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THE ORIGINAL
'DO-IT-YOURSELF'
MAGAZINE

HOBBIES *weekly*

FOR ALL
HOME CRAFTSMEN

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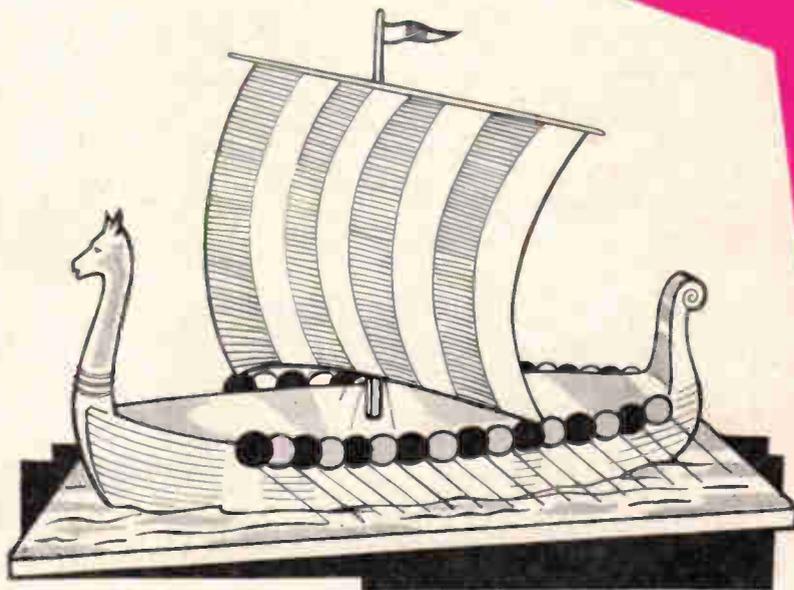
CHEMISTRY

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A VIKING SHIP



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5^D



THE most famous British Army mascot is probably the regimental goat of the Royal Welch Fusiliers. So old is the custom for this regiment to have a goat marching at its head that no one knows when it originated.

When on parade, 'Billy' carries a handsome silver shield, surmounted by the Prince of Wales' plume and motto.

One of these goats was guilty of a breach of military discipline when the regiment was in India some years ago.

After parade, when the sergeants mustered in the orderly-room with the company returns, one of them was standing, twiddling the list in his fingers, his hands behind his back.

Then in came Billy. With a shake of

his curved horns he snatched the returns from the sergeant's hands and ate them!

Every year, on St David's Day, (1st March), the officers of the regiment hold a banquet, and 'Billy' is the guest of honour. He is led round the table in procession by the drum-major.

Famous Mascots of the Army

This custom led to an amusing incident in 1775, when the Royal Welch were lying in Boston at the outbreak of the American War.

Picture the mess-room, hung about with trophies; the rows of officers, powdered and pigtailed, their scarlet coats, frilled shirts and blue facings reflected in the polished table, with the candle-light glinting on the gay gold lace. The band starts to play as the drum-major enters with the goat. Suddenly, 'Billy' gives a terrific bound, flings the drum-major full length on to the table, leaps over the heads of the astonished officers, and is away to the barracks, amid a roar of laughter from the rank and file.

A famous goose

During the Canadian rising in 1838-9, the Coldstream Guards were posted at a farmhouse near Quebec. One day the sentry at the gate saw a goose heading straight for the farm pursued by a hungry fox.

He dared not fire and bring out the rest of the detachment. So he watched. The fox was gaining rapidly on the terrified bird.

As it reached the astonished guardsman, the fox was close upon it, and made a ravenous snap at it as it tried to squeeze between the man's legs. But the British bayonet brought the chase to an end.

There was no mistake about the goose's gratitude. It rubbed against the soldier's legs and refused to leave the spot, pacing up and down with each relief day after day.

After the rebellion, 'Jacob' the goose was carried back to England by the Coldstream. For twelve years he did regular duty with the sentries at the barrack gates. Then one November morning he was killed by a passing vehicle. His epitaph states that he 'died on duty'.

TRICKY DESIGN WANTED

MR H. F. Wood of 61 Goodall Road, Leytonstone, E.11, is an inveterate fretworker who has made up nearly all the musical boxes and many table lamps in Hobbies list of designs. For the 'Old Woman in the Shoe' musical box he obtained a good result by veneering Formica to the wood before cutting, thus eliminating painting and facilitating the cleaning of the models. We do think, however, that a much greater variety of colours can be obtained with an enamel finish, which in itself gives as dust-resistant a surface as the Formica.

Mr Wood has won many prizes in handicraft exhibitions, and like many more keen fretworkers is seeking something really difficult to cut, something 'very tricky and tedious and needing patience, such as a large bridge'. If any reader can oblige Mr Wood with some such design, perhaps they would get in touch with him direct.



Be a winning 'Jockey'

MECHANICAL RACE GAME

FOUR people can take part in this exciting game, each turning a numbered wheel to 'jockey' their own miniature racehorse along the special race-track. A novel table-top game which will give great fun to all members of the family, it can easily be made by the home toy-maker, by closely following the instructions and drawings.

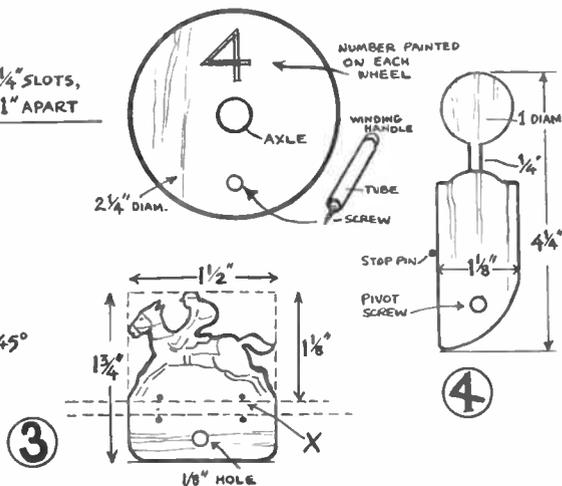
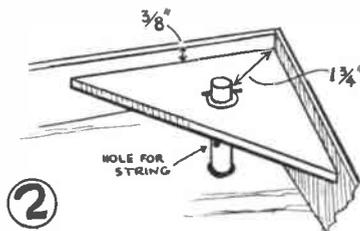
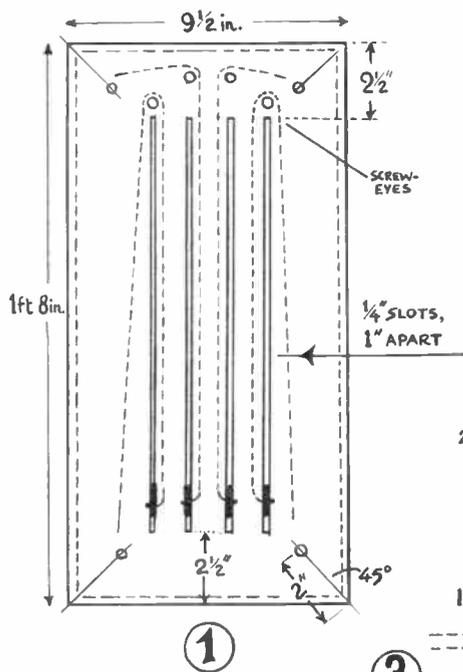
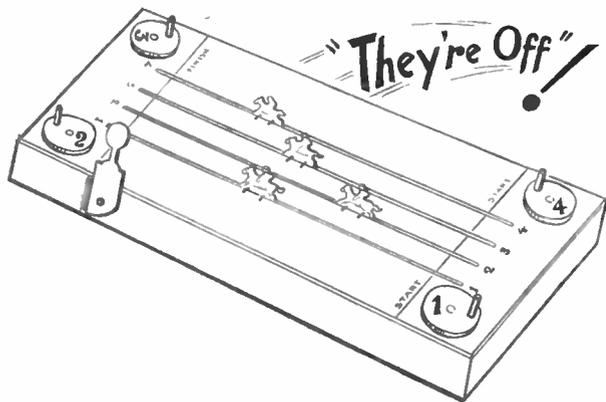
Obtain a plywood or hardboard panel of about $\frac{3}{8}$ in. thickness, of dimensions shown, and mark out the four tracks and positions of corner holes as detailed in Fig. 1. Drill the four holes to $\frac{3}{8}$ in. diameter and a small hole in each track for inserting the fretsaw and cutting the slots.

The dotted line around the plan of the course (Fig. 1) indicates positions of $1\frac{1}{2}$ in. wide plywood strips which make

wood and each drilled to accept a wheel axle-rod, positioned to correspond with the four corner holes in the panel. Cut four $2\frac{1}{4}$ in. diameter discs of $\frac{1}{4}$ in.-thick plywood, each with a centre hole of $\frac{3}{8}$ in. diameter for the axle rods. These rods are $\frac{3}{8}$ in. diameter, cut to a length of $1\frac{1}{2}$ in. Fix a winding handle to each wheel before gluing in the axle rods. Insert axles

not in use; a stop-pin provides for upright position.

The miniature racehorses and jockeys are cut out with a fretsaw to the pattern given in Fig. 3. A hole should be drilled in each for attaching the strings which pull the models along the track, before cutting from the plywood, to avoid splitting. Clean up the four models with



up a frame around the panel. The illustration of the finished model shows this clearly, while Fig. 2 gives detail of one of the corners viewed from underneath the panel.

The four corner brackets (Fig. 2) must be accurately cut from $\frac{1}{4}$ in.-thick ply-

through corner pivot holes and secure with a washer and fret-nail from underside as detailed in Fig. 2.

Make a winning post as shown at Fig. 4, and screw this to the side of the course on the finishing line as shown in illustration. The post folds down when

glasspaper then paint each a different colour. A number can also be added if desired. The panel should be painted green to resemble a race course, the sides being painted another bright colour.

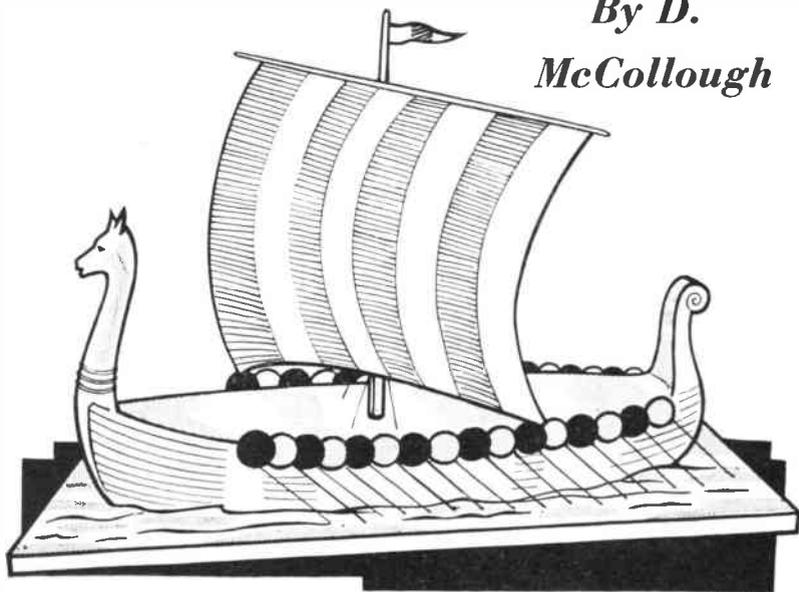
● Continued on page 309

BUILDING A VIKING SHIP

By D.
McCullough

THIS model of a Viking ship is built, as near as possible, in the same manner as the original, which was 78 ft. in length, and 16 ft. 9 in. at the midship section, with the sides flaring out. She was clinker-built of oak with sixteen planks per side, the keel being 66 ft. in length.

She was a long open boat, broad in the middle, with a low freeboard and sharp high ends. The bows and stern were alike, and she had sixteen oars a side, sixteen thwarts, and the shields painted alternately black and yellow. She had ornamented stem and stern posts, while the steering oar was on the aft starboard side.



Required material	Approximate cost.
Block balsa, 1 ft. by 1 in. by 1 in. . . .	8d.
Dowel, 1 ft. by $\frac{3}{8}$ in.	4d.
Strip balsa, 3 ft. by 3 in. by $\frac{3}{8}$ in. . . .	1s. 0d.
2 strips balsa, 3 ft. by $\frac{1}{2}$ in. by $\frac{3}{8}$ in. . .	3d.
2 strips balsa, 3 ft. by $\frac{1}{4}$ in. by $\frac{3}{8}$ in. . .	3d.
Balsa cement (2 tubes)	1s. 0d.
Approximate total cost:	3s. 6d.

Study the plans carefully before starting to make the model. The body plan, which is the most important, is an outline view of the ribs, looking head-on at the boat. These ribs are numbered, and on the half-breadth and sheer plan they are spaced at 1 in. intervals along the keel. The half-breadth plan is a view of half of the ship, looking down on to it, while the sheer plan is a side view.

The keel may be laid in one or three parts — as shown in the sheer plan. It is cut from $\frac{1}{2}$ in. by $\frac{3}{8}$ in. strip balsa, and the wood will have to be steamed or otherwise 'kerfed'. This is an old-fashioned method, but may be effected with care. It consists of making a series of cuts about a third of the way through the wood where the bend occurs. This, however, weakens the wood where it bends, so special care should be taken if this method is used. When the keel has been shaped it is lightly nailed to a working block with pins. It is desirable to have a working block of some kind, but if this is not available, pin to the kitchen table.

The stem and stern posts are made from block balsa 1 ft. by 1 in. by 1 in. They are carved out, and do the function, not only of stem and stern posts, but also of ribs 1 and 2. Cut the block balsa into two 6 in. pieces and start with, say, the stern post. From the sheer plan mark out on both sides of the wood the required shape, which is shaded in

the plan. Then cut this out. After that mark out rib 2 from the body plan, then cut this out. In the same way mark out and cut out the shaded part of the half-breadth plan. Then rub over with glasspaper, especially the curve at the stern. A curved scroll effect can be carved at the top, as shown in the sheer plan.

The stem post is carved in the same manner, using the same end of the half-breadth plan, the bows and stern being alike. Particular care should be taken when carving the figure-head. This can be any shape you like. Do not try to carve the ears, as they may be stuck on afterwards. When the stem and stern posts have been carved, they are stuck to the keel, as shown in the sheer plan.

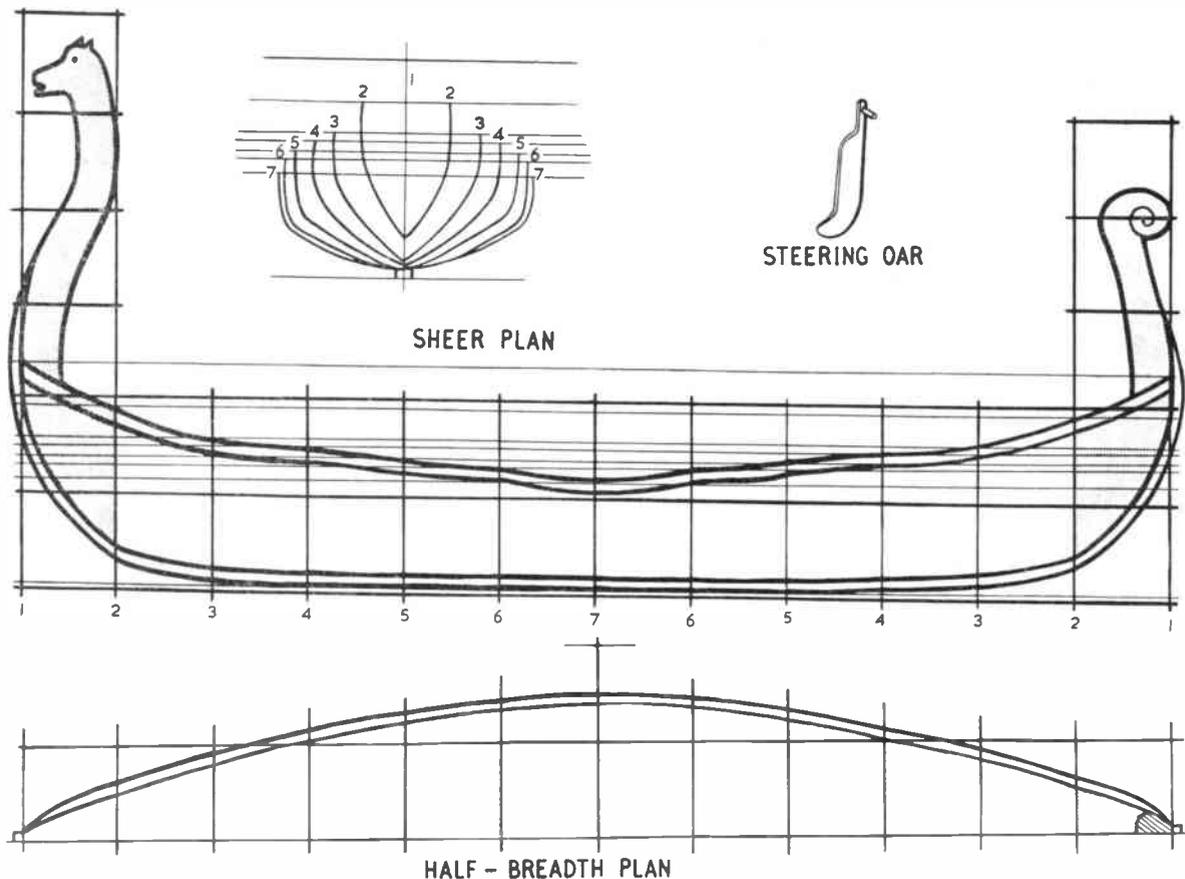
The ribs are made from $\frac{1}{2}$ in. by $\frac{1}{8}$ in. strip balsa. These, like the keel, may be steamed or 'kerfed'. Start with No. 3, because No. 2 is included in the stem and stern posts. Glue two small blocks of balsa about $\frac{1}{2}$ in. by $\frac{1}{2}$ in. by $\frac{1}{8}$ in. on the keel where the No. 3 ribs will go. Then shape the two pairs of No. 3 ribs, cutting them off at the right angle, and stick them on the sides of the small blocks. This process, a block of balsa at each end of the boat stuck on the keel and two ribs on either side of each block, is used for the rest of the ribs

except No. 7 which, of course, being in the middle, has only one pair. Ribs 5, 6, and 7 will need a small block of balsa stuck in the bend for support.

When the ribs are dry, turn the boat upside down, resting ribs 5, 6, and 7 on a block of wood. The planks are then cut from $\frac{3}{8}$ in. strip balsa. Start the planking from the keel upwards, the first plank stretching from rib 4 to the other. They are approximately 4½ mm. wide, overlapping each other by 1½ mm. When the planking is finished, the gun'1 is put on in the same manner, being made of strip balsa $\frac{1}{2}$ in. by $\frac{1}{2}$ in., and curved on the outside. The hatches over the stem and stern stretch from rib 1 to half way between 2 and 3.

The mast is made from $\frac{3}{8}$ in. dowel in two parts, 10½ in. and 7 in. long, bound together at right angles with thread, so that the join is 2½ in. from the top of the main mast, which is the longest, and in the middle of the other. Do not forget to taper the ends. The mast is stuck on the keel, on either side of rib 7, with four small blocks of balsa around it for support. The forestays, made from thread, stretch from the top of the main mast, through slits at the ends of the horizontal part, to the gun'1, to the inside of which they are stuck.

The boat is now finished with a light coloured varnish or with flat paint. The



thwarts, cut from balsa $\frac{1}{16}$ in. thick are approximately 3 mm. wide, and are varnished before they are stuck in. The shields, sixteen each side, and made from thin cardboard, are painted alternately black and yellow. They are stuck on the gun'l, overlapping each other.

The sails, made from alternate red and white strips of material, $\frac{3}{8}$ in. wide, sewn together, are better if made double, and strengthened with wire, so that they keep their shape. A small triangular flag can be made and stuck at the top of the main mast.

The boat is now just about complete. It is stuck on four blocks of wood, which are stuck in appropriate positions on a stained, varnished base, say, 1 ft. 4 in. by 10 in. The base may, however, be of plain wood with an imitation 'sea' of Plasticine or papier mâché. The oars, cut from $\frac{1}{16}$ in. balsa, are about 2 in. long and 2 mm. wide, and like the thwarts are varnished before being stuck on. They are stuck just below the shields with the

smallest touch of glue on each end — if too much is used it may dissolve some of the stain on the base.

The last thing to put on is the steering oar which is stuck aft on the starboard side.

● Continued from page 307

MECHANICAL RACE GAME

Paint each wheel a colour to correspond with the colours of racehorses. The winning-post is white, with a touch of red or black for the top disc.

When all parts are dry, the model horses can be fitted in their track slots. Knock two fret-nails through the base section of each figure X, and then, with the figures in position in the slots, add two more nails to hold them in place so that they may slide smoothly along the tracks. Refer to Fig. 1 again, for details of how the strings from each horse travel through screw-eyes to their corresponding wheel, to where ends of strings are fixed.

It will be noted that the two inside

horses have strings that go almost direct to the wheels, whilst the outsiders have a string which turns back, through a screw-eye, to its winding axle.

The wheels are turned clock-wise by competitors, who aim to get their horse to the post first. The experienced model-maker will be able to add his own authentic details to the game. Little numbered posts that shoot up when touched by horse at the finish would indicate clearly the winner. Each wheel should be rewound and its corresponding horse returned to the start after each run. The length of the course could be effectively increased if desired.

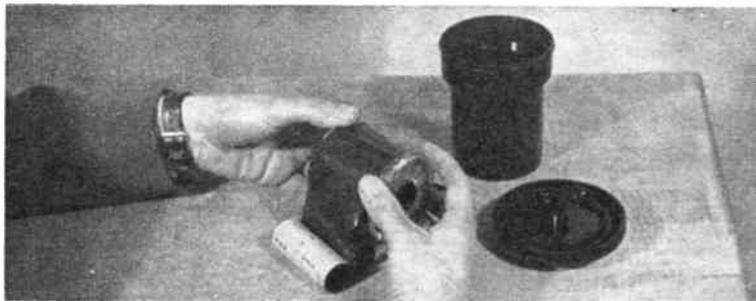
(T.S.R.)

METHODS OF DEVELOPING

THE surface of the film facing the camera lens is coated with an emulsion containing silver salts. When a picture is taken these salts are affected by light entering the camera and a latent image is formed. This only becomes visible when the film is developed, the majority of the silver salts being converted into metallic silver and producing the light and shade in your picture.

After developing, small amounts of silver salts remain on the film. These are still sensitive to daylight and so, to avoid spoiling the negative, it is necessary to remove them. This process is called 'fixing'.

A developing solution consists of various chemicals. These can be bought



Loading the film ready for tank development

If you buy a branded developer follow exactly the printed instructions; otherwise, make up your solution by first dissolving a pinch of the sodium sulphite in three-quarters of the water — which should be at not more than 120°F. Then add each of the other chemicals in turn in the order given above, making sure each one is thoroughly dissolved before adding the next.

Filter the mixture into a 20 oz. brown bottle with a screw-top or other airtight fitting. Stick an appropriately worded label to the waist of the bottle.

A typical fixing solution comprises: sodium thiosulphite, 4 oz; potassium metabisulphite, $\frac{1}{2}$ oz.; water to make 20 oz. These ingredients are again sufficient to make one pint, which should be bottled and labelled.

In addition to these chemical solutions you will require either four developing dishes, or a developing tank. A set of polystyrene dishes each measuring 7 in. by 5 in. costs about 15s. 0d.; a tank costs approximately 30s. 0d.

As developing must be carried out in complete darkness the use of a tank, which is light-proof, is to be recommended. If you use 35 mm. film, and a 36-exposure roll of this is 5½ ft. long, such a tank is an essential item of equipment.

Load the film into the tank in absolute darkness and in accordance with the tank manufacturer's instructions. When this has been done, and the lid of the tank securely replaced, the rest of the operation can be carried out in normal light.

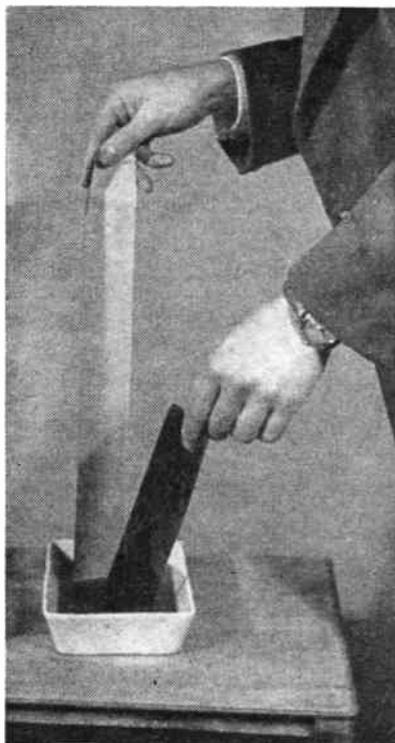
Fill up the tank with water at 68°F. Leave for two or three minutes, agitating occasionally with the rod provided. This softens the film's emulsion and prevents the developer being contaminated by the anti-halation backing on the film.

Pour off the water and refill the tank



Testing temperature of the solution to ensure strict application of the correct developing time

with developer. Leave the film in this for the recommended time (see chart), agitating for five seconds every minute. This exact timing is important. It will



The see-saw method used in dish developing

separately or in measured, ready-to-use form. The ingredients required for one pint of a typical developer are: Sodium sulphite crystals, 4 oz.; Metol, 20 grains; Borax, 20 grains; Hydroquinone, 50 grains; water to make 20 oz.

standardize your processing technique and thus ensure your negatives being of a consistent quality.

After use, filter the developer back into its bottle, as this, like the fixer, can be safely used several times.

Next, rinse the film by refilling the tank with water at 68°F to which has been added a few drops of glacial acetic acid. Pour this off and fill the tank with fixer at 68°F and leave for not less than ten minutes; longer will do no harm. Agitate occasionally.

To ensure the developer and fixer are at the correct temperature stand the bottles in a bowl of hot or cold water as required. Test with a thermometer.

After fixing, remove the agitator and stand the tank under running water which is at not more than 68°F. Wash the film in this way for about half an hour.

At the end of this time, and while the tank is still full of water, add three or four drops of a wetting agent. One of the new household washing-up liquids is ideal for this purpose.

Remove the film after about three minutes, attach a clip to each end and hang up to dry in a dust-free atmosphere. If metal film clips are not available use wooden, clip-type clothes pegs. Wipe off surplus moisture from the film with a squeegee or a slightly damp viscose sponge.

If you decide to use developing dishes, the order of procedure is the same as above, but the film is agitated by hand and all work must be carried out in complete darkness until approximately half-way through the fixing time. After this, light will not be harmful.

Before starting with this method, fill the four dishes to half their depth. If you are right-handed you will find it easier to work from right to left, using the first dish for water, the second one for developer, the third for the rinse, and the fourth for fixer. Then, having unrolled your film and removed the backing paper, proceed as follows.

Take an end of the film in each hand, being particularly careful to hold it by the edges and so avoid getting finger marks on the emulsion side of the film. With a see-saw movement pass the full length of film through the clear water. Do this for about half a minute, when the film will have softened appreciably. This, in addition to safeguarding your developer, makes it easier to handle by lessening its natural tendency to curl.

Gently shake off any surplus moisture and, still holding the film in the same way, transfer it to the dish containing developer. Squeeze the edges of the film until it curves slightly across its width. Pass it through the solution, again with a see-saw movement. Keep this backwards and forwards action going at an easy

pace for the recommended time, making sure the full length of film is immersed with each complete movement.

As the entire developing process so far has to be carried out in total darkness your only guide will be sense of touch. So start with the fingers of one hand below the surface of the liquid and end each swing with the fingers of the other hand similarly immersed.

The developing time must be accurate. To ensure this you will need either a clock or an assistant who will stand outside the closed door of your dark-room and call out the time to you. If you use a clock, stand it in a position where its face will pick up sufficient illumination from a safelight to make it easily readable. But be absolutely certain that none of this light enters your actual working area. If it does, 'fogging' will occur and the quality of the negative will be greatly affected.

When development is complete, rinse the film, then transfer it to the dish containing fixer. Keep it moving through the fixer with a see-saw motion for about ten minutes. Then remove and wash.

The film can be washed in running water of a suitable temperature, or in a dish. With the second method the water should be changed at least six times at intervals of four or five minutes.

Clip the film at each end, hang it up and, after removing any surplus mois-

DEVELOPING CHART	
FILM	
MEDIUM PAN.	
Temp.	Time
65°F	14 mins.
66°F	13 mins.
67°F	12½ mins.
* 68°F	12 mins.
69°F	11¼ mins.
70°F	10¼ mins.
*Recommended temperature	

ture, which, if left, may cause streaking and drying marks, leave to dry in a dust-free atmosphere.

The developing and fixing chemicals described are suitable for processing black-and-white films manufactured by all the leading companies. Their life varies according to their use. It is recommended to give a 10 per cent increase in developing time for each use of the developer, with four uses for 35 mm. and 8 uses for 120 film. The fixer may be used until exhausted.

The next article in this series will cover contact printing.

THIS ROLL-O BALL BOARD WILL AMUSE THE CHILDREN

ROLL-O is an easy game for fathers to make for their children to keep them well amused either out-of-doors during fine weather or indoors when it is raining.

The game is very simple to make and play and the necessary equipment merely consists of three balls and a board con-

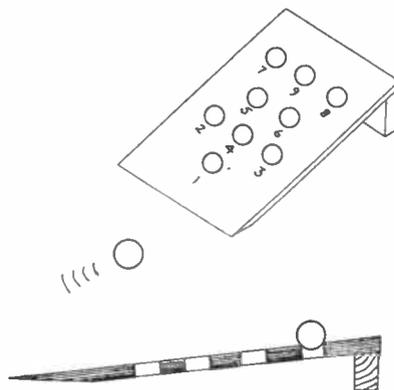
taining nine holes. Each hole on the board is given a certain number from one to nine.

To play the game, place the board on the ground and stand away at a specified distance. Each player then rolls the three balls, one at a time, towards the board and tries to score the highest number of points. The player who scores 21 points first is the winner.

The balls should, of course, be all the same size. The board is a piece of $\frac{3}{8}$ in. thick plywood and may be cut to any convenient size. Smooth off the edges with glasspaper and then bore nine holes through the board in the pattern shown. The diameter of these holes should be slightly less than the extreme diameter of the balls so that they do not pass through.

Nail on a block of wood at the top edge to give a tilt to the board and chamfer the edges which rest on the floor.

The most difficult hole to 'catch' should be given the highest number of points. (F.K.)



CHEMISTRY AT HOME

SILICATES are salts derived from the element silicon, Si, which occurs widely in the form of silicon dioxide, SiO₂. Sand, quartz, and flint all consist essentially of this oxide. Clays, too, contain the combined oxide as aluminium silicate, Al₂O₃·2SiO₂·2H₂O. Felspar, mica, and even some gems such as the emerald, garnet, and topaz are complex silicates, often of variable composition.

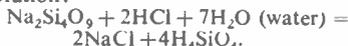
In fact silicon chemistry is a highly complex subject. Yet there is plenty the home chemist can do which is both interesting and instructive. A moment's thought reveals that the bricks and mortar in which we live, the glass window we look through (ordinary glass is a sodium calcium silicate), and the crockery from which we eat all owe their origins to silicon dioxide. Such a useful substance deserves further investigation in the home laboratory.

An interesting start can be made with waterglass, which, though generally a mixture, roughly approximates to a sodium silicate of the formula Na₂O·4SiO₂ or Na₂Si₄O₉. It is prepared by fusing sand or flint with anhydrous

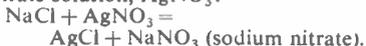
sodium carbonate, Na₂CO₃. A glass-like mass is left on cooling and this is dissolved in water to form the familiar egg preserving solution.

EXPERIMENTS WITH SILICATES

Sand and flint are not quite pure silicon dioxide. A specimen of the pure substance may be prepared from waterglass by adding to its solution in warm water dilute hydrochloric acid, HCl, until the mixture is shown to be acid in reaction by its turning blue litmus paper red. A white gelatinous precipitate of orthosilicic acid, H₄SiO₄, is formed and sodium chloride (salt), NaCl, is left in solution:



Wash the precipitate by decantation in a large bottle until one wash water is shown to be free from sodium chloride by a sample giving no white precipitate of silver chloride, AgCl, with silver nitrate solution, AgNO₃:



Let the precipitate dry at room temperature. White orthosilicic acid remains. Heat it to redness for about ten minutes in a crucible. Water is given off and white silicon dioxide remains:



An interesting variation of this experiment gives a soluble form of hydrated silicon dioxide and illustrates the principle of dialysis.

Dissolve about 2 grams of waterglass in 100 c.c. of water. To 2 c.c. of this in a test tube add dilute hydrochloric acid from a burette (Fig. 1) until an acid reaction is obtained. Note the volume of hydrochloric acid used. Take 100 times this volume and dilute it to 100 c.c. Add the remainder of the waterglass solution to this highly diluted acid. This time no precipitate forms. The clear solution contains silicon dioxide combined with an indefinite quantity of water and may be expressed as SiO₂·H₂O. It is present in a peculiar form. It will not pass

through an animal membrane such as parchment, whereas the sodium chloride also present will. The two may be separated by dialysis.

A piece of parchment from an old tambourine, a piece of bladder from the butcher's, or a sheet of genuine chemical parchment paper may be securely tied to the neck of a large jam jar, the bottom of which has been cracked off by filing a mark all round and applying a hot glass rod.

Hang this in a trough of water by means of string fastened to the jar with plastic tape (Fig. 2). In a few hours, test a little of the water with silver nitrate solution. A copious white precipitate of silver chloride is obtained, showing the sodium chloride is passing through the membrane. Change the water every few hours until it no longer gives the chloride reaction.

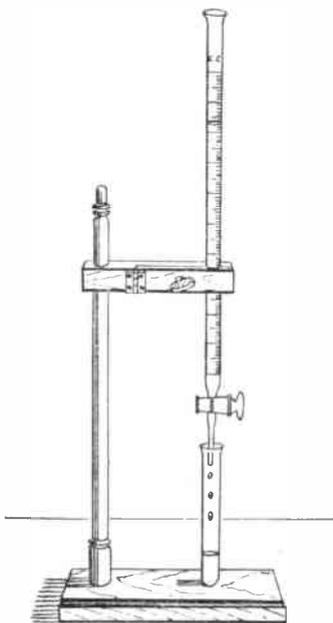


Fig. 1—Estimating the amount of acid needed

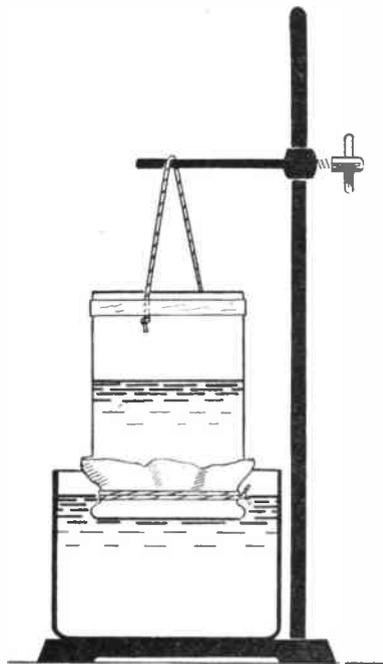
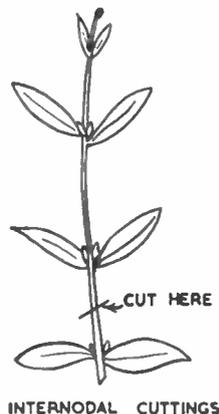


Fig. 2—Apparatus rig for dialysis

In the jar a limpid solution of the colloidal hydrated silicon dioxide remains behind. Keep it aside in a beaker for a few days. Slowly it clouds and a gelatinous white precipitate of orthosilicic acid separates. The colloidal solution is therefore unstable.

One of the earliest experiments the home chemist does is to grow a silica garden. Though this has previously been dealt with, newcomers to the science may like to have details.

● Continued on page 313



INTERNODAL CUTTINGS

FEBRUARY 'fill dyke' is often a month of severe weather. Snow and ice are usually widespread, especially during the early days of the month. Cold freezing winds can cause havoc amongst newly planted evergreen shrubs, which should be protected by sacking, straw or bracken.

March is likely to be a busy month so it is wise to make good use of the lengthening days of February. Even if general gardening is impossible you can get forward with jobs like cleaning pots, making boxes, preparing composts, sharpening tools, etc.

SOME FEBRUARY JOBS - WEATHER PERMITTING

Plant honeysuckle and jasmine.
Lift and divide herbaceous plants.
Plant fruit trees, roses and other shrubs.
Remove big buds from currants.
Plant shallots.
Prune gooseberries and currants.
Tie in loganberries and blackberries.
Clean up strawberry bed.
Sow first peas (round seed).
Sow broad beans.
Dig trenches for celery, runner beans and leeks.

Place cloches in position and sow lettuces, radish, summer cabbage and red cabbage.
Purchase and set up seed potatoes.
Order seeds.

IN THE COLD GREENHOUSE

Stir soil around lettuces.
Ventilate.

IN THE WARM GREENHOUSE

Bring in bulbs, cinerarias, etc. for forcing.
Repot fuchsias and geraniums.
Inspect all cacti and remove mealy bugs.
Set up dahlias in peat.
Take cuttings of fuchsias, geraniums, coleus, chrysanthemums and perpetual carnations.
Sow the following: antirrhinums, gloxinias, begonias, tomatoes, celery, leeks, cauliflowers and onions.
Increase ventilation and pot on flowering plants as necessary.

IN THE COOL GREENHOUSE

Take cuttings of chrysanthemums and carnations. Provide bottom heat.
Sow seeds as for warm house.
Fumigate and increase ventilation.
Bring in bulbs.

MOST people look upon fuchsias as subjects for the greenhouse or for indoors, but they are ideal for summer bedding. Those who possess a number of stock plants can easily produce two or three dozen young plants for bedding out in late May or early June.

Repot your stock plants this month and spray with clear water to encourage new growth. Take cuttings as early as possible, planting them in pure sand and providing a little bottom heat. Internodal cuttings should be taken and a long shoot can be divided into two or three pieces.

Plant out into boxes of J.I. No. 1 and pinch out to encourage bushy growth. Transplant into the garden after hardening off for a week or so.

Choose varieties which are vigorous and naturally bushy. (M.h.)

● Continued from page 312

EXPERIMENTS WITH SILICATES

One-quarter fill a jam jar with water-glass. Add twice its volume of lukewarm water and stir until an even solution is obtained. Add a quarter inch bottom layer of sand and then drop in small fragments of cobalt chloride, $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$, copper sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, ferrous sulphate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, nickel sulphate, $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$, lead acetate, $(\text{CH}_3\text{COO})_2\text{Pb} \cdot 3\text{H}_2\text{O}$, and strontium nitrate, $\text{Sr}(\text{NO}_3)_2$.

Very soon blue, green and white coral-like growths sprout from the chemicals and grow up through the solution, branching realistically.

These growths consist of silicates of the respective metals, but of indefinite composition. To make silicates of defi-

nite composition we must use sodium metasilicate, $\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$.

Most silicates are insoluble in water. An interesting example is calcium metasilicate, CaSiO_3 , for it is the active principle in most hydraulic cements. Dissolve 5 grams of sodium metasilicate in 100 c.c. of water and stir into it a dilute solution of calcium chloride, CaCl_2 , until no more white precipitate forms. The precipitate is calcium metasilicate. Sodium chloride remains in solution:



Wash the precipitate by decantation in a large bottle until one wash water is shown to be free of sodium chloride by its giving no precipitate with silver nitrate

solution. Filter off the calcium metasilicate and let it dry in a warm place.

