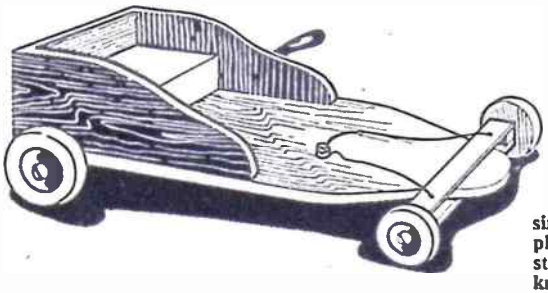
57th YEAR OF PUBLICATION

MAY 7th 1952

Hobbies WEEKLY

VOL. 114 NUMBER 2949

Full-size Plans for a 'Chuck' Glider in this issue



Build the boy this

SPEEDY LITTLE COASTER

Construction is simple, but it is a plaything which will stand many hard knocks.

THE simple lines of the coaster described here have been so designed that additional strength and support are incorporated wherever they are most needed, at the same time keeping the construction free from any intricate joints. A toy of this nature will, obviously, be subjected to more than its fair share of hard knocks. Ensure that it is as stoutly constructed as possible.

Baseboard

For the base-board of the chassis you will require a length of ¾in. thick timber, 14ins. wide by 27ins. long. Since it is unlikely that a board of this width will be obtainable, it will have to be made up from two 7in. wide lengths of timber.

Plane and square up the two boards. Mark out the shape of one side of the chassis on one board, place both boards together in a vice and cut both to shape at the same time, using handsaw and bowsaw to remove the waste and cleaning up with spokeshave and glasspaper.

When the chassis has been cut to shape, join the two boards, using a simple rubbed joint and strengthening the underside of the chassis with three battens, each 3ins. wide, as shown in Fig. 1.

The sides and back of the body are next on the construction list. These are cut from ¾in. timber and should be shaped to the pattern and dimensions given in Fig. 2. The sides should be placed together in a vice when working to ensure that they are made identical in outline.

If desired, the small seat may be dispensed with, but its addition will not entail the use of much extra timber or labour, and it does much to strengthen the body of the coaster. The seat consists of a 8in. wide piece of board, 12½ins. in length, mounted upon two stout fillets of wood, each 1in. in thickness by 4ins. wide and 8ins. long (see Fig. 3).

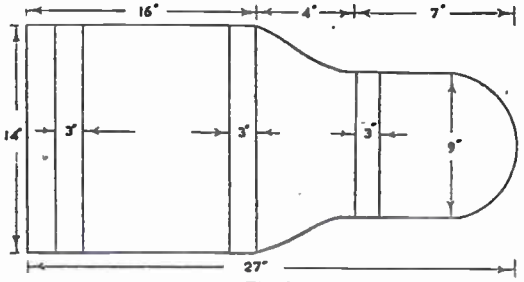


Fig. 1

Assembling the Body

When assembling the body, the sides and back are nailed or screwed to the baseboard first, and when these are securely in position, the supports for the seat are nailed or screwed to the

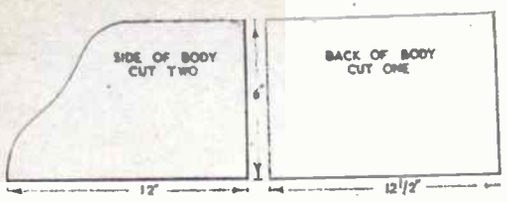


Fig. 2

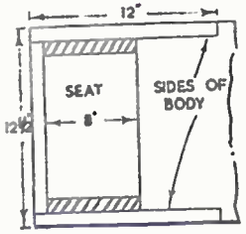
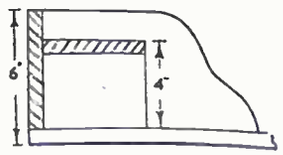


Fig. 3



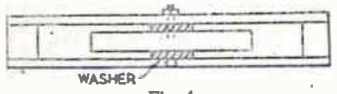


Fig. 4

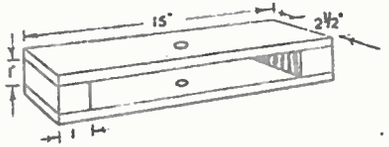


Fig. 5

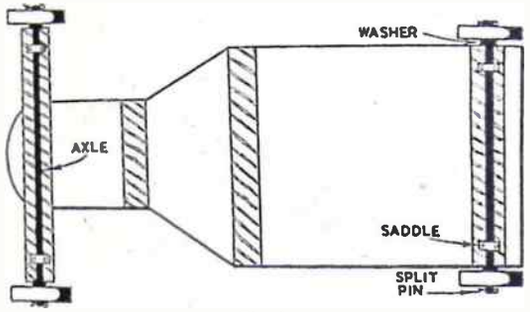


Fig. 6

baseboard and the inside of the body, the seat being then fastened to the back and to the supports.

Fig. 4 shows the movable steering-piece on which the front wheels are mounted. The two stretcher bars are cut from ¾in. timber, each being made 2½ins. wide by 15ins. long. They are joined at each end by screwing them down to two blocks of 1in. square stock, as shown.

Fixing the Steering-Piece

The steering-piece is attached to the front of the chassis by a short carriage-bolt, passed through holes of appropriate diameter bored to receive it. The bolt is inserted from the underside of the steering-piece, the head of the bolt being countersunk so that it is flush with the surface of the wood. The end of the bolt should be burred over, by hammering it lightly, in order that the nut is retained in position. Washers must be inserted immediately above and below the base-board (see Fig. 5).

Rubber-tyred metal wheels are best for the coaster, but hard-wood wheels can be made quite serviceable if they are metal-bushed, to ensure their longer life and better performance.

An ordinary wooden wheel can be bushed by cutting off a short length of metal tubing to the same width as the wheel, the bore of the tubing being slightly larger than the diameter of the axle-rod that is being used. The existing hole in the centre of the wheel should be sufficiently enlarged to enable you to tap home a short length of tubing, previously cut to size with a hacksaw.

If desired, the rear wheels may be larger in diameter than the front pair. This will have the effect of raising the rear of the coaster and giving it a 'rakish' pitch.

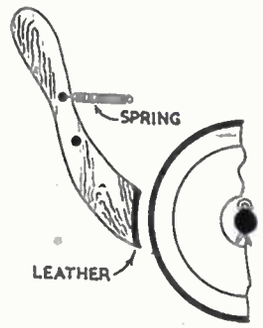


Fig. 7

The axles are fastened to the underside of the coaster by means of metal saddles made from strip-iron, cold-bent to the necessary shape. Mild steel rod of the requisite diameter may be used for axles, if necessary.

Front Axle

The front-axle is secured to the lower bar of the steering-piece, and the rear-axle is screwed down to the batten marked (C) in Fig. 1. Washers should be used on either side of each wheel. For detailed fixing of the axles see the underside of the coaster, as illustrated in Fig. 6.

The hand-brake is fitted to the right-hand side of the coaster (unless the rider is left-handed), and is bolted in such a position on the body that forward pressure of the handle results in the leather pad being brought into firm contact with the rim of the rear-wheel. A small spring keeps the brake clear of the wheel when not in use (see Fig. 7).

Making the Brake Arm

The brake-arm is cut from a small, stout length of timber to the shape shown in Fig. 7. Measurements have been omitted since these are mainly determined by the diameter of the rear wheel and the handiest position for the brake from the rider's point of view. The pad of leather which is tacked on to the business-end of the brake can be easily renewed as and when required.

