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THE ORIGINAL
'DO-IT-YOURSELF'
MAGAZINE

HOBBIES *weekly*

FOR ALL
HOME CRAFTSMEN

FULL DETAILS FOR MAKING ...

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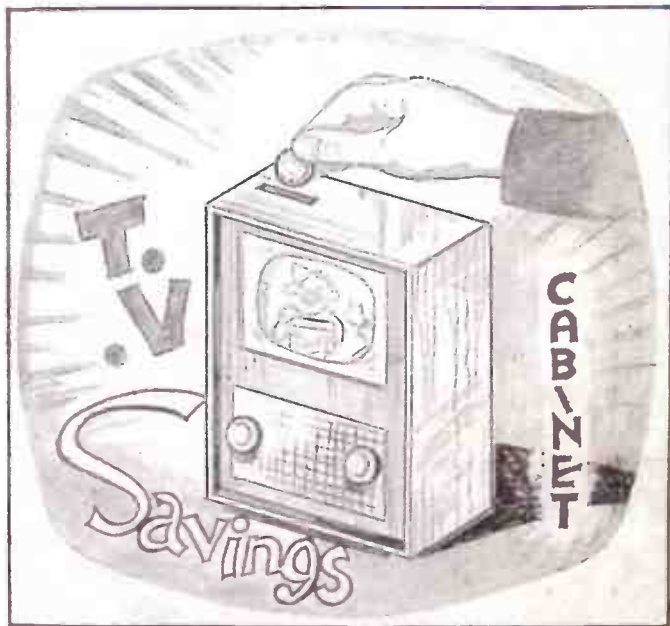
PATTERNS FOR

A SEDAN CHAIR

WORKSHOP AND

NOVELTY PROJECTS

ETC. ETC.



WITH 'MOVING' PICTURES



Up-to-the-minute ideas

Practical designs

Pleasant and profitable things to make

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Taking pictures with a Flash Gun

IT is easy to take successful flash photographs, and no particular skill or expensive equipment is needed. Parties, amateur dramatics, or indoor portraits or groups are only a few of the subjects which can be taken by flash, and it is possible to use *any* camera, even if it is not synchronized.

Flashbulbs cost about 8d. each upwards, according to size. The smallest size will easily give enough light for average groups, etc. The bulb is ignited by current from a battery, and can only be used once. Flash shots can be on the same roll of film as ordinary outdoor photographs, etc, so there is no need to take a lot of flash shots, or waste the remainder of the film. The extra cost of taking a flash photograph or two is thus very small.

Each bulb gives out a certain amount of light, and as this is known, it is easy to make a correct exposure. There is no reason at all why every flash shot, including the first ever made, should not be perfectly successful.

Guide numbers

If the subject to be photographed is far away from the flashbulb, it will not be so strongly illuminated as if it were nearer. Some kinds of film are also more sensitive than others, and thus need less light. For these reasons, each type of bulb has a 'guide number' which applies to a particular kind of film.

An example or two will make it clear

how the guide numbers show the exposure. 'Photoflux' PFI bulbs will be economical for home use, and have a guide number of 120, with Selochrome film. This means that if 120 is divided by the distance between flashbulb and subject, the result will be the camera lens aperture to use. Suppose the subject were about 15 ft. away from the flashbulb. The lens aperture would then be $f/8$. Again, suppose the subject were 7 ft. away. The aperture would then be $f/17$, but as this is not marked on cameras, $f/16$ would be used, and would be perfectly satisfactory.

By 'Photographer'

There is no need to work the aperture out exactly, because a few feet each way do not make much difference. Each maker provides a list of guide numbers for various bulbs, on the carton, or in a leaflet. With faster films, and larger bulbs, the guide number becomes larger. This is useful when taking subjects a long distance away.

To avoid any need for calculation, the disc calculator shown in Fig. 1 can be made. It consists of two discs of card, pivoted together at the centre. The large disc is marked with distances from 3½ ft. up to 30 ft. The smaller disc has apertures from $f/4$ to $f/32$. It also has three sets of film speeds, covering from 25 to 33

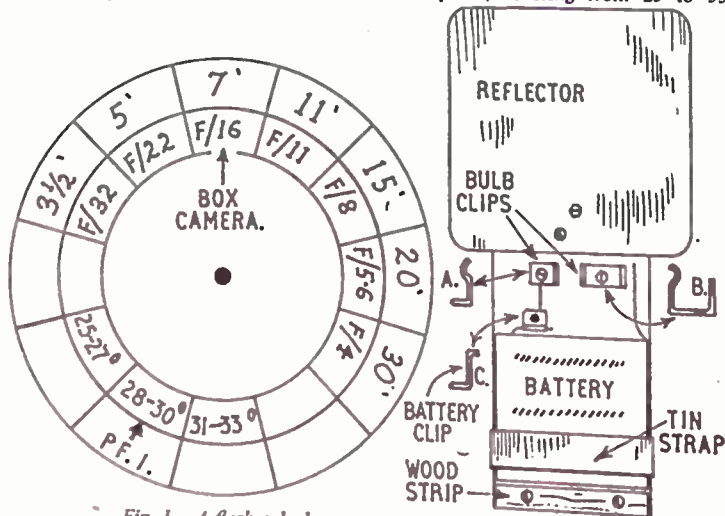


Fig. 1—A flash calculator

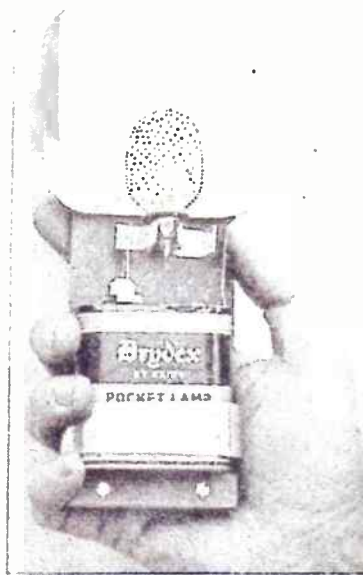


Fig. 2—Making a flash gun

degrees. These are BS speeds, and will usually be found marked on the film carton. The speeds are for Tungsten (artificial) light. With most films this is about the same as daylight speeds. But a few films have different speeds for artificial and daylight, and in this case the artificial light speed is the one to use.

The calculator is for PFI bulbs. If the camera has a 28-30 degree film, the correct exposure would be $f/32$ at 3½ ft., $f/22$ at 5 ft., $f/16$ at 7 ft., and so on, round to $f/4$ at 30 ft. If the film is of different speed, simply turn the one disc so that the actual speed comes opposite the PFI arrow. Appropriate apertures and distances can then be read.

A box camera or simple folding camera usually has a fixed aperture of about $f/16$. As this cannot be changed, simply adjust the distance between flashbulb and subject to the figure shown (e.g., 7 ft., with a 28-30° BS film).

Distance and aperture

It will now be clear that a whole range of distances and lens apertures can give correct exposure. To obtain the correct combination, either aperture or distance may be adjusted.

For example, suppose a shot were to be taken, and it is found that the best distance is 5 ft. With 28-30° BS film, it is thus only necessary to close the aperture to $f/22$.

Again, suppose the camera lens will only stop down to $f/16$. It would then be necessary to move the flashbulb away from the subject to about 7 ft.

The distance between camera and

subject does not matter. Usually, however, the flashgun is near the camera, or attached to it, so that camera and bulb are at the same distance. The method is then to select a suitable distance for the camera, and adjust the aperture according to this distance.

If the camera does not have a synchronized shutter, the shutter should be set to B for brief time. The camera is then best held on a tripod or table.

To make the exposure, the shutter is opened, the bulb fired, and the shutter at once closed. Room lighting should not be too strong, especially if there is any movement in the subject. The length of time the shutter is open will not influence the exposure, because the flash only takes a fraction of a second. But if the shutter is left open too long, the ordinary room lighting will record weak images as well, which will spoil the shot if the

subject moves.

With synchronized shutters, set the shutter to 1/25th second, and plug the gun lead into the camera socket. If the shutter has an adjusting lever for electronic flash, etc, set this to X.

With synchroflash the camera and gun can be held in the hand, and there will not be time for room lighting to cause images on the film.

The flash lasts less than 1/25th second, and this speed is merely chosen so that the shutter will be open when the flash comes, but will then close at once.

Making a flash gun

A simple gun can be made by screwing a shiny tin reflector to a piece of wood carrying a battery, as in Fig. 2. Dimensions are not important, but 4 in. by 4 in. will do for reflector, and 2½ in. by 5½ in. for the wooden handle. Capless

bulbs like the PFI can be inserted between two metal brackets shaped as shown. Bracket A is connected to the clip C, which is in contact with one strip of the battery. Clip B is similarly shaped to A, but has a projection. The gun can be held in the hand, and the long strip on the battery can be pressed against B to fire the bulb.

