

# HOBBIES WEEKLY

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IN THIS ISSUE

Included in this special double number is a fine coloured picture which lends itself admirably for making into a jigsaw puzzle. Full instructions for cutting are given inside, together with a host of interesting projects for modelers, handymen and all hobbyists.



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

*Make this  
delightful novelty*

## WILLOW PATTERN MUSICAL TRINKET OR CIGARETTE BOX *FREE DESIGN INSIDE*

This charming article is intended for use as a trinket or cigarette box, and its novel appeal makes it an ideal suggestion to make up as a gift. Incorporated in the model is a musical movement which plays a tune of your choice when the lid of the box is raised. The music stops when the lid is lowered again.

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# OUR BIRTHDAY NUMBER

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## The Story of the Willow Pattern

THE Willow Pattern was introduced to England about 250 years ago and has remained a great favourite with each succeeding generation. The story behind the familiar blue and white design is based upon a charming sad little story from ancient China.

Koong Shee, the beautiful young daughter of a rich merchant, Koong Ping, fell in love with her father's handsome young secretary named Chang. Chang, alas, although handsome, was poor, and Koong Ping's ambition was to see his daughter married to the rich, powerful merchant, Lo Feng. Now Lo Feng was old and ugly, and little Koong Shee refused to yield to her father's entreaties to marry such a repulsive old man, and, in a rash moment of defiance, she declared her devotion to the handsome young Chang.

In great rage Koong Ping ordered his servants to seize his daughter and bear her away through the garden and across the bridge to an island in the centre of a little lake. Here on this island she was imprisoned in a summer house, with no hope of release until she promised to marry Lo Feng.

### To the rescue

When news reached Chang of Koong Shee's imprisonment he went into hiding among the tall bamboos bordering the lake and gazed despairingly across the water towards his lover's island prison.

Vowing eternal love to the beautiful Koong Shee, and knowing that he risked instant death if caught by Koong

Ping's servants, he called across the water that he was coming to rescue his beloved, and then rushed across the little bridge. He reached the summer house, released Koong Shee, and the two young lovers were on the point of running away to freedom when Koong Ping, carrying a whip and followed by two of his servants armed with swords, ran across the bridge to the island, barring their way.

### Sad ending

We now come to the saddest part of this little story.

In a blind fury Koong Ping ordered his men to kill Chang, and, even as the young man fell to the ground mortally wounded by the guards' swords, the outraged father flailed his young daughter with cruel lashes of the whip.

As Chang died, so little Koong Shee dropped to the ground and died under the cruel strokes.

Then Koong Ping and his servants gathered the two bodies and placed them on a boat and rowed them across the lake for burial.

High overhead circled two young doves. Koong Ping heeded them not — he, in his wickedness, was not to know that true love will always conquer death and all things evil — that even as his craft bore the broken bodies across the waters of the lake, the hearts of little Koong Shee and her gallant Chang were reunited for all time in the shape of the two beautiful birds wheeling high up across the blue vault of the sky.

ALL those who are connected with the publishing of this magazine are, naturally, proud of the fact that this *Hobbies Weekly*, which first came out on October 19th, 1895, continues to claim the interest of a big public. And in this, our Birthday Number, we say a big 'thank you' to all readers who have written during the past year — in praise or in constructive criticism.

Naturally, if we know what readers like we can continue to include articles and subjects which give the maximum interest, and during the past year we have been happy to act on various suggestions from readers as subjects for designs and articles.

Not all good ideas, of course, see the light of day. For instance, there may be snags in supplying or obtaining the various components for what would otherwise be a popular 'do-it-yourself' project. Furthermore, we like to keep most subjects within the capabilities of the average handyman, always bearing in mind that we are catering for the young and old, the learner and the craftsman.

★ ★ ★

As I was preparing this Birthday Number, I was particularly pleased to receive a letter from Mr. H. Bagshaw of 37 Rushy Lane, Sandiacre, Notts., who has been a reader of our magazine since its first issue. His keenness for fretwork has apparently been with him all through these last 60 odd years, and although now aged 85, Mr Bagshaw tells me that he is at present interested in making a trinket box, the patterns for which appeared in a recent issue.

When browsing through the third issue of the magazine, dated November 2nd, 1895, sure enough I came across Mr. Bagshaw's name. With it was a request for a design for an inkstand 'where horseshoes are worked in'. I am happy to report that Mr. Bagshaw's wish was gratified in a subsequent issue. Which proves that right from the very start of our magazine one of our main concerns has been in helping all fellow hobbyists to the best of our ability. That is the principle we shall always strive to maintain.

# MAKING THE TRINKET BOX

**T**HE story of the Chinese Willow Pattern Plate is familiar to us all, and its symbolic figures are recognised everywhere. This theme has been incorporated into our model, the overall picture of which represents the main pagoda and other scenes from the story are featured on side panels.

This charming article is intended for use as a trinket or cigarette box, and its novel appeal makes it an ideal suggestion to make up as a gift. Incorporated in the model is a musical movement which plays a tune of your choice when the lid of the box is raised. The music stops when the lid is lowered again.

Anyone who can use a fretsaw should make a success of this design. Neatness in cutting to outline is, of course, desirable where the small human figures and birds, etc., are shown on the decorative overlays, but the assembly is quite simple and is described here step by step. These overlays stand out in relief on the side panels, but if difficulty is experienced in obtaining satisfactory outlines, the scenes can be traced direct on to the sides of the box and painted on instead.

## Trace and transfer

All the parts needed for making the box are shown full size on the design sheet. They are mostly cut from  $\frac{1}{4}$ in. wood and a few parts such as the overlays are  $\frac{1}{8}$ in. Trace the various pieces from the design sheet and transfer them to their appropriate thicknesses of wood by means of carbon paper. Next cut them out with the fretsaw and clean up all parts well with glasspaper.

Commence assembly by making up the base, which consists of pieces (1), (2) and (3). Fig. 1 shows how pieces (3) go between pieces (2), being secured by glue, and piece (1) is then added on top. Ensure that this base is well cleaned with glasspaper before gluing on the steps, which are made from pieces (15) and (16).

## Adding the movement

Now build up the 'box' portion on to the base by adding pieces (4), (4a) and (5). These are butted together and glued and added to the base in the position shown by dotted lines on the design sheet, an indication also being given in the cut-away drawing (Fig. 2).

Glue pieces of Hobbies No. 34  $\frac{1}{4}$ in. quarter-round beading in the four corners. These are  $1\frac{1}{2}$ in. long and serve to support the floor (piece 17) which conceals the musical movement and will be added later.

At this stage the musical movement can be screwed to the base, as shown on piece (1) on the design sheet. Remove the key from its shank before screwing down the movement, and then replace the key from the underside. The arm of the movement should be bent parallel (and as close as possible) to the side of the box as shown in Fig. 2. The plunger which starts and stops the music is made from medium gauge wire bent to form an 'eye' at one end which is an easy fit over the arm. The plunger is held in position by a notch in piece (17), and by

## KIT COSTS ONLY 9/3

Panels of planed wood in their appropriate thicknesses are included in Hobbies Kit No. 3284 for making the Willow Pattern Box. Kits also contain moulding, beading, wire, flock paper, hinges, etc., and cost only 9/3 from branches, etc., or from Hobbies Ltd., Dereham, Norfolk (post 1/6 extra).

Appropriate tune titles available on the No. 1 musical movement include Anniversary Waltz, Jingle Bells, Blue Danube, Vienna, City of my Dreams, Brahms' Lullaby, Auf Wiedersehen, Merry Widow, Gounod's Ave Maria, Auld Lang Syne, Limelight, Moulin Rouge, Home Sweet Home, and Swedish Rhapsody.

These are the famous Reuge Swiss movements and cost 15/6 (postage 6d. extra). Get a kit and movement and make a start on this fascinating novelty right away.

a staple made from a fret pin with the head removed. The wire plunger can be left longer than is really necessary, and the surplus can be trimmed off after trial when the lid has been fitted.

Add pieces of Hobbies No. 300

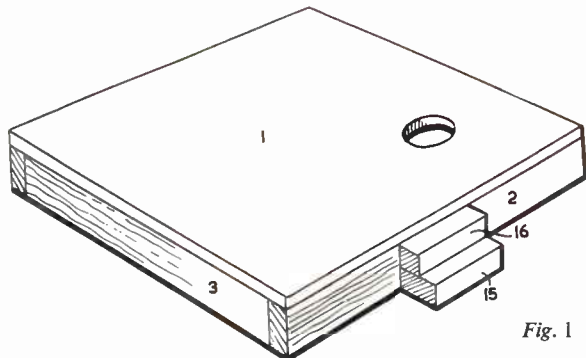
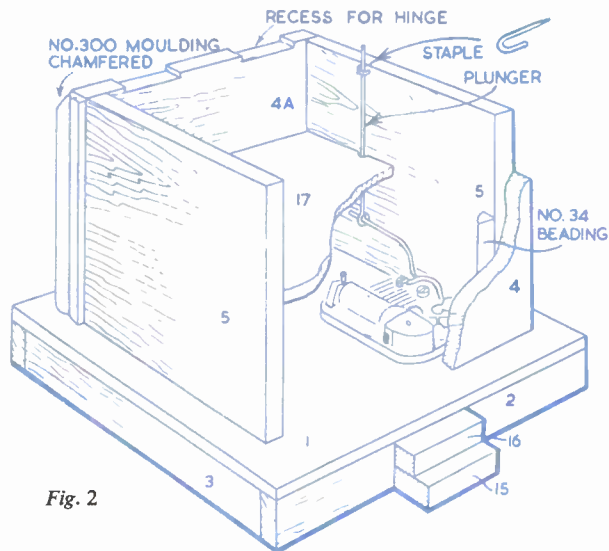


Fig. 1

moulding at each corner of the box (Fig. 2) and then fit the floor (piece 17). It is not necessary to glue the floor in position as adjustments may later have to be made to the musical movement.

The next stage is to assemble the various pieces which go to make up the lid. Pieces (7) and (8) are halved together and glued on top of piece (6) in the positions shown by dotted lines on the design sheet. Fig. 3 also shows how these

pieces overhang at the corners. Piece (9) is next glued to piece (6) as indicated.

Now make up the box arrangement (Fig. 4) consisting of two pieces (10) and four pieces (11). Pieces (11) are mitred and glued at the corners to form the sides, and then sandwiched between pieces (10). On top of this box are glued pieces (12) and (13), which are halved together, and piece (14). It will be seen that these also overhang the edges. On top of this assembly, glue a Hobbies No. 20 toe. This section is then glued on top of pieces 7 and 8 as seen in the illustration of the finished article, and also indicated in Fig. 4.

Before hinging the lid to the box, add the decorative overlays (18), (19), (20) and (21) to the four side panels of the box. The exact placing of these overlays on their respective panels is shown on the design sheet, panel (1) coming in the front with the steps.

#### Fixing the lid

The hinges for the lid are recessed into the back (piece 4) as shown in Fig. 2. Note that the rear underside edge of the lid and the tops of the two rear pieces of corner moulding must be chamfered (sloped off) to allow the lid to open, and thereby also provide a stop for the lid. The lid overhangs the box equally all round and the positions where the hinges will be fitted underneath the lid must be gauged and marked off while the lid is temporarily placed in position, and then fixed by screws.

The wire plunger of the musical movement can be temporarily removed while the lid is being located, and on refitting, the plunger is adjusted in length so that the movement starts and stops with the opening and shutting of the lid.

Having ensured that everything works satisfactorily, the lid can be removed for the purposes of finishing the model. The sequence in order to obtain a very satisfactory finish is first to seal the grain with a woodfiller. Then glasspaper smooth and apply an undercoat of white paint all over. Smooth down again and add one top coat of white paint. Rub down with fine silicone carbide paper used wet, and then apply a final top coat of white to the whole model. Having thus provided a perfect background, the blue embellishments will need only one coat.

It will be appreciated that neatness in adding the colour is essential. It is recommended that the worker makes reference to the actual colouring and decoration of a piece of willow pattern plate when putting in the various depths of blue. Detail should be added according to the worker's capabilities, with a small water-colour brush. Even if the adding of coloured detail is not attempted, quite a pleasing effect is

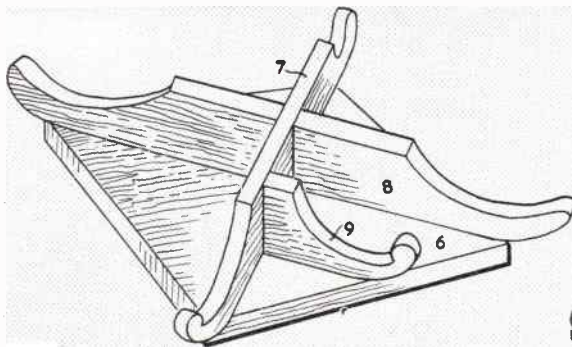


Fig. 3

obtained by painting the overlays a solid blue. Suggestions for the decoration of the top can be seen from the finished illustration, and here again it is suggested that ideas for patterns etc. can be obtained by studying an actual willow pattern plate.

After hinging the lid back in position, the inside walls of the box and the floor (piece 17) should be lined with flock paper, to give a neat appearance to the container for holding trinkets or cigarettes, etc.

