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SPECIAL TRIX SUPPLEMENT IN EVERY ISSUE.

HOME CRAFTS
WOOD WORKING
MODEL MAKING
AMATEUR MECHANICS
ETC. ETC.

Hobbies AND WIRELESS SUPPLEMENT

2D

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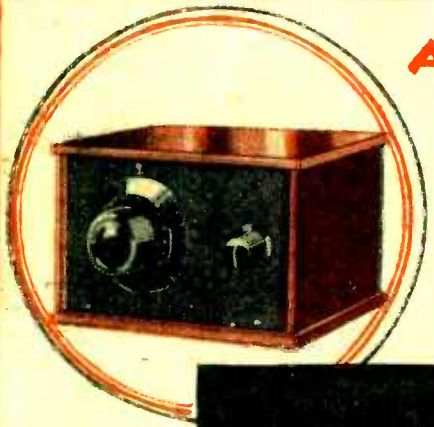
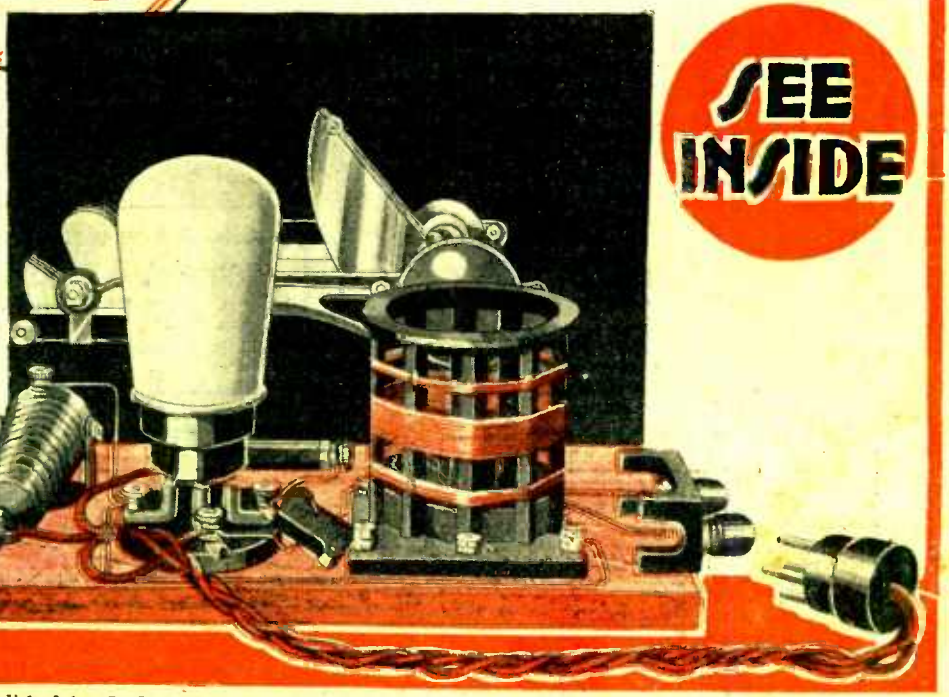


A WIRELESS Short Wave Adaptor!



SEE INSIDE

Published by GEO. NEWNES, LTD., 8-11, Southampton Street, Strand, London, W.C.2.

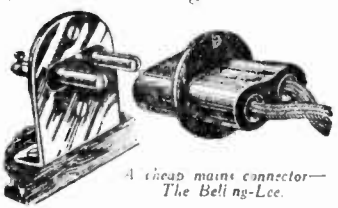
Hobbies

Vol. 75. No. 1,928 Published Every Wednesday OCTOBER 1st, 1932

THIS WEEK'S CLEVER IDEAS

Mains Input Connector.

NO matter what device you use which works from the mains, it is important to ensure that the connection is safe. Many cheap mains connectors (usually those of foreign manufacture) have their internal connecting screws too close together, with the result that in use the ends of the wire fray out and "short," thus blowing the fuse. Messrs. Belling-Lee, Ltd., famous as the makers of every type of terminal and electrical connector, have just produced the mains input connector shown, at 1s. 3d., which ensures complete safety in use.



A cheap mains connector—The Belling-Lee.

New Pocket Watch.

IN our issue for September 10th we dealt with a new style of wrist watch which has no glass, dial or hands, and is damp and dust proof. A pocket watch on the same lines has now been produced, and the correct time, as with the wrist watch, is shown through mica-protected windows. There are three of these windows, showing a direct reading of the hour, minute and second. These pocket watches cost 5s.

Chain Wrench for Cyclists.

A NEW chain wrench marketed at the low price of 1s. 6d. consists of a 8in. lever toothed at the end with an 8in. length of ordinary half-inch pitch cycle chain attached to it in the manner of a whip. When this chain is bent round a nut or bolt head and caught up by the hook of the lever a vice-like grip can be exerted, giving much greater purchase than an ordinary spanner. Nuts which are rusted on and those which will not yield under the leverage obtainable from an ordinary spanner easily give way when this tool is applied. A larger size with a 36in. lever is also made.

Mercury Switches.

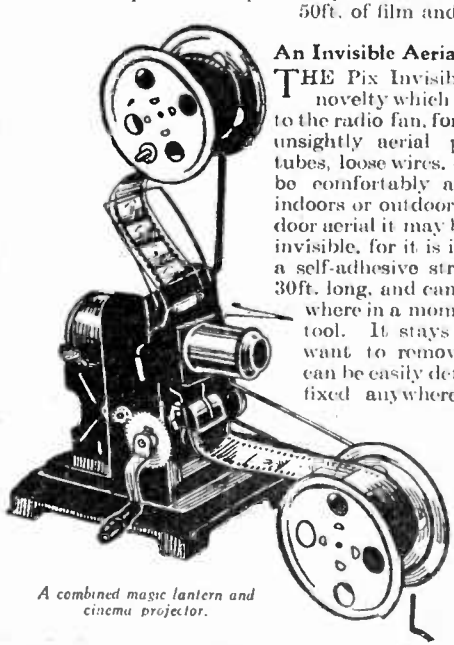
LAST week we illustrated some new types of mercury switches, the primary object of which is to break a circuit carrying high voltage and high current, avoiding the arcing which usually takes place with mercury switches, and which latter give rise to a poisonous mercury vapour. Those illustrated last week are totally enclosed.

"The Cycling Road to Health and Fitness."

MR. WILFRED HILL has just written a book under the above title which should appeal to cyclists and all would-be wheelmen. There is a splendid preface in the book by that grand old man of cycling, the Rev. Frederick Hastings. Copies may be obtained for sixpence post free from The County Chemical Co., Ltd., Chemico Works, Bradford Street, Birmingham.

Combined Home Cinema and Magic Lantern.

A NEW model combined electric cinematograph and magic lantern fitted with a double spool, including the bottom take-up spool, has just been marketed at 8s. 6d. complete with electric lamp, for use with a standard pocket lamp battery. It is complete with 50ft. of film and 60 slides.



A combined magic lantern and cinema projector.

An Invisible Aerial.

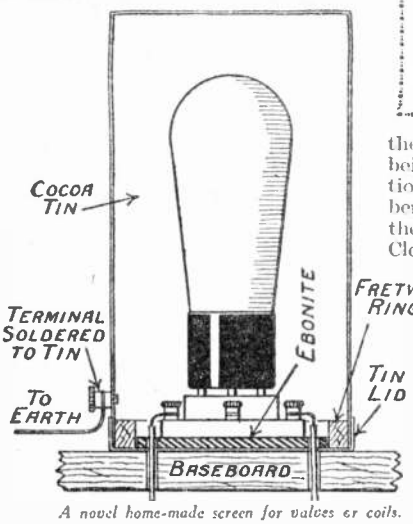
THE Pix Invisible Aerial is a novelty which should appeal to the radio fan, for it eliminates unsightly aerial poles, lead-in tubes, loose wires, etc., and may be comfortably accommodated indoors or outdoors. As an indoor aerial it may be made quite invisible, for it is in the form of a self-adhesive strip 1in. wide, 30ft. long, and can be fixed anywhere in a moment without a tool. It stays put until you want to remove it, when it can be easily detached and refixed anywhere. It can be run round the room under the lino or carpet, up the staircase, under the banister, and any other convenient place.

The address of the manufacturers of items mentioned on this page can be obtained on application to the Editor.

NOTES AND NOTIONS from our READERS

A Home-made Screen for Valves.

THE illustration shows a novel home-made screen for valves or coils.



A novel home-made screen for valves or coils.

The screen is constructed from a cocoa tin. First of all the valve-holder is removed from the baseboard and the lid of the cocoa tin is fixed in its place. A thin piece of ebonite is placed over the tin and the valve-holder is mounted over this piece of ebonite. In this way it is impossible for the internal contacts of the valve-holder to be "shorted" by the tin-lid. This piece of ebonite should come to within ¼in. of the edge of the tin-lid.

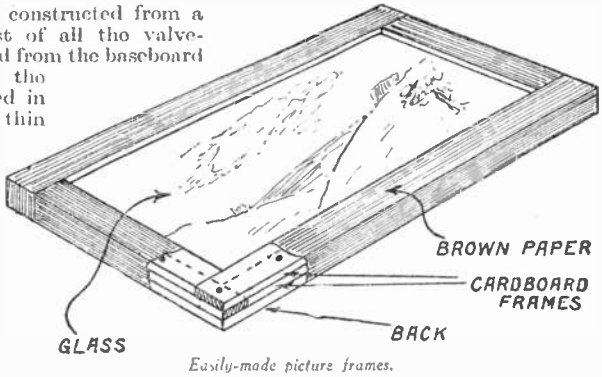
Now obtain some thick fretwood and cut out a circular piece which will just fit inside the tin. On this fretwood circle mark another circle with a radius smaller by ¼in. Now cut away the centre portion. This leaves a rim ¼in. wide all round, and should be fixed round the mouth of the tin with small nails. When the tin is placed over the valve the ring of fretwood will fit against the ebonite circle which has been put beneath the valve-holder, and will thus keep the screen secure. Moreover, the fretwood will prevent the edge of the tin from "shorting" the terminals of the valve-holder, should the tin be accidentally dropped when being put in position. The connections to the valve-holder can be taken beneath the baseboard as shown in the diagram.—F. W. Spolton (King's Clere House Lodge, Nr. Newbury, Berks).

THAT DODGE OF *YOURS?*

Why not pass it on to us? We pay Five Shillings for every item published on this page. Mark your envelope "Notes and Notions," and address to The Editor, "Hobbies," Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. *Every notion sent in MUST be original!*

Easily-made Frames.

A CHEAP and attractive frame can be made from stout cardboard. Cut four strips, 1¼in. wide, and lay together to form a frame. Cut another four strips, 1in. wide, and arrange these on top to form a second frame, the outer edges level. Nail both together with shoe-maker's tingles, and black the inner edges with ink. Fit a piece of glass into the rebate, place the picture on top and cover with a piece of cardboard as large as the frame.

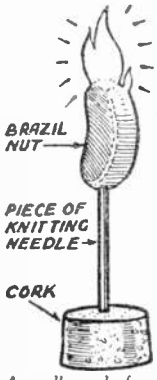


Easily-made picture frames.

Hold all firmly together with the thumb and fingers and turn over. Glue strips of brown paper to cover the frame and reach over the back to about one inch.—W. J. Ellson (80, Westfield Road, Horsley, N.8).

A Novel Candle.

AN effective substitute for a candle or taper can be made from the kernel of a brazil nut. If you light one end of the nut it will burn clearly for some time. This is due to the oil in it.



A candle made from a bean.

Transfers from the Newspaper.

TO obtain an impression of a picture in a newspaper, moisten the paper and rub soap over the required picture. Press the picture in contact with a clean sheet of paper and rub the back of the picture with an old knife handle or similar smooth object. Then peel it off. An impression of the picture will be transferred to the blank sheet. A new newspaper gives the best results.

A Cheap Stain for Wood.

DISSOLVE a few grains of Potassium Permanganate in cold water. This will make a dark purple solution which, when brushed on to a bare wood surface, will stain it a rich dark brown. This stain is non-poisonous and has slight antiseptic properties. It is so cheap that two-pennyworth of permanganate will make enough solution to stain dozens of small articles.

How to make transfers from a newspaper.

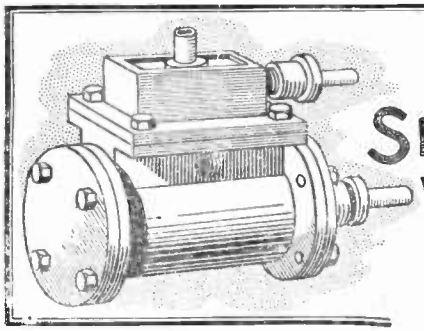
This Week's Mental Nut. No. 36.

THREE books will be awarded each week for the first three correct solutions opened. Mark envelope "Mental Nut," No. 36.

A POLICEMAN was chasing a burglar who was exactly twenty-seven steps ahead of him when they started. The constable took five steps to the burglar's eight, but two of the policeman's steps were equal to five of the burglar's. How many steps would the policeman have to take to catch the burglar?

Answer to Last Week's Problem.

MARY'S age is 27½ years and Ann's 16½.



MAKING A SLIDE-VALVE CYLINDER WITHOUT CASTINGS

By "Home Mechanic"

(*Concluded from page 660, September 24th issue.*)

Cylinder Covers.

We will now turn our attention to the cylinder covers. For these two flat brass discs ⅜in. thick and 1¾in. in diameter will be required. If these cannot be obtained ready made, they must be cut out of sheet brass the required thickness, with hammer and chisel, the edges being nicely squared up afterwards with a file. Four holes should now be drilled in each cover for the fixing screws, at the points indicated in Figs. 2 and 3.

Take one of the discs and face up one side. This will complete the back cover. Now drill a ⅛in. hole through the centre of the other disc and face up on one side. The other side should be slightly countersunk round the hole in the centre by using a ¼in. flat drill bit.

Stuffing-Box and Gland.

To make the stuffing box for this cover, procure a short length of brass tubing of ¼in. bore and about ⅜in. outside diameter, and tap a thread inside one end to a depth of ⅜in. Cut off this piece of tubing, and with a small screw clamp hold it firmly in place on the cover. Adjust it so that the hole in the cover is exactly central with the tapped hole in the stuffing box, and then solder it in place. For the gland, get a piece of brass tubing ⅜in. outside diameter, the bore of which must be a nice sliding fit to the piston rod (⅛in. diameter). With a screwplate, cut a thread on one end for about ¼in. along the tube, corresponding to the thread tapped in the stuffing box.

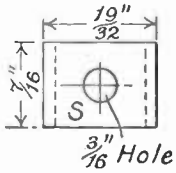


Fig. 9.—Showing how the steam chest is formed.

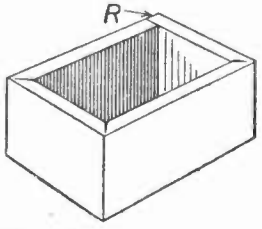
This piece can then be cut off. Now obtain or make a small brass washer, which should be about ⅜in. diameter and 1/32in. thick, and drill a ⅛in. hole in the centre.

Hold this washer and the small screwed gland in a clamp and, after carefully adjusting, sweat well together. The stuffing box and gland for the valve rod are made in a similar way, but their positions are reversed, the gland being soldered into the steam chest. It will also be noticed that slightly different sizes of tubing are used. (See Fig. 1.)

Piston and Rod.

The piston should claim our attention next. Of course, if any reader intending to make this little cylinder can get a friend who has a lathe to turn up the piston, so much the better; if not, it can be made up as follows: Get two brass discs ⅜in. thick, and which fit nicely into the bore of cylinder, and one smaller one ⅛in. thick and in. diameter. Take the two larger discs, and after slightly tinning one side of each, hold them in a clamp so that they exactly coincide, and sweat together. With a centre-punch, carefully mark the centre and drill a ⅜in. hole through the two discs. It is, of course, essential that the hole should be quite square with the face of the disc. Now tap a ⅛in. thread right through, and hold in a gas flame to separate, then clean up both sides. The small disc should have a ⅛in. hole drilled in the centre.