The battery is held by a metal strap and wooden strip, as shown. An ordinary 4½v. flash-lamp battery, in good condition, will easily fire the bulbs.

For open flash, open the camera shutter, press the strip to fire the bulb, and close the shutter. This can also be done with synchronized cameras. If operation from the shutter is wanted, with a synchronized shutter, a flash plug should be wired to B and the battery contact, and the shutter set at 1/25th second, as explained.

MARCH

THESE NOTES REFER CHIEFLY TO MIDLAND GARDENS. DUE ALLOWANCE SHOULD BE MADE FOR CHANGE OF LATITUDE.



Cuttings of fuchsias and dahlias will be available now. At the end of the month a little water may be given to cacti. Seedlings grown the previous year may be reotted or transplanted.

Cool house

BEGIN general potting up of boxed cuttings — geraniums, pelargoniums, etc. Pot off cuttings of carnations and chrysanthemums. Start begonias, etc. Sow seeds of half hardy annuals.

Cold house

STIR the soil round lettuces, and take off decaying leaves. Ventilate well, except when frost threatens. Seeds of half-hardy annuals may be sown at the end of the month. Sow in boxes, cover with glass and newspaper. Remove paper at first sign of germination.

broccoli, turnips, parsnips, carrots, and peas. Sow lettuce and radish under cloches for early salads.

Onion sets or plants are put out at the end of the month. Potatoes may be planted according to local conditions. The plot reserved for greens, such as sprouts, may be used now for sowing flower annuals under cloches.

Inside — warm house

START tubers of begonias into growth. Sow tomatoes and cucumbers. Most kinds of bedding plants may be sown for early displays. Coleus may be sown now for potting on later.

★ ★ ★ ★ ★ ★ ★

For your seed sowing and potting, the following formulas can be recommended:

JOHN INNES COMPOSTS.

SEED SOWING:

2 parts (by bulk) loam (sifted through ½ in. sieve)
1 part peat (horticultural grade)
1 part coarse sand (approx. ¼ in. particles).

Add to each bushel of the mixture:
1½ oz. superphosphate and ¾ oz. chalk.

NO. 1 FOR PLANTS IN POTS OR BOXES:

7 parts loam
3 parts peat
2 parts coarse river sand.

Add to each bushel of the mixture:

1½ oz. hoof and horn meal
1½ oz. superphosphate
¾ oz. sulphate of potash
¾ oz. chalk.

NO. 2 AND NO. 3 COMPOSTS:

Add double and treble the amounts of fertilizers as given for No. 1, excepting the chalk, which will remain the same for all three. These composts are for potting on.

All loam should, of course, be sterilized. Excellent results may be obtained from using good garden soil in place of loam. The peat is, of course, essential.

CHEMISTRY AT HOME

POTASSIUM iodide is the raw material for the experiments given in this article. As it is kept by dispensing chemists, you may readily top up your stock should you not have enough on hand.

As its name implies, it is a combination of the metal potassium and the non-metal iodine. The latter is a halogen, and its fellow halogens chlorine and iodine readily liberate it from potassium iodide.

To a few c.c. of an aqueous solution of potassium iodide contained in a test tube add some chlorine water. A brown colouration and a black precipitate of iodine appear. Repeat the experiment, but use bromine water in place of chlorine water. Iodine again appears.

Manganese dioxide and sulphuric acid also liberate the iodine. Mix roughly equal volumes of powdered potassium iodide and manganese dioxide, place the mixture in an evaporating basin on a sand bath, and add enough strong sulphuric acid (caution: corrosive) to cover the mixture. Part fill a conical flask with cold water, and clamp in on the evaporating basin, as shown sectionally in Fig. 1.

Now heat the sand bath. Violet vapours soon begin to come off. These condense on the flask bottom owing to the cooling action of the water. Remove the flame, and let the apparatus cool. On removing the flask you will find the iodine present as steely black crystals,

which have a pungent odour. The principle of this method is used to obtain iodine from the ash of certain seaweeds.

Sodium bisulphite will also separate iodine. Add sodium bisulphite solution drop by drop to one of potassium iodide. Iodine appears. This method is used to obtain iodine from the vast nitrate deposits of South America. Sodium nitrate is first extracted from these deposits, and the mother liquor, which contains combined iodine, is treated with sodium bisulphite.

SOME EXPERIMENTS WITH IODIDES

Using the convenient chlorine method, iodine may be made in larger quantity for experiments. Dissolve some potassium iodide in water, and pass in chlorine gas, using the apparatus shown in Fig. 2. A narrow bottle is best used for the potassium iodide solution, so that the chlorine has a good depth to pass through. The apparatus should be rigged outdoors or in a fume cupboard, since chlorine is poisonous if breathed in more than traces. Bleaching powder ('chloride of lime') is put into the generating bottle, and dilute hydrochloric acid run in a little at a time through the thistle funnel, so as to keep up a steady stream of gas.

When no more iodine appears to be forming, remove the beaker, and wash the heavy precipitated iodine by decantation several times with water, let it settle well, pour off the upper liquid, and store the iodine paste in a glass-stoppered bottle.

Take out a little of the iodine, and press it as dry as possible between filter paper. Avoid touching it with the hands, for it stains, and will irritate some skins. Sodium thiosulphate solution will remove it from the skin if you should inadvertently touch it.

Put the iodine in a dry test tube, and warm the tube. Violet vapours of the element appear, and are extremely beautiful. Condensation on the cooler parts of the tube produces the steely black crystals previously seen. This sublimation method is used commercially to purify iodine for medical and chemical use.

Put another and more generous por-

tion of the iodine into a test tube. Cover it with about three times its volume of water, and bubble hydrogen sulphide through the suspension. Generate the hydrogen sulphide in the open air from iron sulphide, and dilute hydrochloric acid. When the gas has been passing through for a few minutes, sulphur begins to be deposited. This increases in amount. Finally the iodine disappears. We now have a mixture of a solution of hydriodic acid, and a precipitate of sulphur.

To obtain the hydriodic acid, filter the solution, and through the filtrate pass a rapid stream of carbon dioxide, generated from marble chips and dilute hydrochloric acid, so as to remove dissolved hydrogen sulphide. When the smell of this has disappeared from the liquid, the hydriodic acid may be bottled for the laboratory stock. Test a drop with blue litmus paper, and note that it is strongly reddened, showing an acid to be present. Add a little of the acid to solid sodium carbonate. Brisk effervescence occurs owing to liberation

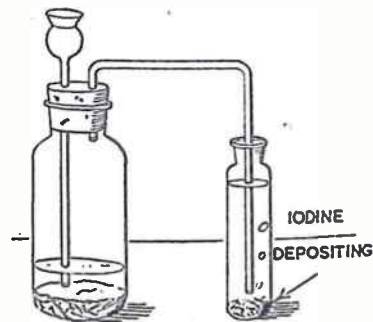


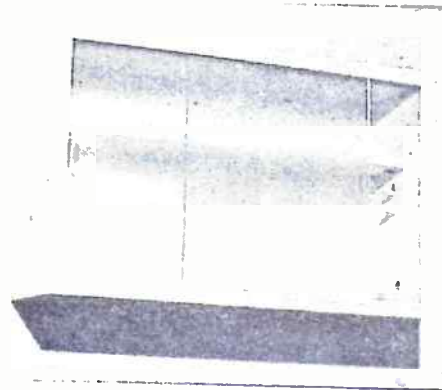
Fig. 2—Preparing iodine from chlorine and potassium iodide

of carbon dioxide, and formation of sodium iodide. Such a solution of hydriodic acid may, therefore, be used for the preparation of soluble iodides by interaction with the carbonate of the metal concerned.

Most of the iodides of the common metals are soluble in water. Insoluble are those of mercury, copper, silver, and bismuth. Hence they may be prepared by double decomposition. That is, by mix-

Continued on page 387

Attractive Bathroom Cabinet



WITH EITHER GLASS OR PLYWOOD SLIDING DOORS, THIS HANDY FITMENT FOR THE BATHROOM SHOULD PROVE AN ATTRACTIVE PROJECT FOR ALL HOUSEHOLDERS

CUTTING LIST	
Finished Sizes	
Softwood	
2 at 19 1/2 in.	by 6 in. by 1/2 in.
2 at 12 1/2 in.	by 6 in. by 1/2 in.
1 at 19 1/2 in.	by 3 in. by 1/2 in.
1 piece of 3 ply 20 1/2 in.	by 12 1/2 in.
2 doors 11 1/2 in.	by 9 1/2 in.

