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THE ORIGINAL  
"DO-IT-YOURSELF"  
MAGAZINE

# HOBBIES *weekly*

FOR ALL  
HOME CRAFTSMEN

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VALVE RADIO

COLLECTORS' CLUB

HARRY SECOMBE'S

'STAR CHOICE'

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FOR NOVELTIES

AN ASHTRAY

IN MARBLE

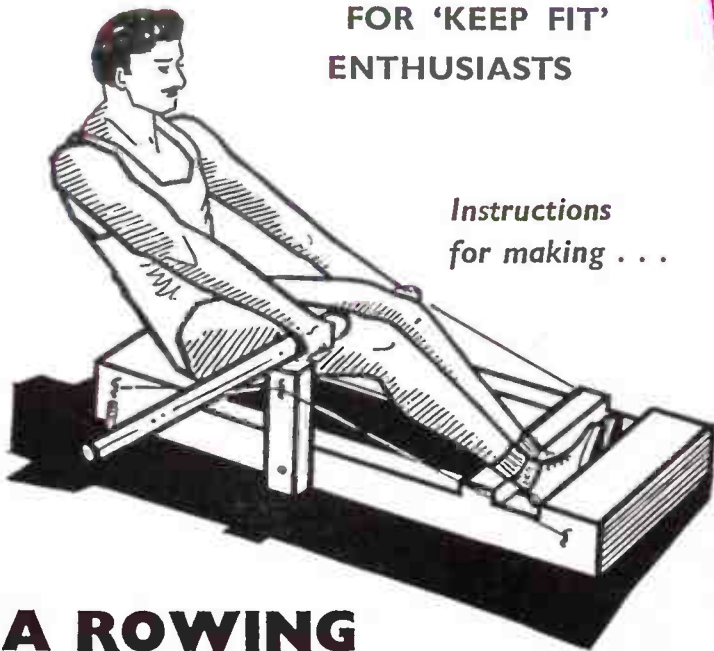
CHEMISTRY AND

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FOR 'KEEP FIT'  
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*Instructions  
for making . . .*



## A ROWING MACHINE



Up-to-the-minute ideas

Practical designs

Pleasant and profitable things to make

World Radio History

5<sup>0</sup>



THE first automobile to appear on a stamp was an electric car, which was used on a 4 cent American stamp in 1901.

An American car was used on a stamp in 1945. But not on an American stamp. Liberia issued a set showing President Roosevelt in a Jeep reviewing troops.

The three countries having the best 'record' for use of cars on stamps are Yugoslavia, Italy, and Germany. It's easy to understand Germany's and Italy's interest in cars on stamps. Yugoslavia is the surprise — its stamps are the best of all. In 1939, to commemorate the Automobile and Motorcycle Races held on 3rd September, four stamps appeared. Two showed motorcycles and two showed racing cars. Both cars are front-drive machines and look like Tatra's. A 1953 set depicted motorcycles, sports and passenger cars.

Great Britain has never put its Rolls,

Bentley, Jaguar or Daimler on stamps; nor has Spain used its Hispano-Suiza; nor France its cars, or even celebrated its international shows or the Le Mans race.

Russia, America, and Sweden have issued many match labels depicting motor cars. They are also featured on many British cigarette cards.

Many hotels throughout the world run their own guest-car, which usually appears on the luggage label.

Collecting these cars is great fun.

This hobby world

**G**EORGE F. NICHOLS (aged fifteen) of Box 137, Oxford, Mass., U.S. America writes: 'My hobby is collecting odd stones that resemble dogs, birds, and human heads and figures. Also stones that have strange designs on them.'

George has collected over 700 stones, and is still hunting for more. It all

started at a State Fair where they had an aquarium display. In the centre of the room, in a glass case, was an interesting clam shell. It had the likeness of a church with coloured windows. This freak of nature which became the main attraction was insured for 10,000 dollars.

'At that time I was building a swimming pool', says George. 'I had noticed some coloured stones resembling figures and different designs. Thinking of the clam shell, I decided to collect odd stones. At first I kept them in a box, but then I couldn't display them. Most of them looked good only when wet. So I varnished them. This brought out their full colour. Then, instead of propping them up with sticks, etc, I moulded plaster bases under them. For every stone kept, I throw away a thousand.'

George has stones from the size of an egg to the size of a human head. He has climbed down wells, walked through swamps up to his knees, searched forests, sand pits, and fields looking for stones. He has been chased off farms, woods, and fields by sticks, stones, guns, and dogs. His collection is thought to be the largest in the world.

New Zealand's airmails

**T**HE first aeroplane flight in New Zealand took place on the 5th February 1911. But more than twenty years elapsed before airmail stamps appeared.



Examples of labels featuring the motor car industry



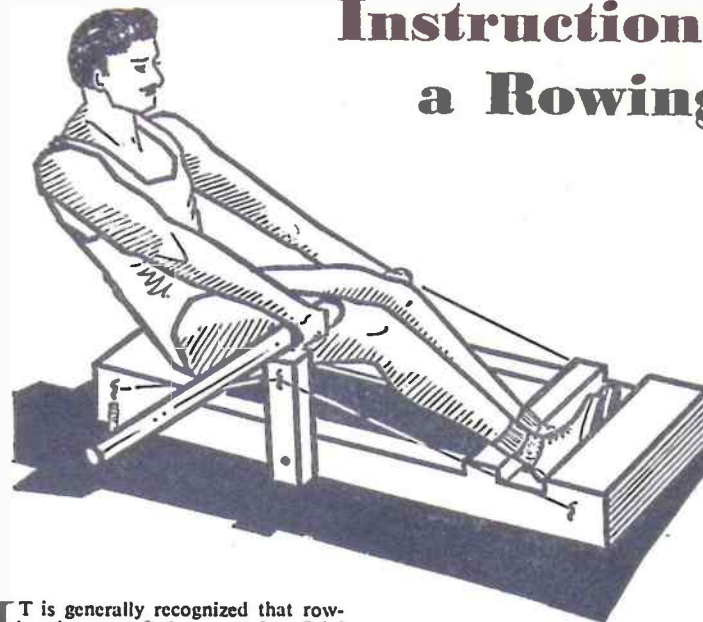
The first series, issued in November 1931, depicted an aeroplane flying over New Zealand. Later in the year 'Seasonal Greetings' flights were made throughout the country. So the 3d. value was printed in a different colour (green), and then overprinted FIVE PENCE in red.

To commemorate the first official airmail from New Zealand to Australia on the 17th February 1934, the 7d. stamp was printed in blue, then overprinted TRANS-TASMAN AIR MAIL 'FAITH IN AUSTRALIA'.

The second and last series of these stamps was issued on the 4th May 1935. The design was a reproduction of a photograph of the Bell Block aerodrome, the landing place of the early aeroplanes from Australia. The values were 1d., 3d. and 6d.

Airmail stamps were finally withdrawn at the end of 1939.

# Instructions for making a Rowing Machine



**I**T is generally recognized that rowing is one of the most beneficial exercises for health, since it brings into play many muscles, notably of both arms and legs. Those who are athletically minded and who value the wonderful sense of well-being which springs from a state of fitness will, undoubtedly, want to make and use this simple rowing machine. It can be made quite easily from material obtained at very little cost.

The sketch in Fig. 1 shows the general arrangement and construction. Make a start with the framework of the base, using 3 in. by 2 in. or 2 in. by 2 in. wood, and making the frame about 2 ft. wide and 3 ft. long.

The seat should be 3/4 in. thick and 12 in. wide, and a 3/4 in. thick cross batten should be nailed at the opposite end to form a footrest. The width is not important.

The 'oars' may be sawn from an ash handle — of the kind used for garden rakes, or adapted from a suitable tree

branch. Each are 18 in. long. If the handle end requires paring down to ensure a comfortable grip, this should be done with a knife or spokeshave, finishing with glasspaper No. 2 to ensure a smooth finish. About 3 in. space should be allowed between the handle ends when both fitted 'oars' are in a straight line. This will prevent the thumbs from colliding or jarring the 'oars' when doing a workout.

A pair of second-hand or new rowlocks should be purchased, and the sockets mounted on a pair of 2 in. by 2 in. posts, each about 15 in. long, as in Fig. 2. The other end of each post is now bolted to the side of the frame, one on each side and 6 in. in front of the leading edge of the seat. A small cleat is screwed to the outer side of each batten 1 in. or 2 in. below the top. Similar cleats are also screwed to the outside edge of the base, one at the front and one at the rear

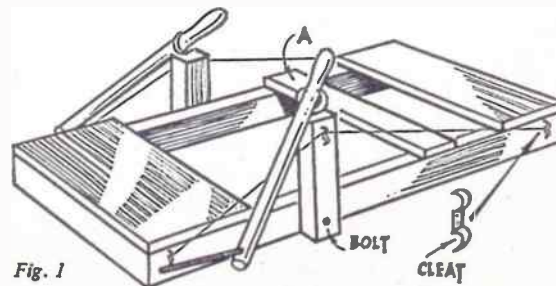


Fig. 1

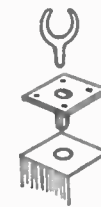


Fig. 2

of each side. A length of linen line is passed from the front cleat around the batten cleat and thence to the rear cleat, thus giving support to each batten.

Tension on each 'oar', to imitate the pull in a real rowing boat, is provided by 'expander' springs, which can be obtained at athletic outfitters. As an alternative, strong catapult rubber may be used or even discarded inner tubes from car or cycle may be utilized. Each tension spring or band should have one end dropped over a screw hook in the base, and the other end fixed to a screw hook near the 'water end' of the 'oar'. Use more than one tension spring or band to each 'oar' if strenuous exercise is favoured, the tension being adapted to suit individual requirements.

When inserting the rowlocks give the pins a smear of oil to assist smooth movement.

As will be seen from the sketch, the rower's feet rest against the end of the base. An additional footrest (A in Fig. 1) can be nailed across for a user with short legs.

When completed, varnish in oak or mahogany, or paint in contrasting colours, such as blue base with white uprights, the 'oars' being left 'natural' or clear varnished.

Constructed as described, this rowing machine can be quickly dismantled for stowing away by simply unhooking the tension bands, loosening the lines on the cleats, and loosening the batten bolts. The uprights will then lie flat alongside the base and the machine, with oars, can be stowed under the bed if desired, ready for the early morning 'row', or packed away in a comparatively small space.