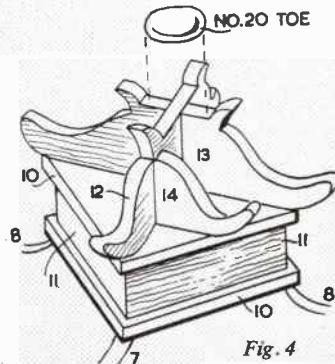


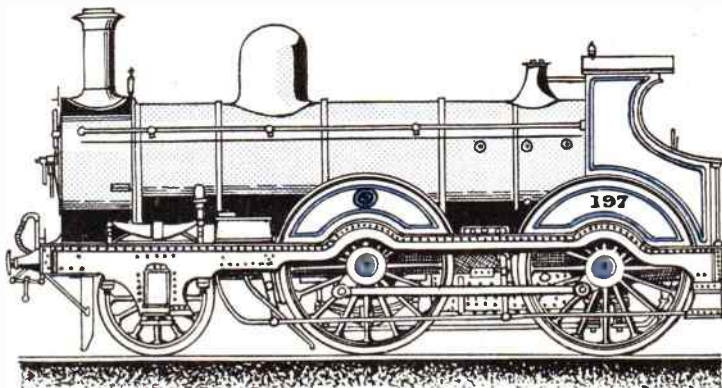
Fig. 4

## Interesting Locos - No. 13

IT may not be generally known that the first locomotives of Standard (4ft. 8½ins.) Gauge to run on the G.W.R. were not G.W. engines in the true sense, but stock taken over from the absorbed lines of the Shrewsbury and Birmingham, and Shrewsbury and Chester railways in the early 1850's. Fifty-six engines from these two lines were added to the G.W. stock in 1854, and they were the first 4ft. 8½ins. gauge engines on the G.W.R. Later the G.W.R. absorbed the West Midland Railway in 1863, this line being at the time an amalgamation of one or two small railways, the first of which was the Oxford,

Worcester and Wolverhampton Railway opened in 1852. This line had in service among its locomotive stock six excellent 2-4-0 type passenger engines manufactured in 1862 by the well known makers, Beyer Peacock & Co. One of them, No. 197, is shown in the illustration.

They were used on the principal section of the West Midland Railway between Wolverhampton, Worcester, Hereford and Newport, and did some very fine work. They had 16in. by 20in. inside cylinders, and the coupled wheels were 6ft. in diameter. Three of them were later converted to 2-4-0 Pass Side Tanks. (A.J.R.)

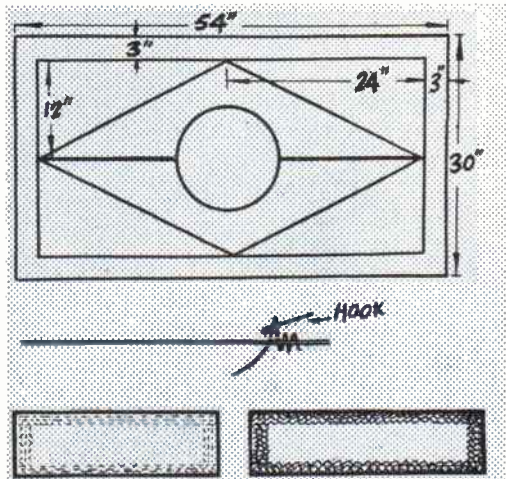


# FROM BAGS TO RUGS

A GOOD warm and serviceable rug can be made at home for practically no cost at all. The only items that may have to be purchased are hessian for the foundation and backing, and one or two brightly coloured dyes. A strong meal or corn sack can be substituted for hessian for the foundation, providing it is well washed before using. Even so, it will still be found advisable to use hessian for backing the finished rug.

## Any old materials

The materials you will work with will be stockings, knitted underwear, including father's pants and vests, and other items such as skirts, dresses and coats. If you have an abundance of dark colours, then it will be necessary to dye some of the lighter coloured garments to a brighter hue to achieve an attractive rug.



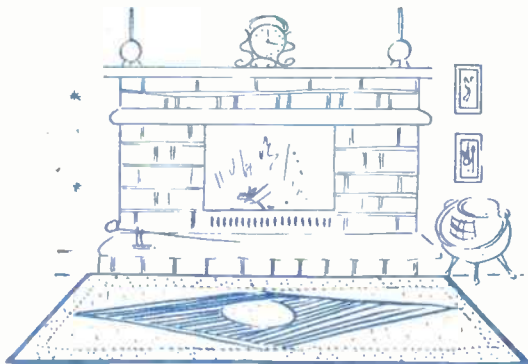
*Underside should look like rows of running stitches.*

*The top is covered with short close loops.*

Before you start to dye, it is as well to plan your design and colourings, so that you can get your proportions right. The simpler the design, the fewer colours you will need and the bolder it can be.

Once you have decided on your design, use a blue crayon to mark it out on the hessian. Once this is done you will be able to tell at a glance the proportion of the rug in relation to its whole size that will have to be covered with any particular colour. Divide your material accordingly, and dye it in accordance with the instructions on the packet.

*How to get  
fireside  
comfort at  
very little  
cost*



Once the material is dyed and dried it will be ready for cutting. It should be cut into long strips about  $\frac{3}{4}$  in. wide for stockings and knitted materials, but slightly narrower for the heavier woven cloth. The longer the strips, the easier and quicker they will be to work with.

Try to keep the pieces in separate containers for each colour. If you don't do this you will lose time hunting for a particular shade amongst a pile of assorted coloured strips.

Keep the heavier skirting or coating material for working the border. This will give the rug a bit of weight and help to keep it in place on the floor. It can, of course, be made entirely with either woven or knitted cloth if this is all there is available.

The border can be anything from 3 ins. to 6 ins. wide, depending on the size of the rug. The border enhances the appearance of this type of rug, and acts as a frame for the rest of the pattern.

Once the pieces are cut you are ready to commence. It is usual to complete the border first before going on to filling in the remainder of the rug.

## Push and pull

With the left hand hold a strip of the material underneath the hessian. Push the rug needle through from the right side, hook round the material, and pull through the hessian to make a short loop. Repeat this operation, inserting the needle each time close to the finished loop until the strip has been used up. Continue in this manner with each length of material until the surface of the rug is completely covered with tightly

packed short loops. The evenness in the height of the loops is controlled by the left hand, which holds the unused portion of each strip. A slight pull on this will reduce the longer loops to uniform size.

## Hessian backing

The appearance of the wrong side of the rug should look like closely packed running stitches. There should be no looseness, and the stitches at the back should lie flush with the hessian.

When finished, the rug should be backed with hessian. This will give firmness as well as add to the life of the rug.

For your first rug don't be too ambitious either in design or size. Once you have made one you will be more competent to tackle larger and more elaborately designed rugs and you will be surprised to find how very attractive these can be. (V.L.)

## WROUGHT IRONWORK KITS

WITH the introduction of 'Brontecraft' do-it-yourself wrought ironwork kits, a wide range of useful and decorative items for the home is now available, and all that is required to assemble them is a screwdriver.

The latest additions to the 'Brontecraft' range — which includes plant pot holders, fire screens, chandeliers, wall and table lamps — are house name signs for the gate post or porch, retailing from 12/6, a book rack (15/5), and pairs of shelf brackets in various sizes and to fit any length of shelf (from 11/6).

A free illustrated price list giving details of the complete range of 'Brontecraft' kits can be obtained from the manufacturers: Parkerdale Ltd, Brontecraft Works, Oxenhope, Keighley, Yorkshire.

In response to requests

# 2-TRANSISTOR RECEIVER

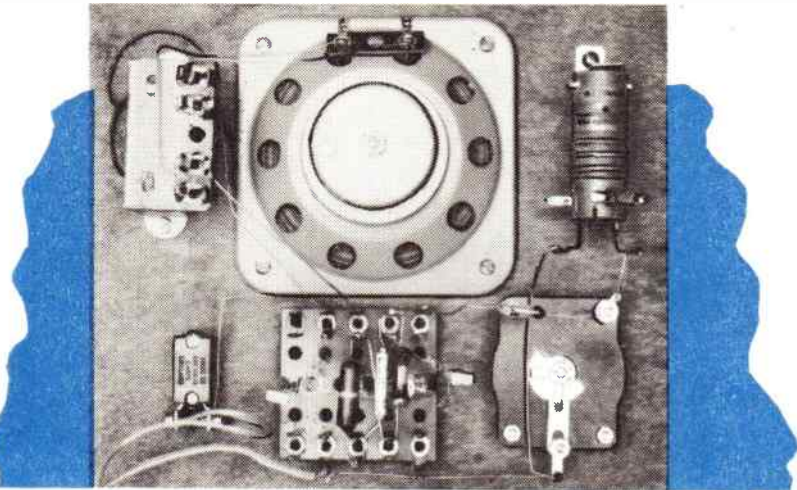
A SIMPLE and straightforward circuit using two transistors will give a fairly good degree of amplification. For loudspeaker use, three transistors are often employed, but two only will be sufficient for reasonably good loudspeaker results from local stations. It is always possible to add another transistor later, if needed.

By 'Radio Mech.'

The circuit is shown in Fig. 1, and it is worth while trying to gain a fairly accurate idea of the results which can be expected. Such simple circuits are not intended for long-distance reception, or for the reception of many stations. Against this is the small size, while the cost is quite low, and reception of local stations only is often sufficient for listening in bed, or other personal use.

## Parts wanted

As with all small receivers, reception depends upon local conditions, and the aerial and earth. With a reasonably good outdoor aerial and earth, volume is quite sufficient. Short aeriels, or an indoor aerial, will reduce volume, but it



The general layout

A ready-made medium wave tuning coil is used, but a home-wound coil for this band can consist of 85 turns of 32 S.W.G. enamelled wire, turns side by side, on a 1in. diameter insulated tube. It is also in order to use a dual-range coil, with wavechange switch, if long waves are also wanted. Winding details

electrolytic or paper. Any voltage rating between 6 V. and 350 V. is suitable. Condensers of high voltage rating are not, of course, wanted here, but can be used if available. Transistor coupling electrolytic condensers of  $2\mu\text{F}$  to  $8\mu\text{F}$ , 6 V. working, are very small. So are some bias condensers. The old type of block condenser, if used, can be mounted near the switch. Electrolytic condensers will have positive and negative markings. Negative must go to the 10K resistor, and positive to the 100K resistor.

The crystal diode used for detection is of the usual type as fitted in crystal sets, and any on/off switch will be satisfactory.

Two similar transistors will be satisfactory, and the popular 'Red Spot' type is not very expensive. A better quality type, such as the Brimar TS2, can be fitted instead, if the extra cost is to be allowed. The cheap type of transistor varies somewhat in performance, but is usually reasonably good.

The loudspeaker can be any small model of good make, with a transformer to suit. Very small speakers will not give quite so much volume as the larger units, and a 3in. or  $3\frac{1}{2}$ in. model is about the minimum which can be recommended. If a larger speaker is to hand (even an 8ins. or larger model) it can be used, if size is not important, and can be expected to give slightly better results. It is essential that the transformer be intended for use with the speaker, and it should have a ratio of around 20:1, for a  $\frac{2}{3}$  ohm speaker, or

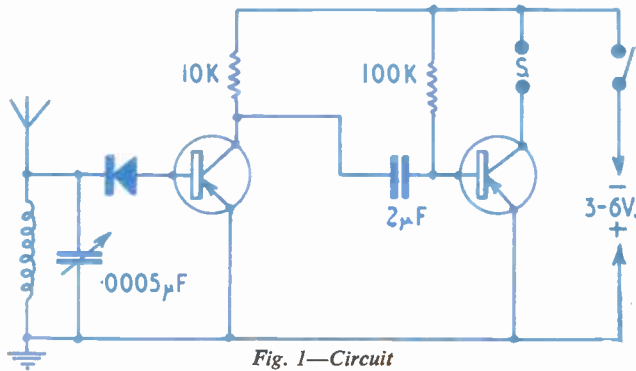


Fig. 1—Circuit

may still be sufficient, if the local station gives a good signal in the area where the set is used. Indoor aeriels are no use in metal-walled houses or caravans. In unfavourable conditions, remote from a local station, with a very short aerial, or with no earth, volume is not good enough for the loudspeaker, but may still be sufficient for headphones. In such circumstances, the circuit can give very good results when a crystal set would be useless.

for such coils have been given in past issues. For tuning, a  $0.0005\mu\text{F}$  variable condenser is necessary. An air-spaced condenser is slightly better than the solid-dielectric model, but the latter is much smaller.

One small carbon resistor is 10K, or 10,000 ohms (brown, black, orange). The other is 100K, which is 100,000 ohms (brown, black, yellow).

The coupling condenser can be anything from  $2\mu\text{F}$  to  $50\mu\text{F}$ , and may be

8:1 for a 15 ohm speaker. Reputable manufacturers provide suitable transformers for their speakers. Other transformers can work fairly well, but volume will begin to fall, if the ratio or impedance is badly in error.

### Panel construction

The receiver is built complete upon a flat panel, so that all parts are behind, as shown in the photograph. Three-ply is suitable, the panel being about 7½ ins. by 6½ ins. If small size is important, this can easily be reduced. Or dimensions may be changed to fit an existing cabinet.

The loudspeaker opening, shown in Fig. 2, should be cut to suit the diameter of the cone. After glasspapering and varnishing, a piece of speaker gauze or silk can be fixed behind the aperture. Two other holes are cut for condenser and switch.

Wiring is shown in Fig. 3, parts being spaced out slightly to make connections

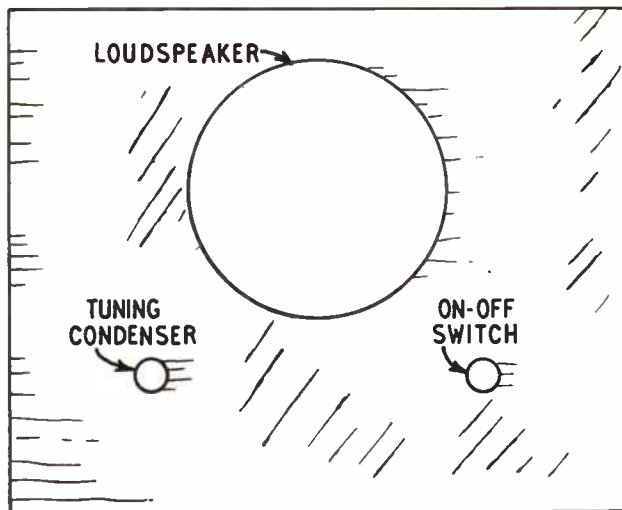


Fig. 2—Details of panel

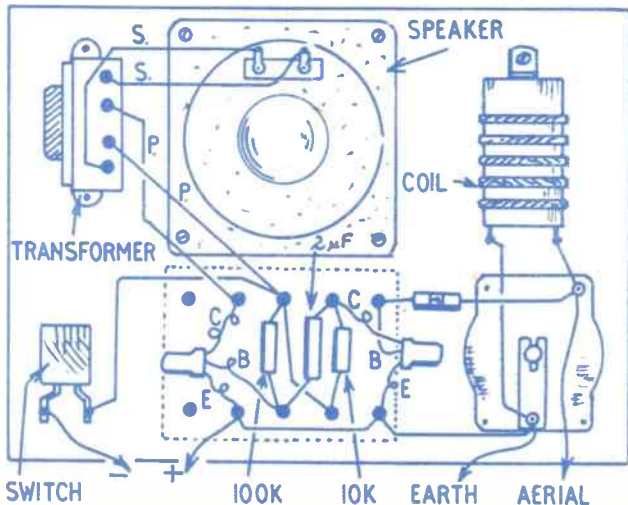


Fig. 3—Wiring plan

clear. Short wood screws are used to hold speaker, transformer, and other parts, washers being added if there is any chance of the points coming right through the panel.