For the piston rod obtain a length of German silver rod of ⅛in. diameter. This metal is preferable to steel owing to the latter being subject to corrosion, which soon upsets the smooth working of the piston rod through the gland. Grip the rod carefully in a vice and cut a ⅛in. thread along one end a distance of in. by the aid of a screw-plate. One of the tapped discs can now be screwed "home," as shown at U (Fig. 11). The middle part of the piston can now be slipped on and the other disc screwed up tight, clamping the middle part in place.



Now apply a little soldering flux at V and sweat this end of piston to rod by using a soldering iron. File off all superfluous solder and carefully clean up the edges W, which must be left quite square. The piston-rod can now be cut off to the length required and the end squared up.

Slide-Valve.

The slide-valve is made out of a piece of stick brass or gun-metal, and should be filed to shape and the cavity chipped out with a small chisel to the size shown in Figs. 1 and 2. Only a small amount of lap is indicated (about ⅛in.), which will be found suitable for general use. The valve rod can be of brass or German silver, being filed away where it engages in the slot in the valve. (See Fig. 2.)

Having got so far, proceed to drill and tap the holes

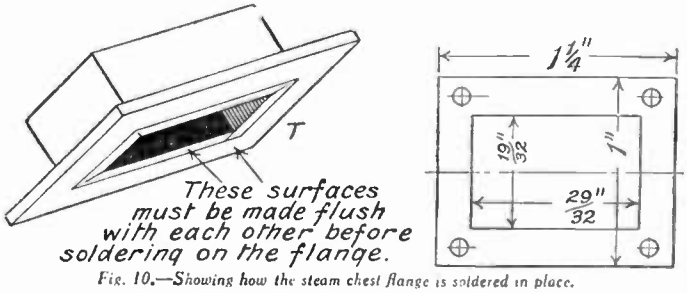


Fig. 10.—Showing how the steam chest flange is soldered in place.

in the cylinder flanges for taking the fixing screws for covers. The positions of the four holes must, of course, exactly correspond with those already drilled in the covers. Each hole is to be tapped to take $\frac{3}{32}$in. screws or bolts if the latter are preferred.

The piston can be packed in the usual way with asbestos string or hemp saturated with Russian tallow. We are now ready to fix down the covers, but before doing so cut two circles of thin brown paper the diameter of the cylinder flange and soak well in linseed oil. These are placed between the flanges and the covers when the latter are screwed down, and will make a perfectly steam-tight joint.

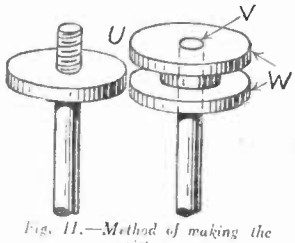


Fig. 11.—Method of making the piston.

Setting the Valve.

The valve can now be set. To do this first place the valve rod and steam chest in position, and fix the latter down with a couple of screws. Screw up the stuffing-box sufficiently to hold it tight, and then, holding the valve in mid-position, with a scriber make a slight mark on the valve rod flush with the face of gland, as indicated at X (Fig. 1). Now carefully measure the distance Y, and make a note of it for future reference. This method allows the position of valve and length of eccentric rod to be determined when all the parts have been assembled. The two screws and the valve rod can now be withdrawn and the stuffing-box unscrewed.

All that remains to be done now to complete the cylinder is the steam chest top. This is simply a piece of sheet brass $\frac{1}{16}$in. thick, cut out to just fit the inside of steam chest. (See Figs. 1 and 2.) In the middle of this brass plate sweat on a small brass washer, and having marked the centre, drill a $\frac{3}{32}$in. hole, which can be tapped to take the screwed end of the steam pipe. Now take the plate and press it down so that its surface is a little below the top of steam chest, and then well solder all round.

Packing and Lagging.

The parts can now be assembled and the steam chest screwed down, having packed the joint in the same way as the cylinder covers. The stuffing-boxes can be packed with the same sort of material used for the piston, and the cylinder is then ready for steam. Although not shown in the drawings, the cylinder should be lagged in the usual way to prevent excessive radiation. With regard to the steam pressure, 20 to 25lb. could be safely used, provided that all the joints have been well soldered.

If the instructions given are carefully followed out, coupled with a good deal of patience, the builder will find that he is in possession of a neat and efficient little cylinder which will amply repay him for the time and trouble expended in its construction.

In conclusion, it would perhaps be as well to mention here that the writer some time ago constructed a small model horizontal steam engine, the cylinder of which was a "built-up" one, similar to the one described, and which worked very satisfactorily. With the Editor's permission, particulars of this model will be given in a later article.

MAKING A TRICKLE CHARGER FOR D.C. MAINS

(Continued from September 17th, page 633).

CUT a groove across the lamp-holder support as at "B" in Fig. 3, to allow clearance for the connecting wires to go behind the holder.

You can now fix on the lamp-holder and screw the support firmly to the base in the recess allowed for it. Extra rigidity is ensured by fixing in a small angle block, when the assembly will appear as in Fig. 3.

Next prepare the two ebonite panels. You can get them out of a panel 7in. by 6in. The necessary holes for mounting the switch will depend upon the particular make of component you purchase. Apart from this all the dimensions will be found in Fig. 4.

Mount the switch and terminals on their panel and screw both pieces of ebonite into their recesses in the base. Proceed with the wiring by reference to Fig. 1. Connections from the terminals to the switch are easily made with the usual kind of insulated connecting wire, soldered joints being the best if you are "happy" with your soldering iron. Now make the connection from one contact of the lamp-holder to the appropriate point on the switch. This is more easily done with a single piece of well-insulated flex. Now join up your long length of flex, one lead to the remaining point on the switch and the other lead to the unused contact of the lamp-holder. The other end of the flex is passed through the hole in the middle of the smaller ebonite panel and connected with your mains plug or adaptor.

There now remains to be made the metal cover, which is a protection and gives the unit that well finished appearance the majority of us desire these days. The material used to construct the cover can be to your own choice, tinned iron sheet being about the least expensive.

If you have followed the given dimensions up to this point, do so again for the cover as shown in Fig. 5. Mark out on your metal sheet very carefully as shown and drill all the holes. The large holes are for the purpose of cooling and are therefore essential.

After cutting out with shears and trimming up as neatly as possible, the bends, indicated by dotted lines in Fig. 5, are made, and the joints of the three flaps forming the opposite sides of the cover soldered. These joints are marked "X" in Fig. 6, which shows the finished cover. Slip the cover over the unit and see that it fits properly, then insert the correct size lamp in the lamp-holder and refit the cover, fixing it with six small screws through the holes provided.

Do not connect up your accumulator yet, as the charger is not ready for use until you have arranged that the polarity of the mains corresponds with that given in Fig. 1.

To do this put the charger switch in the "charge" position and plug into the mains and switch the current on. The pair of terminals marked "accumulator" must now be tested with pole-finding paper, taking the necessary precautions not to make contact with bared wires, etc., or you will be subjected to a nasty shock.

Having discovered the polarity of these terminals, if it happens to correspond with the markings on them all is well and good. If the polarity differs however, you must put the matter right by reversing the mains plug or adaptor in its socket. In either case the correct position should be marked permanently on both plug and socket for future reference, as it is essential that the plug be always inserted the correct way.

This having been done, switch off the mains and connect up your accumulator and receiver to their respective terminals on the unit.

A SELF-INKING PRINTING PRESS

(*Concluded from page 666, September 24th issue.*)

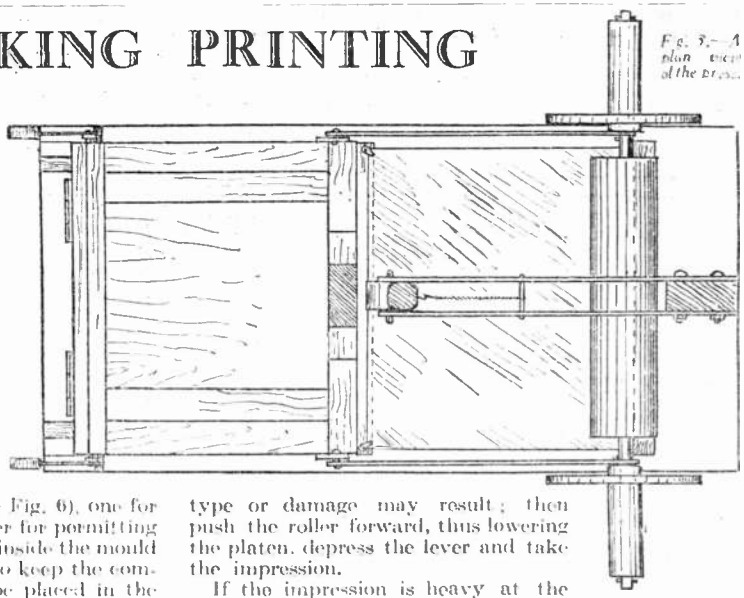


Fig. 7.—A plan view of the press.

AT each end, a split pin will keep all secure. The wooden discs are cut from plywood to fit the handles; they are glued on so that the distance between them equals the base, plus $\frac{1}{16}$in. each side for clearance.

Clothing the Stock.

To clothe the stock you will need a roller mould. Get a 9½in. length of brass tube, 2in. diameter, and cut a pair of plywood discs to fit the ends, boring through each, exactly central, a hole to fit the stock tightly. The top disc has two spaces cut out (see Fig. 6), one for pouring in the composition, and the other for permitting the air to escape. The portion of stock inside the mould should be wound with a layer of twine to keep the composition from shifting, it should then be placed in the tube (the latter being well oiled), and the discs fitted on each end. The mould being placed upright, the roller composition should be melted in a water bath and gently poured in, then left to set. After a few hours the roller can be pushed out, but should be left for a day or two before using.

The Roller.

This is then connected to the platen by the link arms. Draw the roller towards the end of the chase, then cut two pieces of wood, F, to act as stops to support the platen, and screw them to D, not to the base.

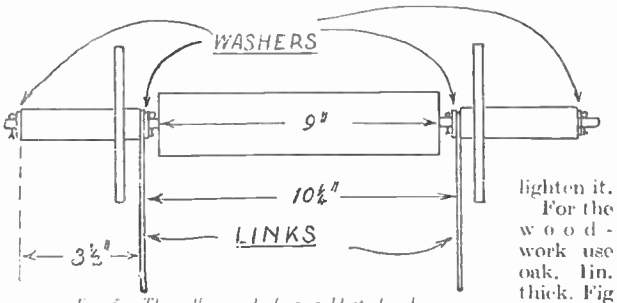


Fig. 5.—The roller made from mild steel rod.

To adjust the platen, set up some type in the chase and ink the plate. Draw the roller towards you, bringing it over the type, and raising the platen. Cover the latter with a few thicknesses of paper, secured at the outer edges of the platen with drawing pins. Fix a pair of gauge pins, and lay a sheet of paper on the platen; take care the gripper fingers are not likely to come in contact with the type or damage may result; then push the roller forward, thus lowering the platen, depress the lever and take the impression.

If the impression is heavy at the front, try one or more thicknesses of paper on the platen; if still heavy, loosen the screws, fastening D to the base, and take off a shaving or two underneath until right. If the impression is heavy at the back, pack paper under D to lighten it.

For the woodwork use oak, 1in. thick. Fig 7 shows how the various parts can be cut from a board 3ft. 5in. long by 11in. wide. The reference letters identify the following parts.

A, Base; B, Platen; C and F, Platen battens E; E, Front crosspiece of platen; D, Back crosspiece of platen; G, Base crosspiece D; H and I Base crosspiece B and C. J, Lever; K, Pillar; L, Base crosspiece A.

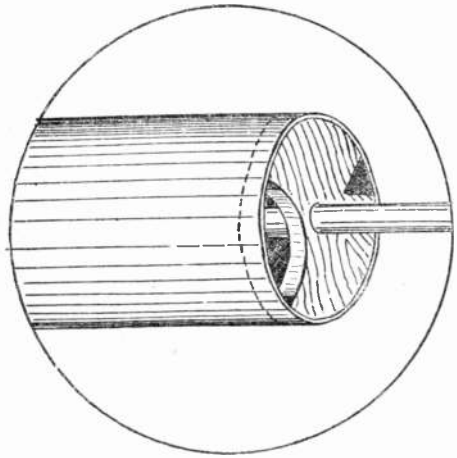


Fig. 6.—The roller mould for clothing the stock.

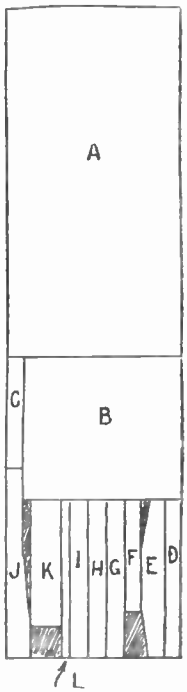
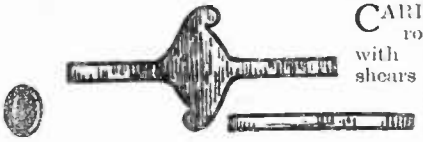


Fig. 7.—The various parts of the woodwork.

SIMPLE JEWELLERY MAKING FOR AMATEURS

By M. Bywater, A.R.C.A. (Lond.)

(*Continued from September 17th issue, page 631.*)



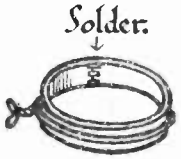
Portions of the ring before making up

CAREFULLY cut round the edges with the cutting shears and file every edge but the two ends which are to be soldered together to form the band.

The filing should be continued until the edges have the smoothness of a worn penny.

Next cut a strip of silver of the length to fit firmly round the stone, and file in the same way.

The complete ring.



Band of metal wire ready for soldering.

The stone, if the setting is too large, will appear to be loose even when burnished.

The parts of the metal which are to be soldered or joined must be quite clean, also the solder itself.

This is done by filing or scraping until the surface is bright. Grind up the borax crystals with a little water on a piece of slate. Cut two small strips of solder and snip them into tiny pieces. They should then be dipped in the borax so that every part is coated.

When the pieces of metal which are to take the solder are scraped clean at the joins, they are also treated to borax, which can be applied with a small soft brush.

A brooch pin and clasp.

The band which is to hold the stone is wired tightly, but not too tightly, on to the silver strip, two lengths of binding wire being taken down and across and twisted to give the necessary grip.

Little chips of solder are then placed along the joins.

Lay on the charcoal block, and with the mouth blowpipe and spirit lamp, gently heat the silver all over until the borax boils.

Having done this, the flame is directed with more force on to the solder, which, if the proper heat is used, should flush and run along the joins, filling up every crevice.

If the whole of the join is not filled up the work must be put into pickle (usually one part of hydrochloric acid to ten parts of water) to clean it.

Repeat the process until all joins are properly filled up.

The joins must be at red-heat before the solder flushes. Heating is often called annealing.

Rounding the ring in preparation for joining should be done on a taper steel spandrel, using a light wooden mallet.

If the band shows any unevenness it should be reheated and beaten out flat.

When a perfect round has been obtained and the joins meet, they are wired together and soldered as described above. The ring is then ready for the setting.

Setting.

Stones, such as the garnet and the chrysoprase, simple in shape and smooth surfaced, are easiest to set.

Lay the stone in the band or setting, and with the burnisher (an agate burnisher used for taking prints from the linoleum block is quite effective), gently but firmly stroke the silver with an upward pressure all round the stone, which must be held into the setting while being burnished.