If a rigid, non-collapsible model is desired, support the uprights with 2 in. by 3/4 in. battens in place of the cleats and line, and screw or nail uprights and side supports instead of using bolts. (M.H)

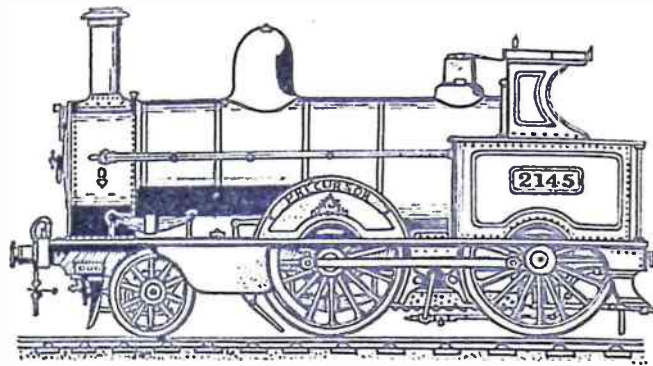
\*\*\*\*\*  
 \* Next week's free design will be \*  
 \* for making a novel 'Guitar' Vase \*  
 \* Holder for home decoration. \*  
 \* Make sure of your copy. \*  
 \*\*\*\*\*

# THE L. & N.W.R. 'PRECURSOR'

IN April 1874, Mr F. W. Webb introduced the 5 ft. 6 in. 2-4-0 'Precursor' class designed primarily for the heavy express duties on the L. & N.W.R. main line between Crewe and Carlisle. Before finally deciding to use only 5 ft. 6 in. diameter wheels for this express type, Mr Webb experimented for some time with a 0-6-0 Goods engine by removing the leading coupling rods (between the leading and driving wheels), thus converting the engine to 2-4-0 type.

This experimental engine was tried on various duties, including the fast trains between Crewe and Carlisle, with apparently satisfactory results, and on some turns it ran the through distance of 141½ miles on heavy express trains.

These results proving satisfactory, Mr Webb went forward with the creation of the new 2-4-0 engines, the first one, No. 2145, being named 'Precursor' and this engine is the subject of our illustration. The engines carried the following leading details: cylinders, 17 in. by 24 in., ports 14 in. by 1½ in., and 3½ in., wheel-base 7 ft. 5 in. by 8 ft. 3 in. Total: 15 ft. 8 in. Total heating surface 1,074.6 sq. ft.



London & North Western Railway. Four-coupled passenger locomotive No. 2145 'Precursor', Crewe 1874

Grate area 17.1 sq. ft. Working pressure 140 lb. sq. in. Weight in working order: on leading wheels 10 ton 8 cwt., on driving wheels 10 ton 10 cwt., on trailing wheels 10 ton 10 cwt. Total: 31 ton 8 cwt.

An Allan's straight-link valve motion was employed. After some years' service, however, all the class were finally converted to 2-4-2 Passenger Side Tanks and remained in service for many years on the L. & N.W.R. (A.J.R.)

# AN ASHTRAY IN PARIAN MARBLE

ASHTRAYS are always useful in the home and make ideal 'personal' presents. Here we describe how to cast one in Parian marble. Parian, sometimes better known as Keene's cement, is not to be confused with plaster of Paris although it is normally used for plasterwork and crack filling. It contains an agent which delays setting and is not affected by atmospheric moisture. When it has set hard it can be worked and polished. The marbling effect is the result of mixing dry mineral colours before casting.

The mould is made as shown in Fig. 1 where a 5 in. square of ¾ in. wood is used for a base. You will also need two pieces of sheet tin measuring 1 in. by 10 in. and some 1½ in. panel pins. The design is traced out on the wood in accordance with the measurements shown in Fig. 2, panel pins being inserted at suitable points to hold the shaped tin erect.

Bend the two pieces of tin as shown, cutting away the surplus and fitting on the board, which should be greased to prevent the cement from sticking. You may use boiled linseed oil for the wood or some old varnish while the sheet tin is best smeared with a little petroleum jelly.

The bowl of the ashtray is made by inserting a bicycle bell, or some such

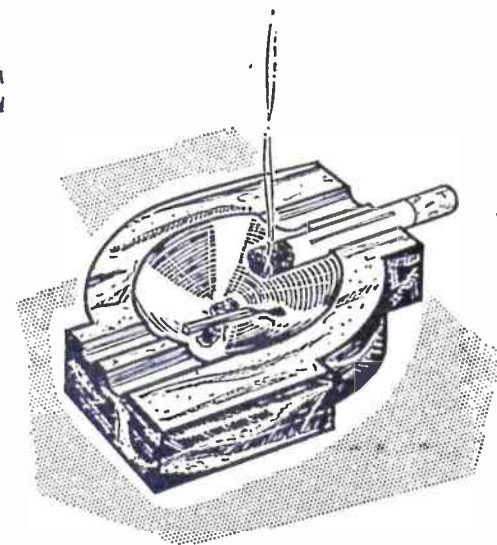
of stiff, thick cream. The mixture should be thin enough to pour into the mould yet not so thin and watery that the additional mineral colours 'bleed' by dissolving too rapidly.

Remember that the ultimate aim is the streakiness of marble and not patchy blurs.

When the plain mixture is perfectly even and free from lumps the selected colours are spread alternately across the top. Do not be afraid of applying a generous quantity and make certain that they are kept separate.

The mixture, now with the colours added, is folded about three times. When the colours become streaky it is time to stop. Additional mixing will only create a muddy blend.

This liquid marble is now carefully transferred into the prepared mould until it is half filled. The cycle



easily, then turn the mould over on to the left hand, tapping the wood base to release the completed tray.

The cast material will be found

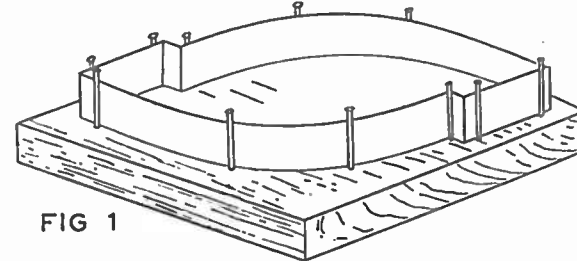


FIG 1

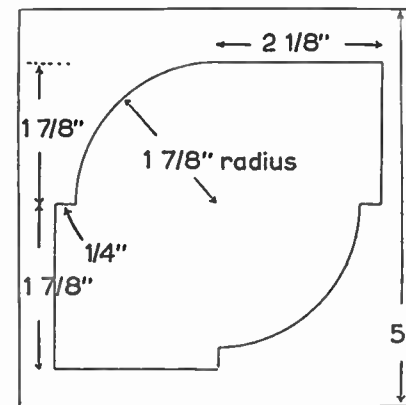


FIG 2

shape in the centre of the mould after a half inch layer of mixed cement has been placed. The bell should also be greased. The grooves for the cigarettes are made after casting.

For casting you will need two cups of Keene's cement plus the mineral colours. Black and gold produce a nice blend, or you may choose pale green and gold which gives a result very similar to alabaster.

Place the cement in a dish, using an old table knife or trowel for mixing. A little water is added and the plain, white mixture stirred to an even consistency

bell or other former is then placed in the centre with the dome downwards. Filling then continues around the bell to the top of the tin. Make sure that the mixture fills all the corners. The mould is taken up in the hands after filling and each side gently tapped on the table so that the mixture is tamped down and any air bubbles forced to the surface. Allow the setting to be quite natural and on no account should you try to speed this part of the process by heat.




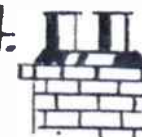

When the cement has set hard remove from the mould. Tap the rim of the bell a few times when it will come away quite

impervious to water and if a fine grade of silicon carbide paper is used the tray can be polished under water. You may also use a buffer in conjunction with a hand electric drill, a plane, or a cabinet scraper.

Wrap a piece of abrasive paper around a dowel rod for cutting the cigarette grooves.

Repeated rubbing will produce a nicely polished tray while any of the modern silicon wax polishes will impart a rich finish. Glue a piece of felt to the base to prevent furniture from being scratched. (H.M.)

## TWO-MINUTE QUIZ by Ed. Capper

<p>1.  DOES THIS BIRD ROOST IN ST. PAUL'S?</p>	<p>2.  IS THE ARCHITECT DEVISING A FOUL DEED?</p>	<p>3.  MORTAR FILLING AT TILE ENDS IS CALLED-what</p>
<p>4.  WHAT IS MEANT BY PARGETING A CHIMNEY?</p>	<p>5.  Where would you find a MISERICORD in a church</p>	

Answers on page 349

# Aids to better Workmanship

IT is sometimes claimed that the do-it-yourself man is incapable of producing the same standard of workmanship as a tradesman. This may be quite true when speaking about some of the tricky and highly skilled jobs, but this need not be the case when carrying out the ordinary kind of repair jobs nowadays tackled by the home craftsman. Listed here are a few points which the home craftsman should adopt automatically when carrying out home jobs.

**USE GOOD TOOLS.** It is much easier to produce a good standard of workmanship with good quality tools than with shoddy ones. The initial cost of good tools is, of course, a little higher, but this can often be offset by building up your kit gradually. You will never regret keeping clear of cheap, bargain-priced tools.

**MEASURE TWICE — CUT ONCE.** Don't rush into a job and start cutting up the materials before giving it some careful thought. Materials are expensive nowadays, so it pays to be as economical as possible. When working with materials like plywood, hardboard, lino, and plastics, arrange your cuts to give the minimum amount of waste. After marking out, always check your measurements before cutting.

**MARK OUT WITH FINE LINES.** Theoretically, a line should have neither breadth nor thickness. When marking out your work, keep the point of your pencil sharp. Accurate work is often

marked out with a marking knife, a tool with a chisel-like edge. The home craftsman, however, will find it quite satisfactory to use a pencil, provided it is kept sharp. Don't expect a high degree of accuracy if you work with a pencil which

*By K. Finlay*

gives a line about  $\frac{1}{8}$  in. thick. Never draw your pencil along a line more than once as this only makes the line broader.

**KEEP YOUR TOOLS SHARP.** You must keep your tools sharp at all times. In addition to being dangerous, it is impossible to produce a good standard of workmanship with blunt tools.

**USE YOUR NAIL PUNCH OFTEN.** Nothing mars the appearance of a job more than nail heads protruding through a painted or stained surface. Keep your nail punch handy, after inserting nails punch their heads below the surface. The holes can be filled up later with plastic wood or beeswax.

**KEEP SCREW SLOTS IN SAME DIRECTION.** When working on a job where screws are going to remain visible, keep the slots on the screw heads running in the same direction. You will find that this greatly improves the appearance of the finished work.