There is no reason why mirrored glass should not be used. To slide easily, all doors should have smooth edges with the corners very slightly rounded. The doors should be 1/2 in. greater in height than the distance between top and bottom, and the width should allow for an overlap of 1 in.

THE carcass is constructed in the usual manner, as shown in Fig. 1, with open housing joints at the corners. Allow 1/4 in. to project on the ends for cleaning off afterwards. The grooving must be done before gluing, the grooves being 1/2 in. deep in the bottom shelf (see Fig. 2). This allows the doors to be placed in position afterwards, and if glass doors are used, they can be removed easily for cleaning.

The width of groove depends on whether plywood or glass is to be used. If ply doors are made, the ply should be measured first, and the grooves made to fit. If glass is to be used, the grooves should be 1/2 in. wide. Finger holds can be cut out in ply doors or glued on. With glass doors, the glazier supplying the doors will cement on small finger grips or will bore holes to enable suitable handles to be fixed.

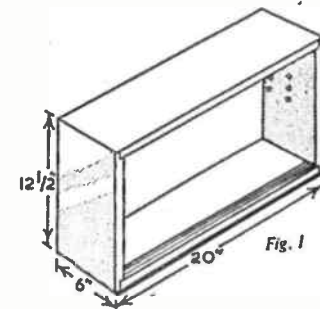


Fig. 1

Continued from page 386

Experiments with Iodides

ing solutions of potassium iodide and a soluble salt of the metal concerned.

The reaction with copper sulphate is of especial interest. What we know as copper sulphate is more precisely termed cupric sulphate. Therefore, we should expect to get a precipitate of cupric iodide with potassium iodide solution. Let us see what actually happens.

Add some potassium iodide solution to copper sulphate solution. A yellow brown precipitate forms. Take a drop of the mixture and place it on starch paper (filter paper which has been dipped in thin starch solution and dried). A blue colour appears on the paper, which is characteristic of the well known reaction between starch and free iodine. This, therefore, proves that the copper has not taken up all the iodine it should.

Repeat the experiment, but first add some sulphur dioxide solution or ferrous sulphate solution (to remove free iodine) before adding the potassium iodide. A buff precipitate is now formed. This consists of cuprous iodide, which contains less iodine than the cupric iodide we expected to obtain. In the first trial its

colour was masked by the free iodine.

Another interesting iodide is that of bismuth. To a solution of bismuth nitrate add some potassium iodide solution. A brown precipitate of bismuth iodide forms. Continue adding potassium iodide solution little by little. After each addition, put a drop on filter paper. When the brown spot of bismuth iodide obtained is ringed with yellow, stop adding potassium iodide. Further addition would cause the bismuth iodide to redissolve with formation of a soluble complex salt.

Filter off the bismuth iodide and wash it with two lots of water on the filter. Transfer the iodide to a beaker and stir it up with a good volume of water, and boil the whole. The brown colour disappears, and the solid particles become copper-red.

This copper-red substance is bismuth oxyiodide, the normal bismuth iodide having parted with some of its iodine, and taken up some oxygen owing to the action of the boiling water. Filter it off, and wash it well with water before allowing it to dry for your specimen collection.

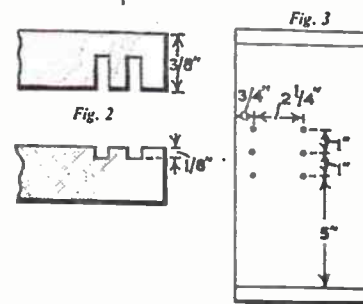


Fig. 2

Fig. 3

An adjustable shelf 3 1/2 in. wide allows extra tall bottles to stand at the front of the cabinet. This shelf rests on four 3/4 in. long 1/2 in. dowels fitted into a variety of holes (see Fig. 3). These holes are best bored before gluing.

After the carcass has been glued, and cleaned up, the ply back can be nailed on with 3/4 in. ovals, and then trimmed down with a smoothing plane. Painting should be done in accordance with the existing colour scheme.

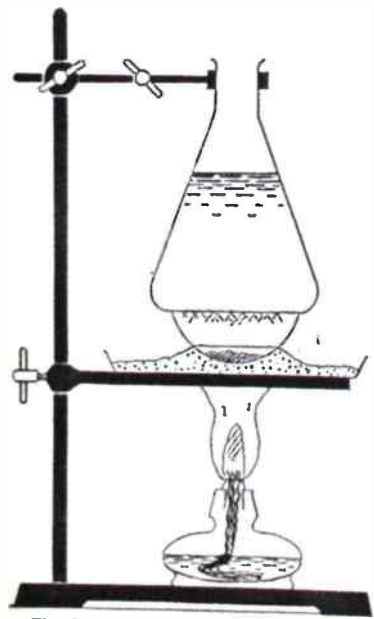
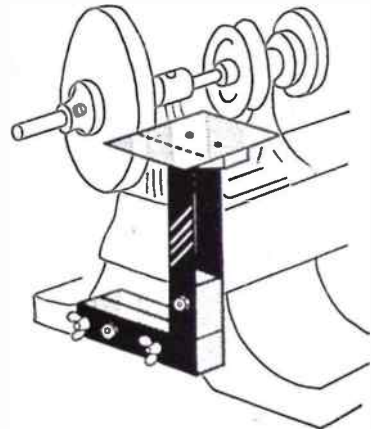


Fig. 1—Apparatus for showing iodine formation

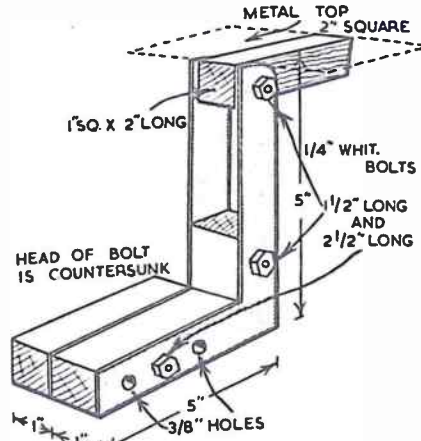
Make a Handy Grinding Table



grinding table set to a pre-determined angle will give an accurately angled edge to your tools each time they are ground.

Construction of the table is so simple that the method will be obvious from the illustrations. The iron frames are stout 1 in. wide sash squares, obtainable from any good ironmonger, and wooden parts should preferably be of hardwood. The table itself is a 2 in. square of aluminium, brass or steel. The assembly is held to the lathe by two 3/4 in. by 6 in. coach bolts which pass right through the lathe mounts, and are permanent fixtures.

For convenience, the grindstone should be clamped between the grindstone arbor and the spare pulley. This allows the flywheel to be dispensed with when grinding. If the operator will be content with only half a table, the table assembly can be left in position whilst



turning, when preparation for grinding requires only the removal of the flywheel.

One final tip: use goggles or spectacles when grinding. They may save you a trip to the hospital.

(R.N.T.B.)

Interesting Locos—No. 22

THE EASTERN COUNTIES LINE

THE very excellent 2-4-0 tender locomotive shown in the illustration was designed by Robert Sinclair for the fast main line goods and mineral traffic of the E.C.R. and was manufactured by Neilson & Co. in 1859.

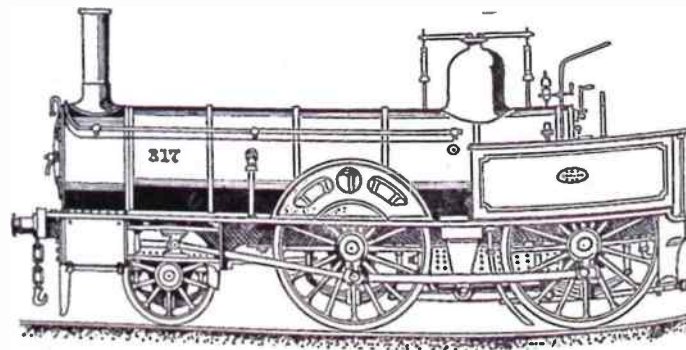
The engine is provided with horizontal outside cylinders, 18 in. diameter by 24 in. stroke, and inside bearings for the carrying wheels. The coupled wheels are 6 ft. 1 in. diameter, having compensating levers between them. These engines proved remarkably successful on the main line and could be worked both fast and economically on almost all duties, which led to the construction of a further ninety engines of the same type. They were built by various British locomotive builders from 1861 to 1866. The later examples had 17 in. by 24 in. cylinders, and the dome was fitted in the middle of the boiler; cabs were provided in place of the extended weather-board as on the first engines.