If any simple decoration is desired, twisted wire can be soldered round the base of the setting to give finish.

It must be remembered that all soldering is done before setting the stone, which is always the final operation.

If the flame is concentrated on to any small shavings of silver they will run into tiny beads which, when soldered together, make amusing patterns.

Another form of ring is made from half-round silver wire cut to measure and soldered to a close setting.

A band of metal is made to hold the stone, as previously described. File both the top and bottom edges quite flat, and solder to a piece of silver a little larger all round than the band itself. When the solder has flushed, cut away the superfluous metal and file the edges smooth.

The half-round wire is then rounded, joined to the setting and the stone burnished in.

Solder is always laid on the inside of a join, and though the crack may successfully be filled up, traces can sometimes be seen on the outside of the band or wire.

If the space is too small to be re-soldered, stroke gently towards it with a file until it disappears.

Beginners may find brooches easier to make than rings, especially if the hinges (made from tubing) and the pins (made from brass wire) are bought ready-made.

How the metal is fitted round the stone.

The brooch in the illustration was a first attempt at repoussé work.

The design is traced on the back of the metal, which is then warmed and laid, face downwards, on the pitch-block. The heat of the metal melts the pitch enough to hold it in position.

The design is then beaten up from the back with hammer and punches.

Those who wish the silver to have an oxidized appearance should brush a not too strong solution of ammonium sulphide over the metal.

As soon as it becomes the desired colour it should be washed in clear water.

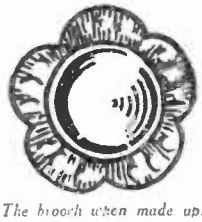
Flat strips of wood, covered with chamois leather, make good polishes.

For a high polish the surface can be stoned all over with Water of Ayr stone, working with a circular motion to avoid scratching the metal. Finish off with jewellers' rouge and water, and wash in hot soap and water.

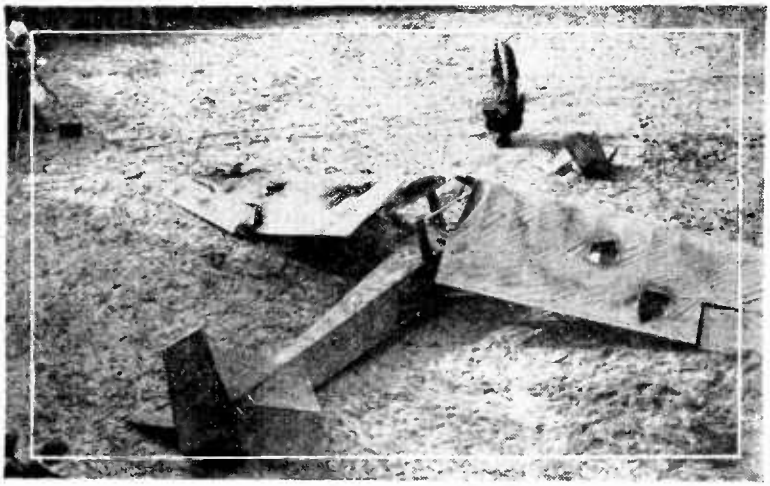
Stoning removes all marks made by the tools and files.

This gives a sufficiently bright surface for most requirements.

The setting wired ready for soldering.



The brooch when made up.



This photograph shows how an aeroplane crash is faked.

HOW FILMS ARE FAKED

By Leslie Wood

This article tells you how the talkie studios transplant their actors where they please without asking them to leave the building, and how they create their own fogs and storms to order.

A HONEYMOON couple whirl down Whitehall in an open touring car and, behind them, the Cenotaph recedes in the distance. But the actors are two Hollywood stars who have never been to London!

In a haunted house, gloomy with cobwebs, a girl is terrified at peal after peal of thunder. Yet, outside the studio, the sun was shining when this scene was made. On another stage an actor looks out of the window of a train and watches Windsor Castle in the distance, flags fluttering in the breeze, but the "train" is a section of scenery and the studio is thirty miles from Windsor.

How are all these seeming impossibilities accomplished? How do the talkie studios transplant actors where they please without asking them to leave the building, create storms and fogs to order?

All are part and parcel of the everyday equipment of the magicians of the movies—the technicians who make the modern talkies.

The couple who raced down Whitehall were not in a car at all, but in the disembodied seat of a car mounted on rockers in the studio. Behind them was a cinema screen on which a film of Whitehall, specially photographed and sent from London, was projected from behind by a powerful blue light. The cinema camera recorded both the acting in front, supposedly in a car, as well as the picture projected on the screen beyond.

Synthetic Cobwebs.

The girl in the haunted house was surrounded by synthetic cobwebs made by pouring rubber solution on to a board, allowing it to become "tacky," and then placing another board on top. When the two boards are pulled apart, long, thin, wispy strands are the result, which, with the addition of a little dust in the form of Fuller's Earth, defy detection when hung in eerie corners. The peals of thunder were produced, not by waving a long sheet of iron such as is used in theatres, and known as "the thunder sheet," but by upsetting a bushel of potatoes on to the surface of a side-drum!

And the actor who "watched" Windsor Castle actually looked out of the windows of a scenery train in the studio and saw—a perfectly plain bright-blue background. A film of Windsor Castle, printed on pink celluloid, is threaded in the camera to run face to face with the negative about to be made. The blue light from the plain back-cloth acts as a printing light and imprints the pictures of Windsor Castle on to the new film negative, but the actor, being between the printing light and the camera, obscures the printing light whenever he moves. Thus Windsor Castle is imprinted all round the actor, but not *through* him. At the same time he is illuminated by yellow lights, which enable his image to penetrate the pink film of Windsor Castle (the pink base merely acting as a colour filter). The result is an actor in front of a solid castle.

How a Steamer is Faked.

In *Lady of the Night*, produced by D. W. Griffith a short time ago, one shot depicted happy couples waltzing to the strains of a harp on the deck of a steamer making its way down the Seine, the silhouettes of the buildings on the opposite bank outlined against the sky, lights twinkling in their windows, until the steamer passed under a bridge and the scene faded out. Actually the deck of the steamer was a cleverly contrived piece of scenery built on flat railway trucks drawn along on rails by a tractor. The camera, too, which photographed it was mounted on a truck running on lines alongside the dummy deck, and the illusion of the near riverbank was created by building fake trees and lamp posts between the two sets of rails, so that they intervened now and then between camera and steamer deck as both travelled side by side. The Seine was an artificial lake in the studio grounds and the illusion of width was obtained by building the houses on the far bank in miniature. Small electric globes in the windows of the model houses were operated by electricians from a central switchboard off stage, and, by the clever manipulation of the switches, lights were extinguished here and there in lower rooms and made to reappear a second or two later in the bedrooms. The arch of the bridge under which the ship passed was full size: the next, actually over the waters of the lake, was considerably smaller: the next smaller still, and so on down to the last arch, which was on the same miniature scale as the houses. The key to the secret of this piece of magical make-believe lay in the fact that the cinema-goer saw the deck of the steamer and the actors life-size, but could not see the railway trucks beneath, nor the dry land beneath, but only the waters of the lake beyond: the Seine appeared wide because the spectator had no means of judging the distance except by comparing the actors with the buildings on the opposite bank. And while he could see a great bridge dwindling away in perspective, he did not guess that the "perspective" was actually a piece of grotesque distortion.

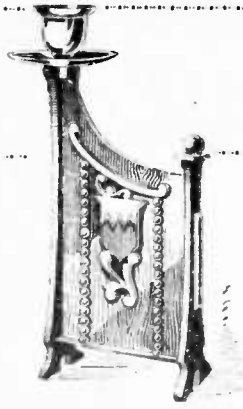


Fig. 1.

TWO ORNAMENTAL WOODEN CANDLESTICKS

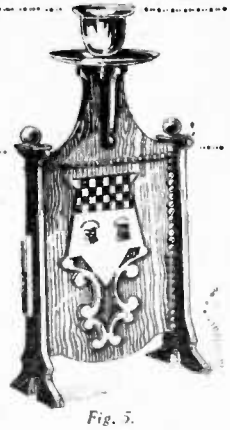


Fig. 5.

These two dainty and novel candlesticks make striking ornaments for the mantelshelf. Fretwork for both is supplied in Parcel No. 141 for 3/-, whilst suitable candle holders (No. 6101) cost 1/- from Hobbies Ltd.

WE give this week details and instructions on how to make up the quaint candlesticks shown above. Quite a new note has been struck in design, and they will, no doubt, find favour among busy fret-workers. The candlesticks may be made up in pairs to form a very suitable ornament for the mantelpiece or sideboard. The ornamentation introduced takes the form of brightly-coloured heraldic motifs worked up upon the thin wood overlays glued to one side only of the stands.

In making up these designs the worker is called upon to practise a little draughtsmanship, but this is of such a simple nature that a few lines with simple dimensions are all that is required. The few curved lines that are shown are very easily traced in from the diagrams.

The design shown in Fig. 1 consists of two shaped uprights forming the feet, and a wide centre panel which has two tenons running into the open mortises in the uprights. The feet and the panel are of ¼in. wood, and the outlines obtained by drawing a number of ½in. squares (Fig. 2) upon the wood. At the same time the lines of the mortises should also be put in and made a ¼in. wide.

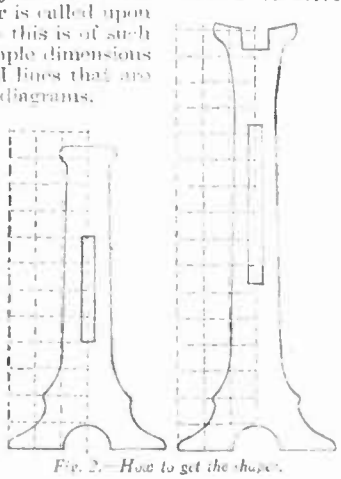


Fig. 2.—How to get the shapes.

The panel and decoration.

For the panel a piece of wood 7in. long and 4½in. wide is required, and after squaring this up, set out the measurements shown in Fig. 3 and carefully line in the curved portions. The tenons are made ½in. wide so they project ½in. beyond the face of the legs. Use a fine fretsaw for cutting and before fixing the panel to the legs, clean up the surfaces thoroughly. Test the tenons in the mortises before gluing the parts together, and do not use too much glue. Along the lower edge of the panel glue a strip of wood ½in. wide and ¼in. thick, and round off the edges slightly with sandpaper.

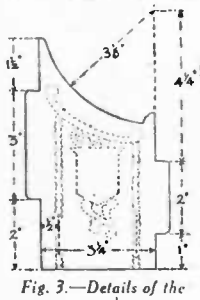


Fig. 3.—Details of the panel.

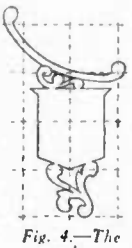


Fig. 4.—The overlay.

The overlay (Fig. 4) should be cut in two pieces, the top scroll being with the grain of the wood running lengthwise, and the shield with its scroll below and above cut as another separate piece with the grain running vertically. Make an enlargement from the diagram using the 1in. squares and ½in. satinwood. The finest saw possible must be used in cutting such delicate work as these overlays, and as a precaution against breakages the thin wood should be nailed to plywood before the cutting is commenced.

French polish is the best finish for these articles, and it should, of course, be done before the various parts are put together. One or two very fine brass pins should be driven through the overlays to make them hold well to the polished surface of the panel. An added effect is given by pinning and gluing on two pieces of No. 52 Half-round Ball Beading in the position shown.

The fixing of the brass candle cup and drip plate is effected by means of gluing into the square opening at the top of the foot a small block of wood. Into this drill a hole and screw in the shank on the base of the cup. To form a capping to the smaller upright foot, glue on a square of wood with a turned knob above.

Another Design.

The second design is almost identical (see Fig. 5.) Two uprights are made to the same outline as the smaller foot in the first design. The centre panel measures 5in. long by 5in. wide, and cut to the outline shown in Fig. 6. Two small bracket pieces are glued on each side of the panel at the top to give support to the block holding the candle cup. These brackets are shown in Fig. 7 and cut from ¼in. wood. The overlay design is shown in Fig. 8. Three pieces of the round beading are cut off and glued on the face of the panel, according to the dotted lines, and finished as before explained.

Fig. 7.—A bracket.

In putting on the coat of arms or crest on the shields the surface of the overlay wood is prepared by lightly sandpapering. The design may be faintly drawn on in pencil. It will be necessary carefully to outline the design and to copy from a suitable print in oil or water colour.

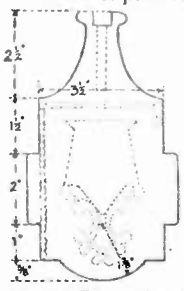


Fig. 6.—The panel with candle holder.

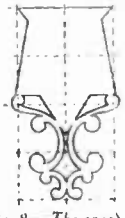
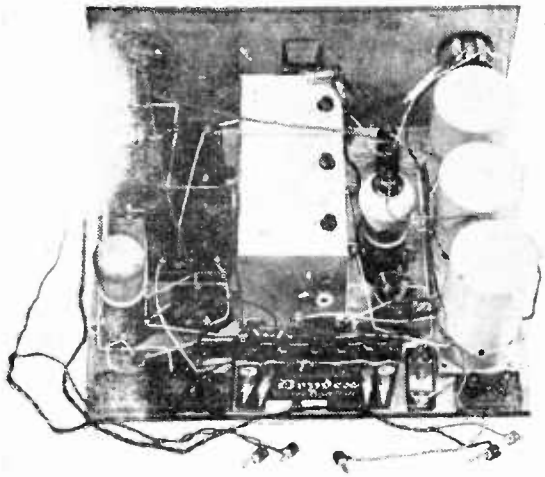


Fig. 8.—The ornamental overlay.



A rear view of the finished set.

THE "HOBBIES" SUPER-MAG THREE VALVER

By "Hobbies" Radio Expert

An eminently up-to-date Receiver, embodying many novel features.

A SHORT time ago the writer set out to forecast the features which would be most popular in 1933 receivers and the set to be described was designed around the result of those predictions. The finished set is a very fine instrument which will have an instant appeal to those who want "something better" but are not prepared to go to great expense.

The "Super-Mag Three," as the set has been called, possesses all the refinements of an expensive "de-luxe" receiver, but can, nevertheless, be built at a cost of about £5 10s. This price is for the bare set exclusive of batteries, etc., but many constructors will already have suitable accessories on hand. When working out the design the first consideration was to produce the simplest possible instrument which would provide reception of a large number of stations at enjoyable loud-speaker strength. Quality of reproduction must be as high as the excellence of contemporary components would allow, and some form of volume control must be incorporated which would not impair that quality in any way. As with any modern set, there must be provision for connecting a gramophone pick-up. It was decided that batteries should be employed for power supply since statistics show that of the eleven million homes in this country only about three millions are equipped with electric light mains.

To permit of good reception of more distant stations a screened-grid amplifier was obviously necessary and it was decided that a single S.G. stage would be ample provided that a really efficient arrangement were adopted. This should be followed by a detector (with reaction) and a high-gain L.F. amplifier thus making three valves in all. A pre-detector volume control would be necessary to prevent overloading of the detector and power valves when listening to nearby transmitters. The form that this should take next came up for consideration and that acting on a variable-mu S.G. valve was soon chosen. For the benefit of those readers whose technical knowledge is not quite up to date, it should be explained that the variable-mu is merely a modified screened grid valve, the amplification (or "Mu" generally denoted by the Greek letter μ) of which can be controlled by varying the grid bias voltage applied to it. An increase in bias voltage reduces its amplification factor and, in consequence, the signal current applied to the following valve.

Due to the smoothness of volume variation afforded and to its entire freedom from distortion, this system is a great advance on every other known form of pre-detector volume control.

