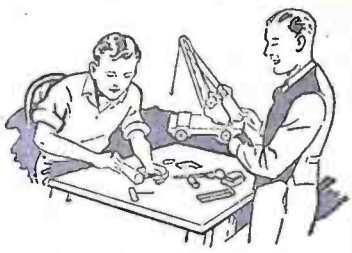
57th YEAR OF PUBLICATION

SEPTEMBER 17th 1952

Hobbies WEEKLY

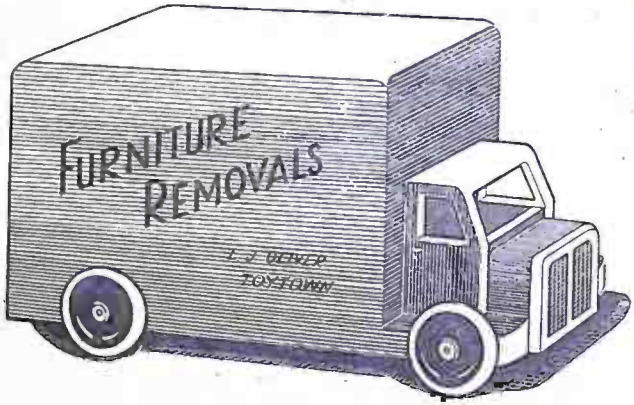
VOL. 114 NUMBER 2968



Design Sheet for this Toy
FREE INSIDE

Amuse the kiddies with a

TOY FURNITURE REMOVAL VAN



THE furniture van, or pantechnicon as it is often called, is a familiar sight in the town or country. Children watch with great interest as chairs, beds, tables and various oddments of furniture are loaded.

With this toy van, they can do 'removals' of their own. They can have great fun loading doll's furniture and pulling it on an imaginary journey of many miles. At the end of the journey, during which time the doll's house has been moved elsewhere, the furniture is unloaded into the new home.

Materials

The kit of parts includes sufficient wood of the correct thicknesses, four 2in. diameter wooden wheels and four screws for fixing the wheels.

First of all study the design sheet and the diagrams with these instructions.

IN THIS ISSUE

When you have a rough idea of what the finished thing looks like, you can commence tracing the various parts on to the wood. Notice that the base or chassis part (A) is cut from ½in. material. One other point to remember is to keep the grain running in the direction of the arrows.

Cut out the parts, using a heavy grade saw which is designed specially for toymaking. Clean up the parts with glasspaper so that they are ready for assembly.

Assembling the Parts

As suggested by the letters, the base (A) is the main part, and to this are glued and pinned the sides (B), and the front of the van (C). The roof (D) is now placed in position and the side edges rounded as suggested in Figs. 1 and 2.

The doors (E) are cut as one piece from ¼in. wood, and then cut down the middle to form two pieces. One edge of each piece is neatly rounded and both doors must work freely in the back of the van as shown in Fig. 2.

Do not use hinges, but pivot the doors by means of ¼in. fretpins driven

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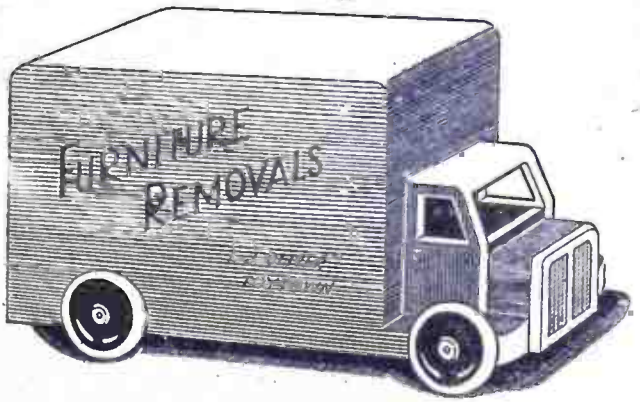

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THE MAGAZINE FOR MODELLERS, HANDYMEN AND HOME CRAFTSMEN

through the roof and base. This forms an invisible pivot which will withstand more knocks than a small hinge. Small pieces of waste wood glued on, or round-headed screws driven in, will form the handles to the doors.

The Cab

The cab comprises five pieces (F (two pieces), G, H, and I) which are glued and pinned together before fixing to the base. A little shaping to make the roof slightly rounded is all that is needed. A steering wheel is not necessary, but if you wish to insert one you should do so now before gluing the cab in position. A small circle of wood with a long nail driven through gives a fair representation of this component.

To form the bonnet the two pieces (K) are glued to the base and to piece (H). The top (J), which is rounded as shown by the section on the design sheet, is glued on pieces (K). Piece (L) forms the radiator and is simply glued to the base and pieces (K) and (J) as shown in Fig. 1.

Painting

The choice of colour is left to the worker. Do not use cheap paints, but buy a hard gloss enamel which will dry in a few hours. Paint the whole of the cab and bonnet and pick out the radiator, door handles, etc., in aluminium later.

The wheels should match the van colour, but the rounded edges can be painted dark grey to represent tyres. The name on the side can be painted by hand, or a suitable name can be cut from a newspaper or magazine and pasted in position. A little clear varnish applied with a brush will keep it clean.

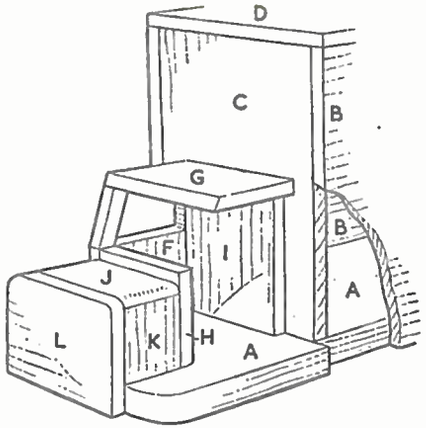


Fig. 1—A drawing showing the general construction

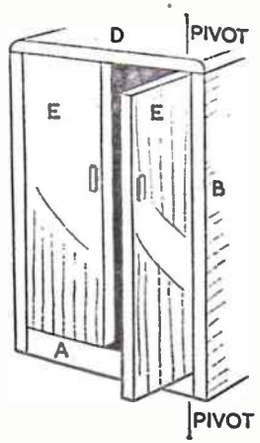


Fig. 2—How the doors are 'hinged' to make a strong clean job

COMPLETE KIT FOR 12/1

For making this large toy furniture van you can obtain a complete kit, including wood, turned wheels and fixing screws, from any Hobbies branch, or post free from Hobbies Ltd., Dereham, Norfolk, price 12/1, including tax.

The back wheels are screwed to the sides (B) and the front wheels to the base (A). The exact positions are shown on the design sheet. All that remains to finish this attractive toy is to insert a screw in the front, under the base, and attach a length of strong cord.

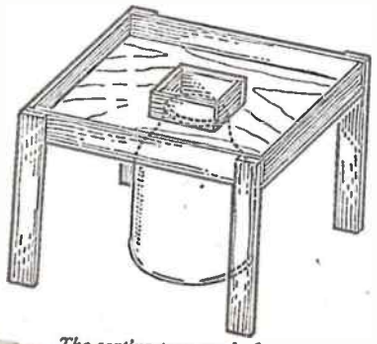
WORKSHOP NOTES AND HINTS No. 15

A Useful Sorting Tray

MOST homecraftsmen and model makers accumulate a great quantity of small nuts and bolts, odd screws, springs, washers, small machine parts, and so on which will 'come in useful'. Very often an attempt is made to classify the parts and to keep similar parts in different jars and tins, but even in the best-run workshop there is often a large jar or two filled with odds and ends that defy classification, and going through this collection is often a tedious business.

Simple Device

But here is a simple device that takes but an hour or less to make but which saves a very great deal of time in the long run. As can be seen from the sketch, it consists of a shallow square tray with a fenced-around square hole in the centre. It is supported by four legs and so dimensioned that a jar can be placed underneath the central hole and anything dropped through this hole falls through into the jar beneath. In use, the contents of the jar are tipped into the outer part of the tray, and the jar stood underneath. One then quickly rummages through the 'junk', looking for the desired part and, at the same time, throwing unwanted parts down the hole. Thus, in a very short time, the part required (if contained in the 'junk') is found and the rest returned.