Transistors and other small parts are mounted on a tag board. These may be purchased new, or obtained from ex-service equipment. Or a small square of Paxolin, with eight small bolts, will be equally satisfactory. (Two tags on a 10-tag board are unused in Fig. 3.)

The transistors have wire leads, which should be left full length. (C) indicates the Collector, (B) indicates the Base, and (E) indicates the Emitter. With Red Spot transistors, red shows the Collector, the Base and Emitter contacts coming as in Fig. 4. But with Brimar TJ1, TJ2 or TJ3 transistors, red indicates Emitter,

with Green for Base and Black for Collector. The TS1, TS2 and TS3 types have white to show the Collector, Base and Emitter leads coming as also shown in Fig. 4. For the present circuit, the TS2 type can be used, or the Red Spot, or many other kinds.

With a terminal board, the leads are looped, and held by the terminals or bolts. With a tag board, soldering is required. The iron should be really hot, and must be removed immediately the joint is made. If heat is allowed to travel up the wire into the transistor, it may be damaged. This also applies to the crystal diode. However, trouble from this is not likely if the leads are not cut short, or the iron kept in long contact with the joint.

The red end of the diode should be taken to the fixed plates of the tuning condenser. If the diode is not marked, or does not have Positive (red) or Negative (black) signs, then it should be wired in circuit each way round, in turn, to find which gives best results.

In Fig. 3 the transformer primary connections are marked (P) and the secondary, which is wired to the speech-coil tags of the speaker, is indicated by (S).

Short lengths of flex are necessary for battery connections, and positive and negative should be marked. The battery must never be connected up in the wrong polarity. With flash-lamp and torch batteries, the carbon rod, with cap, is positive, and the zinc case is negative. Each cell is 1½ V., so that a 2-cell battery is 3 V. and a 3-cell battery is 4½ V.

The earth lead can be taken directly to the moving plates tag of the tuning con-

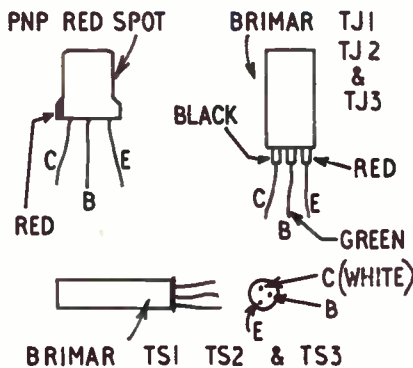


Fig. 4—Transistor connections

● Continued on page 9



Make this Toy

# PEDALLING CLOWN

THIS working toy will prove extremely popular with the youngsters. 'Pedro' pedals merrily along when he is pushed across the table or floor by his coat tails, the action of the legs looking particularly realistic. It is not too early to start thinking of Christmas presents and what could be better than a nicely painted 'Pedro' in the stocking?

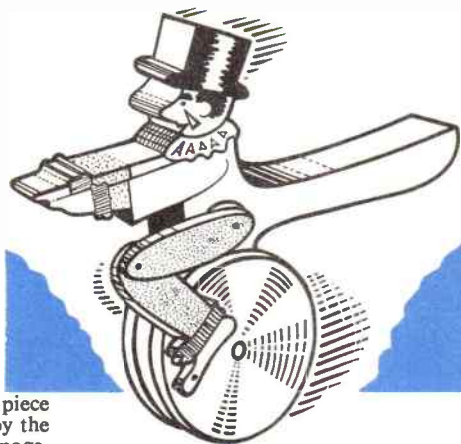
The parts are shown full size on pages 16 and 17, and the thicknesses are also

indicated. To avoid mutilating your *Hobbies Weekly*, lift the page, trace off the parts and transfer them to wood by means of carbon paper. Cut the axle holes in the wheels (C) and piece (A), first, then cut round the outlines. Use a fine sawblade for cutting and hold the saw upright, particularly with the wheels.

Commence assembly as shown in Fig. 1 by gluing the pieces (B) one on each side of piece (A) and

the washers (D), one on each piece (B) in the positions shown by the dotted lines on the pattern page. Paint the inside of the wheels and the projecting piece of (A) (where the spindle fits) and allow to dry. Now glue the spindle into one wheel, pass the spindle through the hole in (A), ensuring that it is loose enough to work smoothly and glue the other wheel in position.

Before assembling any further, all the parts, including the legs, pieces (E) and (F), must be cleaned up with fine grade glasspaper and painted. It is advisable to fill the grain first to get a good finish. Any brand of woodfiller will do. Use bright colours and be sparing with the paint. It is better to put on three thin coats than two thick ones. Rub down each coat, except of course the last, with silicon carbide paper used wet.



"pedro"

## FULL-SIZE PATTERNS ON PAGES 16-17

When all is dry the legs are assembled by pivoting one piece (E) to one piece (F) as indicated in Fig. 1. One pair goes on each side of the model and piece (F) will be on the outside in each case. Now pivot (F) to (D) and (E) to the wheel by means of  $\frac{3}{16}$  in. round-head screws. The feet should be positioned on the wheels so that when one knee is up, the other is down. It should now appear as in the picture of the finished toy and is ready for action. (M.h.)

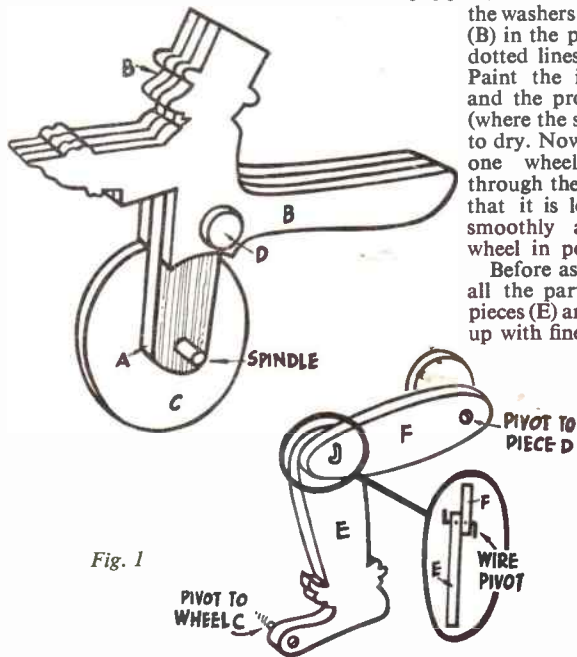


Fig. 1

Continued from page 8

## The 2-Transistor Receiver

denser. The fixed plates tag or terminal is used for the aerial connection, as in Fig. 3.

The earth lead may be connected to a descending water pipe, or to a metal spike or object buried in the earth. An unpainted tin, buried a foot or so deep in damp soil, will be satisfactory, but will eventually rust away. Copper or brass spikes are not subject to rusting.

With long aerials, tuning may be sharpened by taking the aerial to a tapping on the coil, or by adding a condenser in series with the aerial lead-in. The best value depends upon con-

ditions, and a pre-set of about  $0.003\mu\text{F}$  maximum capacity may be fitted, or fixed condensers of about  $0.001\mu\text{F}$  to  $0.003\mu\text{F}$  may be tried.

The performance of the circuit can be tested with headphones. If these are joined from diode to earth, normal crystal set volume should be available. Poor volume shows that a better aerial or earth may be necessary, if the diode is in good condition.

With the phones wired across the 10K resistor, much louder signals should be heard, due to the amplification of the first transistor. If not, suspect this tran-

sistor, or connections to it, or the battery. With the phones in parallel with the 100K resistor, similar results are obtained. If not, the coupling condenser ( $2\mu\text{F}$  in Fig. 3) is faulty. With the phone connections transferred to the transformer primary, the increase in volume due to the second transistor should be apparent.

A 3 V. or  $4\frac{1}{2}$  V. supply is suggested for the TS2 transistors. For the Red Spot transistors, 3 V. to 6 V. may be used. Increasing the battery voltage does not bring about much increase in volume.

If phones only are used, no transformer is necessary. Good reception will also be possible in conditions which are too unfavourable for loudspeaker results.

# MAKING UP YOUR JIGSAW PUZZLES

THE attractive picture given free with this issue of *Hobbies Weekly* is intended for use as a jigsaw puzzle. It is easy to make and the only tool required is a fretsaw.

The picture should first of all be stuck down to a suitable piece of plywood  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. thick. Paste can, of course, be used, but there is a tendency for the water in the paste to warp the wood. It would be better to use Fabrex, smoothed on both the wood and the back of the picture, allowed to dry, and then placed together.

To form an interlocking puzzle the lines should be cut as indicated in the full-size diagram below. The expert fretworker will, no doubt, be able to make the cuts without any guide at all, but those less experienced will be well advised to mark out the pattern first.

Trace the jigsaw shape, duplicating as

many times as necessary, and transfer to the picture by means of carbon paper. Use a sharp pencil, and mark through lightly, so that you can just see where to cut.

For the actual cutting use a hand-frame or machine with a fine saw inserted. Do not cut out individual pieces, but cut the picture into strips, down or across, and later cut these strips to make the separate pieces.

For presentation the puzzle should be put into a cardboard box, covered with decorative paper. Flat chocolate boxes or large cigarette boxes are ideal for converting. Simply cover them with coloured paper either patterned or plain, and decorate with coloured scraps cut from magazines.

It is quite simple to make a box if you have a couple of sheets of cardboard. The diagram in Fig. 1 shows how the

card should be cut and bent after scoring along the dotted lines. The lid should, of course, be slightly larger than the box. Cover with coloured paper and trim with decorative picture. (M.h.)

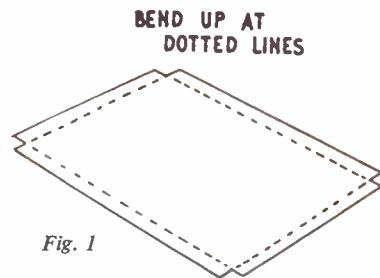
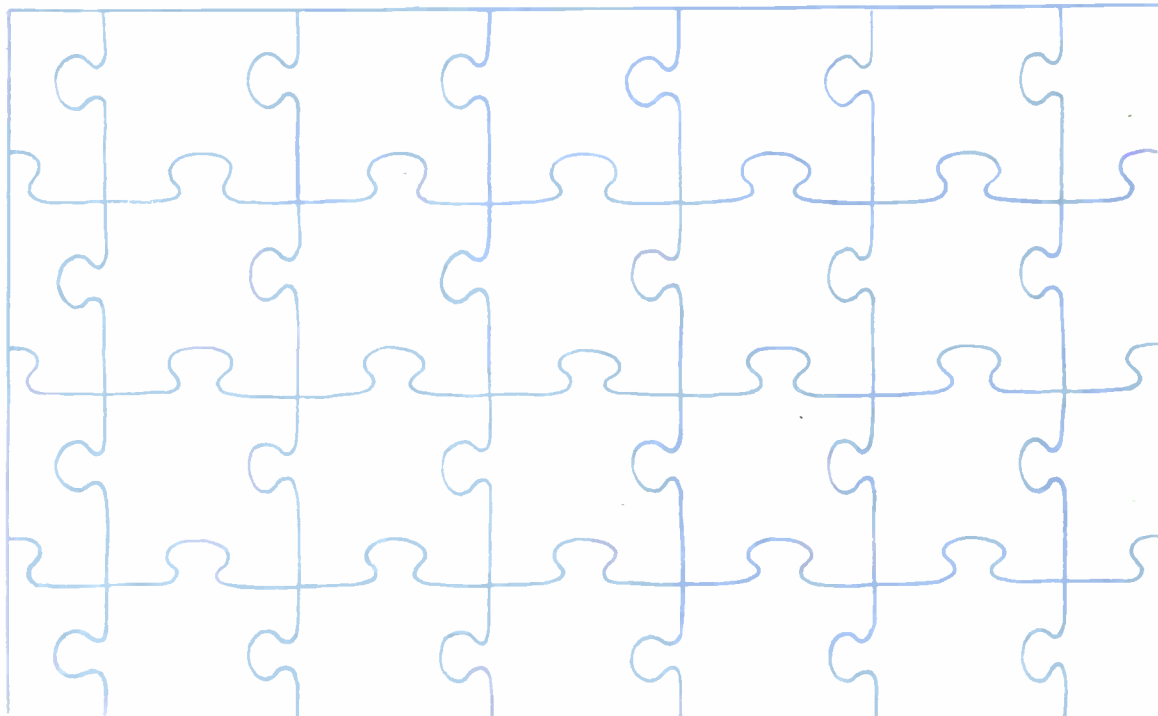


Fig. 1



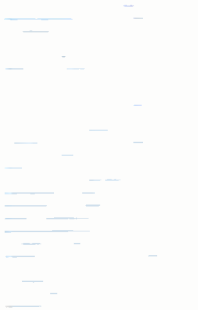
# TELEVISION PHOTOGRAPHS

IT is quite possible to take photographs of scenes on your television screen. Granted, there are some limitations, but providing you are alert and take full account of the following, you may expect reasonable success. Definition cannot, of course, be better than that given by the set, and we must also allow for the curvature of the tube. It is, of course, assumed that the set itself is in good working order, and the tube is not in the last stages of useful life.