In a highly sensitive receiver such as this, selectivity was of very great importance because without it the long-range qualities would be entirely nullified. It was patent therefore that a band-pass tuner would be necessary. Of the many varieties of tuners of this kind, that employing "mixed" coupling, that is a combination of inductive and capacitative coupling, was considered the most satisfactory from the points of view of constant peak separation and high efficiency, and was therefore settled upon.

LIST OF COMPONENTS.

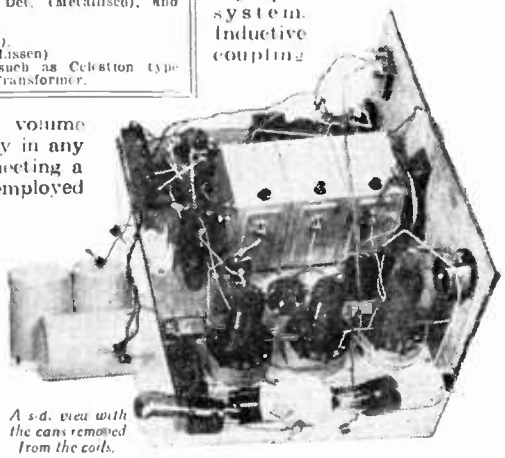
1 Plywood Panel, 14ins. x 7ins.
1 Baseboard, 14ins. x 11ins. (5-ply for preference).
1 Shielded 3-Gang Condenser (Lotus "OS/CH3").
1 .0003 mfd. Differential Reaction Condenser (Lotus "MD3")
1 2-pole On-Off Switch (Colvern "S2").
1 Coil Assembly, comprising one pair Link Circuit Band Pass and one Tuned Anode Coil mounted on Baseplate and fitted with Ganged W.C. Switch (Colvern "KBLC" and "KGB")
1 50,000 ohm Potentiometer (Colvern "ST10").
1 .0001 mfd. (max.) Pre-Set Condenser (Colvern)
4 Valve Holders (Lotus)
1 .05 mfd. Mica Condenser (T.C.C.)
1 1,000 ohm Non-Inductive Resistance (Dubilier 1 watt).
1 5,000 ohm Fixed Resistance (Dubilier 1 watt).
1 1 mfd. Non-Inductive Condenser (T.C.C.).
1 .0002 mfd. Fixed Condenser (T.C.C.).
1 2 megohm Grid Leak (Lissen)
1 Grid Leak Holder (Bulgin).
1 1 mfd. Fixed Condenser (T.C.C.)
1 2 mfd. Fixed Condenser (T.C.C.)
1 Radio Frequency Choke (Lotus).
1 Low Frequency Coupling Unit (Bulgin "Transcoupler").
1 Grid Bias Battery Clip (Bulgin)
3 Terminal Mounts (Belling Lee)
6 Terminals, 2 marked "Pick-Up" and 1 each marked "A," "E," "L.S. +" and "L.S. –" (Belling Lee type "R").
Wander Plugs, marked "H.T.+," "Screen," "H.T. –," "G.B.+," "G.B. –1," "G.B. –2," and "G.B. –3" (Clix)
2 Spade Terminals, marked "L.T. +" and "L.T. –" (Clix)
1 Safety Anode Connector (Belling Lee).
1 Baseboard Fuse-Holder with 60 m.a. Fuse (Belling Lee)
Coil, "Glazite," Length Lewcos braided wire, flex, screws, etc.

ACCESSORIES.

2 Valves, 220 V.S.G. (Metallised), 210 Det. (Metallised), and 220 P.A. (Cossor).
1 9-volt Grid Bias Battery (Lissen).
1 120-volt High Tension Battery (Lissen).
1 2-volt 24 ampere hour Accumulator (Lissen).
Loud Speaker, preferably Moving Coil, such as Celestion type PM with low-ratio output Transformer.

The Circuit.

Now let us examine the wiring diagram of the complete arrangement. The aerial feeds into the first band-pass coil through a .0001 mfd. pre-set condenser which enables the tuner to be matched to any particular aerial-earth system. Inductive coupling



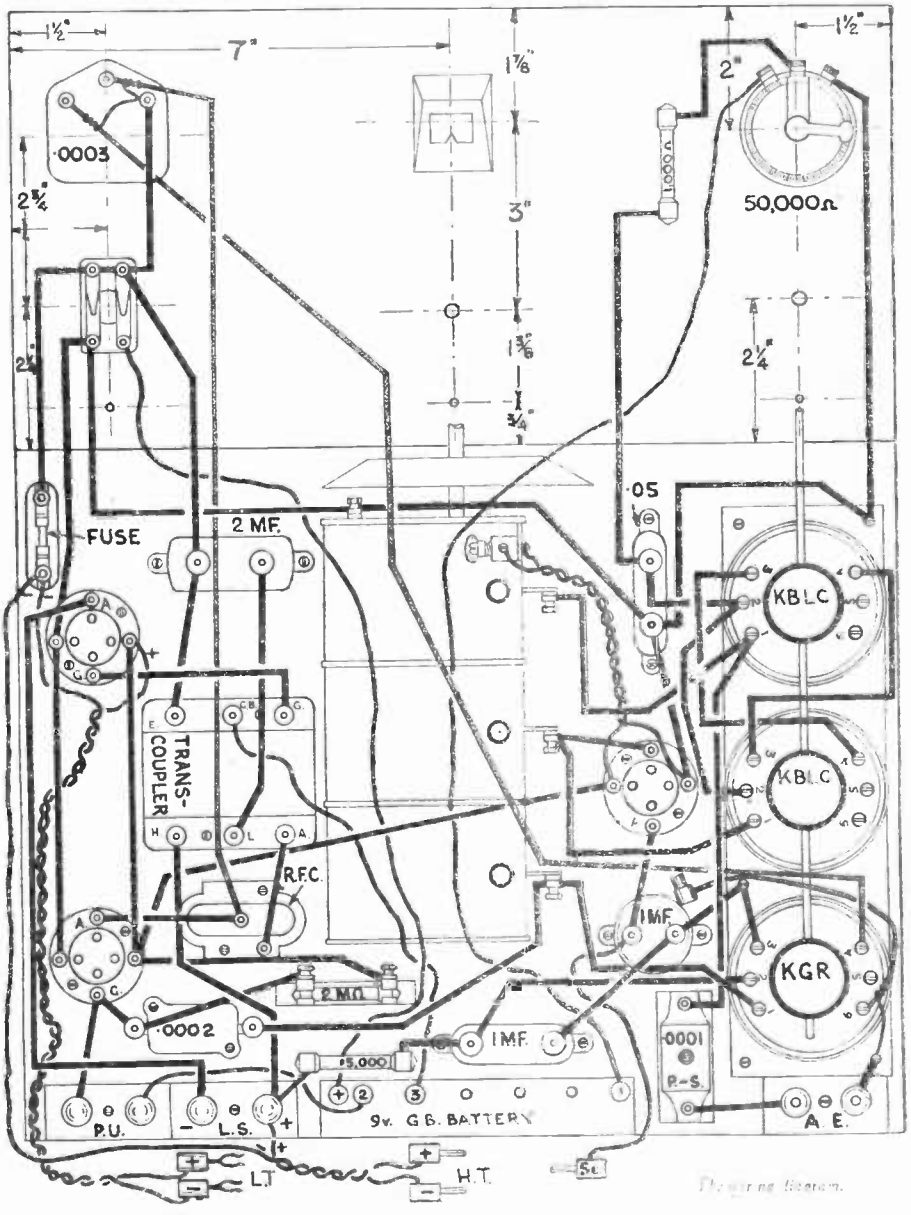
A s.d. view with the cans removed from the coils.

is obtained between the two sections of the band-pass tuner by cross-connecting the terminals of two small windings, one in each section, whilst the correct amount of capacity is introduced by connecting the lower ends of the tuned coils together and to one side of a .05 mfd. *mica* condenser of which the other side is taken to earth and to the moving vanes of the tuning condensers. The .05 mfd. condenser is by-passed with a 1,000 ohm decoupling resistance which serves to feed the grid bias voltage to the variable-mu valve. This resistance is taken to the slider of a 50,000 ohm potentiometer in shunt with the 9 volt bias battery, and thus any voltage from zero to 9 can be applied to the grid of the latter valve by operating the potentiometer knob. The potentiometer becomes, therefore, the main volume control. Coupling between the V.M. and detector valve is on the tuned anode principle, the tuning coil employed being one which is exactly matched with the two sections of the band-pass filter. In consequence all three coils can be tuned simultaneously by a three-gang condenser, so reducing the tuning to "one knob control." A 5,000 ohm resistance in the high tension positive lead to the tuned anode coil serves to decouple the anode circuit of the first valve. This value of resistance is rather low for decoupling purposes, but is found to be adequate for the variable-mu valve which is somewhat more stable than an ordinary screened grid one. The lower resistance does not reduce the available high tension voltage by any great extent and so allows the first valve to work more efficiently.

Reaction is applied to the tuned anode coil by means of a .0003 mfd. differential condenser connected to a suitable reaction winding.

The usual values of grid condenser and leak, namely .0002 mfd. and 2 megohms respectively, are employed. Two pick-up terminals are also wired in the detector grid-circuit, one of these goes directly to the grid and the other is taken to the 1½ volt tapping on the grid bias battery. The only real disadvantage to this simple method of pick-up connection is that the set must be de-tuned when the pick-up is in use or else radio and gramophone reproduction will interfere with each other. In the plate circuit of the detector valve we find the usual radio-frequency (or high frequency) choke and the input terminals of a low frequency coupling unit. The unit, which is of fairly recent introduction, has been described in these columns before and consists of a tapped resistance, a feed condenser and a 3.1 step-up transformer. The tapped resistance has a maximum value of 50,000 ohms.

(To be concluded next week.—Ed.)



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FOR THE FRETWORKER

Patterns on the centre pages.

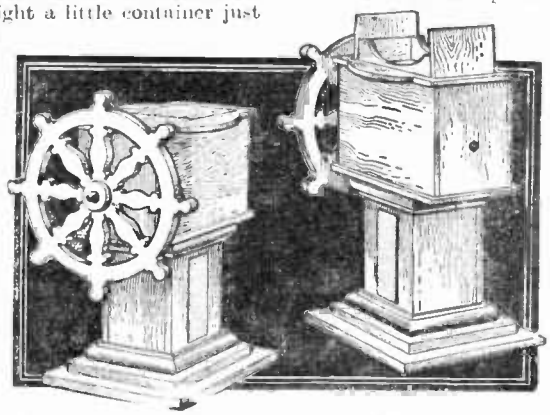
THE "HELM" MATCH BOX

HERE is a decided novelty which any fretworker can make, and one, indeed, which is sure to be popular. Made up for Christmas, it forms a top-hole little present or just the sort of thing to sell at any stationer's or stores. It is, as can be seen, a model of the steering wheel and complete helm of an ordinary boat. When the wheel is turned the interior mechanism raises the lid and brings to light a little container just large enough to hold matches.

How it Works.

When the wheel is turned a little further the match box again sinks out of sight, and the two lids close down over it to form the closed model shown in the first illustration. A back view with the lid open, and the match box just showing above is given in the second picture. The patterns, of course, are printed full size on the centre pages, and they can be pricked off on to the wood or cut out and pasted down in the usual way.

The whole thing can be made for 1s. from the wood supplied by Hobbies, and the patterns can quite easily be pasted down on to one of their standard panels of mahogany C (¼in. thick) and another panel E (⅛in. thick). With these is a short length of $\frac{3}{16}$in. dowelling supplied for the spindle. Most of the parts are plain rectangles and can be measured off with the ruler and pencil. The great point in this model, as in all others, of course, is accuracy, and one must have patience in getting the parts together as they should be, so that the mechanism works accurately.



A simple mechanical novelty made in fretwood.

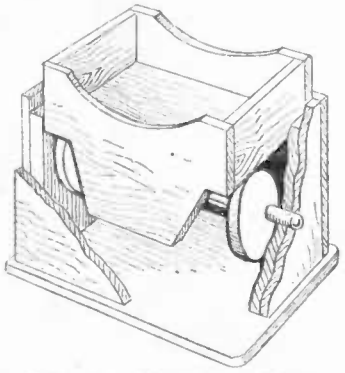


Fig 1.—An excellent drawing of how the match box rises and falls.

The box containing the "works" is raised by a pedestal, and the detail at Fig. 1 has one side cut away to show how the parts are fitted. As can be seen, two eccentries work on the axle of the wheel so that when they are turned they lift the match container upwards. This in turn pushes up the two hinged lids and holds them open until the box starts on its downward course by the eccentrics going over. As they pass the apex, the box drops again and the lids are so fixed that they, too, fall again into the shut position.

Cut out all the parts shown on the pattern sheet carefully, and clean and true them up with the fretsaw and sandpaper. There is one point to note in cutting the shape of the top of the case. This piece contains also the two parts forming the lid, and the fretsaw cuts round the white lines provided—not the dotted lines, of course. Before cutting out these inner parts, however, it is advisable to drill the holes in the four places shown for the pivot pins. These pivot pins are shown in Fig. 2, where the action of the lid when the box is raised is clearly seen. Use a very fine bit in the drill, and drive it ¾in. inwards in the thickness of the wood. Thus, when the two parts forming the lid are cut round with a fretsaw, the hole of the pivot pin is sure to be accurate. The back edge of the lid must be rounded off to allow the swing, and it is important that this pivot hole be driven in accurately to ensure the weight of the lid being properly distributed (see Fig. 3).

The pedestal comprises two bases and four upright pieces—C and D—which are glued together as shown in the detail on the chart. Afterwards four short pieces of moulding (No. 24) are added round the pedestal by being mitred at the corners with the fillet uppermost.

The Mechanism.

A complete box can be built to hold the mechanism. The two ends and two sides are glued and nailed to the floor. To provide a proper thickness two inner ends ¼in. wide are glued inside, and these are so fixed that the spindle hole comes opposite the holes in the outer end.

Cut 4in. of $\frac{3}{16}$in. dowelling for the spindle, and cut out two discs from

(*Continued on page 24.*)

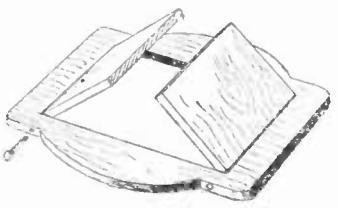


Fig. 2.—How the lids are pivoted with nails.

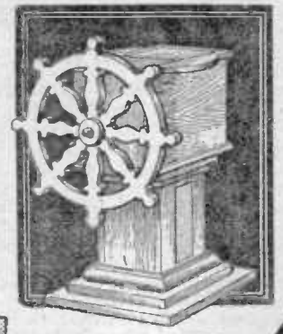
No. 1928 Hobbies DESIGN

THE "HELM"

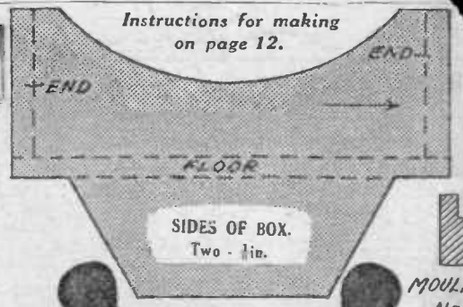
NOVELTY MATCH BOX

When you turn the wheel the lid lifts and a box with matches is raised. The box disappears again as the wheel is turned.

Parcel No. 1928 contains all wood required and costs 1/- or 1/4 post free from Hobbies Ltd., Dereham, or any agent.



