20th JULY 1960 VOL. 130 NUMBER 3371

THE ORIGINAL 'DO-IT-YOURSELF' MAGAZINE

HOBBIES weekly

FOR ALL HOME CRAFTSMEN

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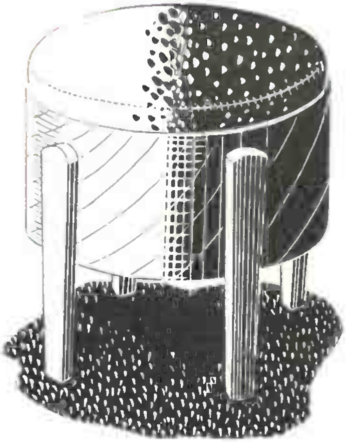
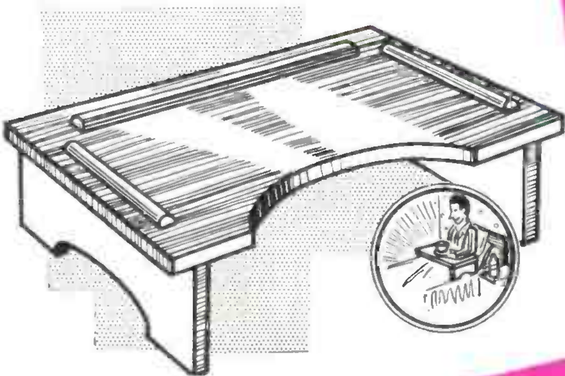


A Comfortable
MODERN STOOL

Instructions for making . . .

A Handy
FOLDING BED TABLE



Up-to-the-minute ideas

Practical designs

Pleasing and profitable things to make

5D.

1933 was a good year for Austrian philately. Highlight of the year was the WIPA exhibition in Vienna. A large variety of interesting private postal stationery exists from the show.

A special WIPA flight, Vienna–Budapest and Budapest–Vienna was organized, and special cachets were used on all mail carried.

AUSTRIA

For airmail collectors, the year 1933 brought two Kronfeld glider flights to the Semmering, and the Gray–Maribor (Jugoslavia) glider flight with a variety of private stationery with imprinted stamps. In addition to the events mentioned, no fewer than nine Austrian rocket mail flights also took place.

On 13th July 1933, just after the WIPA, the four-country flight of the Austrian glider pioneer Kronfeld, took place. He toured Austria, Switzerland, Italy and Hungary, and three special official cards were issued by the Austrian Government for it.

Three other semi-postal sets were issued by Austria that year, a record for the period before World War II. The first F15 set appeared in conjunction with the ski championships at Innsbruck on 9th January. The stamps commemorating the 250th anniversary of the relief of Vienna from siege by the Turks, appeared on 6th September.

The first Winterhelp set also appeared that year.

MEADOPHOLOGISTS who enjoy good beer and a gossip with country folk will find The Harbour Inn at Exmouth in Devon an interesting place.

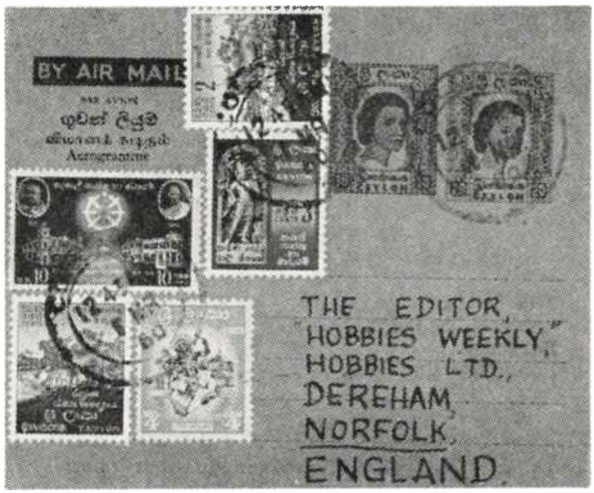
In summer you may meet famous cricketers and other noted sportsmen at this 800 years' old inn.

Mine host, Mr M. A. Rodmore, is assisted in the summer season by Oxford undergraduates. The first team of young men from Oxford were presented by local Cambridge undergraduates with a suitably inscribed and autographed china bowl, on which many others from the Varsities subsequently made their mark.

Exmouth was once the foremost port of the West Country.

Our photograph is of Kenneth Christie, who would like to thank readers for all their help. He is completely disabled, but since writing to the Editor he has found many new friends. Their kindness is helping him to get well. Why not write to Kenneth at 8 Oakland Villas, Reynoldson St., Newland Ave., Hull, Yorks.

Frederick Medis of 'Ivanhoe', Jambugasmulla, Nugegoda, Ceylon, writes — 'I am a regular reader of your magazine. I would like to write to other readers who collect match labels, stamps, coins, razor blade covers, postcards, antiques, dolls, shells, and cigarette cards.' The air mail cover of his interesting letter is illustrated below.



Below: Austrian stamps

Rosella Jonas, of 1608 Mahaning Avenue, Youngstown 9, Ohio, U.S.A., writes: 'My main hobby is postcards. I would be glad to hear from any postcard collectors in the hope that I can exchange with them. I can furnish other hobby material in return for cards.'

And if you would like a friend in Grenada, write to Pansy Rowley, 3 Tyrrel Street, St. George, Grenada, West Indies.

In modern style

A COMFORTABLE PADDED STOOL

THIS stool is both smart and practical and can be made in a few hours by the handyman. The padded portion consists of a slab of foam rubber which forms a soft and comfortable seat for televiewing and other occasional uses. The sides and seat may be covered with material to match or harmonize with curtains or other upholstery.

The side view and plan in Figs. 1 and 2 show the general layout and the suggested sizes. The framework is made up from two circles of ½ in. plywood (A) and four supports of ¾ in. wood (B). These are shown in Fig. 3 where it can be seen that pieces B are notched to correspond with the cut away portions of pieces A. Glue and pin these pieces together and leave to dry.

The framework is covered with stout cardboard and heavy quality material as shown in Fig. 4. The material is overlapped round the cardboard and glued at the back. The cardboard should project about ⅜ in. at the top to hold the foam rubber in position. Glue the cover round pieces A, making the join down one of the pieces B.

The four legs (E) are now cut from ¾ in. thick wood, drilled to take countersunk screws and painted or varnished ready for fixing. They are fixed in position as seen Fig. 5. They must of course be screwed through the sides into pieces B.

The foam rubber seat is covered with material which is stitched in position underneath. (M.h)

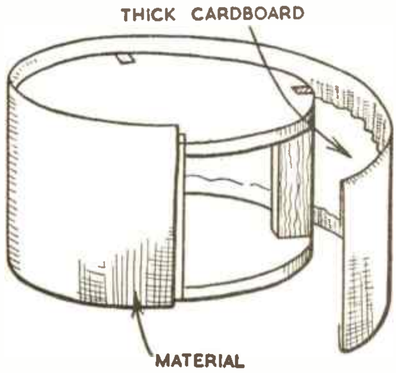
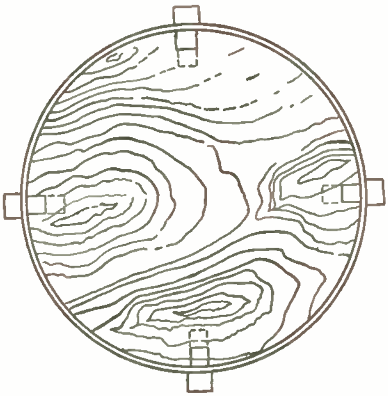


Fig. 4



PLAN

Fig. 2

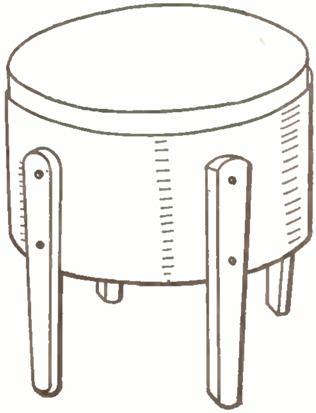
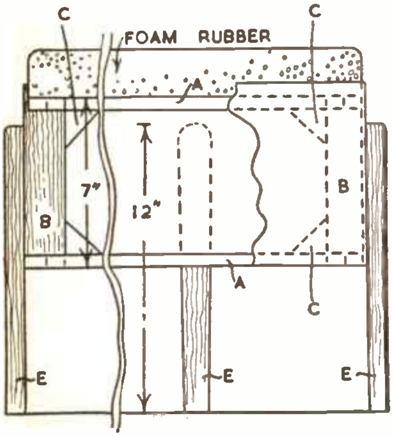


Fig. 5



SIDE VIEW

Fig. 1

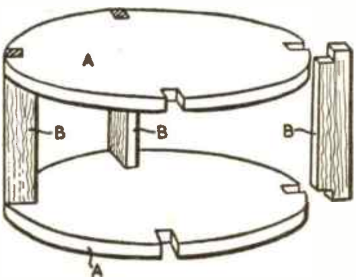


Fig. 3

★ Next week's free design will be for making a Child's Desk — a very popular project which should created a lot of interest. Make sure of your copy. ★

MARIONETTE CONTROLS

By G. A. Edmonds

TO make the controls for your marionette described in previous issues, the following materials and tools are required: One wood lath, 2 ft. long; two small screws; one 1 in. small-headed nail; Tenon saw; hand-drill and a selection of bits.

Cut the lath into the following lengths: 12 in.; 4 in.; 4 in.; 3 in.. Bore small holes at each end of the 3 in. and both the 4 in. lengths, and proceed with the following instructions as illustrated in Fig. 1.

At 2½ in. from the end of the 12 in. length fix one 4 in. length across it with one of the screws. This is the bar for the hand strings and must be tightly screwed.

Turn over the 12 in. length so that the hand bar is now underneath. Measure ½ in. from the same end as before and drive in the nail. At 5 in. from the same end the 3 in. bar is attached by the other screw. Firstly, however, a hole must be drilled in the centre of the 3 in. bar slightly bigger than the diameter of the screw. The screw is driven in tightly enough to stop wobble, whilst still permitting easy lateral movement. This bar will take the shoulder strings.

Immediately behind this bar two holes are drilled side by side. They must be sufficiently far enough from the bar to ensure that the head strings that come through them are not impeded in their movements.