The sorting tray ready for use

The size of the tray can be very much what the maker cares to have it (the larger, within reason, the better), and this will depend on the type of jars being used. Screw-capped jars are best, but uncovered jam-jars are not to be despised. Plywood is the chief material used, and the legs may be made to fold inwards so as to store the tray more conveniently (it can hang on a wall).

A square wooden model makes for easy construction, but a circular metal tray would be even better. It is not difficult to fit a round metal centre to a square wooden tray, since many people use a patent tin-opener that cuts off a lid 'as clean as a whistle' and if the bottom of the tin is similarly cut out, one is left with a circular metal collar. (323)

How you can make

A MUSIC STOOL

THIS music stool—an essential in many homes—forms an excellent project for the amateur woodworker who can make simple mortise and tenon joints. It is not just a 'paper idea' but, as the photos show, has actually been made up to the writer's original design. All dimensions are given and no difficulty should be encountered. Though the model *can* be made in deal, afterwards stained and polished, it is worth spending a few shillings more on having a good hardwood such as oak or mahogany, especially as the stool is to grace the best room for very many years and match the best furniture.

The stool with the lid open

The legs (A) are of 1in. square section, 25ins. long (all dimensions refer to *finished* sizes), four, of course, being required. They are eventually chamfered ⅛in. each way where shown with a heavy black line in Figs. 1 and 2 (the same applies to the lower rails F and G). See also Figs. 5 and 8. This chamfering is best left until the joints have been cut.

The main rails (B) and (C) are mortise and tenon jointed into the legs. All dimensions for the jointing are given in Figs. 8 and 9. Note that the mortises (slots) are NOT centred on the leg but to one side. The rails (B) and (C) are both of 3½ins. by ½in. section. The clear run between the joints is, for (B), 18ins. and for (C), 13ins. To these must be added ½in. each end for the joint (Fig. 9). The ends of the tenons are bevelled as shown.

The lower rails (F) and (G) are tenoned to each other as shown in Fig. 5. There will be a similar joint where rail (F) (two required) runs into the main legs (A), i.e. a ½in. square tenon in a mortise ½in. deep.

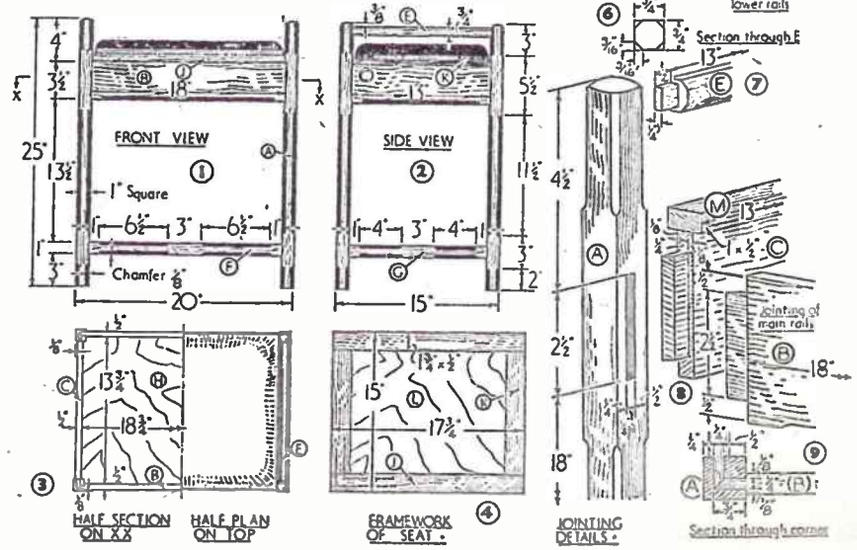
Upper rails (E) (two required) are of octagonal (eight-sided) section, planed up from ¾in. square material with a tenon in each (Figs. 6 and 7), for which a mortise is cut in legs (A). It may be an advantage to cut the tenons before the wood is planed to octagonal shape.

Part (M), two required, seen in Fig. 8, but hidden in the other diagrams, is a plain piece of 13ins. by 1in. by ½in. wood nailed to the top of (C), the nail heads being well sunken and filled. At this stage the job may be glued up, and whilst waiting for the glue to set, the lid of the seat can be prepared (Fig. 4).

This is made of 1¾ins. by ½in. wood, suitably jointed at the corners—a stub or haunched mortise and tenon being used, for example. The overall size of this frame (which must be flat and not in winding) is 17¾ins. by 15ins., i.e. when finally hinged to the back rail (C), it is as deep, back to front, as the stool itself, and has ½in. side clearance where it abuts rails (M).

The box seat has, as yet, no bottom. This (H, Fig. 3) is easily fitted. Around the bottom of the main rail pieces (B) and (C), glue and tack lengths of strip-

(*Continued on page* 388)



Renovating a Piano

I HAVE a piano which was pierced by glass during the war. I have removed the glass and it has left holes which I want to fill, also I want to strip off the old stain and re-stain and polish it. Please tell me how to do it. (*C.A.—Romford*).

BE sure to remove all particles of glass first. Remove existing polish with a proprietory brand of varnish remover, then stop all holes level with plastic wood, coloured to suit the stain. Plastic wood can be bought, coloured mahogany, oak and walnut. Rub over surface with fine glasspaper and dust off. Now apply a coat of brown hard spirit varnish (after staining, of course) and when hard, apply a second coat. Let this harden also, then rub down lightly with worn glasspaper. Then apply a final coat of varnish. The varnishing must be done in a warm room. Leave for a few days, then go over the surface with a french polish rubber, wet with a mixture of french polish and polisher's glaze. This should bring up a fine lustre. Let it dry in a warm room, free from dust, when a satisfactory result should be obtained.

* * *

Pick-up Tone Control

I HAVE a record player which I play through the wireless. I would be obliged if you would let me know how to fit a tone control to the pick-up and also the values of the components needed. I have quite a few variable and fixed condensers, resistors and potentiometers which I might be able to use. The tone control on the wireless is out of order and is difficult to get at to repair. (*P.A.B.—Leeds*).

TOP-NOTE reproduction may be reduced by using a condenser of about ·01 in series with a potentiometer of about 50,000 ohms, and wiring these across the pick-up leads. Actually the values used may be varied between fairly wide limits. But condensers of too large capacity will reduce the higher frequencies excessively. Similarly, the amount of control possible will be reduced by using a potentiometer of much under the value given. High notes may be emphasized by wiring a condenser of small capacity (about ·0002 to ·001) in series with one pick-up lead; a potentiometer may be wired in parallel with this to reduce the effect when desired. The most suitable component value will depend upon the characteristics of the pick-up, but about ·0005 mfd. with ·25 megohm in parallel is suggested. All controls of this type reduce volume to some extent, and this should be compensated for by turning the receiver volume control up accordingly.

BUILDING OUR CAR RADIO?

If you are building the car radio described in our issue of August 13th, be sure to read the important notes on page 397 of this issue.

* * *

Painting an Electric Fire

I HAVE a small electric fire, the original colour of which was white with an enamel paint finish. The surface has now become dirty and I desire to repaint it. Can you please inform me of a suitable paint or enamel to use, which will need, of course, to be heat-proof? At the same time, please tell me of a good proprietory paint-stripper. (*W.J.R.—Birmingham*).

THE only really heat-proof paint is the 'vitreous' as used on gas stoves and the like, but this is not a process which can be carried out by the home worker. Probably the next most satisfactory is a good grade of gold or silver paint, which are purely metallic in base. A paint-stripper that has proved effective is sold under the name of 'Strypit', but any of the good brands should be quite satisfactory.

* * *

Brush Graining

CAN you tell me the procedure and materials needed for brush graining for doors and woodwork? Are there any special brushes or types of paint required? (*D.E.W.—Hornchurch*).

