the mill.

Mark all envelopes containing stamp queries with the word "Stamps" in the top left-hand corner.

Stamps Worth Having

By P. L. PEMBERTON.

It is a puzzle to most people to know what purpose can be found for postage stamps of the face value of 20s. and upwards. In our own country, of course, we rub along very well with a set of stamps ranging from ½d. to 10s., but it was not always so. Our current issue, when it first appeared, eighteen years ago, was rounded off by a 20s. stamp, but this was discontinued after a few years. Before that there had been Victorian and Edwardian £1 stamps for upwards of thirty years, while in the 'eighties, on tendering five sovereigns, one could procure a golden lined stamp of imposing size, inscribed "Postage — Five Pounds," and adorned with the youthful portrait of Victoria the Good. With its bold repetition of the handsome denomination "£5" on either side of the portrait, it stands as a philatelic monument to the opulent times in which it flourished. This, like the 20s. stamp, was used indiscriminately for postage, telegraph, and fiscal purposes, and this in spite of the fact that they were only inscribed "Postage," without the addition of the words "and Revenue," which were introduced later into the design of all our stamps.



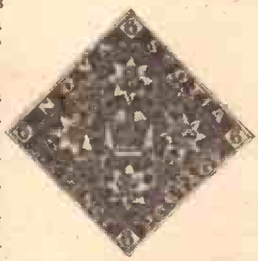
Brazil 60 (reis) stamp of 1843. They were known to have been printed in vertical rows of ten, but the numbers of the stamps in the sheets are unknown.

The £5 Stamp!

It must be remembered that postal rates, especially to foreign countries, were considerably higher then than now, and the high value stamps were used in fair quantities on insured parcels. The first printing of the £5 was on slightly bluish paper, and anyone who laid out a five-pound note on one of them at the time could to-day, provided that he had preserved the stamp in good condition, exchange it for anything from twenty to thirty times the amount. A fine used one on bluish paper is worth about £15. A later printing was in a darker shade of orange and on paper without the bluish tinge. This is much commoner and is worth only about £10 mint and £7 10s. for a fine postally-used copy ; the same stamp overprinted with the word "Specimen," sells for about 30s. The rarest of all the British high value postage stamps is the £1 brown-lilac of 1882, with the anchor watermark, on white paper. A fine mint specimen of this is worth to-day over £200.

The Queen Victoria £1 Stamp.

Curiously enough, the last £1 stamp of Queen Victoria — the long green one—is not worth more than double its face value, unused, and the Edwardian £1 is on about the same mark. Many speculators invested in these stamps in the hope of a big rise in value, but the magnitude of their operations defeated the object—for, after all, stamps must be rare to be valuable. The case of the Georgian £1 stamp is very different. Speculation which had proved unprofitable in the case of the earlier issues was not repeated to any extent. Moreover, the stamp was withdrawn from use unexpectedly, and before the fact became generally known, there were few post-offices where any could be found, with the result that it is now quoted at £8 unused and 85/- used.



The Nova Scotia Sixpenny of 1851, featuring Royal Crown and heraldic Crown of the United Kingdom.

The Green £1 Issue.

Quite a large percentage of the green £1 stamps, of all three reigns, bear the Jersey and Guernsey postmarks. This is because certain tobacco firms adopted the ingenious practice of importing tobacco by post *via* the Channel Islands, where the duty is negligible, the customs duty into this country and postage combined being paid by means of £1 stamps affixed by their agents in Jersey and Guernsey. By selling the stamps thus used, in large parcels to dealers, at from 7s. to 10s. each, the firms recouped themselves to a considerable extent. In the same way the higher values of the recent issues of Cyprus have been used in large quantities in sending Turkish cigarettes to England. Many other goods are imported from the smaller British Colonies through the post, notably sponges from Malta, Cyprus, and the Bahamas, for a large part of the cost of carriage is recovered by the subsequent sale of the stamps.

Issues of Small Colonies.

This curious and little-known practice, no doubt accounts, in some measure, for the fact that so many of our most insignificant Colonies issue stamps up to £1 and more in value, though doubtless the world-wide demand by stamp-collectors is a more determining factor, and, in any case, the great majority of such stamps are used for fiscal purposes.