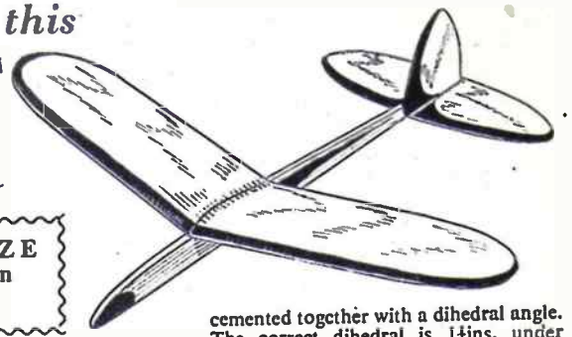
Finishing

Once the final assembly of the coaster is complete it will be time to think about the finishing touches. Do not spoil the ship for a ha'porth of tar—or, in this case, a few odds and ends of paint. Give the woodwork a final rub down with glasspaper and follow up with a coat of priming paint in a neutral shade. Use enamel or hard-gloss paint for the final coat, and pipe the edges of the coaster in a contrasting shade. Do not be sober in your colour scheme. Use gay, dashing colours.

The steering of the coaster may either be done with the feet or by means of 'reins' attached to small holes drilled in the top bar of the movable steering-piece. (362)

You'll get good results from this

QUICKLY BUILT 'CHUCK' GLIDER



THE simplest of all flying model aeroplanes is the 'chuck' glider—so called because it is launched by hurling it into the air. And the harder it is thrown, the longer it should fly—or so it is claimed! Actually there is quite an art in launching a 'chuck' glider properly to get the best duration—an art only acquired by practice, and careful trimming. Hurling a badly trimmed model into the air will most probably result in it hurtling downwards again—to strike the ground with terrific force.

FULL-SIZE plans are on page 95

Fortunately, however, models of this type are pretty robust. They are built of solid wood—balsa for lightness—and can take quite a few hard knocks without damage. The main thing is to make a really good job of all the cement joints for it is here—particularly the wing-fuselage joint—that the greatest stresses occur.

Excellent Performance

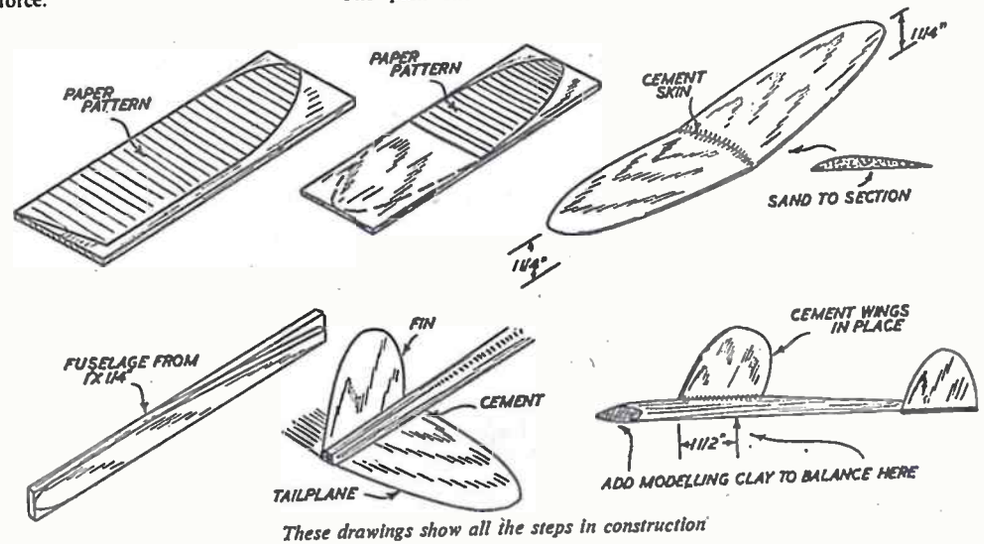
The model described is capable of an excellent performance and flights of forty-five seconds or so should be commonplace once you have reached the 'expert' stage. Even a beginner should have no difficulty in getting it to fly properly and turn in thirty second flights, with very little practice. Furthermore, cost of materials is low and building time only a matter of an hour or so. You can spend a lot more time on filling and polishing the balsa surfaces, but this is not strictly necessary.

The plan shows all the necessary parts full size. Cut out the wing, tailplane half and fin and use these parts as templates. For example, pin the wing template out on to a 6½in. length of medium hard ¼in sheet balsa (3in. wide sheet) and then cut round this outline to form the wing panel. Use the panel to cut out another identical panel.

The tailplane is cut from a 6in. length of ⅛in. light balsa sheet. Mark on the centre line and then use the paper pattern to trace or cut one half at a time. This will ensure a perfectly symmetrical tailplane. The fin is also cut from light ⅛in. sheet.

Carve and glasspaper each wing panel down to a reasonable aerofoil section and then chamfer the root of each slightly so that the two panels can be cemented together with a dihedral angle. The correct dihedral is 1¼ins. under each tip, so prop the wing up to this and cement together. Add a skin of cement over the top of the joint for greater strength.

The tailplane and fin can be glass-papered down slightly and the edges rounded off. It is not necessary to glasspaper these down to any aerofoil section.



These drawings show all the steps in construction

The Fuselage

The fuselage is cut from a strip of 1in. by ¼in. hard balsa, 10ins. long. Taper off the rear end, as shown on the plan and round off the nose. Round off the edges of the fuselage with glass-paper, but *not* where the wing and tail unit positions come. The fuselage is not tapered in width, incidentally.

Fixing the Tail Unit

It is a simple matter to cement the tail unit to the fuselage. The tailplane cements on the bottom of the fuselage

(*Continued on page* 84)

Books to Read!

A review of interesting books for craftsmen which have been recently published. Obtainable through newsagents or booksellers or direct from the publishers mentioned.

Successful Conjuring for Amateurs
by Norman Hunter

EDITED by F. J. Camm and published by Messrs. C. Arthur Pearson, this is one of the most comprehensive books on the subject of conjuring that the reviewer has so far chanced to see. It contains a fine collection of fully explained tricks and illusions, including the secrets of many famous acts which have baffled audiences for generations. Whether your ambition is to be a successful amateur entertaining your friends at parties, or whether you wish to progress from being a good home conjurer to stage work, this is certainly the book for you. It is not cheap, but is so comprehensive that it represents best possible value for money. As with all books with which Mr. Camm is associated, this volume is profusely illustrated, and the standard of the photographs and line drawings is of a very high order.

Published by C. Arthur Pearson, Tower House, Southampton Street, Strand, W.C.2—Price 18/-.

• • •

Stereoscopic Photography
by Arthur W. Judge, A.R.C.S., D.T.C., Wh.Sc., A.M.I.Mech.E.

THE author of this work has been associated with stereoscopic technique for over 30 years, and in this book he gives a comprehensive account of the theory and practice of stereoscopic photography and its applications to industry, science and education. Since the last edition was published, many new developments and applications have taken place and new apparatus has been produced commercially.

Published by Chapman & Hall, 37 Essex Street, London, W.C.2—Price 42/-.

• • •

Everyman's Wireless Book
by F. J. Camm

THE author of this book, now in its 11th edition, needs no introduction. To older readers of *Hobbies Weekly*, he is known as a one-time editor of this paper. He is at present editor of several magazines published by George Newnes, and is a recognised authority on the subject of radio. This particular volume from his prolific pen forms an elementary introduction to the principles of radio transmission and reception. It takes the reader from first principles, through the various stages from the microphone to the reception of the programme in the home. Happily for most of us, it dispenses with mathematical formulae and guides the reader through easy stages to such subjects as fault finding, the building of receivers and the obtaining of perfect reception. The many illustrations are clear and to the point, and for the man who wants to know about radio, this book is highly recommended.

Published by George Newnes Ltd., Tower House, Southampton Street, Strand, W.C.2—Price 12/6.