FOR brush graining, first coat the work with red priming colour, and stop all holes and cracks with putty and white lead, mixed. Level off and apply two coats of medium buff colour paint, flat not glossy. For the graining colour, mix one part raw umber, one part burnt umber, one part yellow ochre (all in paste form) with equal parts of raw linseed oil and turpentine. Add 2ozs. paste driers to each pound of pigment. Use this much thinner than ordinary paint and brush out bare. No special brushes are needed, but a 1½ins. wide one is to be preferred for the brushing out.

* * *

Black Job

I HAVE lined the top of kitchen sink with aluminium, but every time my wife cleans it, her cloth comes away from the job black. The harder she rubs the aluminium the blacker the cloth gets. She has tried soap and water and Vim, but of no use. Can you tell me of any way to stop this? (*J.M.—Saltcoats*).

THERE are many aluminium alloys on the market, and some are quite unsuitable for domestic purposes. The only remedy we can suggest is to apply a coat of aluminium paint, which makes a good undercoat, and, when dry, two coats of white bath enamel. This should stand washing down well and obviate future trouble.

Making a Music Stool

(*Continued from page 387*)

wood, say, of ¾in. or ½in. square section. This will form a ledge for the plywood bottom (H) to rest on. (H) is nominally 18¾ins. by 13¾ins., but take required dimensions from the actual job.

Stripwood which can be rough-sawn if desired about ¾in. square is tacked all round seat frame (K) on one face, about ½in. in from the edge. Into the recess thus formed, a plywood panel (L) is fixed. The seat is to be stuffed, and particulars for doing this will be described in an article next week. In the meantime, hinge on the as yet unstuffed seat. Use brass hinges but employ, temporarily, iron screws of the same size as the brass ones to be finally used. Similarly fit a lid stay (seen in the photo). When all adjustments have been made, such as a test for leg wobble, etc., take off the lid and give the complete job a thorough clean up, staining and polishing as desired—usually to match existing furniture. (W.A.B.)

Details for completing the stool will be found next week in an article entitled 'A Stuffed Box Seat'.

Worthwhile Woodwork

'SILHOUETTE' BOOK-END DESIGN

THIS design for book-ends may be called 'silhouette' type, for the vertical end pieces mounted on the built-up plinths may be profiled to any desired design. The design may be symbolic, traditional, heraldic or the profile to scale of a member of the family. A number of suitable designs are given, laid out on a grid for ease of duplication. You may have other and better ideas. The main thing is to use the same design for the profile block at each end.

The assembly of one book-end is shown in Fig. 1. The other member of the pair is identical. Parts are easy to cut and assemble and lend themselves readily to good finishing. The metal bases (aluminium sheet of about 18 or 20 S.W.G. is recommended, although dural or steel of similar thickness can also be used), stabilise the ends in use by sliding under the two or three end books.

All parts required are shown dimensioned in Fig. 2. Two off each are required for the pair of book-ends. Choose the wood carefully, as blemishes will show on the finished work.

After the parts have been cut out accurately, assembly is a simple matter. The bottom of the plinth, the profile block and the vertical end are keyed together, the bottom of the profile block resting on the top plinth block. Glue joints will be strong enough if properly made, although for added strength, screws or pins can be used through from the inside of the vertical end into the plinth parts and profile block. Make sure that each assembly is true and square.

The metal base plate is attached to the bottom of the plinth with countersunk woodscrews. The metal can be dimpled quite readily to seat down the heads flush. The baize or cloth covering for the bottom of the metal base is then simply glued in place and trimmed off around the edges later with scissors or, preferably, a sharp razor blade.

Finishing is a matter of individual choice. If all the parts are to be given the same finish, e.g. staining and polishing, this is done after assembly. Some designs, however, may look better with the plinth black. A 'personal silhouette' for the profile block may look best in black, when the plinth would be stained wood.

Then again there is the possibility of imitating 'stone' finish by covering the plinth and back with marble paper, for example, colouring the profile cut-out in gold. In fact, there are endless possibilities with this simple construction. Where different colours or different finishes are used, it will be best to finish the individual components separately and then assemble them. (R.H.W.)

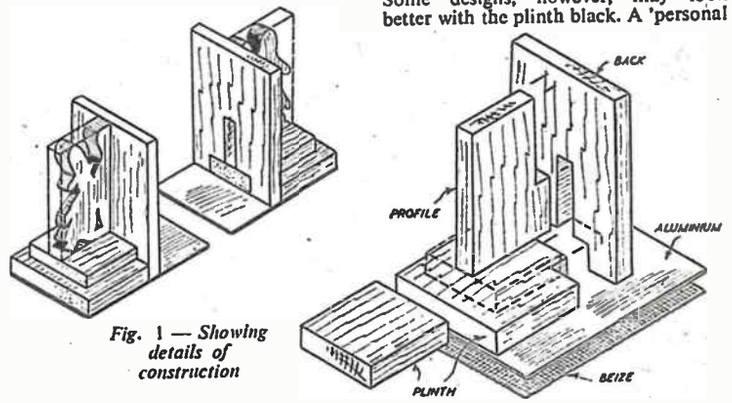


Fig. 1 — Showing details of construction

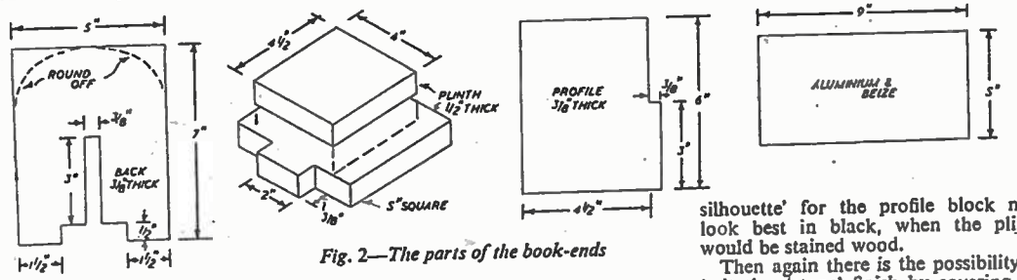


Fig. 2—The parts of the book-ends

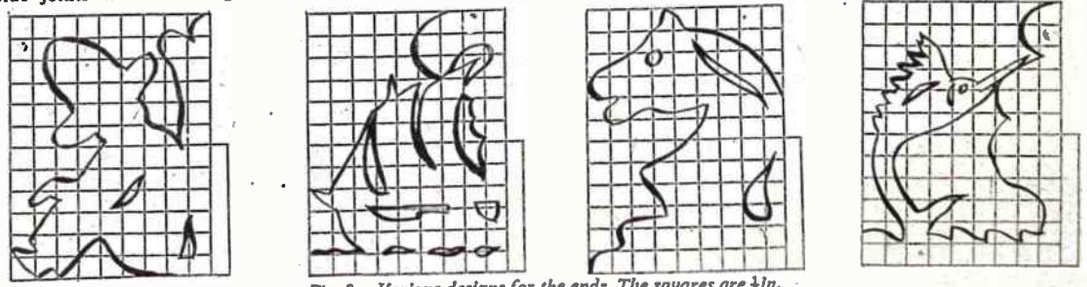


Fig. 3—Various designs for the ends. The squares are ½in.

Overhauling Wooden Fences

WOODEN fencing benefits from an annual overhaul and there is little doubt that a few hours spent regularly on work of this kind will postpone almost indefinitely the time when major repairs and expensive renewals become necessary.

The best way to make a start is to examine the fencing, noting particularly any weak points which call for attention. Palings which, though otherwise sound, are not securely fastened should be nailed back into position. Sometimes it is found that palings have become rotted at the lower end: in this event a repair may often be effected by inverting the paling so that the weak part comes to the top where, generally speaking, wear and tear is less.

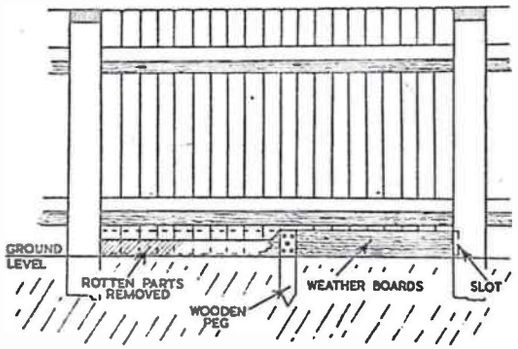


Fig. 1

Remove Rotted Parts

If all or most of the lower ends of the boards are rotten, the answer may be to remove the rotted parts to prevent them holding dampness which will, in time, affect the remaining parts of the boards. This may leave a gap at ground level and if this is not wanted, a weather board may be fitted as indicated in Fig. 1 to close the gap.