Cobalt metasilicate, $\text{CoSiO}_3 \cdot x\text{H}_2\text{O}$, is worthy of preparation on account of its colour, which makes it suitable for a pigment. Again dissolve 5 grams of sodium metasilicate in 100 c.c. of water and add cobalt chloride solution. A fine violet-blue precipitate appears:



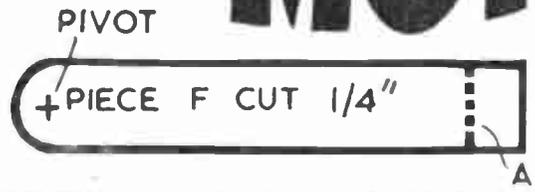
Continue adding cobalt chloride solution until no more precipitate is formed. Then wash the precipitate free of sodium chloride by decantation, until one wash water fails to give the chloride reaction with silver nitrate. Allow the precipitate to dry in a warm place.

(L.A.F.)

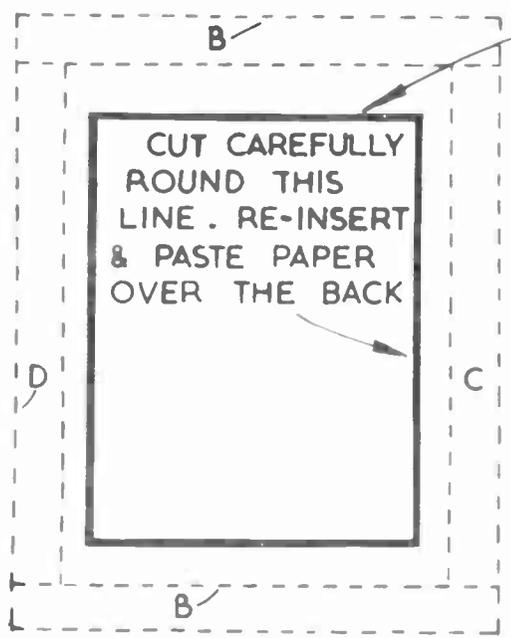
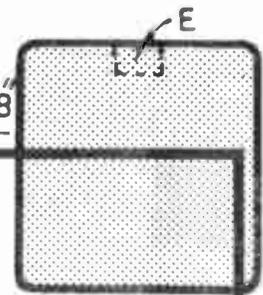
"Penny" MONEY BOXER

A FASCINATING NOVELTY

PIECE D
2 3/4" X 2 3/4" X 1/4"



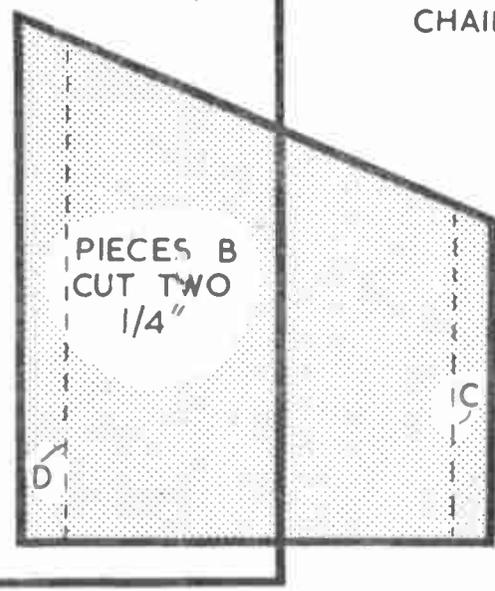
PIECE H CUT ONE 1/8"



OPENING TO REMOVE MONEY

CUT CAREFULLY
ROUND THIS
LINE. RE-INSERT
& PASTE PAPER
OVER THE BACK

PIECE A CUT ONE 1/4"



HOBBY CHAIN

BOXER

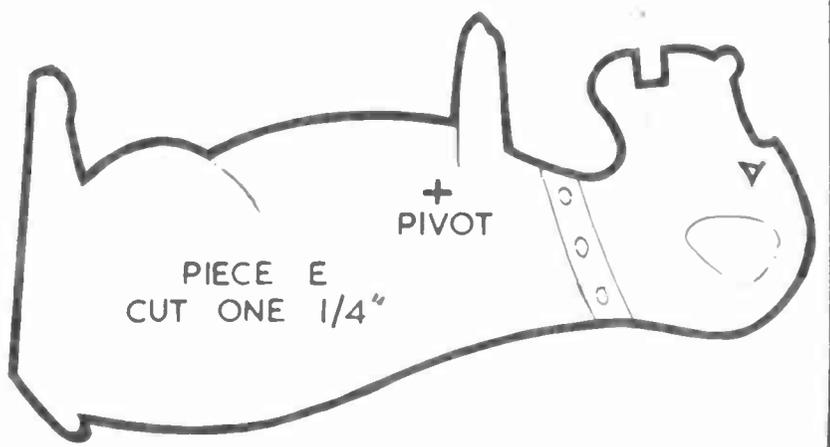
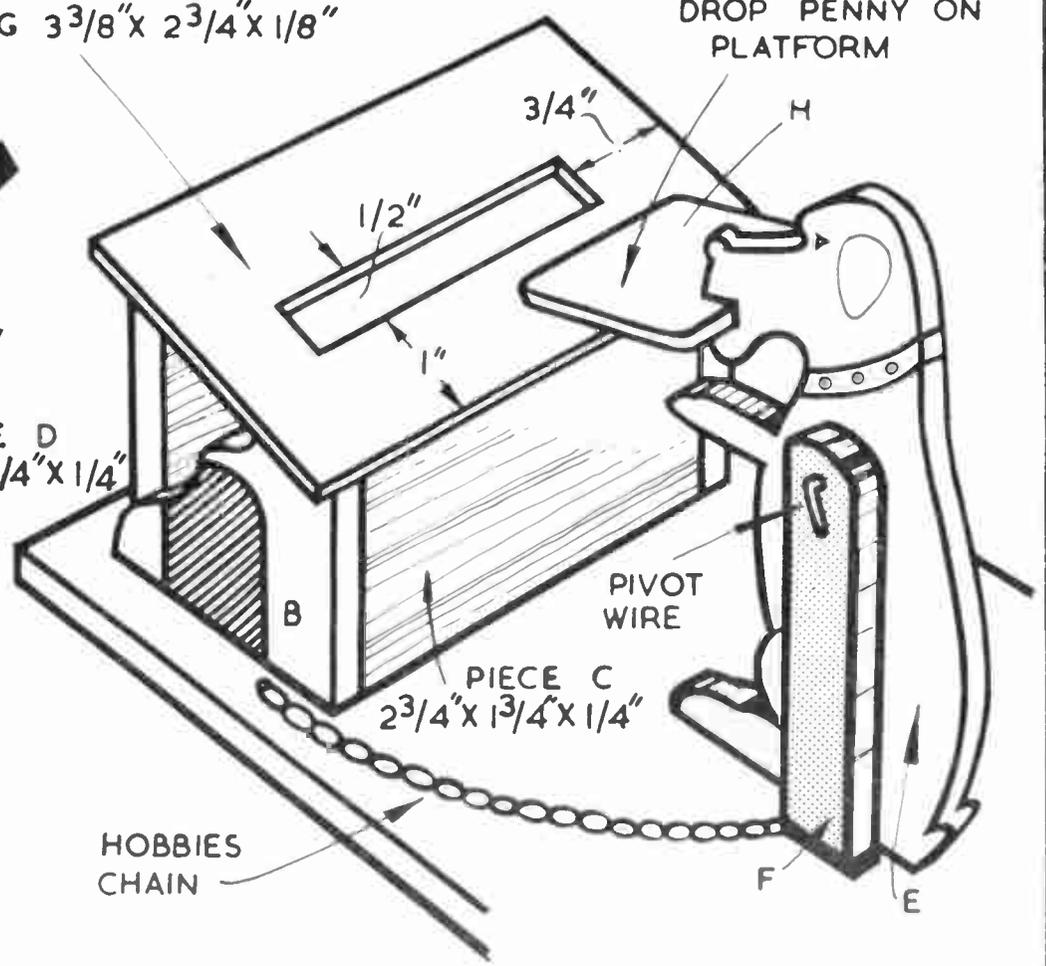
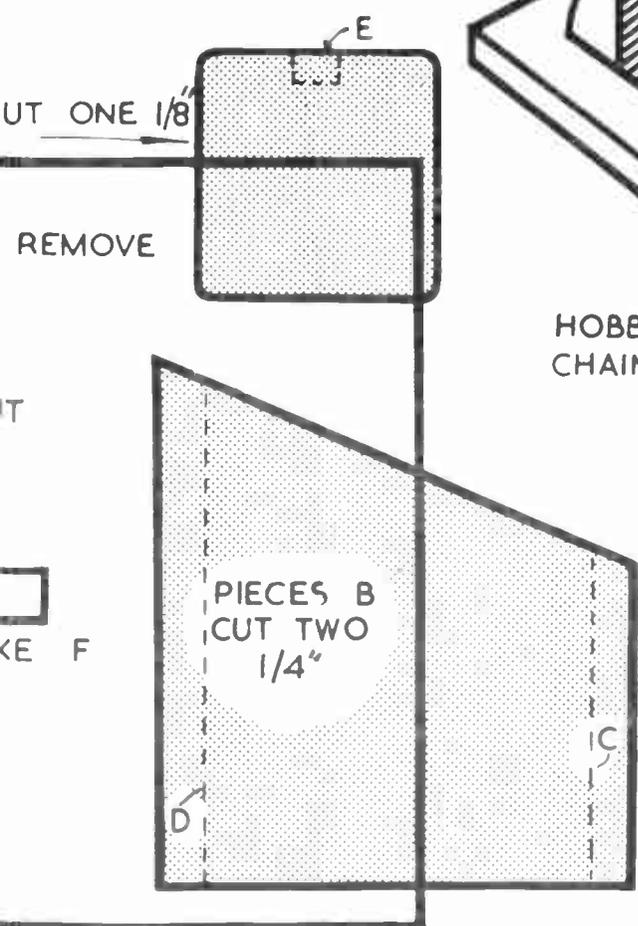
ATING NOVELTY

PIECE G $3\frac{3}{8}'' \times 2\frac{3}{4}'' \times \frac{1}{8}''$

DROP PENNY ON PLATFORM

PIECE D $2\frac{3}{4}'' \times 2\frac{3}{4}'' \times \frac{1}{4}''$

PIECE C $2\frac{3}{4}'' \times 1\frac{3}{4}'' \times \frac{1}{4}''$



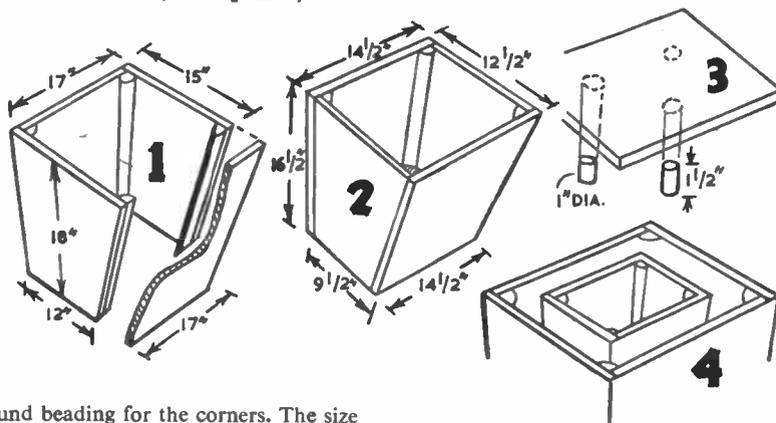
Attractive Flower Butt in Concrete

FLOWERS and shrubs can provide much attraction when they are placed outside a doorway. This article deals with a simple way of making a concrete butt that will be attractive in itself and will withstand the weather better than will wood.

Fig. 1 shows the outside of the mould to be made. Hardboard or plywood is used for the sides, and $\frac{1}{2}$ in. quarter

board or plywood is best levered off the corner pieces, so that the concrete, which is not yet hard, will not be bruised. For the inside part of the mould, lever off the corner pieces. The concrete will still be rather 'green', and should not yet be moved.

If a number of air holes are found in the sides of the concrete, mix a mortar of



1 cement to 3 sand. Use a small piece of wood as a float, and work the mortar into the concrete, using a circular action. Then use a clean paint brush dipped in water to pass over the dressed concrete. Allow four days for the concrete to harden.

The bottom part of the mould that has been used to form the drainage holes can finally be knocked out from the underside. (A.R.N.)

round beading for the corners. The size shown can be varied to suit particular needs, but the dimensions should be increased or decreased throughout.

Fig. 2 shows the inside of the mould, made from the same materials, but with reduced measurements.

The base of the mould is shown in Fig. 3. This is fixed to the underside of the inside mould, and 1 in. dowels about $1\frac{1}{2}$ in. long fixed to the underside. These will provide drainage in the base of the butt.

For easy stripping of the mould after the concrete has set, keep the smooth side of the hardboard to the cavity that is going to be filled with concrete, and paint the corner pieces with lime wash or clean oil. If plywood is used, treat all the cavity with lime wash or oil.

Fig. 4 shows the mould ready for filling with concrete. It is placed upon a level and clean surface, the top of the mould being checked for level. For filling, use 1 part cement, 2 parts sand, and $1\frac{1}{2}$ parts small shingle or chippings of about $\frac{1}{4}$ in. size.

Place the concrete into the mould in 2 in. layers; use a length of timber to compact the concrete. Make the process continuous until the mould is filled.

Cover the mould with thick paper or damp sacking for four days, then remove and strip the mould. The hard-

A GAME TO MAKE



AN elastic-powered launcher, obstacle track and target board are the three easy-to-make units which provide an exciting table-top 'winter

By T. S. Richmond

sports' game. Players have to direct miniature ski-men from the launching pad over the obstacle hill to obtain highest scores on the finishing target.

The launcher platform unit is built up in 'bread-and-butter' fashion from four pieces as detailed in diagram. Cut piece A with a fretsaw from $\frac{3}{8}$ in. plywood, cutting out also the middle sliding platform C, which, trimmed to length shown, will later be replaced.

Piece B is of same dimensions as A, but of thin cardboard, and has a 1 in.-width slot. Piece D is of $\frac{3}{8}$ in. plywood with a $6\frac{1}{2}$ in. by $3\frac{1}{2}$ in. opening. Glue a 1 in. strip of card along both edges of C so that they project $\frac{1}{2}$ in. X, forming

runners to the underside of A when replaced.

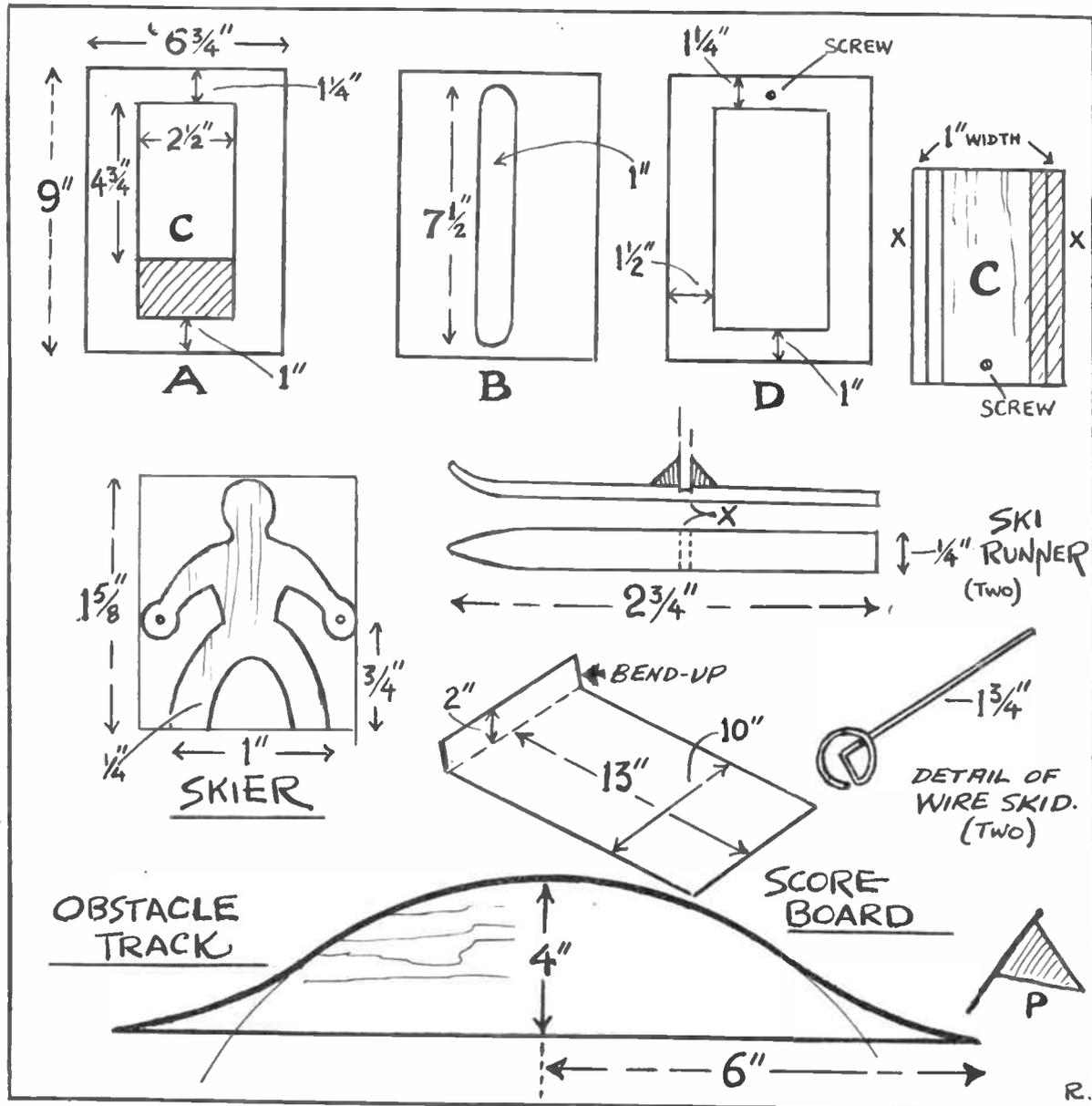
Glue the spacer frame D to A and then, with C sliding freely, add the backing piece B, binding the whole 'sandwich' together with tape around the outside edges. Fasten an elastic band between the screws in C and D; access being made through the slot in the base. Glue and pin on a strip of wood and dowel rod handle for pulling back the launching pad, as in the heading illustration.

Make a little skier figure for each player, the body and two runners consisting of thin plywood. Legs of skiers are glued in slots in runners X and the wire skids glued in holes bored in hands of figure.

A plan of one of the two sides for the obstacle unit is shown and these form supports for a 3 in.-wide cardboard runway, glued to the curved edges. A larger outside shape is glued to each side of track to make the finished unit. Add

little pennants P of card and wire. The track should be covered with a glossy paper or varnished so that the skiers glide smoothly over.

The score card or wood board can also have a slippery surface by coating with paper-varnish after, of course, drawing in and painting various score positions in the form of numbered flags, etc., on to which the skiers finish. The units may be decorated and finished off as desired to make a novel and entertaining gift.



Designs Designing

WE have now arrived at the stage when we must discuss the important part that colour plays in our designs. Unfortunately, it is not generally appreciated how vital this can be, but try to imagine the position if our clothes, homes, flowers, trees and grassland were of the same colour. The only contrast we should enjoy would be that of light and shade and the world would be a dull place.

It is extremely difficult to describe colours and the effects of colours in words, but we can attempt to describe some of their qualities. These may be briefly interpreted as hue, intensity, and value. We will deal with these in turn.

A hue is the difference in colour and we have red, yellow, blue, orange, green, and so on. No doubt you will be fully aware that most are a combination of the three primary colours.

Intensity of a colour is rather more difficult to appreciate but we can say quite definitely that this relates to the purity of a colour. For example, a hue of pure tone is intenser than one subject to greyness. Scarlet is intenser than its secondary colour of mauve to which has been added grey, while emerald is intenser than jade and so on.

When we speak of the value of a colour we refer to its lightness or darkness, an example being red and maroon. The latter is far heavier in effect and it will be obvious that less is required if we are to achieve a balance when the two are used together.

Our hues are prepared from pigments derived from many sources but the colours we see are actually reflections of light. When they are combined they produce either a good or bad mixture and this reflects on the designer. The aim must always be a harmonious combination. As a guard against violent clashing of discordant colours we can resort to using the simple expedient of one hue in different intensities. While the contrast may not be quite so vivid we do at least achieve harmony and the next step is to pick out a detail in the vigorous contrast of another hue. The practice of using different tones of the same hue is quite common as you will have observed in house decoration.

If two entirely different hues are placed together they appear to influence each other like an optical illusion. If light red and dark yellow are placed side by side the former will look much darker and bluer. The yellow will assume a greenish tint and this illusion can be tested quite easily by preparing strips of the two hues and bringing them together. This practical test should be sufficient warning that care is required in the selection of colours which are to be applied in adjoining positions.

By S. H. Longbottom (PART IV)

Although you may not be able to decide on good colour without some experience, the following points will assist and enable you to modify obvious errors appearing on the finished work.

((a) Outlining the design. This may be done in gold, silver, white or black. All of these may be regarded as neutral and the selection of any one will necessarily be determined by the background.

(b) Coloured motifs. These may be applied on white or black backgrounds quite successfully and no outline is necessary.

(c) Coloured motifs on a contrasting background may merge into the latter, losing much of their luminosity. The impact of the motif can be restored if a lighter tone is used for an outline.

(d) When both the background and design are in dark colours a most striking effect can be produced by using a light outline.

(e) Gold is most effective with a black outline on any background.

Colours are said to have temperatures and may be described as warm, cold, lively or sombre, but you must always remember that despite the hue, the intensity plays a large part. Moreover, you will recall that intense colours always appear the heavier, but the addition of

some grey will achieve a balance. Warm colours are red and orange; green and blue are cold. Fresh colours are yellow and yellow-green, while violet is said to be dull.

We must also recognize that colours have a definite effect on our emotions and no doubt you will be fully aware of such common terms as 'seeing red', 'feeling blue', 'green with envy', or 'purple with rage.'

When we decide to decorate a piece of craftwork we must always consider what wear and tear it may experience. Note these two points. The novelty which will be in regular service like a toy soon looks soiled if painted in too light a hue, while the project which will be carefully used may be painted in a lighter hue.

Without resorting to a colour chart it is possible to prescribe the following good and bad combinations:

GOOD	BAD
Orange and blue	Orange and purple
Golden yellow and blue	
Vermilion and purple	
Vermilion and blue	Scarlet and violet
Scarlet and blue	Scarlet and yellow
Scarlet and turquoise	Scarlet and green
Lime yellow and blue	Lime yellow and turquoise
	Green and purple
	Yellow and bright red

On occasion there may be a necessity to prepare your own colours but you should note that many paints dry lighter, so it is wiser to allow any test mixtures to dry before proceeding. The following mixtures will be found useful.

(a) Red and yellow make orange.
(b) Red and blue make purple.
(c) Blue and yellow make green.
(d) Four parts of orange plus one part green make citron.

(e) Four parts of green plus one part purple make olive.

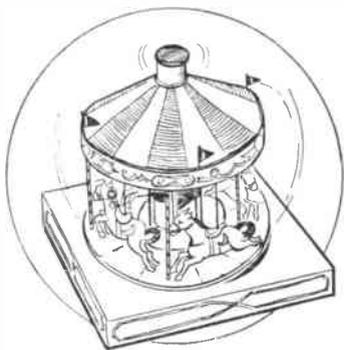
(f) Four parts of orange plus one part olive make russet.

Further intermediate tints can be achieved by adding white and black.

From the foregoing, and the methods of inventing original designs described in preceding issues, you should now have sufficient information to enable you to prepare your own ornamentations in tasteful colourings. Make no mistake about it, colour plays an important part in designing our decorations and if you have seen a black and white film after a coloured one you must have noticed the distinction between the two.

If you always proceed cautiously there is no reason why your efforts should not be highly successful, and remember, you are entitled to some licence in colouring in the same way as you produce your line effects.

MAKE A CARNIVAL ROUNABOUT FOR THE CHILDREN



YOU can draw your own hobby horses or use animal pictures from children's papers for the fretwork mobiles of this jolly roundabout.

Cut the base first, adding strips of ply for the sides if desired. The 2 in. square block should be drilled vertically to take the axle rod. This rod should be sufficiently long for adjustment of height later.

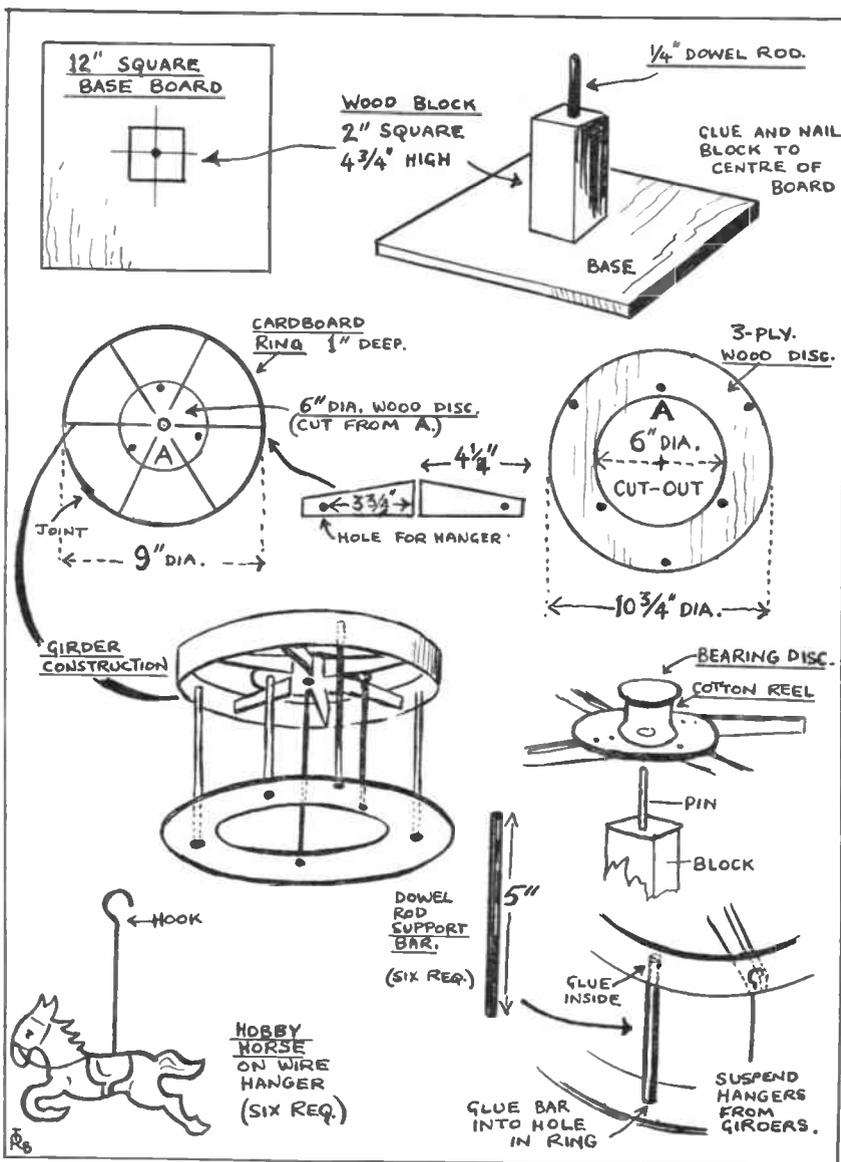
By

T. S. Richmond

Next cut out the platform ring and drill the holes for the six support rods. A length of cardboard, 1 in. deep, should be carefully bent to a circle and glued with a lap joint. Cut six 'fins' and, using the 6 in. diameter disc cut from the platform ring, build up the girder assembly as detailed in the diagrams. The centre hole must, of course, be a loose fit over the axle rod.

Join the upper and lower units with the vertical support rods. Make a hand spinner with the disc of plywood and section of a cotton reel. Glue this to centre of the disc A and trim the axle to obtain a free-revolving roundabout. The tip of the rod should be rounded and the spinner disc also smoothed with glasspaper.

Form a shallow cone from a circle of cardboard to cover the top girder unit. The hangers are made from bits of wire according to the type of animal figures you will use. Small dolls, etc. can be placed on the platform. When gaily painted and decorated, the attractive toy whirligig is spun merrily around to the delight of the child for whom it makes an exciting gift.



HOW TO MODEL YOUR HOUSE

HOW would you like a miniature of your own house? Set on a table in the hall it would make a fine showpiece for your friends to admire. Although at first sight it might appear difficult, it is really quite simple once you get down to it.

The first job is to decide upon the scale and this will be influenced by the method of finishing. If your model is to be small, you could use papers sold for modelling 'OO' gauge railway buildings. This is to the scale of 4 mm. to the foot and there is a wonderful range of imitation brick, roughcast, tile, slate, cement, etc. papers to choose from. These papers can usually be obtained from Hobbies branches and shops that sell model railway accessories.

If your house is red brick and pantiles you could use Hobbies Doll's House papers, which are imitation papers to the scale of $\frac{1}{4}$ in. to the foot. The brick is natural or bright red, and the tiles red or green. Slate effects could be obtained with poster paint lined in pencil.

Having decided upon the scale, say $\frac{1}{4}$ in. to the foot, you must now make a reasonable drawing, to scale, of the various aspects of your house. You will need at least three drawings — the plan, front view and end view. The other views should also be drawn out if they differ from those already detailed.

The picture in Fig. 1 shows a model of a house, to approximately a scale of $\frac{1}{4}$ in. to the foot. It has been designed for use as a doll's house, but it will be seen that the use of scale paper and tiles give a realistic effect.

Make up the house in box form, improvising with plywood and pieces of triangular fillet to build up the main shape. Fig. 2 shows how the fillet may be used for strengthening corners. This should be omitted if the interior is to be decorated.

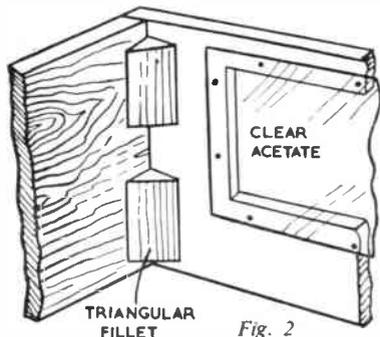


Fig. 2

Windows can be made from clear acetate, the bars being painted on with poster paint. If the paint will not stick easily, just wipe over the acetate with a corner of a rag which has been rubbed on moist soap. This will take away any greasiness. Of course oil paint or enamel could be used to give a more lasting finish. If you possess a ruling pen it will be ideal for drawing the straight lines.

Window frames could be made from stripwood (Fig. 3), or cut from thin wood with a fretsaw (Fig. 4).

Guttering is made from half-round beading and downpipes from round rod. Shaped pieces such as swan necks are cut out with a fretsaw and shaped as shown in Fig. 5. Chimney stacks are easily made from stripwood and round rod.

Climbing plants are simulated by plastic wood squeezed on to the wall and shaped with a pointed stick. Small pieces of twig will look like tree trunks and can be inserted to give a realistic effect. The plastic wood can later be painted to represent foliage and flowers.

Other materials which can be used to advantage are green flock paper for lawns, pea bulbs for interior lighting, round-head screws for door knobs (fill the slots with putty), and balsa wood for shaped parts.

Plastic wood, pea bulbs, flockpaper,

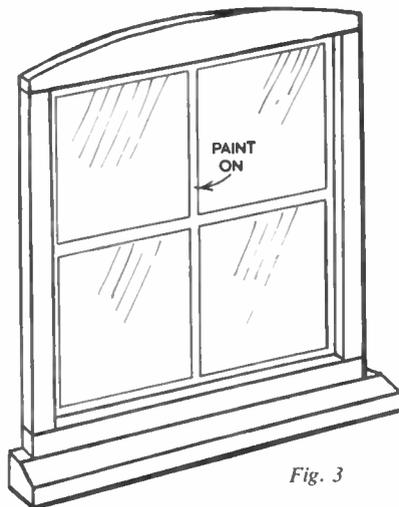


Fig. 3

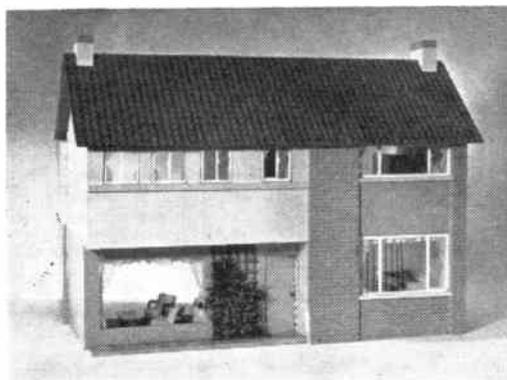


Fig. 1

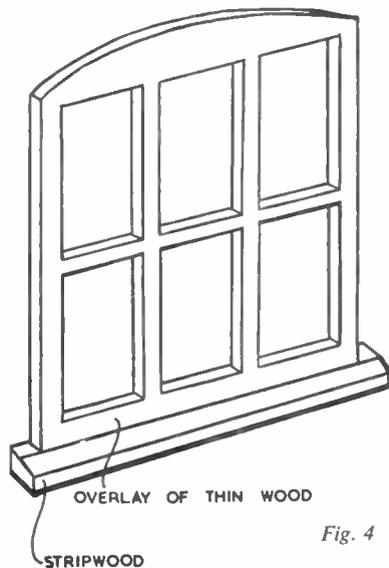


Fig. 4

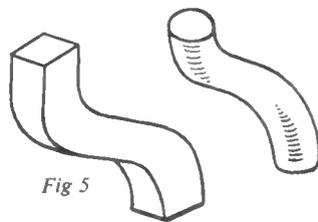


Fig. 5

tiny hinges for doors, round rod, half-round beading, stripwood of various sizes, triangular fillet, brick and tile paper approximately $\frac{1}{4}$ in. to the foot, and transparent material for windows can all be obtained from Hobbies Ltd, Dereham, Norfolk. (M.h.)

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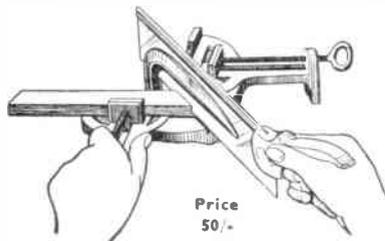
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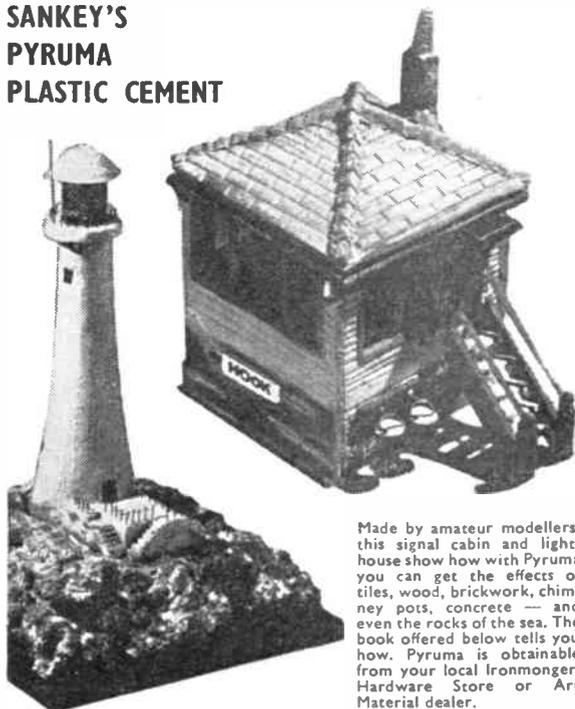
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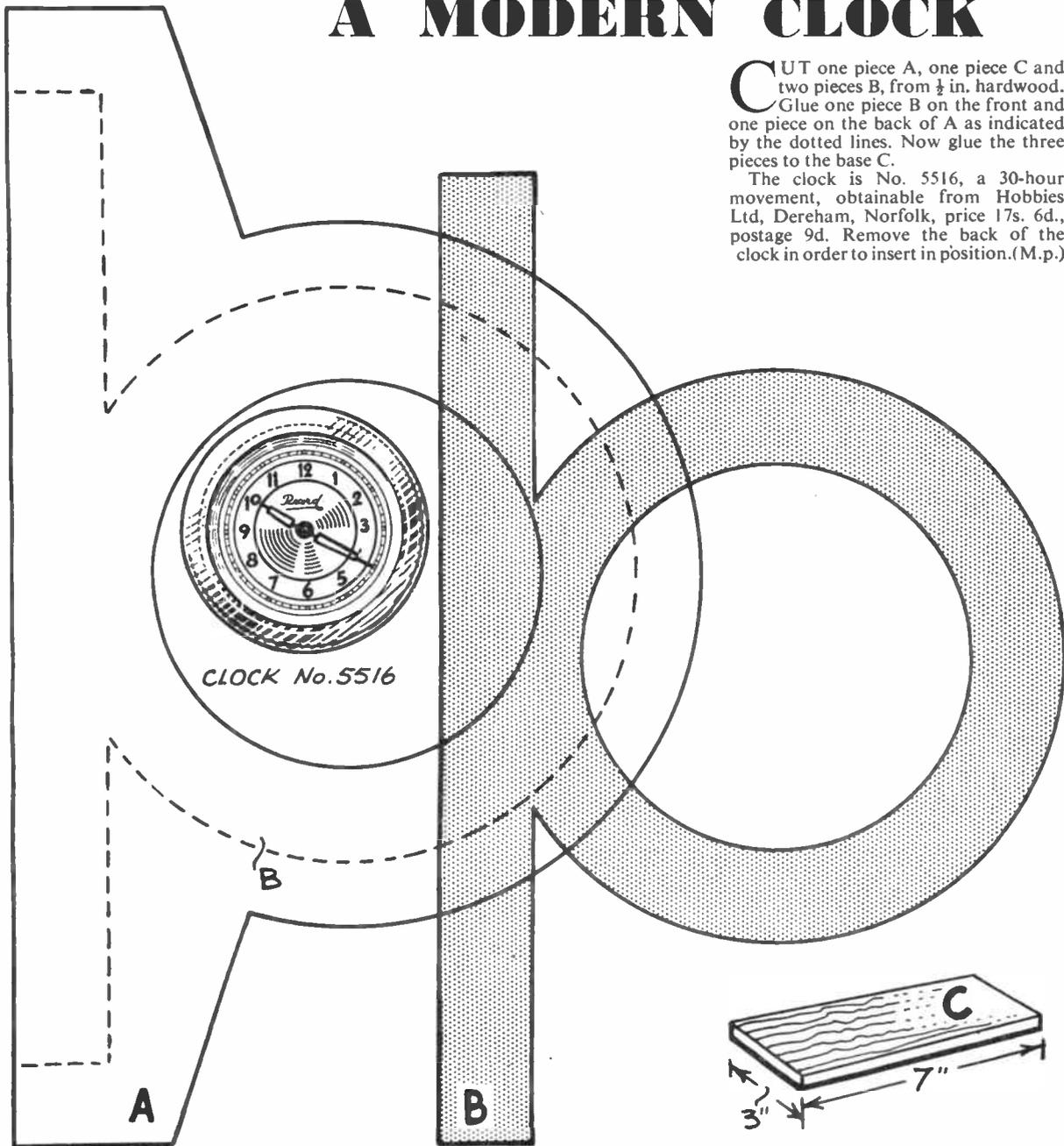
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Address.....

A MODERN CLOCK

CUT one piece A, one piece C and two pieces B, from $\frac{1}{2}$ in. hardwood. Glue one piece B on the front and one piece on the back of A as indicated by the dotted lines. Now glue the three pieces to the base C.

The clock is No. 5516, a 30-hour movement, obtainable from Hobbies Ltd, Dereham, Norfolk, price 17s. 6d., postage 9d. Remove the back of the clock in order to insert in position.(M.p.)





'FLYING CAT' CATAMARAN (Designed by F. M. & J. A. Montgomery)

For high quality and outstanding performance the 'Flying Cat' is one of the best 'buys' in its class.