The engines of 1859 had a total heating surface of 1,079 sq. ft., and boiler working pressure of 120 lb. per sq. in. and weighed, in working order, 31 tons.

The tenders ran on six wheels and had wooden frames with iron horn-plates fitted on. In order to increase the weight at the trailing end, a cast-iron footplate was provided, but in the engines built by Hawthorns and Stephenson in 1861 this was replaced by a water tank having

a capacity of 135 gallons, thus giving an additional supply to that carried in the tender tank.

The name 'Eastern Counties Railway' was changed to 'Great Eastern Railway' in 1862, after several minor lines had been absorbed. (H.J.R.)



Robert Sinclair's 2-4-0 Mineral engine of 1859

HAVE FUN WITH CUBE CRICKET

SIMPLE games which can conveniently be carried in the pocket and produced in an emergency to while away any spare time are always useful. 'Cube Cricket' is such a game, and is both easy to construct and exciting to play. Two light-coloured wooden bricks from a child's toy box will serve admirably to make the apparatus needed for the game, and these may be of slightly different sizes, if you wish.

By A. E. Ward

You can make the wooden cubes yourself. Ensure that the six faces of each block are exactly the same in area, and the sides all equal in length, as the cubes are to be used like dice. Smooth the cubes well with glasspaper, and paint them in gay, though light, colours.

Wash the painted cubes in warm soapy water in order to remove any traces of grease, and dry them carefully.

Inscribe the first cube as follows, using Indian ink. Write the numbers: 1, 2, 3, 4, 6, and the phrase: 'how's that?' upon the respective faces, to make the 'Batsman's Cube'. Then make the 'Fielder's Cube' by printing the words

'caught, bowled, stumped, run out, no ball', and the abbreviation: 'L.B.W.'.

To play the game you will also require a pencil and paper with which to record the scores. Cube Cricket is suitable for two players, although a third person may be occupied as a 'score keeper'. The rules of the game are quite straightforward, and the 'match' commences after the two players have tossed a coin to decide who will 'bat' first.

The batting player commences his 'innings' by shaking his cube between both hands, which should be boxed together, and then throwing the cube down upon the floor or table top. Runs are scored as indicated by the upturned face of the cube, but should the words 'how's that?' be exposed, it is the turn of the fielding player to cast his cube.

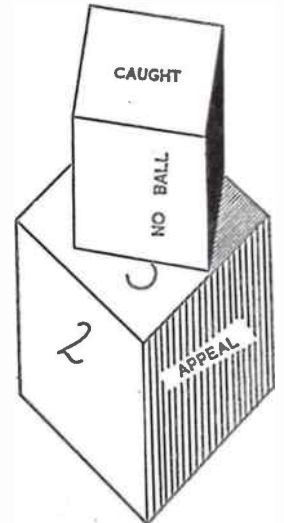
Only if the fielding player throws a 'no ball' does the batsman continue to score for his first total. The batsman will be allowed a further ten chances to obtain runs before his innings is regarded as being terminated.

The eleven totals for the complete innings are added together to indicate the final 'team score' of the batting player.

When the first player is 'all out', he exchanges cubes with his opponent, and then becomes the fielding player. The

game continues until the innings of both players are finished.

You may, of course, have more than one innings each, or a group of players, using several sets of cubes, might organize a series of matches to determine a champion.



Colourful 'Flowers' from Coal

IF you like making novel experiments, here is one you can try, which will prove really exciting, since the results are sustained over quite a period, and become more interesting daily. To be brief, our simple experiment will produce a bowl of colourful 'flowers' during the winter months from that common household commodity we burn on our fires — coal.

From time to time these dainty 'bouquets' have been given the names of 'coalflowers', 'heavenly flowers', and 'miners' trifles', but whatever the name, you will find the experiment most rewarding.

You may use a small glass bowl or an ordinary earthenware bulb bowl of medium size, the latter probably being best since it is porous, and will itself assume the pretty colours obtained.

Wash out the bowl, filling it to the brim with tiny pieces of coal about the

size of garden peas. We do not want pieces much larger than this, neither do we want any coal dust.

Now for the 'chemicals', which are few and cheap. We require a small bottle of red ink, a small packet of powder blue (the type used for laundry purposes as distinct from decorating), some common salt, and cloudy ammonia. Pour the red ink into a larger bottle, along with one tablespoonful of the cloudy ammonia, and one tablespoonful of warm water. Now add a tablespoonful of common salt, and the powder blue, shaking together until dissolved.

Continuous growth

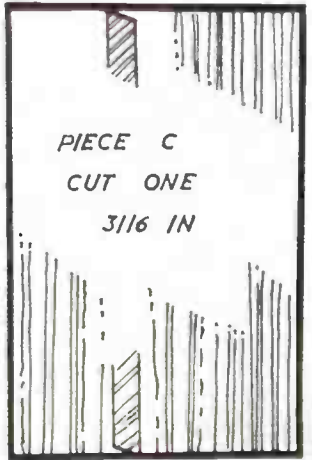
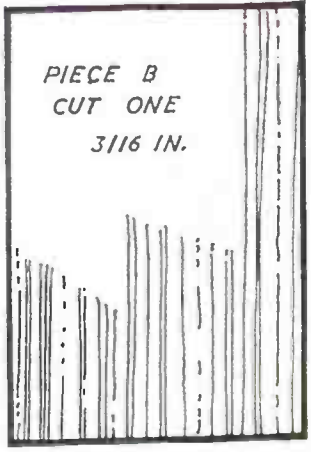
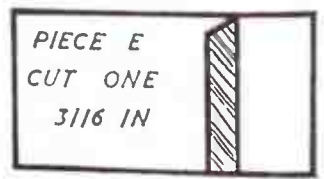
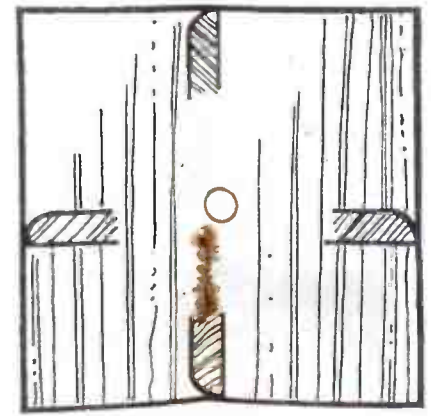
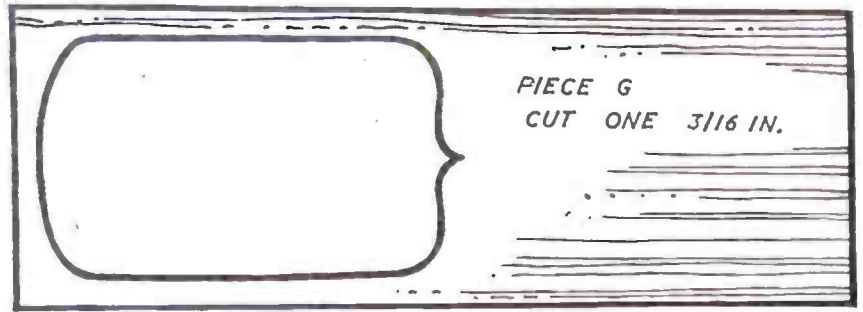
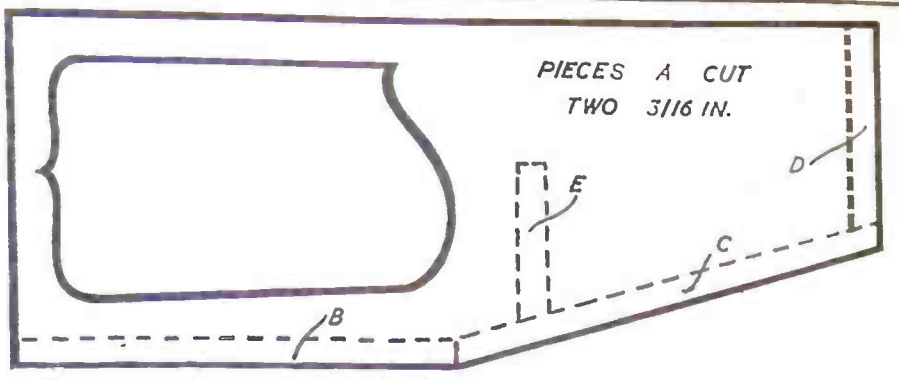
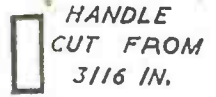
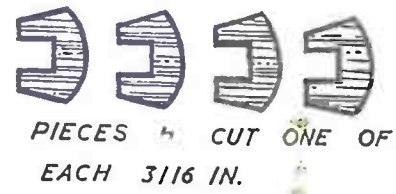
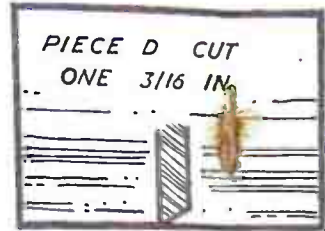
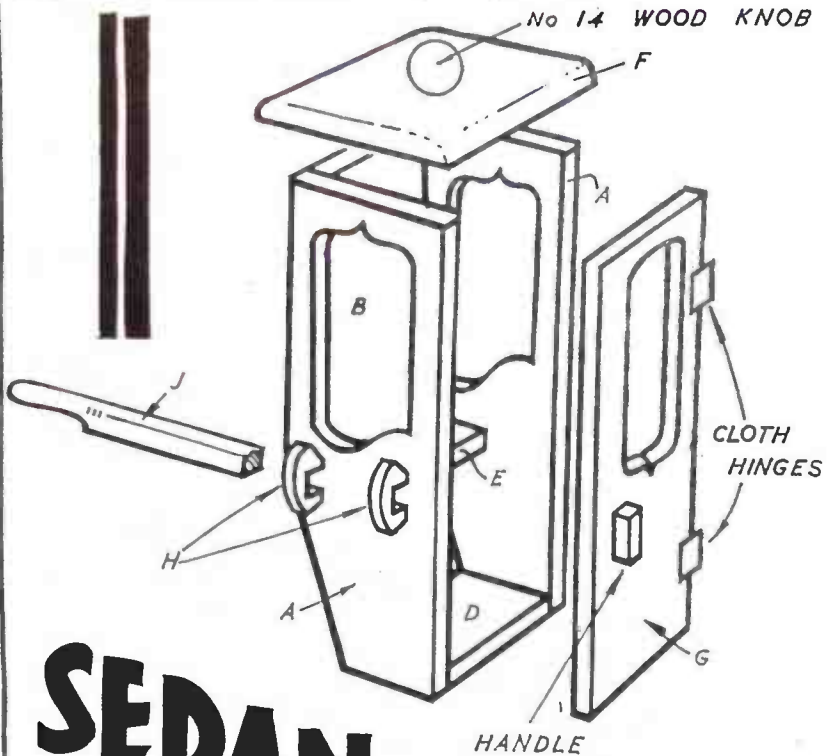
This solution is poured as evenly as possible over the coal in the bowl, so that it covers as much of the surface as possible, and the bowl is left in a warm place until the 'flowers' begin to grow.