Postponing Renewal

Some boards may be found to be so weak that further nailing will only worsen the position—in this case, renewal may be postponed for a time by stapling a length of galvanised iron wire along the line of boards as shown in Fig. 2. Wire about $\frac{5}{32}$ S.W.G. (or that used for the thinner clothes lines) will be found suitable for this. Staples driven into the sound parts of the boards will keep the fence in trim even though staples have to be omitted here and there on account of badly-damaged boards.

Repairing the Posts

Another job which pays a good 'dividend' in time and money saved is to fit covers to the tops of the fence posts. These may be made of wood or metal, and should, of course, be painted or otherwise waterproofed. Fig. 3 gives a general idea of a number of different kinds of caps which will be found useful in the usual cases. Occasionally the tops of the posts are badly pitted by rotting brought on by constant exposure. Such damage is sometimes repaired by filling with a concrete mixture, but it may be preferred to rake out the damaged parts and fill with a mixture of sawdust and small wood chips soaked in tar or glue. The caps mentioned can be fitted when the filling has hardened.

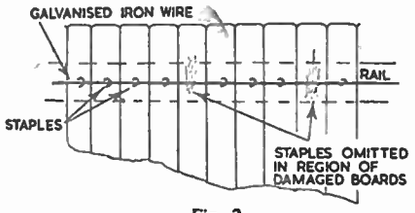


Fig. 2

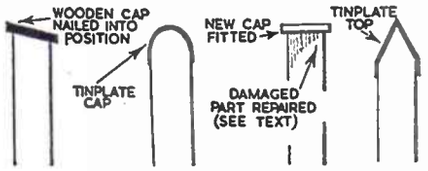


Fig. 3

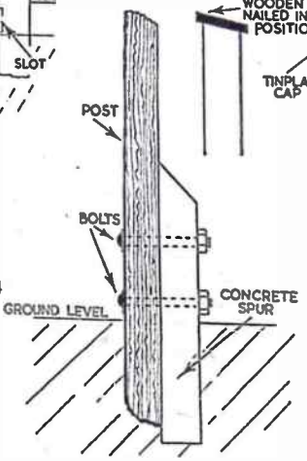


Fig. 4

If the lower part of the post is weak, a repair can be effected with reasonable economy by fitting a concrete spur in the way shown in Fig. 4. Spurs may be bought ready made from most builders' merchants and ironmongers, or can, at little cost, be made at home. The nuts and bolts securing the spur to the post should be galvanised or painted to prevent rusting and the repair will last almost indefinitely.

The last job, and one which should be done every other year, is to give the fencing a coat of creosote or other wood preservative. (VAG)

Radio Conversion

I AM using a battery set with an eliminator as my accumulators are old. Is it possible to do away with them and work it off the mains? I am on A.C. 240 volts? (*E.M.—Horlow*).

LOW tension current may be derived from the mains, but the exact circuit details depend upon the consumption of the receiver. A mains transformer with an output of about 6 V. is required. A full-wave metal rectifier changes the output to direct current, and this is smoothed by means of large condensers of about 5,000 mfd. or so. A final resistor then drops the voltage to exactly 2 for the filaments. As the voltage drop in the resistor and other parts depends upon the current flowing, which in turn depends upon the number and type of valves in the receiver, it is not possible to give exact figures.

NOTES ON SOFT SOLDERING

EVERYTHING appeared to be in perfect order. The resistors and capacitors were of the correct values. The wiring had been checked. The valves seemed to be working normally. Yet the set refused to work. Many radio amateurs already will have guessed the fault—a dry joint! Even with a test meter it is not always possible to find a bad connection. The joint (Fig. 1) may behave normally when an appreciable current is flowing. With a small R.F. current it acts as a high resistance. Such a fault may take hours to locate. With a little care in soldering it could have been avoided.

Definition

Any kind of soldering may be defined as the process of joining two pieces of metal by means of a thin layer of another metal. This last metal, or solder, must have a lower melting point than the metals it unites. A sound joint can be made only if the solder 'wets' the surfaces of the metals.

Until comparatively recently, this most ancient branch of the metal worker's art was confined to skilled craftsmen. Evidence of their ability is to be found in the gold chains and other jewellery found in Egyptian tombs. Brazing and silver-soldering are still among the arts and mysteries of their craft. With the advent of electric power and radio, however, soft-soldering has become the prerogative of the amateur craftsman.

Fig. 2 shows sections of well-soldered and dry joints. In (a) the surfaces of the metals have been well 'wetted'. The solder has penetrated them to a minute degree to form a thin layer of what is virtually an alloy. Where the solder fails to 'wet' the surfaces, a layer of oxide is formed as shown in (b). The solder may penetrate the oxide in places, but there is no real contact. The result is a high-resistance joint.

Rapid Oxidization

All metals in common use oxidise rapidly when heated in contact with air. It is to prevent this oxidisation that flux is used. It covers the joint to form an air-tight seal under which the solder may flow. More oxide is prevented from forming while the soldering-iron is heating the metal. The flux also helps to lower the surface tension of the molten solder, allowing it to flow more easily.

Copper and tin are easy metals to solder. There is no difficulty in 'wetting' them. Aluminium, on the other hand, cannot be soldered by ordinary means. Oxidisation occurs almost instantly after the surface has been cleaned. Ordinary fluxes cannot keep pace with it. A supersonic soldering tool has been designed for use with aluminium. The vibrations set up literally shake off the oxide film as it forms.

Zinc chloride or 'killed spirits' is very corrosive. It should never be used for electrical work. The safest flux is pure resin. In its powdered form it is awkward to use. Dissolved in industrial spirit, its use becomes more practicable. With the advent of resin-cored solder, the whole process has been facilitated.

For Radio Work

Solders used for radio and electrical work are alloys of tin and lead. The proportion of tin to lead determines the melting point. A mixture of 60 per cent tin to 40 per cent lead is widely employed. This 60/40 alloy melts at about 200 degrees C., which makes it particularly suitable for general work.

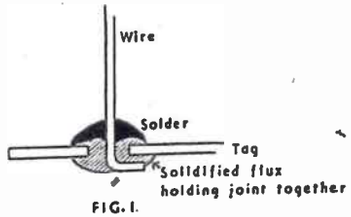


FIG. 1.

Good soldering is not difficult, but certain conditions must be fulfilled for perfect results. The speed at which soldered joints can be made depends not only upon the melting point of the solder but also upon the temperature of the iron. And speed *is* important. Many radio components are ruined by the use of insufficiently hot irons. If the bit is not hot enough, it has to be applied for some time before the solder runs. The heat travels along the wires to the component and damage results. When the bit is at the right temperature the solder flows instantly. There is no time for the heat to reach the body of the component. The more quickly the work is completed, the less chance there is of harm.

Tinning

A soldering-iron is useless unless the point has been tinned. It is only through the tinning that the heat can be conveyed from the iron to the metal. To tin an iron, heat it until it will just melt the solder. Then file one face clean. Before it has time to discolour, rub it in some solder and flux on a tin lid. Repeat the process on the other faces until the point is completely covered for about $\frac{1}{4}$in. up. Providing it is not over-heated, an iron should hardly ever require re-tinning. Any surplus resin which finds its way to the tip burns to form a black scale. This can be wiped off with a cloth to reveal the bright tinned surface underneath.

One or two tips about the correct use of solder may be of assistance to readers. When using resin-cored solder, never apply it on the end of the bit. The flux is 'fried' where it has no chance of doing the job for which it is intended. Always lay the end of the coil of solder on the work and apply the point of the iron to it.