Finally, a small hole is drilled at the far end of the control to take the back string, and the control is now ready for the strings to be attached.

The materials required for stringing are as follows: Black button-hole thread if possible, but black cotton will do; a needle; one small curtain ring; one 1½ in. elastic band; one drawing pin.

It is advisable to make the strings only as long as is needed to bring the controls to waist level when the puppet is standing on the ground. Any performance longer than ten minutes duration can be very exhausting to an operator who is forced to keep his hands high owing to the inordinate length of the puppet strings.

Begin with the shoulder strings. In this way the puppet can be hung from the controls when completing the remainder of the stringing. Lay the puppet on the table and sew a shoulder thread through the seam halfway along each shoulder. Tie the other ends of the threads to the holes at each end of the shoulder bar on the controls. Keep each thread separate and do not allow them to cross. The control can now be hung for the easier stringing of the remainder.

We now deal with the head strings. Prepare the curtain ring by hitching the elastic band around it (as seen in Fig. 2.) so that it is ready when required.

The head is replaced on the head strings that were left at the neck of the puppet. A thread is tied on each of these strings close to the head and any excess string is cut off. Keeping the head threads as taut as are those from the shoulders, thread one through each of the holes behind the shoulder bar and tie both to the curtain ring. Fix the end of the elastic band to the centre control shaft by a drawing pin after making sure that the shoulder and head threads are of equal tension (Fig. 2)

The head is now upright and there should be little tendency for the puppet to turn whilst it is hanging. A test should now be made to see if the curtain ring mechanism is working smoothly.

Hold the centre shaft as if for normal operation, and place the forefinger of the hand holding the shaft into the curtain ring. If the threads are running easily through the holes, then move the finger forward and the head should drop. Let go the ring, and the head resumes its normal position. Pull the ring back, and the head looks upward. Move the ring backwards and forwards, and the head makes the 'speaking' movement.

The five remaining strings are looser than those already fixed, but be warned about having them too long.

Tie a thread to each of the strings that emerge from the backs of the hands, and cut off the excess string. These threads are attached to each end of the hand bar, making sure that the hands hang loosely.

The back thread is sewn to the dress on the back of the puppet at a point just below the waist, and the other end is tied to the hole at the back of the controls. This ensures that when the upper half of the puppet is bent forward, the hips and the legs remain erect.

Finally the strings for the legs. Take the remaining 4 in. bar and drill a hole in the centre big enough to allow the bar to be placed on the small-headed nail at the front of the controls, and to be removed easily, as in Fig. 3.

With this bar in place on the nail, sew a thread to the top of one knee and tie the other end to this leg bar, leaving the thread to hang limply. Do the same with the other leg.

Operating the Controls is best described by listing each operation separately. It is a good idea to stand a mirror on the floor against a chair so as to see the reflection of the puppet; then the operator gets the same view as the audience.

Walking

Hold the controls in one hand and remove the leg bar with the other. When the bar is rocked sideways one leg after another should lift and bend at the knee, with the lower leg still hanging down, and then straighten out as it returns to the ground. As the controls are moved forward, we have the typical puppet walk.

Should the legs not perform in the manner described, then perhaps the feet should be weighted. Experiment with Plasticine, plaster, solder, or lead, or any other usable material, until the desired effect is obtained. It is also worth looking at the dress around the knee to see if it is too tight.

Hand movements

The hands may be moved separately by pulling at the appropriate string, or together by pulling at both.

Head and shoulder movements

The head and the shoulders may be made to move for the puppet to look

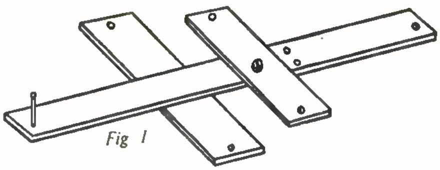


Fig 1

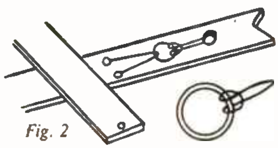


Fig. 2

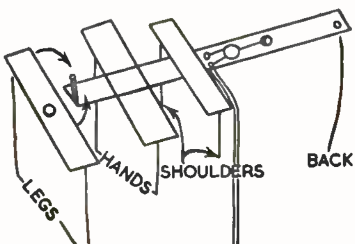


Fig. 3

● Continued on page 273

For the model maker

Low Voltage Circuit Interrupter

By 'Modeller'

THIS circuit interrupter works automatically, and is intended for use in a model light-house, or any other model where small bulbs need to be switched on and off at regular intervals. The 'on' and 'off' periods can be adjusted somewhat, but will usually be at intervals of between about 1 second and 6 seconds. This is satisfactory for flashing lights in many models.

The interrupter is made on a strip of wood about 5½ in. long, 1¼ in. wide, and ½ in. thick. The actual dimensions of the various parts will not make any difference to the working, however. Two blocks of wood, with two long bolts, to clamp the bi-metal strip, are also needed. At the other end of the interrupter, a small piece of brass, such as can be cut from an old dry flash-lamp battery, is fixed with a small bolt, as in Fig. 1.

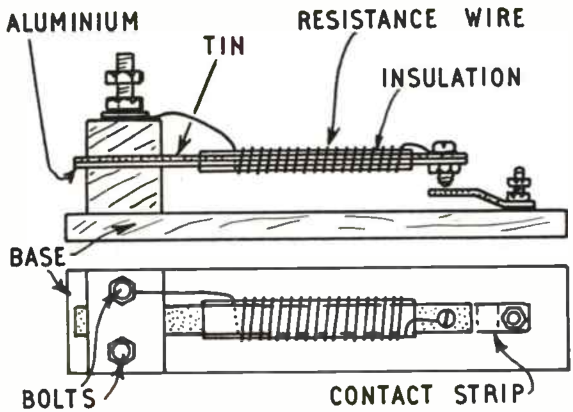


Fig. 1—Bi-metal strip and contact

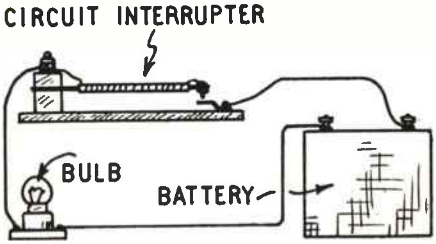


Fig. 2—Electrical circuit

The bi-metal strip

This consists of two strips of thin metal, each about 4½ in. long and ¼ in. wide. Different metals must be used, so that they expand at different rates when heated. Thin tinned iron, and thin aluminium, such as can be cut from household canisters, will be satisfactory. Copper is suitable instead of the aluminium. With some household commodities, the barrel of the container is made from tinned iron, and the end (or lid) from an aluminium alloy.

The two strips are the same size, and should be flat, with no rough edges to cut the insulation. A small bolt holds them tightly together at one end, as in Fig. 1. A layer of thin insulation, such as paper or transparent tape, is bound tightly round the strips. The heater winding is made on top of this insulation, as shown. For most small bulbs and batteries, 32 S.W.G. resistance wire will do, and about thirty or forty turns are wound on the insulation, slightly spaced from each other.

One end of the winding goes to the small bolt mentioned. The other end is taken to one of the long bolts. The bi-metal strip is then clamped tightly between the two blocks of wood, as shown. The bolts should not touch the metal strips.

The operation of the strip can now be tested by connecting a small battery from the long bolt to the projecting end of the bi-metal strip. After a few seconds, the unequal expansion of the metals should make the free end of the strip rise ⅛ in. or so.

The small fixed contact strip is so adjusted that the point of the small bolt bears lightly upon it, when the strip is cold. As current flows, the strips slowly heat, until the end rises and interrupts the circuit. The strip then cools, so that the contact is restored. Current then flows again, and this sequence is repeated as long as the battery is connected.

Interrupter circuit

The wiring for a small light-house or similar model is shown in Fig. 2. Interrupter, battery, and bulb are simply joined in series. To stop the bulb permanently, the battery is disconnected, or a switch added in one battery lead.

Some voltage drop arises in the interrupter winding, so the bulb must be of lower voltage than the battery — for example, a 2½V. or 3½V. bulb with a 4½V. or 6V. battery. The current taken by the bulb also governs the speed with which the strip heats, and the brightness of the bulb, with a given battery. So a few trials should be made with different bulbs and batteries, if necessary.

If the metal strips are thin and flat, the resistance winding will only need to grow warm — not hot. The device can only work if the strip is clamped firmly, and the end bolt is tight. It is also necessary to have the aluminium at the bottom, as shown.

The interrupter cannot be used with mains voltages. But it can control the flashing on and off of several low-voltage bulbs, if needed. Other gauges of resistance wire will also work. The timing interval can be changed by bending the contact strip, or altering the number of resistance wire turns on the strips.

● **Continued from page 272**

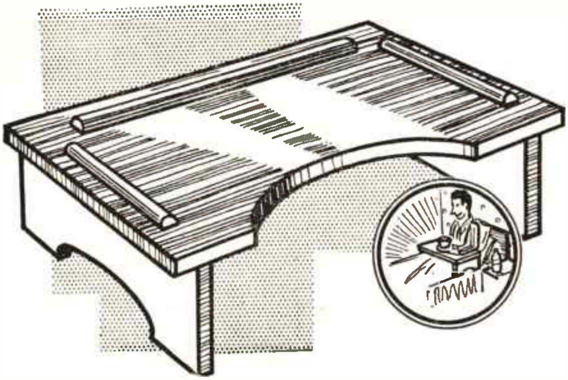
MARIONETTE CONTROLS

around by pushing forward one side of the shoulder bar which is loose on its screw. If this movement is not excessive the legs and waist will remain pointing to the front whilst the upper part of the body turns.

For other movements, practise before the mirror will soon bring what is wanted within the limitations of the puppet.

A simply-made stage for the marionette will be described in another article.

A FOLDING BED TABLE



By F. Kerr

EVERY home should have a bed table of some sort because it is such a handy item during times of illness when invalids usually have to eat, write and possibly do some light work in bed. The illustration at Fig. 1 shows a handy table which folds flat when not in use so that it can be easily stored away or used as an ordinary tray. The construction is very simple and there are no intricate joints to make. The measurements given in the accompanying illustrations will make a handy-sized bed table but of course these may be modified to suit individual requirements.