Afghanistan (Shahi) stamp of 1872.

If we consider a 20s. stamp as a high value, what should we say of stamps representing £25 and over ? Of these there are several examples in the British Empire. British

Central Africa, now known as the Nyasaland Protectorate, issued stamps of the face value of £10 and £25 in 1895, though since 1898 they have dropped the latter. Since they are inscribed "Postage and Revenue," there is nothing to prevent them being used for postage when need arises, though it is needless to say that this very rarely occurs. A stamp of the value of £25 was also issued by the British colony of Northern Nigeria in 1904, and though there has been much argument as to whether this should rank as a postage-stamp, its place in the catalogue is now secure, and it is quoted at £300. In the early years of the century Natal issued £5, £10, and £20 stamps, but these were withdrawn after a few years, and luckily for the pockets of subscribers to new issue services, they have not been revived.

The Virgin Islands Fourpenny.

British African Colonies.

The extravagant ideas of the British African Colonies are easily surpassed by some of our Asiatic possessions. Ceylon has issued stamps of 100, 500, and even 1,000 rupees, the last named, at par, representing the sum of about £65!

Straits Settlements and Johore are both responsible for stamps of $100 and $500, which represent, at par, £10 and £50 respectively, though with silver at its present low price the cost in English money would now be not much more than half these sums.

Should They Be Included?

The stamps to which I have referred are beyond the reach of the majority of collectors, and even if they were not, it is debatable whether they should be included in a purely postage-stamp collection, since, on the rare occasions when they are used, the major part of their face value represents services other than ordinary postage. Many collectors limit themselves in the matter of face-value, according to their means or their desires, and by so doing, spare themselves the heartburnings which they would assuredly experience if they hankered after the doubtful luxury represented by the stamps of high face-value.

But still, there is a fascination about their possession which is sufficient excuse for the desire.

TOY ANTI-AIRCRAFT GUN (*continued from page* 148).

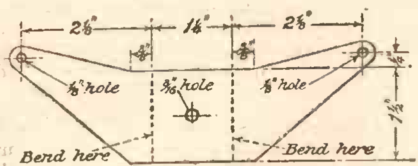


Fig. 6.—How to mark out the cradle.

out the shape on the piece of metal with the aid of a scriber or fine-pointed bradawl, drill the three holes to the sizes indicated.

We now have to cut the piece to the required outline, and for this purpose we use a hammer and chisel. Lay the metal plate on top of an ordinary flat-iron (this makes a good anvil) and cut all round the outside of the line with the chisel. When you have done t is, the edge must be carefully filed down to the line, and the two ends bent up at right angles on the dotted lines.

Gun Mounting and Base.

It will be noticed upon reference to Fig. 1 that the gun cradle is mounted on a conical pedestal support. In our simple model this can be of wood, and could be turned in a small lathe to the shape shown. If a lathe is not available, this part will have to be shaped by hand with a carpenter's chisel, and finished with a rasp and glasspaper. The base is simply a piece of ⅜in. wood 3½in. square, which can be fixed to the pedestal support by means of two screws driven in from underneath.

A brass screw 1in. long and a washer are used for fixing the cradle on top of the pedestal. The screw should not be screwed down too hard, but just sufficiently to permit of the cradle being turned easily.

In order to maintain the gun in a central position when mounted in the cradle, a piece of brass tubing about ¼in. long can be slipped on each trunnion, as shown in Fig. 2. When placing the trunnions in their respective holes in the top of the cradle, press the longer trunnion in place first, then spring the opposite side of the cradle out slightly, and slip the other trunnion in position.

Clamping Device.

All that is now required to complete the gun is the clamping nut and handle J. The latter may consist of a piece of French nail pressed into a hole drilled at an angle to receive it in the side of the nut, and then soldered. The end of the handle should be nicely rounded with a file.

How to Work the Gun.