Before dealing with the practical side of this type of photography we must explain that the pictures on our screens actually consist of two sets of scanning lines — odd and even — and these are electrically transmitted so that they interlace. In practice it takes exactly 1/50 second for each set of lines to scan the picture, and it will be realised, therefore, that with an accurate shutter operating at 1/50 second, we should only obtain an image of one set of lines. To receive the complete image with both

~~~~~  
*By S. H. Longbottom*  
~~~~~

sets of lines means that we must reduce our shutter speed by half, that is to 1/25 second — quite a normal speed. Any inaccuracy on either side of these speeds will effect the resultant image. Where the exposure is less than 1/25 second, part of the second set of lines may not be taken, while if it is more, some lines will be photographed twice.



*One of the BBC announcers, Richard Baker, taken at the end of the news*

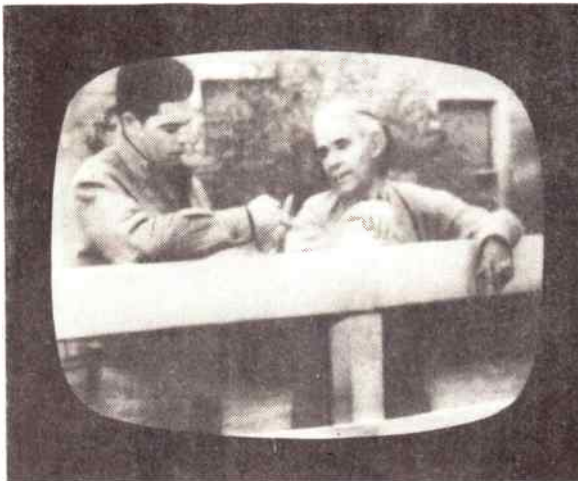
You should not worry unduly about this, however, for modern cameras are reasonably accurate. Older cameras may not be so precise, and you may often find that a speed of 1/50 second is nearer to 1/25 second.

After several test exposures had been made it was confirmed that 1/25 second is the fastest speed that can be used. Only half of one set of lines was recorded in a photograph taken at 1/100 second, and a 1/50 second exposure proved just too fast to catch both sets of lines. In all snaps taken at 1/25 second, both sets of lines were caught, and with this knowledge, other photographs become possible.

Most home television receivers have a limited brightness range of approximately 17:1, but you should not try to increase contrast in any way. You will find by experiment that the best type of picture is that containing a reasonable range of grey tones, or one which would be termed 'flat' in normal photography. This type is quite suitable for our purpose and control can be adjusted during processing. The limited brightness we have to deal with has to be compensated in some manner, first by using a fast film (and for your information an Ilford HP3 film was used for the pictures shown) and secondly, a wide aperture for the lens. You can use  $f8$ , but you will obtain even better results if you can increase the aperture to  $f6.3$ ,  $f5.6$ , or  $f4.5$ . In brief, wherever possible, you are recommended to use HP3 film, an aperture of  $f5.6$ , with a speed of 1/25 second for good results.

## Firm base essential

A few words about the actual taking may not be amiss here, and our first necessity is a firm base for the camera. If you have a tripod, so much the better, but you may use a stool or table, so that the camera can be held quite rigid during the exposure. A cable release is helpful if fitted, otherwise you must hold the camera firmly with one hand while pressing the trigger with the other. You will not be able to approach the set too closely, and here you will have to be guided by the knowledge of your camera. You may, however, make some experiments by fitting a portrait attach-



*A snap of Dale Robertson in a scene from the BBC Wells Fargo series*

ment which will permit nearer approach. Again, different screens vary in size, so it will be appreciated that it is difficult to give hard and fast rules. In the present illustrations a 17in. screen provided the pictures.

If your set has a protective screen of plate glass, you may also include some unwanted reflections unless precautions are taken. Draw the curtains to eliminate daylight, and turn out all lights. Only by taking such precautions can we be certain that no other objects in the room are illuminated and will reflect in the plate glass screen.

Stationary scenes, like the test cards, present no difficulty whatever, but when watching the screen and waiting for a still moment, it is surprising to note how many times a performer opens or closes

his eyes, or, perhaps, makes some tiny action with his hands. We have to wait until we reach that moment when the performer is quite stationary, and often you can pre-determine this by listening to the dialogue. For example, when taking the picture of the news reader, it was found better to wait until almost the end for that familiar sentence 'and that is the end of the news'. At this point it seems to be the practice for the announcers to look up quite cheerfully, remaining motionless until faded out.

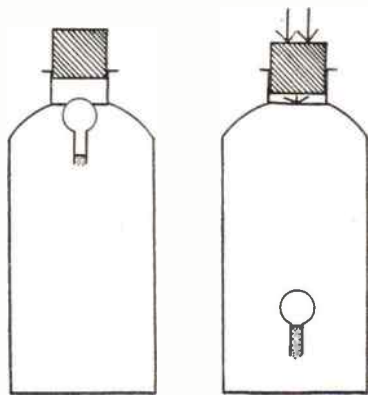
You will find that this is the best technique to adopt, for listening to the dialogue in a play is a guide to the closing words of a speech. Press the trigger without hesitation at the correct time to get many interesting shots of your favourites.

Before taking your camera out and setting it up before the set, you are advised to watch carefully and closely to a programme in the light of the foregoing advice, and you will find that there are many occasions when action does really stop, and long enough for you to take a photograph at a speed of 1/25 second. This applies mainly to scenes and the like. Again, as different television cameras are brought in we get close-ups on the screen, giving larger pictures.

It should be remembered that any pictures taken from the screen must be used for private amusement only and, whenever reproduction is proposed, it is advisable to seek the permission of the broadcasters.

(Note: Photographs are reproduced here by permission of the B.B.C.).

## A CARTESIAN DIVER



**T**HE French philosopher, René Descartes, first described this ingenious scientific toy over 300 years ago. Today the 'Cartesian Diver' or 'Bottle Imp' remains a popular source of amusement and instruction. A diver can be constructed quickly and without difficulty as follows.

Take a 4in. length of  $\frac{1}{4}$ in. diameter glass tubing and heat one end in a hot bunsen flame. Wait until the end has sealed over and a blob of molten glass has formed, then remove it from the flame and immediately blow hard through the other end until the blob has become a firm glass bulb  $\frac{1}{4}$ in. in diameter. Leave the glass a few moments to cool. Finally, use a sharp-edged file to make a nick in the tubing about  $\frac{1}{4}$ in. below the bulb, then break off the bulb, together with its short neck.

The completed diver can be tested by placing it in a bowl of water. If it sinks it is too heavy, and should be discarded and another one made with a slightly larger bulb. The diver should float, so that the bulb just breaks the surface.

Successfully tested, the diver is floated in a lemonade bottle almost filled with water. When a tightly fitting cork is pushed into the bottle, pressure is exerted upon the water surface. As water is virtually incompressible the pressure will be communicated downwards and upwards, causing some water to enter the neck of the diver and compress the

air inside the bulb. The increase of weight caused by the water entering its neck will cause the diver to sink.

The diver can be made to rise again, or hover half way up the bottle by gently releasing the pressure on the cork, and may be used to illustrate the principle of the submarine and airship, as well as the swim bladder of a fish. 'Cartesian Divers' on which faces have been painted in oil colours will fetch a ready sale at church or charity bazaars.

● Continued from page 13

## Making Chemicals

dryness in an evaporating basin over wire gauze. Continue the heating until the mass no longer gives off combined water in the form of steam. Let the whole cool somewhat and bottle it while still warm. If you let it grow cold it will absorb water from the air and deliquesce to a sticky mass, or even completely liquify. Keep it in a well closed bottle.

Alternatively, calcium chloride may be prepared by diluting 50 c.c. of strong hydrochloric acid with 50 c.c. of water and adding gradually 25 grams of precipitated chalk. Use a large beaker, owing to the evolution of carbon dioxide. Finally warm the solution, and if it clears, add a small further quantity of chalk, so as to produce a slight excess. Filter from the excess and evaporate to dryness as in the first method.

Wood charcoal is simplicity itself to make. All you need is a tin whose lid has been punched with a number of holes. Half fill the tin with wood, and put it in the domestic fire, so that it is about half immersed in the coals. Smoke soon appears from the holes and takes fire. When the flames go out, remove the tin and let it cool. On opening, you will find the wood has converted into charcoal.

Animal charcoal, so useful as a decolourising agent in the laboratory, is made in a similar way from bones. Grind, and sieve it when cold. If you intend to use it for decolourising acid solutions, it must first be treated with acid to remove acid soluble mineral matter.

Dilute 50 c.c. of commercial strong hydrochloric acid ('spirit of salt') with the same volume of water and pour it on to 20 grams of animal charcoal. Some effervescence occurs, but soon subsides. Let the whole stand overnight, and then warm it in a water-bath for an hour or so. Filter off the charcoal and wash it free of acid with water, that is, until the wash waters which come through no longer redden a slip of blue litmus paper. Dry the acid washed charcoal. You will only obtain about 2 grams of charcoal from the 20 grams of charred bone, but it is, besides being essential for decolourising acid solutions, a very powerful decolouriser for other solutions, and much superior to the untreated bone char. Consequently, only small amounts need be used.

It should be ground finely and sieved through a coffee strainer before bottling it for use.

# CHEMISTRY IN THE HOME

## MAKING YOUR OWN CHEMICALS Part 1

A GREAT deal of money can be saved in the home laboratory by making for oneself certain of the commoner chemicals. While it is true that some of them are so cheap or of such common occurrence, it is not worth one's while, and that some of them again are too troublesome to prepare, there are many instances where it is sound practice to ask oneself: 'Will it pay me better to make this than to buy it?'

Where the raw materials are considerably cheaper than the desired chemical, it will, obviously, be advantageous. A less obvious argument in favour is that where the raw materials cost as much or more than the desired chemical, one may have ample or even surplus stocks of the former. To bring these into use avoids cash outlay on the chemical aimed at.

Methods are given for the preparation of a selection of important chemicals. Apart from the interest of making them and the cash saving, a useful insight into general chemical reactions will be gained, and this cannot fail to be useful where you have surpluses, for the methods may suggest adaptations to suit your own special requirements. The quantities given will yield in most cases about an ounce of the chemical. For the preparation of larger amounts simple multiplication will show the quantities of reactants needed.

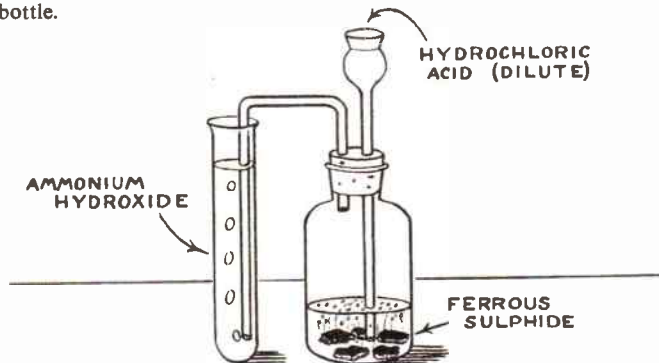
### Ammonium oxalate

Ammonium oxalate is a useful reagent for the detection of calcium and for the preparation of other insoluble oxalates by double decomposition. Dissolve 25 grams of oxalic acid in 100 c.c. of hot water. Add powdered ammonium hydrogen carbonate a little at a time until the solution no longer reddens blue litmus paper, but turns it purple. About 16 grams of ammonium hydrogen carbonate will be needed. Evaporate the resulting solution of ammonium oxalate to dryness on the waterbath.

### Ammonium sulphide solution

Another essential reagent is ammonium sulphide solution. Pour 30 c.c. of strong ammonium hydroxide into a tall narrow glass vessel, such as a large test tube, and pass into it hydrogen

sulphide (generated from ferrous sulphide and hydrochloric acid) until the ammonium hydroxide smells strongly of it. The diagram shows the apparatus rig. Add an equal volume of strong ammonium hydroxide solution. This gives a concentrated solution of colourless ammonium sulphide. If you want some of the yellow type, shake it with enough flowers of sulphur to produce a full yellow solution. Allow the surplus sulphur to settle and decant the solution into a bottle.



*Making ammonium sulphide solution*

Both types of ammonium sulphide should be kept in well closed bottles, and its preparation should be conducted in the open air, owing to the stench from the hydrogen sulphide.

### Bromine water

Bromine water is usually made by dissolving bromine in water, but as pure bromine is a dangerous chemical to handle owing to its corrosive nature and very irritating fumes, a safer and easier method not generally known is given. Dissolve 0.55 gram of potassium bromate in 40 c.c. of hot water. Allow the solution to cool and dissolve in it 1.98 grams of potassium bromide. Add 10 c.c. of 10 per cent sulphuric acid. Dilute sulphuric acid of this strength may be made by gradually adding 5.4 c.c. of the strong acid to 90 c.c. of cold water, and finally making up the volume to 100 c.c.

The acidified bromate-bromide solution turns yellow and later deep orange, owing to the formation of free bromine. The reaction is complete in an hour or two. The solution contains besides bromine a small amount — about

1 per cent — of potassium sulphate, but this is of no consequence in the common uses of bromine water. Keep the reagent in a glass stoppered bottle. Bromine water decomposes slowly in daylight. Hence the bottle should be covered with black paper or be stored in the dark.

### Calcium acetate

Calcium acetate is cheaply prepared from precipitated chalk (calcium carbonate) and diluted acetic acid. Dilute

24 c.c. of glacial acetic acid with 72 c.c. of water. Add gradually 20 grams of precipitated chalk. Use a large beaker, for carbon dioxide is evolved, accompanied by considerable foaming. Finally warm the solution to complete the reaction. If the solution is now clear, add a little more chalk until some remains undissolved. Filter the solution and evaporate it to dryness either on the water-bath or in the domestic oven.