The table top is made from ⅜ in. thick plywood. Cut this to the required size and round off the corners for added appearance. Note also, that a shallow curve should be cut from the front edge to allow the table to be drawn closer to the body when in use. Smooth off the sawn edges with a rub of glasspaper. After this, three lengths of moulding, about ⅜ in. broad, should be fixed to the top surface to serve as a border. The three pieces of moulding may be fixed quite independently from one another so that no corner joints are necessary. Position them about 1 in. or so in from the edges. If desired, plastic topped plywood may be used for making the table top. However, if you intend to use ordinary plywood and cover the surface afterwards with some plastic material then do this before fixing the three border mouldings in position. This will avoid unnecessary cutting of the plastic material.

Next, the legs should be made. These are also made from ⅜ in. thick plywood and should be cut to the shape shown in Fig. 2. Use a bow saw, coping saw or padsaw to cut the necessary curves. Once again smooth off the sawn edges with glasspaper.

Two hinging strips, ⅜ in. square, should now be screwed to the underside of the table top. Note from Fig. 3 that they are positioned directly underneath the side mouldings on the upper surface. This will ensure that the points of the fixing screws will not be noticed on the surface. When this is done, hinge the two brackets in position using two pairs of brass butts.

The spring block, 3 in. by 1½ in. by ⅜ in. should now be glued and screwed in position at the centre on the underside of the table top.

Now comes the fixing of the spring. This consists of a piece of hardwood, preferably oak or beech, 1½ in. by ½ in. Fig. 3 shows how the spring operates. The ends are held in position by means of two plywood stops which are fixed to the sides of the legs. The length of the spring should be carefully made to suit the job. A tight fit is desired so that the legs are kept firmly in the open position.

Finally, complete the job by painting, staining or polishing, as desired.

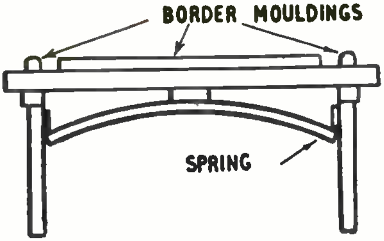


Fig. 1

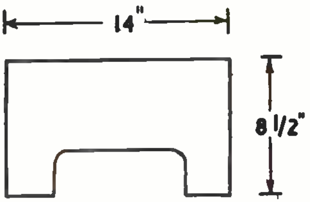


Fig. 2

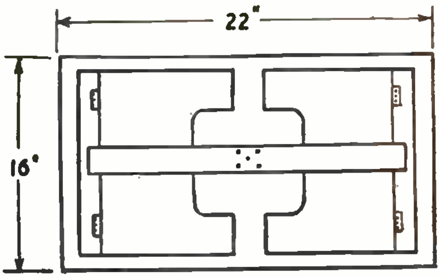


Fig. 3

PHOTO FILTER CASE

AN attractive vest-pocket filter case can be made easily by modifying a cheap cigarette case for this purpose.

Remove the elastic bands and cut a piece of plywood to fit into one side; cut the corners and shape the sides carefully so that the wood fits neatly, and flush with the edges of the case.

Cut a number of holes in the plywood sufficiently large to take the filters. They should be cut a shade smaller than required and glasspapered round until a neat fit is obtained for each individual filter.

Place a white card in the case before fixing the wooden frame in place. Stain the wood slightly and then fix it in the case by bending down the flanges which originally held the elastic bands. Write the names of the filters on the white card before putting the filters away.

Fit another piece of decorated wood to the other side, to hold the filters securely in position when the case is closed. (R.W.)

CHEMISTRY AT HOME

In response to requests from some of our readers, Lawrence A. Fantozzi, the contributor of these articles, is now incorporating chemical symbols, formulae and equations as applicable. It is hoped by this means further to assist the more advanced student while at the same time maintaining the general interest. —Editor.

INDUSTRIALLY known as 'yellow prussiate of potash', potassium ferrocyanide has the formula $K_4Fe(CN)_6 \cdot 3H_2O$. Two interesting facts arise from this formula. First, that it owes its crystalline form to the three molecules of water of crystallization and, second, that it is derived from hydroferrocyanic acid, $H_4Fe(CN)_6$. That an acid should contain iron, Fe, is in itself curious, for iron usually acts as a base. Despite its sinister name, potassium ferrocyanide is not poisonous.

Gently heat a little potassium ferrocyanide in a crucible. It turns from yellow to white, losing its water of crystallization and falling to powder.

Add some solution of ferric chloride, $FeCl_3$, to one of potassium ferrocyanide. An intense blue precipitate forms. This should be ferric ferrocyanide, $Fe_4[Fe(CN)_6]_3$, in accordance with the equation:

$$4FeCl_3 + 3K_4Fe(CN)_6 = Fe_4[Fe(CN)_6]_3 + 12KCl$$

but unless special conditions are observed mixtures containing potassium are obtained. These mixtures comprise the pigment Prussian Blue.

To obtain pure ferric ferrocyanide it is best to start from hydroferrocyanic acid, but before passing to this you will undoubtedly like to prepare Prussian Blue. In industry the preparation of this pigment is one of the most important uses of potassium ferrocyanide.

Dissolve 15 grams of ferric chloride in 200 c.c. of water and 12·6 grams of potassium ferrocyanide in 200 c.c. of water (warming the water will speed the solution of the salt). Stir the potassium ferrocyanide solution into the ferric chloride solution. Pour the blue liquid into a big bottle fitted with a siphon (Fig. 1) and nearly fill with water. When the blue precipitate has settled well, siphon off the clear upper liquid by blowing down tube A, and then fill up again with water. Repeat this washing by decantation several times, and then filter off the Prussian Blue and dry it in a not too hot oven or in the air.

It looks rather like indigo, and has a similar bronzy lustre. The latter is increased by rubbing. Another pigment can be made from this. Heat a little of it in a lidded crucible. Do this in the open air or in the fire, since poisonous vapours are given off. When the crucible has been red hot for a few minutes, let it cool. A brown powder will be found within. Boil it with water, filter off, and wash it several times. The resultant pigment is Prussian Brown and consists of ferric oxide, Fe_2O_3, and carbon, C.

By rubbing up a little of each of these pigments with weak gum water on a glass sheet by means of a pliable knife, blue and brown water-colours may be made.

The hydroferrocyanic acid needed for the preparation of pure ferric ferrocyanide is obtained by precipitation from potassium ferrocyanide solution with hydrochloric acid, HCl:

$$K_4Fe(CN)_6 + 4HCl = H_4Fe(CN)_6 + 4KCl$$

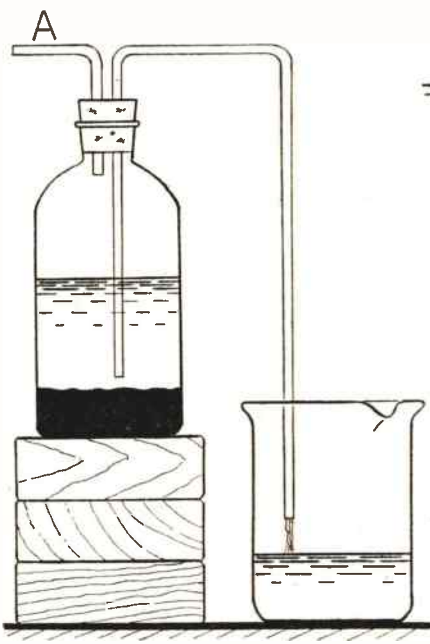


Fig. 1—Siphon washing of Prussian Blue

potassium chloride, KCl, remaining in solution.

Dissolve 42 grams of potassium ferrocyanide in 170 c.c. of boiling water and continue boiling for a few moments to expel dissolved air, for this would otherwise cause slight oxidation of the hydroferrocyanic acid. Let the solution cool and then stir in 50 c.c. of strong hydrochloric acid (caution; corrosive). A white precipitate of hydroferrocyanic acid appears which turns faintly greenish-blue.

Now filter off under reduced pressure using a filter pump (Fig. 2). Wash with several small lots of strong hydrochloric acid. Keep the acid in a well-closed bottle just large enough to hold it until needed, so as to protect it as far as possible from the air.

Remove about a quarter of it to a beaker and stir in small quantities of water until it has dissolved. Add a solution of 9 grams of ferric chloride in 200 c.c. of water, and stir well. An intense blue precipitate of ferric ferrocyanide forms:

$$3H_4Fe(CN)_6 + 4FeCl_3 = Fe_4[Fe(CN)_6]_3 + 12HCl$$

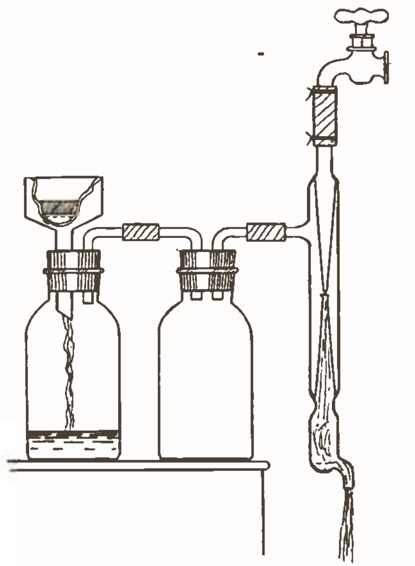


Fig. 2—Filtering hydroferrocyanic acid under reduced pressure

Wash it several times in a large funnel, and then let the bulky blue mass dry in a warm place.

Some soluble ferrocyanides may be prepared by acting on ferric ferrocyanide with a metallic hydroxide. The latter produces insoluble ferric hydroxide, $Fe(OH)_3$, which may be removed by filtration. Calcium hydroxide (slaked lime), $Ca(OH)_2$, for instance, gives calcium ferrocyanide, $Ca_2Fe(CN)_6$:

$$Fe_4[Fe(CN)_6]_3 + 6Ca(OH)_2 = 3Ca_2Fe(CN)_6 + 4Fe(OH)_3$$

Take about half the ferric ferrocyanide you prepared, and suspend it in enough water to give a very thin cream. Clamp the flask in a boiling water bath, and add small quantities of calcium hydroxide until the blue colour just disappears and gives place to a brown. Filter off the brown ferric hydroxide and expose the pale yellow filtrate to the air. This removes any dissolved calcium hydroxide by letting it combine with atmospheric carbon dioxide, CO_2, with precipitation of white calcium carbonate, $CaCO_3$:

$$Ca(OH)_2 + CO_2 = CaCO_3 + H_2O \text{ (water)}$$

When the solution grows no more turbid, filter it, and you have a filtrate consisting of calcium ferrocyanide. As it is difficult to crystallize, it is best kept in solution.