**USE CORRECT SIZE OF SCREWDRIVER.** When inserting screws, always

use the correct size of screwdriver for the job. Turning a large-headed screw with a small screwdriver is likely to damage the blade and make the task more arduous. Using a larger screwdriver than is necessary may result in the blade scraping the timber when the screw is to be inserted flush. Always bore small pilot holes with a bradawl when inserting screws, to avoid burring the heads.

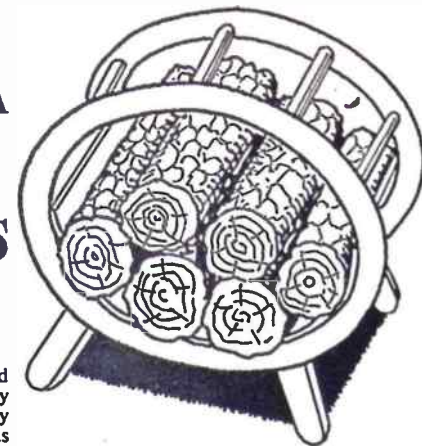
**USE WOOD FILLERS SPARINGLY.** Wood fillers are necessary for filling up small cracks and splits, but don't overdo it. Never look upon fillers as a means of camouflage for bad workmanship, and only use them for filling small holes. Large cracks and knot holes should be made good by inserting wooden plugs.

**DON'T NAIL GLUED JOINTS.** There are many excellent adhesives on the market nowadays which, if used correctly, will produce a joint stronger than the timber itself. Don't mar the appearance of your work by inserting nails and screws into joints which are going to be visible. Choose a good adhesive, and the joints will be strong enough without further fastening.

**USE A GLASSPAPER BLOCK.** Before completing your work, it is usual to give it a rub down with glasspaper. When doing this, it is essential to use a glasspaper block. Holding the glasspaper in the fingers causes hollows to appear on the surface which will be visible after painting, etc.



# HARRY WANTS A CRADLE FOR LOGS



IT is almost impossible, says Ed Capper, to keep up with Harry Secombe, when he starts his bubbly conversation. The famous comedian was saying:

'...and there's nothing I like better than a tramp in the woods and an adze ...'

'An adze?' I queried.

'Yes, it all adze up ... ha! ha! get it, an adze ... it all adds up. No? — well never mind, a chopper to you ... then I find a tree, throw 'out me chest and bang! that tree is felled in a flash ...'

'Felled?' I foolishly said.

'Yes, it felled down ... get it, felled down ...'

'And what is all this to do with wanting something for the home?'

'Ah, yes, the home. Now, what do I want; you tell me eh? — oh no, of course you can't ... well, now, I want to sit by the fire and now and then throw a log on it ...'

'So ...?'

'I want to get the logs from their holder ...'

'And?'

'Holder! gosh, ain't you dumb — you're making me older every moment ...'

Then I tumbled to it. Harry wanted a log cradle. Four sentences later I discovered that he wanted a modern design. The project shown here was the result.

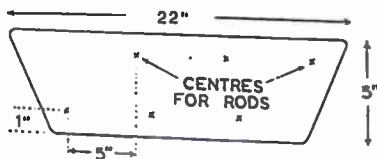
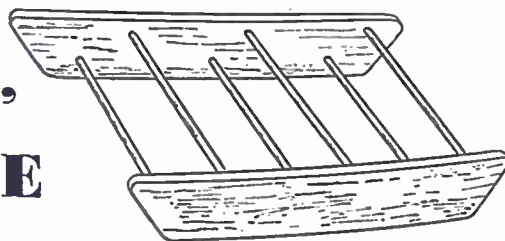
Cutting instructions are shown on the set of squares in the diagram. Besides the profiles shown, you will need five lengths of  $\frac{1}{2}$  in. dowelling, 12 in. long, and a bottom piece of 5 mm. plywood that will easily bend to fit inside the cradle, cut 16 in. by 13 in. The frames and leg pieces are cut from  $\frac{1}{2}$  in. plywood; the latter can be cut from the central off-cut of the frames.

To assemble, fit the leg pieces to the inside lower sweep of the frames as shown. Use glue and  $\frac{1}{8}$  in. countersunk screws. The dowels are fitted between the frames in the position indicated on the drawing. They are held with 1 in. long screws, through from the front of the frames and centrally into each dowel end.

Finally, the bottom piece is inserted around the top edge of the lower portion of the frames. It will project slightly in front of the frames and should be held with glue.

All the screw heads should be sunk slightly below the surface of the wood and the depressions filled in with a wood filler before the unit is painted.

# A SHOE 'SLEDGE' IS EASY TO MAKE

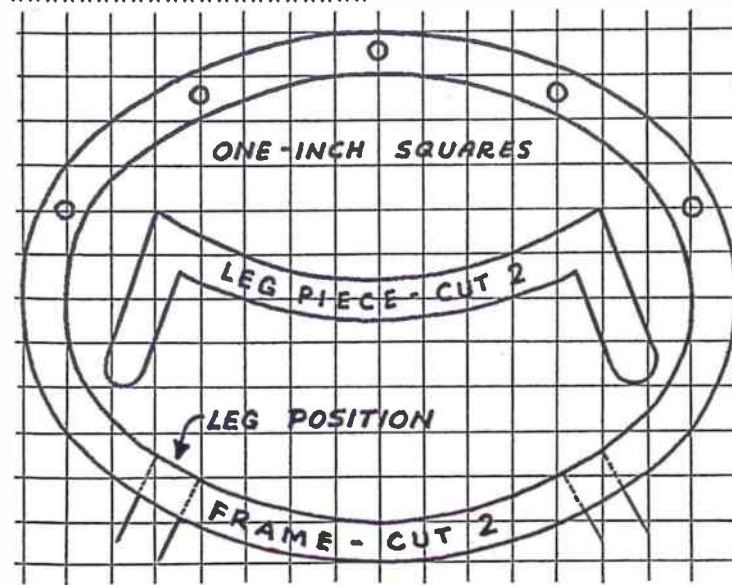


dowel rods, as indicated. It will be seen that there is 5 in. between the lower and upper rods, and the two pieces may be cramped and worked together with the

holes bored for  $\frac{1}{8}$  in. dowel rods. You will require six of the latter, each 12 in. long, which are glued into the holes with a good adhesive. That is all there is to it.

A coat of paint will preserve the accessory, besides giving it an attractive appearance. Incidentally, these sledges are quickly made and make ideal little gifts. (S.H.L.)

\*\*\*\*\*  
 \* Ask Harry Secombe a ques- \*  
 \* tion ... and what do you get? \*  
 \* Well, Ed Capper managed to sort \*  
 \* it all out! \*  
 \* \*\*\*\*\*



# A FRAME AERIAL 1-VALVE RADIO

SOMETIMES an aerial or earth cannot be fixed up, and it is then not possible to use a small, simple receiver. To overcome this, the receiver described here has a frame aerial, so that an external aerial or earth is not needed. Despite this, it has only one valve, and is very easy to construct.

The frame aerial is mounted on top of the case, which holds the receiver and dry batteries. Used in this way, the aerial gives the best possible volume, for its size. It can also be rotated, without moving the receiver, to make use of the directional properties which such aerials have.

The circuit is shown in Fig. 1, and uses a 1S5 valve, which is easily obtainable at low cost. An equivalent, such as the DAF91, will give the same results. The valve requires  $1\frac{1}{2}$ V for the filament, and this can be drawn from a single dry cell, a  $1\frac{1}{2}$ V dry portable receiver battery, or two or more dry cells wired in parallel. More than  $1\frac{1}{2}$ V must not be used here.

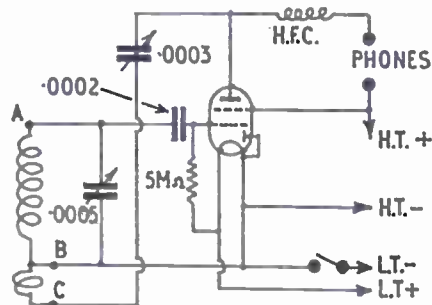


Fig. 1—Frame aerial receiver circuit

For high tension, a small 67½V or similar battery is most satisfactory. As there is only one valve both batteries will have a very long working life indeed.

## Frame aerial

This is wound upon two pieces of wood each 12 in. by 2 in. The wood should be at least  $\frac{1}{4}$  in. thick, so that a hole can be drilled for a thin axle. The two pieces are cut as shown in Fig. 2, so that they fit together to form a cross. The ends of the pieces, over which the aerial will be wound, should be glass-papered smooth.

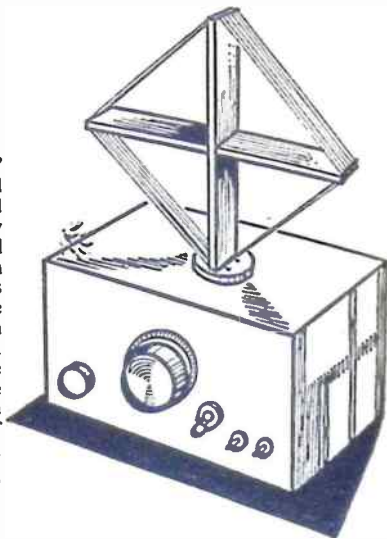
For the winding, any enamelled or cotton-covered wire of about 24 to 28 S.W.G. is satisfactory. To begin, the wire is anchored by passing the end

through a small hole, this point being 'A' in Fig. 2. Seventeen turns are then wound on, each turn passing completely round the frame, and the wire is anchored by passing a loop through another small hole, to form point 'B'. The seventeen turns take up about 1 in. of space across the ends of the cross-pieces, so the turns are slightly spaced from each other, to arrange this. A little extra space must also be left to clear the axle, as shown. The wire should be kept tight, and will be in free space except where it passes round the ends of the cross-pieces. It is not necessary that

## By 'Radio Mech'

the seventeen turns occupy exactly 1 in.

A clear space of about  $\frac{1}{4}$  in. is then left, and nine turns are wound on, the wire then being cut and fixed as before,



slips of thin card, between disc and frame will leave clearance for the winding, as in Fig. 2. The axle can be a length of steel knitting needle, etc.