### Calcium chloride

Calcium chloride can be recovered from the residue left in the generating bottle when you have prepared carbon dioxide from marble chips and hydrochloric acid. Decant the solution from the remaining marble and add a little lime water to remove any iron present as an impurity. If iron is present, a slight brown precipitate of ferric hydroxide will appear. Lime water should be added until a precipitate just ceases to form. If pure white marble has been used, the presence of iron is unlikely in more than unimportant traces.

Filter the solution and evaporate to

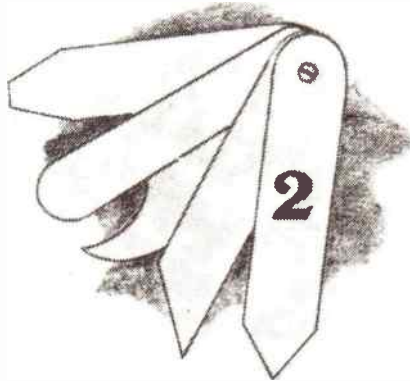
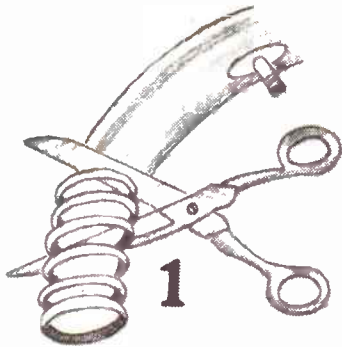
● Continued on page 12

# DON'T EVER THROW AWAY . . .

IT is silly, of course, to clutter up the workshop with all kinds of junk. All the same, many scrap ends of material can have a second and useful purpose. So, before you dispatch anything to the dustbin, think carefully. It may be useful later. For instance:

## 1. — Cycle inner tubes

A worthwhile stock of rubber rings can be made by cutting through the tube with scissors. They will be useful for holding bundles of small wood lengths, holding two pieces together when gluing, for holding seals on jam-jars, etc.



Also obtainable from an old inner tube are thin washers or long lengths for use as elastic bands.

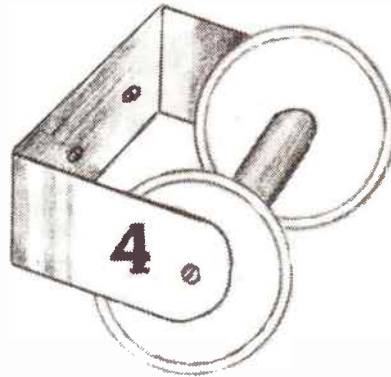
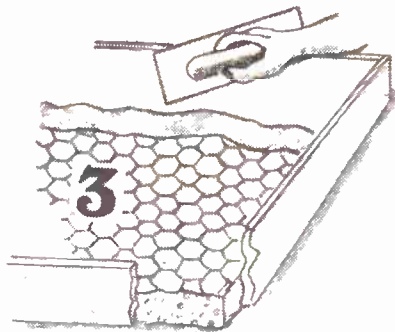
## 2. — Hacksaw blades

Snap your old blades in half by holding in a vice and giving a sharp blow with a hammer. Grind off the remains of the teeth and then shape different ends to the broken blade halves. Fasten them together as a pack with a nut and bolt through the end holes.

You will find the multi-ends very useful for scribing lines on metal, cleaning dirt from awkward corners, etc. A few shapes are shown in the drawing — you will think of many others.

## 3. — Wire netting

At some time or other you will want to attempt some concrete work such as building a step or a sill. Most amateurs do not realize how a little reinforcement of the work vastly improves its life and its quality. Use that scrap end of chicken wire as a reinforcement between a



bottom and top layering of the concrete as shown.

If the wire netting is of close mesh don't forget that by bending it into a semi-circle it can make pea-guards and other plant protection units for your garden.

## 4. — String

There is no need to elaborate on the uses of string in the workshop. A simple method of neatly storing the string is to make up the holder as shown. A scrap length of metal is shaped to a square 'U' form as the bracket. Through the two free ends, drill a hole and between them suspend a roller made from two paint tin lids nailed on to the ends of a short piece of broom handle.

To use the unit, drill two other holes in the bracket back piece and fix to a convenient wall. Wind on the first length of string and join by knotting, subsequent lengths of string as they become available.

If you prefer to keep separate lengths of string available, suspend an old coat-hanger under a shelf and drape the string lengths over the horizontal rail.

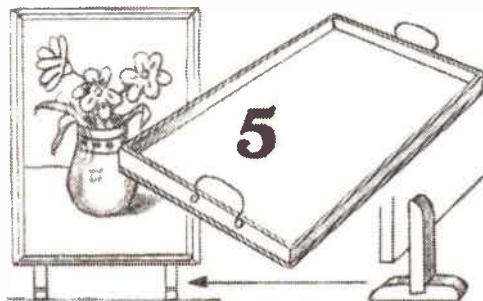
## 5. — Picture frames

If the glass in an old picture frame you are going to scrap is unbroken, remove it carefully and store it in a safe place. Remove the cardboard or thin wood backing from the picture (it is probably unusable), and in its place screw on a new backing of 3 ply-wood or ½ in. hardboard.

Affix two easily-bought handles and you have a first-class tray that can be painted or stained and varnished as you prefer.

Also easily made from old picture frames, are firescreens. In this case the actual picture can be retained or a more modern print affixed.

● Continued on page 15



Fix new and stronger backing as for a tray and make two legs from 1in. square battening, joined and fixed as shown in the drawing.

An old frame, with its back and glass completely removed and the legs, instead of being fixed inset as shown, fixed to the outside edges of the frame, makes an ideal frame for an embroidered unit.

#### 6. — Polythene bags

Inverted and held down with cut-off forked twigs, polythene bags make ideal individual cloches for the keen gardener. Besides their heat-retaining properties

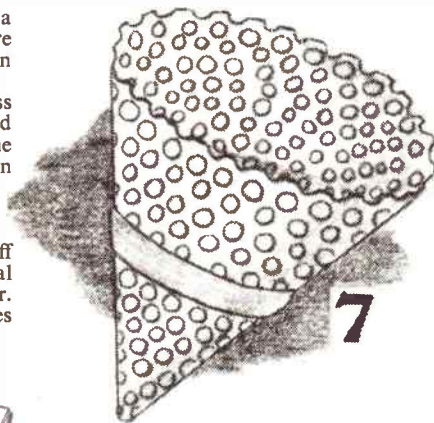


for young plants they keep away destructive slugs, etc.

If you have any short lengths of scrap wire hanging around the workshop, bend into 'V' shape and use upside down as support stays inside the bags if you desire to use a large bag.

#### 7. — Perforated zinc

Those lengths of perforated zinc that remain after you have made, say, a meat safe, make ideal paint strainers if they are formed into a cone shape as shown in the drawing. The cone is held in place with an elastic band (or a length cut from an old inner tube!).



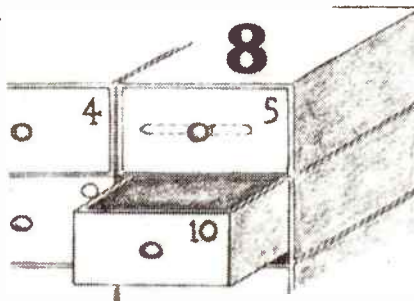
Do remember to thoroughly rinse the strainer in turps after every use and the strainer will give you years of good service.

Another good use for perforated zinc. Cut out a circle that just fits into the tin from which you are using paint on a job. The following morning, before you start to re-use the paint, place the cut circle on the surface of the paint. It will take all the annoying 'skin' out of harm's way to the bottom of the tin.

#### 8. — Matchboxes

Glued together in a stack, matchboxes make an ideal miniature chest of drawers to house small parts. The pull-out handles are simple paper fasteners, pushed through the front and folded back inside.

The drawers can be numbered and their contents listed on a near-at-hand chart for easy reference.



## How to scribe around mouldings

WHEN fitting timber against a moulded surface it is necessary to remove from the end of the timber a shape exactly the opposite to that of the moulding. This is known as scribing and the three most common methods are as follows.

The first method is by the use of compasses. Place the timber to be scribed against the moulding at the correct height, open the compasses to a convenient width and then proceed to

trace the outline of the moulded surface as shown in Fig. 1. This job should not be hurried and it is essential that the compasses are held level all the time. Once the moulded outline has been traced on the timber, remove the waste with a coping saw and a good fit should result.

The second method is the mitred method and is used when one piece of moulding is scribed to a piece of similar moulding. The end of the piece to be scribed should be mitred. This is best done with the use of a mitre block. After this, use your coping saw and cut out the outline formed at the shorter edge of the splay cut as shown in Fig. 2. This will produce an accurate shape to fit against the moulding.

The third method is by the use of a pack of playing cards but it is not as accurate as the former two methods. Place the ends of the cards against the moulded surface making sure that all the cards are touching the moulding as shown in Fig. 3. This will cause the cards to assume the moulded shape which can afterwards be transferred on to the timber to be scribed. It is obvious, however, that when the moulded surface is rather large the transfer of the desired shape must be done in stages unless, of course, two or more packs of cards are used. (F.K.)

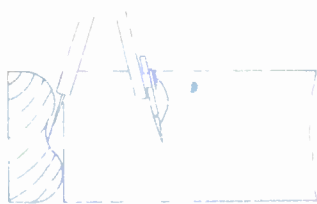


Fig. 1

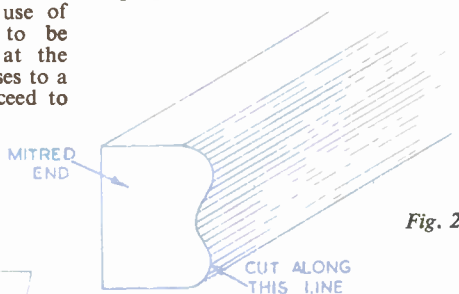


Fig. 2



Fig. 3

PIECES E CUT ONE OF EACH 1/8 IN.  
PIECES D CUT ONE OF EACH 1/8 IN.



PIECES B CUT TWO 1/4

PIECE A CUT ONE 1/4 IN.

FACE & DRESS MARKED ON  
PIECES B ONLY



THE PEET

pedro



# ALLING CLOWN

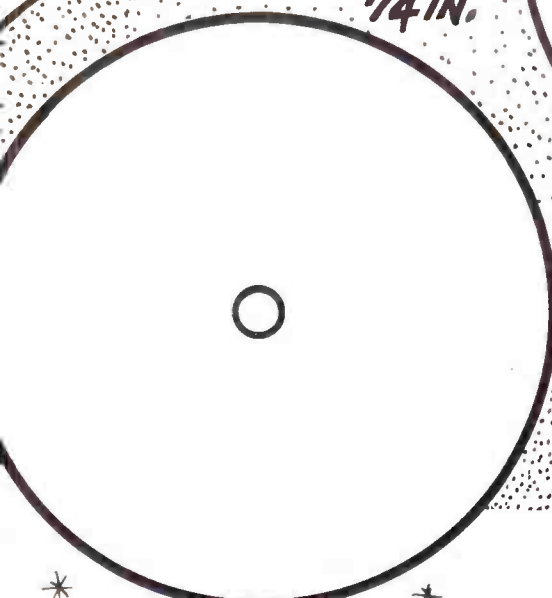
This Novelty  
Makes an ideal  
Present

Full Size  
Patterns



INSTRUCTIONS  
FOR MAKING ON  
PAGE 9

WHEELS C  
CUT ONE OF EACH  
1/4 IN.



SPINDLE CUT ONE FROM  
1/4 ROUND ROD

# HOW TO DISPLAY MOTHS

EVERY moth breeder likes to have some of the adult moths on show to remind him of the pleasure he has had breeding them. The best way to display them is in a glass-topped case. The bottom should be lined with cork, to hold the pins on which the moths are set, and then covered with a sheet of white paper.

First you must kill your moth. This has to be done as soon as the wings have

left down the centre. On the bottom of this groove glue some strips of cork from an old table mat. It is a good plan to paste a lined paper on to your board to act as a guide when levelling up the wings when setting.

Special Entomological pins are used for pinning moths, and a  $\frac{1}{4}$  oz. of these should be obtained from a dealer.

Moths are pinned through the centre of the thorax between the wings. Take

taking out the pins and lifting up the tracing paper strips carefully. The moths are then lifted off by their pins and transferred to their showcase.

By B. Gardiner

Unless it is desired to study the variation in the pattern of the wing-markings, which can be very considerable in some species, it is quite sufficient just to set a male and female of each species that you have bred. A neat label should be attached to each specimen on the pin, giving the date of breeding. Below each, a small label should give the name of the species and also the country of origin. You will find that it will not take so long to get a world-wide representative collection of Silkmoths and the really ambitious will soon fill up several showcases.



Fig. 1—Section through setting board

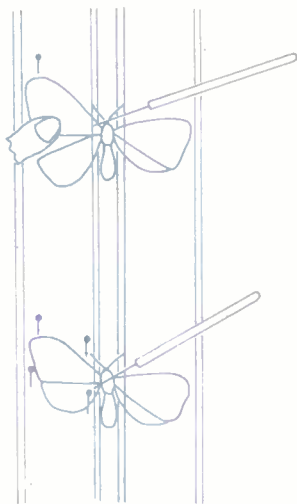


Fig. 2—How to set

hardened after emergence from the cocoon, for a moth will soon damage itself once it begins to fly.

## Use Ethyl Acetate

Obtain a large tin or jar, and put a pad of cotton wool on the bottom. On to this put a teaspoonful of Ethyl Acetate (obtainable from most chemists), and then another layer of wool. The moth is put in the tin and the lid tightly closed. It is stupefied within a few seconds, but should then be left for a few hours to ensure it is quite dead. Your moth may then be set, for which a setting board is needed. Large setting boards are expensive but can easily be made as follows.