For the preparation of soluble ferrocyanides the free acid may also be made to react with a carbonate in the normal way. Magnesium ferrocyanide, $Mg_2Fe(CN)_6 \cdot 12H_2O$, is formed by dissolving magnesium carbonate, $MgCO_3$, in a solution of the acid:

$$H_4Fe(CN)_6 + 2MgCO_3 = Mg_2Fe(CN)_6 + 2CO_2 + 2H_2O$$

the twelve molecules of water of crystallization appearing when the solution is crystallized.

It should be noted that the magnesium carbonate of the laboratory is a mixed basic carbonate. Consequently, no exact formula can be assigned to it. Hence the convenient use of the formula of the normal salt, $MgCO_3$, to show the main reaction.

Dissolve about half the remainder of the hydroferrocyanic acid in just enough cold water, and stir in small quantities of magnesium carbonate. When the effervescence due to evolution of carbon dioxide no longer takes place, filter from excess magnesium carbonate and evaporate to the crystallization point, and allow the solution to cool down overnight.

Pale yellow crystals of magnesium ferrocyanide separate and may be dried on a porous tile. Further crops can be obtained by evaporating the mother liquor.

In a similar way strontium ferrocyanide, $Sr_2Fe(CN)_6 \cdot 15H_2O$, may be obtained by substituting strontium carbonate, $SrCO_3$, for magnesium carbonate.

Fire Races and Magic Pictures

HAVE you ever seen one of those mysterious 'fire races' that are sometimes found in Christmas crackers? The novelty is classed as an 'indoor firework', is quite safe to use, and consists of a thin sheet of rough paper upon which pictures of racehorses or aeroplanes are often printed. You are instructed to bend down the edges of the paper, stand it upon a plate, and then to touch several numbered black crosses with a red hot nail or cigarette end. To everyone's surprise little lines of sputtering fire will proceed upon erratic courses from the black crosses. Great fun is had in guessing which smouldering 'racer' will be the first to reach a printed 'finishing line'.

You can easily manufacture these amusing games and make exciting fire pictures of animals and people. Apart from a little artistic skill, a fine watercolour brush and some sheets of soft finish notepaper, you will need a saturated solution of potassium nitrate in water. Another name for potassium nitrate is saltpetre. Obtain an ounce at a chemist's shop. You had better explain to the chemist what you intend to do with your purchase. Prepare your saturated solution by dissolving the potassium nitrate in an eggcupful of hot water. Keep stirring with the end of a spoon and only stop adding the solid when no more can be dissolved by the water.

Make your games or pictures by painting the solution on to the paper in simple and continuous outlines. You will not be able to draw odd details like eyes and separate ears. Leave a gap of ½ in. between where your outlines start and finish. Mark an ink or pencil cross where you intend the start to be. If you decide to make race games, let the various tracks wander about in a haphazard fashion. This will cause much hilarity later on. Now you must let the solution dry upon the paper. When your fire games and pictures are finished, the trails of saltpetre should be invisible.

In order to demonstrate your fiery miracles, turn down the edges of the papers and stand them where the smouldering fire can do no harm. Touch the crosses with the point of a red hot knitting needle and watch the hissing points of fire trace out the secret tracks of saltpetre. A series of 'fire Derby's' may be run, and youngsters will be delighted to see the little animals and people 'grow' before them. If you are not very good at drawing, cut out the simple shapes of beasts and men from magazines, and use these as templates by carefully painting round them with the brush. Do not make your outlines too wide. (A.E.W.)

● Continued from page 277

FUN WITH STATIC ELECTRICITY

the crease, in the left hand. Stroke the paper, downwards, using the thumb and first finger of your right hand. Note that the ends of the strip fly apart and remain so, because you have given them like charges of electricity. Repulsion between similar electric charges is the principle of the static detector, or electroscope.

You can soon make a simple, but very effective, type of electroscope. Fashion two little spheres out of ¼ in. cubes of cork, using a razor blade and glasspaper, and join the balls together by means of a 6 in. length of cotton or silk thread. Make a 9 in. high 'gallows', from which the cork balls may be suspended, by bending an 18 in. length of ¼ in. diameter glass tubing over a Bunsen flame. Fig. 2 will illustrate the correct shape. Nail a cotton reel to a floor polish tin, to serve as a base, then erect the gallows by inserting the lower end into the cotton reel. Suspend the cork balls from the top of the gallows, in such a manner that they hang at the same level.

Put a charge on one side of a rubber balloon and hold the negatively charged surface just beneath the cork balls of your electroscope. Electrons will jump across to the cork balls, which, being insulated from earth by the glass gallows and thread, will become strongly charged negatively. Like charges repel, so the cork balls will fly apart, whilst vibrating in a curious manner, and may remain parted for several seconds after you take away the charged balloon. When you test the uncharged side of the balloon your electroscope will not be affected. Try testing plastic or sealing wax rubbed with wool, or a dry glass rod, rubbed with warmed dry silk.

Static electricity exists everywhere. You will produce electricity whenever you rub your feet upon a mat, tear a piece of paper, or stretch a rubber band. Ladies will have noticed the lively crackle of electricity whilst they are undressing and warm nylon garments rub against wool.

FUN WITH STATIC ELECTRICITY

By A. E. Ward

HAVE you ever combed your hair and then used the plastic comb, like a magnet, to pick up little pieces of newspaper and bits of thread? If not, try the experiment and demonstrate how your body can be a generator of static electricity. Hold the 'charged' comb above your head and look at yourself in a mirror. Your hairs will stand on end and repel one another. If the weather is very damp and hot you may be disappointed. For the best results, experiment by the fireside.

'Static' means electricity standing still. It does not flow like current electricity. Static charges accumulate upon the surfaces of insulators, like glass, plastic, and sealing wax when we rub them with fur, silk or wool. If you hold a key near a plastic comb which has been charged by friction through your hair, you may hear a tiny crackle, as a miniature spark of electricity jumps across to the metal and is conducted, via your body, to earth. You will have proved that static can be converted to current electricity by 'discharging' through a conducting substance. All metals, together with water, carbon, and human beings are good conductors, or 'carriers', of electricity. Now you will know why it is difficult to perform experiments with static electricity on summer days, for then the warm air is bound to hold some moisture which will constantly conduct away electric charges as they are produced.

Take a large sheet of thoroughly dry newspaper, hold it against a dry wall and rub it hard, all over, with a piece of dowel or broomstick. When you stop rubbing and remove your hands the whole sheet will adhere to the wall and will remain 'stuck fast' for a period of time which depends upon the dryness of the air and wall. When you rub the paper it acquires an electric charge which causes it to attract the surface of the wall, just as a magnet will cling to a corrugated iron fence. Equip your friends with wooden rods and sheets of paper and see who can make his paper stay longest upon the wall.

For the next experiment you will require a simple turntable, made as follows: Construct a little pedestal by screwing a 4 in. length of ½ in. diameter dowel to a wooden base block measuring 3 in. by 3 in. Firmly insert a sawn off piece of a steel knitting needle into the top of the dowel 'pillar', in such a manner that it points vertically upwards for about 2 in. Seal over one end of a 1½ in. long stub of narrow bore glass tubing by holding the end in the top of a hot Bunsen flame and steadily rotating the glass between your fingers. Bore a hole in the middle of a 1½ in. diameter slice of cork, into which the sealed end of the glass stub can be tightly fitted. Mount the cork platform upon the steel spindle and make sure that it will be able to spin round very easily. Press four tacks into the cork, in order to provide supports for the various rods and other objects which will be placed upon the platform. These directions are clearly illustrated in Fig. 1.

Rub a vulcanite fountain pen with a piece of woollen cloth and place it upon your turntable. Run a comb through your hair and hold it near one end of the fountain pen and observe what happens.

The pen will move away, causing the turntable to rotate, because the two electric charges will repel one another. Two rods of plastic tubing, cut off an old hula hoop, will be ideal for this and many other experiments with static electricity. Rub a warmed glass rod with a piece of dry silk and place it upon the turntable, then rub a second glass rod with silk and hold it near one end of the first rod. Again repulsion will occur between the two charged objects. Now rub a fountain pen, or plastic rod, upon your coat sleeve and hold the charged pen or plastic near the charged glass rod upon the turntable. Attraction will occur!

These experiments will suggest to you that there are really two kinds of static electric charges. When we rub plastic, rubber, or vulcanite with fur or wool, we give a negative, electric charge to the object rubbed, whilst the fur or wool becomes positively charged. This is because all atoms are composed of evenly balanced numbers of positive electric particles, or protons, and negative electric particles, or electrons. Electrons can be rubbed off fur or wool on to plastic, rubber or vulcanite so that those substances may be given a negative electric charge. When glass is rubbed with silk, electrons are rubbed off the glass, so that the glass will have a deficiency of electrons and acquire a positive charge, whilst the silk is given a surplus number of electrons and becomes negatively charged. Positive and negative electric charges were given their names by the great American scientist, Benjamin Franklin.

Inflate a rubber balloon and rub it several times upon a woollen garment. It will now be possible for you to make the balloon adhere to the wall or ceiling. By rubbing the balloon you give it a strong negative charge of electrons. The electrons on the surface of the balloon repel the electrons in the atoms near the surface of the wall, so that the wall acquires positive charge. Thus attraction between opposite electric charges is the cause of the balloon sticking to the ceiling. This explanation will not be hard to understand if you pause to think awhile. It is great fun to cover the ceiling with rubber balloons in this manner. Note that any two charged balloons placed close together will be repelled and roll away from each other, across the ceiling.

Repulsion can be demonstrated, using a 2 in. wide long strip of newspaper. Fold the paper in two and hold it, just beneath

● Continued on page 276

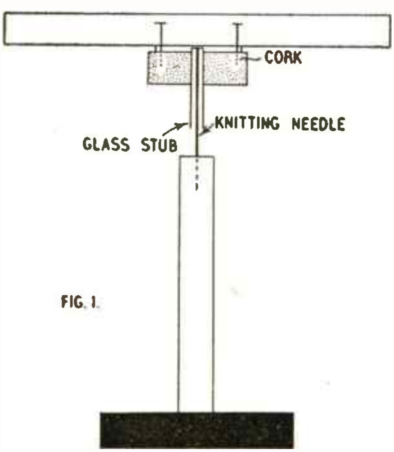


FIG. 1.