• • •

Cine Photography for Amateurs
by J. H. Reyner

WHEN this book was first written, the possibilities of the home cinema were still largely unexplored, but over the years this hobby has gained ground rapidly and now ranks among the most popular hobbies in the country. Mr. Reyner's work in cine photography is well known, and his book is full of practical value, the outcome of many years' experience with the cine camera. It is the fourth edition of this book and it has been revised and brought thoroughly up to date. In it the enthusiast will find sound advice on the taking and projection of good films, and the book will well repay careful study. Everything the amateur needs to know is clearly explained, and the contents are really comprehensive. The would-be cine photographer is taken right from the principles of his art, through the stages of taking and processing the films, to their editing and projection. This is not a cheap book, but for the man who wants to take good films it is an excellent investment.

Published by Chapman & Hall, 37 Essex Street, London, W.C.2—Price 22/6.

MAKING THE 'CHUCK' GLIDER

(*Continued from page 83*)

and the fin to one side of the fuselage, on top of the tailplane. This method gives the strongest glued joints and is also self-aligning. Form a fillet of cement between the fuselage and the fin and tailplane and leave to set.

Slightly flatten the underside of the centre of the (joined) wing with glasspaper and then cement the wing on top of the fuselage in the correct position, as on the plan. Form a large fillet of cement between wing and fuselage to make a really strong joint. Then leave the assembly plenty of time to set. There is no objection to pushing pins through the wings into the fuselage to hold the assembly temporarily until the cement has set.

Finally clean up the whole model by glasspapering lightly and then add the modelling clay balance weight to the nose. Add just enough weight for the model to balance level when supported under the wings at a point 1½ins. back from the leading edge. Provided your model is assembled as per the plan this should be the correct balance point for flying. However, since the weight of balsa wood varies considerably you may require slightly more, or less, ballast. It is an easy matter to trim the model by test flying.

Take the model out of doors, preferably on a calm day, and launch gently from shoulder height. If it stalls, simply add more nose weight. If it dives, remove some of the weight. You will then want a reasonable amount of space to see just how well your model can fly.

When properly trimmed, launch upwards with a throwing motion, aiming the model at about 45 degrees to the horizon. If it tries to go into a loop and dive right down again, try warping the rudder slightly in one direction or another so that the model pulls out into a glide circle at the top of the climb. Persist with this method for obtaining long flights. Once properly trimmed you can fly your model in quite strong winds with little risk of damage. (355)

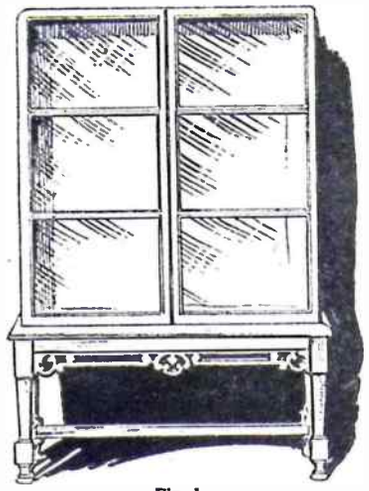


Fig. 1

The construction of a CABINET BASE

A READER tells us that he has a book cabinet and desires to raise it a matter of 2ft. off the floor by means of an open base. Having supplied certain diagrams which should help him, we pass the suggestion on in the hope that other readers may benefit in the same way should they have a similar cabinet.

The actual appearance of the finished job is seen in our sketch (Fig. 1) and shows how by means of four turned legs, a few rails, and a fretted front rail, the whole cabinet is transformed.

The cabinet shown is 4ft. wide, and the base is constructed to conform proportionately with this width. It is quite possible, however, to adapt the design to suit a narrower cabinet by designing the rails, etc., accordingly.

Remember that the cabinet, being intended for books—which are heavy and bulky—must be well made. If the cabinet is intended to house pieces of china or similar, then certain rails, and even the legs, might be less in section and weight to give a lighter appearance, but we have suggested here, sizes that would suit the book cabinet.

The Legs

Square legs 2½ins. in section with turned centre and foot are shown here, and are suitable for letting in the rails according to the details given in Figs. 3 and 4.

Before beginning construction look at Fig. 2. This shows a front view and an end view of the base with the wide top rails (A) connecting the two front legs, and rails (B) binding the back legs with the front pair. Each end pair of legs is held by the short rails (C) into which is tenoned the cross rail (D).

The ornamental rail (E) lies flush with the rail (A) and is housed into the legs at the ends.

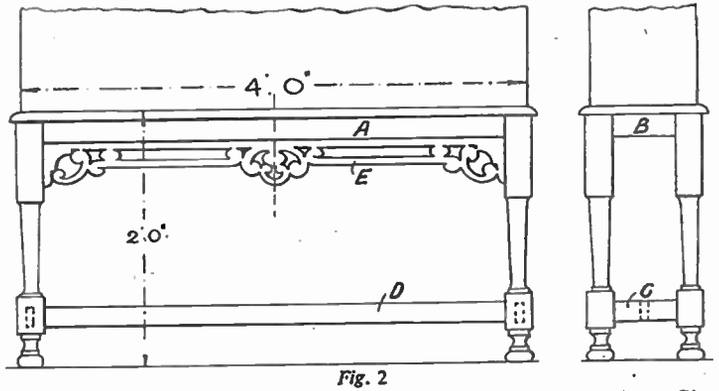


Fig. 2

On the top of the legs, and projecting about ¾in. or so beyond the faces of them, is the main top frame, a portion of which is shown in Fig. 6. It is on this completed frame that the cabinet is secured.

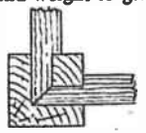


Fig. 3

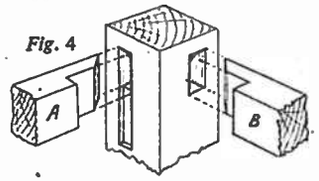


Fig. 4

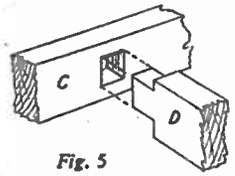


Fig. 5

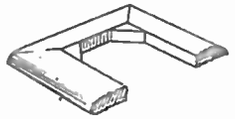


Fig. 6

The first job is to make a drawing of the front view and the side view of the base, so that the mortises of the legs and rails can be set out accurately. The cross section of one of the legs showing how the rails go into it is seen in Fig. 3, and note should be taken of how the rails are shouldered to the leg on the outsides and meet at the junction of the two mortises. Care must be taken to cut the angles of the tenons accurately, as much of the strength of the joint depends on a tight fit.

In Fig. 4 is shown the top of the leg with mortises cut and the two rails cut and trimmed ready to go into them. The housing is also shown here ready for the end of the front fretted rail to be glued in.

The lower rails of the base are shown cut ready for fitting in Fig. 5. Note how the long rail (D) is shouldered into the short cross rails (C).

Careful measurement must be taken in preparing the top frame, and the ends of all four rails must be cut accurately to 45 degree mitres. Glued blocks should be put in the corners inside as shown.

Fretted Rail

It will be observed that a number of simple scrolls constitute this rail, which is for ornamentation only, to relieve the otherwise somewhat severe effect of the whole front. Only half the design need be drawn, the other half being prepared by first making a tracing of the finished half and then turning this over and laying a sheet of carbon paper under it, drawing over this. A good solid line should be aimed at so as to get a sound guide for cutting.

Use a coarse fretsaw and clean both faces of the rail before fixing it in its place. A thumb moulding should be worked along the four edges of the top frame and smoothed with glasspaper.

The wood chosen for the cabinet base should, of course, be suited to that of the cabinet itself, and should be finished appropriately. (367)

Concrete and Metal make

AN ORNAMENTAL SHOE-SCRAPER

THE making of the ornamental shoe-scraper shown here is an interesting piece of work, which any average handyman could undertake. Though it entails a certain amount of woodwork in constructing the moulds, no great carpentry skill is required. The project holds a chance of making quite a bit of pocket money, too, for once the moulds are made, any number of the 'dog' ornaments can be made.