Bending of the wires from the frame will cause single-strand leads to break,

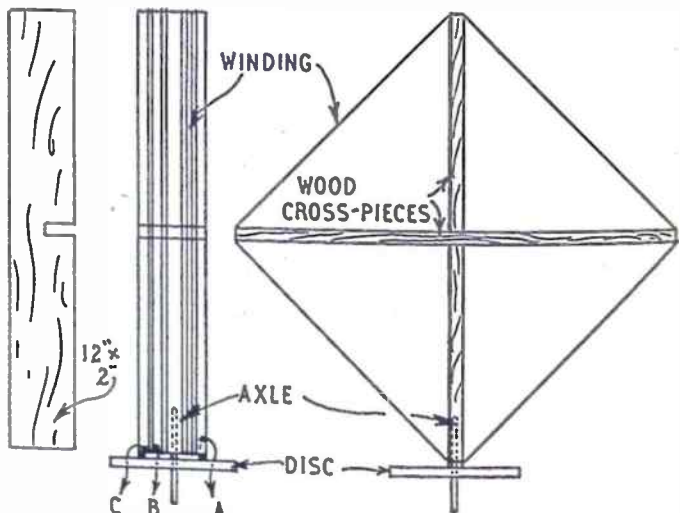


Fig. 2—How the frame aerial is made

to give lead 'C'. These nine turns must be in the same direction as the previous winding, and they are side by side, not spaced.

A disc of thin wood about 3½ in. in diameter is cut, and fitted to the axle. Two panel pins are driven through this disc into the bottom of the vertical wooden piece, so that the disc and frame aerial will rotate together. Washers, or

so a piece of thin flex is soldered to each end of the winding, and to the tapping 'B'. These flexible leads pass down through three small holes drilled in the disc. Fig. 1 also shows the beginning 'A', tapping 'B', and end of the frame winding 'C'.

## Receiver wiring

A small baseboard about 5 in. by 7 in.

will leave enough space for the batteries. The panel is 7½ in. wide and 4½ in. high, so that it will overlap the sides of a case made from  $\frac{1}{4}$  in. thick wood.

The reaction condenser, switch, and phone terminals are fixed in holes drilled in the panel. Some tuning condensers also have a large nut and can be fixed to the panel in the same way as the reaction condenser. Other types have small brackets, and these are screwed to the baseboard, the control spindle passing through a clearance hole in the panel.

As the tags of the valveholder project downwards, wires should be soldered to these before fixing the holder in place. The holder can be screwed to  $\frac{1}{4}$  in. blocks of wood fixed to the baseboard. Or long screws can be used, with spacing sleeves cut from ebonite tube or anything similar under the holder, to keep the tags clear of the baseboard.

It is best to solder all the leads to the holder tags before making any other connections, and before finally screwing the holder in position. Fig. 3 shows the holder as seen from above, and the wiring should be checked against this when the set is finished.

The L.T. positive lead goes to positive on the  $1\frac{1}{2}$ V battery. L.T. negative is taken to negative on this battery. H.T. negative is for the negative connection for the 67½V or similar high tension battery, and H.T. positive goes to plus on this battery. Flex is used for the battery leads. The batteries are not connected until the set is finished, but the

leads should be marked so that the proper connections can be made.

The set can be tested, without fitting it in its cabinet, by joining the three leads from the frame aerial to the appropriate points in Fig. 3. That is, 'A' to the fixed plates of the tuning condenser, 'B' to the moving plates (metal frame), and 'C' to the moving plates tag of the reaction condenser.

## Cabinet

This is of such a size that the receiver, with batteries, can be pushed in, the receiver panel forming the front. A piece of wood at least  $\frac{1}{4}$  in. thick is fixed to the top of the cabinet, in the centre, and a hole for the axle is drilled straight down through this block and the cabinet top. The frame aerial is then put in place, with one or two thick washers between the disc and block fixed to the cabinet. The three thin flex leads pass down through holes in the cabinet top. Sufficient wire is left so that the frame can be rotated about one complete turn, and so that the leads can be permanently joined up to points 'A', 'B' and 'C' in the receiver, when this is drawn just forward out of the cabinet.

## Directional aerial

The valve is inserted, then batteries connected as explained. The usual type of high or medium impedance phones are best, and phones which give good results with a crystal set will be very satisfactory.

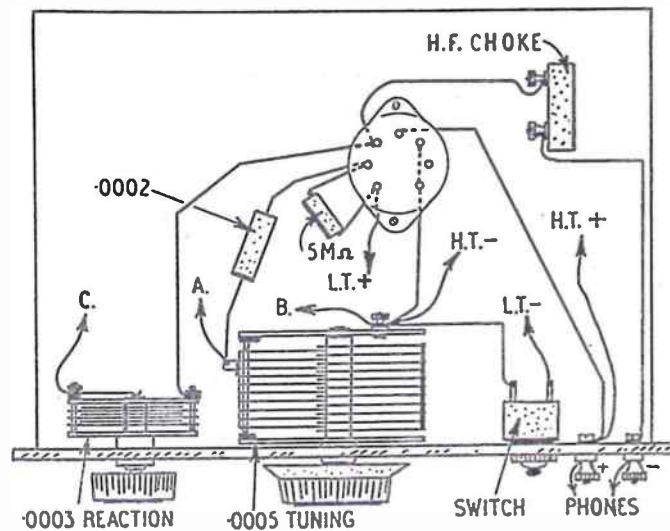


Fig. 3—Frame Aerial Set wiring plan

## COMPONENTS LIST

1S5 valve. B7G holder.  
-0005mfd. air-spaced tuning condenser with knob or dial.  
-0003mfd. reaction condenser with knob.  
High frequency choke.  
-0002mfd. fixed condenser.  
5 megohm resistor.  
On/off switch. Phone terminals. Wire for frame, etc.

Tuning will be found to be quite sharp, and turning the reaction control knob clockwise will build up volume until the set begins to oscillate. With a circuit of this kind, reaction is fairly critical, so this knob should be adjusted to keep the set almost oscillating. In these circumstances, quite a large number of stations will be heard.

The exact manner in which reaction works depends to some extent upon the particular valve and high frequency choke. With the frame wound as directed, reaction will usually be satisfactory. But if adjustment of the reaction condenser is very critical, and the set oscillates violently with the knob only turned a little way, then it will be helpful to remove a turn or two from the nine turn section of the frame. This can be done by loosening the end 'C'.

The aerial gives best reception when turned to be in line with the station tuned in. With local BBC stations, almost any position will do for the aerial, because signals will be fairly powerful, and the programme may be radiated by a network of transmitters. But when tuning in weak or distant stations, the frame should be slowly rotated, by means of the disc, for best volume. A circuit of this kind is usually selective enough to cut out interference from unwanted stations. But if this should arise, it can be reduced by turning the aerial to give weakest reception of the unwanted station.

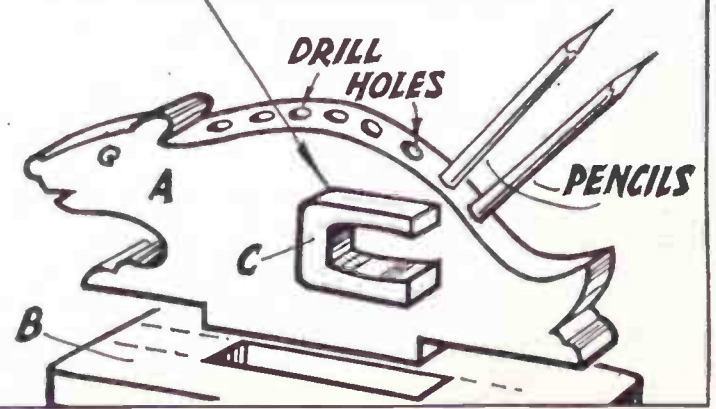
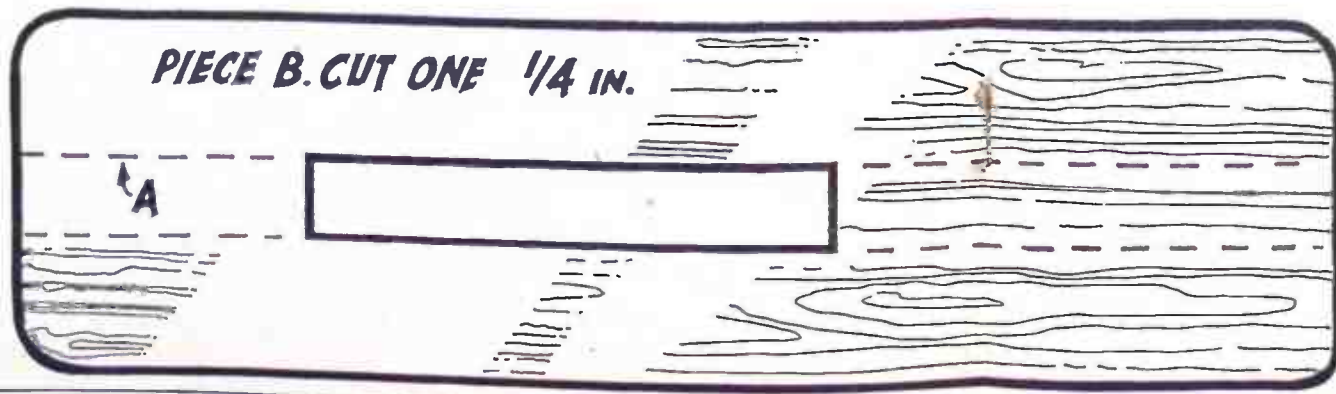
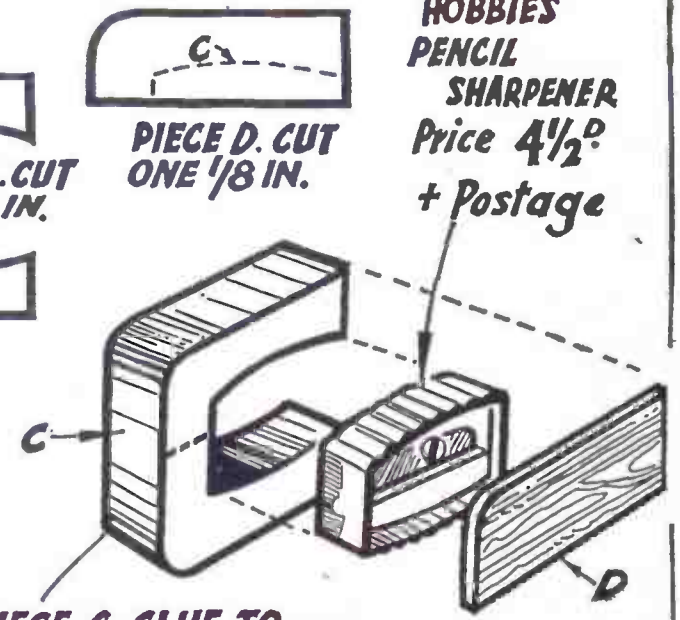
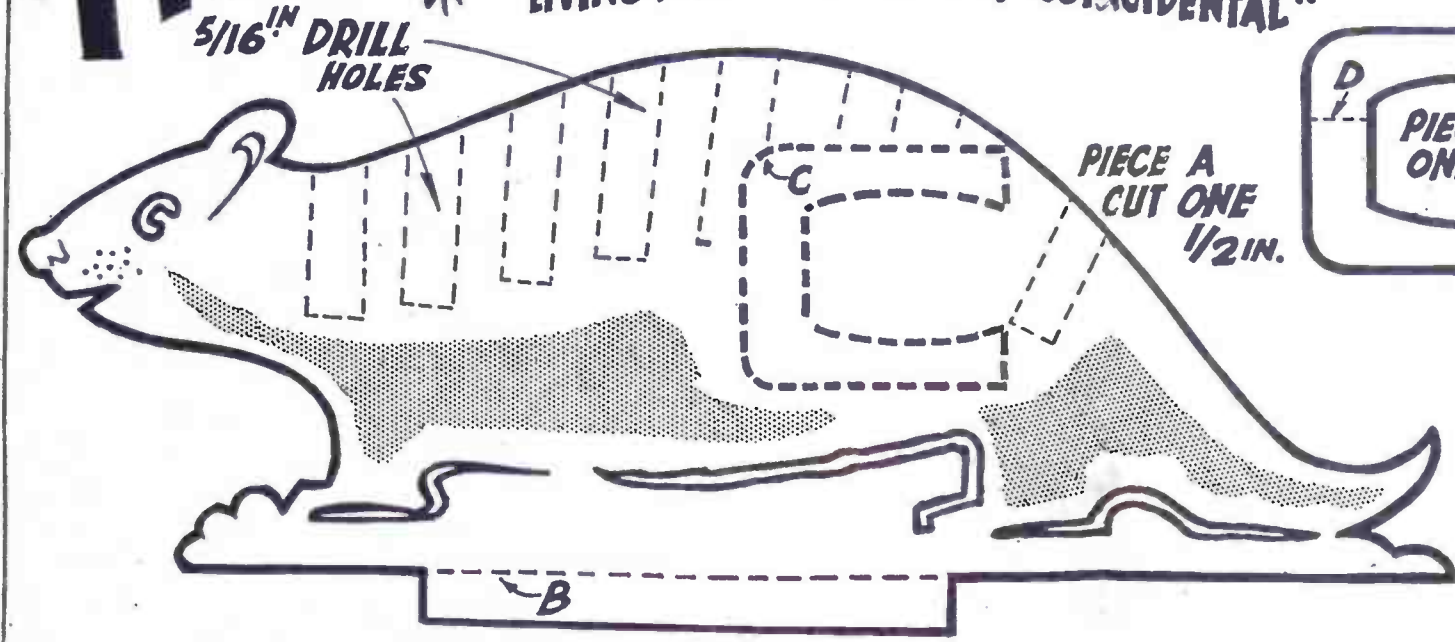
## ANSWERS TO QUIZ (see page 344)