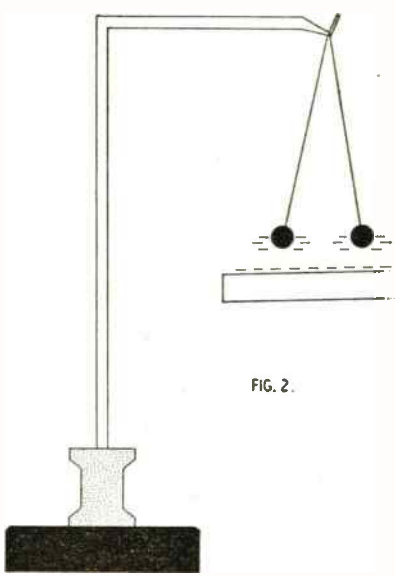
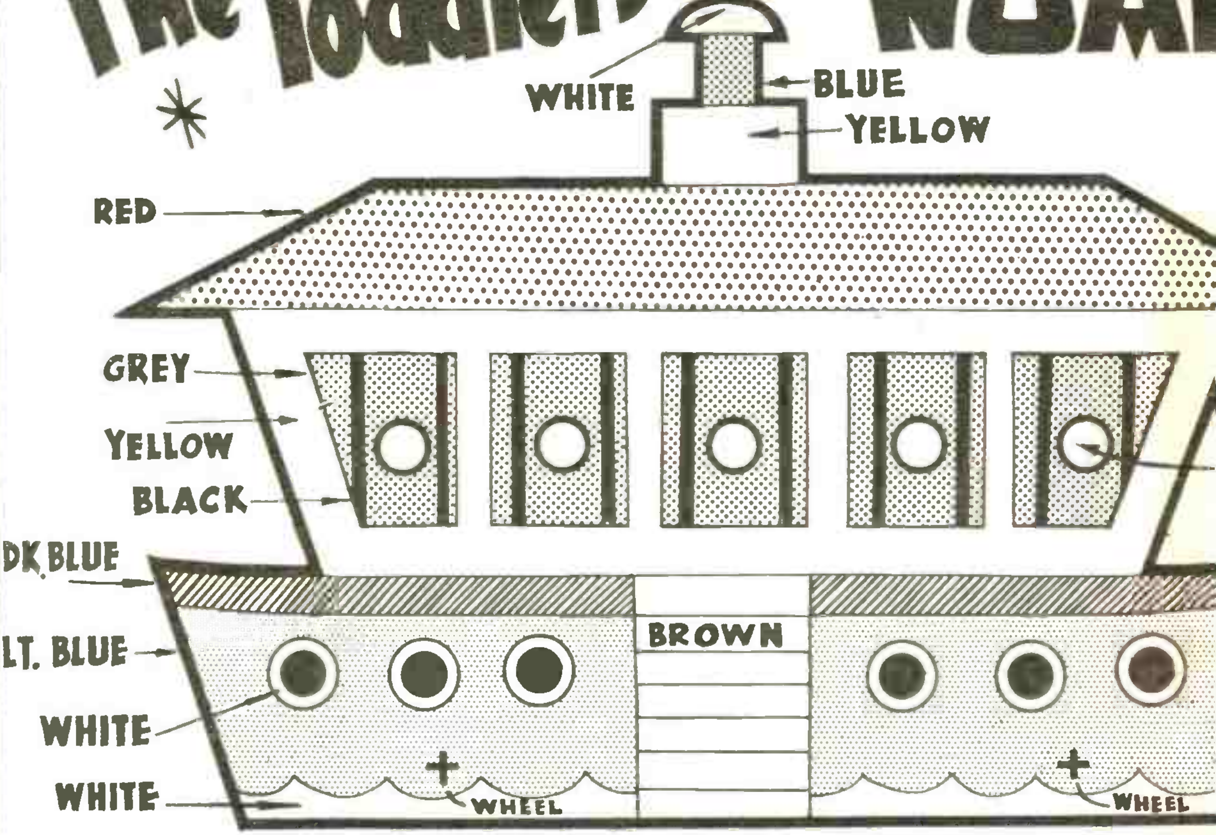
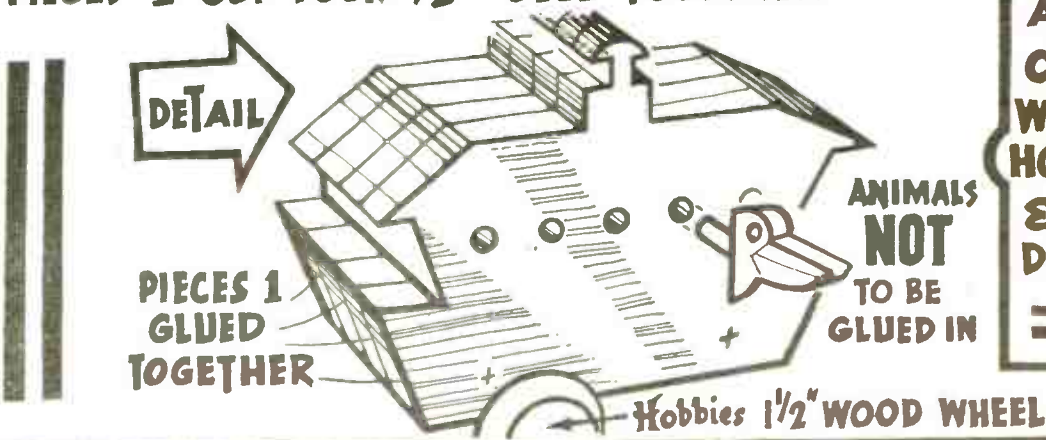


FIG. 2.

The Toddler's NOA



PIECES 1 CUT FOUR ½" GLUE TOGETHER



ALL A
CUT
WOOD
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& FIT
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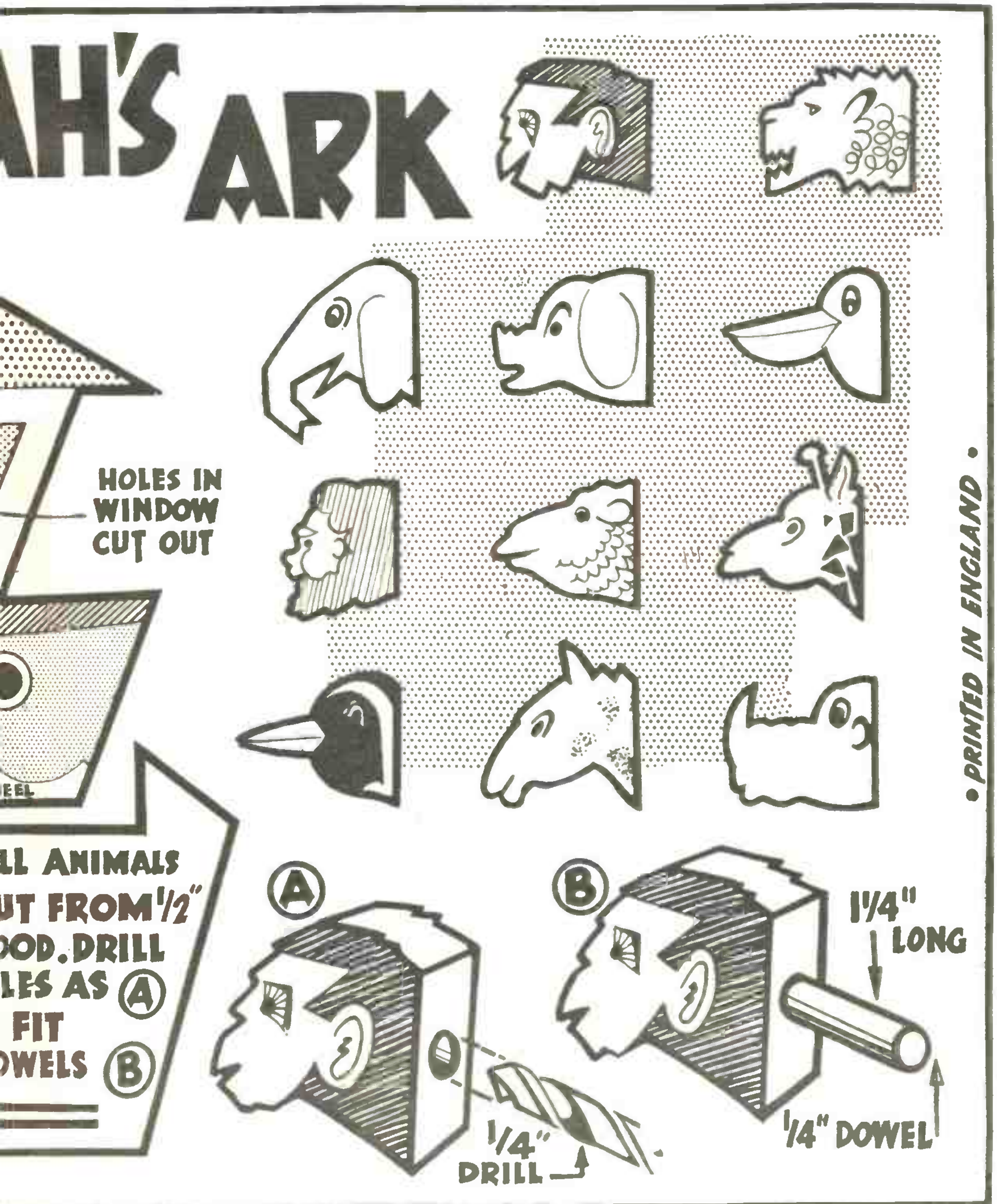
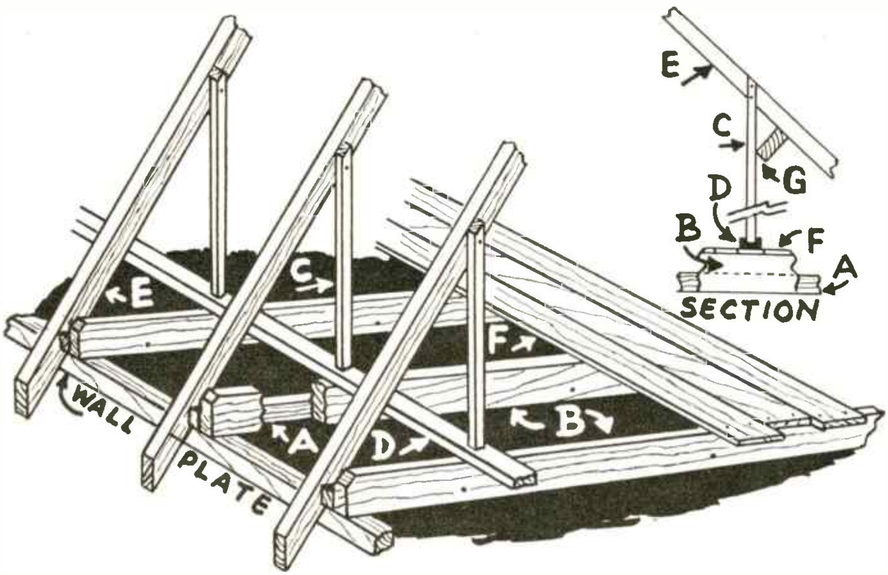