Briefly, the scraper consists of three distinct items, the base, the metal scraper and the moulded 'dog' sitting at one end of the base. The illustration Fig. 1 gives a good idea of how the article looks.

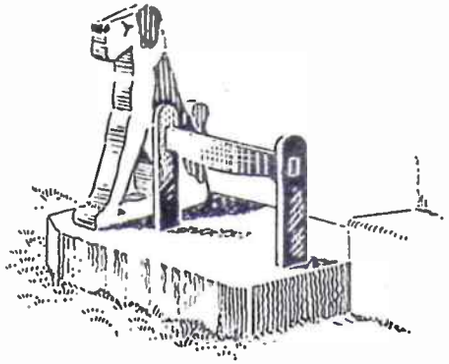


Fig. 1—The completed scraper

Solid Base

The base consists of a solid piece of concrete 3ins. deep and about 15ins. long by 12ins. wide. In the top surface of the concrete a recess is formed to take the 'tenon' of the cast concrete dog.

The mould for the concrete base is seen in Fig. 2, and it is made up of a few pieces of ½in. box wood, planed up, cut to required size and strongly nailed together. In the four internal angles of the frame, triangular blocks of wood are nailed, and over all is nailed the floor—which can be made up of two or more boards.

At one end of the floor must be nailed a block of wood as shown in Fig. 2 to form the sinking for the tenon of the dog. This block should measure 6½ins. long by 2½ins. wide and 1½ins. deep, and should be placed on the floor 3½ins. away from one of the long sides of the mould frame, and 1½ins. away from one of the short sides.

The frame is now complete and ready to receive the concrete. Before adding the concrete, however, it will be best to prepare the mould for the dog.

There are two distinct methods of making this mould and each will be described. In the first case a simple rough, but strong, frame is made up like Fig. 3, with an inside measurement of 19ins. by 14ins. The rails forming the frame should be 2½ins. wide and nailed to a strong floor of two or more narrow boards.

Now proceed to the making of the pattern of the dog. On a piece of board 1½ins. thick and measuring 16½ins. by 12ins. draw the outline shown in Fig. 4, using the squares as a guide for enlarging in the usual way. Cut round this with the fretsaw. Note also the one interior piece which must be dealt with. When this has been done, proceed to make another cut-out to exactly the same outline. Screw the pair together, and then lay them in the box frame so that a slight clearance appears all round as Fig. 3 shows. Next lay a light wood rail across from side to side and screw this to the dog pattern and to the side rails, just as shown in Fig. 3. Fine sand is banked hard around the pattern, and forms the mould when the wood pattern is drawn upwards and away from the floor, the cross rail and the small blocks of wood facilitating this action. The sand must be fine and evenly spread, and tamped down with a suitable tool hard up against the wood pattern so as to form a hard 'wall' to withstand the pressure of the concrete when this is poured in.

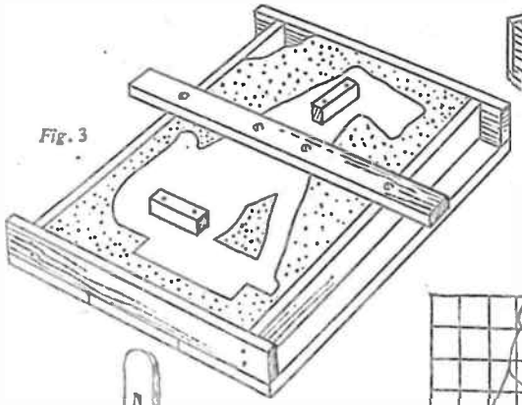


Fig. 3

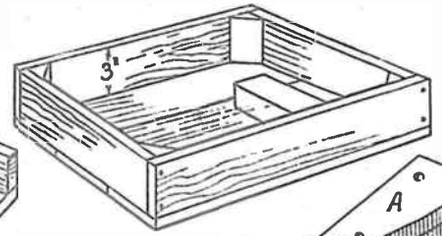


Fig. 2

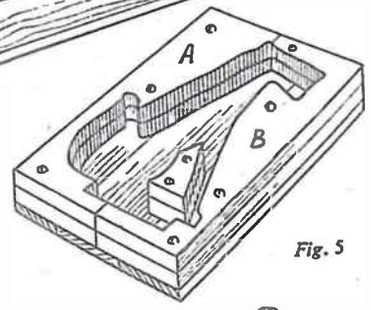


Fig. 5

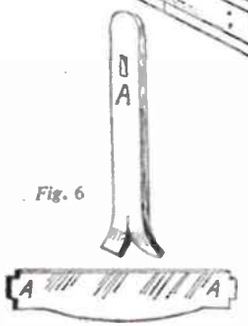


Fig. 6

Fig. 4—Note that the squares are 1½ins. The pattern should be enlarged in the usual way

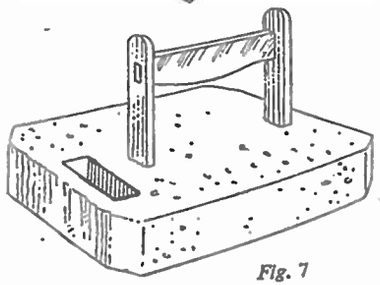


Fig. 7

Alternative

The alternative method of forming the mould is shown in Fig. 5, and is, perhaps, the more easily handled. And once the pattern is 'set up', it can be used many times over to produce the model dogs in concrete. Instead, therefore, of using the solid pattern of our last method, the surrounding wood frame, as it were, is used, the pieces being screwed together and fixed to the floor just as seen in Fig. 5. Note how the shaped piece behind, and forming the front leg of the dog, is arranged and screwed to the floor, and also how the complete outline of the dog is cut from two pieces of wood lengthways. There is a double thickness of wood to get the required thickness of concrete as in our previous method. The inside of the mould should be cleaned out and no saw-dust or grit allowed to remain.

The floor of the mould and the edges must now be brushed over with soft soap in not too liquid a state. This prevents the concrete sticking to the mould and ensures the easy removal of the casting later.

The concrete consists of sand and Portland cement. Sometimes ballast is used. This consists of sand with an admixture of small stones, but a composition having a good proportion of sand is best for the job as it gives a smoother finish.

The sand and cement are mixed dry in the proportions of about three parts sand to one of Portland cement. A good measure to use for this purpose would be an ordinary 8in. earthenware flower pot, the hole in this being filled with a cork or plug of wood. When sufficient of the dry ingredients has been heaped on a board or a paved surface and thoroughly mixed, a hollow should be scraped in it and the water added gently and stirred in to make a smooth consistency—but not too wet a one.

The stirring must be continued until a properly saturated heap is made, containing no dry powdery residue.

In pouring the concrete into the mould, take care to 'tamp' down each trowelful of the concrete so that no air bubbles occur. A short piece of ½in. diameter rod forms a good tool for this 'tamping' process.

Smoothing the Mixture

When the mould is full of the mixture, a wooden lath is drawn over the top to get a perfectly level surface, any little cavities remaining being neatly filled in.

Concrete castings such as these take some little time to harden, as the close timber framing prevents a free circulation of air so necessary for the purpose. However, after a lapse of about forty-eight hours, the mould can safely be removed.

The base frame of the shoe-scraper is carried out in a similar manner to the dog, the whole frame being filled and levelled up with the concrete. When set hard the frame is turned over and gently removed.

To make the metal scraper, two pieces of stout strip iron will be wanted for the uprights and one piece for the horizontal cross member. The top edge of the latter should be filed to a slight bevel. The pieces are shown in the diagram Fig. 6, and this also shows how slots are cut near the top of the uprights to take the projections on the cross piece.