Its twin hulls are 16 ft. long and it has a beam of 7 ft. 6 in. The draught is 6 in. with plates up and 2 ft. with them down. Carries about 200 sq. ft. of sail on metal mast.

Incorporating many advanced ideas, its most striking feature is the way the hulls are splayed outwards to give an efficient underwater hull shape with one float lifted.

In kit form from £115 Complete with mast (less sails) £254 10s.



HOBBIES RUNABOUT 'ZIP'

Designed especially for the beginner, as an inexpensive introduction to the water. Skinned with oil-tempered hardboard and suitable for a small h.p. outboard engine. Will carry an adult and one or two children. Length 7 ft. 8½ in., beam 2 ft. 10½ in. Weight (without motor) 80 lb.

Complete kit £19 19s. Full size plans 16s. 6d.

Before you decide . . .

. . . you must consider these

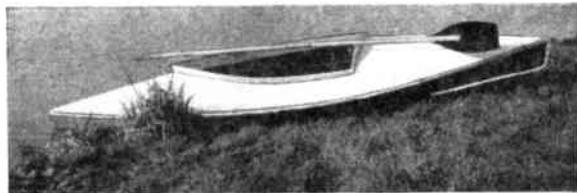
EXCITING NEW CRAFT by



HOBBIES RUNABOUT 'ROAMER'

An ideal craft for the family, designed for all waters. Best marine plywood and quality materials. Length 9 ft. 8 in., beam 4 ft. 2 in. Weight (without motor) 130 lb. Car rack transportation.

Complete (without motor) £88 10s. Kit (with plans, etc.) £52 10s.



PBK 10 AND PBK 20 CANOES

These famous single-seater and two-seater craft are supplied complete, in kit form, or as full-size plans to build your own.

PBK 10 (single-seater) 11 ft. long, 28 in. beam, load 300 lb. Complete £24 5s. Kit £15 10s.

PBK 20 (two-seater) 15 ft. long, 32 in. beam, load 700 lb. Complete £32 10s. Kit £22 5s.

Full details of these craft from Hobbies branches, or from Head Office.

All prices ex-works.

HOBBIES LTD, Dereham, Norfolk

8th FEBRUARY 1961

VOL. 131

NUMBER 3400

THE ORIGINAL
'DO-IT-YOURSELF'
MAGAZINE

HOBBIES *weekly*

FOR ALL
HOME CRAFTSMEN

*FREE plan
for making*

Also in this issue:

FIRE STATION WITH
FOLDING DOORS

COLLECTORS' CLUB

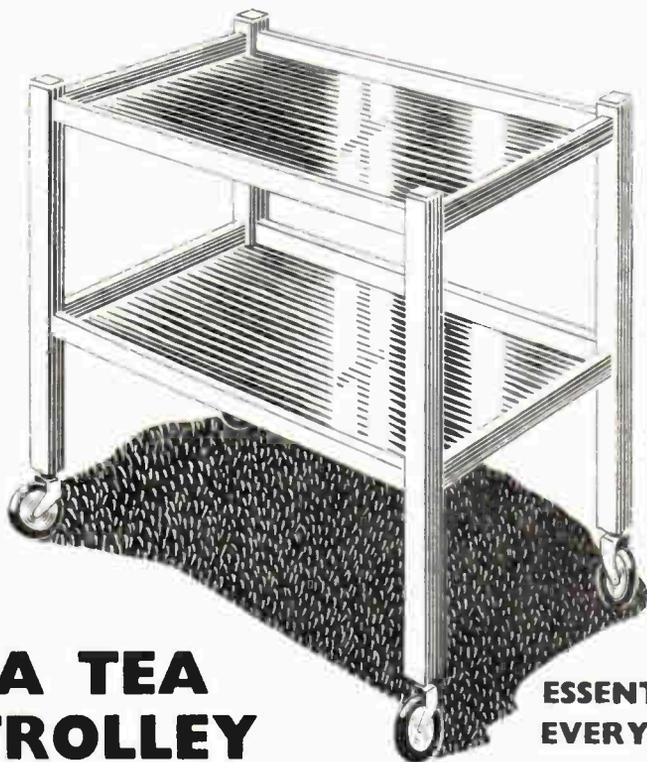
SHORT-WAVE
ONE-VALVE RADIO

MAKE HIGH-FLYING
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**A TEA
TROLLEY**

**ESSENTIAL IN
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Up-to-the-minute ideas

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READERS from all over the world are now writing to Mrs. Mary E. Arnold, a regular reader from 29 Bendrick Road, Barry, Glam., South Wales.

Although she is completely disabled, Mary has answered all letters and sent out some lovely hobby material.

'I collect stamps, match, hotel, beer and cheese labels, orange papers, souvenirs, and tea towels,' she says.



Mary E. Arnold with husband and son on holiday at Dawlish

Inseparable companion

Constantin Minacoulis, of Suez Canal Authority, P.O. Box 20, Port-Tewfik, Egypt, U.A.R., writes:

'I am forty-one years old, and was born in Suez. I like to travel and see new places. In 1952 and 1955, on pleasure trips with my family (wife and two children, a girl and a boy) I visited Greece, Italy, France, and England.'

'I am a regular reader of *Hobbies Weekly*, and since my fifteenth birthday this magazine has been my inseparable companion. Everything in it is very interesting. I am not doing a propaganda — I really think the paper is good.'

'Kindly include my name in your pen friend columns', writes S. C. Chhabia, of Burmah-Shell Depot, Kota Jn., India.

'My chief hobbies are toy making in wood, reading books on advertising, retail selling and window display. I am also very fond of reading *Hobbies Weekly*.'

Those who still need friends will find the following list useful:

Mrs W. J. Lavoie, 91 Daboll Street, Providence 7, R.I., U.S.A. 'Postcards, stamps.'

Roy E. Schade, 1,012 W. Orleans Street, Philadelphia 33, U.S.A. 'Baseball, stamps, cards.'

Mitzie Alexander, 7,612 W. Fullerton Avenue, Chicago 35, U.S.A. 'Blotters, stamps, cards.'

Struina Algimontas, Ylgoji 4A, Siaulia, Lithuanian SSR, U.S.S.R. 'Stamps, cards, books, labels.'

H. P. Barton, 8 Greenough Avenue, Jamaica Plain 30, Mass., U.S.A. 'Music, stamps, cards.'

David Barron, of 4 Horwood Square, Queenstown, Cape Province, South Africa, collects cigarette cards and pictures of the Royal Family. He has sent some nice silk cards depicting 'Dogs', which were issued in South Africa just before the last war (see below). He has many cards for exchange.

WORLD-WIDE FRIENDSHIPS

I have received further covers from our Australian friend, Bill Robinson. One marks the '50th Anniversary of the Girl Guide Movement', and another depicts the banded ant-eater, which appears on the new 6d. stamp. A third marks the centenary of the Northern Territory.

Harry Dudfield, of 23 Collins Avenue, Linden, Wellington, New Zealand, writes:

'I thought you would be interested in the New Zealand Christmas stamp. It is the first such stamp issued by this country. I have been a reader of *Hobbies Weekly* for many years and always look forward to the next issue of this interesting magazine. I would like fellow readers to write to me.'



Constantin Minacoulis

'I am a keen stamp collector and would like to exchange with fellow readers. My son is also a keen young handyman and stamp enthusiast'.



A MODEL FIRE STATION WITH FOLDING DOORS

THIS model fire station is fitted with doors which fold back in a similar way to the full-size original doors. The scale is suitable for the fire engines in the popular Matchbox series, but it may be altered to suit models of other makes in different sizes. The dimensions given permit the building to accommodate three engines.

The material used for the majority of the parts is $\frac{1}{8}$ in. thick hardboard, which is easy to cut and finish, yet has adequate strength to resist damage. The smooth side is always kept to the outside of the building.

The base is cut to dimensions of 7 in. by $4\frac{1}{2}$ in. A chamfer about $\frac{3}{8}$ in. wide is filed along one of the long sides to act as an entry ramp, and a narrow slot is cut

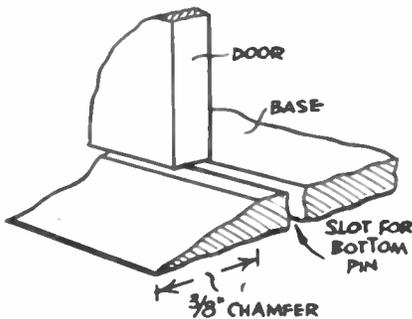
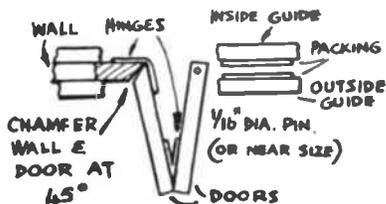


Fig. 1—Ramp and bottom guide

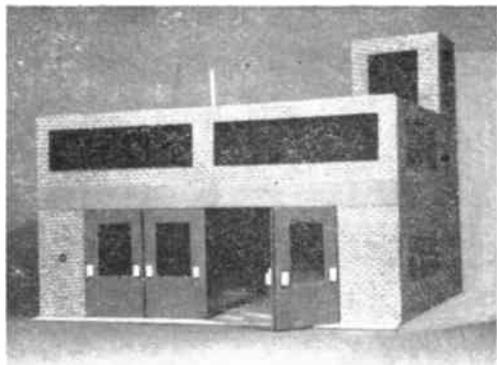
through the board, just beyond the chamfer and parallel with the edge. This slot is $\frac{1}{8}$ in. wide, or a near size to fit the pin, approximately 5 in. long and centrally placed between the shorter sides. The slot, which is shown in Fig. 1, acts as a bottom guide for the folding movement of the doors.



PARTLY SECTIONED PLAN

Fig. 3—Arrangement of folding doors

By A. E. Bensusan



Two walls are cut 7 in. by $3\frac{3}{8}$ in., and two $3\frac{3}{8}$ in. by $3\frac{3}{8}$ in. An aperture 5 in. wide by $2\frac{1}{4}$ in. high, should be cut in the front wall, to take the doors, and the side edges of this cut-out are chamfered at about 45 degrees. The windows can now be cut out, or they may be simulated with

the former so that the fire engines can be seen when the doors are closed. The outer pair of doors should have their outer sides chamfered at about 45 degrees, while the inner pair should have pins fitted into drilled holes at top and bottom. Drill the holes for the pins very

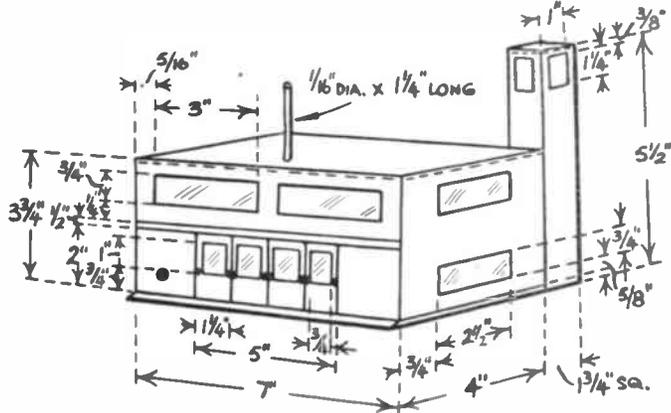


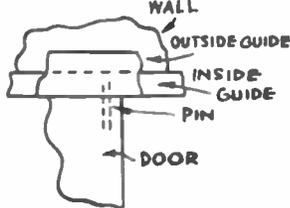
Fig. 2—General view

paint at a later stage. The walls are erected by smearing their mating and lower edges with glue and setting them on the baseboard. Fig. 2 shows the general arrangement.

Four doors, 2 in. by $1\frac{1}{2}$ in., are cut from hardboard, and these may have cut-out or painted windows, preferably

carefully to prevent distortion of the material. These pins guide the doors in their folding movement. The sides of all the doors can be rounded to give a thinning effect, and they are then hinged together, and to their frames, with strips of glued linen tape as shown in Fig. 3, the lower pins being located in the slot in the baseboard.

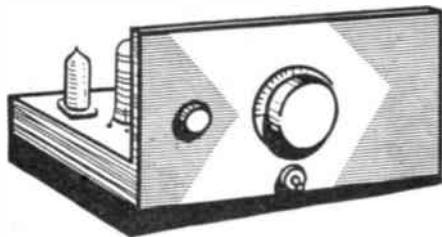
A strip of hardboard or thin plywood, $\frac{1}{8}$ in. wide by 6 in. long, is glued immediately above the doors at the inside of the building to act as a top guide. A piece $\frac{1}{8}$ in. wide by 7 in. long is glued outside to complete the guide arrangements. Some thin packing pieces may need to be stuck to the inner faces of these guides to reduce the distance between them to the pin size. Very small blocks of wood glued to the front of the doors, near to the hinges, enable them to



PART FRONT VIEW

● Continued on page 332

SHORT-WAVE ONE-VALVER



THE short-wave one-valver described here is intended for head-phone reception, and runs from dry batteries. As there is only one valve, running costs are very low indeed. It is possible to pick up stations at a range of thousands of miles, even with an indoor aerial. This is because short-wave signals travel great distances.

By 'Radio Mech'

In a further article, directions will be given for an audio amplifier stage, to change the receiver to a two-valver. This will provide reasonable loud-speaker results from quite a number of the more powerful short-wave stations, and also allow good phone volume at increased range. Hints on erecting suitable aerials will also be given.

The one-valve circuit is shown in Fig. 1, and is intended for a 1S5 valve, or any equivalent. This valve needs a 1.4V. filament supply, and this is obtained from a 1½V. dry battery. Radio batteries as used in all-dry portables may be employed, or dry cells from flashlamp and torch batteries. Be sure more than 1½V. is not employed. With flashlamp and torch batteries, a single cell will deliver this voltage. Several cells can be used at once, if they are wired in parallel. That is, all zinc cases together for negative, and all top caps together for positive.

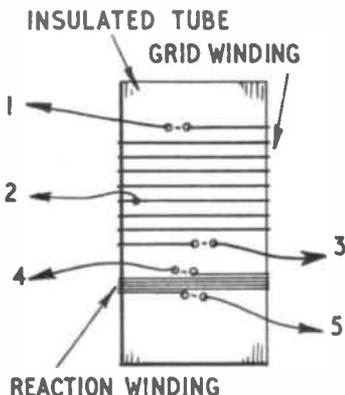


Fig. 2—The tuning coil

For high tension, a 67½V. battery will be satisfactory. This will have a very long life. With the one-valve circuit, there is no point in using more than 67½V.

An ordinary type of short-wave H.F. choke is used, and this item is easily obtained. A choke can be wound, if preferred, using an insulated former about ¼ in. in diameter, and some 36

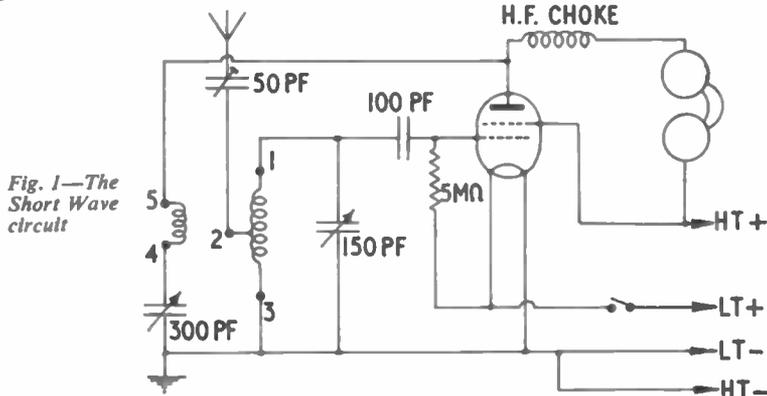


Fig. 1—The Short Wave circuit

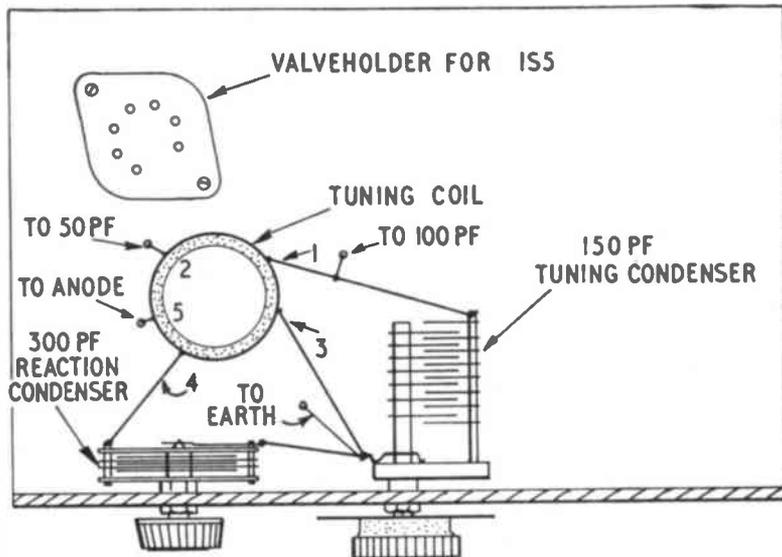


Fig. 3—Connections and parts above the chassis

A single fixed coil allows the more interesting frequencies to be tuned. If other wavebands are wanted, plug-in coils can be wound, as will be described later. The tuning condenser need not be 150pF, but something near this capacity is most suitable.

S.W.G. or similar wire. Four compact piles, each having about fifty turns, will be satisfactory. The whole choke will thus have about 200 turns. The exact number is unimportant. If the choke is wound on a glass tube, the ends of the windings can be secured with touches of

cement, but the windings must not be waxed, painted or varnished.

The tuning coil is shown in Fig. 2. To cover approximately 19 to 40 metres, the grid winding can have eight turns of 18 to 22 S.W.G. enamelled or tinned copper wire. Turns are spaced so that the winding occupies about 1 in. to 1½ in., and the tube or former is about 1½ in. in diameter. The tapping, 2, is three turns from the earthed end of the coil.

For reaction, 26 S.W.G. or similar wire is satisfactory. A clear space of about ¼ in. is left, and six turns are wound on, side by side. Note that both windings are in the same direction, as in Fig. 2.

Insulated tubes or formers of different diameter can be used, the number of turns being changed to suit. Ribbed formers and plug-in formers may be obtained. The latter fit into a holder so that coils can be changed. Winding details for several coils will be given in the next article. The bands covered by the single fixed coil will, however, allow good reception from many parts of the world.

The ends of the windings should be long enough to reach the various parts in the receiver, as in Fig. 3. Shorter connections will be possible if the ends are secured at points similar to those in Fig. 3.

Chassis construction

The chassis can be of thin wood or aluminium. An aluminium chassis can easily be made or purchased. It can be about 5 in. by 8 in., with 2 in. runners. If wood is preferred, this will be satisfactory.

For aerial, earth, and phones, two twin socket strips are bolted to the rear runner, as shown in Fig. 4. Clearance holes should be made for the sockets. If terminals are preferred, cut a strip of ebonite or paxolin for the rear of the chassis, and drill this for the terminals. A central hole is also drilled for the four battery leads.

A metal panel, or plywood panel with metal behind is best but not essential. The receiver will function equally well with a panel of wood alone, but tuning may then be slightly influenced by the position of the hands, especially if no earth is available.

A B7G type valveholder is fitted as in Fig. 3. The coil can be cemented to the chassis, or held with small brackets, or it can be a push fit on a disc of wood screwed to the chassis. If a metal chassis is used, slip insulated sleeving over wires where they pass through the chassis.

Reaction and tuning condensers are

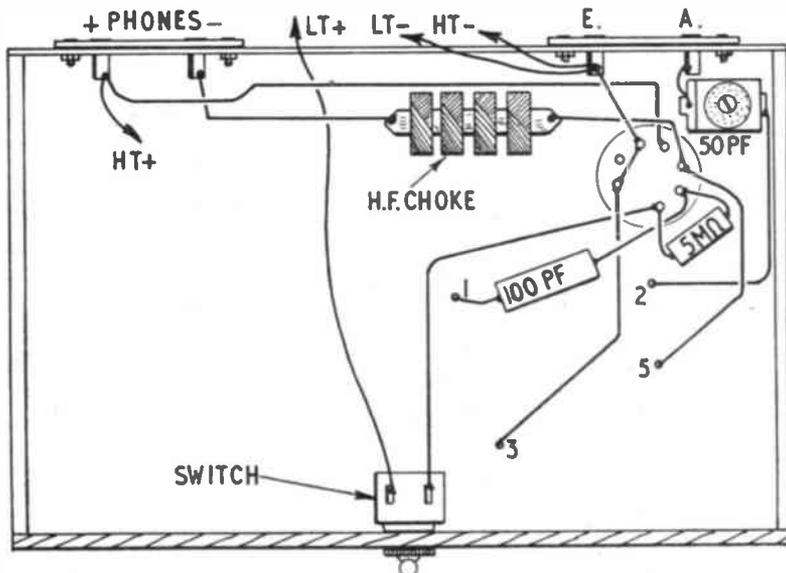


Fig. 4—Components and wiring underneath the chassis

fitted as in Fig. 3. Wire the moving plates tag of the reaction condenser to the moving plates tag of the tuning condenser, and use this point for the earth connection. A simple knob is sufficient for the reaction condenser, but it should be of reasonable diameter, or critical adjustment will be almost impossible.

For tuning, it is possible to use a large knob and dial. A reduction drive is better, as tuning will be sharp. Or the band-spreading condenser mentioned later may be added.

About wiring

When wiring up, follow Figs. 3 and 4. If a metal chassis is used, remember that no leads, valveholder sockets or tags, or other items must come into contact with the metal. The chassis is, however, joined to the earth line. This can easily be done by using a small bolt at point 3 in Fig. 4.

In Fig. 4, the numbers show the coil connections. Point 1 also goes to the

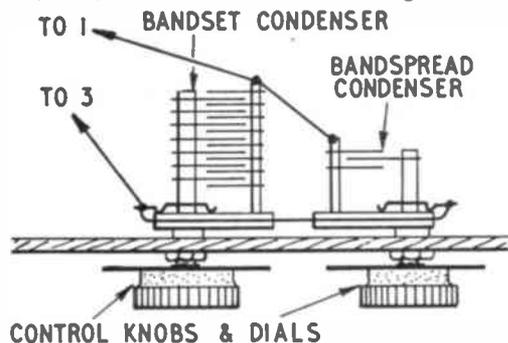


Fig. 5—How to add bandspread tuning

fixed plates of the tuning condenser, and 3 goes to both sets of moving plates, as described.

Lengths of thin flex are used for battery connections. Fit suitable plugs or clips, so that there is no danger of mixing up these leads.

If tags and leads are clean and bright, soldered joints can easily be made. Cored solder, as supplied for radio work, is most suitable. Heat the joint with the soldering iron, simultaneously applying the solder to the joint. Do not carry solder to the joint on the iron, as the flux in the solder will then be unable to work on the surfaces to be soldered together. Remove the iron as soon as the joint is properly made.

Using the set

Insert the valve, and connect phones and batteries. Be sure not more than 1½V. is applied to the valve filament by confusing H.T. and L.T. connections, or by using a wrong battery.

Good quality medium or high impedance phones, such as will give good

● Continued on page 336

MAKE A HIGH-FLYING KITE

THERE are several types of kites, ranging from the simple pegtop to the more ambitious box kite. When properly constructed they give hours of pleasure at little cost.

The best known, easy-to-make kite is the PEGTOP pattern (Fig. 1). The backbone A is a 2 ft. length of $\frac{1}{4}$ in. square stripwood. The bow C is formed from a 20 in. piece of thin split cane or flexible wood. This is bent to a semi-circle and held in that position by the bowstring B. The centre of the bow is lashed to the top of the backbone with thin twine X. Two strings E, are run from the ends of the bow to the bottom of the backbone, thus completing the frame. These strings

is twice the length of the kite, and has a few twisted pieces of paper tied to it at intervals.

The backbone of the EDDY KITE is a 2 ft. length of $\frac{1}{4}$ in. square stripwood shown at A in Fig. 2. A piece of thin split cane or flexible wood, 2 ft. long, forms the cross strut B. These two are lashed together, X, in the form of a cross $4\frac{1}{2}$ in. from the top of the backbone. A surround string D is run round these sticks to complete the frame. The ends of the cross strut are bent backwards and held in position by a bowstring. The distance between the bowstring and the centre of the strut is $2\frac{1}{2}$ in. The bowstring lies clear at the back of the kite.

31 in. long. Two pliable cross pieces (B, 31 in. long and C, $15\frac{1}{2}$ in. long) are also required. The cross piece B is fixed centrally $1\frac{1}{2}$ in. from one end, and C is $2\frac{1}{2}$ in. from the other end of A. Use thin twine to lash them together. Notch these sticks at the end to receive the string D, which forms the outline of the frame and braces the parts.

Two cross strings are placed at E and F, 7 in. from each end of the centre rib A. Further bracing strings are crossed, as at G and tied to the cross string F as shown at H on both sides.

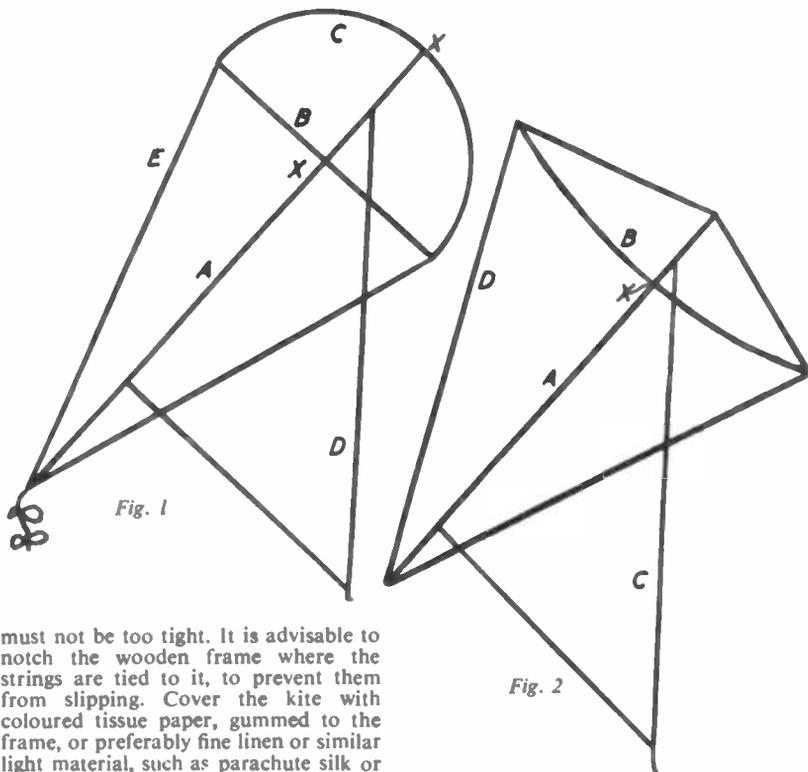


Fig. 1

Fig. 2

must not be too tight. It is advisable to notch the wooden frame where the strings are tied to it, to prevent them from slipping. Cover the kite with coloured tissue paper, gummed to the frame, or preferably fine linen or similar light material, such as parachute silk or nylon sheeting, if available.

A piece of string D, double the length of the kite, has its two ends tied to the backbone, one near each end, in the approximate positions shown.

The kite line is attached to this bridle so that the upper arm is shorter than the lower. The best position at which to fix the line to the bridle will be found by practice in flying the kite. To enable quick adjustments to be made, the kite line is attached to the bridle with a reef knot and a bowline knot. The string tail

The covering, of light material, should be wider than the frame, and sewn to the string surround. This loose fit will enable the cover to bulge like a sail when the kite is flying.

A bridle C, and a kite line are fitted, like those for the pegtop. No tail is needed for this model.

The JET KITE, another grand flyer, is seen in Fig. 3. The main centre rib A is a piece of split cane or flexible wood,

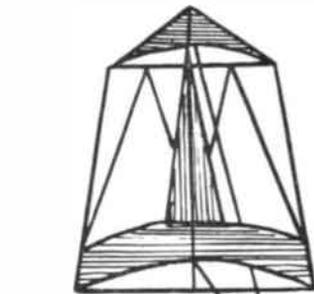
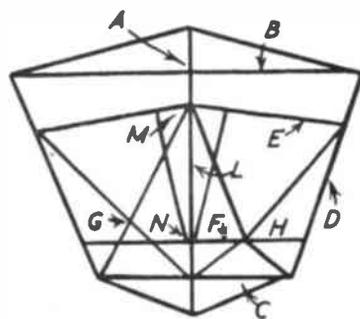


Fig. 3



The cross piece B is curved upwards to form a bow, the centre of which is $3\frac{1}{2}$ in. above the string to which its two ends are tied. The shorter cross piece C is bent and tied in the same manner. The depth of the curve at the centre is $2\frac{1}{2}$ in. The centre rib is also tied to form a bow, the depth of the curve at the centre being $1\frac{1}{2}$ in. All these curves follow the same direction.

The front and rear parts of the frame,

between the end and the cross strings E and F, are covered with tissue paper, indicated in the diagram by shading. This is gummed on to the two cross pieces and the strings. The piece of tissue paper L, is 4 in. wide at M, tapering to a point at N.

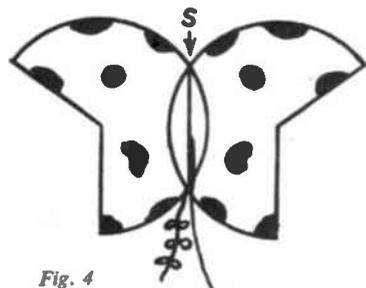
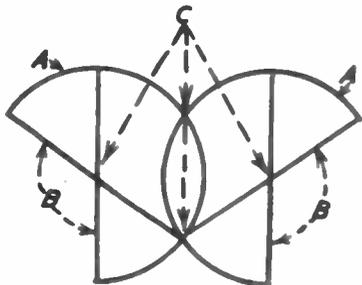


Fig. 4



The bridle string, 5 ft. long, is fastened to the centre rib A at the junction of the cross pieces B and C. Usually the kite line is attached to the bridle at a point where it centres under the cross stick B.

Fig. 4 shows the most graceful BUTTERFLY KITE in flight. Two 2 ft. 6 in. lengths of split cane are required. These are bent to a curve as at A. Tie a piece of strong string B to one end of each of these curved sticks and take the string to a point 3 in. from the other end.

Tie another string to the free ends of the sticks, and run up to a point 3 in. from the ends which are already tied. These arched frames are then lashed together at C so that they overlap, as shown.

Thin, strong paper, marked with spots, will make a good covering for the wings. Allow for a 1½ in. margin of paper all round, so that it can be gummed securely round the edges of the framework. Before gumming, cut slits round the edges of the paper so that it will not wrinkle. A short tail, about 1 ft. long, is needed. The kite line is attached to the centre of the butterfly's body, on a piece of string indicated at S in the diagram.

A great favourite because of its excellent flying qualities is the BOX KITE. All the sizes given in Fig. 5 may be modified to suit individual requirements.

The frame consists of four pieces of ½ in. square stripwood, A, B, C, D, each 42 in. long. Four stripwood cross struts E and F are required. They are 26 in. long, ½ in. wide, and ¼ in. thick. The two bands G and H are made from a light material, and are 6 ft. 3 in. long by 13 in.

be a close fit, to keep the bands tight. Lash them together at the centre with thin twine. Small blocks of wood, glued on to the longerons will keep them in position. A detail of the ends of the cross struts is shown at I.

A bridle of strong string, 7 ft. long, is

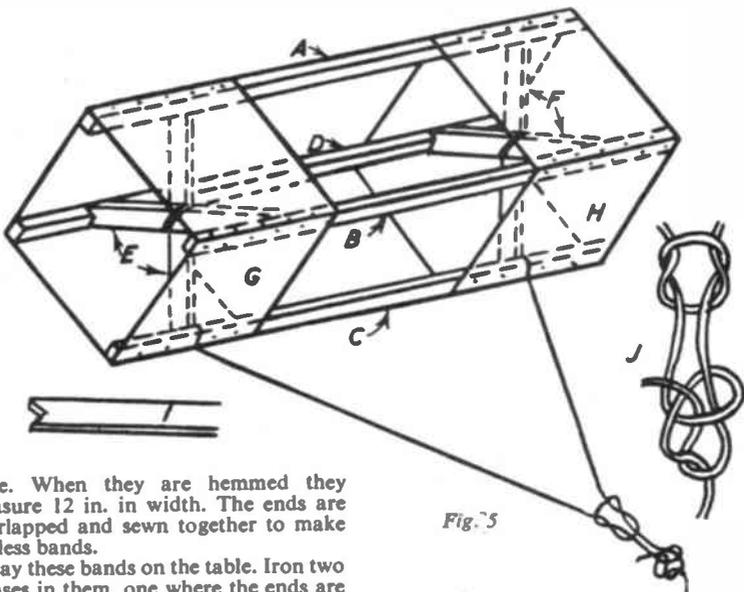


Fig. 5

wide. When they are hemmed they measure 12 in. in width. The ends are overlapped and sewn together to make endless bands.

Lay these bands on the table. Iron two creases in them, one where the ends are joined. Fold over again and make two more creases. The four creases on each band will indicate where the four 42 in. struts, or longerons, are fixed. They are tacked on along both sides of each crease.

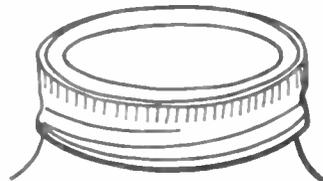
The ends of the cross struts are cut to a V-shape. Tape is bound round them, near the point of the cut, to prevent splitting. They are inserted at the centre of each band, as shown. The struts must

be tied to one of the longerons, 6 in. from either end. The kite line is attached to the bridle with a reef knot and a bowline knot, J, to permit adjustments to be made. Usually the lighter the wind, the shorter the front line of the bridle. When the wind is blowing strongly, it is advisable to tie the line direct on to the longeron, just behind the front band. (E.)

A NEAT POWDER DISPENSER

THE dispensing of powders can be made so much easier by making use of a little gadget which is found in most households. This is the plastic pourer that is fixed in the top of a table salt canister. Besides using it for sugar, flour or even soap powder, there are many other uses, such as in the garden for distributing fertilizers.

When the salt canister has been emptied carefully cut round the top to get a circle of tinfoil 3 in. in diameter. Lightly hammer round the edge to flatten, and file smooth. This piece will just fit in the top of a screw top preserving jar in place of the glass cap. The rubber band may be needed in order to obtain a good fit. (A.F.T.)



MAKING THE TEA TROLLEY

A TEA trolley is almost an essential feature for every household, for providing snacks and light meals by the fire. The attractive design described here is of liberal proportions, enabling all the requirements for the meal to be assembled thereon.

The two trays, in fact, are 24 in. by 18 in. and the trolley is fitted with rubber-tired wagon castors ensuring an easy, gliding motion. The trolley stands 30 in. high overall, and is 28 in. wide by 20 in. deep. Two ways of jointing the side rails to the legs are suggested on the design sheet, and will be explained more fully later on.

Hobbies Kit No. 3400 for making the Tea Trolley contains all plywood, stripwood, wagon castors, etc, together with plastic covering and adhesive. Kits price 52s. 6d. from branches or carriage free from Hobbies Ltd, Dereham, Norfolk.

All the necessary diagrams for the making up of the parts, together with full measurements, are shown in the design sheet. Make a start with the four legs. These are cut from 1½ in. square timber and chamfered all round at the tops to give a neat appearance. The eight rails are cut from 1½ in. by 1 in. timber, four of each size.

As regards the jointing, Fig. 1 on the design sheet shows the mortise and tenon and in Fig. 2 will be seen a full-size section of this particular joint. An alternative method of jointing by dowels is shown in Fig. 3. Obviously when marking out the lengths of the rails, the type of joint to be used will have to be taken into consideration. For the mortise and tenon joint, an additional allowance must be made for the tenons.

Before making a joint, the rails should be rebated as shown in Figs. 4 and 5. This rebate is to take the tray and give a neat fitting.

The trays are identical, as seen in Fig. 6. They are cut from ½ in. plywood. Before gluing and cramping the joints of the legs and side rails, make sure that the trays fit nicely in the rebates. Add plastic covering to the complete surfaces of the

trays, but do not overlap the edges. The trays can now be glued and pinned from underneath into the rebates.

The legs are bored to take the wagon castors, which will be inserted after completing the cleaning up and polishing. Incidentally the legs and rails can be finished individually before assembling.

The mortise and tenon is, of course, the stronger joint to use. The tenons are cut with a tenon saw and mitred on the mitre block, so that the mitred ends of the tenons will meet and give a strong fixing. The mortises are first marked, and then bored as shown in Fig. 7, clearing out with a chisel. With dowel joints, the main thing is to ensure accuracy in

marking out and maintaining the bit in an upright position when drilling.

Next week's issue will show how to make a contemporary-style desk, a rotary printing duplicator, and display shelves for trophies. There will be interesting projects for all ages. Make sure of your copy.

● Continued from page 327

MODEL FIRE STATION

be operated. The structure is roofed with a rectangle of hardboard 7 in. by 4 in.

The building is covered with brick paper, obtainable from model shops, and varnished for maximum protection. The front guide strip is painted to represent concrete. The public alarm may be painted on the front, the head of an ordinary pin making a realistic push-button. The doors should be painted red, and, if the windows were cut out, they should be backed with clear plastic sheet; otherwise they can be painted black. The flat roof may be painted any desired colour, and a wooden mast

erected on the top by fixing it with glue into a drilled hole of suitable size.

The hose drying tower is cut from four pieces of hardboard, two 1½ in. by 5½ in., and two 1½ in. by 5½ in., glued together into a square-sectioned format after the top apertures have been cut out. If preferred, the apertures may be omitted and shown with black paint. A top, 1½ in. square, is also cut and fitted, the brick paper is also used to cover this tower. The top is painted and the sub-assembly glued to the back corner of the building.

PRINTING FRAMES AND BOXES

CONTACT prints are made by exposing sensitized paper in contact with a negative. If single prints are being made a simple printing frame only is required. It consists of a 6½ by 4½ in. hardwood frame into which is set a piece of glass, and a hinged wooden back held securely in position by two metal spring arms.

The printing is carried out in three stages: loading the frame, exposing, and processing. These operations must be carried out under suitable safelight illumination.

easiest way to achieve this is to place the frame face upwards on a table or similar rigid object and adjust the light to fall at a suitable angle. The frame should be 12 in. away from a 60 watt lamp; 18 in. away from a 100 watt lamp.

By K. Baxter

After exposure, remove the paper from the frame for processing. For this you require dishes containing developer

Dissolve the chemicals in the order given, using about three-quarters of the total water required at not more than 125 F. When completely mixed add the rest of the water.

Immerse the print in the developer for 1½ to 2 minutes. Using print forceps, keep it moving throughout this time.

When a print has been over-exposed the image appears almost immediately. If under-exposed, the image is late appearing. In either case the depth of tone achieved will not be satisfactory.

After development, pick up the print with the forceps, allow it to drain, then transfer it to the rinse, moving it about in this for 15-30 seconds. The print is then lifted up, drained, and placed face down in the fixer — this solution may be made from the same formula as recommended for negatives.