To fire the gun, the spring-rod is pulled back till the catch-plate snaps behind the stop E, thus "cocking" the gun. A steel cycle ball is now dropped down the barrel, and the trigger piece depressed, which releases the catch-plate and allows the spring to project the ball.

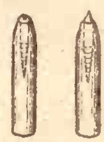


Fig. 7.—The wooden shells.

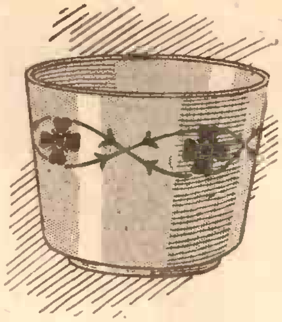
Ammunition.

In addition to cycle balls, "shells" could be used, made from a hardwood rod, pieces about 1¼in. long being cut off and a hole drilled in each to take a round-headed screw. After inserting the screw, file the end of the wood, as shown in Fig. 7, so that the end of the "shell" comes flush with the head of the screw. Another kind of "shell" is also shown in Fig. 7. In this case the head of the screw is cut off with a hack-saw, and part of the stem is filed to a sharp point.

Some good fun may be had by getting a small toy balloon, tethering it about 4ft. from the ground, and firing at it with the sharp-nosed "shells."

Windmill and tree ornamentation.

Making
ORNAMENTS AND VASES FROM OLD NEWSPAPERS
By C. G. Jackson



Floral decoration.

Materials Required.

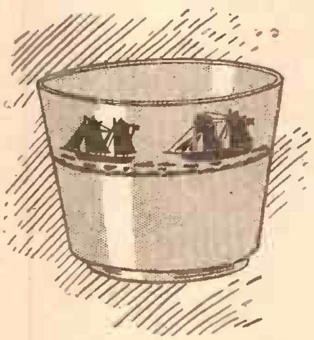
FEW hobbies present so few difficulties at their start as this one, since the materials are easily acquired. They are: plenty of old newspapers, a bowl of water, a little alum, and a bag of flour.

Cut the several newspapers into pieces roughly 2in. square; it doesn't matter in the least about them being of irregular size, but it does matter that they should not be much larger than the size given. Put the pieces into a bowl of water and leave them to soak for a couple of hours. Now make your paste of flour—say a cupful mixed with cold water until your paste is of the consistency of fairly thick cream. It will now want boiling water added until the consistency is more like the cream skimmed from the top of milk. A tablespoonful of alum is now added to this mixture to make the papier mâché more durable, incidentally making it fireproof, and when the paste is quite cool you are ready.

With this article are some sketches showing the first and easiest models to begin upon and undoubtedly the ordinary basin—without a lip—is the best.

Getting to Work.

We will assume that the paper is now soaked sufficiently; you then take the basin or bowl selected and cover it *inside* with a layer of cut-up newspaper. Now here comes the chance for a little skilful work in what may have seemed so far a ridiculously easy job. You must not leave any space upon the inner surface of the bowl uncovered; at the same time you must not overlap the pieces or the final result will not be to your liking. By taking care it will be found quite easy to fit in the pieces, remembering after all that you have cut them from a common sheet, and that they did once comprise a whole. It does not matter in the least if the rim of the bowl presents an uneven appearance; it can be trimmed off afterwards.



Ship style of decoration.

Now comes the next and most important stage. Give the newspaper lining of the bowl a good coating of your paste, taking care to cover the whole of the surface without displacing any of the sections. Here is a hint worth taking particular notice of: don't put the paste on too thickly. Then follows the second lining, and here again care is needed to prevent overlapping, yet ensuring that the whole surface is covered. This operation is repeated again and again, until you have from six to eight layers, thus ensuring a sufficient thickness. The bowl may now be set aside in a safe place to dry, care being taken that it will not catch any dust. It s a good plan to have three or four bowls under construction at the same time.

When thoroughly dry, remove the papier-mâché lining from your bowl. Trim off the edges of the rim with a sharp knife, and with a small piece of glass-paper go over the bowl to give it a finished appearance. It is now ready for enamelling. Do not hesitate to employ colours, but, on the whole, there is nothing quite so nice as the all-over black coat relieved by gold, silver, or coloured designs.