Cut a piece of ply 14ins. by 5ins. On to this glue two pieces of  $\frac{1}{2}$ in. thick soft deal 14ins. by 2 $\frac{1}{2}$ ins., so that a  $\frac{1}{2}$ in. gap is

care to get the pin vertical in relation to the body. A pair of forceps is very useful for handling your pinned moths, and if these are not available, you should use as long a pin as possible, so that the head sticks up a good way from the body.

The moth should now be pinned on to the setting board and pushed down the pin, so that the body is in the groove and the wings level with the sides.

Two strips of tracing paper should be fastened to the top of the board with pins. The best pins to use are glass-topped ones, as these are not so hard on the fingers.

## Setting procedure

A setting needle is now required. This is just a suitably mounted sewing needle in a wooden handle.

The method of setting is best seen from Fig. 2. First draw up the forewing on one side with the needle as shown. The wing is held lightly through the tracing paper and a pin inserted near the tip. The hindwing is now drawn up so that its forward edge is underneath the forewing. The wings are then secured in position by placing further pins. Although only four such pins are shown in the diagram, it may be found that large moths require more to hold the wings. The operation is now repeated on the other side.

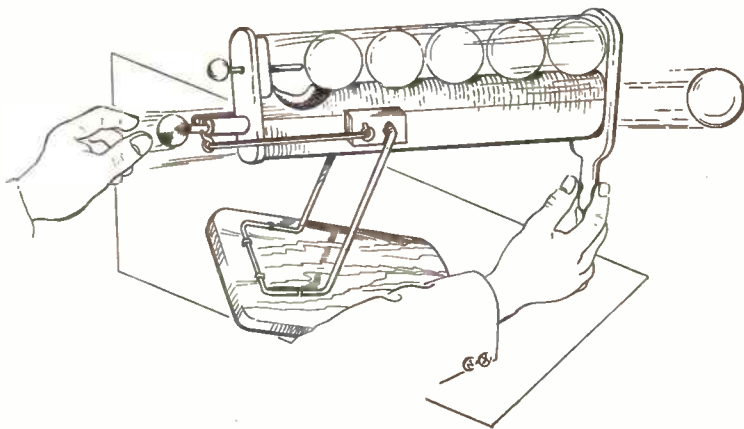
When pulling up the wings make sure that the hind margin of the forewings is at right angles to the body, as this gives a neat finished appearance to your moth. It is here that the advantage of having lined paper covering the setting boards comes in.

The set moths should be stored in a warm and dry place with some ventilation. After about a month they will have dried out, and may then be removed from the boards. This is done simply by

## SOME GIFT!



'Is this your idea of a coffee table as a birthday present?'



## 'SATELLITE' GUN

**A**N interesting toy which can be made from oddments of, wood dowel rod, wire, cardboard tube and transparent material, etc., is this 'Space Gun', utilising table tennis balls as missiles, which the marksman is required to shoot from the cardboard tube ejector barrel.

Clean up all wood components with glasspaper, smooth sharp edges to metal parts and paint or cover the cardboard tube before assembling the toy. It would be as well to paint all units, excepting the stand and transparent chamber, before assembly. Fig. 1 clearly shows

each component in the respective order of assembly.

The 'gun' will hold up to six table tennis balls in the transparent missile chamber. These could be provided with the ball ejector, or purchased separately.

The power for shooting the ball missiles consists of two rubber bands of suitable diameter and width, which can easily be replaced by the operator when necessary, so that a breakdown need be only a temporary affair.

The twin bands, of course, are attached between wire holder (O) and screw-eye (X).

### LIST OF PARTS

(See Fig. 1)

- A. Base:  $\frac{1}{2}$ in. ply. 6ins. by 4ins. Front end rounded.  
 B. Stand: stout wire, 18in. length, bent to shape. Height of uprights 5 $\frac{1}{2}$ ins.  
 C. Barrel: cardboard postal tube, 9ins. long by 1 $\frac{1}{2}$ ins. inside diameter. Hole cut  $\frac{1}{2}$ in. from one end of tube to accept table tennis balls.  
 D. Ball storage chamber: stout transparent material (celluloid or perspex), 9ins. by 7ins. Edges along length cemented to card tube (C) and formers (H) and (E).  
 E and F. Disc formers:  $\frac{1}{2}$ in. wood, 1 $\frac{1}{2}$ ins. diameter. Centre hole in (E) for wire rod (P). Centre drilled through (F) for plunger rod (L).  
 G. Breech stabiliser:  $\frac{1}{2}$ in. ply. 3 $\frac{1}{2}$ ins. by 2 $\frac{1}{2}$ ins. Rounded top and bottom, holes drilled to accept wire rod (P) and breech tube (K).  
 H. Muzzle end piece:  $\frac{1}{2}$ in. ply. 4 $\frac{1}{2}$ ins. by 2 $\frac{1}{2}$ ins., with 3 $\frac{1}{2}$ ins. by 1 $\frac{1}{2}$ ins. cut-out to fit over muzzle ends of barrel and ball chamber.  
 J. Elevation/aiming handle: dowel-rod, 1 $\frac{1}{2}$ ins. by  $\frac{1}{2}$ in. diameter. End slotted to join on to piece (H).  
 K. 'Breech' tube: wood or metal hollow tube. Approximately 1in. long, with centre hole slightly more than diameter of plunger rod.  
 L. Plunger rod:  $\frac{1}{2}$ in. dowel rod. Approximately 3 $\frac{1}{2}$ in. length.  
 M. Trigger knob: turned wooden ball or knob, with centre hole for tight fit on to plunger.  
 N. Stand/rubber band screw-eye block: cut two from  $\frac{1}{2}$ in. hardwood, 1 $\frac{1}{2}$ ins. by  $\frac{1}{2}$ in. Matching holes for both stand supports and screw-eyes. Mount in alignment, 2ins. from tube end.  
 O. Rubber band holder to plunger rod: 2 $\frac{1}{2}$ in. length copper wire slotted through rod (L). Ends bent to form holder for twin rubber bands.  
 P. Missile spacer rod: handle: approximately 2 $\frac{1}{2}$ ins. long by  $\frac{1}{2}$ in. wire rod fitted with small wood ball or other handle. A blob of solder to end prevents complete withdrawal of rod from (E) and (G).  
 The measurements of (H) and (G) and the diameter of (F) will have to be altered somewhat for correct fitment, if other than the size of cardboard tube indicated for barrel is used. Other measurements remain the same, or altered to suit the materials available.

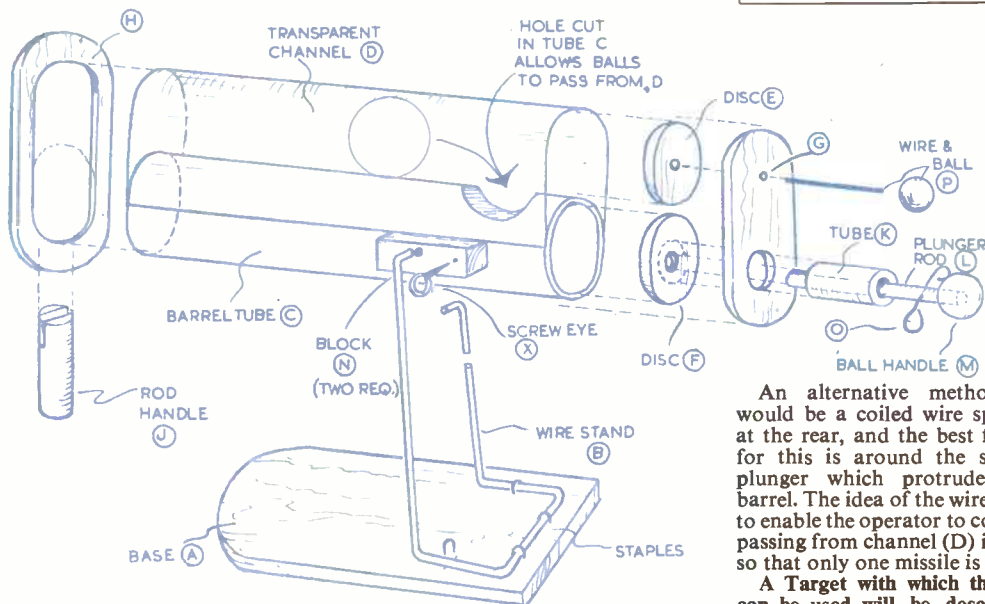


Fig. 1

An alternative method of power would be a coiled wire spring installed at the rear, and the best fixing position for this is around the section of the plunger which protrudes within the barrel. The idea of the wire and ball (P) is to enable the operator to control the balls passing from channel (D) into the barrel, so that only one missile is fired at a time.

A Target with which this 'space gun' can be used will be described in next week's issue by T. S. Richmond, Jnr.

Make this versatile instrument

# A SIMPLE D.C. MULTIMETER

TO the home constructor a multimeter is a great asset. Most hobbyists possess a meter of some kind, but if it is required to measure the voltage at various points over a radio chassis, audio amplifier or intercom set, a voltmeter reading to (say) 20 volts is useless except for some minor purposes. The following multimeter, whilst being cheap and easy to build, is a versatile instrument, and can be used to measure most of the voltages encountered in the instruments listed above.

Some simple theory on the working of a voltmeter will not be out of place here. Let us suppose that the constructor has available a moving coil meter having a resistance of 50 ohms and a full scale deflection (FSD) current of 1 milliamp. Suppose, too, that it is required to convert this instrument to a voltmeter read-

Since the meter has only a resistance of 50 ohms, it is clear that a further resistance of 99,950 ohms must be placed in series with the meter. In actual practice the resistance of the meter is usually negligible compared with the series resistance, except on the lower ranges. In this particular case, a 100 K ohm carbon resistance would be sufficiently accurate.

The circuit of this simple voltmeter is given in Fig. 1.

Suppose now that it is required to convert the meter to a voltmeter reading to 2 volts. By Ohm's Law, the required series resistance is given by:

$$R = \frac{2 \times 1,000}{I} = 2,000 \text{ ohms.}$$

Notice that for this range the resistance of the meter is no longer negligible compared with that of the series resistance. For accurate reading on this scale a resistance of 2,000 - 50, i.e., 1,950 ohms must be used. This resistance is best made by joining in series a 1,800 ohm resistance and a 150 ohm resistance. These last two values are

available commercially, whereas a 1,950 ohm resistance is not, at least, not cheaply.

It should now be clear that to construct our multimeter, we must arrange for various pre-calculated resistances to be switched in series with the meter according to the range we wish to use.

The circuit shown in Fig. 2 makes use of a moving coil meter having a resistance of 50 ohms and a FSD current of 1 mA, but there is nothing to prevent the constructor from using a different moving coil instrument, provided the FSD current is not above 5 mA, and provided the series resistances are calculated as outlined above. Generally, the smaller the FSD current of the meter, the more accurate will it be when measuring voltages across resistive loads. The voltage across the anode load of a valve cannot accurately be measured by a meter requiring a FSD current of more than 1 mA, since the current taken by the meter causes a considerable voltage drop.

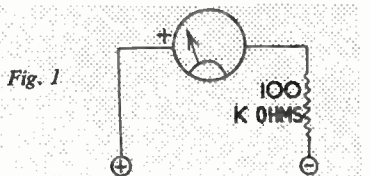


Fig. 1

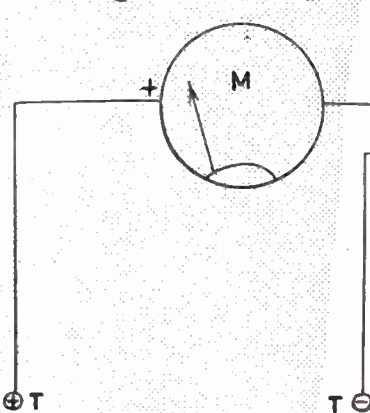


Fig. 2

ing to 100 volts. Then we know that when a voltage of 100 volts is applied to the instrument a current of 1mA must be produced to give full scale deflection. Therefore, by Ohm's Law, the resistance of the instrument is given by:

$$R = \frac{V \ 1,000}{I} \text{ where } V \text{ is the applied voltage, } I \text{ the current in milliamperes, and } R \text{ the resistance in ohms.}$$

$$\text{Therefore } R = \frac{100,000}{I} = 100,000 \text{ ohms (100 K ohms)}$$

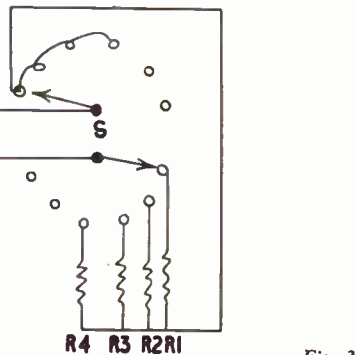
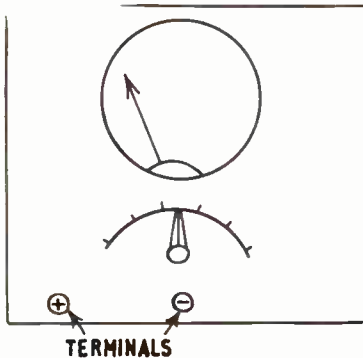


Fig. 3



## COMPONENTS REQUIRED

- M — Moving coil meter. FSD 1 mA. Resistance 50 ohms.
- T — Insulated terminals: one red (positive) and one black (negative).
- S — Two pole, six-way wafer switch.
- R<sub>1</sub> — 1,800—150 ohms. ½ watt carbon resistances (in series). 2 volt range.
- R<sub>2</sub> — 25 K ohm carbon resistance. ½ watt. 25 volt range.
- R<sub>3</sub> — 100 K ohm carbon resistance. ½ watt. 100 volt range.
- R<sub>4</sub> — 500 K ohm carbon resistance. ½ watt. 500 volt range.

The two pole, six-way switch is used in order to facilitate the addition of current ranges later on.