The print must be kept moving in the

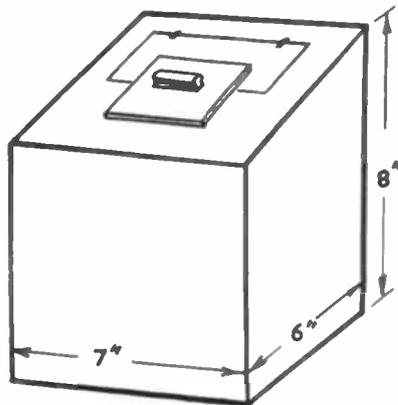


Fig. 1

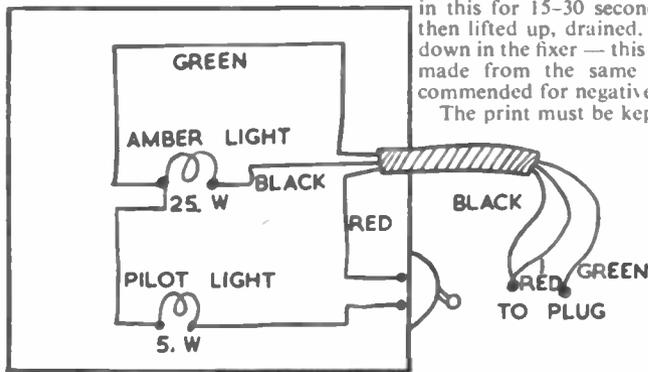


Fig. 2

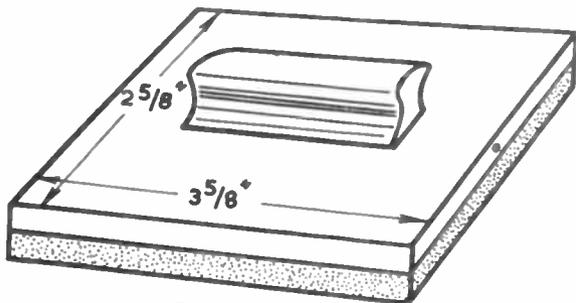


Fig. 3

To load the frame, remove the back and place the negative in contact with the glass, emulsion (exposed) side facing towards you. Lay a piece of contact paper, emulsion side down, over the negative. Close the back of the frame, and secure.

Expose under ordinary artificial light, such as a reading lamp, for 5-10 seconds, keeping the frame steady and at a constant distance from the light source. The

at about 65°F, water for rinsing, fixer, and water for washing.

Several standard formula metol-hydroquinone, 'M.Q.' developers, suitable for contact papers are available. A typical one comprises:

Metol 1.4, Hydroquinone 5.4, Sodium sulphite, anhyd. 20, Sodium carbonate, anhyd. 37, potassium bromide 0.4, water to make 1,000. All quantities are in grams per 1,000 c.c. of water.

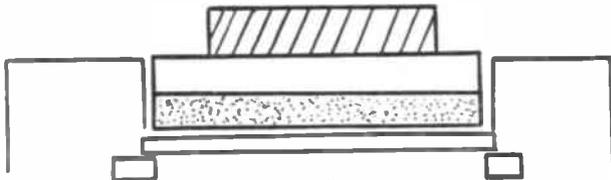


Fig. 4

fixer to ensure that no part of its surface escapes the solution. Fix for about ten minutes and then wash in at least twelve changes of water.

After washing all that remains is for the prints to be dried. After draining, carefully wipe the surface of each print with a viscose sponge. Then lay them face down on a clean cloth that is completely free from fluff, or attach them to a line with suitable clips. Allow to dry naturally in a dust-free atmosphere.

When several prints are to be made, the use of a printing box is preferable to a frame. Such a box is quite easy and inexpensive to make (Fig. 1).

It is constructed from hardboard or

plywood nailed to a framework of three-cornered moulding and is painted matt-white inside and out. Undercoat is quite suitable.

The front is 2 in. lower than the back to give a sloping top that makes for easier working. Two lights are fitted into the box. A 5-watt pygmy yellow safe-light bulb is used as a pilot light, and a 25-watt amber lamp for exposing. The wiring circuit is given in Fig. 2.

Start by painting one surface of each of the five pieces of hardboard which comprise the sides and base. When these are dry, assemble the box, beginning with the base. The sides are then nailed in position, making sure no gaps are left through which light can escape.

A hole large enough to receive a rubber-covered length of triple flex is then drilled centrally through the right-hand side, 2 in. in from the back of the box. Two batten-type bulb holders are wired in parallel and screwed in place.

The side holder receives the 5-watt pilot light; the one in the centre of the base receives the 25-watt exposing lamp.

An oblong measuring 3½ in. by 2½ in. is then cut out of the centre of the lid. A 3½ in. by 2½ in. sheet of ground glass is set into this, being held in position by a rectangular surround of moulding. The lid is then fixed in place.

A pressure pad (Fig. 3) completes the assembly. This is made by sticking a 3½ in. by 2½ in. piece of plastic foam to a block of wood of the same size. A strong wire handle keeps it in place directly over the glass.

At this stage it is a good plan to finish painting the box. When it is dry, drill a small, ¼ in. deep hole in each side of the pressure pad block. Insert the wire handle into these, and staple it to the lid of the box. An open view of the top, with pressure pad and glass in position, is shown in Fig. 4.

To make your prints, first switch on

the pilot light then lift up the pressure pad and place the negative, emulsion side up, on the glass. Cover the negative with a piece of contact paper, emulsion side down. Lower the pad, and while holding it in this position, switch on to full light for exposing. Expose for 5-10 seconds.

To give your prints a standard white border, cut out an opaque black paper mask approximately ¼ in. wide and the same area as your printing paper. Alternatively, you can buy a celluloid mask specially made for contact printing. This type of mask is to be recommended if you anticipate producing a large number of prints as it will stand up to a considerable amount of handling.

When loading the printing box, first place the mask in position, then the negative, and finally the paper.

Processing is carried out as for prints produced with the printing frame.

A 'POT-LUCK' MARBLES GAME

THIS marble game, based on a fine old skill game called 'Bobs', is easily made and the pleasure it gives on winter nights will reward all your effort. It is a competition between players who have six marbles. The object is to 'sink' the balls into the slots with a cue as for billiards. The highest score after a fixed number of rounds wins the game. The game is played on a level table top and the construction is such that 'balls' will not be lost.

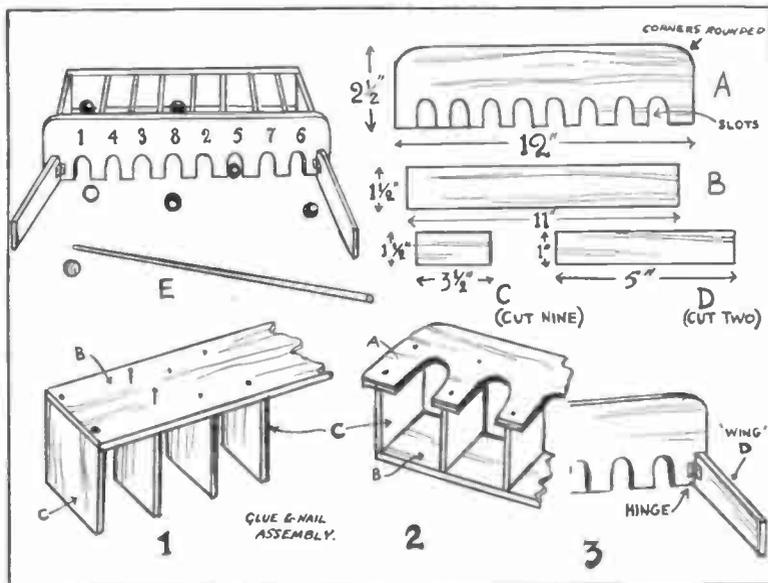
All parts are of ½ in. thick wood except the slotted front which is plywood of any thickness between ¼ in. and ½ in. The first sketch in the panel shows the finished game. Mark out the front piece, including the equally-divided slots, A, and cut out with fretsaw.

Cut the back piece B to dimensions given. Two end members and seven 'pocket' dividers are made by cutting nine of item C. Cut two of D, ½ in. stripwood. A suitable piece of round-rod

is required for a cue, E, the striking end being shaped with rasp and glasspaper to a taper. Two small hinges will be needed for hinging the two 'wings'.

Fig. 1 shows detail of nailing the ends and pocket divisions to back piece. Next, pin on the front (Fig. 2) so that pockets are formed behind each score-hole. Paint the assembled game in a bright colour and add the score figures over the slots. Finally, hinge the wings to the front (Fig. 3).

Use six wood or glass balls in the game. The cue may be used and the balls played from a fixed line, or 'throws' may be made by hand.



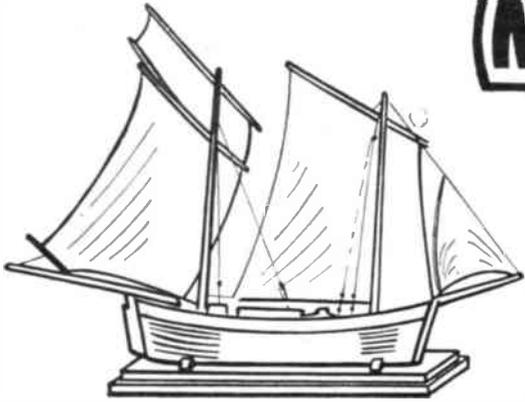
Woodworker Annual

Volume No. 64

THIS annual will have an instant appeal to all those interested in woodwork. It contains the twelve monthly copies of *The Woodworker* for 1960, bound in an attractive cover and indexed for ready reference. The tabulated article on hardboards is of special interest, as also are the many D.I.Y. designs for making various articles of furniture.

Published by Evans Brothers Ltd, Montague House, Russell Square, London, W.C.1. Price 15s. 0d.

Mainly for Modellers



LUGGERS—1

By 'Whipstaff'

FOR our next model in this series, we shall take the lugger. This fishing vessel is in all probability the largest type capable of being drawn up on the beach. The type varies much from locality to locality; some are decked, while others are often open boats with a small decked-in forecabin and accommodation for six men.

Types of luggers are found all around our coasts, such as the Grimsby, Deal, Hastings, Cornish, and other types.

The lugger rig consists of a jib sail, made fast to a traveller and hauled out on the bowsprit, and a large balance lugsail, acting as mainsail. This sail is set on a mast stepped at the peak bulkhead. There is also a smaller lugsail

known as a standing lug on a mast stepped at the sternboard to form the mizzen sail. The sheet of this sail passes through a block at the end of a spar projecting outward over the stern.

The mainsail or dipping lug sits properly only on the lee side of the vessel and has to be set quickly on the opposite side of the vessel if she goes about while tacking to windward.

The type we are taking as our prototype is the Cornish lugger, which was very seaworthy. Unfortunately one would have difficulty today in finding one rigged for sailing; most of the few still afloat are now fitted with engines and have discarded the mainsail. These vessels were fitted on the outside of the

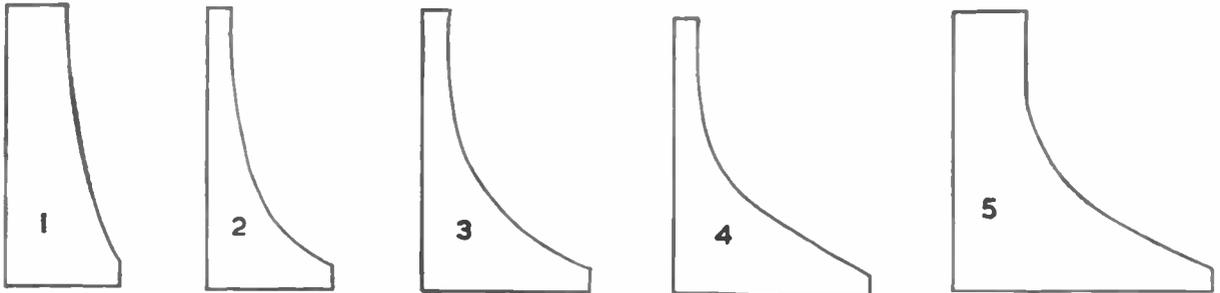
hull with a heavy plank known as the rubbing strake.

The model we are building has been designed to a scale of $\frac{1}{4}$ in. to 1 ft.

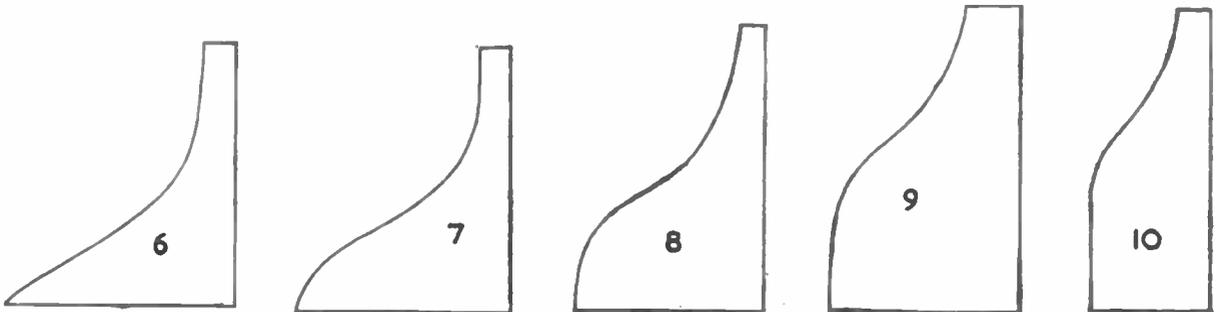
In the diagrams, we have the sheer plan shape and to this shape we cut the keel in $\frac{1}{8}$ in. wood. We next cut the shapes A and B to the waterline shapes, two each of A and B. The pieces A are in $\frac{1}{2}$ in. wood and B in $\frac{1}{8}$ in. These are glued together to make the two halves of the hull and when set they are carved to shape.

To facilitate carving to the correct form, make templates of the body sections as shown. If the edge of the template in use is rubbed with a soft black-lead and then rubbed with a slight sideways motion against the hull as carving proceeds, the high spots on the hull will be marked with lead. By removing the marks, either by carving or with glass-paper, the template can be fitted to the hull perfectly, so that a smooth and graceful shape can be achieved.

When the hull pieces are correctly carved, they can be glued one on each side of the keel piece and while the glu-



TEMPLATES FOR BODY SECTIONS SHOWN FULL SIZE



sets the bulwarks and deck fittings can be made.

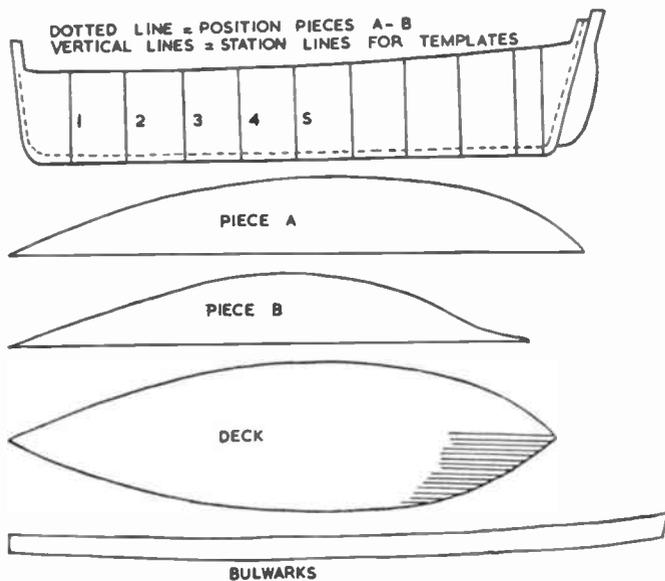
The deck should be cut out from Bristol board, and lined with a thin hard pencil to indicate planking, afterwards being shellacked. It is then glued on top of the hull pieces, which will already

have been carved and smoothed down to fit the camber of the keel piece.

The bulwarks are next cut from $\frac{1}{2}$ in. plywood. These are overlong to allow for trimming when fitting to your hull. Commence fitting at the stern and trim off at the bow.

Cut the rubbing strake from $\frac{1}{8}$ in. wood or heavy card and glue around the hull. Follow the sheer, the top edge of the rubbing strake meeting the lower edge of the bulwarks.

In our second part we will deal with our deck fittings, sails and rigging.



NOTE. DRAWINGS HALF SCALE OF MODEL

BUILDING TERMS

During the course of this series there will occur terms that will undoubtedly be unfamiliar to our readers and therefore the following notes will assist when building the models. These are terms denoting deck fittings etc, used in coastal and fishing craft generally.

DANDY WINCH — a small winch aft, used when bringing the trawl beam alongside.

JINNY BOOM — yard of mizzen lug in Cornish boats.

MAST SCUTTLE, or Box — A narrow slot in the deck, aft of the foremast. The mast falls back into this when lowered.

MITCHBOARD or CROTCH — Vertical support with groove to take lowered foremast.

STANDING LUG. A lugsail with tack fixed permanently to the mast, set on the mizzen mast.

TABERNACLE — A three-sided box built up from the keelson or floors. The aft side is open to allow the mast, which is stepped in the tabernacle to be lowered backwards.

TRAVELLER — An iron ring, which slides freely on the mast or spar. In the model the lug yard is secured to the one on the mast and tack of the jib — on the bowsprit.

YARGORD — A long spar to keep the lug of a lugsail taut when going to windward.

WASH STRAKE — A plank, fixed or movable, fitted to the gunwale, to increase the freeboard.

YOKE — Lower cap on masthead.

Continued from page 329

SHORT-WAVE ONE-VALVER

volume with a crystal set will do very well. Very cheap, or low impedance phones are not recommended.

If an earth is available, take it to the earth socket or terminal. Connect the aerial to the aerial socket. Suitable aerials will be described in a subsequent article, but almost any length of insulated wire will suffice for initial tests.

When the reaction control is fully opened (plates out of mesh) the receiver will be very insensitive. As the reaction control knob is slowly turned to close the condenser, sensitivity will increase until the valve begins to oscillate. For best results, the control is adjusted as necessary, while tuning, so that the receiver is not quite oscillating.

Numerous powerful European and American stations will often be heard without very critical adjustment of the reaction control. But when weak signals are tuned in, adjustment of reaction is very critical. This control does not merely function as a volume control, though it does increase volume as the valve approaches oscillation. For proper results and long-distance reception, both

hands should be used together — one for tuning and one to adjust reaction. With a little care, the way in which reaction controls sensitivity will soon become clear, and good results can then be obtained.

If reaction cannot be obtained at all at some frequencies, aerial damping is too great. To correct this, slightly unscrew the 50pF trimmer which is joined to the aerial socket. Lack of any reaction at all may indicate wrong connections, a reversed reaction winding, or a coil with the reaction winding placed too far from the grid winding.

Tuning will be critical and several stations may be received over a tuning space of only a single degree on the dial. It is for this reason that a reduction drive or bandsread tuning will simplify operating the set. These additions (tuning drive or bandsreading) will not actually increase volume, but will make tuning so much easier that they are well worth considering.

Stations will be found congregated into 'bands' — the 19 metre, 25 metre, 31 metre, and 41 metre bands can be covered by the single coil. Between

these bands, which only occupy a few degrees on the tuning dial, will be occasional Morse transmissions, etc. To receive Morse, adjust reaction until the detector is just oscillating.

Bandsread tuning

This is an alternative to using a good quality reduction drive, and is shown in Fig. 5. A very small variable condenser, known as the bandsread condenser, is wired across the main tuning condenser, which is then termed the bandset condenser. If the bandset condenser is 150pF, and the bandsread condenser is 15pF, tuning with it gives the same effect as if a 10:1 reduction drive were used on the bandset condenser.

The actual capacity of the bandsread condenser is not very important, but something around 10pF to 15pF or 25pF maximum will be convenient. Both condensers should have knobs and dials. A waveband is then located by adjusting the bandset condenser, and the bandsread condenser is then used for tuning.

Further articles will deal with an amplifier to add to the above S.W. receiver, and suitable aerial systems.

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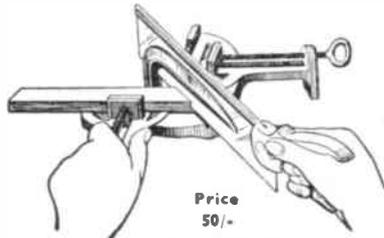
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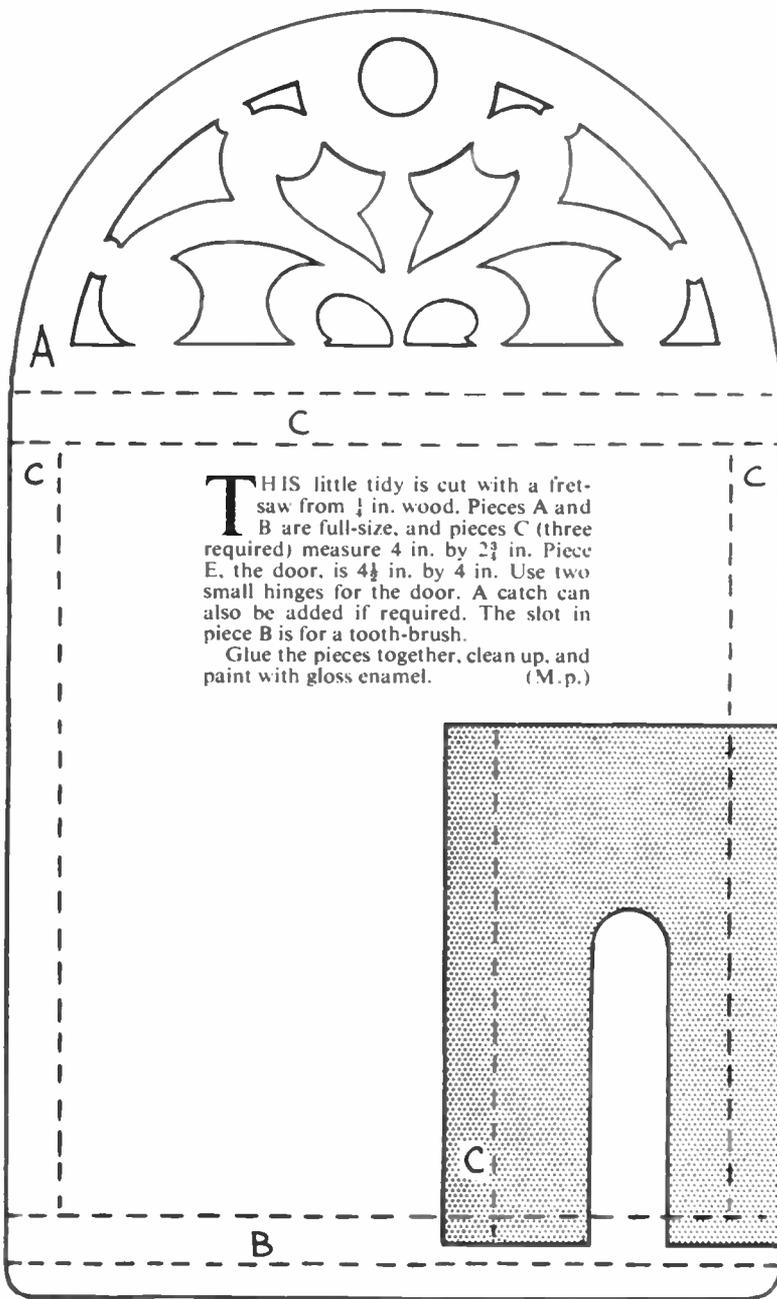
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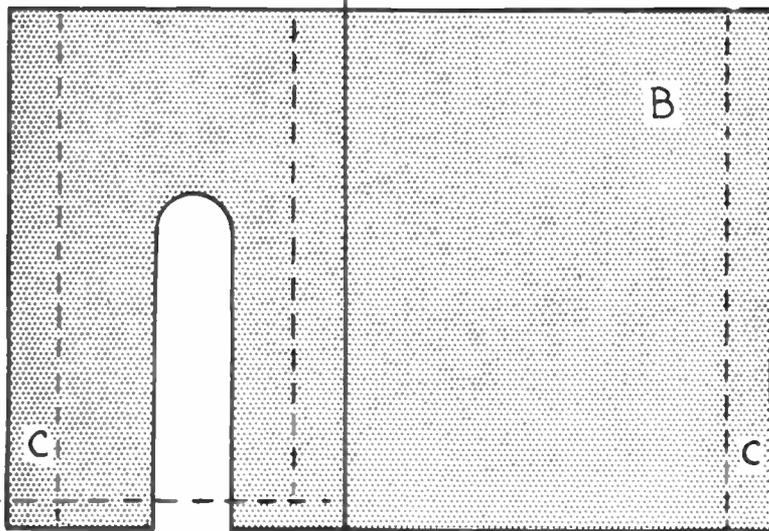
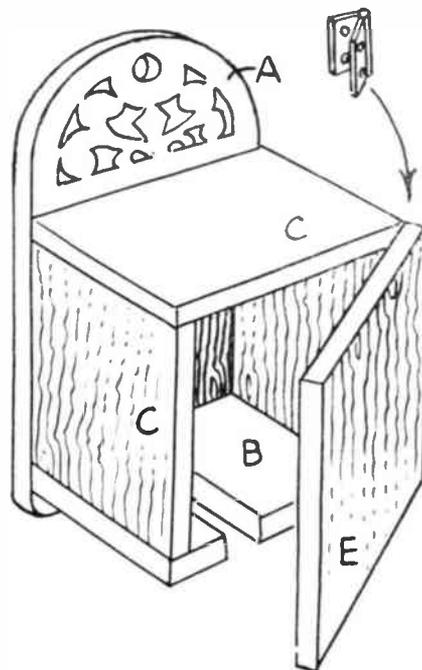
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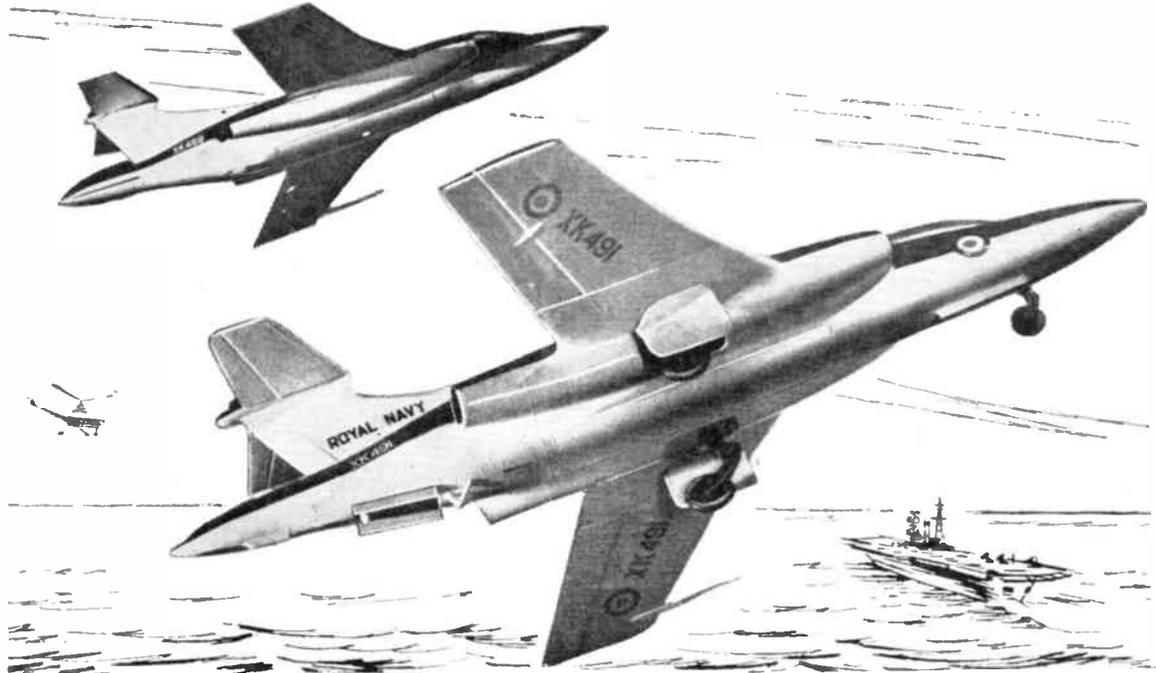
A NEAT SHAVING TIDY



THIS little tidy is cut with a fret-saw from $\frac{1}{4}$ in. wood. Pieces A and B are full-size, and pieces C (three required) measure 4 in. by $2\frac{3}{4}$ in. Piece E, the door, is $4\frac{1}{2}$ in. by 4 in. Use two small hinges for the door. A catch can also be added if required. The slot in piece B is for a tooth-brush.

Glue the pieces together, clean up, and paint with gloss enamel. (M.p.)





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Believe it or not, the nearer one is the Airfix model of the Blackburn Buccaneer (N.A. 39), 1/72nd scale (Kit 4/6). Behind it is a picture of the real thing.

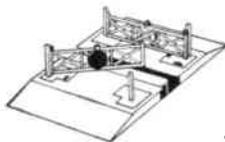
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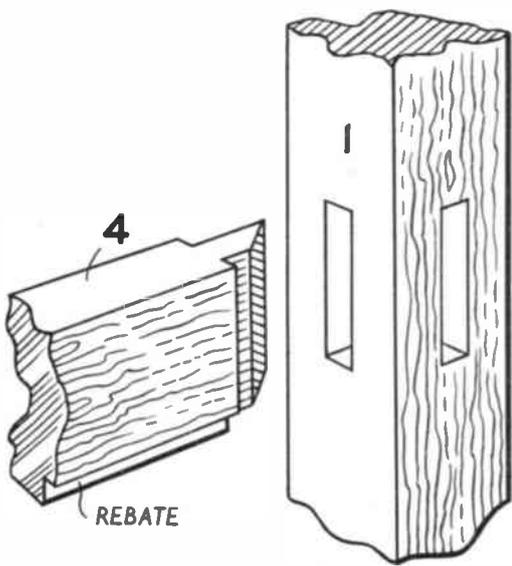
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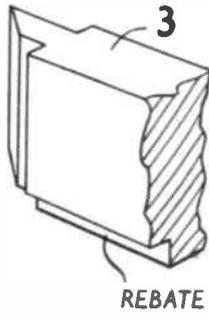
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A truly magnificent 1/600th scale model of the famous battleship sunk in 1941. The 133-piece kit makes up into a 17¼" model which **actually floats!** The accuracy of detail is incredible, even for Airfix: individual deck planks and anchor chain links are clearly visible, and the main gun turrets revolve. Complete with adhesive—6-

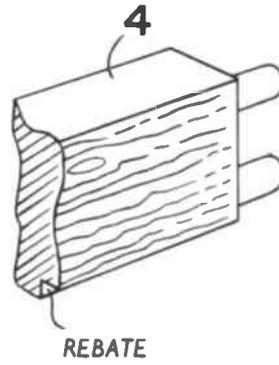


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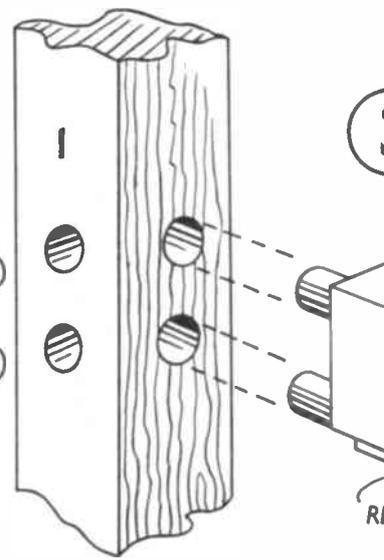
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REBATE

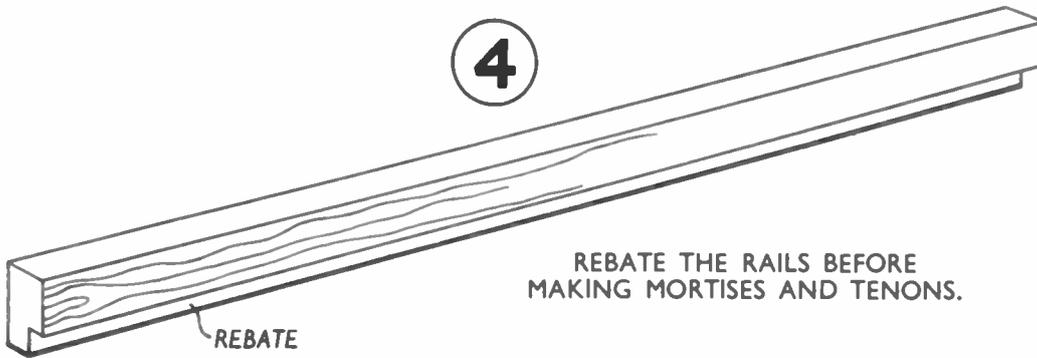


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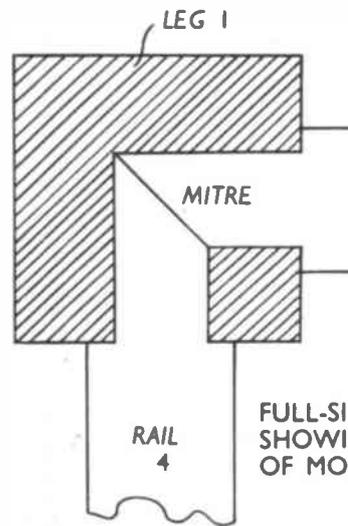
ALTERNATIVE METHOD OF FIXING RAILS.

4

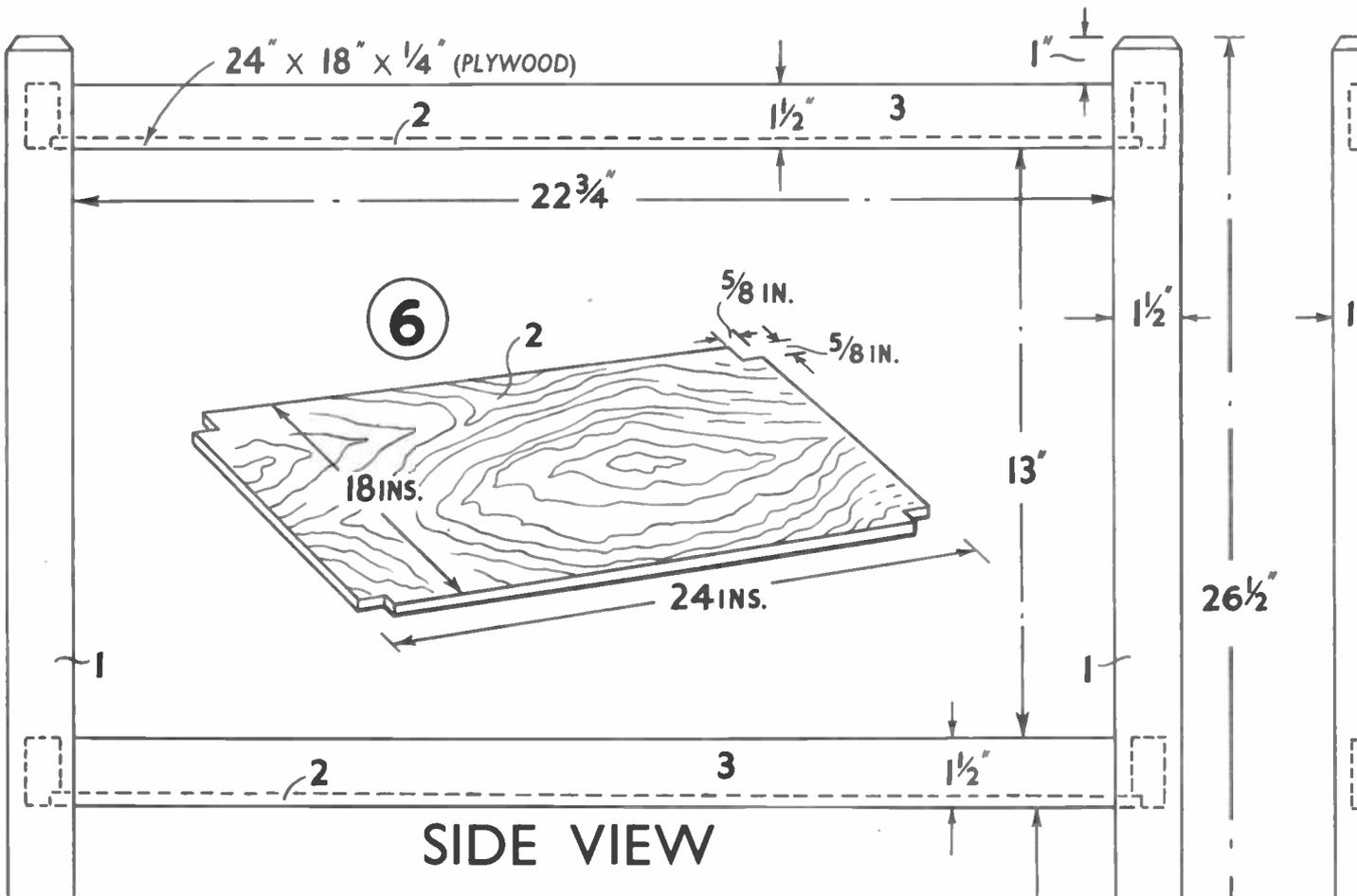


REBATE THE RAILS BEFORE MAKING MORTISES AND TENONS.