Designs for the Bowls.

These are largely a matter of taste, but here we show a few very simple methods of decorating bowls. You have an almost unlimited scope if you are skilful with pencil or brush; if you lack the skill, buy your pictures—coloured or black and white—and put them on, afterwards giving the whole a coat of fine varnish. Or you may cut out pictures from magazines and paste them on. Silhouettes in white are very effective. Or again, with enamel or gold paint carry out some very simple scroll designs. One of the best is the black and white chequer design which looks so effective on the old warships. Sealing wax may be employed, in various colours, for working a design upon the bowl; but I would here add that, unless laid on very thinly, it will chip.

A MODEL FUSELAGE MONOPLANE (*continued from page* 144).

one edge of each piece is allowed to dry in order to stand the pull of the fabric when the other edge is being glued. The mainplane, for instance, was covered in two pieces, the bottom surface first and then the top. The fuselage was covered in four pieces in a similar manner, and the surplus silk trimmed off with a razor blade. Two coats of clear dope were applied, an interval of several hours being allowed between coats.

Flying.

The model is flown with eight strands of $\frac{1}{4}$in. by $\frac{1}{16}$in. strip rubber on each gear, well lubricated. To trim it for flying, see that the tail is tilted upwards very slightly at the back, *i.e.*, a negative angle of incidence is put on. When viewed along the top longerons, the back edge of the tail should be just visible. Then arrange the mainplane so that the model balances on the spars, *i.e.*, the centre of gravity should about coincide with the maximum camber on the wing. Give the propeller about a hundred turns and launch slightly downwards into the wind. If the model stalls or flies in undulations, the plane is too far forward; if it dives, it is too far back. Once the right position has been found, the turns on the rubber may be increased gradually; it should stand about five hundred turns with safety.

Let Your Editor Help You. Address your letters and queries to The Editor, "Hobbies," Geo. Newnes, Ltd. 8-11, Southampton Street, Strand, London, W.C.2. All letters and queries must bear the full name and address of the sender.

"Hobbies" Model Airship.

AS I explained last week, I am making arrangements for early publication of an interesting article on building a model airship. The expert who is undertaking this task for me is associated with one of the largest balloon and airship building firms in the world. The "Hobbies" model airship will not cost many shillings to make. It will not be a small model, for it will be five or six feet long. Its shape will be somewhat similar to the R100, and it will be driven by elastic. It will ascend to a height of 50ft. or 60ft., and remain aloft for a considerable time. I will try and squeeze in an illustration of it next week.

A Note to Querists.

IT would greatly aid my technical staff whose special duty it is to answer all those interesting queries from readers amounting to several hundreds a week if they would write on one side of the paper and use a separate sheet for each subject. In their haste to avail themselves of "Hobbies" free advice service, several readers are omitting to put sufficient stamps on their letters. This often causes delay in replying to readers' questions.

Our New Competition.

SO popular has our puzzle pastime competition proved that I am starting a fresh puzzle competition the week after next. The prize list will be just as big and just as attractive, so that all those readers who have been unsuccessful in our first competition will have another chance of securing one of our splendid prizes. The Competition Editor is now busy judging the entries in the puzzle pastime competition, and I hope to publish a list of prize-winners the week after next.

Crazy Golf—and Billiards.

NOT all of us have the space necessary to lay a crazy golf course. Accordingly, I am having prepared a design for an indoor 5-hole crazy golf course. There are some cute hazards, and the game will be even more entertaining than outdoor crazy golf.

Realising that readers do not always wish to make articles of practical utility, I have made arrangements, for early publication, of some designs for other popular indoor games.

And I shall shortly publish an article on making a miniature billiard table at little cost.

NEXT WEEK!

Building The "Hobbies" Gramophone Amplifier.

TAKING AERIAL PHOTOGRAPHS WITH A KITE.

Making Dry Cells.