AH'S ARK
HOLES IN WINDOW CUT OUT
EEL
LL ANIMALS
UT FROM 1/2"
OOD. DRILL
LES AS (A)
FIT
OWELS (B)
A
B
1/4" LONG
1/4" DOWEL
1/4" DRILL
• PRINTED IN ENGLAND •

LAYING the stronger 7 by $1\frac{3}{4}$ in. joists is the first step in the actual construction of the room. It will be ticklish laying the first two; after that a gangplank can be laid across them, and succeeding joists, to facilitate a foothold.

4—FLOOR AND WALL SUPPORTS

The new joists are laid alongside the existing 4 by 2 in. joists. They are held together by screws. Three screws for each pair of joists will be sufficient. Drill clearing holes in the larger joists before laying.

On no account use nails. You will shudder the ceiling below, causing



cracks or falling plaster. It is wise to use screws for all future fixings.

Remember, the joists must rest on the tops of internal walls or the wall plate of the main outside walls. The wall plate end of the joist should be cut at an angle to match the rafter slope. This ensures that the maximum under surface of the joist rests on the wall plate.

The next step is to fit the grounds of 2 by 1 in. deal. These grounds will eventually carry the short upright part of the wall panelling; the remainder continuing up the rafters to the ceiling.

A 2 by 1 in. bearer plate is first fixed across the tops of the new joists at a point approximately 4 ft. from the wall plate. Into this are housed the 2 by 1 in. grounds (see section). Add a spot of glue to the housings. The tops of the grounds are screwed to the rafters, as shown. Be sure they are fitted upright.

In actual practice, the grounds will be fitted in front of the purlin (see section). It has been omitted from the main drawing for the sake of clarity.

Next, the actual tongued and grooved floorboards should be laid. Here again, use screws and not nails. Three or four boards should be placed in position, cramped up tight with a joiner's cramp, guiding pencil lines drawn across them in line with the joist centre below and finally held with two screws per board per joist. If joins have to be made in lengths of flooring they should be made down the centre line of a joist.

Before laying the boards, some thought should be given to the electric wiring needed for the completed room. Junction boxes are sure to be on view on the existing 4 by 2 in. joists. These can be tapped, but remember they most likely carry only a lighting circuit. They should not be tapped for power or heating until expert advice has been called in.

The point to remember is that wiring can be hidden tidily under the floorboards and behind the wall panelling to emerge just wherever it is needed.

POLYSTIK AS A BONDING AGENT

ONE of the lesser known, but none the less important, uses of Polystik as a bonding agent is in plaster and cement work, as it eliminates the necessity for hacking out or keying when repairs are being made. How to make a lasting and secure job of concrete and cement screeding, flooring, rendering and patching is contained in an informative pamphlet which can be obtained free upon request from the manufacturers Messrs. Croid Ltd, Imperial House, Kingsway, London, W.C.2

For the Bench Lathe

TWO USEFUL ACCESSORIES

A MITRE attachment is a neat and easily-made extra for the circular saw, which is fitted to the Hobbies Lathes. It will be of particular interest to those whose pastimes entail picture framing.

Briefly, it is a metal plate (thin plywood will do, but aluminium, brass or steel are better) with a guide rail below, and a double-sided mitre block above (see Fig. 1). The wooden parts are fastened by countersunk screws. Needless to say, accuracy of construction is essential — the sides of the metal plate must be absolutely parallel, and the two oblique faces of the mitre block at 45° to the guide rail. The guide rail must not be too deep in order that it should clear the saw spindle, but otherwise measurements may be adapted to suit materials available.

By R. N. T. Burke

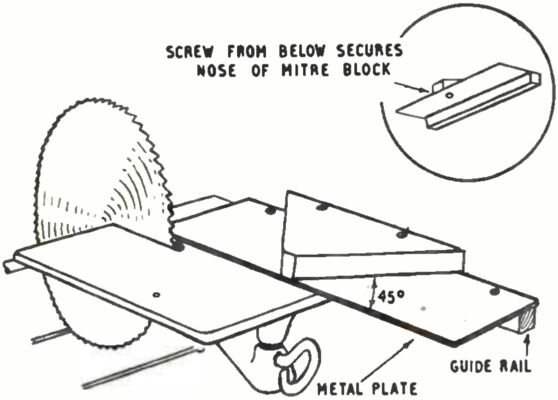


Fig. 1

To cut a mitre, set up the saw, mark the wood and (with the thumb and first two fingers) grip it to the attachment in such a position that the saw will make the required cut. Start the lathe and slide the attachment along the saw table, with the guide rail pressed gently to the edge. The device is reversible and can be used left- or right-handed. It is hardly necessary to add a warning to be careful not to mitre your fingers!

A sanding table with mitre guides can be made from any wooden box which is 6 in. deep or can be cut to this size. Use a carpenter's square to check that the box is true, and then pin guide rails to the work bench, so that when positioned by them one edge of the box is close to and parallel with the sanding disc. Make a mitre sanding guide, as shown in Fig. 2, and drill holes in the table to position it, bearing in mind that sanding with a table is normally done only on the descending half of the disc.

These two attachments will enable a quick, neat, and accurate job to be made of mitres, and the sanding table is useful as well for general work.

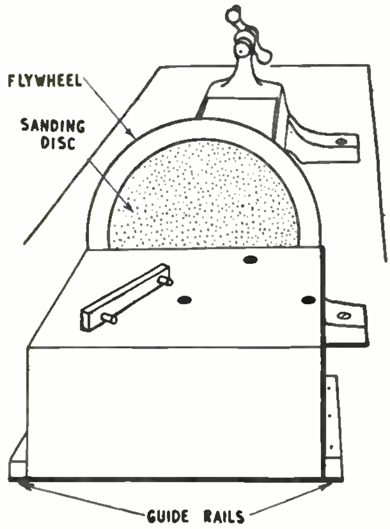
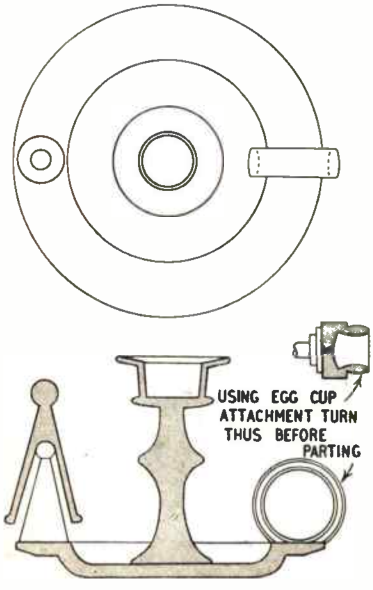


Fig. 2

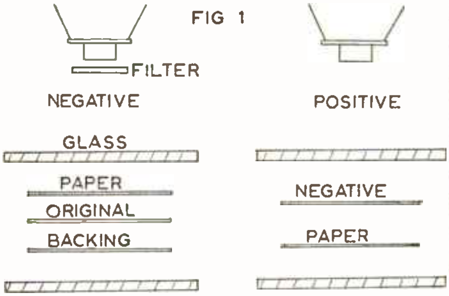
A NOVELTY CANDLESTICK AND SNUFFER



A MOST attractive and useful article to make on the lathe is this candlestick and snuffer. The base, 4¾ in. diameter, may be turned on the wheel arbor (as described in our 30th December 1959 issue), and dowelled to stick for finishing between centres. Turn snuffer between egg-cup bit and tail stock, and withdraw tail to finish off inside.

COPYING WITHOUT A CAMERA

OCCASIONS arise when a copy of a picture or photograph is required, and the normal process is to take a new photograph for the production of a negative. This can be particularly difficult, especially if the original is small, but by employing what is termed the reflective method we can make copies of diagrams, maps, line drawings in books, and similar illustrations, without having to use a camera, and in next to no time.



The reflective method of copying presents little trouble. You will require a contrasty grade of enlarging paper, some plate glass, a yellow filter, and some black paper.

We will assume that you wish to make a copy of a drawing from a book or magazine. This is opened at the appropriate page and the sheet of black paper placed underneath the illustration. It is necessary to ensure perfect contact between the page and the sheet of sensitized paper which is laid emulsion side down on the picture. This is achieved by placing a piece of stiff card or glass underneath the black paper and a piece of plate glass on top of the sensitized paper. The glass may be weighted down to ensure perfect contact, the whole arrangement being shown in Fig. 1. The essential point to note is that the sensitized paper is laid face down on top of the picture about to be copied.

Fig. 3—Negative line drawing

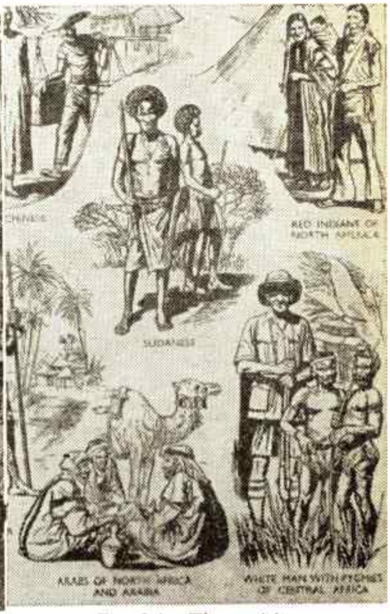


Fig. 3A—The positive

If you use an enlarger as illuminant it is best to cover the lens with a piece of yellow celluloid or similar material. In fact the accompanying pictures were made with the aid of a piece of clear yellow wrapping obtained from a bottle of fruit juice. This is the 'yellow filter' and it can be temporarily held in position by means of a rubber band. It should be noted that while the new negative is made with the yellow filter the latter is not used for making a positive copy.