REBATE

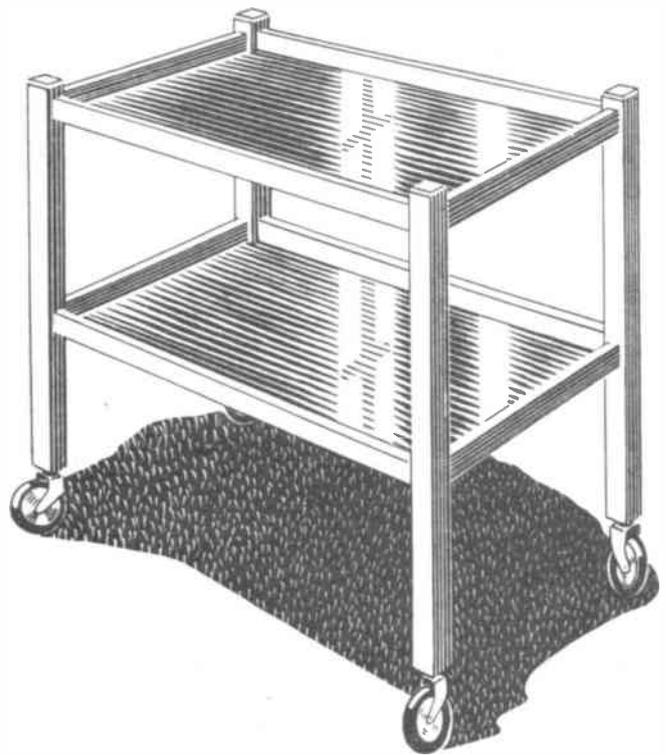


FULL-SIDE SHOWING OF MO



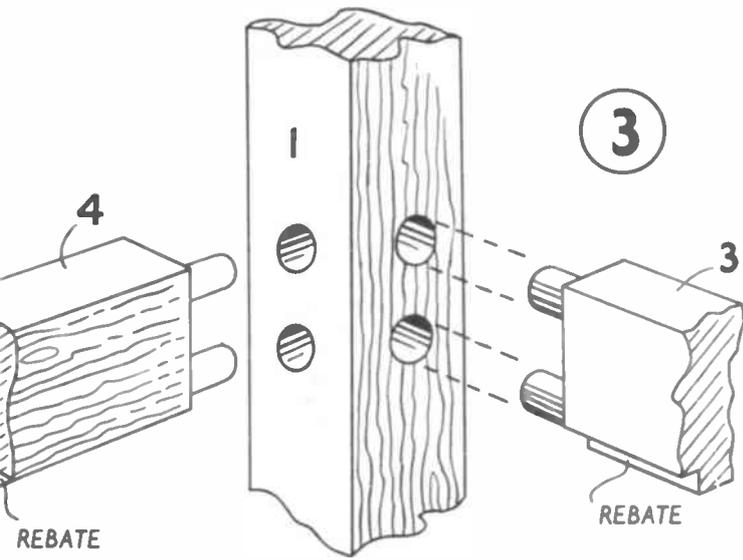
SIDE VIEW

TEA TROLLEY

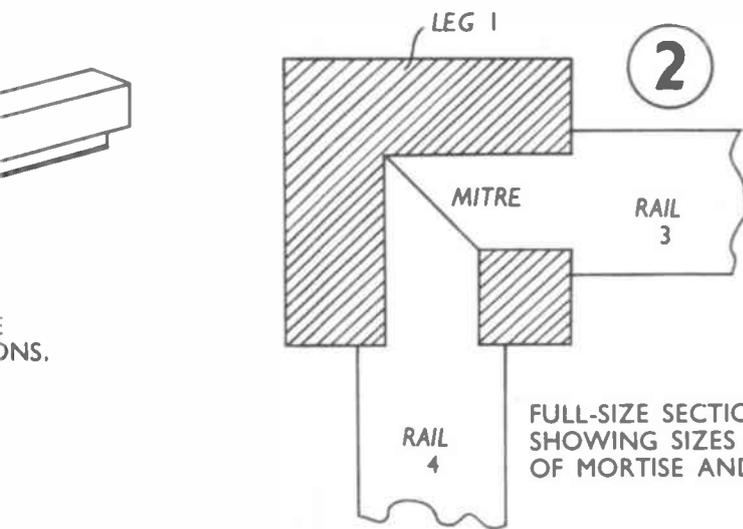


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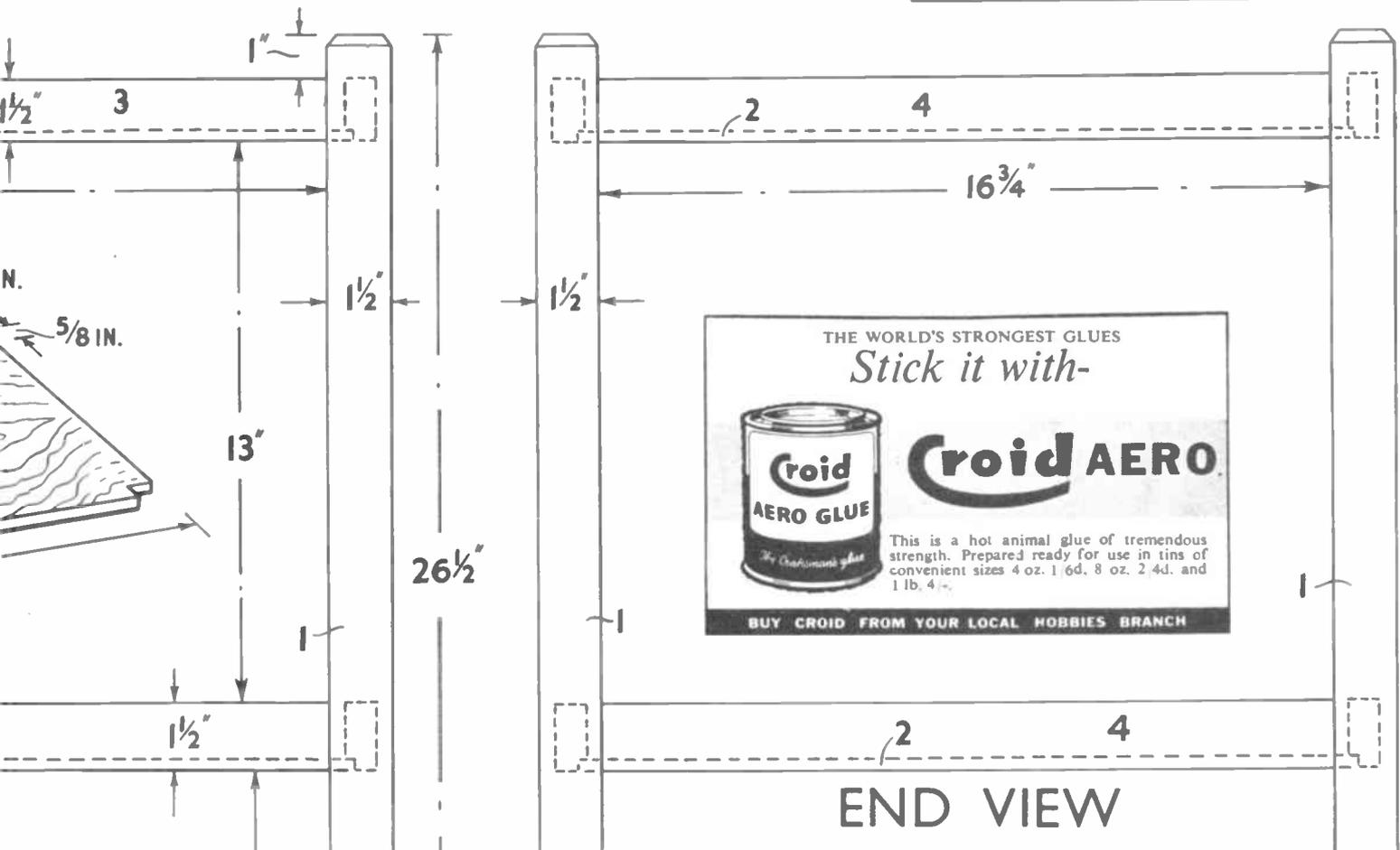
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ALTERNATIVE METHOD OF FIXING RAILS.

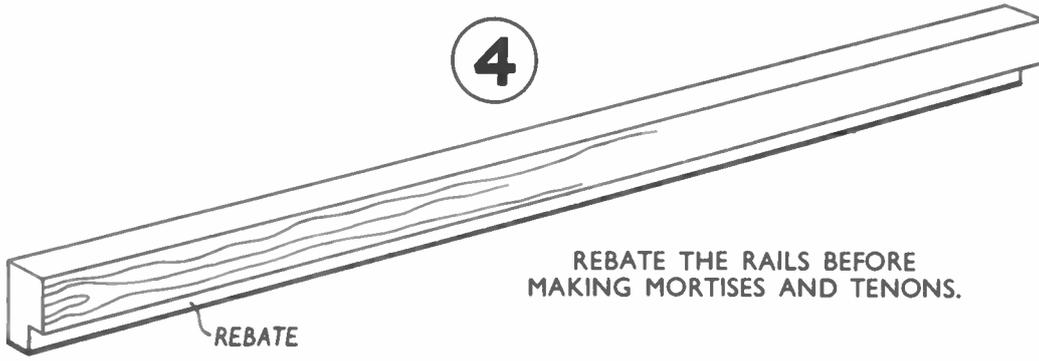


FULL-SIZE SECTION SHOWING SIZES OF MORTISE AND TENON.

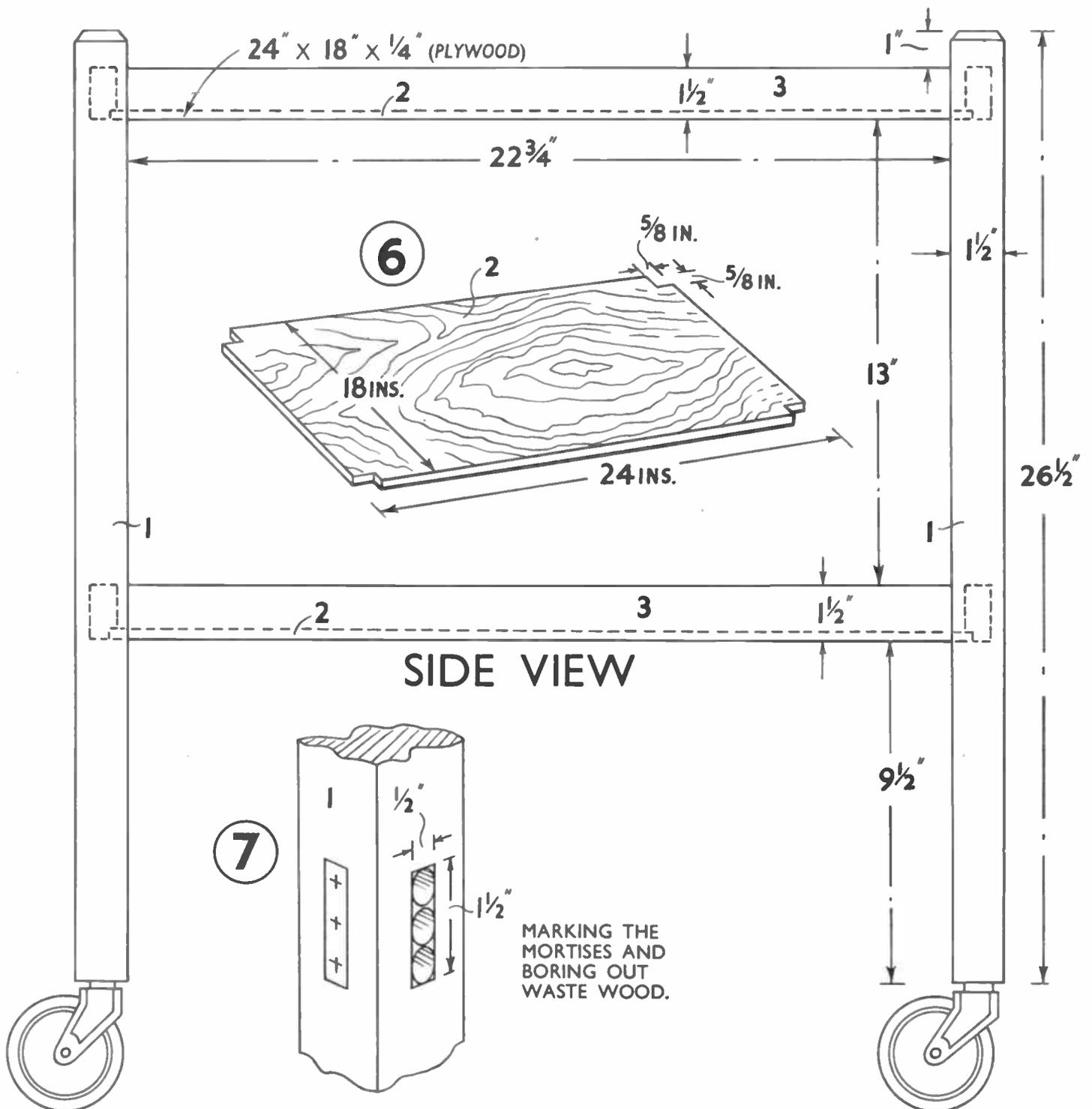
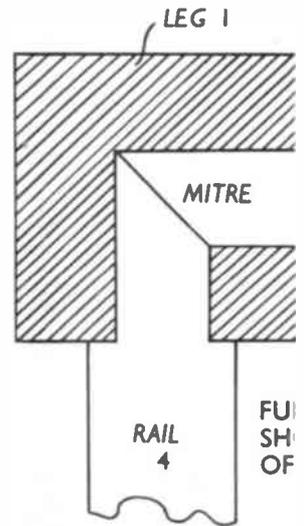


MITRE THE TÊNONS.

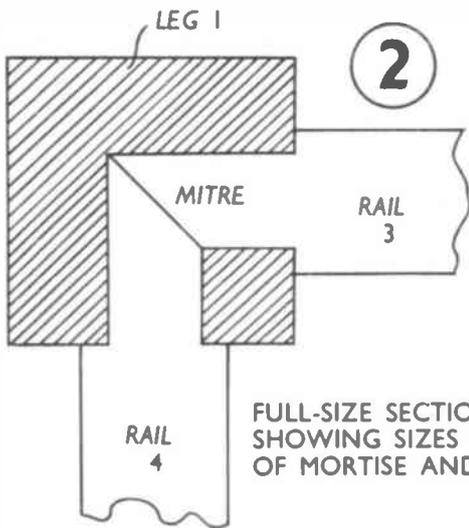
ALTERNATIVE METHOD OF FIXING RAILS.



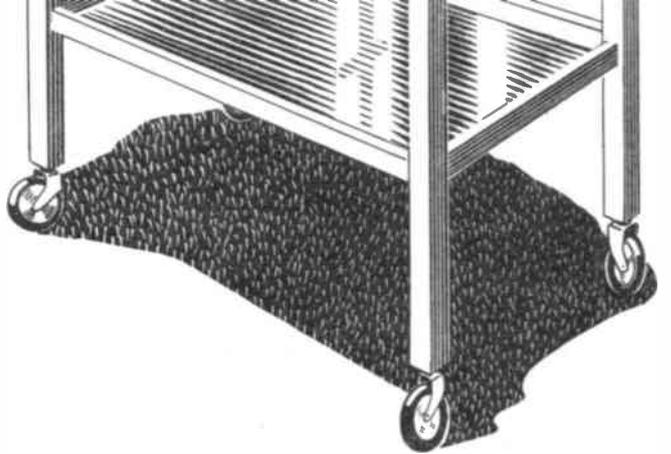
REBATE THE RAILS BEFORE MAKING MORTISES AND TENONS.



ALTERNATIVE METHOD OF FIXING RAILS.

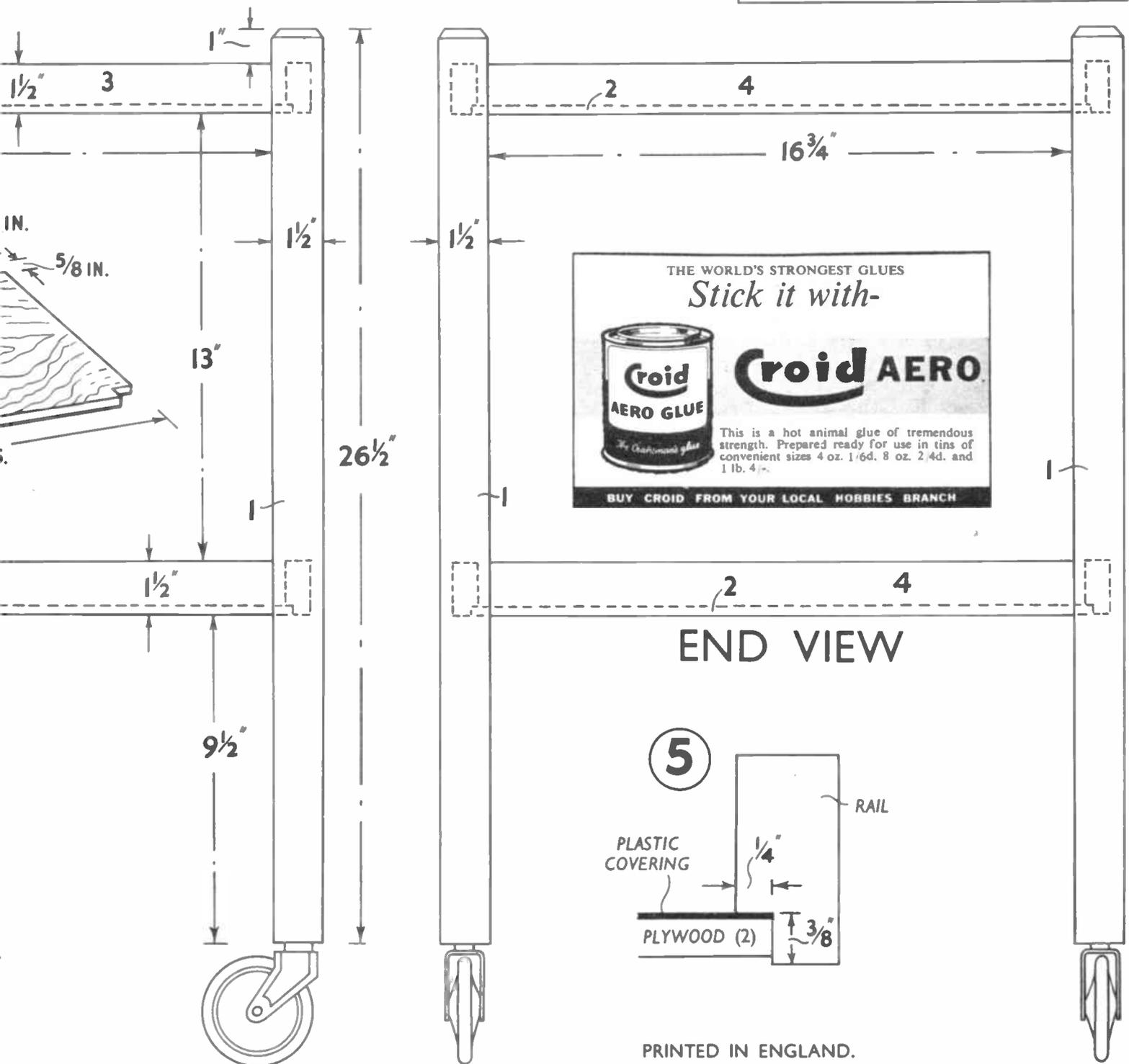


FULL-SIZE SECTION SHOWING SIZES OF MORTISE AND TENON.



SIZE — 28 ins. BY 20 ins. BY 30 ins. HIGH APPROX.

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15th FEBRUARY 1961

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NUMBER 3401

THE ORIGINAL
'DO-IT-YOURSELF'
MAGAZINE

HOBBIES *weekly*

FOR ALL
HOME CRAFTSMEN

Instructions
for
making

Also in this issue:

A ROTARY
DUPLICATOR

COLLECTORS' CLUB

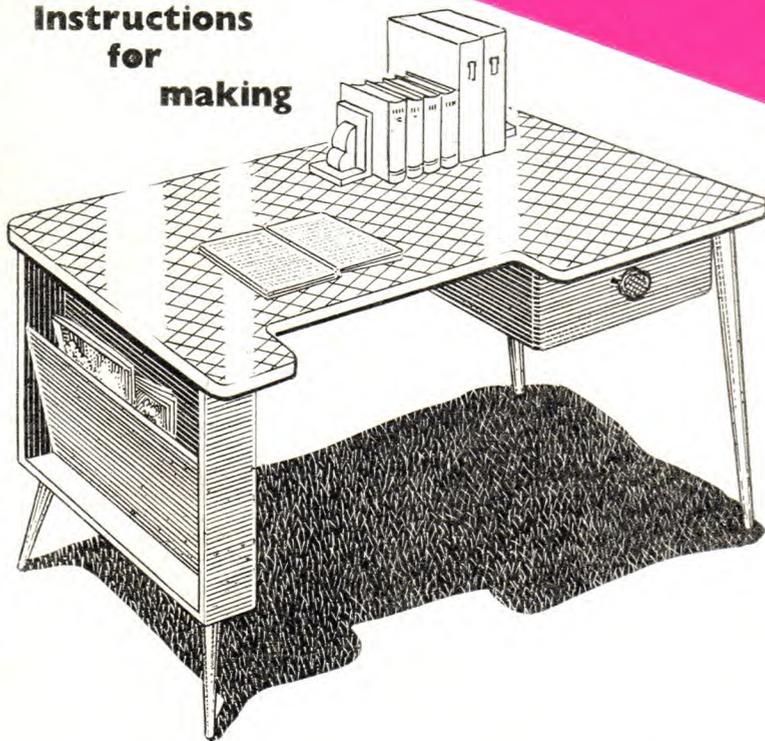
DISPLAY SHELVES
FOR TROPHIES

SHOE RACK IN
MODERN STYLE

A CHILD'S TOY
'WHIZZAROUND'

CARD MODEL
OF A FARMSTEAD

ETC. ETC.



CONTEMPORARY- STYLE DESK



Up-to-the-minute ideas

Practical designs

Pleasant and profitable things to make

5^D



FOR your notebook, we here give details of the new stamps issued for Trinidad and Tobago.

1 CENT. Cipriani Memorial. Biscuit and Black.

This stamp represents the memorial erected at Marine Square, Port-of-Spain, to the memory of the late Captain the Honourable Arthur Andrew Cipriani (1875-1945).

New Issues Guide TRINIDAD

Captain Cipriani was a soldier, sportsman, and politician, and was one of the earliest protagonists of West Indian Federation.

2 CENTS. Queen's Hall. Light Blue.

The view on this stamp represents the building known as 'Queen's Hall', the first Concert Hall built in the island. It is situated at St. Ann's, east of the Governor General's House to the north of Port-of-Spain and just outside city limits.

5 CENTS. Whitehall. Steel Blue.

The view on this stamp represents the building known as 'Whitehall', which now houses offices of the Trinidad Government, including the Premier's, the Ministry of Finance, and is also used as a meeting place for the Cabinet. The name 'Whitehall' was not given because of governmental connexion, but is derived from the colour of the white sandstone of which it is built,

which was specially imported from Barbados.

It was built between the years 1902 and 1904 during a period of absolute prosperity and this is reflected in the elaborate and intricate panelling and the massive chandeliers installed, together with large wall canvases done by a French artist. Interior woodwork and panellings are done in local wood such as cypre and mahogany. Royalty has been entertained within its walls in the persons of the late King George V and also the Duke and Duchess of Kent, while on their honeymoon.

6 CENTS. Treasury Building. Venetian Red.

The foundation stone of this building was laid by the Governor, Sir Claud Hollis, on 8th March 1936. The building was erected by the Public Works Department and opened in 1938.

The General Post Office and Savings Bank are housed on the ground floor, and on the first floor are the offices of the Accountant General's division of the Ministry of Finance, the Audit Department, the Cocoa Board and the Headquarters of the West Indian Currency Board (Eastern Group).

8 CENTS. Governor General's House. Yellow Green.

The view on this stamp represents the official residence of the Governor General of the West Indies. It was formerly the official residence of Governors of Trinidad and Tobago.

This mansion is situated in the Royal Botanic Gardens to the north of the city of Port-of-Spain, immediately outside the boundary and north of the Queen's Park Savannah.



The building was planned on an Indian model and built of local limestone. It was started in 1873 and occupied in 1876 by Sir Henry Turner Irvine. The interior was completely remodelled in 1938. It was damaged by earthquake in 1954.

10 CENTS. General Hospital. San Fernando. Lilac.

The main building is a heavy type ferro-concrete four-storey structure (five floors), originally planned for an accommodation of 500 beds. Ancillary buildings and works consist of a mortuary, a boiler house, porter's lodge, and sewage disposal works.

The foundation stone was laid on the 15th February 1951, by H.E. Major-General Sir Hubert Elvin Rance, G.C.M.G., G.B.E., C.B., Governor and Commander-in-Chief in and over the colony of Trinidad and Tobago, and the institution was officially opened on 4th February 1955, by Her Royal Highness, Princess Margaret.

12 CENTS. Oil Refinery. Brick Red.

This stamp shows a section of the plant used for the refining of petroleum. The mining and processing of petroleum forms the major industry of the territory,



Make this for speedier prints

A ROTARY DUPLICATOR

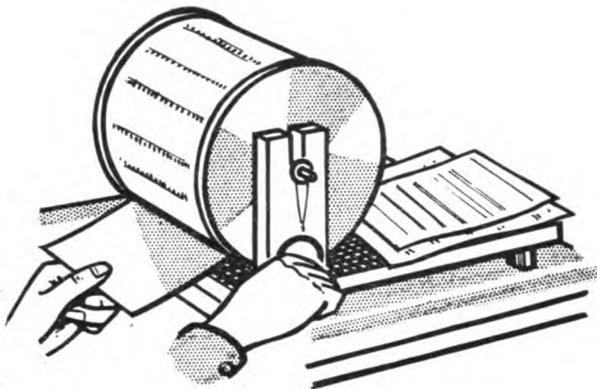
SECRETARIES, club officials, small shopkeepers, and many others will find a duplicator of great assistance in connexion with correspondence and publicity matters. A rotary model such as described here is much speedier in operation than the conventional flat type, turning out six to ten copies per minute.

The illustration will give a general idea of construction. Detailed measurements have not been given as these will largely be governed by the size and nature of the drum used as the stencil roller. This component could be fashioned from a 7 lb. paint tin, although any well-made tin having a diameter of not less than 3½ in. and a height of not less than 8 in. would be suitable. Quarto stencil sheets measure approximately 10 in. by 8 in., but must have sufficient margin to allow for a certain amount of trimming.

Should a suitable tin not be available, lathe owners might be able to turn a wooden roller; a section of the old-fashioned type mangle roller would be ideal, provided the surface was good.

Having obtained something suitable to act as the stencil roller or drum, the next task is to dress it around with some

By
*Trevor
Holloway*



soft, absorbent material which will take the duplicating ink. Thick felt or baize are two suggested materials. It should be carefully cut to size so that when draped around the roller the two ends make a perfect join, or at any rate do not overlap each other, otherwise an uneven surface will result.

The stencil roller has to bear down on what may be termed a pressure roller. A length of broom handle or curtain rod, evenly padded around with cloth, would be suitable. A rubber roller (such as a photographic squeegee) might also be used. When padding the stencil and pressure rollers, the chief point to watch is that there is no unevenness or rucks.

Both rollers must be equipped with some form of bearing spindle. These should be fitted throughout the entire length of each roller. Steel knitting needles or Meccano rods make excellent bearings.

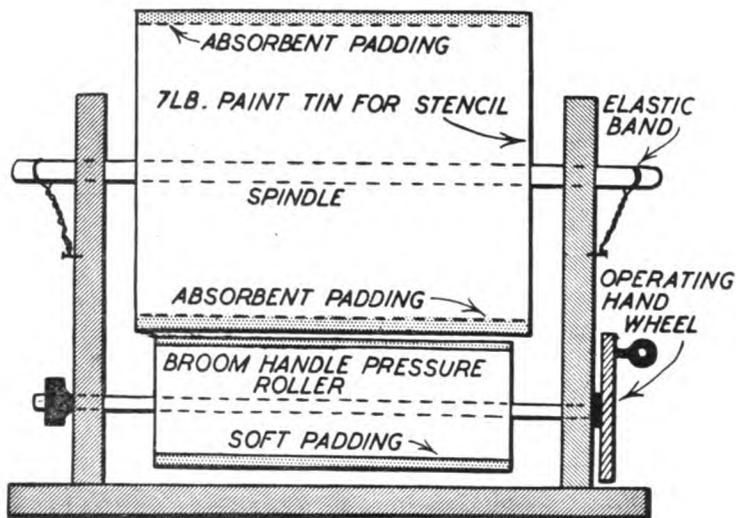
The wooden framework should now be constructed. A suggested measurement for the baseboard is 18 in. by 10 in. The height of the bearing supports will be determined by the size of your rollers. They should be fixed near the edges of the baseboard and about a quarter-way along its length. The stencil roller, as may be seen in the sketch, has its bearings mounted in U-shaped slots cut in the top of the bearing supports.

In order that the stencil roller shall bear down firmly upon the pressure roller, two small coil springs (or elastic bands) should be fitted to the stencil roller spindle-ends. A Meccano wheel, or a wheel from a child's toy, could be employed as an operating hand-wheel.

The constructional work completed, and a typed stencil sheet to hand, we can proceed towards the taking of a few trial prints. Ink the padding of the stencil roller evenly with duplicating ink, and then drape the stencil over the inked padding, the two ends of the stencil sheet being secured by gummed paper or adhesive tape.

A common trouble is too much ink, so use it sparingly at first until you can assess the correct quantity to apply to the padding.

After running off a few prints on scrap paper, you will be in a position to appreciate what adjustments are called for. You may find that greater bearing pressure is required, so the tension of the two springs or elastic bands must be increased. Moderate inking and smooth roller surfaces are the two main considerations.

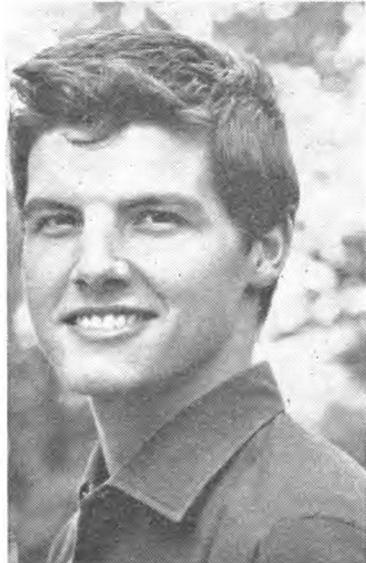


ANSWERS TO QUIZ (see page 343)

1. Sprocket.
2. Barefaced Tenon.
3. It is a plasterer's hawk.
4. Two-pin Switch Socket.
5. Offset.



TROPHY SHELVES FOR JESS



pattern. This has the advantage of easy cleaning.

The finished shelves need some front treatment to give that unit effect finish instead of just another set of shelves. Plywood or hardboard is best. The top pelmet can be shaped to any form you prefer. Incidentally, many hardware dealers now stock hardboard pelmets ready cut.

The pelmet should be held by fixing to a length of 1 in. square battening screwed into the concealed ceiling joists. To locate the position of the unseen joists, tap the ceiling lightly with a hammer. A hollow resounding note will indicate the ceiling itself; a dull, solid note will indicate you are striking immediately below a joist into which you can screw.

Side strips, also of hardboard or plywood should be fitted right down the entire length of the unit, as shown. The lowest shelf looks best around 6 in. from the floor with the front filled in.

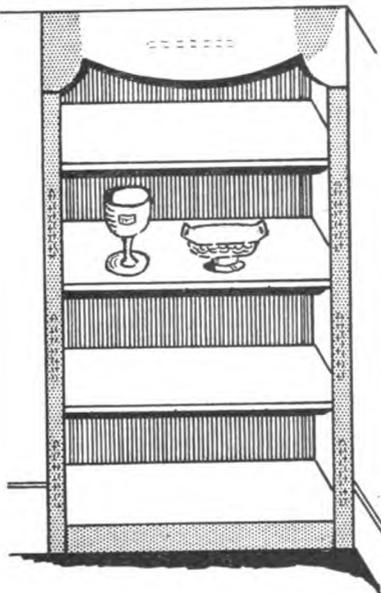
If you can afford it, and your collection of trophies justifies the expense, the shelves can be illuminated with concealed strip lighting. The lights are fitted

★
★ For Jess Conrad, rock'n roll star ★
★ and keen footballer, we have de- ★
★ signed this suitable fitment for ★
★ displaying trophies ★
★

★★★★★★★★★★★★★★★★★★★★
behind the hardboard facings as indicated by the dotted lines in the drawing. The current consumption need not be expensive as 15 watt lamps are ample.

If you are fitting strip lights, make the hardboard facing at least 6 in. wide so that the lights are completely concealed, otherwise the whole effect will be spoilt.

Finally, to make a really classy fitment you can fit plate glass shelves. Stronger lighting can then be used behind the top pelmet, which will illuminate the whole unit admirably.



POPULAR Rock 'n Roll Star, Jess Conrad, who made such a hit when he took the lead in the ITV show 'Wham!' and was groomed to take lead parts in serials such as the popular 'Odd Man Out', has a problem.

He wrote to me (says Ed Capper), 'As you know I play football with the Television All Stars and over the years have collected quite a variety of cups, shields, trophies, etc and I would be glad if you would design for me some shelves on which I could display them. As they are at the moment, they are littered all over my room.'

There is no better home for such a collection than on shelves built into the chimney recess in the room. Most of you know the way to fix shelves. There are two methods: (1) Supporting battens to carry the shelves are fixed to the wall by screws Rawlplugged into holes drilled in the wall or (2) fitting side pieces of timber, of the same width as the depth of the recess, and then screwing the battens to the side pieces to take the shelving.

Use good knot-free timber at least 1 in. thick. If you wish, instead of the rather tedious job of painting or polishing the finished shelves you can cover them with Fablon or Contact adhesive sheeting bearing an imitation wood

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IN CASH PRIZES
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All entries must be made from Hobbies Design No. 3382 presented free with the 5th October 1960 issue of Hobbies Weekly. Back numbers can be obtained from Hobbies Ltd, Dereham, Norfolk. Price 6d. post free.

HOW TO DO CARD TRICKS AND ENTERTAIN PEOPLE

By Harry Baron

WOULD you like to be able to do the Three Card Trick or deal yourself out a hand of trumps, or tell what card a person is thinking of? Would you like to make cards pass mysteriously from one place to another, cause them to change colour, multiply, and disappear?

Harry Baron, who is a member of the Magic Circle, the London Society of Magicians and the International Brotherhood of Magicians, has set out in this very interesting book some of the secrets of handling cards so that even novices are enabled to mystify their friends.

Published by Nicholas Kaye Ltd. 194-200 Bishopsgate, London, E.C.2. Price 15s. 0d.

Making 'Impossible' Pictures

ONE of the most fascinating aspects of monochrome photography is the making of what would be otherwise 'impossible' pictures. This does not mean that they are incongruous but are almost impossible to take. The effects are, however, obtained by careful combination of suitable negatives. Since our outside photography is necessarily restricted in the winter months, now is the time to try your skill with this method.

Some examples of pen and ink sketches are shown, and these are combined with other genuine photographs to give the desired result. The sketches which are to produce these outstanding effects are copied to make negatives of

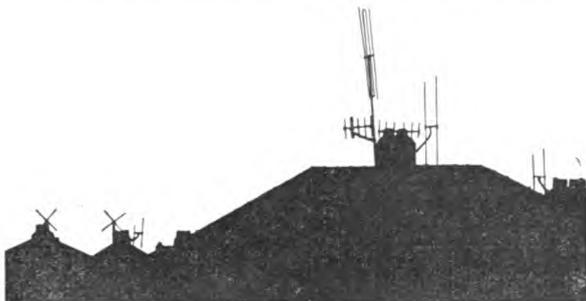
picture. Such a frame is an advantage to enclose a pictorial scene or to counteract the baldness of a blank sky.

Several methods are likely to produce the desired negative. The first involves nothing more than making a pen and ink sketch on white paper, and then making a copy negative. For example, we show a simple drawing of a tree branch during autumn. It was drawn freehand with Indian ink on a piece of white paper. You may sketch from a live subject, invent one, or copy a pen and ink drawing.

Use a sheet of smooth white drawing paper no less than 10 in. by 8 in., so that you can produce a large negative which can be manoeuvred in any way you wish. If your paper is too small you may find yourself in difficulties when print-

By S. H. L.

the silhouette kind. By this we mean that we produce a negative bearing nothing else but the black subject on a white ground. Once the negatives have been prepared the combination printing is simplicity itself for all we have to do is



to make an exposure of one and then the other on the same piece of paper.

First of all we must consider what we would like to do and how to do it. There are many occasions when a commonplace picture can be transformed by adding a 'frame' of some kind. This may be a tree at one side of the picture with a few straggling branches and leaves occupying, say, the left and top of the

ing, for the resultant negative may not be large enough to cover the area of the genuine picture. You should also ensure that there is an area of white ground all round the drawing.

After sketching in pencil, finish with Indian ink and pen or use a fine paint brush for covering large areas.

●Continued on page 347

SHOE RACK IN MODERN STYLE

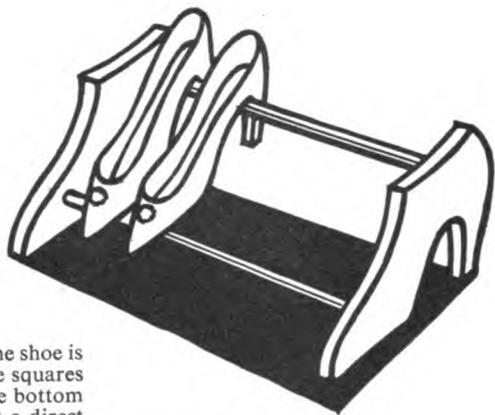
THE shoe-rack illustrated is a simple, one-evening project that will find favour with the ladies in the house.

Each end is made up of $\frac{1}{2}$ in. thick wood, measuring 8 in. by $5\frac{1}{2}$ in. As an alternative to using solid wood, each end may be made from two layers of $\frac{1}{4}$ in. plywood, with the holes for the dowels drilled only on the two inner shapings. This method of working means that the ends of the dowels are concealed.

A gridwork pattern of $\frac{1}{2}$ in. squares is lightly pencilled over each piece of wood

By N. Brown

for the end, and the outline of the shoe is marked by comparison with the squares in the illustration. Note that the bottom of the heel of the shoe is not in a direct

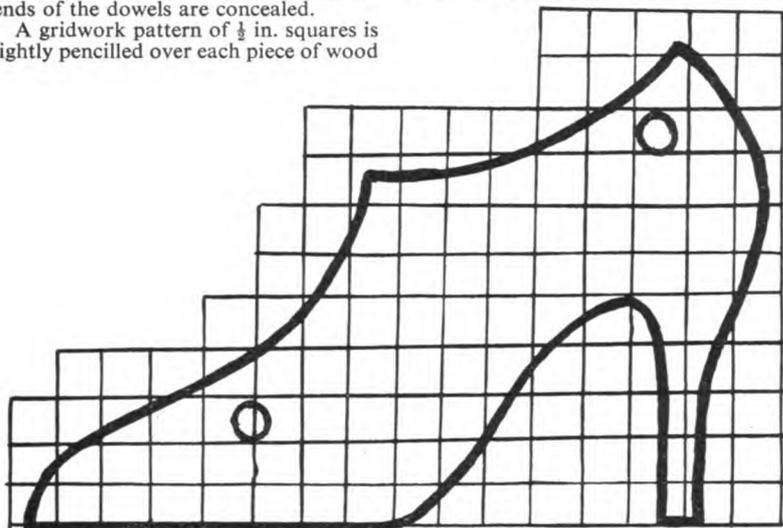


straight line with the sole. This is intentional, as the rack should lean back slightly.

The shapings are cut out with a fret-saw. If the plywood method is adopted the two pieces for each end should be lightly tacked together before being cut as a pair. The edges are smoothed with glasspaper (putting all the shapes together so that they are identical) and $\frac{3}{8}$ in. diameter holes for dowels are drilled in the positions indicated.

Any suitable length of dowel rod may be used to connect the shapings, but if it is desired to make the rack more than 18 in. long, a third shaping should be put midway between the outer pair, so that the dowels pass right through it.

The dowel rods may be left unpainted, but the end shapings may be treated. There is slight scope for decoration here. Black enamel would be the simplest finish, but for fancy shoes, gold or silver paint might be more appropriate.



Continued from page 346

PEN AND CAMERA STUDIES (1)

Remember to erase all pencil work before copying.

Another convenient method to use where you cannot find a suitable basis is to 'borrow' a portion from a stock negative. This is placed in the negative carrier of the enlarger, your sheet of white paper placed on the baseboard. Sketch out the outline of the detail you require with a pencil while holding the paper quite firmly. The details are then completed, after withdrawing the paper, by means of pen and ink. Incidentally, you may use any kind of negative for such outlines even though they may be useless for normal printing since all we require is the basic shape.

In some cases the chosen negative may be a little too tricky to copy by means of the foregoing methods, or too

difficult for freehand work. Make an enlargement — whole plate or half plate — in the normal manner but a little underexposed to make a light toned picture. The unwanted portion of this can be masked out either by painting the negative with an opaque water paint or by covering the printing paper with black paper during the exposure. The result will be a faint picture of the part we require. The next step is to ink in the required portion, bleaching out the remainder in a ferricyanide bath. We then have a black and white sketch of the required portion. Here is a suitable bleaching bath:

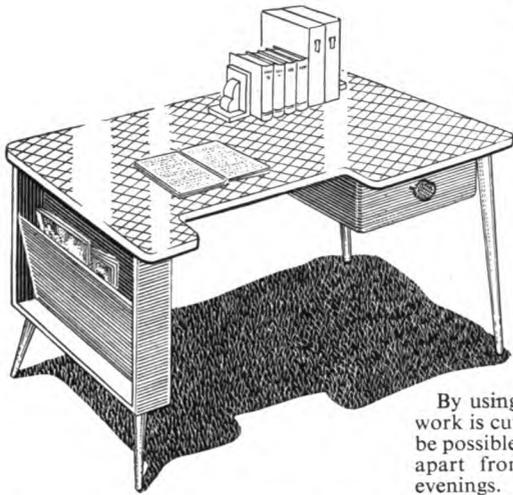
- A Water 10 fluid oz. Hypo crystals $1\frac{1}{2}$ oz.
- B Water 10 fluid oz. Potassium ferricyanide 1 oz.

For making the bleaching bath take 4 oz. of solution A and place in 4 oz. water. Add 96 minims of solution B to this. Soak the print thoroughly in clear water before immersing in the bleach bath. The latter will quickly clear all traces of the lighter tones, leaving a black and white print which is washed in running water for ten minutes and allowed to dry. This will then be very similar in appearance to any of our sketches as already mentioned. Remember that you must use waterproof Indian ink for this purpose or your drawing will wash away during the processing.

In the next part of this feature we will explain how to make the new negatives, how to make suitable combinations and the effect of combining the drawings with genuine negatives.

Instructions for making

CONTEMPORARY- STYLE DESK



By using Hobbies contemporary legs, work is cut to a minimum, and it should be possible to complete the construction, apart from painting, in four or five evenings.