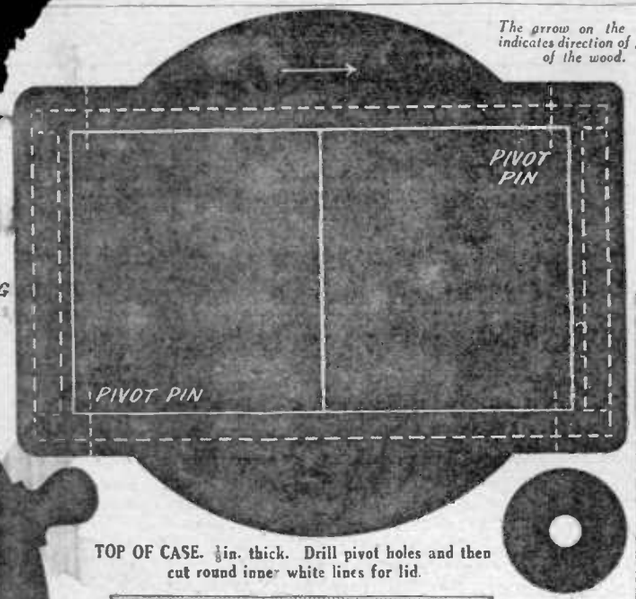
Instructions for making on page 12.



SIDES OF BOX. Two - ¼in.

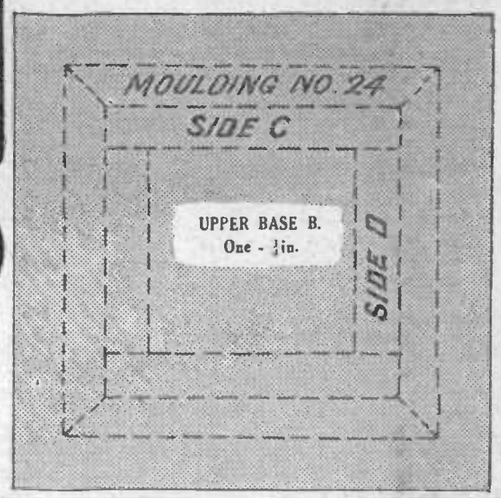
MOULDING NO. 24

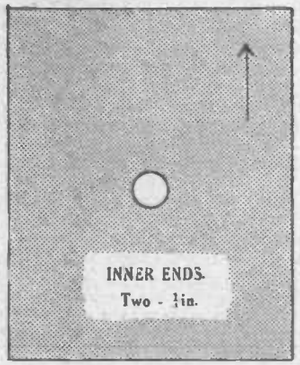
The arrow on the parts indicates direction of grain of the wood.



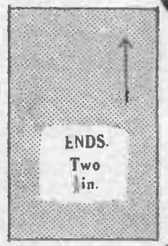
TOP OF CASE. ¼in. thick. Drill pivot holes and then cut round inner white lines for lid.

FLOOR OF BOX. One - ¼in.

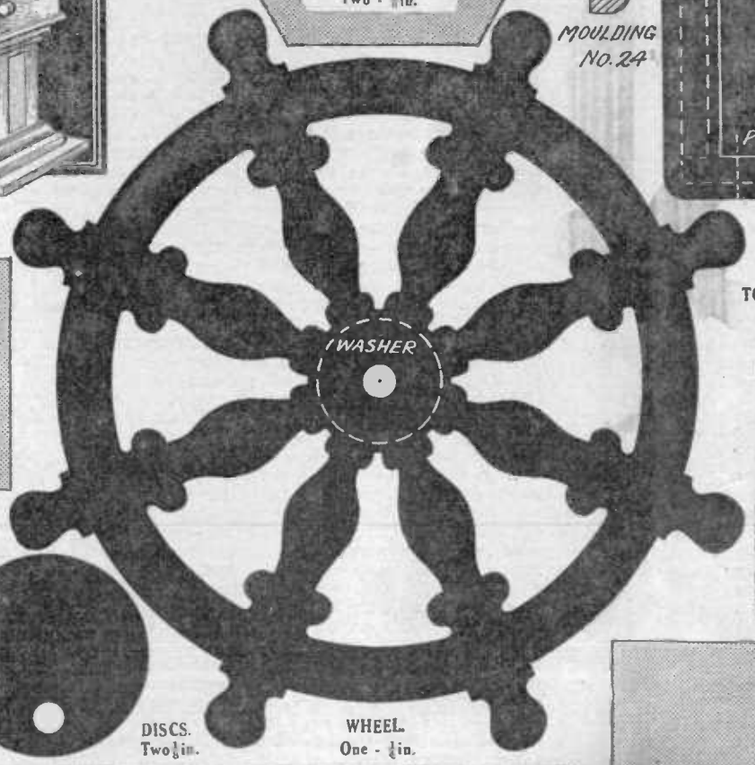




INNER ENDS. Two - ¼in.

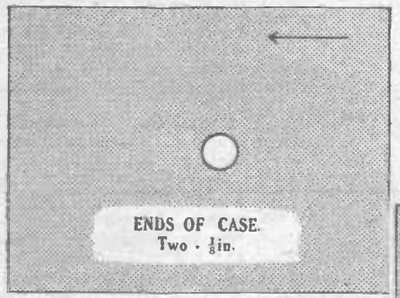


ENDS. Two ¼in.



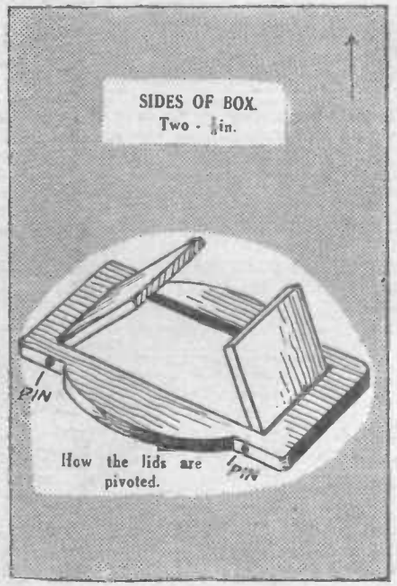
DISCS. Two ⅛in.

WHEEL. One - ¼in.



ENDS OF CASE. Two - ⅛in.

WASHER. Cut two - ⅛in.



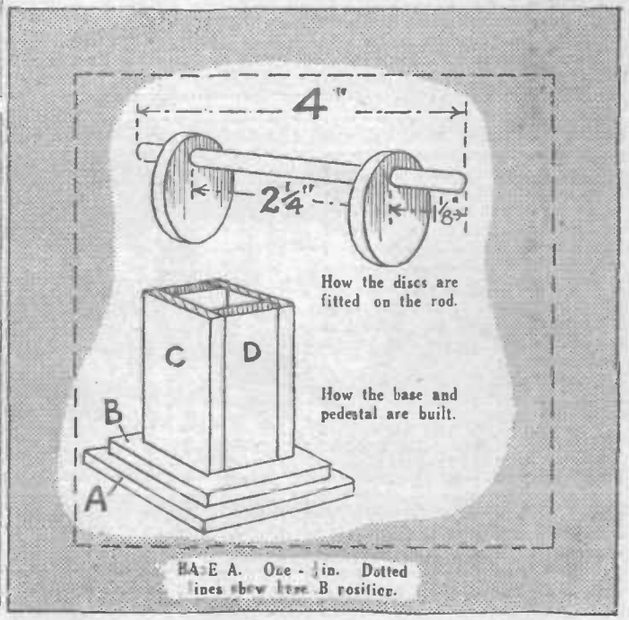
SIDES OF BOX. Two - ¼in.

How the lids are pivoted.

FLOOR. One - ¼in. Dotted lines show position of sides and ends of box.

SIDES D. Two - ¼in.

SIDES C. Two - ¼in.



How the discs are fitted on the rod.

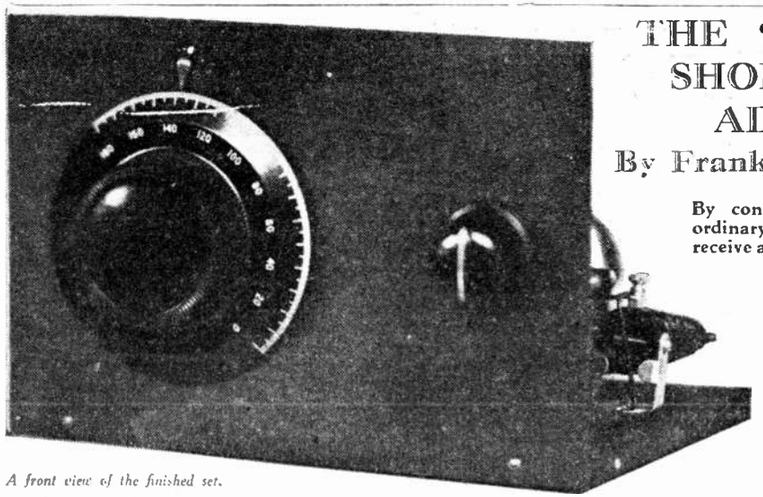
How the base and pedestal are built.

BASE A. One - ¼in. Dotted lines show base B position.

THE "HOBBIES" SHORT-WAVE ADAPTOR

By Frank Preston, F.R.A.

By connecting this adaptor to an ordinary valve set you will be able to receive a number of additional stations below 100 metres.



A front view of the finished set.

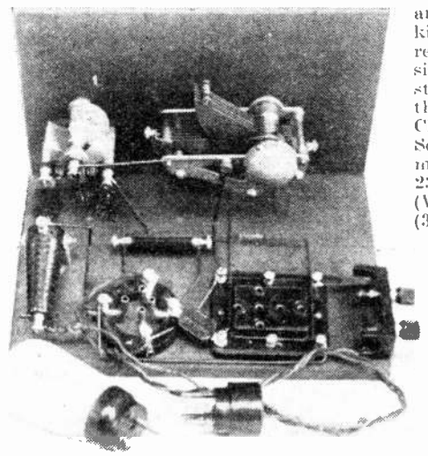
IT is no doubt the desire of all radio enthusiasts at some time or another to listen to transmitting stations situated "at the ends of the earth," but generally speaking, you would require a very powerful, and usually costly, receiver to be enabled to do so. Even given such a set the reception is more often than not spoilt by interference and so cannot be listened to in comfort. At least this is true in relation to stations transmitting on the more usual wavelengths from 250 to 2,000 metres, although when we get down to the ultra-short waves (below 100 metres) a very simple receiver has an unlimited range and interference troubles are practically non-existent. Unfortunately, however, the design and arrangement of an ultra-short wave receiver must differ in many ways from a normal broadcast instrument, and so it is impossible to combine efficiently the two functions in one set. At the same time, it is not every listener who cares to go to the expense of building a complete and additional receiver to enable him to go "globe trotting." Nor is it now necessary, for one can build an adaptor such as the one shown in the photographs on this page, which will enable any broadcast receiver having two or more valves to be used as an efficient short-wave capable of receiving stations in any part of the world. Moreover, no alterations need be made to the broadcast receiver and the change over to ultra-short waves can be made in but a few seconds. The change is effected by removing the detector valve from its socket, replacing it with a plug, putting the valve into the holder on the adaptor and transferring the aerial and earth leads to appropriate terminals on the adaptor.

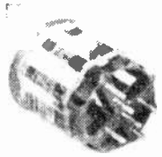
There may be some readers who are not aware of the fun to be gained by listening on short waves, or who do not realize the tremendous number of stations to be heard in almost every country in the world. Those who do give short-wave reception a trial are very soon converted and fully understand why this kind of reception is so frequently referred to as "the sporting side of radio." A few of the stations to be heard, along with their wavelengths, are as follows: Chicago (W9XAA), 16.57 metres; Schenectady (W2XAD), 19.56 metres; Radio Maroc (Morocco), 23.8 metres; East Pittsburg (W8XK), 25.25 metres; Romo (3RO), 2.54 metres; Chelmsford (5SW), 25.53 metres (The British Colonial Station); Buenos Aires (LSX), 29.98 metres; Eindhoven (PCJ), 31.28 metres; Zeesen, 31.38 metres;

(Continued on page 18.)

LIST OF COMPONENTS.

1 Plywood panel 9in. × 6in.
1 Baseboard 9in. × 6in. × ¾in.
1 Terminal block with two terminals marked A and E (Belling-Lee).
1 .00015 mfd. variable condenser with slow-motion drive (Polar short-wave).
1 .00015 mfd. reaction condenser (Polar short-wave type).
1 Dial pointer (Bulgin).
1 6-pin coil base (Eddystone).
2 or more 6-pin coil formers (Eddystone).
2 .0001 mfd. fixed condensers (T.C.C.).
1 5 megohm grid leak (Lissen).
1 S.W. valve-holder (Lissen).
1 S.W. high-frequency choke (Lissen).
1 valve plug adaptor (Bulgin).
2 oz. Litzendraht wire.
1 coil Glazite connecting wire, short length flex and 1 doz. ¾in. round head brass screws.





A rear view showing the simple arrangement of the components.

PRESERVING BUTTERFLIES, MOTHS AND BEETLES

By A. Sharp

Some useful hints for the naturalist.

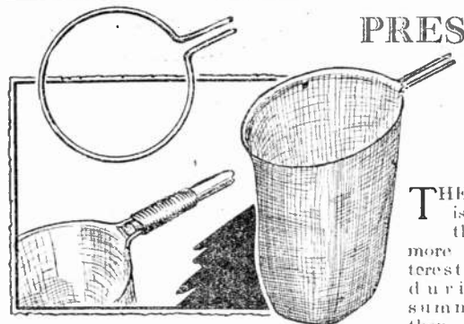


Fig. 1.—Details for making a butterfly net

THERE is nothing more interesting during summer than the collecting of butterflies, moths, and beetles. At this period of the year, when most young folk spend much of their time out of doors the catching of the numerous insects that lend animation to the summer landscape is an attractive hobby. Butterflies, of which there are seventy-one species in this country, usually appeal most. The apparatus required is not expensive—a net, a killing bottle or tin, and a storage receptacle. You can purchase these from any entomological dealer, but the handy fellow can easily make a net out of a yard of muslin, shaped into the form of a bag, sewn round the sides and with a hem around the open mouth (see Fig. 1). A piece of stiff wire is bent into a ring, leaving two spurs about 6in. long; run the wire through the hem of the bag, and work it so that it forms a good circle. The spurs are placed along the end of a stick and firmly bound with wire or string.

The killing bottle may be obtained from a chemist, who will put in the chemical necessary; but remember that this is very poisonous. Better still, perhaps, is to use a laurel tin. This is merely a tin into which you place a mass of pulped laurel leaves at one end—the other end is reserved as the lethal chamber. The pulp should always be freshly made, when it will act speedily on the insects. The juice of the leaves must not be allowed to come in contact with the butterflies, etc. The storage tin, of course, is simple enough, being merely for the purpose of carrying home the insects caught and killed—almost any flat tin will serve, if a sheet of thin cork is placed on the bottom to hold the pins thrust through your captives.

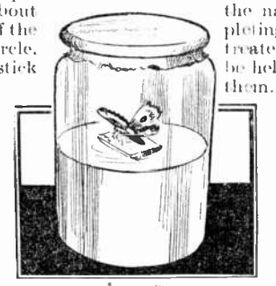


Fig. 2.—The killing bottle

Relaxing.

When you come to prepare your butterflies and moths for the cabinet you will perhaps find that they will need relaxing. There are several ways of doing this, one method being to place the insect, pinned on a cork, so that it will float without getting wet, in a jar half filled with water and covered over with a damp cloth (see Fig. 2). Leave for about forty-eight hours, if they are very rigid. Another way is simply to leave the insects in the storage tin, in which the cork has been damped. Beetles may be relaxed by putting them into hot water for a few minutes, and small delicate insects, not pierced with a pin, may be laid upon blotting-paper, moistened, or upon a piece of damp flannel.

Setting.