The components should be mounted on a bakelite, perspex, or wooden board about 6ins. by 6ins., as shown in Fig. 3, and the board mounted on a box 6ins. by 6ins. by 2½ins. deep. Connections to the terminals should be made by means of spade connectors carrying leads about 2ft. in length. One, the negative, carrying a crocodile clip at the end, and the other a piece of thick wire 4ins. long, covered with sleeving, so that only an ¼in. is exposed.

A pointer knob is required for the switch spindle, and the first four positions of the switch are marked 2, 25, 100, and 500 volts respectively. The last two positions are left unmarked at this stage. (D.A.C.)

A further article will describe how to add an ohms range to the simple D.C. multimeter.



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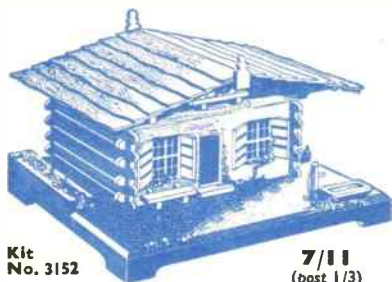


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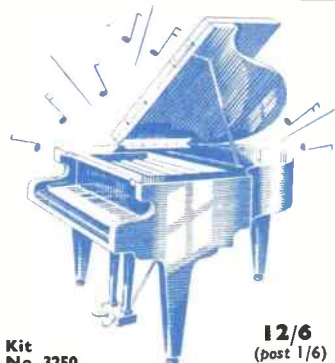
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# 'Goofy' Zoo from 'Conkers'

THERE are more ways of having fun with 'conkers' than the usual knock-out contest. For instance, you can make a 'goofy' zoo, by constructing a series of animals of chestnuts threaded on wire. The drawing shows a giraffe — you will probably think of others. Incidentally these weird animals are just the thing for the modern contemporary room. Made carefully, they can be quite acceptable gifts to anyone modern-minded.

Use  $\frac{1}{16}$  in. diameter black iron bar if possible although any metal, except spring steel of this diameter, will bend easily to the required shape.

Take a long length for the body and neck piece and to join the front leg pieces as shown, by twisting the wire around double. Squeeze the bend together tightly to avoid a large space that will leave a gap between the 'conkers' when finished. Leave out the rear leg pieces for the time being.

## Threading the nuts

Thread the nuts on to the partial framing, this way: (1) From the join of the leg pieces to the body, up the neck and to the head, (2) thread the two front legs, (3) thread the body.

Now, fix the rear leg pieces, as you did the front legs. Finally, thread the nuts on the rear legs.

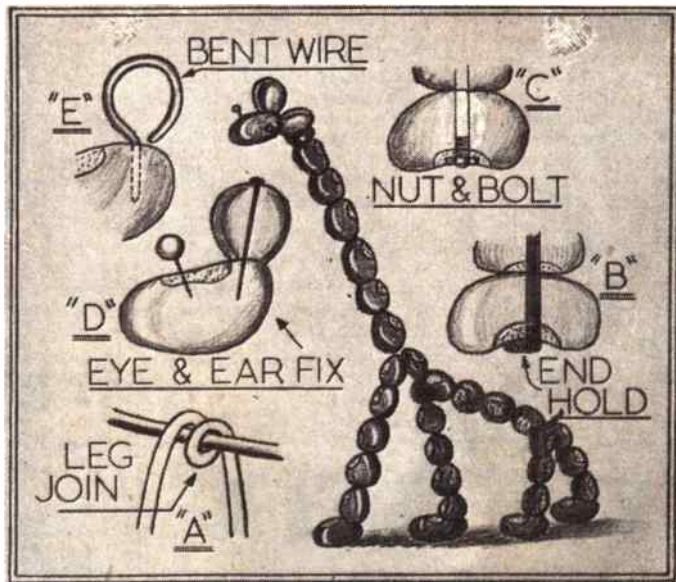
Make all the wire lengths longer than is necessary by at least  $\frac{1}{16}$  in. The excess after the rear legs are affixed is cut off so that about 1 in. remains, which is bent in an upward circle and left as such, as a tail.

Two methods can be employed to prevent the chestnuts from slipping from the framework. The last (or feet) nuts are retained by the ends of the wire being cut off and bent back at right angles, approximately  $\frac{1}{16}$  in. in length (see 'B'). Incidentally, for the feet, do choose four elongated conkers.

A better hold is shown at 'C'. If you possess a  $\frac{1}{16}$  in. die, thread all the ends of the wire. The whole structure can then be kept taut by tightening up a thin nut affixed to the threaded ends.

Another advantage of method 'C' is that the 'conkers' can be used just as soon as they are gathered. As the nuts shrink when they dry out, the tautness of the structure can be retained by tightening further the nuts and snipping off the excess of the threaded wire that protrudes.

It follows, therefore, that if you are forced to use method 'B', the drier the conkers are before being used, the better. Store them in a warm, dry place (not the oven) for at least 14 days before using; otherwise in time your animal will



present a very straggly and droopy picture.

As mentioned before, gaps may occur where the legs pieces are fixed to the body piece of framing. These can be covered however, by careful selection of the nuts. You will find that many have a hollowed-out shape, and by placing two hollowed-out conkers together, one each side of the looped wire, the gap is completely hidden.

Select two small, flat chestnuts for the

ears of your animals. They are affixed to the head with a pin, as shown in 'D'. The eyes can be made from map pins or something similar. Or, if you wish, you can paint on eyes and a mouth. The current fashion is to have a grinning 'Cheshire Cat' face to your animals!

An alternative ear, and which you may feel more contemporary is made by bending a length of wire as shown at 'E', pointing the free end with a file and pushing it into the 'conker' head. (E.C.)

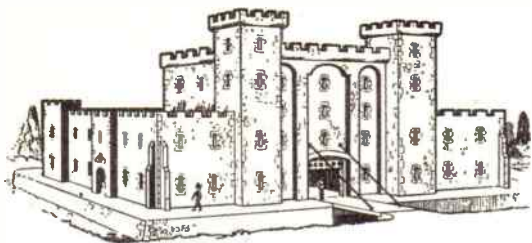
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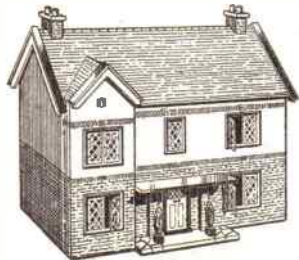


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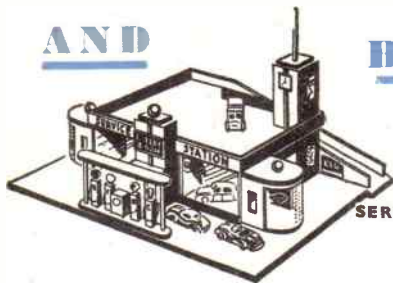
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## POSTERS AND SEALS—by R.L.C.

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mood that suits you most. He listens and agrees with everything you say. Dogs aren't critical, they just love you.

The fire comes next, because it holds dreams and lots of have-beens. Both dreams of the 'to be' and 'long ago' are precious company, and, if we're young, we choose the former for chums — and, if we're old, the latter.

We walk down long aisles of glamour and climb steep hills of hope and happiness. They are easy steps in fire-land. The people we meet have many homely faults. But because of this, we ramble the more contentedly along the glowing paths within the embers.

And oh, the companionship in a bunch of flowers! A little marigold peering from a clump of lady-grass. A pale-hued aster or fluffy chrysanthemum longing for a chat. A vase of pansies. Lonely — with all these smiling faces — absurd, isn't it?





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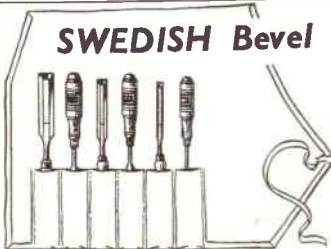
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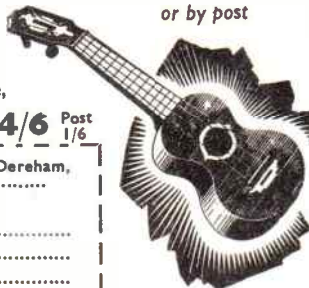
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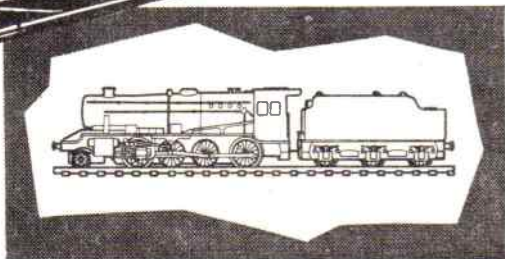
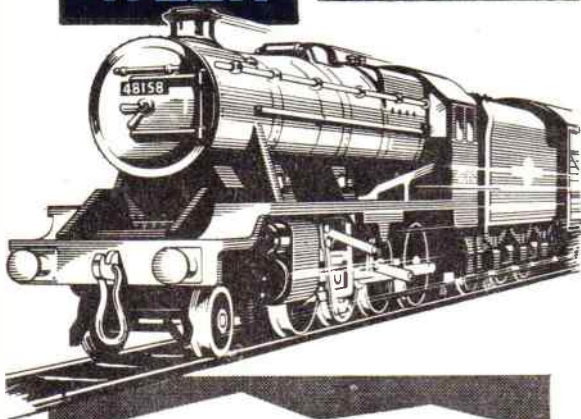
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# MAINLY *for* MODELLERS

## MODEL OF A MODEL—2

By 'Whipstaff'

FIGS. 1 and 2 show the shape of the forecastle and poop deck, cut from  $\frac{1}{8}$  in. and sanded down to  $\frac{3}{64}$  in. thick, and Fig. 3 shows the deck plan. Having carved our hull to shape we must add our deck equipment. No. 1 is the forecastle hatchway cut  $\frac{1}{4}$  in. square from  $\frac{1}{8}$  in. wood, No. 4 shows the two hatchways covered with a grating. These can be cut from  $\frac{1}{32}$  in. wood,  $\frac{1}{4}$  in. square and to the upper side of each a square of small mesh gauze is glued to represent the gratings.

No. 2 is actually the roof of the grand cabin. This is represented by a piece of  $\frac{1}{8}$  in. wood cut  $1\frac{1}{2}$  ins. by  $\frac{1}{2}$  in., and glued in place. Upon the top of this we glue the strips No. 5, three each side of the long boat, to represent the spare spars carried here. The boat is carved from a small piece of wood and glued in place on the assembled unit.

We now come to the most difficult part, attempting to give an effect of the very delicate carving that is such a feature of these models.

Along the forecastle edge and the poop deck edge we want a set of rails which are elaborately carved, and if you have some very fine cream or white lace, this will do nicely. First stretch it taut and then spray with clear cellulose. When dry, a razor blade can be used to cut strips  $\frac{1}{8}$  in. wide. Cut this to fit the curve of your forecastle and poop decks at (A) to (B) (Fig. 2), and glue in position on edge to represent the intricate carved rails. If it is impossible to obtain any fine lace, the bulkhead rails can be painted on bristol board with Gesso. As many of the French rails were solid planking richly overlaid with carving, this will be quite effective.

Cut next the quarter gallery pieces (as in Fig. 4) in  $\frac{1}{8}$  in. wood. It will now be more convenient to decorate around the windows before attaching to the hull. This and all decoration on the hull is better carried out with Gesso paste, obtainable from any handicraft or artists' suppliers.

Use a very fine brush. I find a spotting brush as used for photographic retouching is ideal. It is very fine and the bristles have a certain stiffness which is of assistance when using Gesso.

In Fig. 5 we have an enlarged view of typical French carved design. This can be followed as closely as possible in all places around the stern windows, gallery windows and all along the bulwark pieces. If you cannot get the actual design, a roughened effect with the Gesso paste will give quite a good imitation of carving.

Our next job consists of the two pieces for the bow, shown at Fig. 6. These are cut from thin card; a visiting card is excellent for our purpose. The design is again painted on with Gesso paste, and the pieces are then glued in position.

We must prepare our hull and the decks for painting, and it is essential that we get a very fine smooth surface if we wish them to be as near to bone or ivory in appearance as possible.

From a chemist's supply stores obtain some dental pumice powder. It is quite cheap and is the finest abrasive for ship modelling that I have found.

Make a rubber from a piece of clean linen, and as with French polishing, the pumice powder is placed inside the linen and screwed up to form a ball. Dip this frequently, when working, into a saucer of water, and rub gently with a circular motion until you find the surface of your hull is smooth and polished.

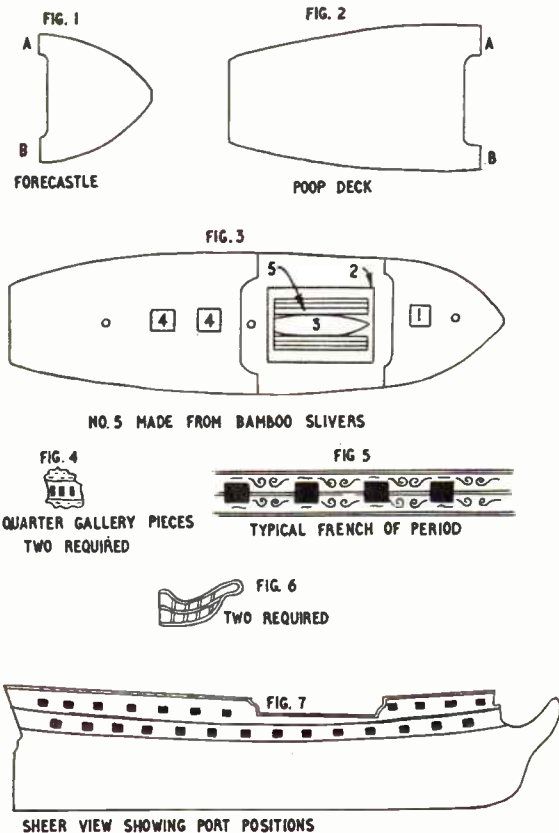
### 'Bone' texture

Give the hull a coat of ivory enamel or Chinese lacquer. When dry, give a second coat and rub down with the pumice rubber. It will depend on what wood is used how many times you repeat this operation. The aim is to get a surface and texture like bone, and it can be done with patience.