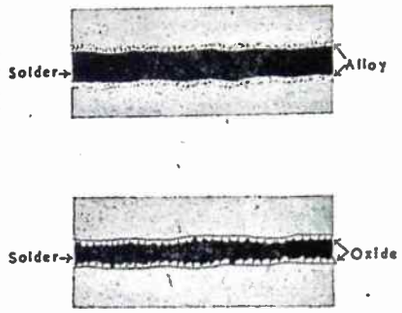


FIG. 2.

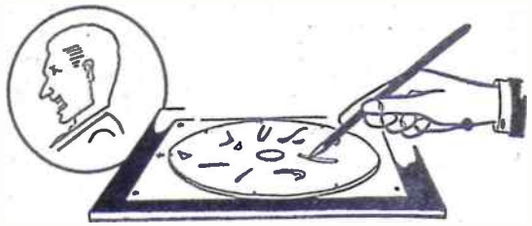
All parts to be soldered must be clean and bright. Scrape them with a piece of hard metal to remove any trace of dirt or grease. Even with tinned copper wire and soldering tags it is best to clean them until the metal is laid bare. When applied, the flux should run easily, followed by a film of solder. If the solder behaves like a spot of water on a greasy surface, then the metal is not clean. Even grease from the hand is sufficient to prevent the solder from running properly. Never touch any surface which has been cleaned for soldering.

Perfect Connection

For a perfect connection, first make a tight mechanical joint. The parts should be in as close a contact as possible. The strength of a soldered joint does not depend on the amount of solder used. After the solder has run all through the joint, the iron should be held underneath to drain off any surplus. (W.C.R.)

Amuse young children with

PICTURE DISCS



They'll have lots of fun producing the pictures.

THIS is an interesting form of amusement, just the thing for young children. By means of these discs, any kiddie can produce pictures with simplicity, and find a fascinating pastime which will keep it interested for hours at a time. The discs are quite easy to make, and their production is by no means uninteresting in themselves, as the makers will find out.

The pictures can be just simple outlines, and if the reader has no particular talent in drawing, suitable examples can be easily traced or copied from books and journals. Drawings of animals are specially suitable for this toy, and any comic figures would, undoubtedly, be equally pleasing, and here the comic papers would provide plenty of examples.

Having chosen the figure, draw or trace it on to a piece of paper and pin the paper to a board. The diameter of the disc can be estimated by striking a circle from a centre just a little above the top of the picture, as in Fig. 1. It should not be too large, a point to be remembered when choosing the picture, in fact a diameter of 4ins. to 6ins. will be found quite enough. With the required radius, strike the circle on to a piece of tracing paper, cut out, and pin through the centre over the drawing, as shown in Fig. 2. A small drawing pin would serve here better than a common pin. At the top of the circle, where marked (A), pencil a small arrow on the paper. This is for a guide.

Hold the tracing paper down firmly to the board, and trace through a small portion of the drawing beneath. In the example shown, the first portions traced are the outline of nose and mouth, and the inner edge of the lapel of the coat. Where the disc of paper touches at

Fig. 2

point (A), make a mark and pencil it (1), as a future guide. Now turn the disc about a sixth of a circle, and trace another portion of the drawing, marking the top at (A) as before and numbering it (2). Repeat these operations for as many times as is necessary to complete the drawing. It is a good idea, also, to number the tracings to correspond, to obviate any chance of a part being copied twice over.

Now strike the diameter on to the material of which the working discs will be made. This can be thin card, or, for a longer lasting disc, celluloid or perspex. Cover the disc with a piece of carbon paper and over this pin the traced disc just made. It is vitally important that the pin should penetrate both discs at their centres. Now, holding all firmly together, trace through the paper to the disc below.

Remove paper and carbon. At those points on the disc marked (1), (2), etc., file a slight notch. Then cut out the lines of the design, so that a pencil point can

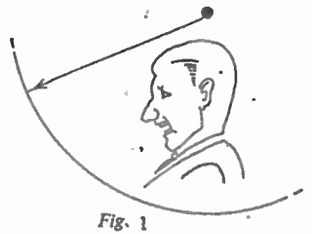


Fig. 1

enter them. An example of what a disc looks like when cut out is shown at Fig. 3, and will be seen as nothing on earth but a meaningless jumble, giving no clue whatever to the picture the disc is able to produce when in use. Looking at Fig. 3 it will be seen that in most cases the cut follows the line all round, but there will most likely be examples when this is impracticable, such as when two lines come so close together as to make a break in the material possible, and it is safer to cut the two as one so to speak.

The outlines can be cut in cardboard with a sharp penknife, though a more suitable tool would be a stencil knife, naturally. In perspex or celluloid a fine fretsaw blade would do the job excellently. Number the guide points, as on the tracing disc originally made, in ink, preferably of the indian ink variety A fair number of discs should be made, say, about half-a-dozen, to provide variety, and though it may seem the making of them is quite a business, they can be completed in a short time.

To use the discs, a square of plywood is a necessary adjunct to the set. On this a piece of paper is laid, and a disc on top, a drawing pin through its centre holding both disc and paper to the board. A second pin is fixed to the paper alone, to prevent it shifting as the disc is turned. At the top, above the disc, make a pencil mark as shown at (A) in Fig. 2. Turn the disc until its notch, numbered (1), is in line with (A), then with the point of the pencil through the appropriate cut-outs on the disc, draw the shape on to the paper below.

Shift the disc to point (2) and trace through the shapes marked (2), to correspond. Repeat until all are copied, then on removing the disc, a replica of the original drawing will be found on the paper.

A pleasing variation of the above can be made by the use of coloured pencils and discs, which instead of having lines, have certain shapes cut out, which the kiddie has to fill in with the colours. For such discs, instead of outline drawings, solid examples are used, suitable for colours, for example — flags. The preparation of such is much as above, the shapes of each differently coloured part being cut out in turn as the disc is rotated on the original drawing. The various shapes should be numbered to correspond to the guide numbers, and lettered R for red, B for blue, etc., as a guide to the correct colours. (W.J.E.)

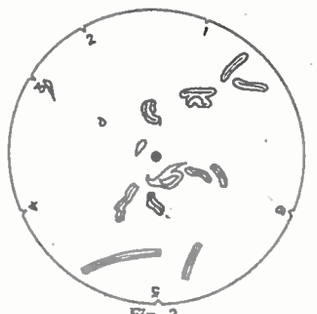
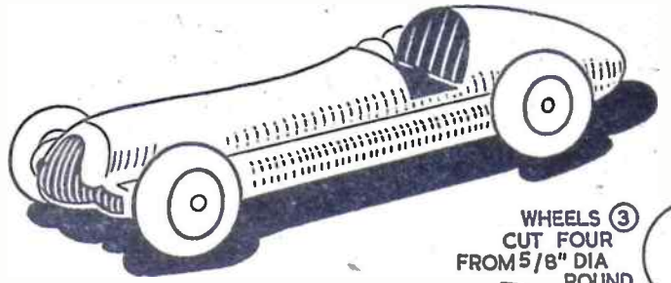
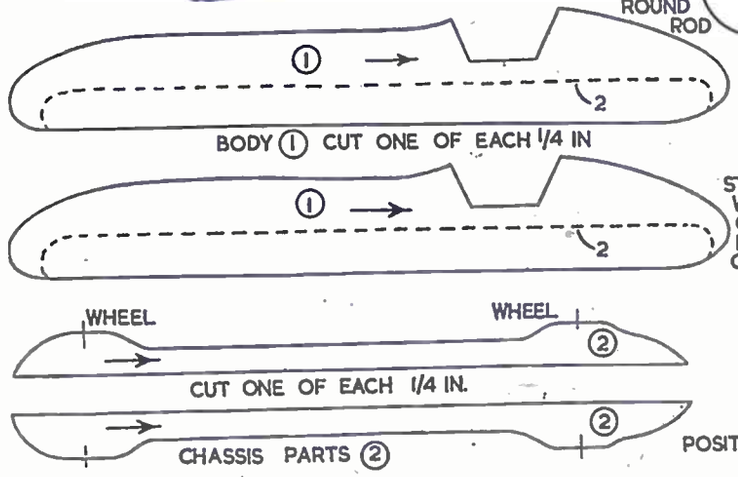