The 'growth' will be given a good start if the bowl is placed on top of a warm oven — not hot — or on the hearth, until the process begins, which may take a day or so. Afterwards the bowl may be kept in a normal room temperature. The 'flowers' will continue to grow in a variety of colours for some considerable time without any further attention.

You should be able to obtain the cloudy ammonia and the powder blue from a chemist or grocer. If you are unable to obtain the blue in powder form, you may use what is popularly termed a dolly blue or blue bag. If it is in a block, it will be necessary to crush before dissolving.

Each day you will see quite a transformation in your bowl, and tiny 'flowers' in many colours seem to grow overnight. The experiment will only cost a few pence, but will provide an interest for a long time. (S.H.L.)

MODES OF TRANSPORT



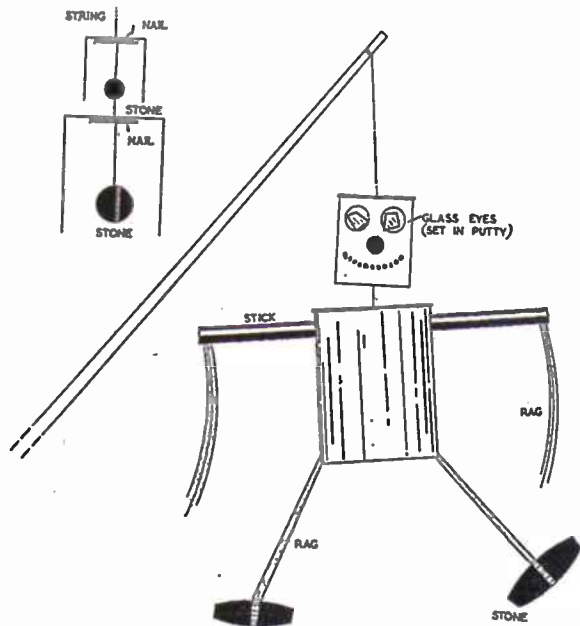
SEDAN CHAIR

PIECES J CUT ONE OF EACH 3/16 IN.



PRINTED IN ENGLAND

A BIRD SCARER FOR GARDENS



A stick of firewood will make a pair of arms for your scarecrow, and two holes must be bored, opposite each other, near the base of the large tin, so that the

CERTAIN plants and seedlings are extremely vulnerable to the unwelcome attentions of birds, so the keen gardener will find good uses for bird scarers. 'Dan the Tin Man' is a novel type of 'scarecrow' who will provide endless amusement for the youngsters while attending to his more serious duties of guarding the garden. Dan's head and body are made from old tin cans. A large fruit tin will serve for the body, and a smaller container can be used to make the head.

Knock large holes in the smaller tin, to form eye sockets, and make a curved row of little holes to represent a smiling mouth. Another large hole will provide an aperture into which you will be able to insert a length of dowel rod, as a long nose. The eyes must be made from two small fragments of a broken mirror, which can be fixed against the eye sockets, using pellets of putty. Bore a tiny hole in the bottom of the tin, and thread through it a length of strong string.

Tie a nail on to the end of the string which passes through the open end of the tin, then tie a stone a short distance below the nail, in such a manner that, when the tin is suspended from the longer string, like a bell, the stone will behave as a clapper.

'arms' can be fixed firmly in place, right through the tin, as shown in the illustration. Dan's legs are strips of coloured rag tied to holes in the top of the tin, and a pair of oval stones tied to the bottoms of the rag legs will make his feet. Fasten some narrow strips of brightly coloured cloth to the ends of the arms. Bore a small hole in the centre of the bottom of the tin.

Now you must join the head to the body, as follows: Tie a short piece of string to the stone clapper in the head, and thread this through the small hole in the body. Tie a nail to the end of the string. The nail will allow the body to be securely suspended, beneath the head. Finally, tie another piece of string to the nail, and fix a small stone to the end, to form a second clapper which will swing freely inside the body.

Paint Dan's head, body, and arms white, and paint his nose bright red. When the paint is dry, suspend your scarecrow from a long stick which is pressed firmly into the ground. 'Dan the Tin Man' will now commence to swing about, nod and swivel in a most entertaining manner. The rags will flutter gaily in the wind, and Dan's glass eyes will glint brilliantly in the sunlight, and when the wind blows more fiercely, the body will produce strange clanging noises, as the stone clappers 'ring' within the tins. (A.E.W.)

Modelling Collier Brigs

IN reply to an inquiry from J. D. of Wellington, 'Whipstaff' gives the following information concerning modelling the famous Collier Brigs:

It is not often we get an inquiry regarding the many interesting coastal vessels that have plied for generations around our own coasts.

The following are details of some of these Colliers from my files. Some were bark rigged, and some brig rigged; Captain Cook chose this type of vessel for his various voyages.

Most of these ships are what sailors termed 'cat-built', meaning they had very bluff quarters, and windows in the stern, appearing narrow in relation to their beam.

The term 'bark' was used to describe these Colliers until during the nineteenth century they changed from three masts to two masts, and then became known as the 'Geordie' or 'Collier Brigs'.

1. **LIBERTY AND PROPERTY.** 1752, Whitley Collier, first barque rigged, later brig rigged. 249 tons burden, length on lower deck 92 ft.; Keel 75 ft.; breadth 25 ft.; depth of hold 10 ft. 9 in.

2. **ENDEAVOUR BARK.** In which Captain Cook made his first voyage. Whitley Collier 1768, burden 366 tons, length on lower deck 97-7 ft.; keel 81 ft.; breadth 29-2 ft.; depth of hold 11-3 ft.

3. **UNITY.** 1848, typical Geordie Brig, 190 tons, length 91-2 ft.; breadth 18-5 ft.; depth in hold 13-9 ft.

4. **BROTHERLY LOVE.** 1764, Ipswich built, tonnage 214 tons; length 86-5 ft.; breadth 24 ft.; depth 17 ft.

5. **ANTELOPE.** Sunderland built. 115 tons.

6. **HERO.** 1854. Unusual in having Clipper type bow. Tonnage 195 tons; length 95-2 ft.; breadth 20-7 ft.; depth of hold 13-3 ft.