The active element in dry cells, B. H. (Colnbrook), is a paste mixture containing flour, plaster of paris and sal-ammoniac. This is smeared all over the inside of the zinc containing case. A carbon rod is supported in the centre so as not to touch the paste or the zinc case, and this rod carries the positive terminal. The space left between the rod and the paste is rammed tightly with a powdered peroxide mixture, leaving enough room to seal off the cell at the top with pitch. A cell so formed gives a small fraction over 1.5 volts when new.

Making Liquid Glue.

To make liquid glue, H. H. (West Croydon), break some glue into small pieces, soak it in strong acetic acid, and then melt it by standing the container in hot water, adding more acetic acid. About 1 part of glue to 5 or 6 parts of acetic acid will be required.

Preventing Rust on Plated Parts.

W. C. J. (Walthamstow) wishes to store his cycle for the winter, but as the plating is scratched he wishes to preserve against rust. The handle-bars should be bound up with insulating tape, and the other parts coated with a mixture of vaseline and sweet oil.

Dull Finish on Oak.

One method of imparting a dull finish on oak, W. R. C. (Acle), is first to apply french polish and varnish, and when this is hard, to rub down the surface by means of pumice powder or emery, applied with a hard brush, such as a nail-brush. An antique finish is gained by applying a wax polish after the dulling down process; this imparts a gloss instead of a shine.

The Wireless Phonetic Alphabet.

The phonetic alphabet generally used for wireless telephone call signs is as follows, B. F. (East Dulwich). A, Ack; B, Beer; C, Charlie; D, Don; E, Edward; F, Freddie; G, George; H, Harry; I, Ink; J, Johnnie; K, King; L, London; M, Monkey; N, Nuts; O, Orange; P, Pip; Q, Queenie; R, Robert; S, Sugar; T, Toc; U, Uncle; V, Vic; W, William; X, X-ray; Y, York or Yorker; Z, Zebra.

Speed of Light.

The speed of light and the speed of wireless waves are the same—186,000 miles per second. Light takes about 8¼ minutes to travel from the sun to the earth, A. A. (Birmingham).

Highest Inhabited Altitude.

The highest inhabited altitude is 16,500ft. in the Bolivian Province of Phiphos. The pressure of the atmosphere there is reduced almost to one-half that at sea-level. The highest town in the world is Pasco, in Peru, which is 14,000ft. above sea-level. This is in reply to W. W. (Dorking).

A Cheap Grain Filler.

A mixture of Russian tallow, plaster of paris, and Venetian red is often used for the purpose, S. N. (Northampton). The tallow is melted in an iron pot, plaster of paris and Venetian red being added if for a mahogany colour, and umber if for a walnut finish, the polish and varnish being made from button shellac instead of the usual flake variety known as orange or lemon shellac.

Compressed Air for Driving Model Aeroplanes.

Compressed air may be used to drive a model aeroplane, G. H. (Hounslow). You will require a copper container made from sheet copper .002in. thick. This should be wound round a wooden former and soldered to form a cylinder. Two half-balls are soldered to each end, and an ordinary cycle valve into one of these for inflation purposes. Small compressed-air engines are obtainable from advertisers in this journal.

Elastic for Model Aeroplanes.

The best size elastic, E. J. (Dimchurch), for model aeroplane purposes is first quality flat strip $\frac{3}{16}$in. wide by $\frac{1}{32}$in. thick. Don't forget to lubricate this with pure green soft soap.

Making Gold Ink.

Take equal parts of honey and gold leaf, thoroughly grind together until the gold is absorbed, agitate with 30 parts of hot water and allow to settle. Strain off the water, washing again many times; finally dry the gold. For use, mix with a little weak gum water. I hope this is the information, P. N. (Manchester), that you require.

Fillings for Blow-holes in Castings.

Blow-holes in castings, C. F. (Darlington), may be filled by using a thick paste made with sal-ammoniac 2 parts, flowers of sulphur 1 part, iron filings 80 parts. This is mixed with water and melted into the holes. These holes are due to gases being trapped during the casting process.

Advertisements are accepted for these columns at the rate of ½d. per word, prepaid.

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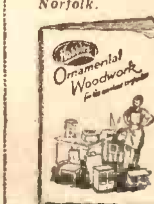

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