A hacksaw and file should answer for making the 'tenons', while the openings to receive them can be made by first drilling holes and then cleaning out to form the square openings.

After fitting together, the ends of the tenons should be riveted over. If desired, the lower ends of the uprights could be split and cranked as shown to ensure a good hold in the concrete base. This extra work, however, should hardly be necessary if the holes in the concrete base are neatly chiselled out and the metal uprights carefully cemented in.

Fitting the 'Dog'

The 'dog' should be properly fitted and cemented in to the base, care being taken to get it perfectly upright.

It only remains now to paint the spots on the dog, somewhat as shown in diagram Fig. 4, and in the sketch of the finished article.

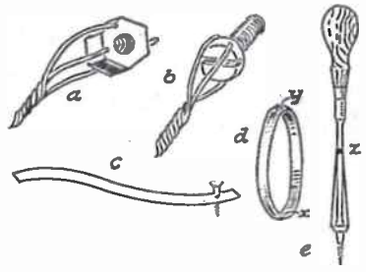
A useful diagram showing the formation of the metal scraper, and the position of the sinking into which the dog will be cemented, is given in Fig. 7.

(371)

WORKSHOP NOTES (7)

Awkward Screws

EVERY handyman of any experience must have had these exasperating occasions where a screw (or nut, etc.) has to be driven in a very awkward place, as when repairing a motor, radio set, or something similar (perhaps driving screws into an overhead position). One wishes not only that one had an extra finger and thumb



but a finger and thumb like long delicate antennae, so as to hold the small parts.

Here, however, are a few ways of overcoming the difficulty. In diagrams *a* and *b* you see that a piece of stiff many-cored wire cable has its end unravelled so as to hold small parts. For simplicity of illustration, only a three-wire cable has been shown. Obviously, the more wires, the better the part is held.

A screw can be held at the end of a strip of thin card or stiff paper as in *c*. After the screw has been started, the paper is torn away. It is also possible to magnetise the end of a screwdriver, at least temporarily, by drawing it over the ends of a permanent magnet a few times. The magnetised end will hold the screw (if of iron).

With Elastic Bands

With two elastic bands, another attempt may be made to solve the problem of holding screws in awkward places. First, a fairly broad rubber band is needed (d) and holes are made top and bottom. Through the upper, *y*, the blade of a screwdriver is passed, and through *x*, the screw is inserted. The rubber band is drawn upwards and held with a small band *z*, the tension being so adjusted that the screw is held just sufficiently tightly. If held too tightly it will probably be drawn to one side. As soon as the screw has been given a good start, the rubber band is taken off. A plain screwdriver is shown in the illustration (e) but in all ticklish jobs of this kind, a ratchet screwdriver is best.

(315)

An informative article on

PROSPECTS WITH PERSPEX

ARE you looking for a hobby which is different? A practical hobby which can be made to pay and which will solve all your birthday and Christmas present problems? Then why not try 'Plastics'?

The word plastics covers a range of materials such as Perspex, Catalin, Lactoid and Erinoid, of which Perspex is, perhaps, the most satisfactory for the amateur craft worker. It can be bought in numerous colours, transparent and opaque, also colourless and in thicknesses from $\frac{1}{16}$in. to $\frac{1}{8}$in. Its advantages over other plastic materials are that it is easily obtainable, it does not warp and, most important of all, it is simple to polish by hand.

Easy to Work

Perspex is a delightful material to work with. It can be sawn, filed, drilled, apped and polished; also bent, if previously heated in a hot oven. The material is not cheap, but it can be obtained in so many thicknesses and in such small quantities that there is usually little waste. In general, I have found that I can make an article for about one quarter the shop price of a similar article.

Normally Perspex is obtainable in sheets from 12ins. by 6ins. upwards; but it is worth mentioning that many of the large suppliers of handicraft materials supply bundles of off-cuts in various thicknesses and colours at so much per pound. It is considerably cheaper to buy Perspex in this way, but, of course, one has to have whatever the supplier cares to send. It is only fair to add, however, that I have purchased Perspex in this way and have always been highly satisfied.

No doubt you are wondering what tools are required for Perspex work and whether or not they are expensive and numerous. Only a very few tools are essential, all of which are fairly cheap, and most of which you probably already possess.

You will need a couple of files, say, a flat file and a half-round file, about 6ins. long. These are for taking off waste quickly and should be 'rough cut' files. Buy handles for them when you purchase your files; they will prove much easier to use. In addition, you need a few needle files of various shapes. These are small files useful for finishing off, particularly in awkward corners. The most useful shapes are round, half-round, square and triangular.

For cutting out, you require either a coping saw or a fretsaw. You probably already have the latter, if so, use only coarse blades when cutting Perspex. A cutting table of the type used for fretwork is desirable.

Finally a drill is required and a selection of twist bits ranging from $\frac{1}{16}$in. to $\frac{1}{4}$in., the $\frac{1}{8}$in. bit being the most generally useful. 'Bits' for drilling all plastic materials should be sharpened at an exaggerated angle (so that they are more 'pointed' than normally) otherwise the material may crack when drilled. Only exert the minimum of pressure when drilling plastics. The drill must never be forced.

That concludes the list of essential tools. However, a small vice is very useful and if at all possible you should obtain one. A small metal vice of the type which can be clamped to the kitchen table is ideal. A vice is not necessary, however, and it is quite possible to file a piece of Perspex of almost any shape or size if it is placed flat on the edge of a table and the file held vertically, so that all filing is done downwards. The work should be held firmly and should overlap the edge of the table as little as possible to reduce 'chatter' and risk of fracture—plastic material being rather brittle.

Other Essentials

The only other essentials are glass-paper—medium and fine—and Perspex polish, usually obtainable in two grades, No. 1 and No. 2. It is possible to obtain a very high polish on Perspex with the aid of these polishes and it is because such a satisfactory finish may be obtained without the aid of a power-operated mop that Perspex is recommended in preference to other plastic materials.

Lastly, you will quickly reach the stage where you are making articles which require the use of an adhesive, and Perspex can be successfully joined by the use of Perspex cement, obtainable wherever you obtain your Perspex. Nothing else is really satisfactory.

What can I make in Perspex, you will ask, and with what shall I begin? There is literally no limit to the variety of articles which can be made from Perspex. It is a relatively new craft and its possibilities have not yet been fully explored. When you have gained some experience of making the more commonplace articles suggested in the following paragraph, further uses for Perspex will readily suggest themselves to you. The keynote in designing articles in Perspex, as in all good design, is simplicity. Seek good proportions and a fine finish to your work. That is infinitely preferable to any amount of ornamentation.

Colours

It is seldom effective to use more than two colours when making an article in Perspex and often the most pleasing effect is obtained by using transparent, colourless material only. However, if colour is desired, it is usually most effective to combine one transparent colour with colourless material. It is good practice as a rule, to use more of the colourless material than the coloured; it is not usually as effective to use them in equal proportions.

Getting the 'Feel'

It is wise to get the 'feel' of the material first by making such simple articles as buckles, serviette rings, paper knives and shoe horns, progressing to salad servers, toast racks, toothbrush racks, photograph frames and cigarette or trinket boxes. By the time you have made even a few of the articles suggested, you will have more ideas of your own than you have time in which to execute them. (377)

Special Next Week:

Full details for making a Novelty Mechanical Bird Scarer.

Coming Shortly:

Instructions and full-size plans for a Model Jet-Propelled Hydroplane.

HOME CHEMISTRY

Experiments with Wood Charcoal

COMMON wood charcoal consists almost entirely of the element carbon. Wood charcoal is prepared by heating wood out of contact with air.

An easy way to make it in quantity at home is to punch several holes in the lid of a cocoa tin, to half fill the tin with pieces of wood, put the lid on and half immerse the tin in the fire.