A setting board is made out of a piece of soft deal, about 3in. wide and of any required length, having a groove cut down the middle, about a quarter of an inch deep, and as wide as may be necessary to receive the bodies of the specimens to be set. A thin strip of cork should be glued to the bottom of the groove. A number of such boards will, of course, be needed when making a collection. Rest the body of the insect in the centre groove, and with a needle smooth and straighten out the wings, taking care not to pierce them; the point of the setting pin is passed through the thorax of the butterfly, and the point inserted in the cork at the bottom of the groove. Next, cut some strips of card or stiff brown paper. One of the strips of card is fastened to the upper and left-hand side of the board, a little higher than to be on a level with the insect's head, and so that the wings can have free play under it; the upper wing is then taken hold of by a pair of forceps and extended upwards as far as the pin which fastens the strip of card to the board; the card is then gently pressed down on it, to retain it in that position whilst the under-wing is brought into proper position under the upper, the card being arranged obliquely so as to act as a brace to both wings; a pin is then passed through the narrow end of it into the board, thus completing one side. The other side of the insect is treated likewise (see Fig. 3). The antennæ can be held in shape by pins placed on either side of them. When the parts are fixed and rigid, the pins may be removed.

When setting beetles, care must be taken to place out the legs and antennæ in proper positions, and keep them there with pins until they are fixed. Tiny beetles can be gummed on wedge-shaped pieces of card, through the broad ends of which are pins that are to fix them in the cabinet.

Should your specimens be attacked by "mites," which frequently settle on an insect, fumigate your boxes occasionally with the smoke of sulphur; or keep camphor in the drawers. When such means fail to eradicate the pests, an effectual stop to their ravages can be brought about by immersing each insect in a strong solution of corrosive sublimate in methylated spirits. The right strength may be ascertained by adding the sublimate until a white deposit is left on a black feather dipped into the solution. Then add one-fifth more spirit, and the proportions will be correct.

Mould is another enemy to specimens in the cabinet; soaking an insect in benzine and allowing it to dry half-a-dozen times will help to do good.

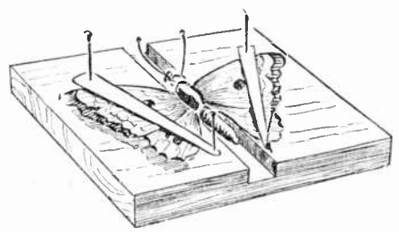


Fig. 3.—How to set out the butterfly

When the higher notes are missing RECTATONE restores them . . .

Over 1,000 Cycles—a rising Curve

The growing ether congestion calls for still more selectivity. The super-heterodyne and special ultra-reaction circuits have been developed to meet this requirement, the tuned circuits being made sharply resonant, deliberately cutting off the high notes. It is clear that a low-frequency coupling device is required which will restore these weakened high notes to their correct value. The new RECTATONE transformer does this. Its frequency response curve is straight up to 1,000 cycles per second and then rises reaching a maximum at approximately 4,500 cycles.

The Ideal L.F. Coupling

The degree of compensation is variable, and may be suited to the particular tuned circuits in use or employed to correct deficiencies due to the loudspeaker or to the acoustics of the room.

Compensation is controlled by a variable resistance connected externally between two of the transformer terminals. If this resistance be omitted or put out of circuit RECTATONE becomes a normal straight-line transformer giving high and even amplification.

1. Has a rising response curve from 1,000 to 4,500 cycles.
2. Balances any form of sound reproduction.
3. Restores a weakened treble to its correct value.
4. Gives a variable compensation and therefore complete control of tone correction.
5. Gives the required tone-correction without an extra L.F. stage.
6. Becomes at will and instantly a normal straight-line transformer.

The ideal L.F. coupling for selective sets. Particularly useful where the same L.F. amplifier is used for radio and gramophone reproduction.

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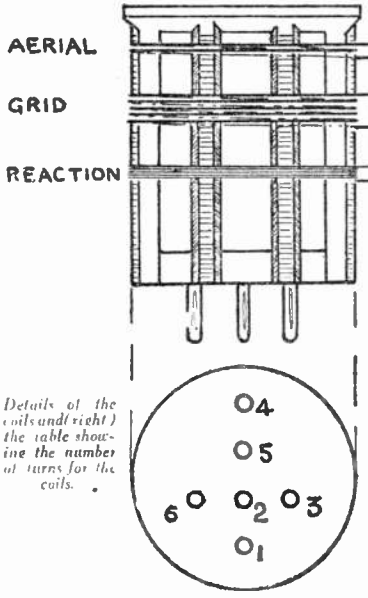
THE "HOBBIES" SHORT-WAVE ADAPTOR (continued from page 16).



Details of the coils and (right) the table showing the number of turns for the coils.

12 to 25	20 to 40	35 to 65	60 to 100	W/L (Metres)
2	2	3	5	Turns
3	5	7	10	"
3	4	5	7	"

Melbourne (VK3ME), 31.56 metres; Paris (FLJ), 32.5 metres; Bangkok (HSP2), 41 metres; Madrid (EAR100), 43 metres; Johannesburg, 49.4 metres. This list shows that short-wave stations are to be found in all parts of the world, but is in addition to that dealing with the thousands of amateurs whose transmissions are always particularly interesting.

Component Requisition.

A list of the components required for the adaptor is given herewith, and it will be seen that these are few in number and of low cost (the total cost need not exceed thirty shillings, and will be considerably less for those experimenters who have a number of spare components on hand). The more important components, such as variable condensers, coils and H.F. choke are of types specially designed and made for short-wave work, and for this reason it is not recommended that substitutes be employed unless they are known to have characteristics similar to those specified on page 17.

Making the Adaptor.

The constructional work is not difficult, even for the veriest novice, and need not occupy more than a couple of hours or so. First prepare the panel; it is made from a piece of oak-faced plywood and has five holes in the positions shown in the wiring plan. The two for the condenser bushes are ⅜in. diameter, whilst those for the two fixing screws and dial pointer are ⅛in. When the holes have been made the wood should be stained and varnished, or may be given a duller finish with polishing wax.

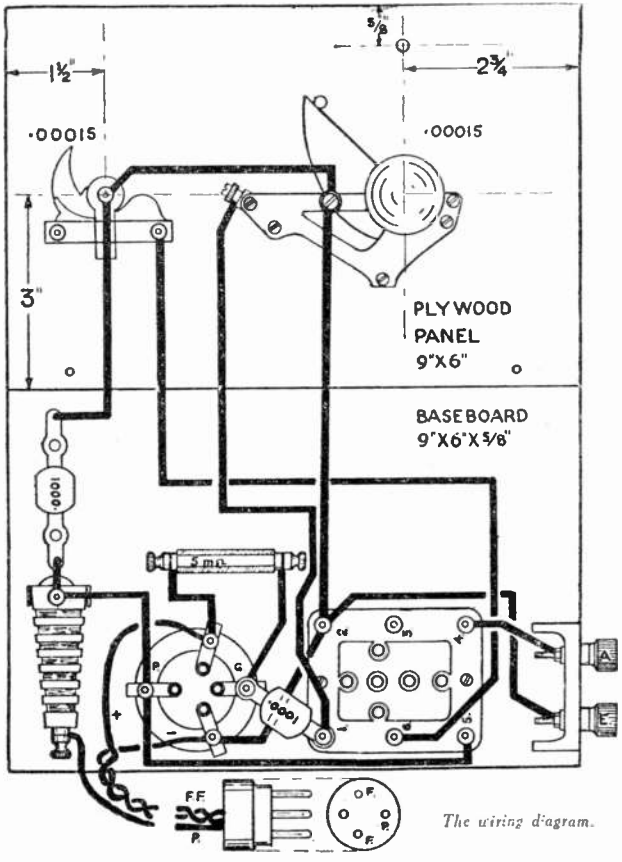
Next mount all the components on the baseboard and attach the panel. The positions can easily be duplicated by making reference to the photographs and scale-wiring plan. Both .0001 mfd. fixed condensers are alike when bought, and have long projecting soldering tags, but the ends are cut off the tags of the one used as grid condenser (connected between the grid terminal of valve holder and terminal of coil base). The tags must be cut with a pair of pliers just past the holes because these are used for connecting to the terminals. Notice that the other .0001 mfd. condenser and also the 5 megohm grid leak are not fastened to the baseboard, but are supported by the wiring.

Wiring.

This is carried out principally in Glazite insulated wire. First make the wire quite straight by drawing it through a cloth tightly gripped in the left hand. Then measure off the length required for each lead by fitting approximately in position, add an extra inch and cut off. The one inch allows for baring half an inch of wire at each end for making a loop to fit the terminal. Two soldered connections are made to one .0001 mfd. fixed condenser, but, if preferred, two 4 B.A. terminals could be fitted through the holes and the wires taken to these in the usual manner.

The flexible leads to the plug should be just long enough to reach the detector valve holder of the broadcast receiver. Notice that one is marked + and the other —; they should be connected to the valve plug so that they go to the positive and negative accumulator connections respectively. If any difficulty is experienced in tracing the accumulator leads, the wires should be tried both ways to find which gives better results. Be careful, however, that the wire marked "P" goes

(Continued on page 20.)



The wiring diagram.

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COMPONENTS

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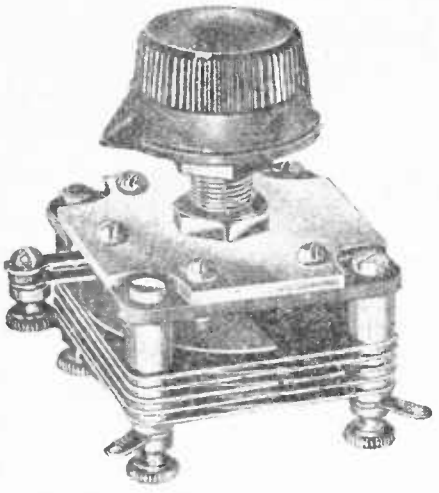

Differential Condenser.
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D.C.34, capacity .00034.
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Specially designed to work on the 150–2,000 metre wave-band.
Type R.F.C.1. Price 2s. 6d.

3-Gang Condenser.
Complete with Dise Drive.
Type P.C.3 ... Price 29s. 6d.

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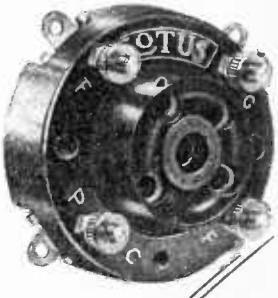
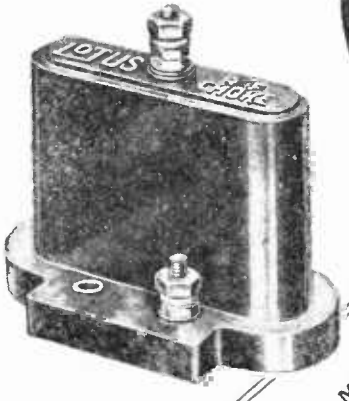
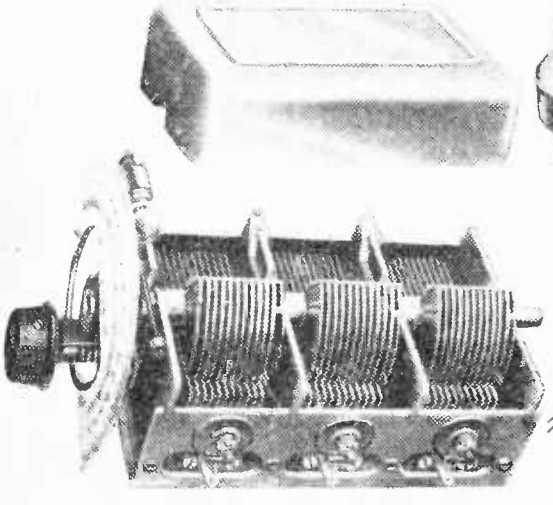
All types from 6d.







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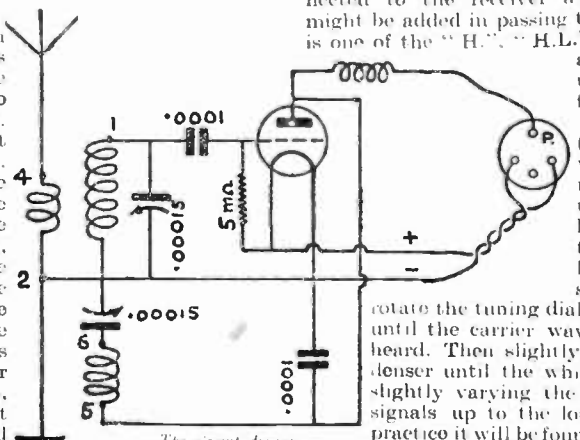
THE "HOBBIES" SHORT-WAVE ADAPTOR (*continued from page 18*).

to the plate or anode pin of the plug because any mistake in that respect might be the cause of a burnt out valve.

When a ready-made valve plug is used the wire can be connected to the terminals provided, but when using an old valve base the procedure will be rather different. Remove all the glass and clean out the inside of the plug with an old knife, then pass the wires through the holes in the base and solder to the appropriate pins on the outside. To make the job look a little neater, fill the inside of the base with sealing wax after the connections have been soldered.

Making the Coils.

The coils are wound on specially made low-loss formers, as shown in the drawing. The formers have notches at intervals of 1/12in. down the ribs, and these assist in keeping the windings even. The drawing shows that the aerial and grid windings are spaced by the distance between adjacent notches, but the reaction turns are wound side by side. A space of 7/12in. is left between the separate windings. The table shows the number of turns required for each winding for four wavelengths ranges, but, actually, the two smallest coils will be most useful and the larger ones need not be made unless it is desired to cover a maximum range of wavelengths.



The circuit diagram

The coils are wound with Litzendraht wire, which is insulated flexible conductor consisting of a large number of strands of enamelled wire. Before attempting to solder the ends of the wire to the pins on the former each strand must be bared of its insulation, taking care that no strands are broken. This done, the ends should be twisted together and passed down the inside of the hollow pins, so that they project slightly from the end. A small spot of solder applied to the end of the wire and pin will then ensure a perfect contact. To prevent the windings from slipping it is a good idea to run a little sealing wax on them where they pass over the ribs. This was done in the writer's case, as can be seen in the photograph.

Using the Unit.

To put the adaptor into use it must first be connected to the receiver as previously described. It might be added in passing that the most suitable valve is one of the "H.", "H.L." or "DX" type, although almost any valve previously used as a detector will function.

Set the tuning condenser (large dial) to about its midway position, and *slowly* rotate the reaction knob until a "rushing" sound is heard. This is an indication that the valve is just oscillating and is thus in its most sensitive condition. Now rotate the tuning dial, by the slow-motion knob, until the carrier wave (whistle) of a station is heard. Then slightly slack off the reaction condenser until the whistle stops, at the same time slightly varying the tuning so as to bring the signals up to the loudest point. After a little practice it will be found quite easy to operate both tuning and reaction condensers simultaneously and so to keep the valve just on the point of oscillation. The operation is not difficult so long as one is careful to rotate the condensers as slowly as ever possible. The reason for this will be apparent when it is stated that a station can be received and tuned out again in less than half a degree of the tuning dial.

By the time that both knobs can be operated in step, station after station can be tuned in without difficulty.

HOW TO CHOOSE YOUR RADIO BATTERIES.

DESPITE the growing use of the all-main receiver, the ordinary battery-operated set still remains by far the more popular type, and is likely to maintain this position for several years to come.

Users of battery sets frequently forget when they have to purchase a new battery that the technical engineers who planned the receiver made it one of their first considerations to see that the valves and other component parts are such that they will give the best results when working in conjunction with each other.

The outcome of this is that the set becomes a complete unit made to give you perfect radio reception, but all the care and attention in the world on the part of the designer will be of no avail if the valves he had so carefully selected are not fed with the correct high tension or the bias is wrongly adjusted.

The selection and use of the high tension and grid bias batteries, must, therefore, be in accordance with the type of valves in the receiver, as batteries play their part in helping to weld the set into the complete unit as much as the component parts themselves, and upon their correct usage depends the quality of your reception. The leading battery manufacturers provide a range of high tension batteries suitable for various sets.