1. St. Paul's Cathedral is called 'Wren's Church' after Sir Christopher Wren, who built it. 2. He is certainly hatching something for hatching is the term used when diagonal lines are drawn across buildings on plans. 3. Torching; it is used to prevent the entry of wind and rain. 4. It is the lining placed over the chimney flue. At one time cow dung was used for the purpose. 5. Where the congregation sit. It is a small wooden bench with a hinged seat.

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# CHEMISTRY AT HOME

**H**AVE you a sceptical friend? One who believes that transmutation or the turning of one metal into another is like the vain dream of medieval sorcerers who tried to turn common metals into gold?

You can confuse his beliefs by means of a simple little trick. Degrease some iron filings by rinsing them with benzene, and let them dry. Put a pinch into a test tube. Pour in copper sulphate solution to the depth of about 1 in. and shake. The iron filings turn to bright copper!

Behind the scenes no transmutation has been effected. Iron, Fe, has merely turned the copper, Cu, out of the copper sulphate,  $\text{CuSO}_4$ , and iron (ferrous) sulphate,  $\text{FeSO}_4$ , has gone into solution. The equation almost writes itself:



Despite your friend's former beliefs, transmutation is an accomplished fact in

The Alderley Edge ore was mostly malachite dispersed through sandstone. Malachite is a basic copper carbonate and has the formula  $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$ . It may be synthesized in the laboratory.

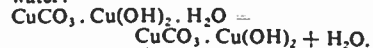
## COPPER SULPHATE EXPERIMENTS—1

As it is a source of other copper compounds, it should be a permanent member of the laboratory stock.

To prepare it, pour cold copper sulphate solution into a big beaker or bottle. It should not more than one-fifth fill the vessel, for foaming will occur, and this must have room. Stir in a cold solution of sodium carbonate (washing soda),  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . A bulky blue

cated by the paper turning blue. The sodium sulphate must now be washed out of the precipitate. Nearly fill the vessel with water and let the precipitate subside, pour off the clear upper liquid and fill up again. Repeat the process until a few c.c. of one wash water give no white precipitate with strontium nitrate solution,  $\text{Sr(NO}_3)_2$ .

During the washing the blue precipitate usually changes to a heavy green sandy-looking powder. This is artificial malachite, formed by loss of combined water:

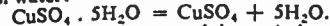


If this change has been delayed, let the whole stand until it has taken place. Filter off the malachite, or basic copper carbonate, and let it dry. This compound has found use as a pigment under the names of Verditer and Mountain Green.

Crush a few small crystals of copper sulphate and heat them in a crucible. They turn white and fall to powder. Put a drop of water on a watch glass and add a little of the white powder. It hisses slightly and instantly turns blue. The hissing indicates avidity for water and the blueing leads one to suspect that copper sulphate owes its beautiful blue crystalline form to combined water.

Let us test this out. Put some more

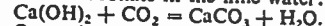
crystallization point. Blue crystals are reformed on cooling. These are the same as the original copper sulphate and the substance has the formula  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . The white powder is anhydrous copper sulphate,  $\text{CuSO}_4$ , formed by simple loss of water:



Anhydrous copper sulphate obviously gives us a valuable test for water. Let us make use of it to find out what happens when malachite, or basic copper carbonate, is heated. Rig up the apparatus shown in Fig. 2. On applying heat the basic copper carbonate blackens, a liquid is given off which turns the anhydrous copper sulphate blue, and the lime water,  $\text{Ca(OH)}_2$ , turns milky.

Here we have evidence that water is

given off during the decomposition by heat and also carbon dioxide — shown by the formation of insoluble white calcium carbonate in the lime water:



Open the cooled tube, carefully remove the blue copper sulphate, and then empty out the black powder. What is it?

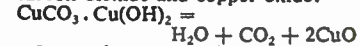
Clean out the apparatus and dry it. Mix a little of the black powder with an equal bulk of carbon, C, in the form of finely powdered wood charcoal and put the mixture in the horizontally clamped test tube. Once again let the delivery tube dip into lime water. Now heat the mixture. Bubbles of gas pass through the lime water and turn it milky, proving carbon dioxide is being formed in the

heating of the mixture. This in turn indicates that oxygen is being taken from the black powder. Shake out the contents of the cooled tube. You will see particles of metallic copper in the powder.

This experiment, therefore, shows that the original black powder was copper oxide,  $\text{CuO}$ :



We now know that basic copper carbonate on heating produces water, carbon dioxide and copper oxide:



In a subsequent article further interesting experiments with copper sulphate will be given.

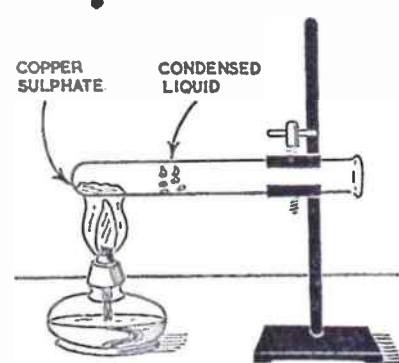


Fig. 1—Finding out why copper sulphate is blue

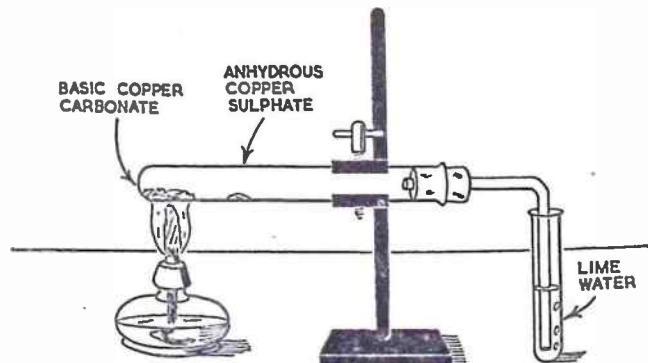
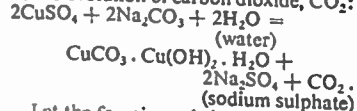


Fig. 2—Analysing the substances formed by heating basic copper carbonate

the atomic pile, where uranium, U, is converted into plutonium, Pu. Modern transmuters find it infinitely more valuable to produce energy rather than gold by transmutation!

The replacement of copper by iron has been used to extract copper from poor ores. The ore from the old mines at Alderley Edge in Cheshire, for instance, was crushed and treated with acid to bring the copper into solution. Scrap iron was added and when the blue colour of the solution was discharged the copper was washed off the iron with water, dried, and fused into ingot form.

precipitate of a hydrated basic copper carbonate,  $\text{CuCO}_3 \cdot \text{Cu(OH)}_2 \cdot \text{H}_2\text{O}$ , forms. Continue stirring in sodium carbonate solution until foaming occurs, due to evolution of carbon dioxide,  $\text{CO}_2$ :



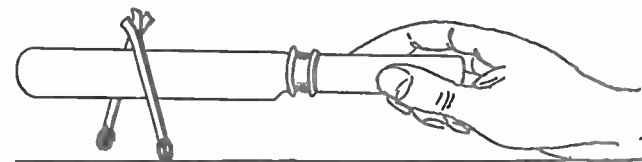
Let the foaming subside and then test the mixture with red litmus paper. If it is not alkaline (shown by the paper remaining red), add more sodium carbonate solution until alkalinity is indi-

crushed copper sulphate crystals in the bottom of a dry hard glass test tube. Clamp the tube horizontally, as shown in Fig. 1, and heat it. Drops of colourless liquid condense on the walls of the tube. When the tube is cool, by means of a bent wire draw into the liquid a little of the white powder from the end of the tube. Again it instantly turns blue. Here is strong evidence that this liquid is water and that copper sulphate indeed owes its beautiful blue crystalline form to combined water. Further confirmation is obtained by dissolving the white powder in water and evaporating to the

## The Magic Matches

**H**ERE is a cute little game to amuse your friends, and one that will cause endless fun. Two ordinary matches are fixed together to form a 'V' and when placed astride a thin straight edge, such as a knife blade, and held as shown, they will mysteriously 'walk' along from one end to the other.