NOTES ON THE 'HOBBY SPRITE'

THE 'Hobby Sprite', which you have now completed, is a delightful little performer in the air, and you will be guaranteed jet-thrills in plenty if you go about it the correct way and provided certain precautions are taken.

First of all it is most important that you read and fully understand the instructions dealing with your P.A.A. Loader Jetex motor — its loading, firing and cleaning. These are included

By Gordon Allen

with your power unit. You will note also that a piece of asbestos paper is supplied with the other motor accessories, and this must be used on the internal 'pod' structure of the Sprite in the region of the motor — i.e. on the structure of the access door and the adjoining structure of the pod itself.

Jetex motors generate considerable heat during firing and if 'fire walls' are not provided, particularly round the rear end of the unit, there would be danger of the surrounding fuselage structure becoming charred or even catching fire. Using the thin asbestos paper prevents this.

Cut a piece of the paper to fit in an 'arch' round the internal rims of formers F4 and 5, and cut a second similar piece to fit round the rims of the corresponding formers F4A and F5A in the access door. Also, face the surfaces of the longerons with the paper at these positions, and use surplus strips on all other exposed edges in this region. Use 'Evo-Stik' to fix the paper in place.

Having loaded, primed and fitted the motor in its engine clip, as per instructions, replace the access door and hold it in place with narrow strips of 'Sellotape'. Mount the wing on its platform with a single tough rubber band about 3 in. long. First place the band round one side of the platform, twist it once, then fix the other loop-end over the opposite side of the platform. Lift the crossed-over band clear of the platform and slide the wing underneath until the band clips over the wing centre-section.

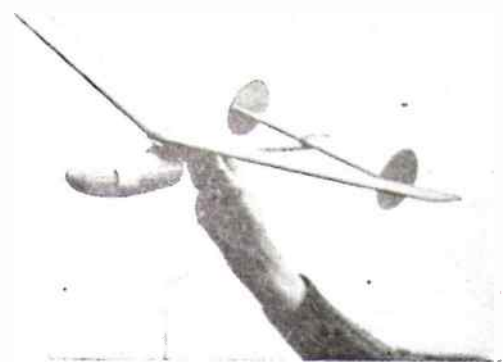
A similar but slightly smaller band holds the tailplane in position. Place this over the fuselage at the rear (in front of the rail platform), stretch it over

the tailplane centre section and slip the other end over a pin or peg fixed at an angle on the underside of the fuselage about 1/2 in. from the extreme end.

Test the model for glide, into the wind, using a follow-through movement of the arm. In the prototype, a piece of 1/8 in. balsa packing was required under the trailing edge of the tailplane because the model had a rather steep glide.

Light your fuse, wait for the motor fuel to ignite, and launch the model into the wind (if any!). Do not throw the model. You will feel a surge of power as the motor picks up and than all that is necessary is a gentle but steady launch.

My own 'Sprite' was indeed spritely on its initial flight made on a calm cold day last December. It flew for about 50 yards in a very steady climb then lifted its nose and began a really fast, powerful spiral climb to about 200 ft. After the motor had cut, the model



descended in a fairly straight shallow glide to give a total flight of about one minute — much to the delight of local schoolboys in whose playing field it landed.

Speaking of landings, if you do your flying in open country where landings are 'soft' then the design is all right as it stands. But if you fly in rougher conditions where your landing strips are likely to be cindery (as in my own case on occasions) then it is advisable to fit a small 1/8 in. balsa 'skid' underneath the nacelle, extending from the nose to former F3. This should be about 1/2 in. deep, should blend nicely with the contour of the model, and should be filled firmly with balsa cement.

My next model in this series will be a semi-scale rubber-driven model with a tricycle undercarriage — the 'Hobby Cruiser'.



A MOTOR BOAT IN HARDBOARD

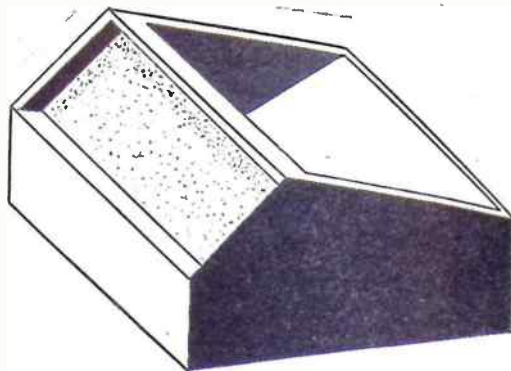
IN a recent reply to a reader's query we pointed out that oil-tempered hardboard could be used for some types of watercraft, and our photograph shows a light motor boat in which the outer skin was made from two 12 ft. by 4 ft. sheets of 1/2 in. oil-tempered Royal Board. This is available in lengths up to 12 ft., and inquiries should be made at local suppliers. For further information readers are invited to write to Spencer Lock & Co. Ltd, City Wall House, Chiswell St., London, E.C.1.

'Kracker' was built by Mr F. A. James, 200 Percy Rd., Whitton, Middlesex.

A FOCUSER FOR ENLARGEMENTS

HERE we describe how to make a focuser for enlarging photographs. Construction is simple, and all you require is some stout cardboard — although plywood will make a better job — a small mirror, and a piece of ground glass.

By S.H.L.



The most important factor in construction is, undoubtedly, the correct angle of image receptance from the enlarger to produce the view on the screen, but if these notes, and the dimensions in Fig. 1 are carefully observed, there should be no difficulty whatever.

Obtain two pieces of cardboard — an old carton will be ideal — cutting two pieces to about 5 in. square. Prepare these pieces of card exactly as shown in Fig. 1, first marking out an oblong 2 3/8 in. wide by 3 3/8 in. long, making sure that all the angles are perfectly 90°. Mark the points A and B each 1 1/2 in. from the top right-hand corner of the oblong, along the top, and down the side; now mark point C 2 1/4 in. down from the top left-hand corner, and finally point D, which is 3 in. from the same corner. Draw a line from A to C, projecting it beyond the perimeter, and a further line from B to D, with the projection as shown. If your measurements have been accurate, the base angle should be 30°.

Now draw a line parallel with line CA, but 1/2 in. above, ultimately making a right angle at point X, to connect with point B.

The shape for one side can now be cut out with a sharp knife similar to the one

shown in Fig. 2. A further piece is required for the other side of the focuser, and this can be quickly prepared by marking round the first one with a sharp knife. The two may be held firmly together, and rubbed on the edges with glasspaper to make sure they are of identical size.

From Fig. 2 you will observe that we have now to glue on a strip of 1/4 in. quadrant section on the prepared lines. Note that these sides must be made to form a pair, and the second one should be made in reverse to the diagram.

The width of the focuser depends on the size of the other components, and it is proposed that you are guided by the size of the mirror. It is suggested that you obtain a small mirror like those fitted in ladies' handbags. Fit it, temporarily, in position, and the overall width will determine the sizes of the front and rear pieces.

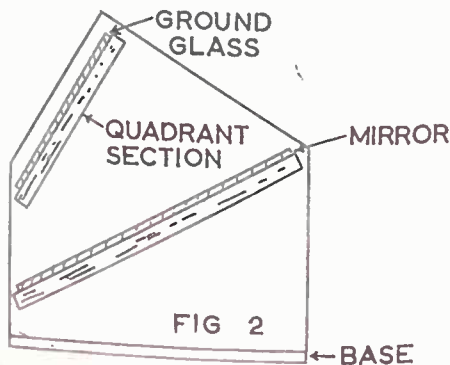
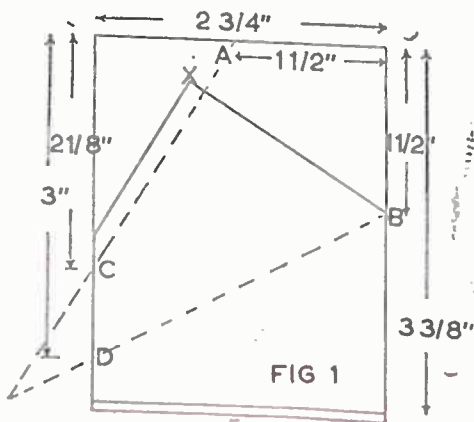
We also require a piece of ground glass fitted as shown, with the dull side towards the mirror, but here we suggest that it is more convenient to use a piece of celluloid, treated to produce a suitable

screen. Lay the celluloid on a flat table, scraping away the shiny surface of one side with an old razor blade held at right angles. You may then finish off with some very fine glasspaper, and the celluloid will be equal to ground glass, but much easier to cut and fit. Take care not to scratch the surface with the glasspaper.