The manufacturers of Drydex batteries, for example, tabulate some 120 different types of portable sets alone, and recommend which of their five different types of high tension batteries should be used to meet the requirements of the various sets.

There are many points which are overlooked by the inexperienced wireless fan, and guidance by the battery manufacturer should, therefore, be all the more welcome. When the ordinary standard-sized H.T. battery is used, for example, the maximum plate current taken up by the valves should not exceed 6 milliamps. If the rate of discharge is greater than this, you should see that you get a battery of sufficient capacity to withstand the extra strain and to have a reasonably long life, otherwise the rate of discharge will be such as to render the battery useless after only two or three weeks' use.

Drydex batteries, for example, are produced in various grades to meet the requirements of sets of different plate current. For the multiple-valve sets which demand a very heavy plate current, there are batteries which are capable of withstanding a discharge up to 30 milliamps.

TWO METHODS OF ENLARGING WORKING DETAILS

and hints on how to choose a pencil

AT some time or other, the reader of these pages who is a fret-worker or woodworker, has to mark out a pattern or part larger than it is printed. There are two popular methods, and both are quite simple and straightforward. Most workers are handy with the pencil, and it makes a job much more interesting to have added an artistic overlay or simple pattern which one has sketched out. One does not have to be an artist to do it, and very little practice will make you quite efficient.

The Use of Parts.

Patterns on design sheets, plain drawings in books suitable for cutting out are often not quite the size required. Or a portion of a design is wanted a little larger, and a slightly different shape. An enlargement of the part, therefore, is required, and the making forms a little change from the woodwork side of the pastime.

Fig. 1.—A suitable subject.

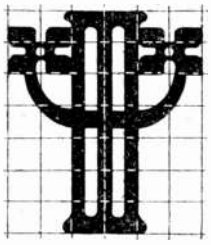


Fig. 2.—With squares drawn on in pencil.

The usual method is by squaring up the subject and enlarging it to the work, as often mentioned in these pages. In detailed drawings of parts which have to be cut, they are shown with squared lines across. These squares make it possible to enlarge the detail to the size required either on the wood to be cut or on paper to be pasted down.

A Simple Example.

Let us take Fig. 1 as example. This is a simple, small overlay which wants to be double the size, in order to fit a cabinet door we have made. First mark a frame round it in pencil with ruler and square, taking care to see its corners are correct right-angles. Then measure and make a mark at ½in. intervals along each side, joining the marks up with pencil lines (see Fig. 2). In this instance the pattern just fits into the space of ½in. squares. If not, mark the sides off into an equal number of squares by dividing the side in half, then quarter, then eighths, and so on.

How to Enlarge.

Next comes the enlargement, which can be done generally on the actual wood. If preferred, of course, it can be drawn first on a piece of paper, properly finished and then pasted down to the wood. If the design is to be double the size, and the squares over the pattern drawn ½in., then those drawn for the enlargement are 1in. If the original squares are merely divisions and no exact common measurement, then they can be just as easily done with a pair of dividers or compasses. If, again, the design is wanted three times as large, it is just as easy to increase the proportion accordingly.

Assuming the pattern is required double size, draw out on the wood, therefore, a frame double the size of the first one, and mark across it squares with 1in. sides. Then have the first pattern at your side and draw it into the second frame, with the pencil marks cutting the same lines in the same position and at the same point. By noting carefully where the pattern crosses or cuts arc, an accurate drawing double the size of the first can be made, as shown in Fig. 3.

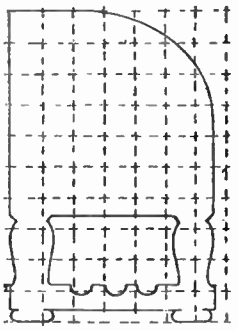


Fig. 4.—An odd shape squared up.

Half only.

This, of course, relates to odd shapes as well as symmetrical ones, and construction diagrams are often shown this way, as illustrated in Fig. 4. Here the shapes of the pattern are shown in ½in. squares, ready to draw out, as has just been described. If the pattern is a balanced one, however, with the halves exactly the same, there is no need to draw out the complete shape. Run a line down the centre and draw in half only on a piece of tracing paper. Then bend the paper exactly along the centre line. The pattern can thus be seen through, and the second half easily drawn in without having to worry about the squares.

The Pantograph.

Whilst the above is a good method, the use of the pantograph saves a good deal of trouble. This is an instrument you can either make or buy. An article on how to make one in wood appeared a little time ago in HOBBIES, or a suitable and accurate instrument made in steel can be purchased from Hobbies Ltd., for 4s. 6d. complete in a box with instructions. The pantograph

(*Continued on page 24.*)

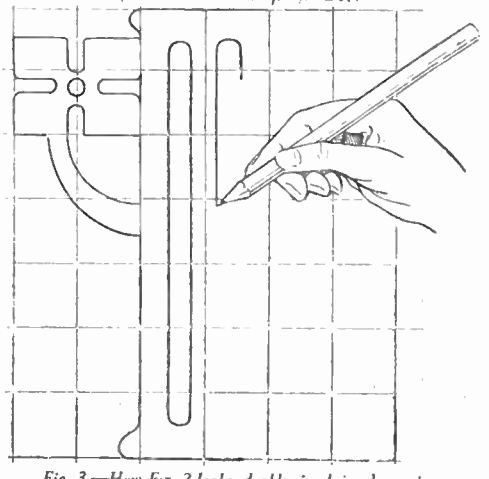


Fig. 3.—How Fig. 2 looks, double size being drawn in. The outline only need be pencilled up as shown.

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TWO METHODS OF ENLARGING WORKING DETAILS (*continued from page 22*).

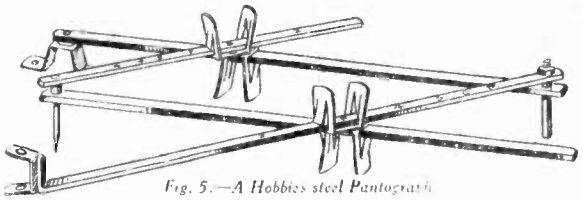

Fig. 5.—A Hobbies steel Pantograph.

is a thing like a small piece of trellis. When a point is drawn over the outline to be enlarged, a pencil is actually marking the subject the size required on a piece of paper.

The illustration at Fig. 5 shows what a pantograph looks like, whilst at Fig. 6 it is being used on a drawing. The slides are marked with figures, 2, 3, 4, etc., so the enlargement may be two, three or more times the original. The two movable clips are put over the number required and set to hold the bars fast. One end of the instrument is then fixed down to a board with a couple of drawing-pins. The subject to be drawn is laid under a blunt point, and a large piece of suitable paper pinned down under the extended arm which holds a pencil in its clip. A black pencil with a sharp point should be used.

It is a straightforward matter, then, to move the pencil so the metal pointer follows the actual outline of the subject. If this is done carefully, the pencil will draw an enlargement of the original accurately and easily. Of course, one cannot expect to control the long, moving arms at the first attempt, but practice on a piece of waste paper first will quickly teach the user to "get the hang of it."

The pantograph illustrated is useful on many occasions, and is an excellent instrument with bright steel arms and strong metal clips for gripping the rules and pencil. Moreover, not only is it useful in fretwork, but comes in handy in repoussé work, map drawing, or for stencilling. Then, too, how often one has a little picture which would make an excellent statuette cut out in wood. Generally, these pictures themselves are too small, but by means of a pantograph they can be drawn a suitable size for pasting on wood and cutting out with a fretsaw.

The worker who undertakes drawings of this kind will find an added interest, and a gradual handiness with a pencil in many subjects. He should always choose a pencil, by the way, to suit his work, and notice the letters on the end when he buys. It is a mistake to get a cheap one, because the "lead" in it is of inferior quality and will break or scratch or refuse to sharpen. They are graded in degrees of hardness, and those marked H are quite hard.

The HB is most popular for general use, but for drawing, such as described here, the most suitable is a B or a BB. These make a much blacker line, but can be sharpened to get a thin one at the same time. Some pencils are made in as many as ten different degrees of blackness, commencing with 6H and going up to 7B. The very hard pencils are used by architects and engineers, and the extra black by artists for shading and coarse drawing. Pencils lettered F are firm and are similar to HB. The latter lettering, by the way, stands for "hard and black."

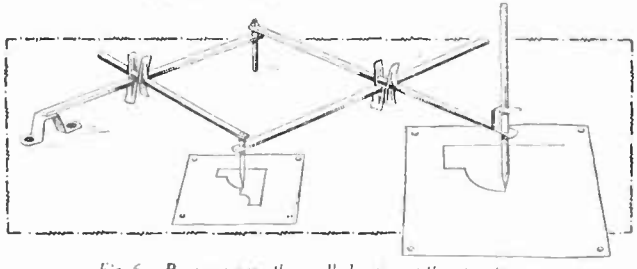

Fig. 6.—By going over the small drawing with a pointer, an enlargement is made on the right by the pencil.

THE "HELM" MATCH BOX (*continued from page 12*).

$\frac{1}{2}$in. wood with a small hole at one edge which will make the disc fit tightly on to the rod. Push the spindle through one end of the box, and then thread on the discs. Push the spindle home into the other end of the box, and then fix the discs so that they come just inside the ends. The discs should fit on tightly, and be further fixed by a nail driven in through a hole made when the parts have been temporarily put together previously.

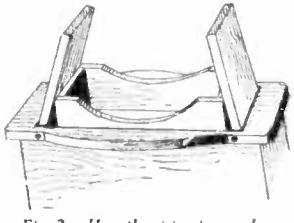

Fig. 3.—How the rising box pushes up the two parts of the lid.

The completed spindle and nails are shown in Fig. 4. One end of the spindle projects $\frac{1}{2}$in. through the end of the box, and to this is fitted one washer, then the wheel and then finally the second washer. The little box which drops down on to the eccentric cogs is composed of two sides and two ends, and glued to a floor all in $\frac{1}{2}$in. wood. The sides have a counteract balance beneath the floor to keep the box steady when it is raised.

The complete lid has already been described and finished, so it can now be placed in position on the top of the box. Before doing so, however, glue and nail the completed box down to the pedestal and finish off beneath the floor with four pieces of moulding as on the base. The lid must be fixed carefully and tested out before being finally glued in. The match holder, too, must be made to fit in the box exactly so it does not wobble or fit too tightly.

Turn the steering wheel so that the wide part of the eccentric is downwards. Then stand the small match container in place and turn the wheel slowly. This should lift the box and so press upwards the two hinged lids. The two latter pieces should be so fixed that when the box is at the top of its motion, the lids lie a little inwards and rest on its ends. Thus when the box descends, the lids fall with it. If, however, the lids are upright or lean a little outwards, they will not drop with the box. The detail at Fig. 3 illustrates this point. When closed, the lid should rest on the match holder, but if it drops a little below the surface a thin edging of plywood can be put along to act as a stop.

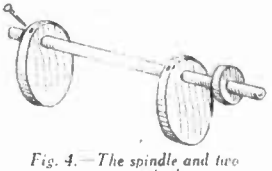

Fig. 4.—The spindle and two eccentric wheels.

The whole model should be varnished or polished, and a strip cut from the side of a match box added to the sides of the pedestal, for striking upon.

A NEW FEATURE.

CAMERA CHAT

Conducted by Owen Wheeler.

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

Lenses on Roll Film Cameras.

WHEN a youngster buys, or is given, a roll-film camera, one of the first things he ought to do is to get on good terms with his lens, which, of course, he cannot do until he has learnt first what it is and what it is capable of. The lenses supplied with roll film cameras are of three kinds—anastigmats, ordinary rectilinears and single lenses. The first have two or three glasses—sometimes more—and their performance is, or ought to be, all that could be desired in the way of both definition and rapidity. They have to be most carefully made, and are consequently more costly than the other two kinds mentioned, but, if one can afford them, they are an excellent investment, for they enable work to be done on dark days and in other unfavourable conditions, which can hardly be attempted with ordinary rectilinears or single lenses. The ordinary rectilinear, consisting of two similar single lenses, is, however, a very useful servant, and most of these fitted to roll-film cameras are of quite good performance, giving very decent definition at full aperture—usually f/8—and straight marginal lines when dealing with architecture. Single lenses, such as are supplied with most cheap cameras, are often satisfactory—indeed, it is wonderful how good they can be at the price—but even at full aperture they seldom work at a wider aperture than f/16, they have often to be stopped down lower than that, and they give bulging marginal lines.

If you cannot afford an anastigmat I would strongly advise you to buy a roll-film camera fitted with a rectilinear—or, as it is sometimes called, a symmetrical—lens in preference to one that is, perhaps, smarter in appearance but with only a single lens to it. At the same time, there is something to be said for single lenses, notwithstanding their marginal distortion and comparative slowness. The picture given by a single lens, if it is a good one, is often more brilliant than that given by a doublet, chiefly because there are only two reflecting surfaces instead of four, and in photography the reflections from the surfaces of lenses may have a good deal to say to the quality of the negative. There is a sparkle about negatives taken with good single lenses which is very delightful, and accounts for the singularly bright little pictures which many youngsters manage to secure with cameras costing only a few shillings. But the main thing in regard to the lens on your roll-film camera is to play up to it, make the most of it by giving it a fair chance of doing itself justice, whatever it is, and however much or little it costs. Remember that it is your lens that makes your pictures, and that your camera only plays a secondary part.

TRICKS TO TEACH A DOG OR CAT

By "Tutor"

Some simple and amusing tricks that you can teach your pets.

One of the most useful things to teach a dog is ratting. Above is seen a terrier with some of his victims and (inset) the same dog when twelve weeks old with the first rat he killed.

IT is easy to teach both a dog and cat many tricks, and as a rule the better the animals are bred the more willing pupils they are. True, one occasionally comes across an intelligent and clever cross-bred dog, but amongst mongrels, to every really intelligent animal, there are fifty or so far from intelligent. One is sometimes asked the question if any particular breed of dog is easier to train to do entertaining and clever things than others. The answer to the question is, no. But the smaller breeds, of course, are the most convenient to train. Presuming you have a dog of one of the small breeds about with you constantly, closer attention can be paid to him than to a dog too large to live in the house. One of the easiest things to teach a dog is to sit up on his hind legs. Indeed, this is one of the first things the dog should be taught. It serves as a stepping stone to his learning more entertaining tricks, and to teaching him to make himself useful. You offer the dog a small piece of food. At first he will stand on his hind legs and reach for the food. He must be pushed down gently into the proper position, and not before he is in the position should the food be given to him. In from a few days to a week the dog should have mastered the trick. But this will depend on your patience and how you handle him and whether he is fond of you or not and his age. A puppy of twelve weeks is not too young to be taught the trick. The dog may next be taught to ask for the food. First tell him to sit up; then say to him—"Say, please." Presently he will give a bark or whine. Then pat him and give him the food. All in due course, if you continue to persevere with him, he will give something approaching an imitation of the human voice. He may then be taught to make a noise that will serve as "thank you." This is a little more difficult to teach. After the dog has eaten the food offer him another piece and tell him he shall have it when he has said "thank you" for the last piece, and keep repeating the words: "say, thank you." When at length he has made a good attempt to obey, give him the food, and offering him a third piece, tell him to say please.

Quick at Learning Tricks.

If you are quiet, gentle and patient with the dog, I dare say you will be surprised how quickly he will gather exactly what he is to do. Never strike him or in other ways be rough with him. The animal may next be taught to find food. Show him a piece. Then let someone cover his eyes or take him out of the room whilst you hide it. You then tell the dog to "seek." At first you must pretend you have lost the food and make it seem to the dog that you are searching with him. Probably you will have to take him to within a foot or so, or a few inches, of where the food is hidden. After he has found a few pieces unassisted he will begin to find others in a few moments. There is a practical side to training a dog to do this simple thing. When you happen to lose something of value out of doors, a hand-bag or perhaps a piece of jewellery, he may find it for you. He will think you have hidden some food and will, as usual, cast about to pick up your scent. When searching for food you have hidden, it is nearly always your scent on it that enables the dog to find it, not the scent of the food itself. When I have been out ratting and rabbiting and have mislaid gloves and ferrets' collars and lines, often the terriers have found the things for me.