The success of the operation depends on how your hand shakes. No matter how much you try you will find it impossible to keep it perfectly still. There is always a certain amount of nervous movement even if you do not realize it, and it is this slight vibration that makes the matches 'walk'.



Two matches of equal size and length are needed for each 'walker'. With a sharp blade, carefully cut a V-slot in the end of each match about  $\frac{1}{8}$  in. long, and slot them together.

Now try them out on the back of a table knife, which should be perfectly straight. Hold the knife between the thumb and first finger, with the wrist resting on the table. Keep the knife parallel with the table, and allow the heads of both matches just to touch its surface.

You may sometimes find it an advantage slightly to tilt the knife to enable the matches to travel along faster. Instead of a knife you can use a piece of thin material that has a straight edge, such as a steel rule.

## MORE MADDENING DROODLES



These are not examples of Modern Art, for all the titles will be perfectly obvious when you discover what they are. For example, figure 4 could be, 'Red Corpses who Love in Vain', 'Back Stage View Of Juba Juba Dancers Taking A Bow' but it is really intended to be quite different. Write down your twelve names before you turn to the real titles.

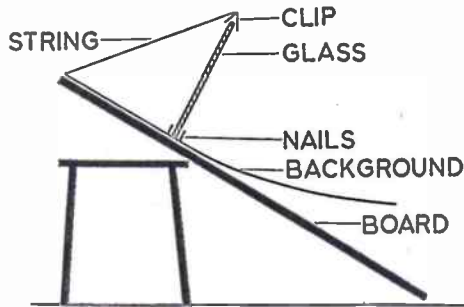
1. Cat - a - Pillar.
2. Duel between world Champion Marksmen.
3. Egyptian Mummy with a Turnmy.
4. Mouse Holes with Curtains.
5. Caterpillar crossing the Ace of Clubs.
6. Lunatic — Man off his Rocker.
7. Red Corpses who Love in Vain.
8. Kite Flown by a Man in a Submarine.
9. Mosquito showing his girl his Latest Job.
10. Kennel for a Bird Dog.
11. 3 Mushrooms and a Toadstool for a Gourmet who likes to play Russian Roulette.
12. Peg Bored.

# A CAMERA TRICK

OUR illustration at the top of the page shows what appears to be a stacked playing card 'house' caught in the very act of falling. It is a good example of another trick camera shot and the same method can be employed for taking other shots of such things as falling crockery, cutlery, tumblers or dominoes.

The main requirement is a piece of plate glass to support the objects, and the actual arrangement is clearly shown in the diagram and other photograph. You will need a board to form a base

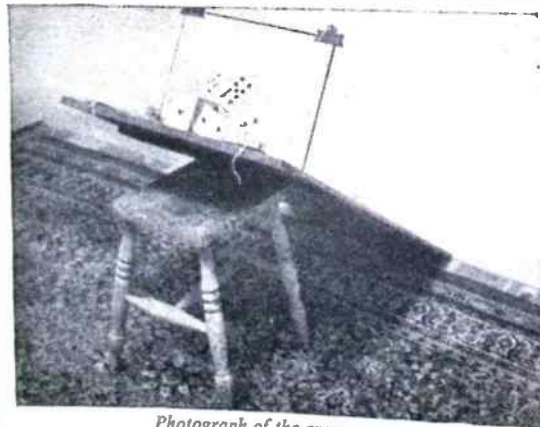
By  
S. H.  
Longbottom



on which is laid a sheet of neutral coloured paper to act as both foreground and background. This sheet of paper is curled up at the rear to make the background.

Two nails are hammered into the edge of each side about 1 ft. from the front end of the board. These make stops for the glass, holding it in a vertical position.

A bulldog clip is attached to each end of the top edge of the glass and pieces of string tied to these. These strings are then tied to other nails knocked into the front edge of the board. This completes the erection of the apparatus, and when the board is supported by a stool, as shown, we have a convenient shelf allowing objects to be laid at any



Photograph of the arrangement



desired angle. The angle of the glass, which is approximately 45°, can be modified by simple adjustment of the stool.

The background paper is propped up a little but must be well behind the glass, so that any shadows are eliminated.

It will be found that playing cards or other objects will stand against the glass quite easily in any kind of arrangement, yet have the appearance of falling when photographed. The only thing to remember is that the camera must be tilted so that the film plane is at 90° to the set.

Perhaps we should also mention that it is necessary to inspect the set for any possible reflections in the glass, and these are countered by altering the angle of the cards or placing another over the reflection. Another detail to observe is the joint between the glass and the foreground, which should also be hidden, or the secret will be revealed.

For your information the illumination was ordinary room lighting. A 200 watt lamp was the light source, diffused by the fitting and with an FP3 film an exposure of two seconds at f16 was given. The reason for this was primarily to exclude harsh shadows which photo-floods would have made, but the high, diffused toplighting has avoided these. It also served to illustrate that you can make similar experiments without any special lighting equipment.

This arrangement will be found extremely interesting for making all kinds of trick shots and particularly where the shadows must be eliminated.

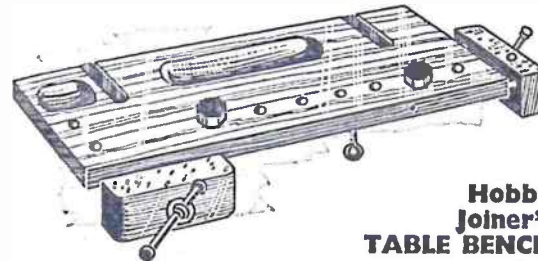
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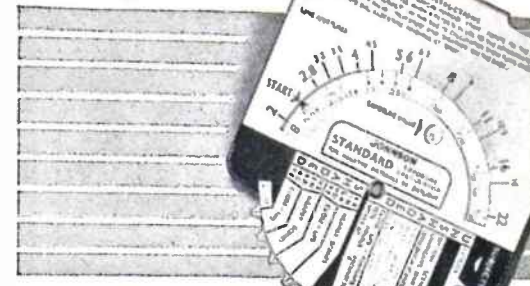


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# THATCHING AND WEAVING

PAPER sculpture embraces all variations of paper and card folding, cutting the pattern, and the repeat method of obtaining continuous borders and friezes, pattern radiation and alteration of design. Here we will deal with the repeat pattern or border, as shown in Fig. D. The work is popular among children, students, and advanced artists for many kinds of decorative panels and border work. The varieties are infinite, and many fascinating motifs may be obtained by folding and cutting paper, and with the addition of the moulding from scoring, the work is further enhanced. Popular subjects are dancing girls, trees, toy animals, and so on.

The work is carried out by folding suitable strips of thick paper, white or

cut out the same design twice in two different colours, preferably those which harmonize or contrast. When the border is produced and finally stuck down or mounted, as the case may be, it should be so affixed that it reveals a  $\frac{1}{2}$  in. of the first motif, thus giving a shadow back-

*By F. T. Day*

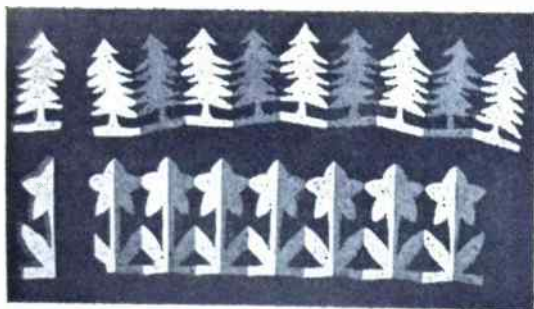
ground effect. To these repeated designs and patterns, small components such as stars, crescents, circles, and the like, may be affixed with good effect. Correct spacing will have to be judged by the worker, and this is all good practice.

All snippings of papers may be used

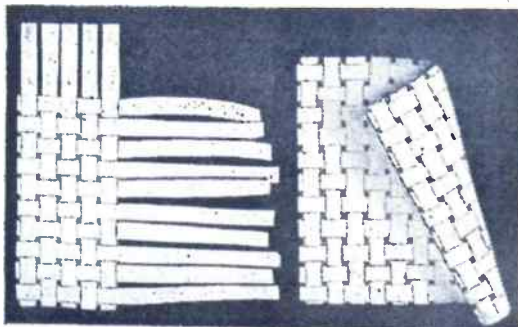
show the method of interlacing.

Baskets may be so made up, and the separate pieces shaped and fashioned to represent a style of basket. The handle may be of covered wire, and in this case, some reinforcement of the top edge of the basket will be necessary, so that the wire handle can be suitably affixed.

Caskets may be made by sticking the thatching prepared into the existing boxes — the thatch serving as a covering ornament. Various small components may be affixed on to the interlaced parts in order to decorate the finished box. It is the creative genius of the worker that counts, and once the initial idea has been grasped, all kinds of motifs, objects, and forms of decoration may be carried out through the medium of paper sculpture.



(D)—Repeat motifs



(E)—Thatching and Weaving

coloured as desired, for the motifs (green for trees, etc.). Only half of the design is drawn and then, carefully keeping to the drawn sketch, the strip is cut. Upon opening up a result is obtained similar to that shown in the illustration. Care must be exercised to see that the left-hand edge of the folded paper is not cut so as to completely sever the design. Scoring and moulding may then take place as may be necessary for the motif. This will give tones and effects not obtained from flat paper.

A strip of paper 2 in. wide by 12 in. long is a good basis for beginners. Fold this into four, and then pencil out some first attempt at simple designing (half of the shape as mentioned).

Thick folds of paper or thin card may tax the strength of some fingers. Two folded and cut repeat patterns may well be worked out into one ultimate design by the super-imposition of pattern upon pattern; one must be larger than the other for this kind of work. Yet another variation of the repeat pattern style is to

for added detail. Frieze designs may be undertaken by the more advanced pupil, and may be used for permanent decoration. Paper sculpture is at its best when used for such motifs, which with another medium would appear just flat. With sculpture they take on a definite shape, and give almost real lifelike effect.

Thatching and weaving is yet another fascinating craft employed in schools and many centres, the work being carried out with paper, leather, metal, and other materials. The method and finished effect is amply illustrated in Fig. E.