Make up the desk in three separate sections — the top, magazine rack, and drawer unit. The three are then assembled, the legs screwed in place, and

the top covered with laminated plastic.

The general arrangement and measurements are clearly shown in Fig. 1. The top is supported by 29 in. contemporary legs at one end, and 9 in. legs at the other end. The magazine rack and drawer are connected by a strengthening piece, as indicated.

Commence by making up the magazine rack from plywood, as shown in Fig. 2. The sides, top, and bottom are $\frac{1}{2}$ in. thick, and the back $\frac{1}{4}$ in. The sloping piece is also cut from $\frac{1}{4}$ in. plywood, and fixed with glue and panel pins through the sides.

A SMART desk of modern appearance, complete with a handy drawer and a neat magazine rack,

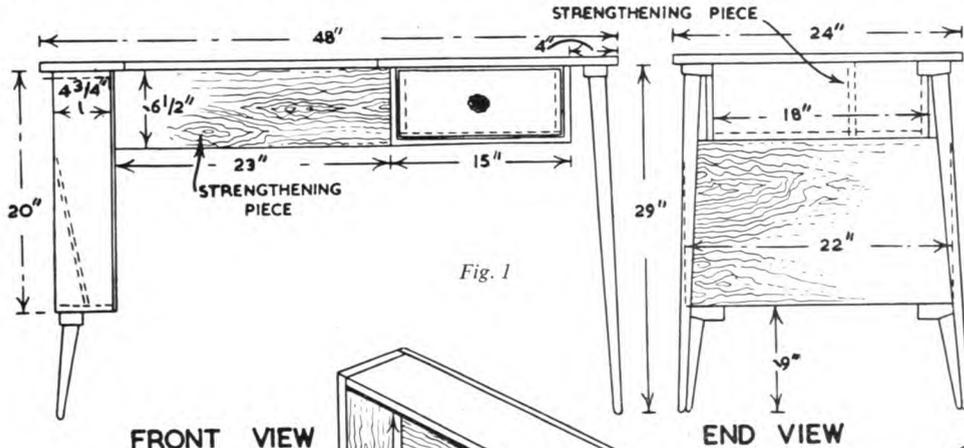


Fig. 1

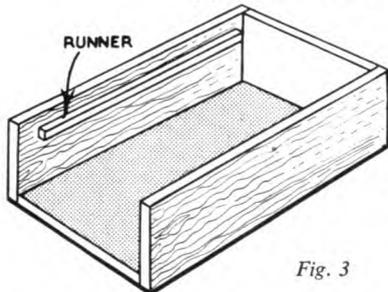


Fig. 3

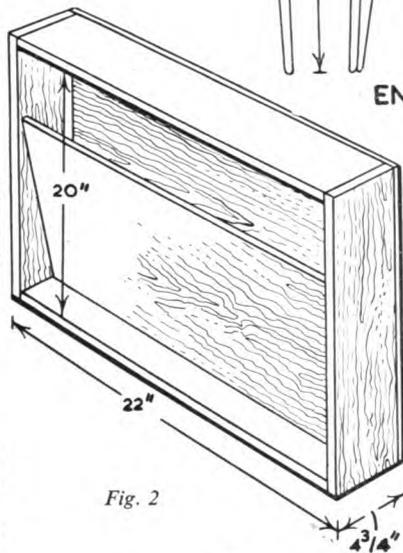


Fig. 2

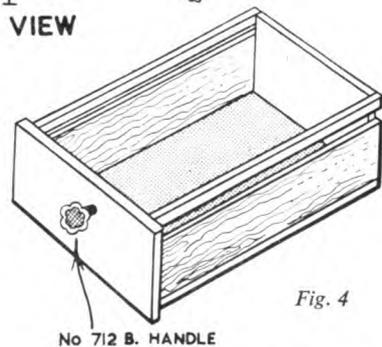


Fig. 4

can be quickly and cheaply made from plywood with a decorative plastic finish for the working top. Finished off by painting with high gloss enamel, it can be made to blend with any furnishing scheme in the home.

The drawer is made up as shown in Figs. 3 and 4. The fixed portion is shown in Fig. 3, and the sliding portion in Fig. 4. Make up from $\frac{1}{2}$ in. wood, and

●Continued on Page 349

THE MAGIC OF SEEING

YOU do not see with your eyes, but with your brain. Your eyes merely collect light rays, like miniature cameras. Without a brain to interpret the shapes and colours of the world around you as light from them falls upon the sensitive retinas or 'screens' at the backs of your eyes, you would be blind, even if your eyes themselves were perfect.

If you could see these words as they are reproduced inside your eyes, the letters would be upside down. The reason for this is that light rays travel in straight lines, so that the rays from an object must enter the pupil of an eye at a slant, and cross over if they are to project a clear and complete image upon the retina.

You can study this effect with the aid of a quickly constructed pin hole camera. Form a tube of cardboard to fit snugly, but not too tightly, over the stout cardboard centre of a toilet roll. Cut out a disc of cardboard which can be glued over one end of the 'shell'. When the disc has been secured in place, make a clean pin hole through its centre. Paint the interior and outside jet black.

Oil a piece of tracing paper by rubbing in a spot of fine grade oil with a fingertip. Glue the paper to one end of the toilet roll centre to form a circular screen, and trim off the surrounding edges of paper when the glue is quite dry. Telescope the 'screened' end of the smaller tube into the shell. Before you do this it will be advisable to prick a series of tiny holes round the edge of the screen in order to allow air in the apparatus to escape without breaking the paper when you slide the tubes together.

Point the pin hole at a brightly illuminated window or street scene, and look through the open end of the tube with your eye pressed against the cardboard rim. You will see a little picture formed by light rays upon the paper screen, but the image will be upside down. In this manner inverted images are formed inside cameras and the human eye. Peer through your apparatus at a lighted candle in a poorly lit room. Vary the distance of the screen from the pin hole by sliding the shell back and forth. Note how a larger but more blurred image is formed when you move the screen away from the hole. Do not let the pin hole be too large, otherwise too much light will enter and spoil the clarity of the image.

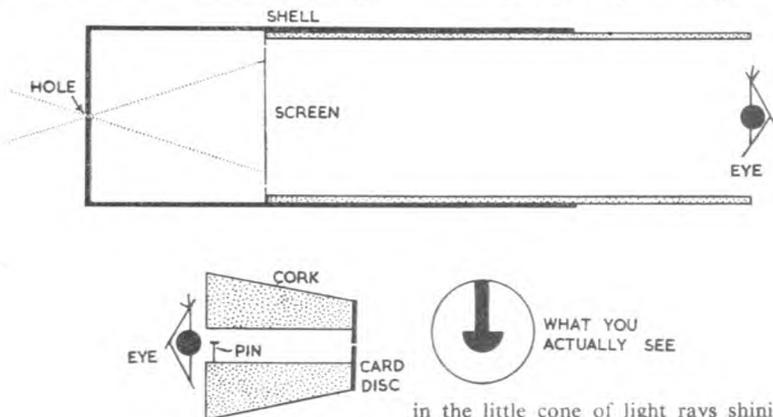
One of the many complex activities of your brain when you are seeing is to let you be aware of people and objects

standing and moving as they should be, the right way up. Prove that your brain can perform this feat of optical magic with the aid of a little 'viewer' made with a cork, a tiny cardboard disc and a pin.

With a cork borer, or red hot nail, make a neat $\frac{1}{4}$ in. diameter hole through

viewer hold it up close to one eye with the pin hole pointing away from you and the pin standing upright within the cork tube. Look towards a lighted window or a patch of bright sky. You will see a large shadowy pin head upside down in a round pool of light.

Holding the pin very close to your eye



the middle of a 1 in. long cork. Cut out a small cardboard disc to cover one end of the cork. Bore a clean pin hole through the centre of the disc, and glue the little cardboard circle to the cork. Snip a pin in half with pliers, and mount the shortened pin, upright, just inside the open end of the cork tube. Paint the completed apparatus black. To use the

in the little cone of light rays shining through the pin hole causes an upright shadow of the pin head to be cast upon your retina. With the pin so close it would be impossible for an ordinary inverted picture of the pin to be focused by the lens in your eye upon the retina. Your brain deals with this upright shadow as it would with this upright inverted image, and the pin seems to be upside down. (A.E.W.)

Continued from page 348

CONTEMPORARY-STYLE DESK

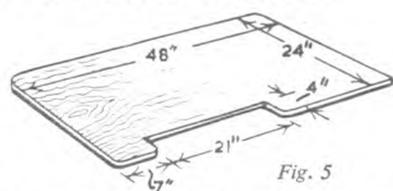
make sure that the drawer slides easily in and out.

The front should overlap on the sides and bottom, and the handle is Hobbies No. 712b, price 1/9, post 6d. from Hobbies Ltd., Dereham, Norfolk. Take care when gluing the drawer sides and runners in position that excess glue is wiped off before it has time to dry, otherwise the drawer will not work smoothly.

The strengthening piece is now screwed to the magazine rack and the fixed portion of the drawer unit. It should be positioned about 9 in. from the back of the table.

Cut the top from $\frac{1}{2}$ in. or $\frac{3}{8}$ in. plywood to the measurements shown in Fig. 4. Screw the top to the rack and drawer unit, using countersunk screws.

Cover the top with laminated plastic or other plastic sheeting available,



following the maker's instructions regarding correct adhesives to use.

The legs are Hobbies No. 583 plain beech, 29 in. long, and Hobbies No. 580 9 in. long. The 9 in. legs cost 2/- each, and the 29 in. legs 5/6 each, postage on three or four legs 1/6 extra. They can be obtained direct from Hobbies Ltd., Dereham, Norfolk, or from local stockists or Hobbies branches.

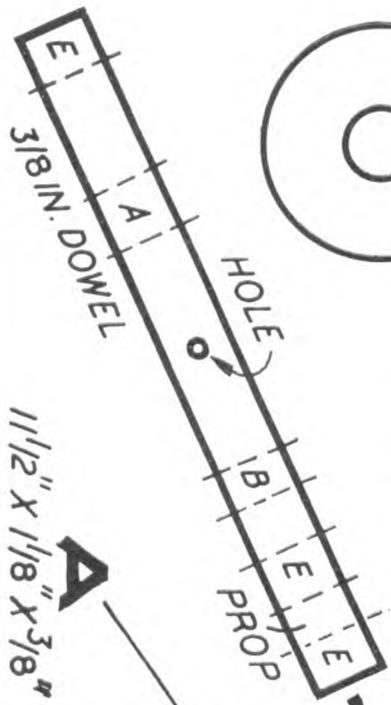
Clean up all pieces thoroughly, and fill the grain before applying undercoat and finishing coat. (M.h.)

WHIRLWIND



PIECES E CUT
THREE 1/4 IN.

D
1 1/4" X 1 1/8" X 3/8"

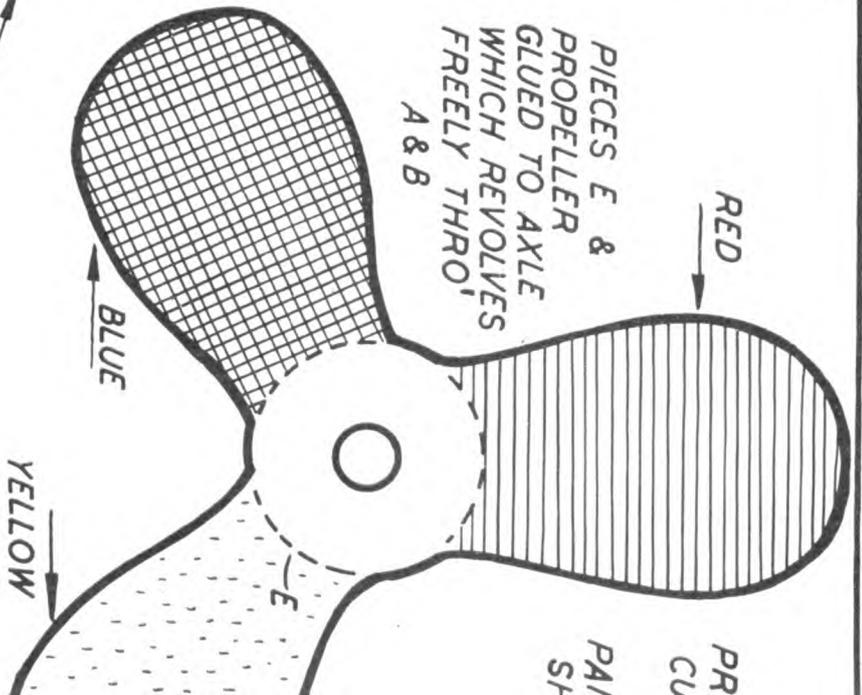


DRILL HOLE

STRING APPROX
LONG 3 FT. 6 IN.

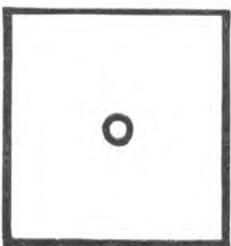
PIECES E &
PROPELLER
GLUED TO AXLE
WHICH REVOLVES
FREELY THRO'

RED



PR
CU
PAI
SH

CURTAIN
RING



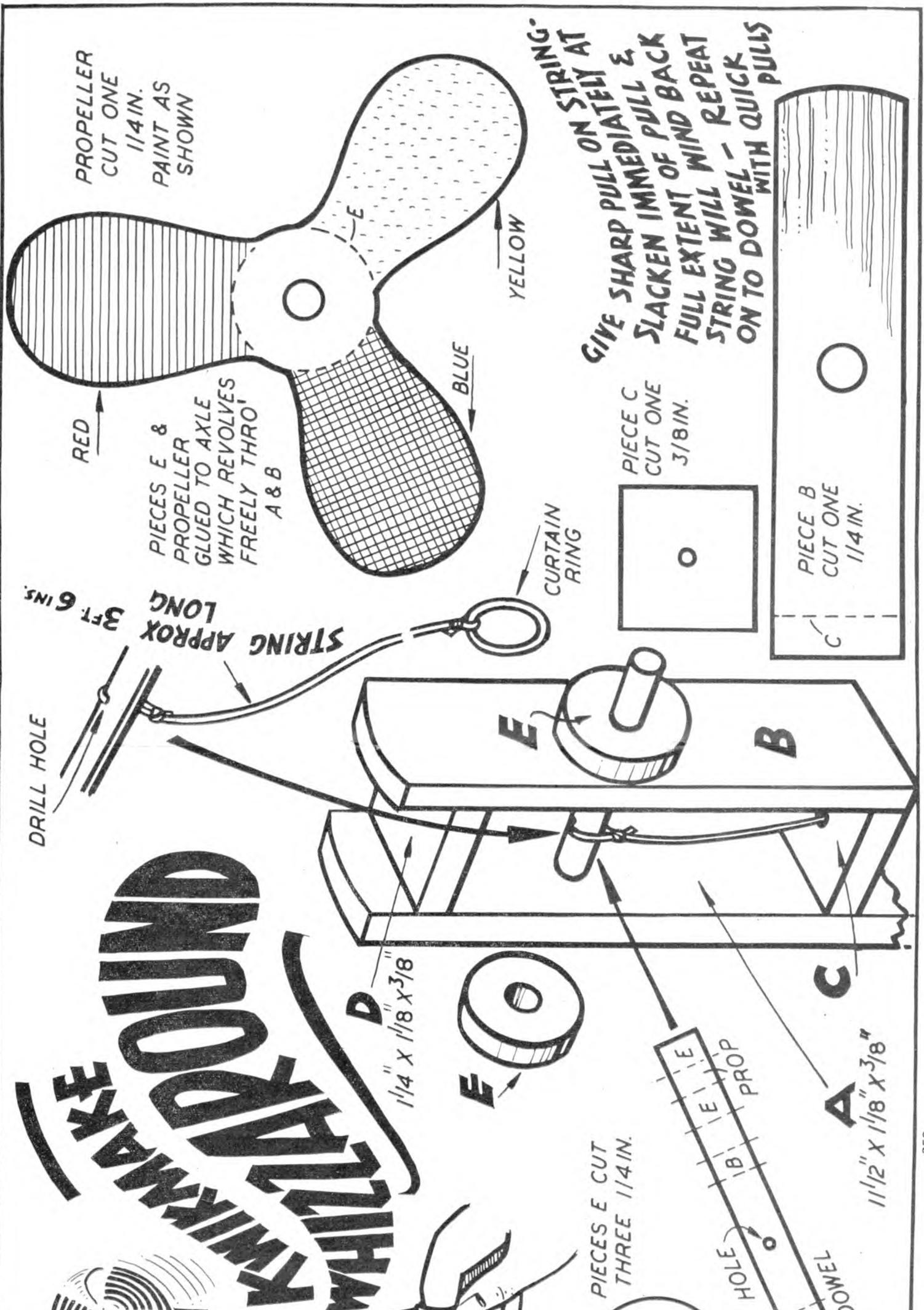
PIECE C
CUT ONE
3/8 IN.

GIVE SHARP PULL
SLACKEN IMMEDIATELY
FULL EXTENT OF
STRING WILL
ON TO DOWEL WITH

PIECE B
CUT ONE
1 1/4 IN.



WINDMILL SOUND



PROPELLER
CUT ONE
1/4 IN.
PAINT AS
SHOWN

RED

PIECES E &
PROPELLER
GLUED TO AXLE
WHICH REVOLVES
FREELY THRO'
A & B

YELLOW

BLUE

GIVE SHARP PULL ON STRING AT
ONIRING.
SLACKEN IMMEDIATELY &
FULL EXTENT OF PULL BACK
STRING WILL WIND REPEAT
ON TO DOWEL - QUICK PULLS

PIECE C
CUT ONE
3/8 IN.

PIECE B
CUT ONE
1/4 IN.

DRILL HOLE
STRING APPROX
3 FT. 6 IN.

CURTAIN
RING

D
1 1/4" X 1/8" X 3/8"

PIECES E CUT
THREE 1/4 IN.

PROP

HOLE

A
WOODEN DOWEL

A
1 1/2" X 1/8" X 3/8"

CHEMISTRY AT HOME

THE familiar household ammonia is really a solution of the gas ammonia, NH_3 , in water, H_2O , and reacts as if it were ammonium hydroxide, NH_4OH . As household ammonia is weak and often of the cloudy type which contains soap and other additives, it is best to use strong ammonia solution of specific gravity 0.88 and which is obtainable from pharmacists. This contains about 33 per cent of its weight of ammonia gas.

Being a base it has a strong alkaline reaction, as you will see if you hold a slip of moist red litmus paper in the mouth of the bottle. The paper turns blue. This also shows that the solution readily gives off its gas. This is increased by warming the solution.

Pour about 2 or 3 c.c. of ammonia into a test tube, hold an empty test tube

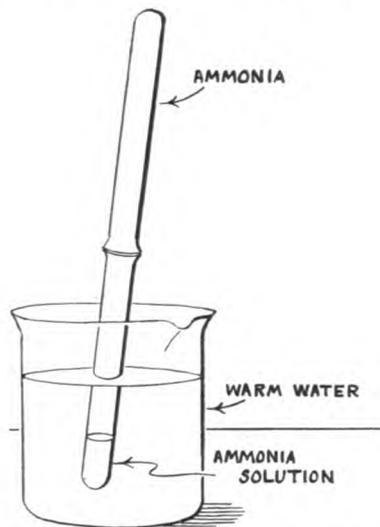


Fig. 1—Preparing gaseous ammonia from ammonia solution

over it and place the first tube in warm water (Fig. 1). Bubbles appear in the solution. In a few moments remove the second test tube, still mouth down, and apply a slip of moistened red litmus to the tube mouth. It turns blue, showing the tube is full of ammonia gas. Note that the gas stays in the tube even though it is inverted, indicating that the gas is lighter than air.

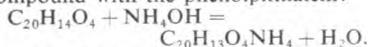
Now dip the tube mouth in cold water. The water rushes up the tube.

Ammonia gas is therefore very soluble in water.

Relying on this high solubility a spectacular trick may be staged, no less than turning water into 'raspberry juice', throwing in an apparently inexplicable fountain for good measure!

EXPERIMENTS WITH AMMONIA

Collect a small flask of ammonia gas and fit a cork carrying a drawn out glass tube, as shown in Fig. 2. The beaker contains water to which has been added a little phenolphthalein solution, $\text{C}_{20}\text{H}_{14}\text{O}_4$. Dip the lower end of the tube in the water. This rushes up the tube and emerges as a pink fountain from the jet, due to the ammonia forming a coloured compound with the phenolphthalein:



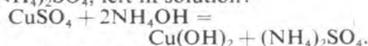
Apart from its common household uses ammonia has one which is not generally known outside dyeing circles. This can be of great use to the home dyer. Every housewife knows that one cannot dye a light colour on top of a dark. With most dyed wool, however, this is possible, for ammonia and soap will strip the colour back to natural and the article may then be dyed any desired shade. This method should not be used with knitted goods owing to the danger of shrinkage, but is excellent for changing the colour of wool yarn.

Dissolve 1 ounce of soap in 5 pints of hot water and let the solution cool to hand heat. Add three fluid ounces of strong ammonia, enter the wool and bring the whole to the boil, stirring frequently. The dye is gradually removed. Add further small quantities of ammonia if the dye removal begins to hesitate, for darker colours sometimes need more ammonia.

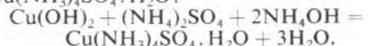
When the wool is back to its natural cream shade, remove it, squeeze or wring it and wash it in several changes of water. The first lot of water should be hot, the next warm, the third lukewarm, and the last cold. This gradual cooling

serves two purposes; the reactants are more readily removed by hot water, thus making for subsequent even dyeing, and the wool is kept soft. Hot wool suddenly cooled tends to become harsh. After this washing, the wool is ready for dyeing to the new shade.

As a soluble base ammonia precipitates hydroxides from some metallic salts. With copper sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, for instance, copper hydroxide, $\text{Cu}(\text{OH})_2$, is formed and ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$, left in solution:



Unless the addition of the ammonia is cautious, however, something strange happens. To a few c.c. of copper sulphate solution add drop by drop a dilute solution of ammonia. At first a blue precipitate of copper hydroxide appears, but continued addition causes this to dissolve and a beautiful intense blue solution is formed, owing to the formation of cuprammonium sulphate, $\text{Cu}(\text{NH}_3)_4\text{SO}_4 \cdot \text{H}_2\text{O}$:



Add about an equal volume of methyl-

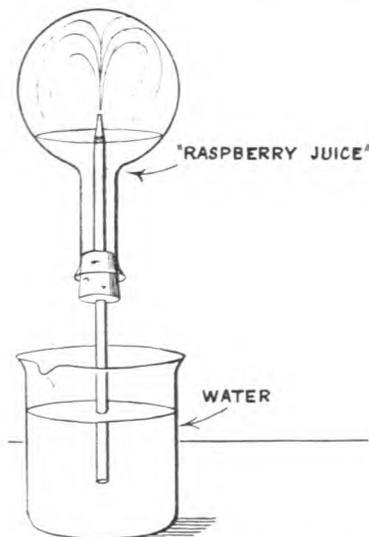


Fig. 2—The mysterious fountain

ated spirit to the blue solution. A deep blue precipitate of cuprammonium sulphate appears, for it is insoluble in alcohol (methylated spirit is a mixture of mainly ethyl alcohol, $\text{C}_2\text{H}_5\text{OH}$, with smaller amounts of methyl alcohol, CH_3OH , dye, pyridine, $\text{C}_5\text{H}_5\text{N}$, and a little petroleum distillate).

This gives us a means of isolating the compound in a splendid crystalline form.

Dissolve about 10 grams of copper sulphate in 40 c.c. of warm water, allow to cool and then add ammonia a little at a time until the precipitate first formed just dissolves. On to the surface of the deep blue solution so obtained, carefully run a $\frac{1}{2}$ in. layer of methylated spirit from a pipette. Let the whole stand undisturbed overnight. Splendid deep blue crystals of cuprammonium sulphate separate out. When no increase of these is observed, pour away the mother liquor and let the crystals dry on a porous tile.

Being a base, ammonia forms salts with acids. With hydrochloric acid, HCl,

for instance, ammonium chloride (sal ammoniac), NH_4Cl , is formed:



Since strong ammonia solution and strong hydrochloric acid both easily give off their dissolved gases, this reaction may be made the basis of a startling trick.

Put two or three drops of strong ammonia in the bottom of a tumbler and on the bottom of an inverted saucer a similar quantity of strong hydrochloric acid (caution, corrosive; any on the fingers should be rinsed off with water and wet sodium bicarbonate applied).

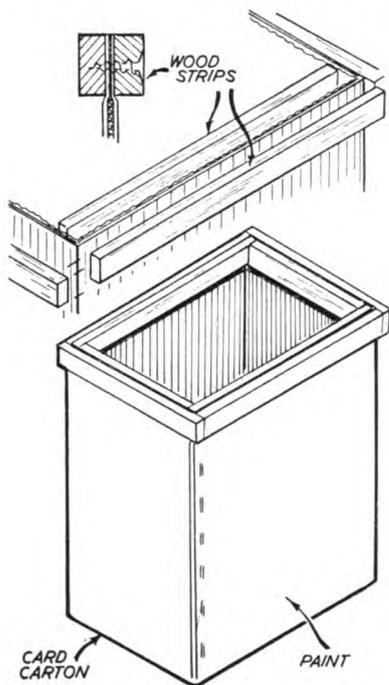
Turn over the saucer and place it on the tumbler. White smoke appears in the tumbler, consisting of finely divided ammonium chloride.

This trick can be made even more mystifying by smoking a cigarette and telling the observer that you intend to fill the closed tumbler with the smoke from a distance. When you place the saucer on the tumbler, at once cover the whole with a cloth, go to the other side of the room, take a few puffs at the cigarette, and then return to uncover the tumbler. The smoke is there with no apparent means of transit!

Three Projects for the Home

WASTEPAPER BASKET

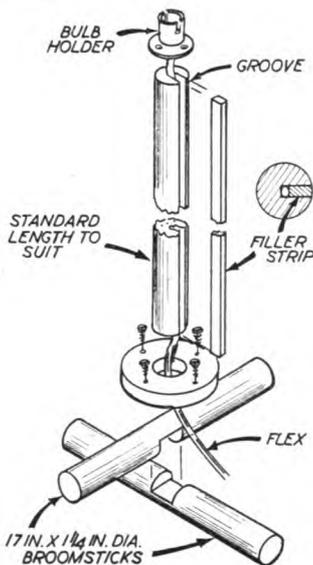
TURN that handy-sized corrugated card carton into an expensive-looking wastebin for the work-room, or a soiled linen basket for the bathroom. Fasten wood strips around the top, inside and out, screwing through and tightening right up to squash the card flat. Then trim off the edges of the card flush with a razor blade and glasspaper the whole rim



smooth. A coat or two of undercoat, followed by a final coat of gloss or semigloss finish, completes the job.

STANDARD LAMP

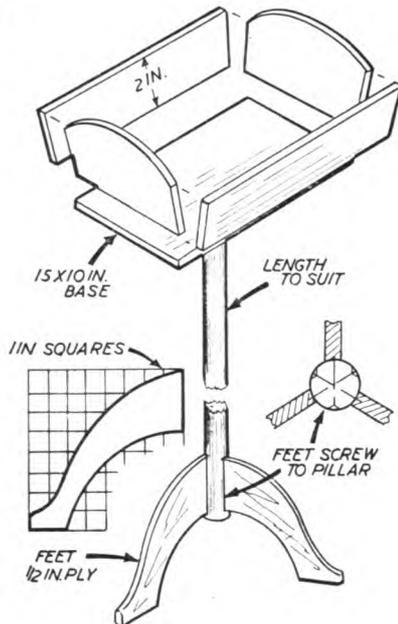
THE base is made from broomstick or dowel lengths, half-jointed and surmounted by a 1 in. thick wooden disc. This disc is bored to take the end of the standard, which is a 6 ft. length of broomstick. A groove is planed in the standard to take the flex, and later filled in with a strip of wood glued in place. A conventional bulb holder is screwed to the top of the standard.



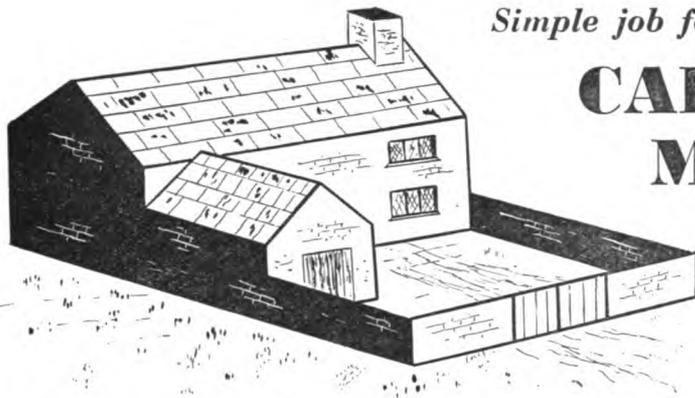
MAGAZINE HOLDER

THE tray parts should be cut and assembled from $\frac{3}{8}$ in. ply stock around a 15 in. by 10 in. by $\frac{3}{4}$ in. or $\frac{1}{2}$ in. ply base. Cut hand grips in the end for carrying the stand from place to place. The pillar can be a length of broomstick or $1\frac{1}{2}$ in. dowelling. The three feet are cut from $\frac{1}{2}$ in. ply, secured 120 degrees apart to the bottom of the pillar. Trim the feet to fit snugly against the pillar and stagger the fastening screws for clearance.

(R.H.W.)



CARDBOARD MODEL OF A FARMSTEAD



THIS model farmstead has been designed for speedy production. The farmhouse is made from two pieces of thin white cardboard measuring 8 in. by $2\frac{3}{4}$ in. as shown in Fig. 1. You need only mark out one of the parts which represents one side and one end of the farmhouse, cutting out the two parts at the same time with a sharp knife. The dotted lines indicate where the card should be scored and folded to make flaps for gluing together.

By H. Mann

We now need a cardboard roof for the farmhouse as shown in Fig. 2. Reference to Fig. 1 will reveal that we have indicated the slope of the roof to be 'T' inches long and this has been done for the sake of accuracy. When the walls of the house have been joined together, measure the section marked 'T' and this distance plus $\frac{1}{8}$ in. represents the width of half of the roof. You will need double this measurement to give the full width of the section for the roof. Score in the centre, fold and glue to the flaps of the farmhouse to finish.

An outhouse can be in the form of a stable, but this could be fitted outside of the main premises if desired, or you could have two such buildings. Fig. 3 indicates how the outhouse is prepared from a piece of cardboard $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in., once again cut on the unbroken lines and scored on the dotted lines. The outer sections form the sides when folded, while the two inner sections make the roof, and these should be folded to a ridge, the flaps at the side being glued. A rubber band will hold the model in position while the glue sets.

A wall around the whole of the farmhouse to prevent stray cattle from entering can be made from a strip of card 1 in. wide. The length of this strip is a matter for you to decide, giving you the freedom to make the area before the farmhouse as large as required. Flaps for gluing should be made at each end, and in the centre you will see that we have made provision for a gateway. The strip is cut in half as indicated, and allowance of 1 in. on either side made for painting a gateway. Score where the gate has to open (Fig. 4).

Measurements for making a hayrick to stand outside the farmyard are shown in Fig. 5. Cut away the waste as shown by the shaded portion. On the left section of the diagram we have marked the

letters R for the roof and S for the sides to assist with the assembly. After scoring, fold up the two outer sections, laying aside until the roof is made.

Fig. 6 shows the piece of card required for finishing the hayrick. Here

FIG 2

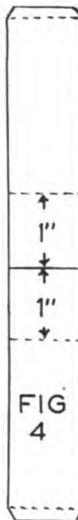
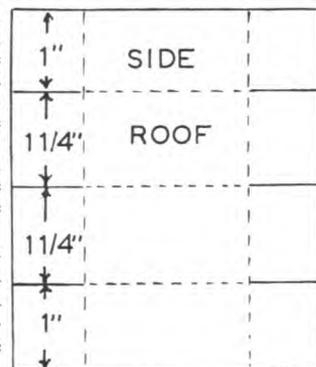
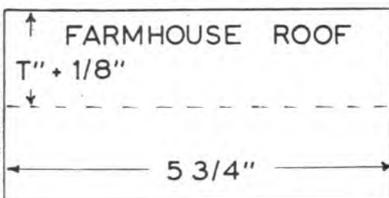
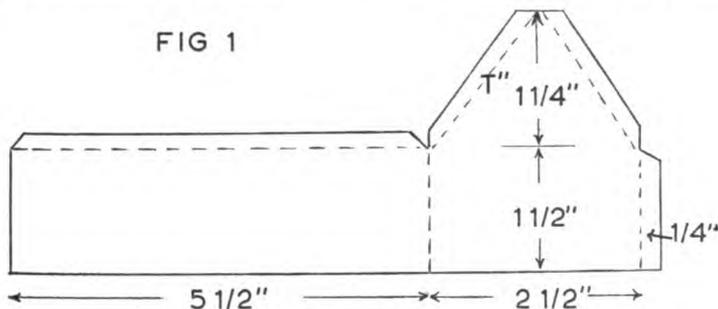


FIG 3

FIG 4

FIG 1



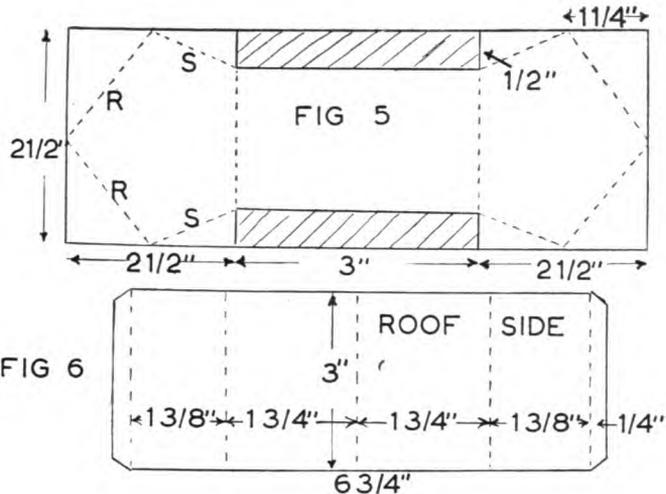
CUT TWO PIECES

you should endeavour to make the ridge a little rounded. In gluing the two sections together it is better to start on one of the two flaps from Fig. 6 to the underside of the hayrick base, proceeding around the model and ending with the other flap on the other edge

of the base. Secure with rubber bands until the glue has set.

Nowadays it seems the practice to give farmhouses a coat of cement wash and it is suggested that you tint your model with a pale stone, cream, or pink wash as required. Doors should be first pencilled in and then coloured brown, or you can stick on a piece of suitably coloured paper. The same applies to windows, but here the glass can be represented by a small piece of cellophane. The roofs should be lined in pencil to represent the slates and then given a wash of slate grey. If you wish to pebbledash the farmhouse you can first give a coat of glue followed by a dusting with fine sawdust and a final coat of colour. The chimney stack is made from a small piece of wood square section with a V cut out to fit the slope of the roof and tinted accordingly — but black at the top.

The hayrick should be coloured with a clean, pale yellow water colour, but it might be advisable first to pencil in the straw with a few lines here and there.



If you wish to make the model more realistic first cover with glue then add

some dried grass stalks, trimming away the waste with scissors.

VOLUME CONTROL FOR AN ACOUSTIC GRAMOPHONE

FOLLOWING a published query concerning the incorporation of a volume control into a spring-wound acoustic gramophone, we have received detailed information from Mr J. Williams of 5 Cambrian Place, Haverfordwest, Pems., particulars of which we are pleased to give to help any other readers with this problem. Mr Williams completed these modifications on a

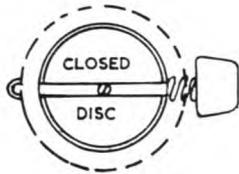
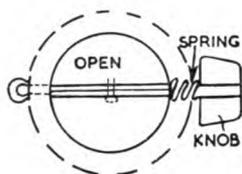
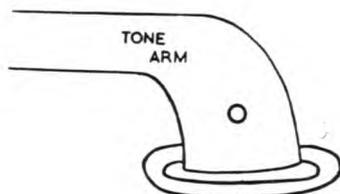
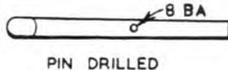
portable without an external horn. He says this method will effectively tone down the volume but will obviously not shut it off completely as the initial sound from the diaphragm in the soundbox is quite audible and is merely amplified by the horn.

The basic requirements are simple — a large split pin $\frac{3}{16}$ in. in diameter by about 2 in. long, a small piece of tin, and

a BA screw. The split pin is opened out slightly along its length so that the tin may be slipped into the slot. Next, the split pin is drilled through with a $\frac{1}{16}$ in. drill in the centre of its length (see sketch) and threaded with a No. 8 BA tap. A local garage or jeweller will do this for a small fee as taps of this size are not normally household articles.

Next the tone arm is removed from the gramophone, and a hole $\frac{3}{32}$ in. in diameter is drilled right through about 1 in. from the lower end. The small piece of tin is now made into a disc of such diameter as will just fit into the tone arm at the point where the hole is drilled through. A small hole is pierced through the centre of the disc large enough to pass the 8 BA screw through. The split pin is now passed through the tone arm, and the disc pushed into its slot inside the arm. The BA screw is threaded into the split pin, through the disc, and tightened up, thus clamping the disc tightly. A small radio knob is secured to the protruding 'open' end of the pin to enable it to be rotated. A small spring is inserted over the split pin before fixing the knob. This holds the pin in any required position. Turning the knob through 90° will either open the passage through the tone arm to the horn, or blank it off, as required.

A small nut and bolt can be substituted for the BA screw but will be found awkward to manipulate in the small space inside the tone arm. (P.P.)



AN EASY WAY FOR PICTURE FRAMING

TRY this method of making picture frames, and you will never use another. It is speedy, accurate, and practically foolproof.

You will need to make a simple jig, the size of which must bear some relation to the size of the frames to be made. That shown in Fig. 1 will be found suitable for most of the frames needed around the house. The jig is used not only for cutting the mitres accurately, but for assembling the joints. It will give long and useful service, so it is worth while making a good job of it.

The best material for the base is $\frac{3}{4}$ in. blockboard or plywood, although well-seasoned hardwood will do. Two lengths of wood, $1\frac{1}{4}$ in. square, are glued and screwed firmly to the base as shown, making sure that the angle between them is a right-angle. The space between these pieces is merely to allow the saw to pass through; its purpose is not to guide the saw. The piece screwed below the base is useful on some occasions for fixing the jig in the vice.

Fig. 2 shows the rebated, or rear side, of a length of picture moulding. At the edge of the rebate, mark off a distance $\frac{1}{8}$ in. longer than the length of the picture. Draw lines sloping outwards from these points at an angle of 45 degrees. Square these lines across the outer edges of the moulding, and draw the 45 degree lines across the front face. After marking the two long sides of the frame

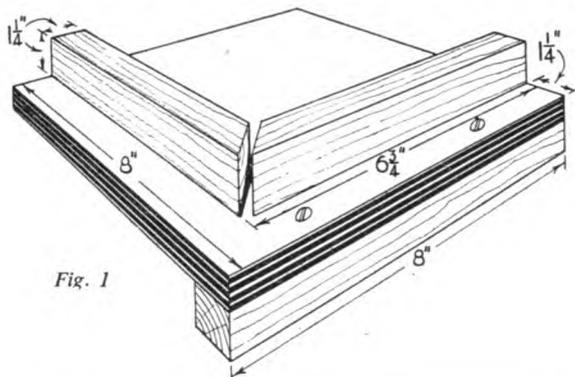


Fig. 1



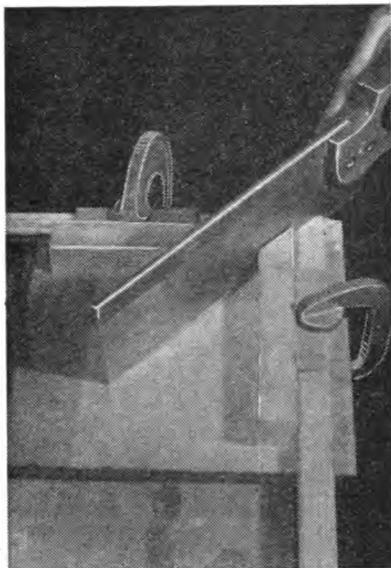
Fig. 2

in this way, mark out two pieces for the shorter sides. The distance measured along the edge of the rebate in this case is $\frac{1}{8}$ in. longer than the width of the picture.