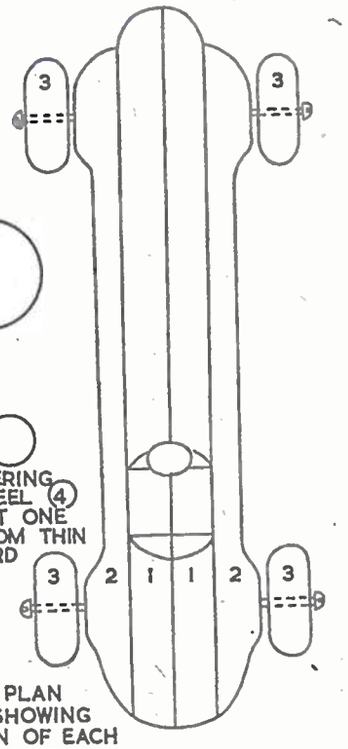
Fig. 3

EASY FOR THE FRETSAW OWNER

Make a Miniature Racing Car







THE mention of Stirling Moss, Mike Hawthorne, Fangio or Ascari conjures up visions of powerful cars roaring at full throttle round the race track. The youngsters love to pretend that they are taking part in a battle of speed on the track. They can have hours of fun with these miniature racing cars, each painted a different colour.

One of Series

Although no particular type was copied for this model, the lines are sleek and low, giving the impression of speed. The car is an addition to the series that has been running in previous issues of *Hobbies Weekly*.

The body of the car is made from four parts only and these are shown full size. Cut them from ¼in. wood and clean up with glasspaper. Glue pieces (1) together and then glue the chassis parts (2) to these. The dotted lines show the exact positions.

The next step is to round off the whole thing with a sharp penknife. Pare away a little at a time until you are satisfied with the shape, and then finish off with coarse and fine glasspaper. A little steering wheel cut from card can be added after the painting has been completed.

The Wheels

The wheels are cut from ¾in. diameter round rod or from ¼in. wood. If you intend to use ¼in. round rod you should cut off ¼in. lengths with a tenon saw.

Paint the car with a glossy enamel and use bright colours such as red or green. Give two coats right over the whole thing and pick out the radiator in white or aluminium. Other parts such as radiator grille and underside of chassis can be black.

The wheels will match the body colour, with a touch of white or aluminium for the hub caps. The rims of the wheels are dark grey to represent tyres. Screw the wheels in position with ¼in. roundhead screws and paint the heads of the screws after fixing. (M.)

Glazing Pottery

COULD you please give me any information as regards glazing of pottery? (R.A.P.—Swansea).

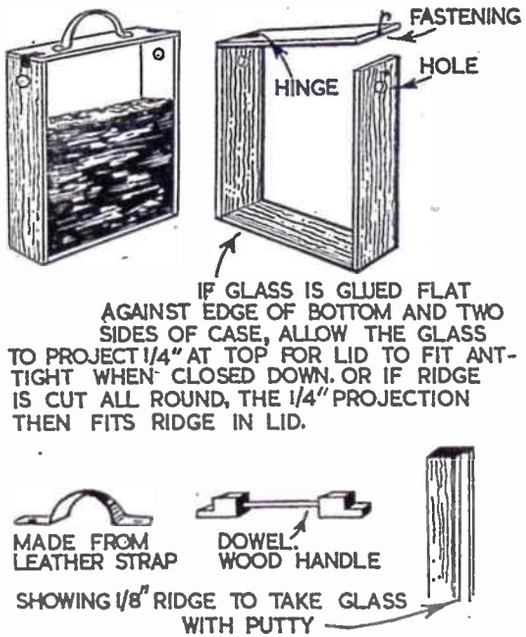
THE glaze on pottery is in general terms obtained by the application of a silicate or other appropriate substance which when 'fired'—that is, melted—in a high temperature furnace, fuses and flows over the surface of the pottery and when cold produces the glossy or glazed effect. The subject is a very large one, as every kind of potter's clay requires its own particular glaze, which may be lead, felspar, or salt—to mention only a few. We suggest you peruse some technical works on pottery and ceramic technology, which could, no doubt, be studied in your local library.

FOR THE YOUNG NATURALIST

An Ant Vivarium

YOU have, no doubt, seen or heard of an aquarium for fish, but what about an ant 'aquarium'? The word aquarium, however, in the case of ants, is misapplied, as it includes the Latin word 'aqua' which means water! Thus the correct term for an 'ant-house' is 'vivarium', which means an artificial enclosure in which to keep living insects or other appropriate live stock.

To make an ant-house or ant vivarium as described here, will afford special interest, particularly to those with a leaning towards zoology and biology. For it has been stated that ants, particularly the white ants, or termites as they are better known to naturalists, are far superior to man as regards civilisation, and possess among their kind quite a list of skilled artisans in their underground cities where there is no chaos, muddle or unemployment! Scientists state that ants have demonstrated that they, among all insects, possess the highest degree of intelligence.



Commence by making the framework of the case or house. Practically any wood will suffice for this, but we will suppose you are going to employ deal. This may be obtained in batten form and 2ins. by ¼in. planed will suit admirably. Saw four strips each 12ins. long. Three of them will form the bottom and two sides of the case, to which the top slip is hinged to afford access to the interior.

A Necessity

As can be understood, the case must be 'ant-tight'. Otherwise, the little chaps will be getting out and about the room. To accomplish this, glass is secured to both sides, and you may run some glue around the edge of the batten and thus secure the glass by this means. See, however, that the hot glue does not cause the glass to crack. This may be avoided by warming the glass before placing it in position. There are several other 'stickfasts' on the market that may be utilised in place of glue. After the glue is dry and quite hard, the passing of a tape or cord band around the middle of the frame acts as an addition in keeping the two sheets of glass secure.

Alternatively, you can cut grooves in the battens and secure the glass with putty. In both glue and putty methods you can employ small pins at intervals, pressed into the wood frame edge and bent at right-angles to assist in holding the glass. Or one may use, in place of the 2ins. by ¼in. batten, a greenhouse batten, that has a ridge to take the glass all around each edge. The two sides should be nailed or screwed to the bottom and the top slip hinged at one side with a fastener placed at the other in order to keep the lid down tight. By aid of a ¼in. or 1in. brace-bit, bore a hole in each side about 1in. or so from the top and then glue a piece of fine gauze, muslin or suitable small-holed perforated metal over each hole on the inside of the case. This permits ventilation but prevents the ants from getting out.

A handle should be secured to the top hinged-slip for convenience in carrying about and may be made from a piece of discarded leather strap or stout cloth. A purchased metal handle could also be used, of course, or even a length of fairly thick rope. Otherwise, one can be made of wood, as in the diagrams.

Upon completing the construction of your vivarium, it should be varnished or painted. Dark oak is a suitable colour for the varnish, and middle-green or oak-brown paint if painted.

After it is quite dry, the vivarium is ready for occupation and only requires to be about two-thirds filled with a mixture of earth and fine sand mixed in about equal proportions. See that both earth and sand are quite dry, and it is a good plan to sift the whole mixture through a sieve. This, of course, gets rid of lumps that would possibly obstruct the view, and it will also give the ants a better chance to bore their tunnels. Having your mixture ready, unfasten the catch at the top, open back the slip of wood, and pour in the earth and sand compost. Give the case a slight shake to settle it.

Now, if you search around in your garden or any suitable place such as under a large stone or an old log of wood, you'll soon discover a colony of ants. With the aid of a trowel, scoop up a quantity of ants complete with their earth or whatever compost they are occupying, and tip into the case. Your vivarium is now completed, and you will be able to observe the ants busily building. In a few days they will have completed quite a village, in which, set aside as a 'creche' or 'clinic', eggs will be tended by those who are nurse-ants, and all others busily engaged, each in his or her own special occupation. They should be fed regularly, however, as being enclosed, they are unable to go abroad and forage for food. Thus a constant supply of food in the form of bits of meat or bread, or even a dead fly or bee, should be dropped in through the hinged top, and you will soon observe the workers hauling this away to their general larder.

Thus an ant vivarium affords many hours of amusing and absorbing interest, from which one can derive much knowledge.