A  $\frac{1}{2}$  in. strip is all that is necessary for beginners, and fairly strong material such as cartridge is required for good handling, and has a long life when completed. Coloured strips give excellent colour variations — it all depends upon the ultimate use of the work. The operation is best described as interlacing under and over alternately, so that the thatched pattern, design or style is obtained. Draw the pieces up closely together; our illustration is purposely exaggerated to

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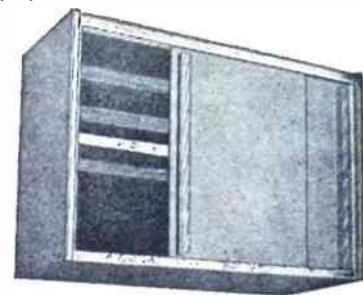
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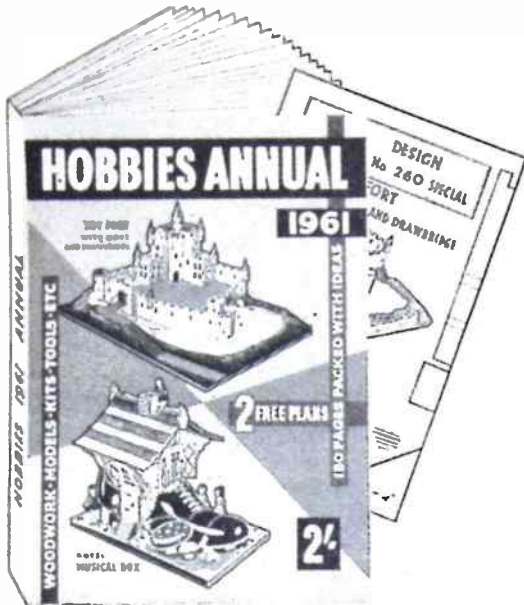
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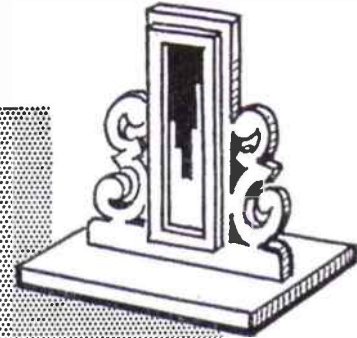
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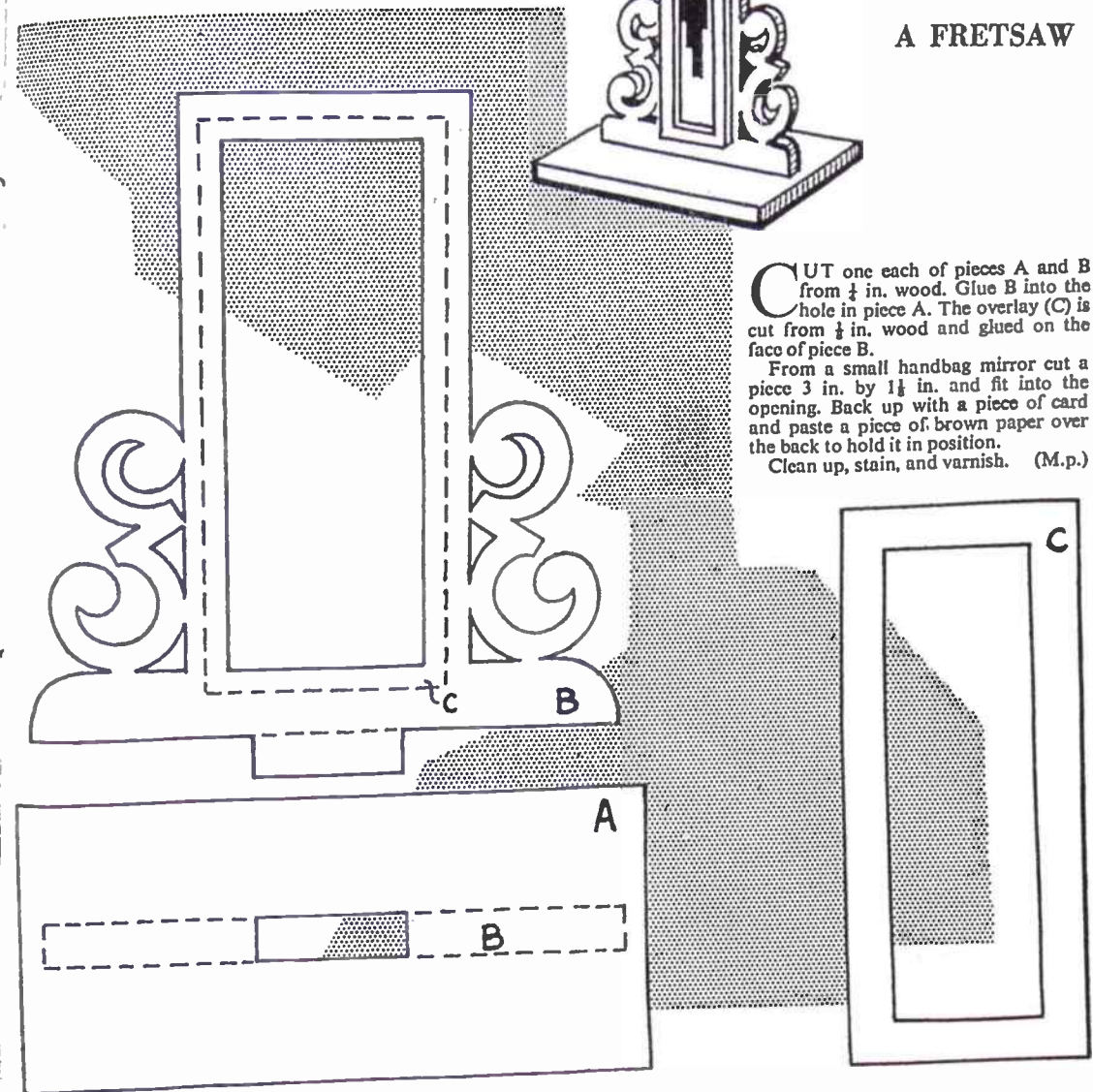
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**READER'S REPLY**  
**HW** AUGUST 1960



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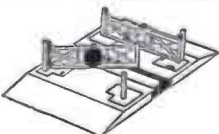
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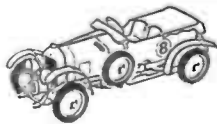
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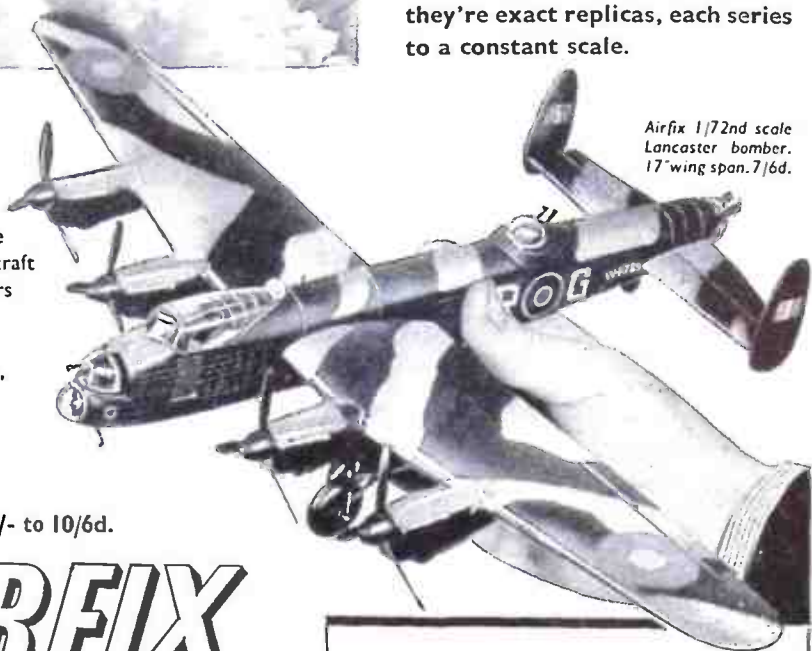


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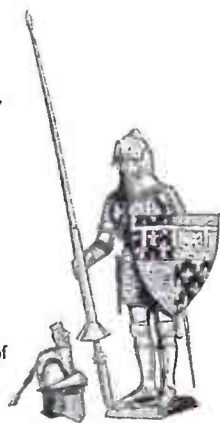
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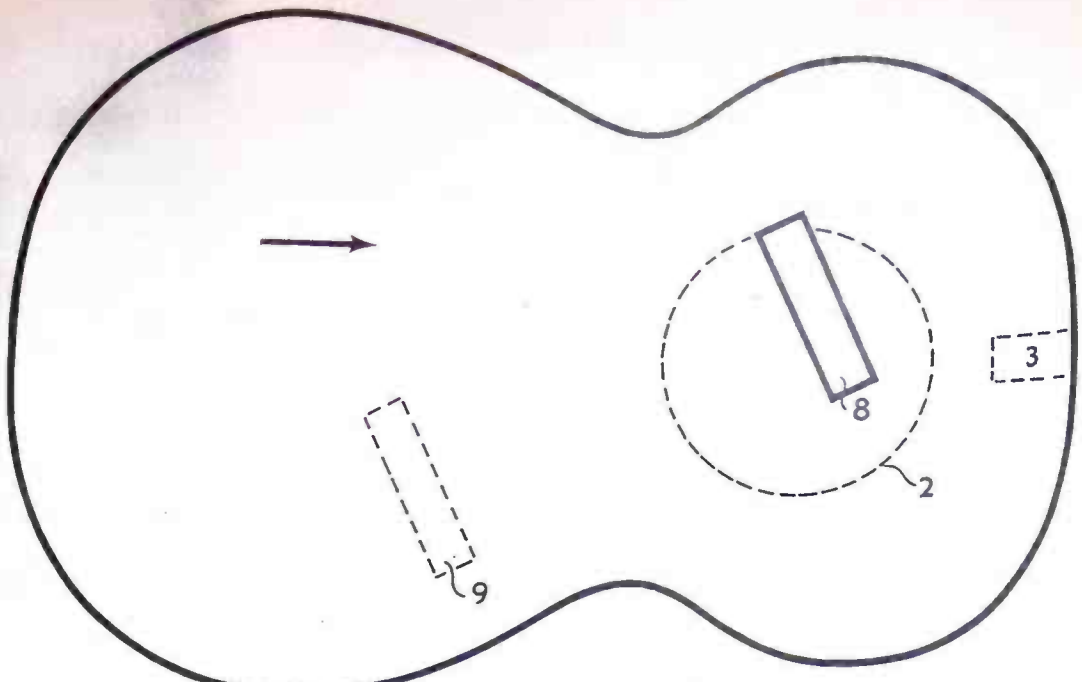
A KIT OF MATERIALS FOR MAKING THIS DESIGN IS SUPPLIED BY HOBBIES LIMITED, DEREHAM, NORFOLK. PRICE ON APPLICATION.