Fix the jig in the vice, and use it to support the wood while the mitres are sawn, keeping the saw just on the waste side of the lines. Next, place the four sides of the frame in their correct relative positions and number the corresponding parts of each joint. It is very unlikely that the mitres will fit properly at this stage; this is where the jig proves its value. (If the mitres do fit, don't throw the jig away; it will still come in handy for gluing up.)

Use two G-cramps to fix two adjacent parts of the frame firmly to the jig. The two parts of the mitre should meet as closely as possible, and the moulding must be in close contact with the $1\frac{1}{4}$ in. square pieces along their full length. One method of cramping is shown in the photograph, one cramp also securing the jig to the top of the bench. A second method is to cramp the moulding to the $1\frac{1}{4}$ in. square pieces, the jig then being held in the vice. The method will depend on the section of the moulding being used.

A tenon saw is now run through the joint along the line of the mitre, thus automatically making a perfectly fitting joint. If the mitres were cut very inaccurately in the first place, a second



sawcut may have to be made. If this is the case, move along both parts of the moulding until the mitres touch again before making the second sawcut.

After treating each joint in this way, the frame is ready for assembly. (After making a couple of frames you will probably prefer to saw and glue one joint before passing on to the next.) The mitres are joined with glue and panel pins. 1 in. pins will do for small frames, and $1\frac{1}{4}$ in. pins for the larger sizes. It is advisable to drill small holes at each mitre for the pins, otherwise the wood may split at the ends. Note, however, that these holes must be 'staggered' so that the two pins at each joint do not foul one another.

To assemble the frame, cramp two adjacent sides in the jig, the two parts of the mitre being pushed tightly together. Remove one of the pieces only, apply the glue, and re-assemble in the jig. Both cramps should be fairly tight so that the moulding cannot move when the pins are driven in. Tap in both pins, and punch them below the surface. Use the same procedure for gluing up the other joints; it is quite safe to remove each joint from the jig immediately it has been glued and pinned.

Hardwood frames look well if finished with a few coats of french polish, followed by wax polish. If you make your own moulding, you may like to make the larger frames in softwood, when they can be painted to match the colour scheme of the room in which they are to hang. (K.B.)

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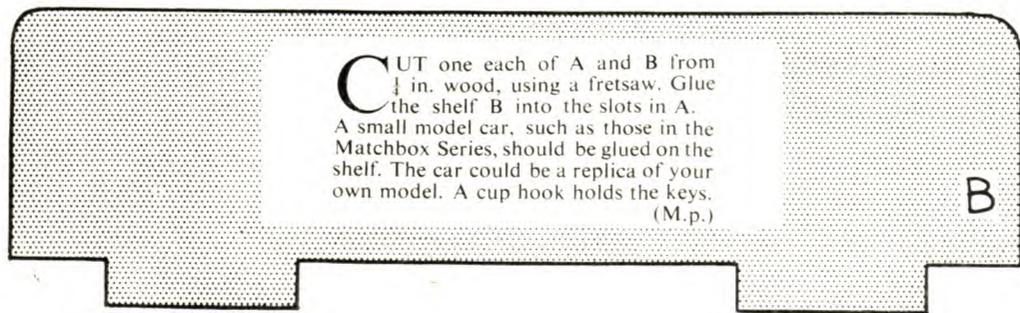
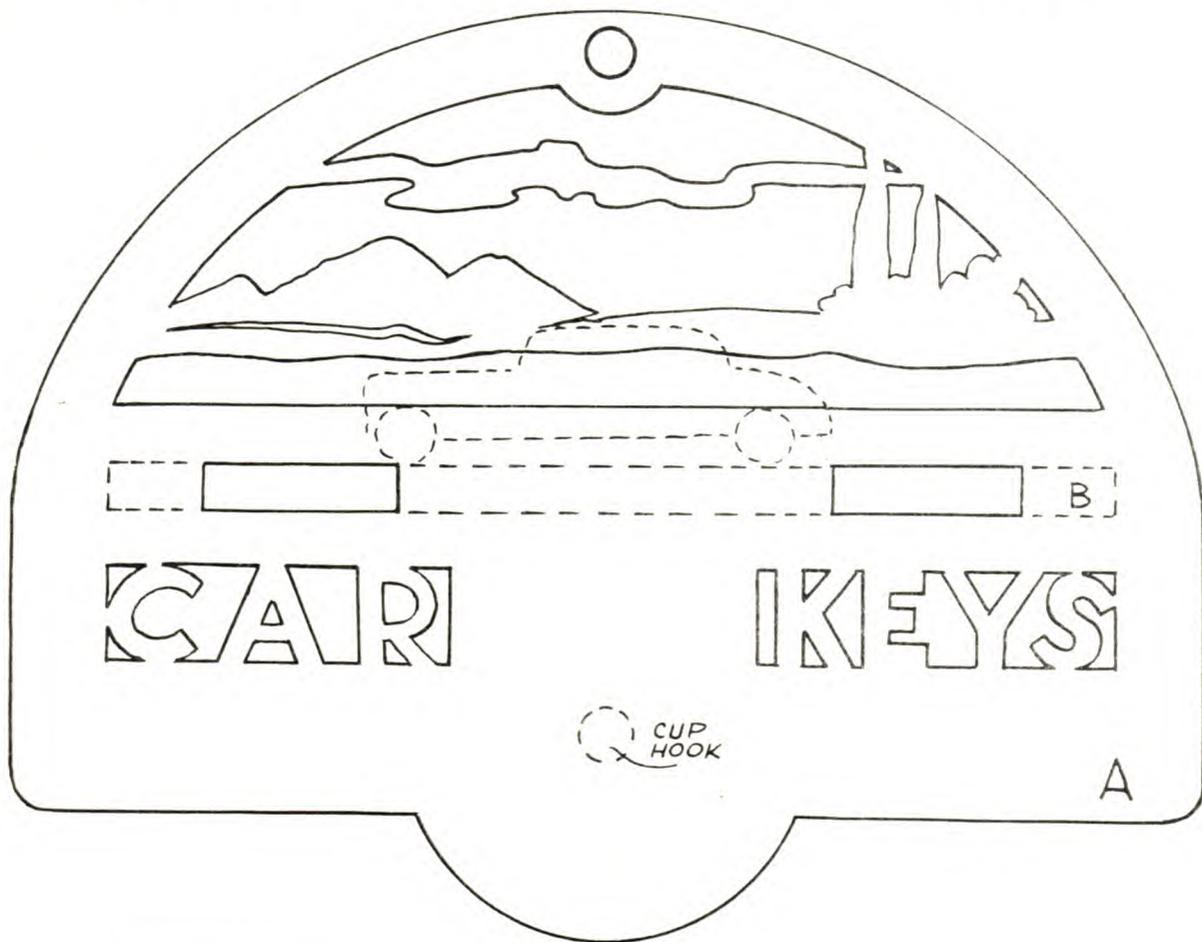
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HOBBIES LTD, Dereham, Norfolk

22nd FEBRUARY 1961

VOL. 131

NUMBER 3402

THE ORIGINAL
'DO-IT-YOURSELF'
MAGAZINE

HOBBIES *weekly*

FOR ALL
HOME CRAFTSMEN

FREE plan for making . . .

Also in this issue:

AMPLIFIER FOR
THE ONE-VALVER

COLLECTORS' CLUB

'IMPOSSIBLE'
PHOTOPRINTS

EXPERIMENTS IN
CHEMISTRY

JIGSAW PUZZLE
FOR YOUNGSTERS

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'CARISBROOKE CASTLE'

MODEL CAR-FERRY WITH TWIN SCREWS



Up-to-the-minute ideas

Practical designs

Pleasing and profitable things to make

5^D



Next week's projects will include a contemporary sideboard, games, toys and novelties, &c. Make sure of your copy.

HAVE you any stamps from the British Solomon Islands? The ½d. value of the current set depicts a Ysabel Canoe. These canoes are constructed from adzed planks. They hold up to forty men.

The 1½d. stamp shows an 'artificial island'. Many of these islands were built in former days by coastal natives on coral patches to protect themselves from the assault of bush-dwelling tribes.

The ship shown on the 6d. value is the 'Miena', a trading schooner, Cape Esperance and Savo Island are shown in the background.

Henderson Field, Guadalcanal (8d.) was the scene of hard fighting in the second world war. In 1949 the fore-runner of the regular passenger and mail



carrying air service landed there.

After the original discovery of the Solomon Islands by Mendana, the Islands were lost for nearly 200 years and were then re-discovered in 1767 by Captain Carteret in H.M.S. Swallow. You can see a chart showing the voyage of H.M.S. Swallow on the 1s. 0d. stamp.

Tinakula Volcano (2s. 0d.) is an active volcano and one of the recognized 'safety-valves' of this area where earthquakes are of frequent occurrence.

More hobbies

F. G. Moisselle, of 5 Fortfield Estate, Terenure, Dublin, is interested in foreign correspondence, stamp collecting and photography.

'My hobbies are model railways, match labels and picture cards', says Oswald Post, of Ellenhall Vicarage, Eccleshall, Stafford.

Leslie Taylor and his wife collect all labels. They will answer all letters sent to 1 Hope Street, Scarborough, Yorks.

Terry's pet kitten

Terry Barnett has a pet kitten. Her name is Fluffy. He has a tortoise, too. 'I call him Samson', he says.

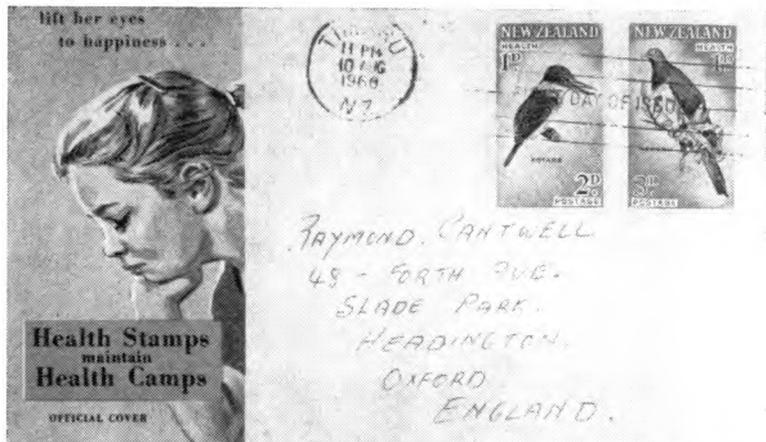
Terry is ten years old. He is proud of his school uniform — blue blazer, grey flannels, blue and grey stockings and black shoes. He collects stamps and labels. Write to 12 Railway Terrace, Wellington, Crook, Co. Durham.

Charles K. Malone, of 330 W. 95th Street, New York 25, N.Y., U.S.A., writes: 'I will swop plain or twisted silver-coated copper wire jewellery for gifts of equal value.'

STAMPS FROM THE SOLOMONS

Throughout the islands canoes are prized possessions. Many are works of art. Considerable care is taken to protect them from fierce sunshine or heavy rains. The 2d. stamp shows a canoe and the kind of house in which they are kept when not in use.

The design of the 2½d. stamp depicts in detail the ornamentation on the prow of a Roviana Canoe. In pagan days the idol at the base of the prow had considerable religious significance.



1960 Health stamps cover sent by Mr Murray Scott. Once again the design features two of New Zealand's native birds



Mrs Celia E. Dawson

Mrs Celia Dawson lives at 12 Tayles Hill, Ewell, Surrey. She is a keen stamp and label collector.

'I am a regular reader of *Hobbies Weekly* and would like pen friends from any part of the world', she says.

Amplifier for the One-Valver

THE short-wave one valve receiver described in our issue of 8th February 1961 can give good results, but some listeners may wish to add an amplifier stage. This can use a 3S4 valve, or one of its equivalents, and may be either resistance capacity coupled or transformer coupled to the detector valve.

By 'Radio Mech'

A suitable circuit for the 3S4 is shown in Fig. 1, and employs R.C.C. between valves. The 100K resistor is the detector anode load, replacing the phones. The detector screen grid is no longer run directly from the H.T. positive line, as in the one-valver, but receives current through the 250K resistor, the $.1 \text{ mfd.}$ condenser acting as by-pass to earth. The $.01 \mu\text{F}$ condenser is for coupling and should preferably be a mica type component. The $25 \mu\text{F}$ condenser and 750 ohm resistor provide automatic grid bias, so that no bias battery is needed for the output valve.

Layout and wiring

Sufficient free space was left on the one-valve chassis, so that the extra valve could be accommodated. Existing wiring in the one-valver, to detector, coil, reaction condenser, tuning con-

denser, etc. need not be changed, except to cover the items mentioned.

Underneath wiring for the receiver is shown in Fig. 2. Here, dotted lines indicate parts and connections already in the one-valver, and which do not require to be changed.

In the one-valver, a lead passed from the H.F. choke to one phone terminal or socket. This lead is detached, and instead taken to the $.01 \mu\text{F}$ condenser and 100K resistor, as in Fig. 2.

A connection also went from socket 4 of the valveholder to H.T. positive. This wire is disconnected from the H.T. positive point and taken to the 250K

resistor, and a $.1 \mu\text{F}$ condenser is connected from socket 1 to socket 4 of the detector valveholder. These details are also shown in Fig. 2.

After making these changes the new wiring shown in Fig. 2 may be completed. Note that the $25 \mu\text{F}$ condenser will have positive and negative ends, which must be connected as indicated. If this condenser has a metal body, and a metal chassis is used, contact between condenser and chassis must be prevented. This is easily arranged by winding brown paper or other insulating material round the condenser.

Note that valveholder connections in

Fig. 1—Circuit of the amplifier stage

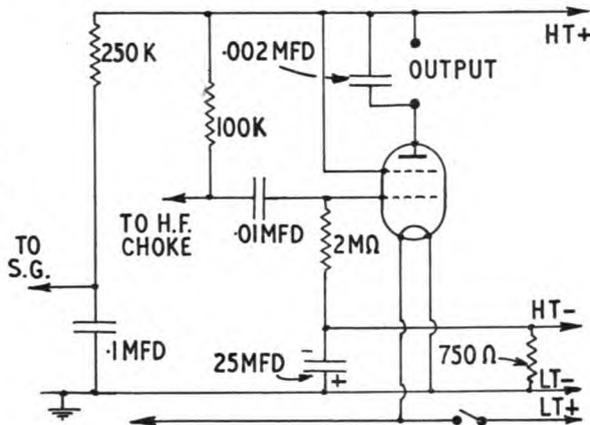


Fig. 2 are for the 3S4 type of valve. The original 1S5 is retained for detector. Other valves may, of course, be used, but socket connections may be different.

Using the receiver

When wiring is completed, the receiver can be used exactly as already described, but signals will be at considerably greater volume. The same battery supplies may be retained; that is, a $1\frac{1}{2}\text{V.}$ dry battery for low tension, and a $67\frac{1}{2}\text{V.}$ battery for high tension. More than $1\frac{1}{2}\text{V.}$ must never be used for low tension.

If a loudspeaker is to be operated, it must be coupled to the receiver by means of an output transformer. Some speakers have this transformer fixed to them. If so, a further transformer is not needed. But if the speaker is a unit without transformer, the transformer is absolutely essential. It is connected as shown in Fig. 3. That is, primary to receiver, and secondary to speaker unit. For the usual 2-3 ohm speaker, the transformer should have a ratio of about 50:1 or 60:1 for best results. Such trans-

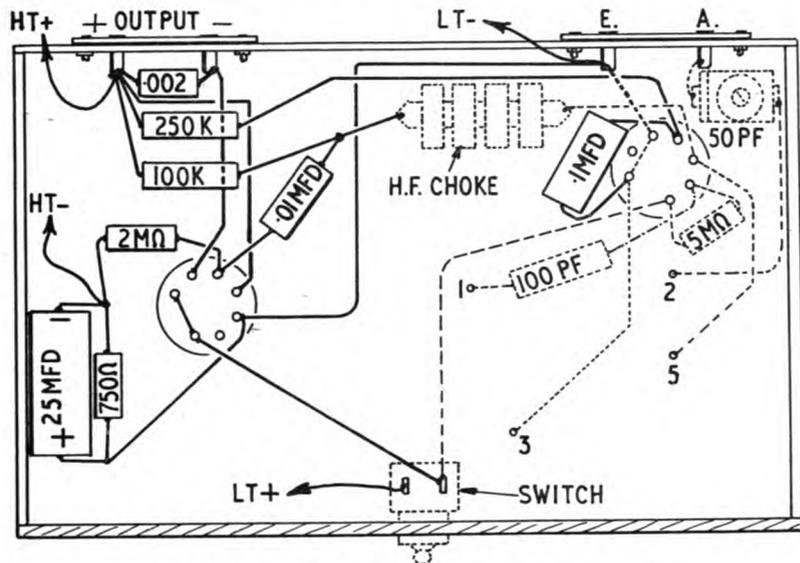


Fig. 2—Wiring and components in the amplifier stage

formers are sometimes called 'battery pentode output transformers'.

The size of speaker used is not important, but it should be of reasonable size. A 4½ in. to 8 in. unit will be most generally satisfactory. It should be mounted in a cabinet.

For long-distance reception, many S.W. listeners prefer to use headphones. If phones are to be retained, they are simply plugged into the output sockets (Fig. 2.)

Intervalve transformer

The experimenter may wish to try

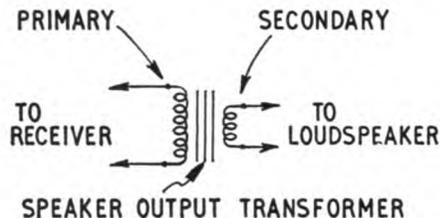


Fig. 3—How a loud-speaker is connected

other circuits, or use a transformer for coupling between valves. A transformer will give a little more volume than R.C.C., provided it is a component actually intended for such purposes. That is, it should have a step-up ratio of about 1:3 to 1:5, and be intended for 'intervalve coupling'.

If it is a parafed transformer, remove the 2 megohm resistor in Figs. 1 and 2. Wire transformer primary to $\cdot 01\mu\text{F}$ condenser, and transformer secondary to valve grid, socket 3, Fig. 2. The

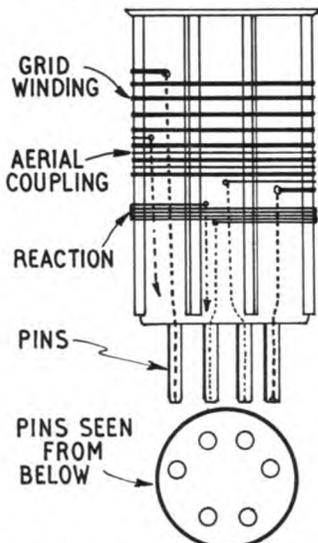


Fig. 5—Making plug-in coils

$\cdot 01\mu\text{F}$ condenser is no longer connected to socket 3. The remaining primary and secondary tags on the transformer are now wired to the H.T. negative line.

If the transformer is for direct coupling, remove the 250K resistor, 100K resistor and 2 megohm resistor, and also the $\cdot 01\mu\text{F}$ and $\cdot 1\mu\text{F}$ condensers. Wire the transformer primary from H.F. choke to H.T. positive. Connect the detector screen grid (socket 4) directly to H.T. positive, as in the one-valver. Connect the transformer secondary to output valve grid (socket 3) and H.T. negative.

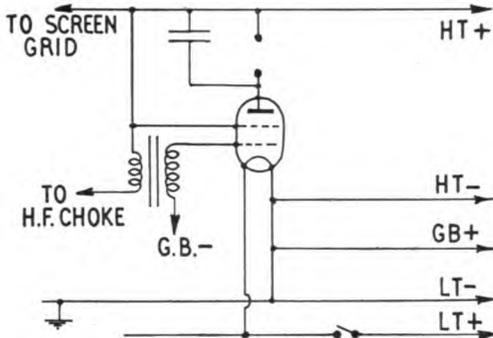


Fig. 4—Transformer coupling and battery bias

When using a direct coupling transformer, it will be observed that the primary simply replaces the headphones. When using resistance capacity coupling, or a parafed transformer, it will be noticed that the 250K resistor and $\cdot 1\mu\text{F}$ condenser also have to be included. This is to keep the screen grid voltage of the detector lower than the anode voltage, because of the 100K anode resistor introduced for R.C.C.

Battery bias

If battery grid bias is preferred, this is easily provided. Omit the $25\mu\text{F}$ condenser and 750 ohm resistor, and wire H.T. negative directly to the earth line, as in the one-valver. Connect grid bias positive to H.T. negative. With R.C.C., take a lead from the 2 megohm resistor to grid bias negative. If a transformer is used, connect the secondary to grid bias negative. Use about 4½V. bias, but adjust the figure to that giving best reception. Less than 3V. bias should not be used.

Direct coupling, with battery bias, is shown in Fig. 4. Very few components are needed for this addition.

Plug-in coils

Plug-in coils may be used with either the one-valver or two-valve receiver, so that other wavebands can be tuned. Ribbed ebonite formers, ready equipped with pins, may be purchased, and a 6-pin coil former of this kind is shown in

Fig. 5. These coils are inserted in a 6-pin holder.

If two or more old valves with bakelite bases are available, they can be used for plug-in coils. Ebonite or paxolin tubes should be cemented to the bases, so that the coils can be wound. The finished coils are then plugged into a valve-holder.

The fixed coil in the one-valver should be removed, and the coilholder or valveholder is fitted in its place. The various leads which originally went to the fixed coil are then connected to the holder sockets. Remember to keep all connec-

tions as short and direct as possible.

The ends of the various coil windings are then taken down inside the coil former and soldered to the pins. Wire up in such a way that connections are correct when the coil is inserted, and take care to make pin connections the same for all the coils, so that any coil can be placed in the holder.

With old valve bases, heat the end of each pin with a soldering iron, and clean out the pin with a piece of stiff wire. With plug-in coil formers like that in Fig. 5, simply take the coil leads down through the pins, solder at the tip, and cut off excess wire.

In the one-valver, grid windings and a reaction winding were used, with the aerial taken to a tapping on the grid coil. In Fig. 5, a separate aerial coupling winding is shown. This winding may also be used for anode coupling, if a radio-frequency stage is eventually added before the detector.

Referring to Fig. 5, connections for the various windings are as follows: *Grid winding*, top to fixed plates of tuning condenser and bottom to earth line; *Aerial coupling winding*, top to aerial condenser (50pF pre-set) and bottom to earth line; *Reaction winding*, top to fixed plates of reaction condenser and bottom to detector anode (socket 5).

Coils can be wound as described below. For most purposes, two or three coils will allow all the most popular

short-wave bands to be covered. There are occasions, however, when it may be desired to tune other bands, such as the 160 metre amateur and shipping band, so winding details for these are also included. The wave-length coverage given is for formers about $1\frac{1}{4}$ in. to $1\frac{1}{2}$ in. in diameter, tuned with a 150 pF variable condenser. If the coil diameter, tuning condenser capacity, or number of turns should be modified, results will be just as good, but the wavebands covered will be somewhat different.

14-28 metres
Grid 7 turns 20 S.W.G. Aerial 3 turns.
Reaction 5 turns.

20-40 metres
Grid 12 turns 20 S.W.G. Aerial 7 turns.
Reaction 9 turns.

35-70 metres
Grid 20 turns 20 S.W.G. Aerial 9 turns.
Reaction 14 turns.

55-125 metres
Grid 34 turns 24 S.W.G. Aerial 12 turns.
Reaction 20 turns.

80-200 metres
Grid 50 turns 24 S.W.G. Aerial 15 turns.
Reaction 30 turns.

The gauge of wire used for aerial and reaction windings is not very important, anything from about 32 to 26 S.W.G. being satisfactory. About $\frac{1}{4}$ in. clear space should be left between grid and reaction windings.

It is usual to space the turns of the smaller grid windings a little from each other to reduce stray capacity. The windings on the larger coils and reaction windings have turns side by side to save space. Insulated wire is then required, but bare wire is satisfactory for spaced windings. A very small drill should be used to make holes for the ends of the windings, which are drawn down through the pins and kept tight before soldering.

Using a 90 V. battery

Some constructors may wish to use a 90V. H.T. battery to obtain maximum possible volume. The screen grid of the 3S4 should not receive more than about 67½V. If a 90V. battery is used, disconnect socket 4 of the 3S4 holder from the H.T. positive line, and insert a 15K resistor between this socket and H.T. positive. A .5µF 250V. condenser is then wired from socket 4 to the earth line. This will reduce the screen grid voltage, while allowing the full 90V. to be applied to the anode and resistors in the detector circuit.

Plug-in coil formers, etc, may be obtained from Home Radio (Mitcham Ltd, 187 London Road, Mitcham Surrey.

A further article will give full details for erecting short-wave aerials and providing earth connections.

HOW TO CRYSTALLIZE GLASS

NO doubt many readers have seen what is known as 'crystalline glass', with its beautiful leaf-like tracery similar to that produced by frost on a window pane. It is not generally known that this glass can very easily be produced.

Here are instructions which will enable anyone to make it for themselves. There are numerous purposes for which it will be found useful, such as for glazing bathrooms, conservatories, and for windows on landings. Or, in fact, any position in which a glass is required which will give a good light without being clear enough to see through. It can also be made into a pretty photo frame, or a handsome fire screen.

The process of crystallizing is as follows. Procure from your local glazier a piece of what is known as 'ground glass', of the required dimensions. This is ordinary window glass which has been roughened on one side by the sand-blast process. If there is any choice always select the coarsest grinding, as this will give the brightest pattern.

First wash the glass carefully, putting some soda into the water so as to thoroughly remove the grease, as that would be fatal to the process. It is best not to touch the ground surface with the bare hand, as even finger marks will sometimes spoil the effect.

Now get some good Scotch glue. Break it up small and soak it in water for eight to twelve hours, or until it is completely saturated. Pour off the super-

fluous liquor, and put the glue into an ordinary glue pot to melt down. If you have not got a glue pot, melt the glue in an earthenware jar standing in a saucepan of hot water. When it is of the consistency of syrup, put a fairly thick

crystallize, and still show the ground surface, it is probably caused by the glass not having been properly cleansed before treatment. These parts can again be coated with the glue (after thoroughly washing them with soda water as before) and left to crystallize again. It should be borne in mind, however, that the second treatment will break up the pattern much smaller than before, so if possible it should not be resorted to, as it will make the panel thinner and therefore more liable to break.

The glass must finally be washed in hot water to clean off what little glue adheres to it. It is then ready for fixing into position.

If it is intended for a bamboo fire-screen, it would be a good plan to procure a reproduction of some work of art and fix it in the framework.

This crystalline glass can be made into pretty photo frames. The glass must of course be ground with the opening for the photo left clear. Any glass merchant could do this for a small charge.

The frames can be made in many shapes—circular, octagonal, horse-shoe, or other designs—and can have openings for as many photos as desired. In crystallizing them, the glue must be spread over the ground part only, and it should be thinned down around the edge of the opening, otherwise the edge would be irregular.

A most brilliant effect is given by covering all the crystalline part with gold leaf or gold, silver, and aluminium paint.

By Lester Smith

coating of it all over the ground side of the glass. There is no need to get this smooth, as it is better for it to be uneven rather than too smooth.

The glue must now be left to dry naturally, without the application of heat, for about twenty-four hours, until a finger-nail will leave no mark on it. It should then be subjected to a dry heat. The best plan for the amateur is to place it before a good fire, changing its position at intervals so that each part is properly warmed.

This will cause the glue to contract and crack, and as it peels off it will bring with it chips of the glass, leaving the bright 'crystalline' effect from which the process is named.

Should any part of the glass fail to

Printing 'Impossible' Pictures

LAST week we discussed several methods of making a suitable pen sketch for our supplementary negative, and we are now confronted with the task of making the negative itself. Since we are handling black and white material any usual type of film will be suitable providing we can rely on it to produce a dense black ground with a clear image. If the camera is used you may pin the drawing to the wall, setting the camera up centrally and ensuring that it is perfectly square. A supplementary lens will prove helpful for getting nearer to the sketch which should be illuminated with artificial light from both sides, using lamps of equal intensity.

An alternative method is to use the enlarger for making the copy negative, when you are advised to use slow process sheet film, for example Commercial Ortho.

The drawing is laid on the enlarger baseboard, and a piece of sheet film inserted in the negative carrier while the drawing is illuminated for the necessary period. It is advisable to test this exposure, since conditions will vary considerably, but as a guide two to four seconds is sufficient when using a 100 watt lamp. Incidentally, you should 'bandage' the slot where the carrier fits to avoid stray light from fogging the film.

Processing is as usual, but since it is essential to produce a 'contrasty' negative as possible, you must allow full development time. If the background is on the thin side there is the danger that it will permit a little light to penetrate during the second printing, with consequent depression of the highlights of the first printing. This does not matter a

By S. H. L.

great deal in some instances for we can compensate by reducing the exposure time of the genuine negative, but at the same time it is advisable to aim at a 'contrasty' negative. If the clear areas in the copy negative are in any way veiled or shadowy you may clear this in a ferricyanide bath.

You will find that cloud negatives of all kinds will make ideally unobtrusive backgrounds for almost any type of picture. Pictorial shots can be improved by the addition of trees or foliage, and this is where you can exercise your own artistic skill. At the same time we cannot overlook the possibility of combining any type of picture with one of our prepared negatives and quite often it is possible to make a light toned print from a genuine negative, overprinting with the new one.

The effect is sometimes further enhanced if the original is a little softer by printing just out of focus. Good cloud effects can be transformed into night skies by overprinting.

We will now assume that you have two negatives ready for making a picture. In the one illustrated, a test exposure was made for the cloud negative which provides the background. A sheet of paper was exposed for 2½, 5, 7½, 10, 12½, and 15 seconds, achieved by holding a card over the paper and mov-

ing each 2½ seconds. The paper was developed for 2 minutes, fixed, and the result examined to determine the most effective tones. Now observe this departure from usual test methods. Having determined that 7½ seconds was correct, a second exposure for this time was made on a new piece of paper with the same cloud negative. The latter was then changed for the new one, adjusted and re-focused as required to fit the new picture, and further test exposures made on the paper. The latter should be laid aside in a lightproof envelope while adjusting the second negative or it may become fogged, but on replacement it is subjected to the same exposures as before.

The reason for this method of test might be obvious when we explain that the first exposure has already provided one, two, or more degrees of tone to the paper, and it may only be necessary to give a short exposure to add the balance. If the prepared negative is given different exposure times as suggested, and the test print carefully examined, you will be able to determine the correct timing for this second exposure. You will also see differing degrees of tone, and it is up to you to decide the correct one.

Note the following important points. In both instances the development must be for the same time, i.e. 2 minutes in the same solution at the same temperature, and it is wise to make a note of the exposure times for both the cloud and prepared negatives.

With these tests completed you are able to make your picture, giving the cloud negative the prescribed time and then the second negative, developing for two minutes.

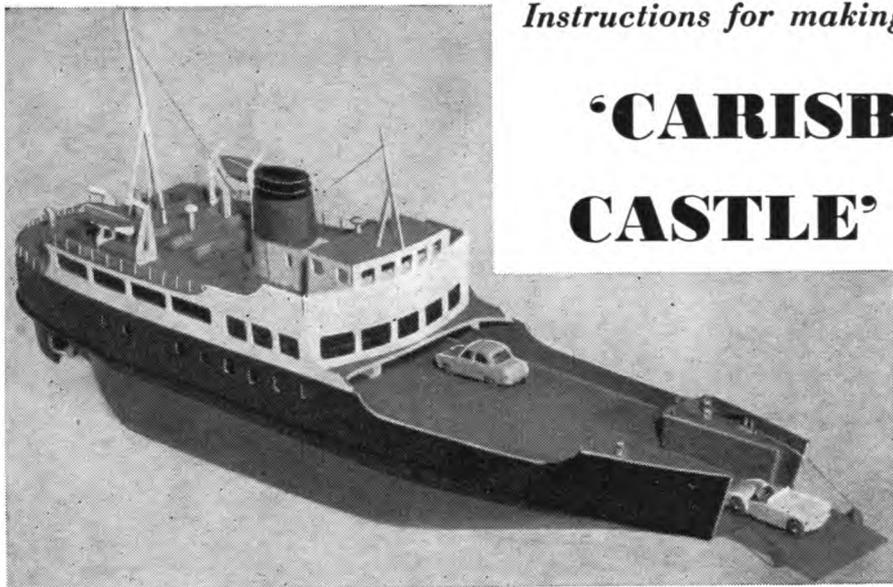
There is nothing difficult in this process, but it is extremely fascinating, and will introduce new ideas for exploring your hobby. Flowers, reeds, and grasses can be treated similarly, giving the illusion of a picture taken in the shade against a sunlit background. Statues and buildings can be similarly treated, or you can introduce boats in your seascapes.

The flying birds are a good example, and although a popular subject for artists it is probably impossible to obtain similar shots by normal photography.



'CARISBROOKE CASTLE' FERRY

MODEL CAR-
CARRYING
FERRY-BOAT
WITH TWIN
PROPELLERS



THE 670-ton ferry-boat 'Carisbrooke Castle' can carry up to forty-five cars, coaches and lorries, and is in service between Southampton and Cowes, Isle of Wight. It has twin screws powered by diesel engines, and was designed and built by John I. Thornycroft Ltd. at Southampton, to whom we are indebted for particulars in

making this model. The overall length of the boat is 191 ft., and she has a breadth of 40 ft.

Our model is to a scale of $\frac{1}{8}$ in. to 1 ft., which is a true scale above the waterline, but slight modifications have been made below the waterline to give increased accommodation for batteries, motors, and other equipment if re-

quired for radio control. The model is 2 ft. long with a $5\frac{1}{2}$ in. beam, and is very suitable for the Matchbox series of cars. It has a working ramp which can be lowered for loading the cars which run straight into their berths.

Propulsion for the model is obtained by use of electric motors, one of which is recommended for each propeller working from a flat $4\frac{1}{2}$ V. pocket lamp battery for each motor. Switching can be arranged according to requirements. Motors, propellers, and model cars, etc. are not included in Hobbies kit, and modellers should also ensure that the propellers obtained have a left-hand and right-hand action.

Because of limitation of space on our plan, all the parts which go to make up the boat are scaled down to half size, and must be marked out, using the scale on the plan. Full size plans are available from Hobbies Ltd., Dereham, Norfolk, price 5/-.

Having marked out all the parts from the plan on to their appropriate thicknesses of wood, we are now ready to start cutting and assembling. Cut each part as it is required in the following instructions, checking for size beforehand. For a working model of this nature, waterproof glue will, of course, be used throughout.

First of all cut out pieces 1 and 2, and glue them together, as shown in Fig. 1, with the keel (1) between the two pieces of the hull. Carry on by adding pieces 3 to 9 in numerical order, as shown in Fig. 2. Pieces 10 are not added until after the hull has been shaped. The propeller shafts go between the pieces 8A

Fig. 1

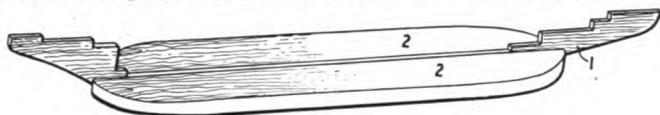


Fig. 2

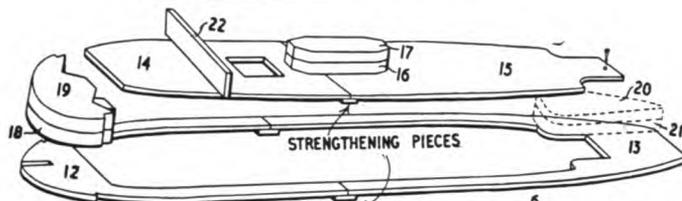
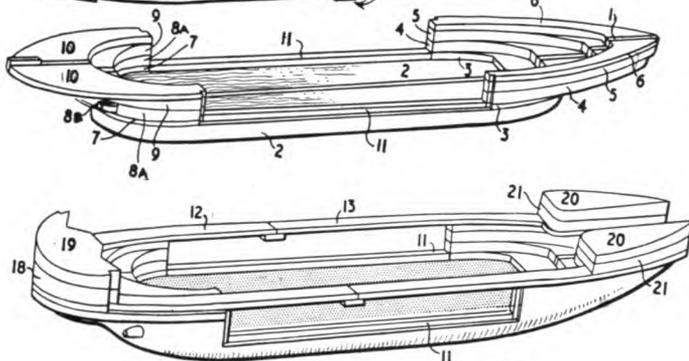


Fig. 3



and 8B, and the gaps may be filled with plastic wood.

The hull should now be rounded, shaping away excess wood until the 'steps' disappear. This will give the correct shape of the hull without resorting to the use of sectional templates. When finished, the sides should, of course, be symmetrical.

With the shaping satisfactorily completed, pieces 10, 11, 12, and 13 can be added, as shown in Figs. 2 and 3. It will be noted that pieces 12 and 13 are shown as being cut separately, and subsequently joined by strengthening pieces. However, if you are using your own materials, this portion can be cut from one single piece. It should also be noted that pieces 14 and 15 are those pieces cut out from the centres of pieces 12 and 13. The hole in piece 14 is altered to suit size of motors used.

Continue work on the model by adding pieces 18 to 21, as shown in Fig. 3. Pieces 20 and 21 are glued together and shaped to the section shown on the plan. The superstructure is removable from the hull for the

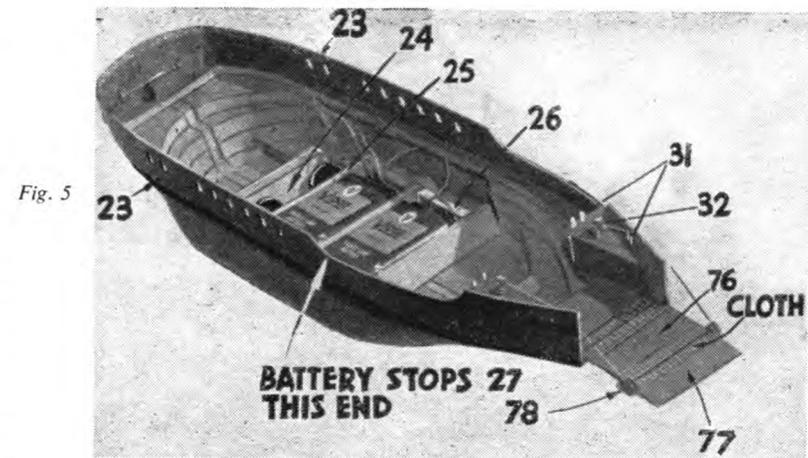


Fig. 5

purpose of getting at the interior, and will later be built up upon pieces 14 and 15.

Fig. 4 shows how the skin (pieces 23) is added to both sides of the hull. These are glued and temporarily pinned if

together pieces 14 and 15 by a strengthening piece of waste wood, and then add pieces 16, 17, and 22, as shown in Fig. 2. Their relative positions are shown by dotted lines on the plan. Next glue pieces 30 to pieces 22 and 17, as shown in Figs. 6 and 13. The position of piece 22 dotted on pieces 30 and 14 give the exact position for gluing.