(D.H.M.)

HOME CHEMISTRY

Experiments with Sulphur Dioxide

AS far back as the days of Ancient Greece the gas sulphur dioxide was used to fumigate houses. By burning sulphur the Greeks produced what we now know to be sulphur dioxide. Even today, sulphur dioxide is often used for fumigation.

To prepare the gas for our experiments it is better to heat a mixture of four parts of flowers of sulphur and five parts of manganese dioxide, both by weight, in a hard glass test tube fitted with a cork and delivery tube. The gas should be washed by passing it through a little water in a bottle. Since it is heavier than air, the gas can be collected by downward displacement (Fig. 1). The experiments are best done in the open air, as the gas has an irritating smell.

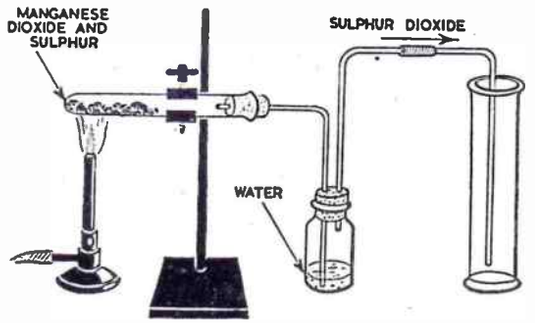


Fig. 1

Besides being a good fumigant, sulphur dioxide will bleach. In fact, for delicate fabrics such as silk, wool and straw, it is used instead of chlorine, which would injure them. Dip some delicately tinted flowers into water, and then place them in a jar of the gas, closing the jar with a greased glass plate. After about an hour you will find they have entirely or mostly turned white.

Vital Importance

Sulphur dioxide is of vital importance in sulphuric acid manufacture. The gas is made to combine with oxygen and water, when the acid is produced. A convenient laboratory method of oxidising the gas is to bubble it through hydrogen peroxide for a few minutes. If you then add the solution to barium chloride solution, there will be formed a white precipitate of barium sulphate (confirmed by adding hydrochloric acid, when the precipitate will remain undissolved). This proves that the sulphur dioxide has been converted into sulphuric acid.

Hold a burning wood spill to the mouth of a jar of sulphur dioxide. You will find the gas is not inflammable. Then plunge the spill into the gas. It will be extinguished, showing that sulphur dioxide does not support combustion either. Even the very hot magnesium flame is almost extinguished in the gas. Light a strip of magnesium ribbon and plunge it in a jar of the gas. The magnesium flame dims and only just manages to keep burning.

Interesting Experiment

An interesting experiment is to watch the effect of sulphur dioxide on sulphuretted hydrogen. Take a jar of each gas and put them mouth to mouth.

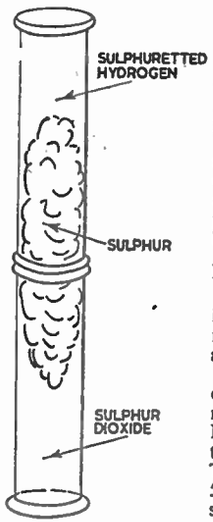


Fig. 2

Immediately a cloud of sulphur is produced (Fig. 2). This sudden appearance of 'smoke' from two invisible gases makes a striking trick to show your friends.

Sulphur dioxide dissolves easily in water. Bubble the gas through a few c.c. of water in a test tube for five minutes and then dip blue litmus paper in the liquid. It will be turned red, proving an acid has been formed. This acid is sulphurous acid. But it is unstable and is soon oxidised to sulphuric acid by the oxygen of the air.

Its salts, however, are mostly stable. Sodium sulphite is well known to photographers. To prepare it, make about 50 c.c. of sodium carbonate solution, halve it, and saturate one half with sulphur dioxide by bubbling the gas through the solution. The solution should then smell strongly of the gas. Now add the other half of the sodium carbonate solution and evaporate to the crystallisation point. On cooling and standing overnight, crystals of sodium sulphite will separate out. Pour off the mother liquor and dry the crystals on a porous tile for your chemical stock.

Sodium hydrogen sulphite (or sodium bisulphite) is also easily prepared. Pass sulphur dioxide into about 50 c.c. of sodium carbonate solution until it is saturated. Then add methylated spirit until a precipitate begins to form. Leave it aside until no more precipitation takes place, and then filter it off. This is sodium hydrogen sulphite, a white crystalline powder, and which you should dry on a porous tile.

This isolation of the salt by adding meths. has to be used, because on evaporating the solution, sodium hydrogen sulphite is not obtained. Decomposition occurs and sodium metabisulphite is formed. Therefore, by saturating another 50 c.c. of sodium carbonate solution with sulphur dioxide and evaporating it to dryness, you can prepare a specimen of sodium metabisulphite for your laboratory stock.

Reducing Agent

As a reducing agent, sulphur dioxide is most useful. It will, for instance, reduce potassium dichromate to chrome alum.

To prepare chrome alum in this way, dissolve 3 grams of potassium dichromate in 20 c.c. boiling water in a beaker. Let the solution cool and add 6 c.c. of ten per cent strength sulphuric acid. The temperature must be kept below 50 degrees Centigrade during the next stage, or the chrome alum will not crystallise out. Therefore, immerse the beaker in cold water. Then bubble sulphur dioxide slowly through the solution. The colour will darken from orange, through brown to greenish-blue. When it is greenish-blue stop passing in sulphur dioxide and set the solution aside for a day or two. Purple crystals of chrome alum will separate out, which you can dry on a porous tile.

In a similar way sulphur dioxide reduces cupric to cuprous salts. Cuprous chloride, the most well-known cuprous salt, you can prepare by dissolving 10 grams of copper sulphate and 5 grams of common salt in just enough cold water. Add to the solution one third

(*Continued on page* 396)

PART 2

Microphones for Tape Recorders

I HAD no idea my voice sounded like that!' No doubt readers who have built their own tape recorders will have heard this remark. Sometimes the surprise is justified, for without a good microphone it is impossible to produce realistic results.

Carbon microphones have been dealt with in an earlier issue. They are of the pressure type and operate by reason of the impact of sound waves on the diaphragm. If any serious recording is contemplated, especially of musical items, carbon microphones leave a lot to be desired.

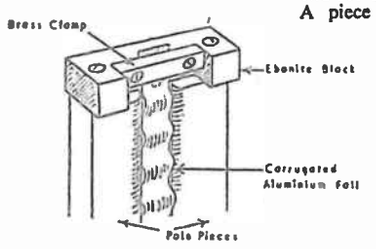


FIG. 2. FITTING THE RIBBON

A ribbon microphone differs from all other types in that it is operated by the velocity of sound waves and not by the pressure. It is capable of extremely high quality, and is in general use by the B.B.C. Its main drawback is its low output, but it will usually be found that the better the quality of a microphone, the lower its output will be.

The construction of such an instrument is not difficult, and Fig. 1 shows the general arrangement. It is simply a corrugated strip of aluminium foil suspended between the pole pieces of a powerful magnet. The foil is extremely light, and follows the movements of the air. It responds to the velocity of the sound waves, and as it cuts the intense magnetic field, tiny currents are induced in the ribbon. No movement will result from sound waves coming from the sides, so this type of microphone is directional.

Any strong magnet may be used, and for this reason detailed measurements for the component parts are not given. Pole pieces of soft iron or mild steel should be fitted to the magnet so that the gap between them is ¼in. Slightly round the inside edges to concentrate the magnetic field.

Two blocks of ebonite or other insulating material are screwed across the top and bottom of the gap, as shown in Fig. 2. To hold the ribbon and provide a connection, two small clamps should be made of brass. The size is about ¾in. by ¼in., with holes at each end for screwing to the ebonite blocks. A piece of insulated wire should be soldered to each clamp for connection to the first transformer.

The thickness of the ribbon should be ·00025in. or less. An old paper condenser will provide the ideal material. Carefully unwind and cut off about 12ins. of paper and foil. Steep in hot water until the foil separates easily. Lay the foil on a clean flat surface and remove any remaining grease with petrol. Now, with a straight edge and razor blade, trim down one edge. Move the straight edge back $\frac{1}{16}$in. and cut the ribbon this width. If the cuts are made ¼in. from each end, it will prevent the foil from wrinkling.