When this part of the work is complete, take a piece of fine notepaper and paint it black with Indian ink. When dry, cut out with a razor blade the port lids and glue in position on the hull as in Fig. 7. When completely dry a mellowed tinting of the ivory can be done by the simple application of iodine. Paint the model lightly with iodine and wipe off immediately with a clean cloth. You will find that the paint will then take on the slightly brownish tints that we get with bone or ivory.

For the fortunate few there is one other way to get the required hull finish. That is if you are lucky enough to have some holly from which to make your hull. This, highly polished with the pumice powder, and treated this way is the nearest approach to actual ivory in appearance.

In a subsequent article we will rig our model in authentic French rig and add an appropriate stand.



All illustrations except Fig. 5 are half scale.

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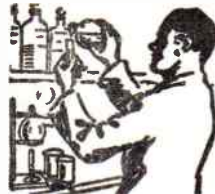
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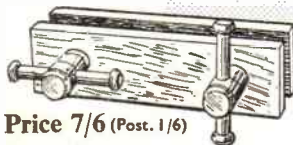
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# Replies to Readers

## Is this YOUR Problem?

### Damp Walls

**T**HERE is dampness on the inner walls of my house and I am anxious to fit a damp course. Could you please inform me how to do this? (K.E.—Blackburn.)

**F**ITTING a damp course is not a job for an amateur, as it involves progressive removal and replacement of bricks while the special damp-proofing material is laid in. All houses except the really old ones, were built with damp courses. Outside you should be able to see it — a few bricks above the normal ground level. If you have earth piled anywhere above this line, damp will be introduced. It could be that some of your bricks are porous and rain is soaking through. This can be prevented by painting the outside with a clear proofing solution, which you can buy from a builders' merchant.

### Cutting Glass Bottles

**C**AN you inform me how I can remove the bottom of a glass bottle? (J.T.—Middlesbrough.)

**B**OTTLE glass is of variable quality, and cutting it can never be regarded as certain. Standing the cold bottle in boiling water up to the desired mark usually works. Rotating the bottle against a glasscutter resting on a block of wood will score the glass all round. Gentle tapping around the line will cause a crack to penetrate the glass, and the bottom can be broken off. If the bottom finishes uneven it can be levelled by rubbing on an abrasive. Emery powder and oil on a stone surface will do it. A wet sandstone will also smooth it.

### Roughcast on Walls

**I** WANT to roughcast the pine-end of my house, and have already given it the first coat of cement. When I give the next and final coat, will I have to roughcast it the following day, or can I leave it indefinitely — say, two or three weeks after giving the final coat of cement? Also could you please tell me the mixture used, and is it possible to roughcast successfully on a wall which has been cemented a year or two? (T.W.—Swansea.)

**T**HE mixture should be about one of cement to three of sand. The sand

may contain particles up to about  $\frac{1}{16}$  in. The usual method is to trowel this on, then before it has hardened, throw on small pebbles. The majority of these will adhere and give the common roughcast effect. It is not advisable to mix these pebbles or chips with the cement and sand mixture. If you wish to roughcast on a previously concreted or brick wall, brush plenty of water over it first, to prevent it from absorbing too much moisture from the mixture. The above rendering is probably what you have in mind, but the Building Research Station recommend using two mixes: the first

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consisting of three parts white hydrated lime, one part cement and 10 parts sand; followed by three parts lime, one part cement and 12 parts sand.

### Removing old Putty

**I** AM renewing panes of glass in my house which is about forty years old, and the putty in some of the frames must be about the same age. The putty has become like iron, but the wood has deteriorated. Consequently when chipping out the old putty, lumps of wood sometimes come away. Could you advise me of any means of softening putty as hard as this? (W.W.—Hove.)

**W**E do not know of any treatment for softening putty which is not liable to damage the surrounding wood. A powerful caustic or acid paint stripper might have some effect on the putty, but it would be unwise to risk it on the wood which is already rather weak. An electric paint scraper might have some effect, but we think the only way is to go ahead with a hacking knife, sold for the purpose, keeping it sharp and using it with a hammer, aiming to direct it between the putty and the wood. Small pieces cut out of the wood will not matter, as they can be made good with putty as you fix the new glass. If you

have any large damage to fill, it might be built up with plastic wood before putting the new glass.

### Moulds for Concrete

**I** AM thinking of making some concrete blocks. For these I have a wooden mould, but have found that the concrete sticks to this. Could you please give me a suggestion on how to prevent this? (J.B.—Kendal.)

**W**ITH a wooden mould it is usual to either give it a taper so that the concrete can be turned out, or to make the mould dismantle with screws. You can grease the wood, but do not overdo this.

### Grooving Boxwood

**I** WISH to tongue and groove some boxwood. I have a grooving plane, but not a tool to tongue. Can you help me? (J.R.—Beeston.)

**T**ONGUES and grooves are usually made in pairs of matched planes. If you are already able to cut grooves, you could cut the tongues with a rebate or fillister plane. They could also be cut with a small circular saw driven by an electric drill.

### Building Television Aerials

**I** AM making a BBC and ITA aerial and using  $\frac{1}{16}$  in. alloy aluminium tubing. Can you tell me (1) the most satisfactory means of bending the folded dipole? (2) Would solid tubing be satisfactory for ITA dipoles? (3) When I wire both aerials up, will it be in order to use co-axial wire for both. (4) What type of solder should be used? In this area a double 5 bar aerial with a folded dipole is necessary; the local shops say that  $\frac{1}{16}$  in. tubing for ITA aerial is not suitable — they suggest  $\frac{1}{8}$  in. Will this make much difference to reception? (P.R.—Saffron Walden.)

**R**EADY-CUT tubes for any band may be obtained from Fringevision Ltd., Marlborough, Wilts. Malleable tubes can be bent round a shaped wooden block secured in a vice. Solid rod is not usually employed, because of its greater cost and weight. Copper or brass can be joined with ordinary solder, but special solders are necessary with aluminium. Bolted joints would be satisfactory. The diameter of the tube does not appear to have much effect on results. The down-leads should suit your receiver. The impedance of co-axial cable to use will be indicated on the receiver, or in accompanying instructions. The position of the ITA aerial, in particular, and its relationship to chimneys, etc., will greatly influence results.

Toy for a child

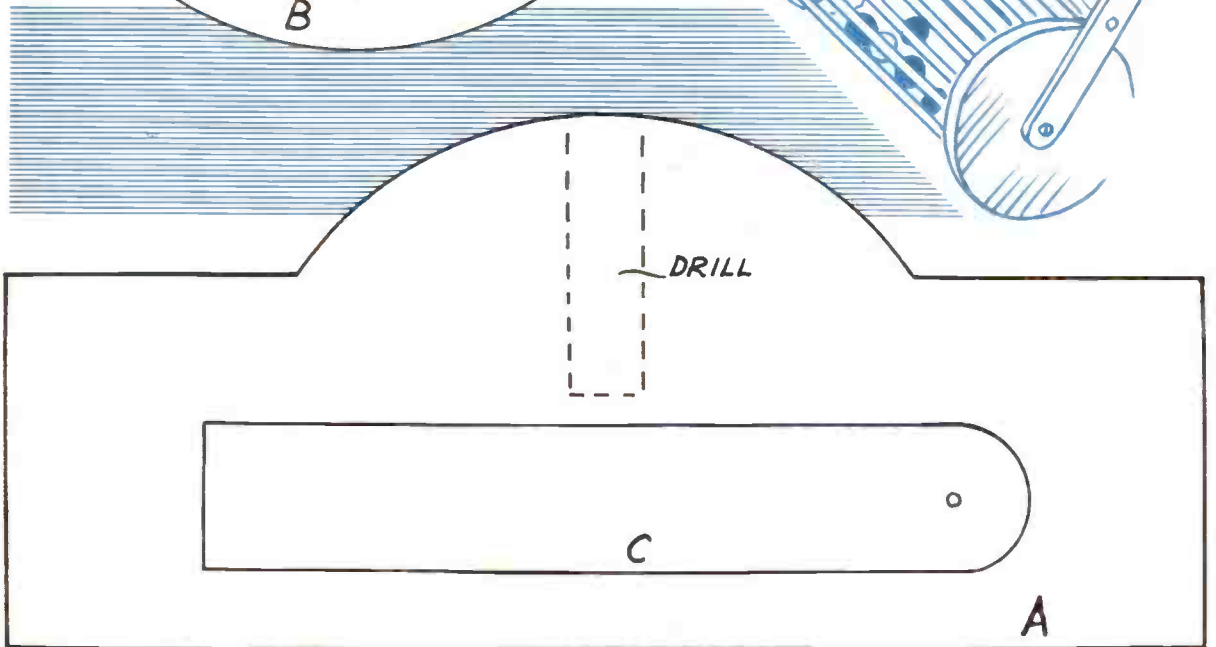
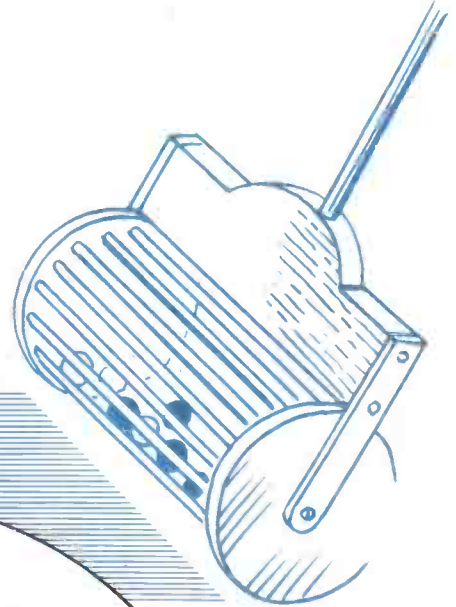
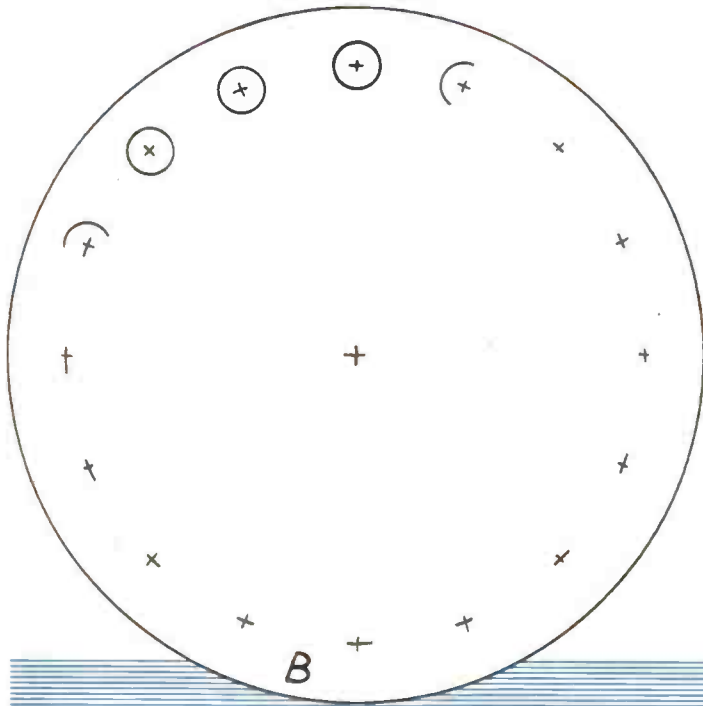
# ROLL-A-RATTLE

**C**UT one piece (A) ( $\frac{3}{4}$ in.), and two pieces each of (B) and (C) from  $\frac{1}{4}$ in. wood with a fretsaw. Drill  $\frac{1}{4}$ in. holes all round pieces (B) as indicated.

Purchase 1 dozen Hobbies No. 81 wood beads and paint. The beads cost 1/- per dozen, postage 6d. from Hobbies Ltd, Dereham, Norfolk.

Construct the drum from the two pieces (B) and 6in. lengths of  $\frac{1}{4}$ in. diameter round rod. Insert the beads as the drum is made.

Glue and screw pieces (C) to piece (A). Pivot the drum to pieces (C) by means of round head screws. Glue a 3ft. length of  $\frac{3}{8}$ in. round rod into the hole drilled in piece (A). Clean up with glasspaper and paint with enamel. (M.p.)

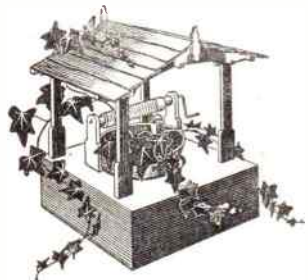




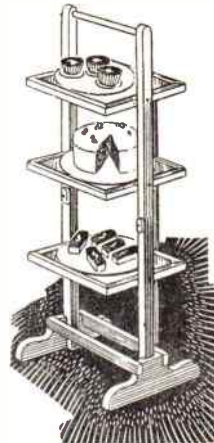
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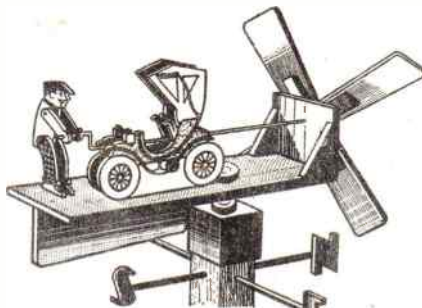
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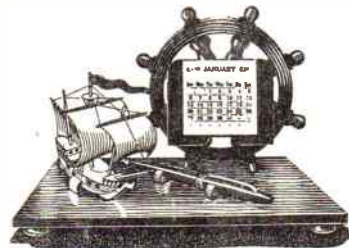
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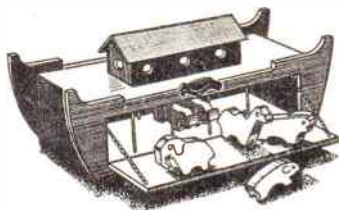
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