The screen and mirror can be held in their respective positions by means of glue, and all that remains, is for the front, back, and base to be fitted. A rubber band will hold the device in position at this stage until the glue sets.

The pieces just mentioned can now be cut to the requisite size, and fixed in position with glue. If plywood has been used a panel pin or two will be advisable, and finally a further piece of cardboard can be cut, having an aperture for fitting to the top to give a smart appearance. The two inside surfaces should be given a coat of matt black to stop reflections, and it might be as well to treat the outside similarly.

In operation the focuser is placed on the enlarger table, so that the image falls on the mirror, but is viewed through the ground glass screen, the enlarger focusing being adjusted until the image is quite sharp.



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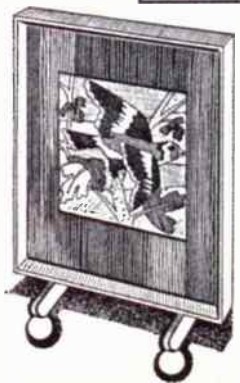
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Repairing Plastic

I HAVE several things made of the same material as denture plates, and some have got broken. Could you tell me the best way to mend these articles? (L.F.—Bury St. Edmunds.)

THERE are a large number of plastics and many things with the same appearance are not always made from powder, formed under pressure and heat. Once set they cannot again be softened. Polystyrene adhesive will stick some of these plastics. 'Pac' and 'Plaskitex', which are sold for repairing plastic raincoats, will stick some others. Certain 'impact' adhesives, as sold for sticking Formica and other plastic table tops may also be successful. One supplier of powder for injection moulding is Dohm Ltd., 167 Victoria St, London S.W.1.

Conversion of Van to Shooting Brake

PLAN to build a shooting brake body on a Morris 5 cwt. van. Could you give me some advice? (A.F.—Rhitonich.)

FOR any bent parts on your shooting brake, ash is the only satisfactory wood generally available. No other wood will stand twisting and bending as well. Ash is probably cheaper than beech, although there are various qualities of each. Oregon pine is brittle and is best avoided. Cascamite glue should make a good job. Another suitable alternative is Aerolite 306. If the wood parts are to be finished natural, a good varnish, preferably of the synthetic marine type, would be best.

Removing Dust from Models

I WOULD like to know if there is any way of cleaning models such as ships, and if not, what is the best step for the prevention of falling dust. (J.O.—Carlow.)

MODELS can be cleaned with light application from an ordinary artist's brush. With care, a bicycle pump or vacuum cleaner can also be used effectively. The only sure preventive for dust collecting is the provision of cases for your models, which can be constructed with transparent plastic sheeting on a wooden base.

Re-varnishing a Dinghy

I WOULD like a little advice regarding re-varnishing a dinghy which I have stripped to the wood. (W.M.—Tamworth.)

IF your boat is built of plywood or hardboard, all of the screwheads and any other hollows should be filled, either with Brummer waterproof stopping or plastic wood. Some of the marine paint manufacturers also sell stopping. If you wish to paint the boat, give the bare wood a coat of ordinary priming paint. Follow this with undercoat and top coat marine paint, such as Cerrux, Little Ship, Spinnaker—all of which are stocked by yacht chandlers. If you wish to varnish the boat and colour it before varnishing, Colron Wood Dye will be suitable, except that if there is any trace of the previous coating in the grain, colouring may dry out unevenly. This will apply whatever stain is used. Colron is probably the one most likely to dry out evenly. Varnish should be a proper marine type. Household varnish will not stand up to water for long. Get a make such as suggested for paint. Give three coats, rubbing down the first two lightly with fine glasspaper. If possible, work on a warm day or in a warm room, and avoid dust. If outdoors, get the varnish on before noon so that it is almost dry by nightfall.

Working Cattle Horns

PLEASE could you give me information on cattle horns, as I would like to use them for decoration; also I would like to know how to make them hard and also transparent. (V.W.—Peterborough.)

CATTLE horns vary considerably. They should be cleaned by boiling in soda water for some time, after all loose flesh has been removed. Transparency is obtained by working to a thin section with files and glasspaper, then polishing. This is best done on a power buff, with first a coarse mop and pumice composition, then a softer mop with a polish intended for plastic rather than one intended for metal. If you have to polish by hand, start with a damp rag and pumice powder, then a brass polish, and finally one intended for silver. Do not mix the cloths, and make sure all of the abrasive from one stage is removed before the other is started. Drilling may be done with twist drills as for metal, but use a moderate speed and only sufficient pressure to keep the drill cutting.

Removing Tin from Lead

I WOULD be much obliged if you could tell me how to remove tin from lead. I have been told that sulphur will remove impurities, but whether this added to the melt would do the trick, is I think doubtful. I would like to add that the amount of tin present is not great, but is just sufficient to make the lead hard and slightly brittle. (R.M.—Taunton.)

REMOVAL of the tin is a very difficult matter without the use of a reverberatory furnace. As this means large scale operation and industrial plant, it is obviously precluded; as is solution of the mixed metal in acids, separation by chemical means and resmelting of the separated lead compound. Sulphur combines with both lead and tin, but as one of the products—stannous sulphide—is soluble in molten tin, it is conceivable that further hardening would result. One industrial process which might be adapted is that of keeping the metal melted and repeatedly skimming off the dross which forms, until a sample of the cooled metal shows a marked loss of brittleness. At this point the remainder of the molten metal should be well stirred with a de-barked green stick to remove any dissolved oxide.

Trays and Picture Frames

I AM making small trays and picture frames (wood). I am using hardboard for the bottom of the trays, rough side up, covered with 'Contact' (plastic covering). When I smooth this down, all the little rough lumps of the hardboard show through. How can I overcome this trouble, please? Also can you advise what to finish off the picture frames with? I would like to keep them in natural colour. (J.F.—N.7.)

THERE is no way of avoiding the marks of the reverse side of the hardboard showing through the thin plastic without laboriously sanding down the surface first. Two pieces of hardboard could be glued back-to-back to give a smooth surface both sides, but this would add to the weight and cost. A quick way of giving a natural wood finish is to use a brushing grade of cellulose, such as 'Brushing Belco'. This may be bought as a clear varnish and dries with a gloss almost immediately. It is heat-resisting. If you are using oak, the traditional finish is to rub with a wax polish so as to produce a semi-matt finish. If you want to stain the wood, use a wood dye before polishing. If you wish to paint the frames, the wood should first be filled with a primer, then given an undercoat, which is lightly sanded before giving the top coat of enamel.