Another trick of an entertaining nature that may be taught the dog is to walk on his hind legs. To do this simple thing tell him to stand up, and walk round the room with him with his forelegs resting on a stick. Gradually remove the stick, but keep it within an inch or so of the legs in the event of the dog seeming inclined to drop down on his four feet. You may, also, teach him to pretend to be asleep. First teach him to lie down when told to. Then to lay his head on the ground and close his eyes. For a time you will find it necessary to place his head in the desired position and to close his eyes for him. Always give him a chocolate or a piece of cake after these lessons. Other simple things to get him to do is to spell his name by placing wooden letters—you may cut some out with a fret saw—in their correct order, to jump over a stick and through hoops held a couple of feet or thereabouts from the ground, and to dive. To teach him to do the latter thing drop an object in clear water sufficiently weighted that it will sink a few inches. The dog will put his head beneath the water and grab it. It may then be thrown in again weighted more heavily.

Collecting Newspapers.

Amongst the useful things it is not difficult to teach a dog to do is to collect the newspapers and letters when dropped through the letter slip in the door. You begin by taking the dog to the door and getting him to carry the things into one of the sitting rooms. Train him carefully and he will listen for the postman and paper boy's knock and bring you the letters and papers as tenderly as a well-broken gun-dog carries game.

Yet another thing that it is not difficult to get a small dog to do is simple shopping, provided you take him with you when on shopping excursions, and let him carry something home for you. Let him have the correct guidance and sooner or later, on being given a basket containing a written order and money, he will visit the shops at which you buy until what you require has been put into the basket.

Almost all the more simple and straightforward things you can teach a small dog to do, you can, also, teach a cat, and by the same methods. You can teach the animal to sit up on its hind legs to ask for food, to say "please" and "thank you," to walk on its hind legs, to pretend to be asleep, to jump, and to find hidden food, and such things as cotton reels, thimbles, small balls and marbles, with all of which it is fond of playing.

HOBBIES

If you find any difficulty when constructing models let our TRIX expert help you with your designs.

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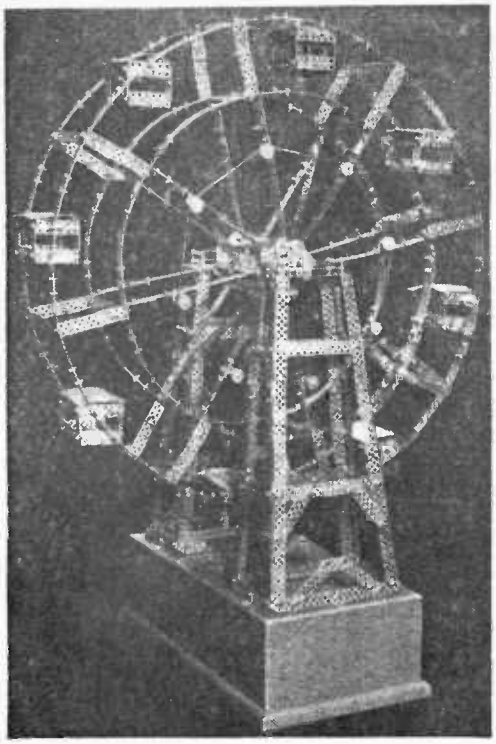
TRIX SUPPLEMENT



A fine working model of the big wheel made with twenty-four sets of Trix No. 1 and thirty-one sets of Trix No. 1a.

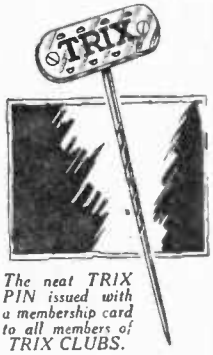
The Big Wheel.

THIS familiar form of amusement is said to date back to ancient China, where the first Big Wheel was constructed in bamboo cane and turned by hand power.

This may have been so, but the big wheels, now built in many countries, are very different from this and are fine examples of constructional steel work. The framework has to be carefully designed to stand up to the stresses and strains of its enormous bulk and the whole wheel and cabins balanced on its main shaft.

Comparatively small power is required to slowly turn the wheel, which is usually electrically driven and controlled.

The cabins keep an even keel throughout and revolve completely round their suspension shafts as the big wheel turns.



The neat TRIX PIN issued with a membership card to all members of TRIX CLUBS.

Big Wheel No. 114.

Built with twenty-four sets No. 1 and thirty-one sets No. 1A.

PARTS REQUIRED.—One hundred and twenty-four of A1, 644 of B1, ninety-six of F5, ninety-six of F9, forty-four of F13, 122 of F17, 778 of N1, five of P29, thirty-nine of S25, three of S55, sixty-four of U1, forty-eight of U2, sixteen of W10, twenty-six of W16.

INSTRUCTIONS.—It is best to build both the foundation towers first. These, made in substantial triangular form, of F17's, are forty-six holes high on the outside, but only forty-four holes on the inner side. The joining above of these inner sides is built of F9's, with F5's in the middle, screwed on vertically as a foundation for the wheel axle. Begin the wheel with the two outer wheel rims.

Screw sixteen F17's, each with three holes overlapping, together in a straight line and join the two ends together with screws (also with three holes overlapping). In this way the circle formed is 224 middle holes in circumference. Each of the following inner circles consists of sixteen F13's (in which likewise three holes are overlapped), and has a circumference of 160 middle holes. The space between the inner and outer wheel rims is achieved by sixteen struts 8mm. long, made from one F9 and two U2's. These struts are evenly spaced flat on the outside of each inner wheel rim and overlapping the outer wheel rim. At the same time F17's are screwed here to join the two halves of the wheel together. The screws are put in on both sides in the second hole from the end, and thus the breadth of the wheel is fifteen middle holes. In the same way F17's are introduced on the inside of the inner wheel. In the last case the strut, the F17 and the spoke, which is described later, are fixed with one and the same screw. A W10 is added between the horizontal inner struts and the sides of the U2's of each spoke. Each wheel spoke, consisting of one F17, one F9 and one U2, is 17.5 cm. The spokes are joined to the wheel nave in the second to last hole of the F17 by means of an A1. Each wheel nave consists of two crossed F9's, which support a rim of eight F5's. The strengthening from nave to nave is achieved by four struts made of F9's (with three holes overlapped). The wheel is strengthened on the inside of the spokes by four struts, each made of two F17's, overlapped to eleven holes. The cabins are built as shown and the sides are joined together with A1's and U1's.

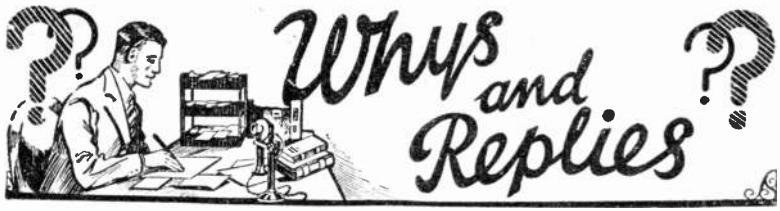
The roof patterns are made of cardboard.

The wheel is set in motion by a handcrank and also by means of a rubber band, or string, which is fastened over the wheel and round eight S55's.

At the end of each of these S55's, W16's are placed to prevent slipping.

The neat cartouche imprint on the Trix envelope.

WHY NOT FORM A TRIX CLUB IN YOUR DISTRICT? *Membership Cards and Buttonhole Pins are available for members.*



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Mental Nut No. 33 Result.

THE three following competitors sent in correct solutions to the above Mental Nut: Mr. W. H. Mason, 50, Woodlands Road, Southall, Middx.; Mr. W. H. Penny, 1, Ainslie Street, Ulverston, Lancs; and Mr. H. C. Wristbridge, 64, Brassey Road, Winchester. These readers each receive a book.

A New Volume.

THIS issue commences volume 75. All of my readers know that I usually signalize a new volume in the form of a free gift or a national model-making competition with valuable prizes. I have in hand arrangements to spring upon them the greatest surprise yet. As soon as the final details have been approved, an announcement will be made in these pages.

My Great Secret.

EVERY reader, of course, knows by this time that my great secret was the launching as a separate entity the new great national weekly paper for the home constructor—PRACTICAL WIRELESS—every Wednesday morning (the same day as that on which HOBBIES is published) for 3d. No reader successfully forecast what the secret was, and therefore no books will be awarded in connection with my offer on page 628 of September 10th issue.

Half-Yearly Index.

THE index for Volume 74 will be ready shortly and may be obtained from the Publisher, George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2, for 4d., post free. Binding cases, which are, of course, supplied complete with title page and index, cost 2s. 9d. from all newsagents, or by post from us for 3s. If you require back issues to complete your volume these may be obtained for 3d. each, post free, from the Back Issue Dept., George Newnes, Ltd., Exeter Street, Strand, W.C.2.

"All About Tuning and Tuning Coils."

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Held Over.

I AM very sorry indeed that great pressure on my space has compelled me to hold over the continuation of Mr. Twining's article on "Model Aeroplane Wings." This will appear next week.

QUERIES AND REPLIES.

Foreign Correspondents Required.

Mr. H. Lombard, c/o Pass Office, Bloemfontein, O.F.S., South Africa, would like to correspond with any reader on different topics.

Van Houtens Cocoa Coupons Required.

Mr. John Fox, Upper Fennor, Oldcastle, Co. Meath, would like to receive Van Houtens Cocoa coupons in exchange for stamps, razor-blade covers, or other cocoa coupons.

Model Theatre Correspondents Required.

Mr. Clifford A. Toomer, Glendale, Rectory Road, Pitsea, Essex, would like to get into touch with any model theatre enthusiasts about 14 years of age.

Difference Between Machine and Instrument.

A machine is any device which alters the direction, point of application, or magnitude of a force, E. R. S. (Manchester). An instrument is any tool or device not necessarily a machine used for doing work.

"Electrically Driven Clock" Correction.

In the concluding article of the "Electrically Driven Clock" which appeared on page 625 of our issue dated Sept. 10th, the expression for calculating length of pendulum should read:

$$N^4 : T^2 :: M^2 : L^2$$

that is,

$$N^2 : 60^2 :: 39.14^2 : L^2$$

or,

$$\frac{N^2}{60^2} \quad \frac{39.14^2}{L^2}$$

whence,

$$L^2 \quad \frac{60^2 \times 39.14^2}{N^2}$$

The "Gear" of a Cycle.

The method of calculating the "gear" of a cycle, O. G. (Ipswich), is to multiply the number of teeth in the large chain wheel by the diameter in inches of the rear wheel and divide the result by the number of teeth in the small chain wheel or sprocket, the answer being the gear in inches. A machine geared to 80in., for example, means that one revolution of the cranks will carry the rider the same distance as an "ordinary" machine with an 80in. driving wheel.

Converting Low-resistance Phones.

Can I convert low-resistance phones to a high resistance? asks P. V. (Seven Oaks). Yes; high-resistance phones are wound with a large number of turns, and it is well to bear in mind that the resistance is really a necessary evil; the sensitivity of the phones depends upon the number of turns and, unfortunately, the greater the number of turns the higher the resistance. By stating the resistance we are able to judge the number of turns.

Filling Worm Holes.

A good composition for filling up a large number of worm holes in wood that is to be afterwards polished by friction, J. C. (Pendleton), is a mixture of finely crushed whiting and linseed oil made into a thin paste, and coloured to match the wood it is to be used upon by adding a suitable colour pigment, such as venetian red or brown umber. Just at the moment of using the mixture pour in a little French polish and mix well; this hardens the mass.

Preserving Fishing Lines.

Soak in a mixture of equal parts of boiled linseed oil and copal varnish. A. W. (Tottenham), then stretch across a room and wipe with a sponge. Allow it to dry and repeat the dressing if desired. To cause it to dry quickly, use gold-size instead of the varnish.

Cementing China to Metals.

Make a cement by melting 1oz. beeswax with 1oz. of resin, and stirring into it 1oz. of venetian red, L. F. (Cirencester). Use whilst hot, and warm the glass. If the wood is to join the edge of the glass, a groove in the wood will assist in holding it. Roughening the surface of the glass with emery powder will also help the cement to stick.

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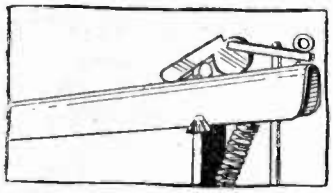
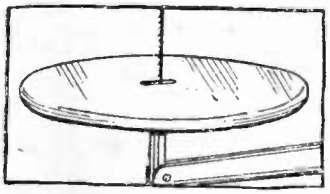
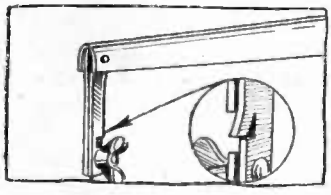
Notice the new method of tension on the back end of the top arm. Quite easy, and yet bringing the saw blade taut with a single throw of the eccentric lever.



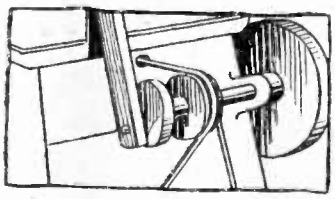
The circular table is polished, and has rounded edges to prevent damaging the work. It can be tilted to either side if required for antofret or ordinary bevel cutting.



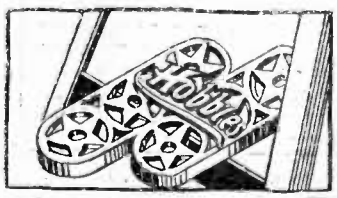
The arms are of steel bent to U shape for strength combined with lightness. A new pattern clamp prevents the saw-blade being put in too short or too far.



The belt drives in a grooved wheel, and has a firm grip. The balance wheel is heavy, but runs freely on a steel driving spindle.



Notice how the treadle is shaped to the feet and properly balanced for easy work. This provides for comfort and reduces weariness.



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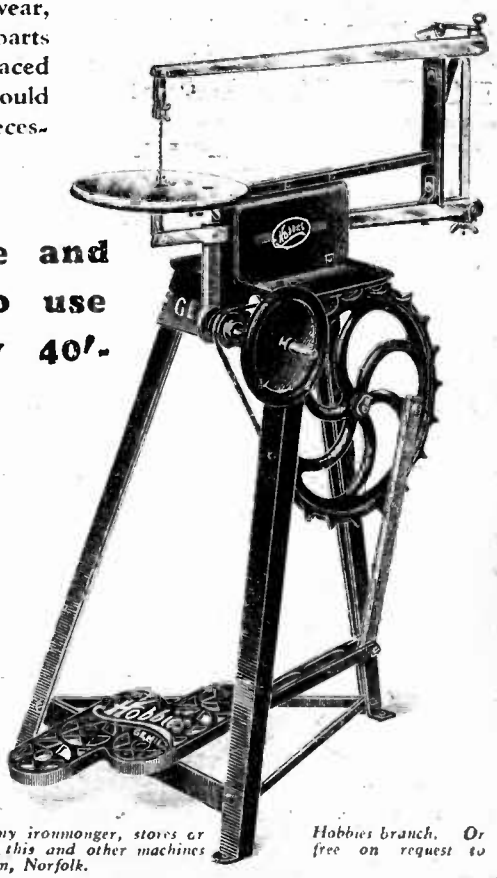

The machine is in black steel with polished table and arms. All moving parts are easily accessible for oiling. Try one for yourself at any Hobbies Branch. Also obtainable under easy payment terms, supplied on request.

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