Exposure will vary with the strength of the lamp and the size of the aperture, and it is advisable to make a few tests. Fig. 2 shows the best way of making a test negative, the horizontal strips being exposed for 2½, 5, 7½ and 10 seconds respectively. When the positive is made the tests are vertical as in Fig. 2A, for 2½, 5 and 7½ seconds. This method not only gives the correct exposure time for the positive but also indicates which density will produce the best results. Make suitable notes on the back of these test prints for future reference, including details of light and the distance between light and the paper. Here a 60 watt lamp was used.

Once the exposure has been made and

● **Continued on page 284**

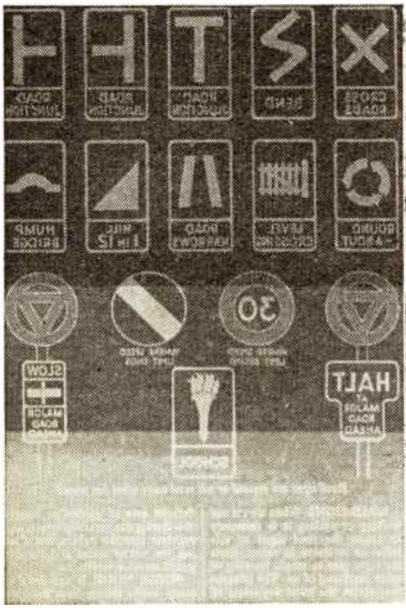


Fig. 2—Test negative

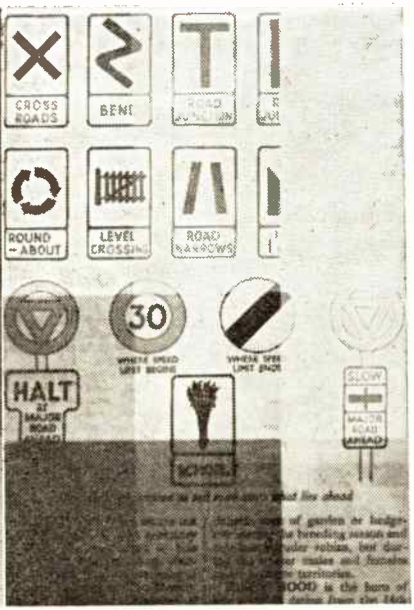
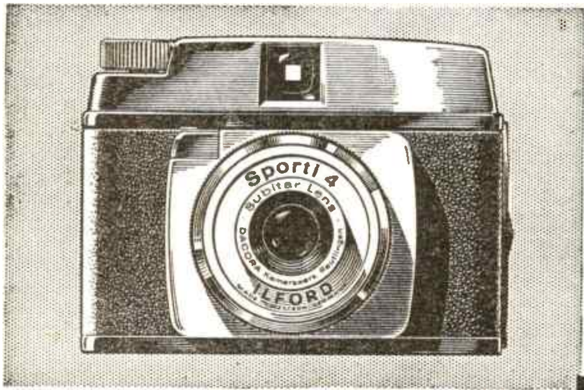


Fig. 2A—Test positive

SPOT ON with the ILFORD Sporti 4



This new 'Sporti 4' is certainly some camera. A really smart job, strongly made, with a big eye-level viewfinder. Even if you've never had a camera before, you can't go wrong with the Ilford 'Sporti 4'. In daylight, set the aperture to SUNNY or CLOUDY and squeeze the button.

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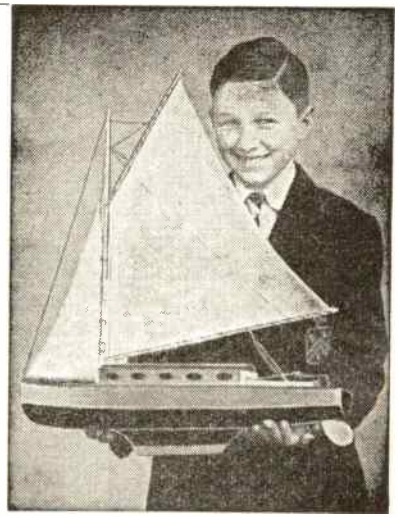

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You are advised to use a good quality paper for the leaves, and it is suggested that you buy a sheet of pastel paper from a stationer's shop. This will be approximately 20 in. by 30 in., will only cost a few pence, and you may either use a pale grey or a pale buff colour, neither of which will show fingermarks. These tints also supply a neutral background for your pictures.

Reference should now be made to Fig. 1, where you will see that the pages are 4½ in. deep and, after allowing for the pleat, are 4 in. wide. Ultimately the pleat is glued together, and compensates for the slight thickness of your pictures. The unbroken lines in the diagram represent score marks on the surface of the paper, while the dotted lines should be scored on the other side, and these will help to make straight folds.

In Fig. 1 you will see we have marked out the large piece of pastel paper. It is quicker to score the whole sheet in this way, cutting into 4½ in. strips, as indicated, and then folding into pleats and pages. Use a blunt pointed instrument for the scoring, such as a wooden skewer.

FIG 1

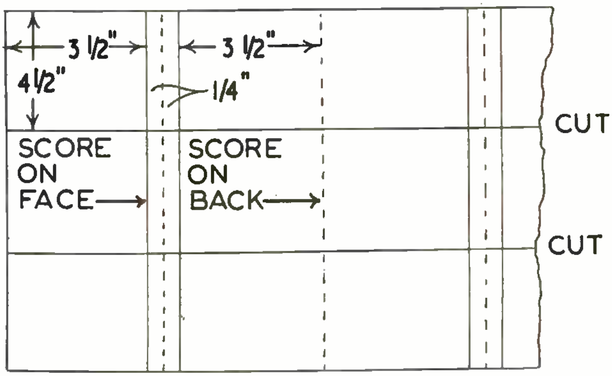
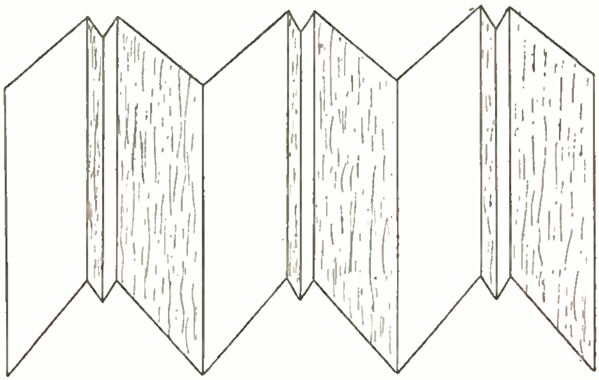


FIG 2

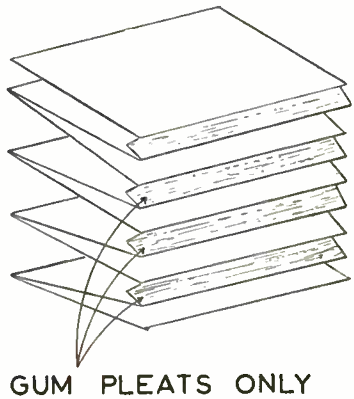


When folded, we produce a long strip of paper, as shown in Fig. 2, and to extend this strip further to enlarge the album we attach a second or third strip. Note that this extension must be made by making a gummed joint at a pleat.

The last stage of making the pages is shown in Fig. 3, and all that is necessary is for gum to be applied between the pleats. When this has been done, leave under pressure for some time until perfectly dry, and you will have a series of pages.

All that remains is to add a cover, for which you will require two pieces of cardboard measuring 4¼ in. by 4¾ in. — a fraction larger than the leaves — which are covered on the outside with either the same pastel paper as the leaves or fancy cover paper. A spine of pliable material should be glued on before the cover, and the thickness of the combined album leaves should be measured to determine the correct width. With the covers so prepared, glue the front and back pages to the insides of the cover. (S.H.L.)

FIG 3



● Continued from page 282

Copying without a Camera

the print is developed as usual you will have a direct copy negative, as shown in Fig. 3. The print is fixed, washed, and dried, and we are ready for making a positive if required. At the same time the negative so made can be 'read' by transmitted light, that is, holding it up to the light and looking through the back, or with the aid of a mirror.

When we are to make a facsimile copy of the original the procedure is modified, and it should be remembered that we use the paper negative in exactly the same way as a normal one, that is, by printing through same. Lay a sheet of unexposed paper on a piece of plate glass with the copy negative on top, the sensitized surfaces being in contact, and a further piece of plate glass covering the whole, as in Fig. 1. Figs. 3 and 3A are examples of line drawings copied from a book. We again make tests, unless you have a master test print like that shown in Fig. 2A, and ultimately expose without the aid of the yellow filter. Any number of copies may be made in a similar fashion.

This method will be found most useful for the rapid copying of black and white pictures, printed matter, and the like. When copying a picture made on thin paper, or tracing paper, a sheet of white paper instead of black should be placed underneath. When the original is reasonably opaque no backing paper is necessary.

Maps, diagrams, text, and pictures from books can be copied far more accurately and with less strain by this simple method.

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Care and use of Hacksaw Blades

NO handyman's tool kit would be complete without a hacksaw for cutting metals, plastics, and other hard materials. The efficiency of a hacksaw depends largely on the state of the blade, and in order to get good service from your blades they must be properly used. Unfortunately, too many handymen misuse their hacksaw blades unintentionally, and this often leads to broken blades — and bad tempers. For better results, therefore, here are a few tips well worth noting.

Hacksaw blades are manufactured in various lengths, having different tooth pitches. The normal tooth pitches are 14, 18, 24 and 32 teeth per in., and it is important that blades having the correct tooth pitch are obtained for each job. A blade having fine teeth is not suitable for cutting soft materials, as the teeth soon get clogged up. Conversely, a coarse blade is unsuitable for hard materials, as they do not produce sufficient 'bite'. The table will serve as a guide in choosing the correct type of blade for the various jobs.