The ribbon may be corrugated by placing it between two pieces of corrugated cardboard and pressing them together. Two wide cog wheels could also be used for this purpose.

Fitting the ribbon is a delicate operation. Carefully fold over ¼in. at one end and insert this between the bottom block and brass clamp. Screw up gently. Now draw the ribbon between the pole pieces and adjust so that it is exactly central. There should be a slight gap between the ribbon and the edges of the pole pieces. Remove the top clamp and lay the ribbon over the ebonite block. Tension lightly and screw on the top clamp. Cut off surplus ribbon, leaving about ¼in. for adjustment.

The impedance of the ribbon is extremely low—in the order of 0·5 ohm. This must be matched into the high input impedance of the amplifier. In order to avoid hum pick-up, two transformers are generally employed. The first matches the ribbon impedance to the connecting cable. A transformer with a ratio of about 22 to 1 is needed, and this is mounted in the microphone case. One of the miniature transformers now obtainable can be used. For matching the cable into the amplifier, an ordinary microphone transformer with a 50 to 1 ratio is suitable.

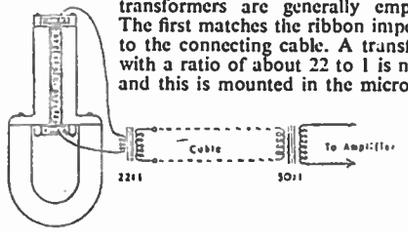


FIG. 1. HOW A RIBBON MICROPHONE IS CONNECTED

When all is ready, connect up the microphone as shown and test. Speak about 12ins. from it to avoid the lower frequencies being accentuated. If the reproduction sounds tinny, the ribbon is too slack. Tighten up until a natural quality is obtained. The tension should be such that a very light breath on the ribbon just causes it to tremble perceptively. When the best reproduction has been obtained, dab a spot of nail varnish round the screws to lock them.

Since the microphone is susceptible to magnetic dust and draughts, make a cover of perforated zinc and line it with thin silk. This will give a professional appearance, and protect the delicate ribbon from damage. (W.C.R.)

Home Chemistry

(*Continued from page 395*)

of its bulk of strong hydrochloric acid and then bubble through sulphur dioxide for half an hour.

Then let the solution stand overnight, when white cuprous chloride will have separated out. Filter this off and dry it by pressing between filter papers. Keep it in a tightly corked bottle, for air eventually converts it into cupric chloride. Cuprous chloride is used in gas analysis.

The not so well known cuprous bromide can be prepared in a similar way by bubbling sulphur dioxide through a cold solution of 10 grams of copper sulphate and 4 grams of sodium bromide (about 150 c.c. of water should be used to make the solution). Small white crystals of cuprous bromide will separate out. Filter them off and dry quickly between filter paper. Cuprous bromide is not so quickly affected by air as cuprous chloride, but still needs keeping in a well-corked bottle. (L.A.F.)

NOTES ON CHANGES IN SHIP DESIGN

By 'Whipstaff'

THE following few notes on the various changes of ship design will not only prove of interest, but, more important, they will sometimes clear up points not quite clear in particular models.

Rudders. These came into use in place of the steering oar sometime during the 13th century. Some put it as late as the 14th century, but that is still open to proof being forthcoming.

Outside Galleries or Stern Walks such as shown in our models of the Golden Hind, Elizabeth Jonas, etc., went out early in the 17th century, the Royal Prince of 1610 being the last warship built with a stern walk. She represents the transition from the galleon type of vessel to the warship of the Stuart Period, which later developed into the ships of the line under the various establishments.

Decorated Sails went out at the close of Elizabeth's reign.

Stern Galleries of the type that became universal during the 18th century were triple for large ships of 90 guns and over and single for the smaller vessels of 64 and 74 guns.

Steering Wheels were first used somewhere between 1703 and 1747. On models of ships built prior to this date we must omit the steering wheel. We have been asked by readers for details of a steering wheel for our model of the 'Ark Royal'. The answer is that it would be incorrect to show a wheel on a vessel of this period. The steering gear in use would be the whipstaff (see article No. I on Building the 'Ark Royal').

Compass or Sailing Needle was in use in the 16th century.

Chain Cables and Hemp Cables. Some of our readers have been in doubt as to whether chain cables would be correct on certain models. The solution to this problem is in the date of the prototype. Chain cables date from 1811, but during part of the later period hemp cables were also carried.

Chain Plates, i.e. Channels, were level with the main deck until 1705. They were then removed to the level of the upper deck by the continental navies. In Elizabethan times chain plates were rarely used for mizzen or bonaventure masts, the shrouds being set up inside the bulwarks.

Figureheads. During the 16th and 17th centuries the Lion and Dragon figureheads were the only type in use. Early in the 17th century the Lion was made official for the large warships known as First Rates, which in some cases had, till then, borne an equestrian figure of the reigning monarch. Towards the end of the 18th century full-length figures representing the ships name came into use, followed in Nelson's time by a white bust or three-quarter figure. I hope, in an early article, to outline the interesting history of the figurehead.

Stern. In 1820 Sir Robert Seppings introduced the round stern in place of the square transom.

During this century composite building was introduced and many famous windjammers were composite built; that is, all interior framework was of iron, the hull then being planked with wood and copper sheathed below the waterline. This method lasted from 1851 to between 1865 and 1870. (A.)

Don't miss reading this if you are

BUILDING OUR CAR RADIO

In our issue of August 13th we published a circuit with instructions for making your own car radio. Unfortunately it was not noticed until the issue had gone to press that the blocks in Figs. 2 and 3 had become transposed, so that what was described as the heater circuit for 6 volt operation, was in fact the circuit for 12 volt operation, and vice versa.

To many of our radio readers this error will have been readily noticeable, and no damage will result, but this correction is being published in the first available issue for the benefit of those who are not so experienced in radio work. If the heater circuits as described in our earlier issue are followed, the reader building his receiver to work from a 12 volt source would burn out his valves as soon as he switched the set on. Those building a set for 6 volt operation and using the heater circuit shown would find that the set would not function.

Under no circumstances, therefore, should the heater circuits shown in the August 13th issue be used. Instead, the corrected circuits as shown here should be followed.

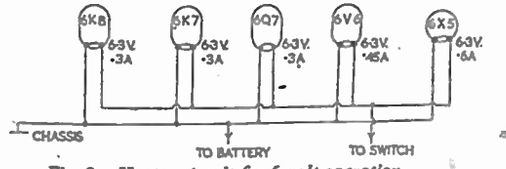


Fig. 2—Heater circuit for 6-volt operation

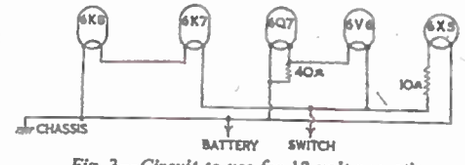


Fig. 3—Circuit to use for 12-volt operation

This is how the two blocks should have appeared

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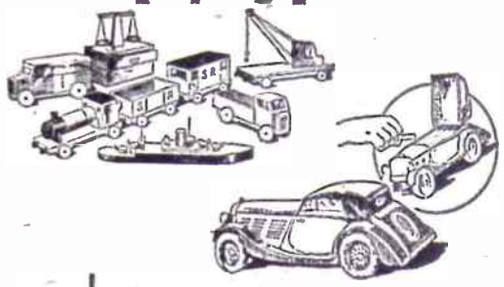

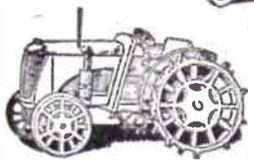

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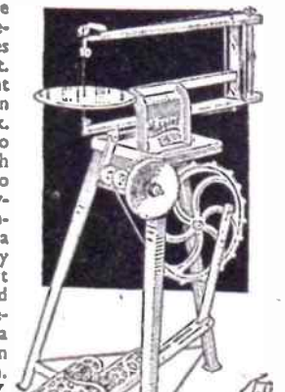

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