The wood soon gives off inflammable

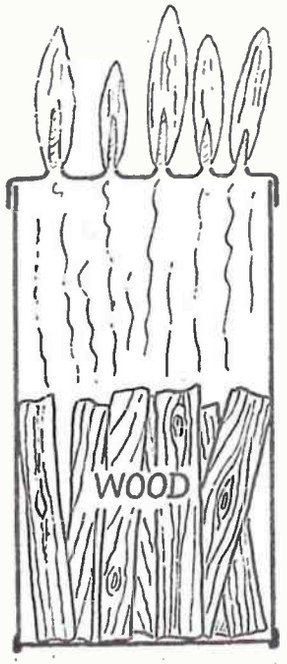


Fig. 1

gases which first drive out the air from the tin, and then take fire at the lid holes. Fig. 1 shows the scheme in section. When the flames go out, remove the tin from the fire. Let it cool with the lid on. On opening the tin you will find the wood has shrunk and formed brittle sticks of charcoal.

Proof

To prove the high purity of this form of carbon, heat a piece to redness in an open crucible. Gradually it will disappear, leaving only a small amount of gossamer-light ash.

What happened to the carbon? Here we had a black solid which disappeared without producing fumes or smell. Chemists refuse to believe anything can be turned into nothing, but that it must have been turned into something else.

This is easily confirmed in the case of carbon. Pour a little lime water into a jar of air and shake. The lime water will be unchanged. Now fasten a piece of charcoal to the end of a wire, heat it red hot and then hold it in the jar for a couple of minutes. Then remove it and shake up the lime water again. This time it will become milky. The milkiness can only have been caused by something the hot carbon left behind—the invisible, odourless gas carbon dioxide. The carbon had, therefore, combined with the oxygen of the air.

Not only will carbon unite with atmospheric oxygen, but will also remove it from some compounds, such as oxides. It is, in fact, used in metallurgy. Iron smelting, for instance, consists of heating an oxide of iron with carbon, when the carbon removes the oxygen from the oxide and leaves iron.

Demonstrating a Principle

We can demonstrate this principle on the small scale with copper oxide. Mix some copper oxide with twice its bulk of powdered charcoal and heat it in a hard glass tube provided with a delivery tube dipping into lime water.

Bubbles of gas will begin to pass through the lime water and turn it milky. After about fifteen minutes allow the test tube to cool and shake out the residue. You will find it contains a lot of metallic copper.

Carbon will also remove oxygen from many sulphates, producing sulphides. This property is much used to convert insoluble barium sulphate into a soluble barium salt. Grind barium sulphate with an equal bulk of charcoal. Then hammer flat one end of an iron tube and pour in the mixture. Plunge the flattened end of the tube into a glowing fire and let it remain at a bright red heat for two hours.

Let it cool, and then tip out the mixture into about six times its bulk of boiling water. Stir well and filter. Add dilute hydrochloric acid to the filtrate until litmus paper shows it is strongly acid.

Sulphuretted hydrogen will be given off, proving a sulphide has been formed. If you evaporate the solution to the crystallisation point and let it cool overnight, crystals of barium chloride will form, which you can dry on a porous tile. This is a useful preparation to know, for barium chloride is not easy to buy these days, whereas barium sulphate is. A solution of barium chloride is often needed to test for sulphates.

Charcoal has strong decolourising power. Half fill a test tube with water. Add a few drops of potassium permanganate solution so that a deep pink solution results. Half fill another test tube with powdered wood charcoal, pour on the pink solution, close the tube with your thumb and shake for one minute.

If you now filter the muddy solution, the filtrate will be colourless. This principle is of vast importance to the sugar industry, for by its means the beet and cane extracts are decolourised. Animal charcoal (made by heating bones out of contact with air) is used instead of wood charcoal on account of its higher decolourising power. Animal charcoal is also much used in organic chemistry for decolourising.

Charcoal will also absorb large amounts of gases and if sprinkled over sewage or decomposing animal matter,

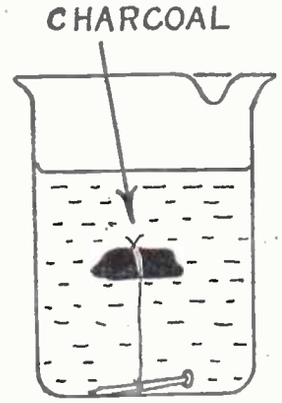


Fig. 2

will remove the exuding gases which cause the smell.

To half a test tube full of sulphuretted hydrogen water add a quarter of a test tube full of powdered charcoal. Close the tube with your thumb and shake for three or four minutes. Filter the solution and smell the filtrate. The offensive odour of sulphuretted hydrogen will now be absent.

Used in Gas Masks

This gas-absorbing property is put to use in gas masks, charcoal being one of the principle absorbents therein. Nut

(*Continued on page* 90)

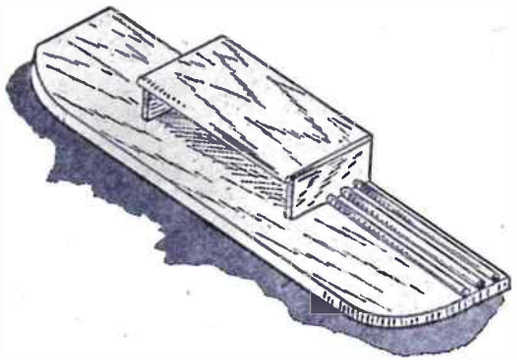
It's quite simple to make

A SHELF FOR THE HALL

ATTACHED by brackets to a wall, this simple shelf is particularly handy for incoming or outgoing letters, gloves, and so on. An unobtrusive open drawer-space is a tidy store space, whilst the whole effect can be rounded off by standing a vase on top.

Quality Material

Choose good quality material for the shelf. Preferably this should be at least ¾in. thick and free from warps. A useful size is 24ins. long by 6ins. wide, but the proportions can be varied to suit individual requirements. It may be a good idea, for example, to fit a shelf of this type on the wall between the frames of two adjacent doors; or a longer shelf along one wall. Whatever the form decided, the edges should be well rounded with a 3in. radius curve.



The Brackets

The brackets themselves used to fix the shelf to the wall should be as unobtrusive as possible. Metal brackets are, undoubtedly, best and these should be painted to tone with the wall or wallpaper colour, rather than contrast with it. The woodwork is stained and polished.

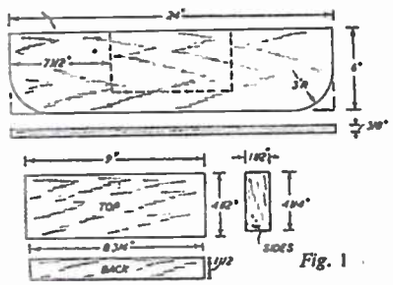
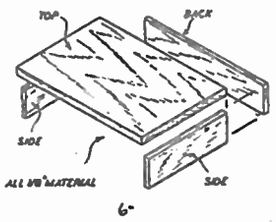


Fig. 1

Fig. 2



6"

The assembly is completed by the addition of the letter rack, which is nothing more than three ⅜in. diameter dowels glued to the top of the shelf, as shown—Fig. 3. Letters or cards are simply propped up between the dowels and the wall.

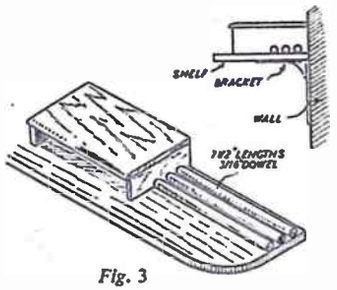


Fig. 3

The top, sides and back of the open drawer compartment are all cut from ¾in. material, and suitable dimensions are given in Fig. 1. Simple butt-jointed glued assembly should be quite strong enough here, for it is unlikely that this particular component will receive a great deal of rough handling. The top projects slightly in the final assembly and should be rounded off. The drawer compartment can be assembled separately on a flat surface—Fig. 2—or on the shelf directly, preferably with the shelf already fixed in place on the wall.