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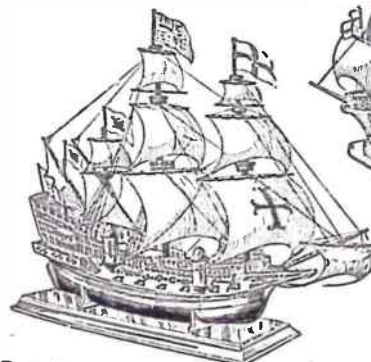
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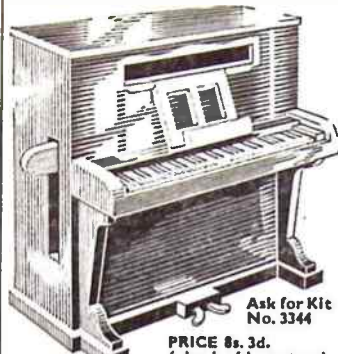
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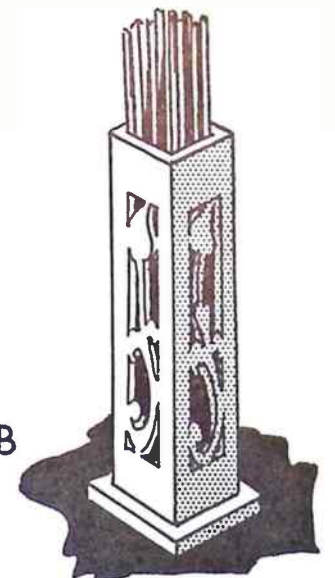
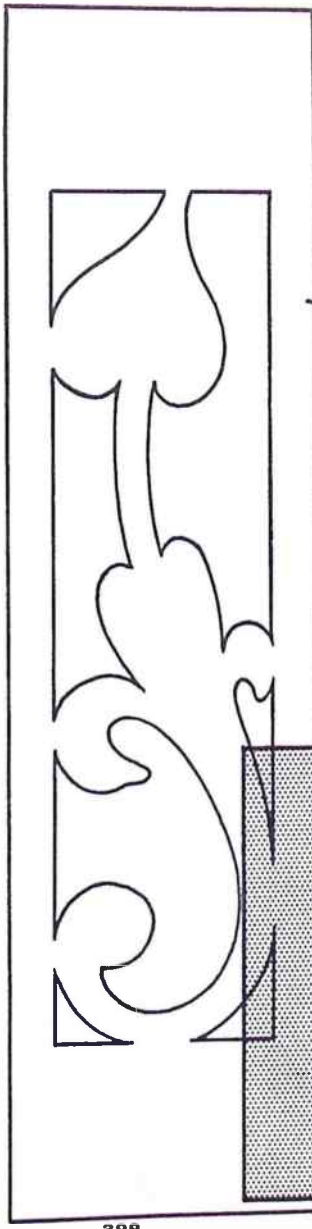
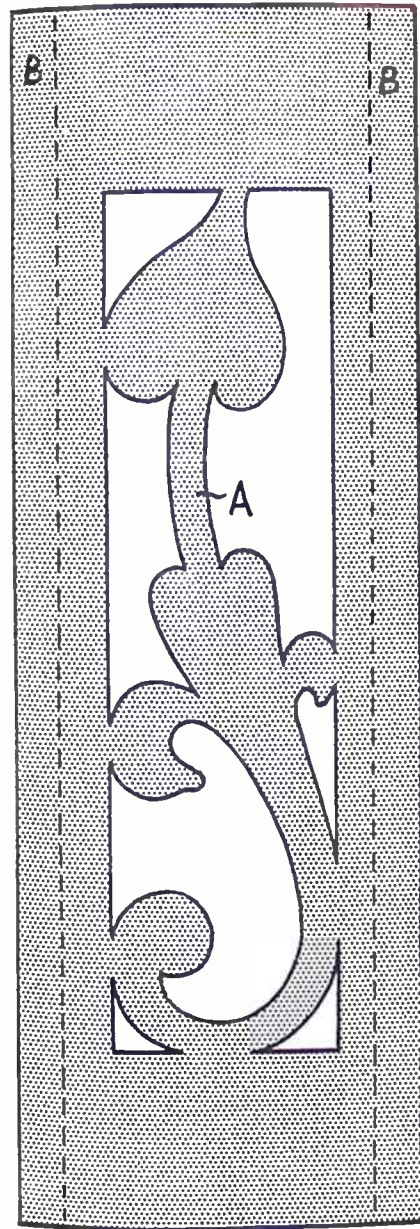
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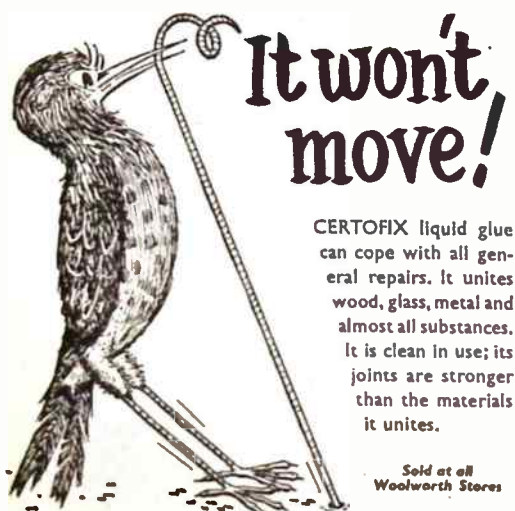
Job for the fretsaw

A SPILL HOLDER



TRACE THE PATTERNS

TRACE and transfer two of A, two of B, and one of C to ½ in. wood, and cut out with a fretsaw. Line the backs of A and B with coloured paper, and then glue pieces B between pieces A. Glue the base in position, and paint or varnish. (M.p.)



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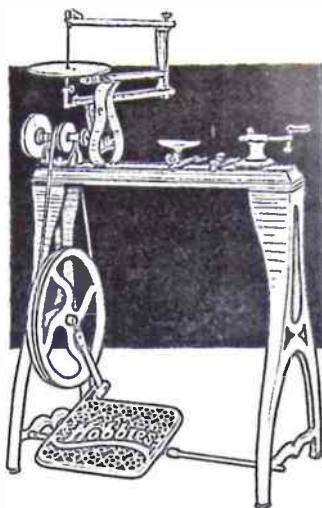


Simpla Shelf Kit. Here's the kit you've been waiting for! With the wonderful 'Simpla' Shelf Kit you can quickly put up 3 big (28" x 5½") adjustable steel shelves! Rigid flush tops capable of supporting up to 1½ cwt! All parts interlock. Just the thing for your garage, garden-shed, work-room, cellar or kitchen. Easy to fit. Easy to clean. Attractive dove grey finish. Made by one of the biggest steel equipment firms in Britain. Only 24/6 plus 3/- part postage and packing. Order from:

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WOODWORKING LATHES FOR THE KEEN AMATEUR



The 'Companion'

The 'Companion' Treadle Lathe. A marvellous combination for the amateur. Obtainable with or without fretsaw attachment shown. The larger driving wheel has two grooves of varying depths to give a change of speed. The headstock is provided with a 2 in. faceplate, a spur centre, and a screw centre for turning cups. It has also a solid emery wheel. The tailstock has a screw feed centre. The lathe is 14 in. between centres and is provided with two rests, designs, saws, etc. The fretsawing attachment is secured to the lathe bed by one bolt, and can be put on or taken off as desired. It is fitted with 19 in. arms and an 8 in. diameter tilting table. A well illustrated book on Wood Turning is included with each lathe.

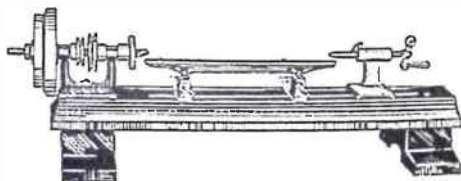
Cash Price: £13 10s. 0d. (as illustrated) or without fretsaw £10 0s. 0d.
Easy Payments: £2 15s. 0d. down, and ten monthly payments of £1 4s. 11d.
Without fretsaw, £2 down and 8 monthly payments of £1 2s. 6d.

The 'Hobbies' Lathe. This lathe has similar features to the 'Companion' but is built for larger work. It stands 6 in. higher, and the distance between centres is 20 in.

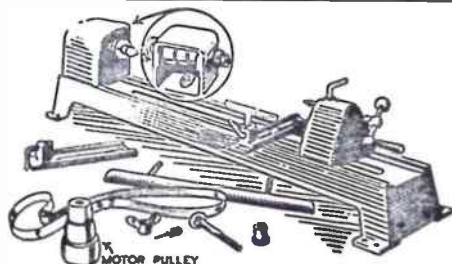
Cash Price: £15 10s. 0d. complete. Without fretsaw £12 0s. 0d.
Easy Payments: £3 5s. 0d. down and 10 monthly payments of £1 8s. 5d.
Without fretsaw £2 10s. 0d. down and 9 monthly payments of £1 4s. 1d.

Handy Bench Lathe. This machine is similar to the 'Companion' Treadle Lathe but without the legs, treadle, etc. The headstock spindle has two small 'V' groove pulleys for drive by $\frac{3}{8}$ in. diameter round leather belt. The balance wheel is similarly grooved, so that three speeds are thus provided. An emery wheel, a spur centre and a screw centre are also included. Two centres obtainable.

Cash Price: (14 in. between centres) £5 10s. 0d.
Easy Payments: £1 down and 6 monthly payments of 16s. 5d.
20 in. between centres model, Cash Price: £5 17s. 6d. Or easy payments: £1 5s. 0d. down and 6 monthly payments of 16s. 11d.



Handy Bench Lathe



Mark II Bench Lathe

On the Mark II Bench Lathe the keen handyman can turn his own stool legs, table lamps, wheels, and 101 things in wood. Unlike some 'cheap' lathes with bed made from steel rods or angle iron, the Mark II is built as a lathe should be built. It has a solid cast bed 32 in. long, machined its entire length. Specification: 22 in. between centres. Height of centres 2½ in. A three-step pulley in conjunction with a similar three-step motor pulley gives speeds of 1,065, 1,420, and 1,890 R.P.M. Drive from motor (*motor not included*) is by $\frac{3}{4}$ in. flat belt provided.

Cash Price: £11 11s. 0d. Easy Payments: £2 5s. 0d. down and 9 monthly payments of £1 3s. 7d.

EASY PAYMENTS. A machine can be dispatched carriage paid after the initial down payment, and subject to the completion of a simple form of agreement. It is impossible for us to allow this system to apply in any part of Ireland, or anywhere outside Great Britain. Agreement forms are obtainable at any Hobbies branch, or you can do the business through the post with Head Office at Dereham, sending your instalments there.

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