It is important that blades are fitted to hacksaw frames and properly tensioned. All hacksaw frames are provided with adjustable tension screws to enable this to be done. If there is insufficient tension on the blades they will buckle when used, and ultimately snap. On the other hand, if too much tension is applied, breakage will normally occur at the holes.

Hacksaw blades are made so that they cut in one direction; the forward stroke. It is important, therefore, to ensure that the blades are fitted in position the correct way round. The blades should be fitted so that the teeth are pointing away from the handle.

When using a hacksaw always use full strokes to ensure that all the teeth are made to do work. The hacksaw frame should be held with both hands to keep it in an upright position; this helps a uniform cutting pressure to be exerted throughout the full cutting stroke. The tilting of a hacksaw frame when in use can result in breaking the blade.

By Finlay Kerr

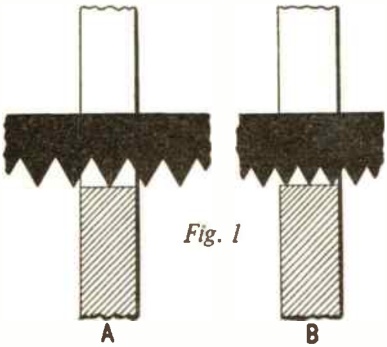


Fig. 1

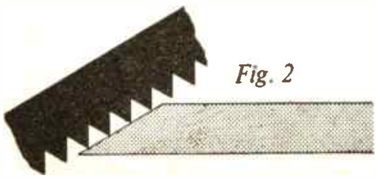


Fig. 2

Sometimes a blade loses its bite because its teeth have been stripped; that is, the points have become blunted. This is usually the result of having insufficient teeth in contact with the metal. Always ensure that at least three teeth are in actual contact with the metal. The reason for this is illustrated in Fig. 1. At A the pitch of the teeth is too great for the thickness of metal being cut, so that only one tooth is in contact at a time. Thus, as the blade is drawn to and fro the points of the teeth are harshly brought into contact with the corners of the metal and get knocked off. At B, however, a finer blade is used which prevents the points of the teeth striking the corners of the metal. When cutting thin sections of metal a broader cutting surface can be obtained by sawing at an angle, as shown in Fig. 2. This also allows the use of a coarser blade.

If the blade should break in the middle while cutting through a piece of metal do not resume sawing in the old saw cut with a new blade. This practice often leads to subsequent breakages. The proper procedure is to turn the metal over and start afresh on the other side.

It is useful to know that hacksaw blades are generally made from two different types of metals, carbon steel and high-speed steel. The latter type is the more economical in the hands of an experienced hacksaw user, but it is a much more expensive type of blade to buy than those made from carbon steel. To avoid undue expense, therefore, it is probably advisable for the home handyman to use carbon steel blades at first until he becomes accustomed to the use of a hacksaw, then he can switch over to the more expensive high-speed steel blades which are more efficient.

Finally, it's no use purchasing good blades and knowing how to use them properly if your hacksaw frame is not also of good quality and design. The most popular type of frame is probably the tubular steel type which has a sliding handle that can be adjusted and locked to suit the various lengths of blades. Also, remember to choose a frame with a bit of weight behind it. You will find this much easier to handle.

TYPES OF BLADE

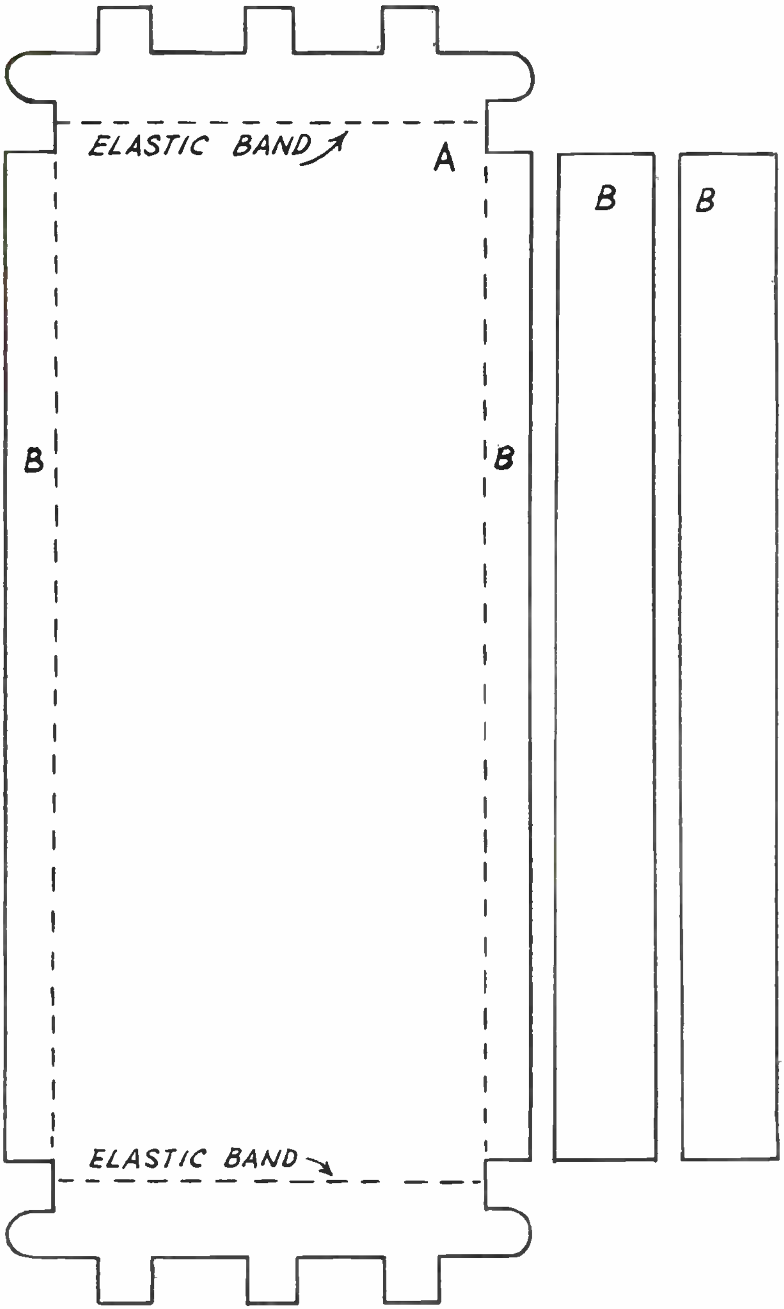
Material to be cut	Recommended number of teeth per inch
Aluminium	18
Angle Iron — Heavy	18
Angle Iron — Light	18–24
Asbestos	14
Brass	18
Bronze	18
Cable (electric)	18
Case Hardened Steels	
up to ¼ in.	24
¼ in. to 1 in..	18
Cast Iron	14
Conduit Tubing	32
Copper..	18
Cycle Tubing	32
Mild Steels	
up to ¼ in.	24
¼ in. to 1 in..	18
Nickel Chrome Steel	
up to ¼ in.	24
¼ in. to 1 in..	18–24
Piping:	
Steel and iron	18
Brass	24
Sheet Metal	
18g and thinner	32
over 18g	24
Stainless Steels	
up to 1 in.	24
1 in. to 3 in..	18–24

'Camping Sites in Britain'

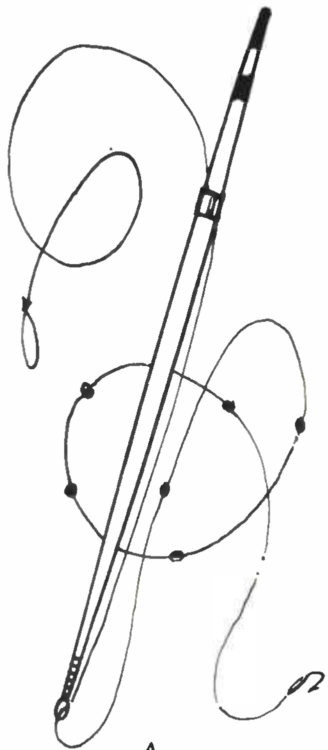
THIS first issue will be of considerable assistance to those people who prefer to spend their holiday camping. Generally a lot of correspondence is entered into prior to the holiday, and doubts arise as to the suitability of prospective sites. Here are details of sites in all parts of the British Isles and Eire, giving charges per day or per week, as well as facilities available.

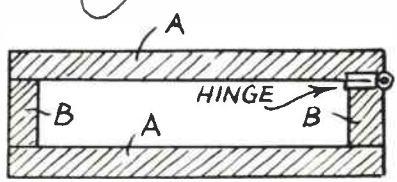
Published by Messrs Cade & Co. (Publications) Limited, 11 Old Bond Street, London, W.1 — Price 3/-.

A CAST BOX FOR ANGLERS



PROTECT your floats, and keep casts intact by making this handy box. Cut two of A and B from ¼ in. wood with a fretsaw. Glue pieces B to one piece A and then hinge the remaining piece A on top. Give two coats of paint and the box is ready for use. The cast is wound round the notches, lengthwise and is held by an elastic band at each end. (M.p.)





SECTION

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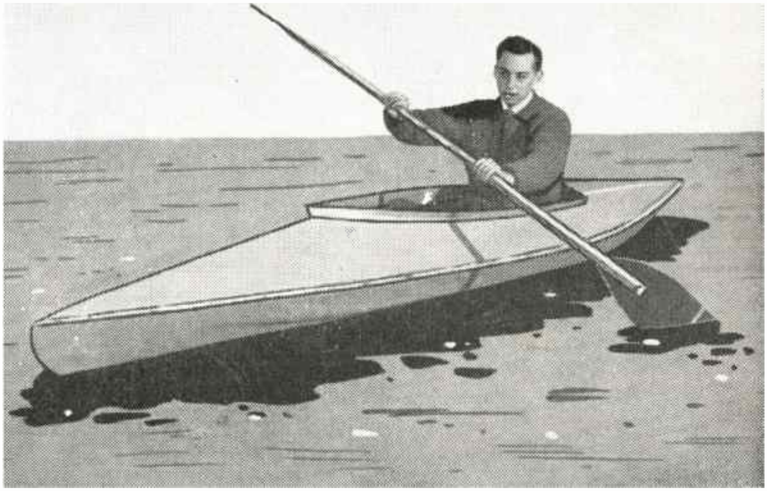

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