(375)

HOME CHEMISTRY

(*Continued from page* 89)

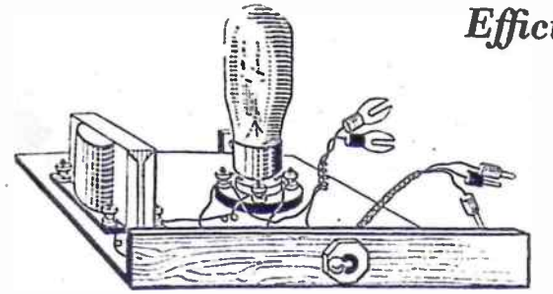
shell charcoal is chosen for this purpose owing to its higher gas absorbing power.

If you drop a piece of charcoal on to water it floats. Indeed, it is so light that it seems barely to touch the surface. The reason for this is that it is so porous that a large quantity of air is absorbed into it and it is this which makes it buoyant.

You can prove this by pulling the charcoal under the surface by weighting it with a small nail and thread (Fig. 2). Now boil the water for a few minutes. Air bubbles will be driven out of the charcoal, and when no more appear, remove the thread and nail. The charcoal will then sink.

The printer uses large quantities of carbon in his ink. The pigment 'carbon black' is used in both printing and in Indian ink. Carbon black is made by burning waste gases from the petrol cracking industry. If you hold the flame of a cigarette lighter under an evaporating basin containing cold water, carbon black will be deposited on the basin.

Such widely different substances as charcoal, coke, graphite and diamonds consist of this all-important element carbon. The vast difference between a piece of black charcoal and a sparkling diamond makes it hard to believe both have the same composition. Yet if they are strongly heated in oxygen, both disappear and yield the same colourless, odourless gas—carbon dioxide. (376)



Efficiency is the keynote of this

EASILY MADE AMPLIFIER

LARGE amplifiers have been described in past issues, but the one dealt with here is of the simplest kind. This does not mean that it does not have a wide field of usefulness, for the builder should find it can be employed in several ways. It will be as well to describe these in some detail, so that it will be seen in what directions the amplifier may be of service.

As it is battery-operated it is perfectly safe for anyone to use. A minimum of parts are required, and construction is so straightforward that no difficulty should arise. Even small batteries will give a long period of service, and the kind of battery used can depend upon the way in which the amplifier is to be operated, as will be described.

For Crystal Sets

Crystal sets give very clear reproduction, but will only work headphones. However, the signal may be amplified, and brought up to sufficient strength to operate a loud speaker. This can also be done if additional volume is wanted on the headphones.

If the crystal set provides good headphone volume, a one valve amplifier circuit of the best type will increase this to good loud speaker strength. This will be so with the circuit to be described, if a 120 volt H.T. battery is used (for preference), with a pentode valve such as the Cossor 220HPT or an equivalent.

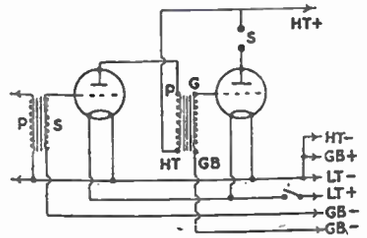


Fig. 3—A two-valve circuit

If a triode amplifier valve is used, or a H.T. battery of only 60 volts or so, volume will be somewhat reduced, but should still be sufficient for a small room, if the crystal set gives a good signal. Such an arrangement, with a small H.T. battery, would be ideal for boosting the strength up for headphones.

If the signal from the crystal set is somewhat weak, or really powerful speaker volume is required, then it will be necessary to add an extra valve, making two in all, as will be described.

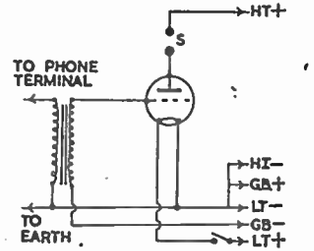


Fig. 1—The one-valve amplifier circuit

However, the single valve should normally be sufficient.

Pick-Up and Microphone

Volume, using a pick-up, will be similar to that when a crystal set is driving the amplifier. This means that reasonable speaker volume will be obtained from a single valve (preferably of the pentode type), when playing records. The pick-up can be of the usual magnetic or crystal type.

A single valve is not really sufficient for speaker operation from a microphone, though fair results can be obtained. Here, the extra valve is almost essential, unless amplified sounds are to be heard with headphones.

The degree of amplification which a single valve can give is limited. A pentode valve gives more amplification than a triode valve, but consumes slightly more current. The volume will also be increased by using a high tension battery of higher voltage. Though a 45 V. battery would do well for phones, a 90 or 120 V. battery is really required to operate a speaker. With the small batteries speaker volume will be somewhat weak.

Building the Amplifier

Fig. 1 shows the circuit. The coupling transformer can have a ratio of about 1:3 or 1:5. The valve-holder is the ordinary 4-pin type, with terminals. If a pentode is to be used, however, a 5-pin holder is needed.

Fig. 2 shows all the wiring. The 5-pin holder will have a centre socket, not present in the 4-pin holder. If a pentode is used, this is wired to the H.T. positive speaker terminal, as shown in dotted lines. A ·005 mfd. fixed condenser can also be wired from the fifth terminal on the valve-holder to the other speaker terminal, as shown. This makes the tone of reproduction a little more mellow, and is not required with a triode.

If a 5-pin holder is wired up as described for a pentode, a triode may be inserted with no changes. However, a 4-pin holder is suitable for triode *only*. If the builder thinks he may use a pentode, the 5-pin holder is, therefore, essential.

The on-off switch is mounted on a small panel, and lengths of flex are used for battery leads. If the transformer is marked (P) and (S) only, then the two tags or terminals at the (P) (Primary) side are taken to the crystal set, and the two at the (S) (Secondary) side are taken to Grid Bias and (G) (Grid) of valve-holder.

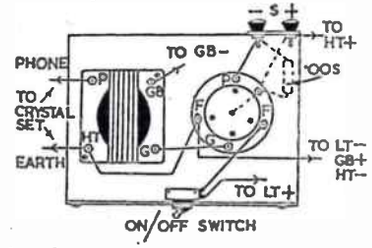


Fig. 2—Wiring plan for the one-valve

Using the Amplifier

With a crystal set, disconnect the headphones and take two leads from the phone terminals on the set to the transformer, as shown in Fig. 2. Phones or speaker are then connected to the speaker terminals (marked (S)) on the amplifier. For low tension, use a 2-volt accumulator. The grid-bias voltage should be adjusted to the figure giving best volume—usually 3 to 6 volts, according to H.T. voltage and type of valve. The amplifier should be switched off when not in use.

(*Continued on page* 92)

EASILY MADE AMPLIFIER

(*Continued from page* 91)

A 2-Valve Circuit

This is shown in Fig. 3. A further transformer and valve are added, thereby providing extra amplification. With such a circuit, resistance-capacity-coupling can be used, and the connections for this are shown in Fig. 4. The two resistors and condenser replace one of the transformers. This is cheaper, but gives somewhat less volume. But with two valves this slight loss is not very important, unless maximum possible output is required.

In this circuit, the first valve can be one giving a good deal of amplification, such as the Osram HL2 or its equivalents. The output valve can be a small power type, or pentode, provided the holder is wired accordingly, as has been explained.

If two transformers are used, and howling arises, reverse the leads to the secondary terminals of one transformer.