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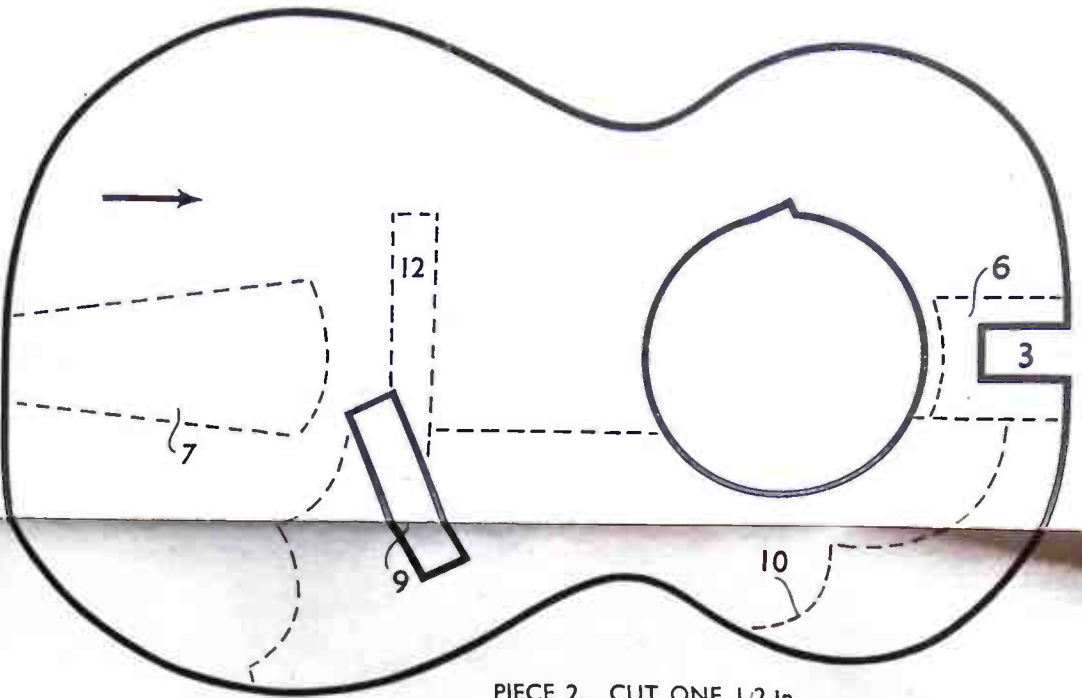
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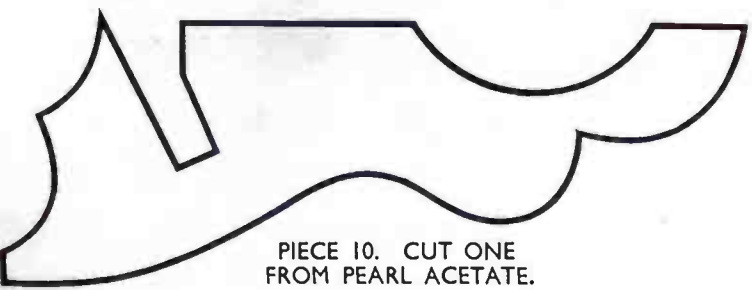
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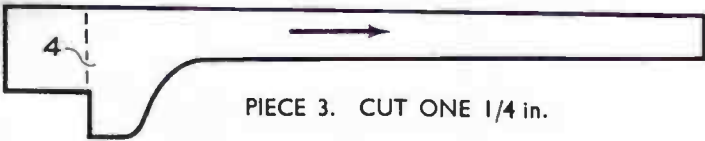
PIECE 1. CUT ONE 1/2 in.



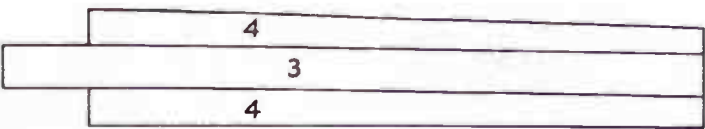
PIECE 2. CUT ONE 1/2 in.



PIECE 10. CUT ONE FROM PEARL ACETATE.



PIECE 3. CUT ONE 1/4 in.

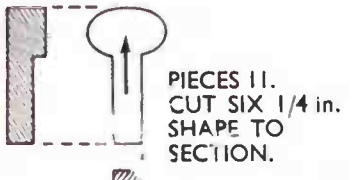


PIECES 4. CUT TWO 1/4 in.

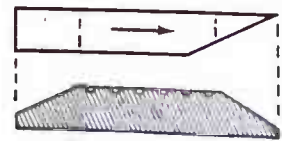


SECTION

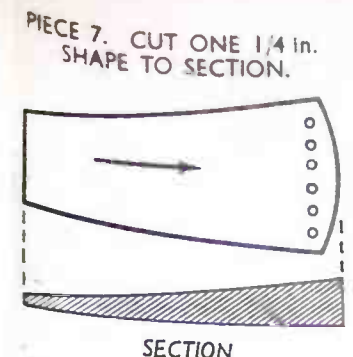
GLUE 3 & 4 TOGETHER AND SHAPE TO SECTION.



PIECES 11. CUT SIX 1/4 in. SHAPE TO SECTION.

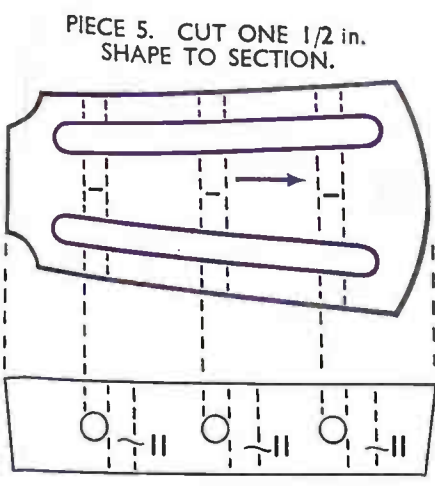


PIECE 12. CUT ONE 1/4 in. SHAPE TO SECTION.



PIECE 7. CUT ONE 1/4 in. SHAPE TO SECTION.

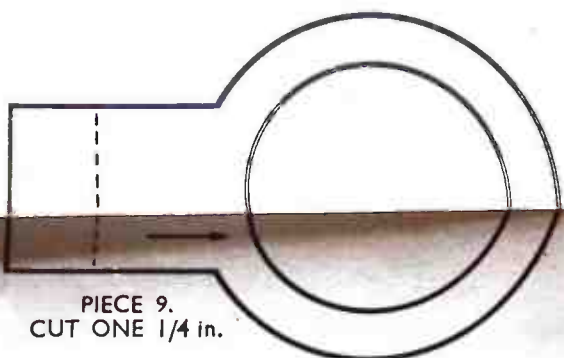
SECTION



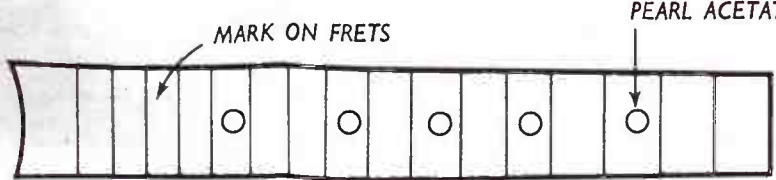
PIECE 5. CUT ONE 1/2 in. SHAPE TO SECTION.

SECTION

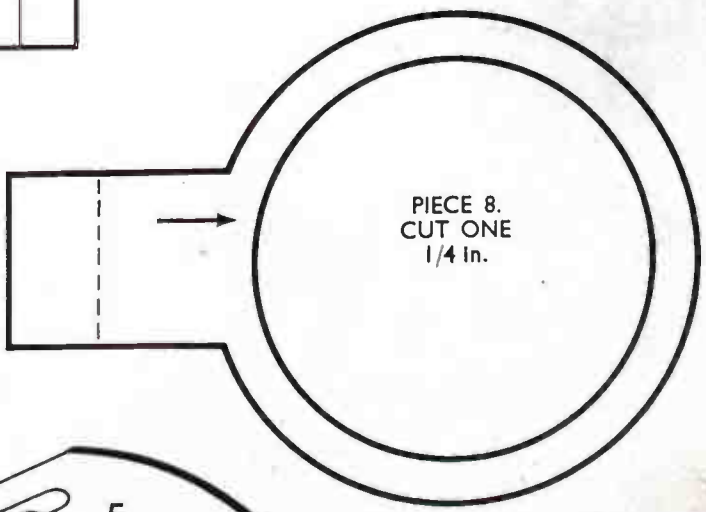
Note. TRACE AND CUT TO OUTSIDE OF THICK LINES.



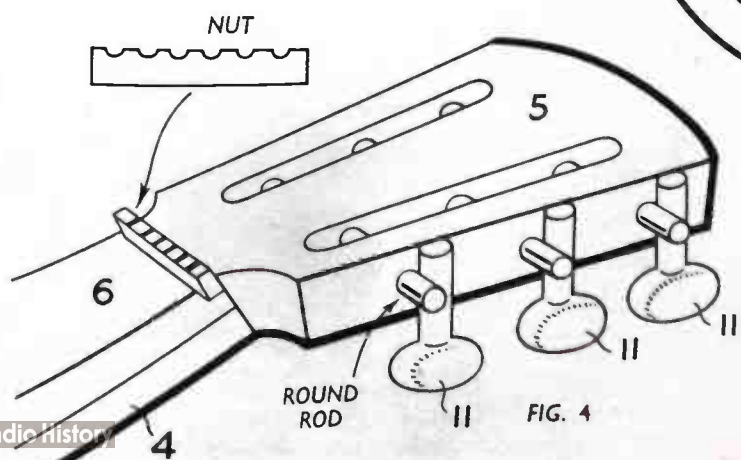
PIECE 9. CUT ONE 1/4 in.



PIECE 6. CUT ONE 1/4 in.



PIECE 8. CUT ONE 1/4 in.



THE ARROWS INDICATE THE DIRECTION OF GRAIN OF WOOD.