Note on Pick-Up Use

Many pick-ups are made so that they can be wired directly to the first valve grid. In this case, the first transformer is not required. It is omitted, one pick-up lead being taken to (G) on the first valve-holder, and the second lead to Grid Bias.

The transformer is best, however, for coupling the amplifier to a crystal set, as it also steps up the signal strength somewhat.

Points to Remember

The amplifier can only increase the strength of signals fed into it, which means that extra stations will not normally be heard, with a crystal set. Those stations already received will, however, be increased in strength.

The amplifier can also be used with a 1-valve set, connecting it exactly as described for the crystal set. The wire going from (HT) on the transformer to (F) on the valveholder must be omitted, if the same batteries are to be used to work both 1-valver and amplifier, as is best. The 1-valver will then be transformed into a 2 or 3 valver, as the case may be, and would give good speaker results.

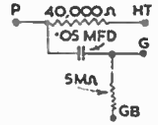
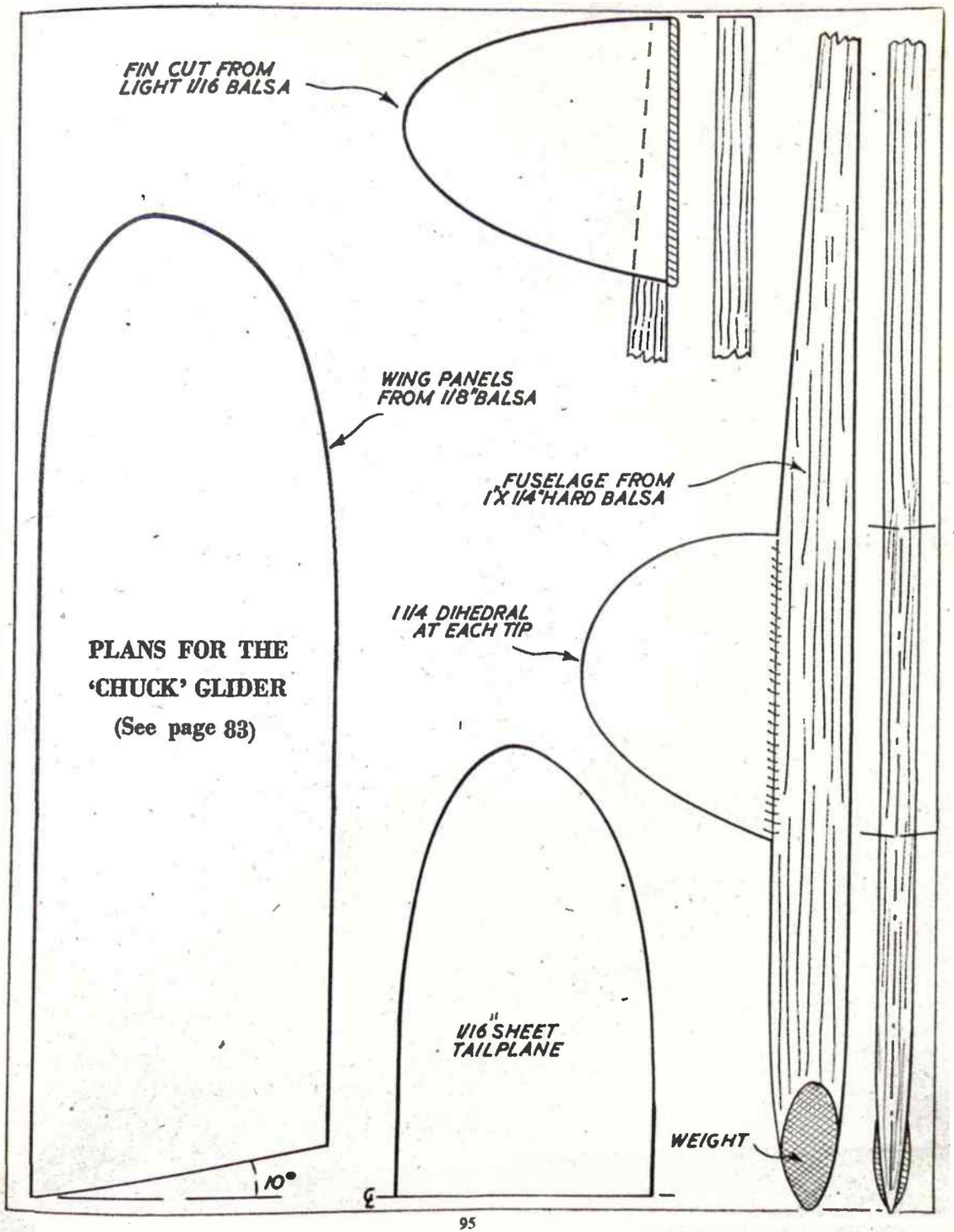


Fig. 4 — Using R.C. coupling

The speaker itself may be of any type intended for battery sets. A permanent-magnet moving-coil speaker is best, and this should have the usual matching transformer always associated with such speakers, and enabling them to be coupled to the speaker terminals of the amplifier. Finally, the speaker should be in a proper cabinet; if used alone, volume and quality of reproduction will be reduced. (364)



FOR FACES & PLACES

You can't go wrong with Selochrome — you get a good picture every time.

ILFORD

SELOCHROME

FILM

F. W. NUTHALL

Toymakers' Casting Moulds

Moulds: deep-cut and ordinary type Aeroplanes, Soldiers, Farm and Wild Animals, Cars, etc. Stamped envelope for full list Illustrated Catalogue 9d. Sample mould 3/6d.

PLASTERCRAFT

ALUMINIUM MOULDS
BROOCH MASKS
GARDEN ORNAMENTS
WALL PLAQUES
BOOK ENDS AND ORNAMENTS
CAKE DECORATIONS

BEAUTIFULLY DRESSED DOLLS
WALK, TALK, SIT AND GO TO SLEEP

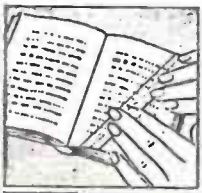
		NON-WALKERS	
21 ins. Tall	35/-	21 ins. Tall	£1 8 0
22 ins. Tall	36/-	22 ins. Tall	£1 10 0
23 ins. Tall	£2 2 0	23 ins. Tall	£1 15 0
25 ins. Tall	£2 15 0	25 ins. Tall	£2 5 6
27 ins. Tall	£4 0 0	27 ins. Tall	£3 7 6
30 ins. Tall	£4 10 0	30 ins. Tall	£4 0 0

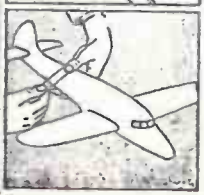
BEAUTIFUL BABY DOLLS
CRY AND GO TO SLEEP

21 ins. Tall 32/-
18 ins. Tall 25/-
14 ins. Tall 16/-

DOLL MOULDS SUPPLIED

69 ST. MARKS ROAD, HANWELL, LONDON, W.

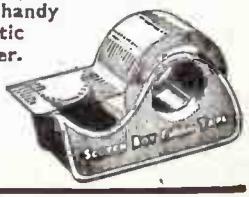




for 1,001 sealing, mending and fastening jobs.

Scotch Boy Tape mends books, plastic materials, toys and models, broken tool handles . . . seals parcels . . . holds snapshots in albums.

When buying, look for the Scotch Boy Trade Mark and the handy red plastic Dispenser.



Printed by BALDING & MANSELL, LTD., London and Wisbech, and Published for the Proprietors, HOBBIES LTD., by HORACE MARSHALL & SON, LTD., Temple House, Tallis Street, E.C.4. Sole Agents for Australia and New Zealand: Gordon & Gotch (A'sia) Ltd. For South Africa: Central News Agency Ltd. Registered for transmission by Canadian Magazine Post.