To pieces 30 add pieces 35, 36, 37, and 42, which are spacers between the two

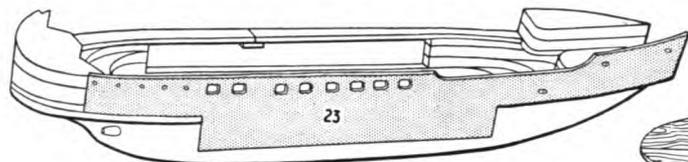


Fig. 4

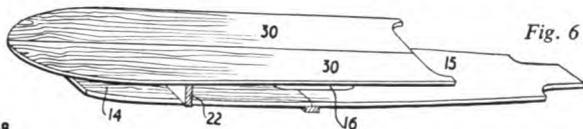


Fig. 6

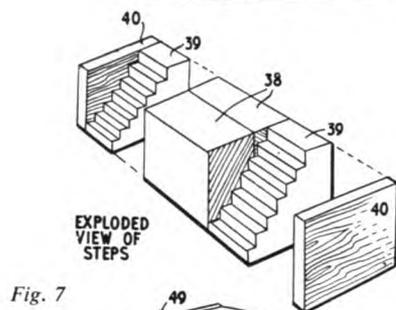


Fig. 7

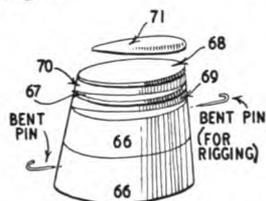
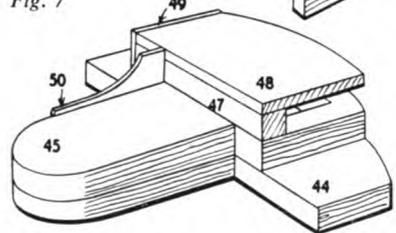


Fig. 8

necessary, while giving time for the glue to set, later withdrawing the pins.

The next stage is to add the battery partitions and motor support (pieces 24, 25, 26) inside the hull, as seen in Fig. 5. The battery stops are merely to hold the batteries in position. The size of the motor support (piece 24) should be adjusted according to the motors to be used, but the positions of the holes for the propeller shafts will remain the same.

As a start to the superstructure, join

decks. Glue the boat deck (piece 43) on top of these with the forward edge level with piece 42. Continue by adding steps 38, 39, 40, and pieces 44 and 45, etc., as shown in Fig. 7. Cut and glue together the pieces which form the funnel, which should be shaped as shown in Fig. 8. Note that the rigging is tied to staples made from fretpins, two of which are shown in the detail. Pieces 46 and 51 are added now, their positions being seen in Fig. 13. Piece 51 will bend easily if one side is brushed with hot water.

The details such as bollards (31), winches (32), vents (34), boats, davits, seats, lockers, etc., are now made up, and added to the superstructure. Their details are shown on the plan with exact positions indicated by dotted lines. The boats are secured to the davits by

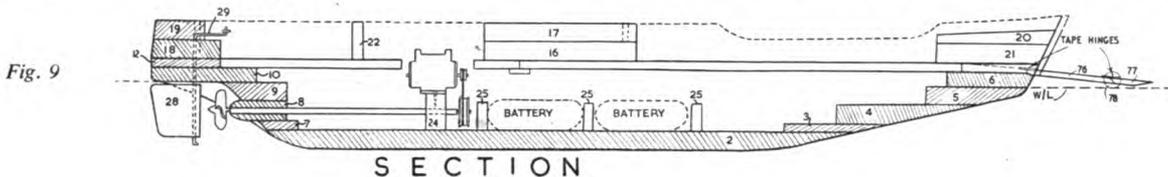


Fig. 9

SECTION

pieces of thin wire. Drill a hole in each end of the boat, pass a piece of wire through, and twist round the davits.

The loading ramp at the bow is formed from pieces 76 and 77, which are shaped and hinged with cloth in position, as shown in Fig. 5, and in the section (Fig. 9). Piece 13 is chamfered to fit the hinged sections, which enable the ramp to be raised to make a tight fit between

the bulwarks. The two pulleys 78 have a small wedge of waste wood glued on the inside to prevent piece 77 from falling down when the ramp is up. A detail of the open ramp is seen in Fig. 14.

The makeup of the twin rudders is shown in Figs. 9, 10, and 11. Fig. 10 shows their position, and Fig. 11 the construction and fitting together.

Railings can be made up from pins

painting. Below the waterline should be red, followed by black for the rest of the hull. The deck surfaces and interior are painted grey, and the superstructure yellow. The funnel is red, tipped with black, and lockers grey. The boat davits should be white, and the lifeboats topped with green to indicate tarpaulins. The seats, B/B, 52, 53, 54, 55, and 56 are light brown.

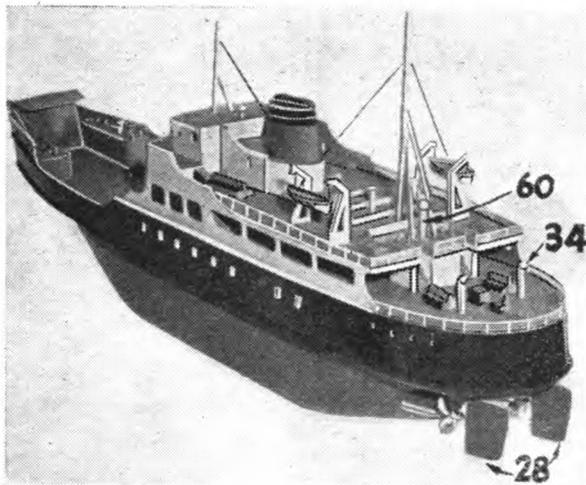


Fig. 10

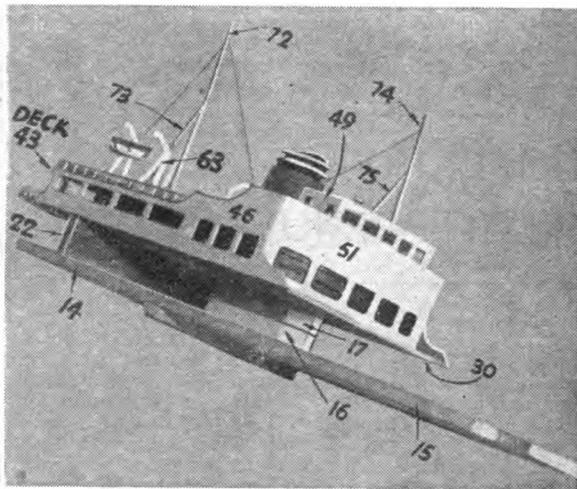


Fig. 13

CONNECTING LINK

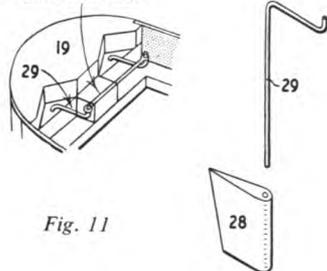


Fig. 11

and cord, or quite a satisfactory job can be made from cord wrapped round a piece of card, and brushed with clear dope which sticks the cord together and stiffens it. Fig. 12 shows how this is done. Finally add the $\frac{1}{16}$ in. square balsa strips along the sides, as indicated on piece 23.

Clean up the model thoroughly before

Now test the model for buoyancy with the batteries, motors, and other equipment in position, adding ballast to bring the boat down to the exact waterline. Lead airgun slugs make suitable ballast.

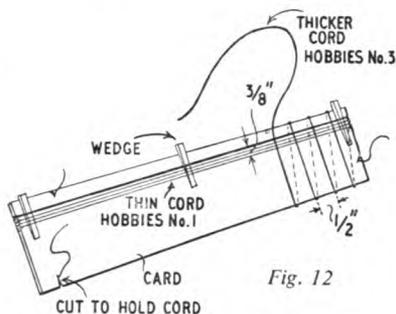
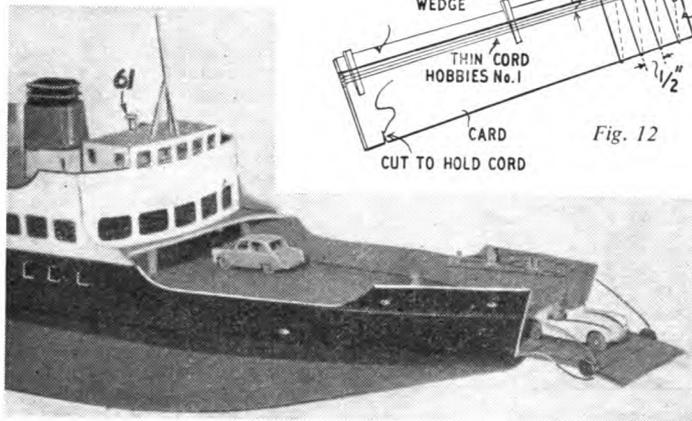


Fig. 12

Fig. 14



Kit for 38/6

Hobbies Kit No. 3402 for making the Model Car-Ferry 'Carisbrooke Castle' contains all the necessary panels of wood in their planed thicknesses, plywood, stripwood, wire, cord, nails and screws, etc. Also included is a full-size plan. Kits from branches, etc. or by post from Hobbies Ltd., Dereham, Norfolk, price 38/6.

A full size plan and printed instructions, if required separately, costs 5/-.

CHEMISTRY AT HOME

THE smell of phenol, $C_6H_5.OH$, is familiar to all who have used carbollic soap, for this has a small proportion of phenol added to act as an antiseptic and disinfectant. 'Carbollic acid' is the popular name for what chemists call phenol.

EXPERIMENTS WITH PHENOL

Phenol consists of white crystals. Both it and its concentrated solution are corrosive to the skin. Hence care should be taken not to touch it with the fingers. Use a spatula to handle the solid. Should any come in contact with the fingers, do not rinse with water. Instead, wipe off with a cloth moistened with methylated spirit, follow up by swabbing freely with meths., and then dry with a cloth.

Coal tar, which yields so many vital chemicals, is also the source of phenol. Not only is phenol used in medicine as an antiseptic and disinfectant, but also for the preparation of aspirin and phenacetin, salicylic acid, dyes, plastics and explosives.

Keep your stock of phenol in a well closed bottle covered with black paper. Light and air cause it to turn pink.

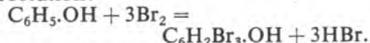
Phenol is not very soluble in water, H_2O , yet its behaviour with a small

quantity of water may lead one to think it is. Put 1 gram of phenol into a test tube and add 0.2 c.c. of water. A liquid forms and the crystals disappear. This seems to indicate that the phenol has dissolved. Actually the water has dissolved in the phenol.

Now add a further 0.8 c.c. of water and stir the mixture with a glass rod. Two layers now form and will not mix. The upper layer consists of a solution of phenol in water, the lower of water in phenol. Add 15 c.c. of water and mix again. The layers disappear and an even solution of phenol in water forms.

This solution may be used to try out some of the reactions of the substance. To a little of it add a few drops of ferric chloride solution, $FeCl_3$. A violet coloration appears.

To another portion of phenol solution add bromine water, Br_2 . A white precipitate of tribromophenol, $C_6H_2Br_3.OH$, forms and hydrobromic acid, HBr , is left in solution:



Add a few drops of ammonia, NH_4OH , to some phenol solution, then a few drops of either sodium hypochlorite solution, $NaClO$, or of bromine water. Warm gently. A blue colour forms. On now adding dilute hydrochloric acid, HCl , the blue is replaced by a red colour.

Liebermann's reaction is especially interesting. To about 1 c.c. of strong

sulphuric acid, H_2SO_4 , in a test tube add a particle of sodium nitrite, $NaNO_2$, about the size of a pin head, then a rather larger particle of solid phenol. Warm gently. A deep green or blue colour appears. Allow to cool and pour the mixture into water. The colour changes to red, but on adding sodium hydroxide solution, $NaOH$, the colour reverts to blue or green. Take care when

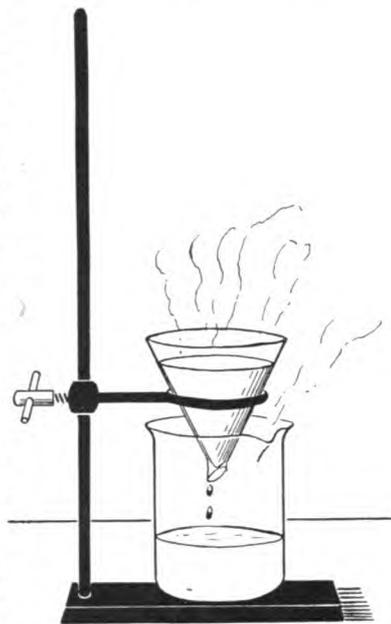


Fig. 2—Funnel adapted for rapid hot filtration

using strong sulphuric acid, for it is corrosive to the skin. Any on the fingers should be flushed off with water and wet sodium bicarbonate, $NaHCO_3$, applied.

Among the many useful substances for which phenol is the raw material, plastics are naturally important. Two of these are easily made in the home laboratory.

Intimately mix by grinding in a mortar 1 gram each of phenol and hexamethylene-tetramine, $(CH_2)_6N_4$. Heat the mixture in a crucible, but gently, so as to avoid charring. A yellow mass results, which may be moulded while warm.

Repeat the experiment using the same quantities of phenol and urea, $NH_2.CO.NH_2$. This time ammonia, NH_3 , is given off, the mixture becoming very fluid and on cooling yielding a soft olive-coloured plastic, which becomes hard and brittle on standing for about half-an-hour.

A most interesting illustration of the value of steam distillation may be seen with two phenol derivatives. When phenol is acted upon with dilute nitric acid, HNO_3 , a mixture of ortho- and

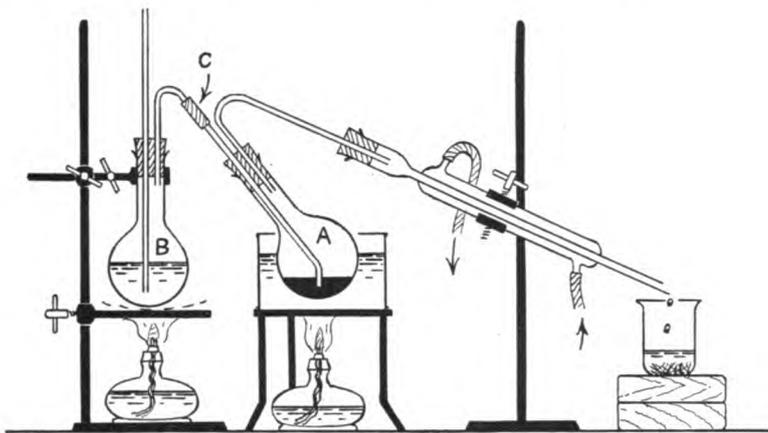
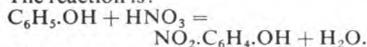


Fig. 1—The steam distillation apparatus

para-nitrophenol results. These two compounds have the same essential formula, namely, $\text{NO}_2\text{C}_6\text{H}_4\text{OH}$, but differ in their molecular structure by having the NO_2 group differently positioned in the molecule. This slight difference makes a big difference in their properties. Ortho-nitrophenol is bright yellow, melts at 46°C , has a strong, peculiar odour and is volatile with steam, whereas para-nitrophenol is almost colourless, melts at 112° , has only a faint odour and is non-volatile with steam.

This difference in steam volatility gives us a means of separating them.

The reaction is:



Mix 8 c.c. of strong nitric acid (caution: corrosive; any on the fingers should be treated as for sulphuric acid) with 30 c.c. of cold water in a 100 c.c. round bottomed flask. Stand the flask in cold water.

Warm 5 grams of phenol with 1 c.c. of water until a liquid results. Let it cool by

means of a dropping funnel or of a medicine dropper (a drawn out glass tube fitted with a rubber bulb similar to the old fountain pen filler) add it one drop at a time to the dilute nitric acid, swirling the flask so as to mix thoroughly. By means of frequent thermometer tests ensure that the temperature does not rise above 30°C . The bath of cold water will assist here.

When all the phenol has been added, let the mixture stand overnight. The mixture is now dark brown and a brown oil has settled to the bottom of the flask. This oil contains the nitrophenols and resinous matter.

Pour off the upper liquid, add 40 c.c. of warm water and swirl to wash the oil. Repeat this twice more and then pour off the water. Rig the apparatus shown sectionally in Fig. 1, pouring the oil into flask A, which is fixed in the water bath. Boil the water in flask B. The yellow ortho-nitrophenol distils over with water into the beaker. If it tends to solidify in the condenser, temporarily run the water

out of the condenser, when the solid will melt and flow out. When no more solid collects in the beaker, stop the distillation and at once disconnect the rubber tubing shown at C. Unless this is done the contents of A will flow into B. Remove the ortho-nitrophenol to a tile to dry.

The para-nitrophenol remains in the oil and condensed water in flask A. Cool the flask in cold water for an hour or two. Filter off the crude para-nitrophenol, rinse the flask well, put back the para-nitrophenol, pour in a mixture of 2.8 c.c. of strong hydrochloric acid, HCl, (caution, corrosive; treat any on the fingers as for sulphuric acid) and 50 c.c. of water and add 0.5 gram of animal charcoal. Heat the flask in a boiling water bath for half-an-hour and filter hot through a funnel whose stem has been cut off so as to prevent premature cooling and crystallization (Fig. 2).

The para-nitrophenol separates in needles as the solution cools. After standing some hours filter off the solid and dry it on a tile.

Novelty: The Shy Young Lovers

THE laws of magnetic attraction and repulsion may be charmingly illustrated with an easily-made toy novelty. Jack and Jill, a pair of shy lovers, will never actually look one another in the eyes, but Jack will not hesitate to steal a sly glance at Jill when her back is turned.

To make the toy you will need half a dozen stout darning needles, two tall corks, two slices of $1\frac{1}{4}$ in. diameter cork,

and a pair of portrait faces of two young lovers, which may be cut out from an advertisement picture in a magazine.

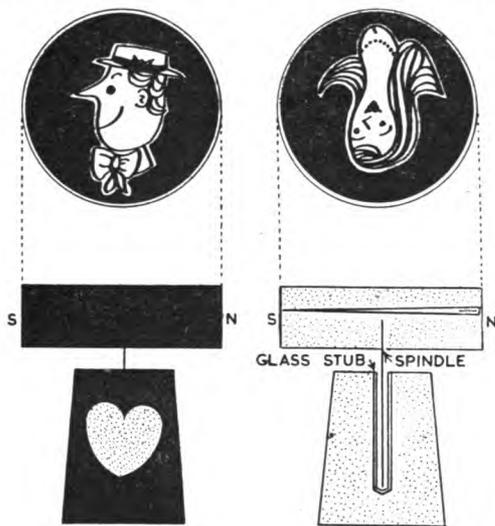
Magnetize four of the needles by stroking them from 'point to eye' with the south pole of a powerful bar magnet. Before each subsequent stroke remember to lift the magnet well clear of the needles. Prepare two $\frac{1}{4}$ in. thick identical slices of $1\frac{1}{4}$ in. diameter cork. Force a pair of the magnetized needles right across the middle of each cork, from side to side. Make sure that each pair of needle magnets are matched exactly along side one another. Trim off the projecting ends of the magnets, using pliers, so that the needles will be completely concealed inside the corks.

Use the two tall corks, which should be approximately $\frac{3}{4}$ in. in diameter at their narrow ends, to make a pair of little bases which will support Jack and Jill later on. Bore a $\frac{3}{8}$ in. deep hole, $\frac{3}{16}$ in. in diameter, straight down through the middle of each cork, at the narrow end. Do this with a red hot nail if a cork borer is not available. Obtain two $\frac{3}{4}$ in. lengths of $\frac{3}{16}$ in. diameter glass tubing and heat-

seal one of the ends of each piece by holding in a hot Bunsen flame, using pliers. Fit the miniature tubes into the holes in the cork bases.

Paint the four cork parts jet black and glue little cut paper red hearts upon the two bases. Search through some old magazines in order to obtain suitable portrait pictures of young lovers that you will be able to cut out neatly and glue upon the magnet-concealing cork slices. The lovers' faces must be facing each other and they should be glued so that the 'eyes' of the hidden magnets will be pointing in the same direction as the eyes and noses of the paper characters. Employ the remaining unmagnetized needles as spindles and fix them beneath the cork slices, in the middle.

Mount the portrait bearing slices upon the decorated bases by inserting the spindles in the glass tubes. Perhaps the spindles will be too long, and will need trimming down with pliers. Test your toy by placing the two parts close together, with Jack and Jill facing each other. When you remove your hands Jack and Jill will seem to be agitated and one or other of the characters will turn aside. When you place the lovers 'back to back' one of the figures will slyly turn to peep at the other. If you magnetized the needles as described, the eyes of the needles will be north-seeking poles, the points will be south-seeking poles. Your toy works because opposite poles attract each other and like poles repel. (A.E.W.)



Make your own Walking Sticks

MUCH enjoyment can be experienced from making your own collection of walking sticks, as well as finding and fashioning them for your friends.

Only certain woods are suitable. Basically, you must have a hard but supple wood which will not rot or crack with age and use. The 'common' walking stick is made from the ash, but thorn woods make excellent sticks, especially the hawthorn and the blackthorn. Holly is excellent; silver birch and laburnum will also do.

You are now ready to take a walk into the country to look for a straight young branch 3 ft. or more long, and about 1 in. thick.

Hedges which have been well pruned usually produce the best blackthorns and hawthorns. Here branches spreading horizontally from the main stem will sprout up straight shoots. Bushy clumps of young shoots may be seen growing from a trunk lopped close to the ground. Straight holly shoots frequently grow from the base of old holly trees, particularly in thick woods; or a straight young branch will grow from the lower portion of the trunk. Ash trees are plentiful in the English hedges, and should be cut when quite young. Ground ash may be found in a wood plantation and can be pulled up by the root.

Walk out prepared

There is a saying among countrymen, 'When should a walking stick be cut?', and their answer is, 'When you see it.' You may never pass the spot again, or the particular branch may be cut down during the next hedging and ditching season. So take a good sharp knife and a small saw with you.

In winter the straight sticks can be seen through the hedges. In early spring or late autumn respectively, the leaves are either small or falling. Thorn sticks, especially, will have plenty of leafy twigs on them, and these should be cut off there and then with the secateurs or sharp knife. The notches left are no bar to the selection of the stick—in fact they give each one its individual character.

Before cutting the stick, make sure that it is straight by viewing it from as many angles as possible.

Bending the handle

Bending the handle of a walking stick is often difficult. Ash bends fairly well, but holly must be done with care. The stick should be longer than required, say 5 ft. The bending operation will be easier if the bend is made about 18 in. from the top. Soaking the stick overnight

in the bath will also help to soften it. It is then put in a loose-fitting pipe or tube and heated with steam from a kettle for at least half-an-hour.

The steaming completed, grip the top end of the stick in a vice — taking care not to strip the bark — and slowly bend it over. If it shows signs of splitting, stop and repeat the steaming process until the wood is finally pulpy enough to bend satisfactorily. Remember not to touch the wood with bare hands, as it will be very hot. The bent end is then firmly tied down with string and put away to set and season. After steaming, the bark is very soft and must be protected from the tight string by wrapping strips of cloth over it at these places.

The root of the ground ash forms its own characteristic handle, but holly or ash growing from the tree must be cut from the knob (where it branches from the trunk) which will make a fine handle. A thorn stick should be cut to include a portion of the branch from which it sprouts. This, when shaped, will make an excellent handle, but it should not be attempted until the wood is seasoned, or cracks may appear.

Each stick should now be laid flat on such as the attic rafters to dry out, when it will become hard and the crook of the handle will set. The string is taken off, and the stick is ready for trimming or

stripping its bark without fear of cracking. Any notches should be cut close in and smoothed off with a file. To shape the handle, a model knife will be found useful.

Finishing

After any defects are filled in with plastic wood, the stick is smoothed with glasspaper. First tear off a strip of coarse paper and run it up and down the stick until the rougher edges have been removed; then repeat the action with fine glasspaper.

Do not remove the bark of a thorn stick. It will polish magnificently and give it character. Holly bark can be retained for its bright colours, which a varnish will emphasize. If stripped, it will produce a clean white stick which will polish like ivory.

A fine clear varnish may be applied to the stick, two coats being given, allowing the first to dry before putting on the second. This will secure the bark to the wood and give it a professional finish.

All that remains now is to cut the stick to a length suited to the person who is going to use it. If you are not sure, use an umbrella as a guide for length. A ferrule is finally hammered on to the tip and secured with a light nail. Make sure it is a good fit, and you will have a stick which you will be proud to use for many years. (E.)

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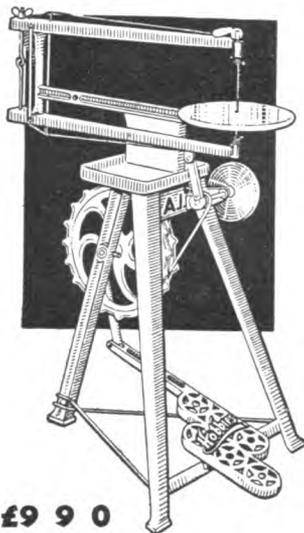
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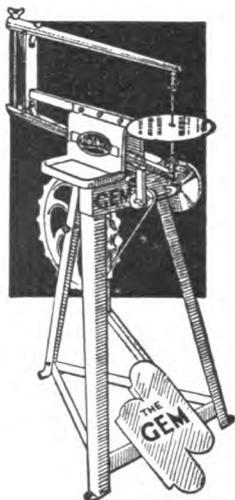
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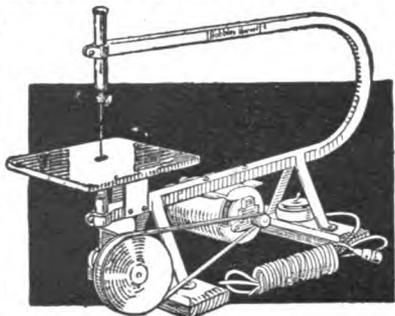
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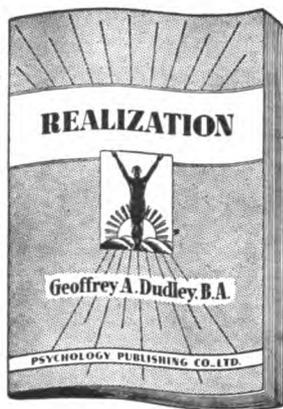
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What is the peculiar influence of this strange book? Whence comes this almost uncanny power which helps the sick back to normal health — the timid to a new self-confident personality, the unsuccessful to positions of eminence and importance? It does seem queer. Yet timid, colourless people simply read this book — and instantly gain courage that performs seeming miracles. Downhearted, frustrated people scan its pages — and quickly begin to overcome their handicaps. Men and women from every walk of life glimpse its mighty message — and feel a new giant power surging within them — an irresistible force leading them to undreamed-of success. From the very first moment they open this book they see things that grip them. New absorbing, startling ideas fasten themselves in their minds. The light of new understanding floods into them. For they cannot turn from the pages of this book and be the same. Defy it as they will, its influence will creep into their systems! That's why it is regarded as one of the most startling books ever published.

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A strange book! A book that seems to cast a spell over every person who turns its pages! And yet there is positively nothing queer — bizarre about its results. The whole secret lies in this simple fact: everyone has sleeping within himself tremendous unused energy — extraordinary personal powers capable of astonishing development. All you need to do is to release these dormant forces — grasp the full sweep of their amazing potentialities — then make them ready to do your bidding.

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And this is exactly what this singular book enables you to do. It shows you how to tap this vast storehouse of the power within. It explains how to realize your own vital power — how to magnify it — how to harness it for practical use. The effect is almost immediate. Self consciousness changes to confidence. Timidity gives way to courage. Humility retreats before self-reliance. You gain poise that commands attention. Charm that makes you irresistible. Popular personal assurance that reveals you to be a dynamic personality that attracts friends and opportunities wherever you go.

WHAT THIS FREE BOOK WILL SHOW YOU

- How to succeed at your work.
- How to obtain vibrant health.
- How to achieve self-confidence.
- How to develop your memory.
- How to relax.
- How to master your emotions.
- How to attain domestic happiness.
- How to realize your ambitions.
- How to win popularity.
- How to gain perfect nerve control.
- How to develop a magnetic personality.

You must see this amazing book for yourself. Test its influence on your own personality. Send for it today — NOW! It's Free. There's no obligation whatever. Merely enclose 3d. stamp for postage.

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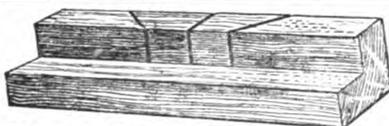
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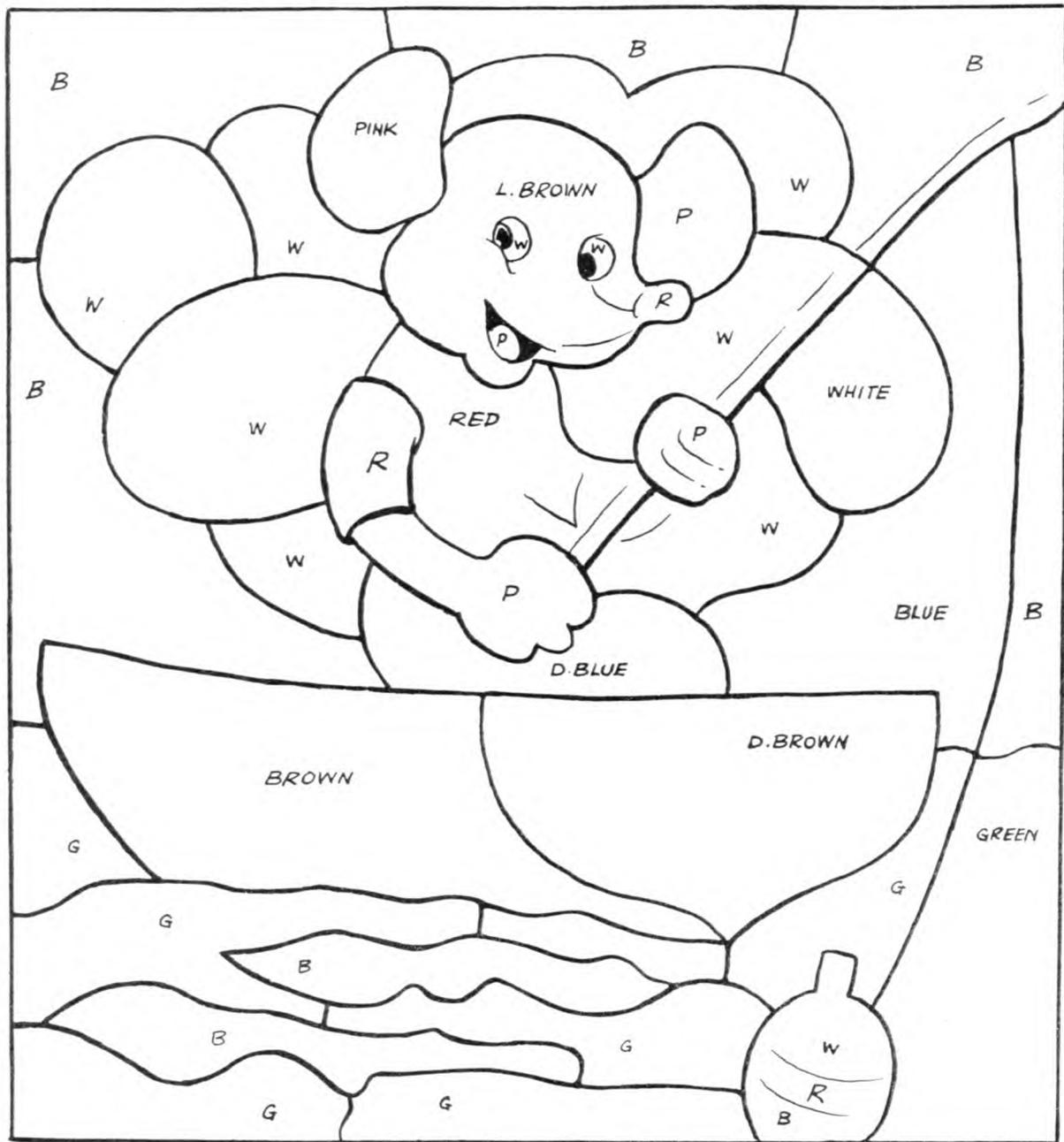
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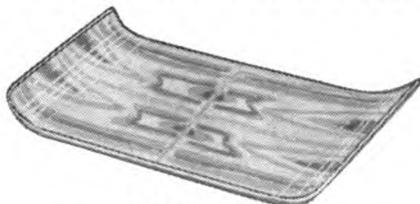
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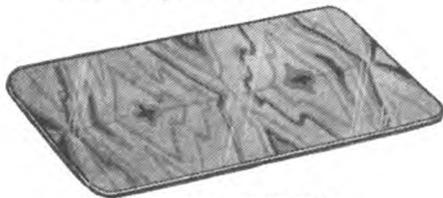
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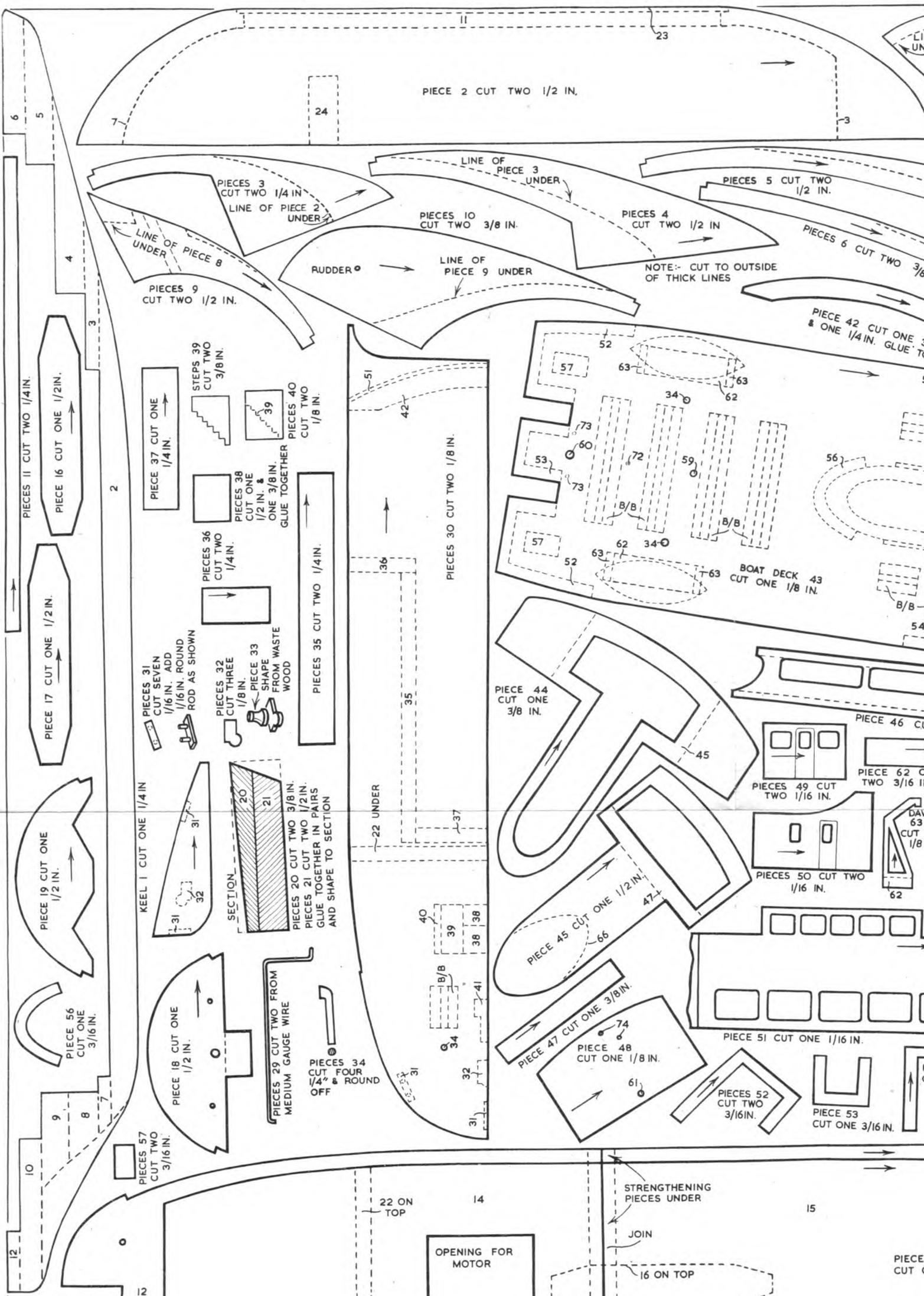
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PIECE 2 CUT TWO 1/2 IN.

PIECES 3 CUT TWO 1/4 IN.
LINE OF PIECE 2 UNDER

PIECES 10 CUT TWO 3/8 IN.

PIECES 4 CUT TWO 1/2 IN.

PIECES 5 CUT TWO 1/2 IN.

PIECES 6 CUT TWO 3/8 IN.

NOTE: CUT TO OUTSIDE OF THICK LINES

PIECE 42 CUT ONE 3/8 IN. & ONE 1/4 IN. GLUE TO

PIECES 11 CUT TWO 1/4 IN.
PIECE 16 CUT ONE 1/2 IN.

PIECE 17 CUT ONE 1/2 IN.

PIECE 19 CUT ONE 1/2 IN.

PIECE 56 CUT ONE 3/16 IN.

PIECE 37 CUT ONE 1/4 IN.

STEPS 39 CUT TWO 3/8 IN.

PIECES 38 CUT ONE 1/2 IN. & ONE 3/8 IN. GLUE TOGETHER

PIECES 40 CUT TWO 1/8 IN.

PIECES 36 CUT TWO 1/4 IN.

PIECES 35 CUT TWO 1/4 IN.

PIECES 31 CUT SEVEN 1/16 IN. ADD 1/16 IN. ROUND ROD AS SHOWN

PIECES 32 CUT THREE 1/8 IN. PIECE 33 SHAPE FROM WASTE WOOD

KEEL 1 CUT ONE 1/4 IN.

PIECES 20 CUT TWO 3/8 IN. PIECES 21 CUT TWO 1/2 IN. GLUE TOGETHER IN PAIRS AND SHAPE TO SECTION

PIECES 29 CUT TWO FROM MEDIUM GAUGE WIRE

PIECES 34 CUT FOUR 1/4" & FOUR ROUND OFF

PIECES 30 CUT TWO 1/8 IN.

PIECE 44 CUT ONE 3/8 IN.

PIECE 45 CUT ONE 1/2 IN.

PIECE 47 CUT ONE 3/8 IN.

PIECE 48 CUT ONE 1/8 IN.

BOAT DECK 43 CUT ONE 1/8 IN.

PIECE 46 CUT

PIECE 62 CUT TWO 3/16 IN.

PIECES 49 CUT TWO 1/16 IN.

PIECES 50 CUT TWO 1/16 IN.

DAVE 63 CUT 1/8

PIECE 51 CUT ONE 1/16 IN.

PIECES 52 CUT TWO 3/16 IN.

PIECE 53 CUT ONE 3/16 IN.

22 ON TOP

14

STRENGTHENING PIECES UNDER

JOIN

16 ON TOP

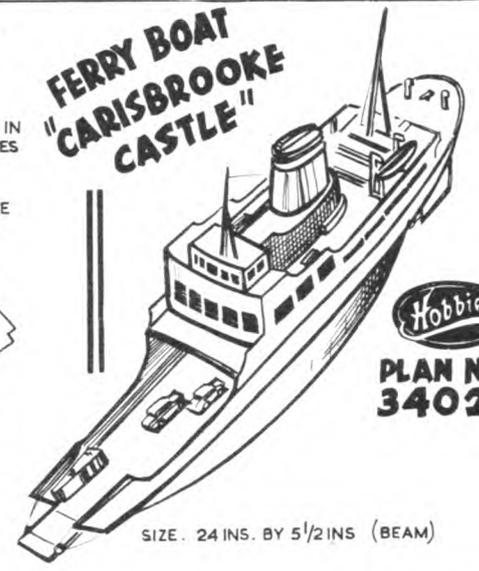
15

OPENING FOR MOTOR

PIECES CUT O

FERRY BOAT "CARISBROOKE CASTLE"

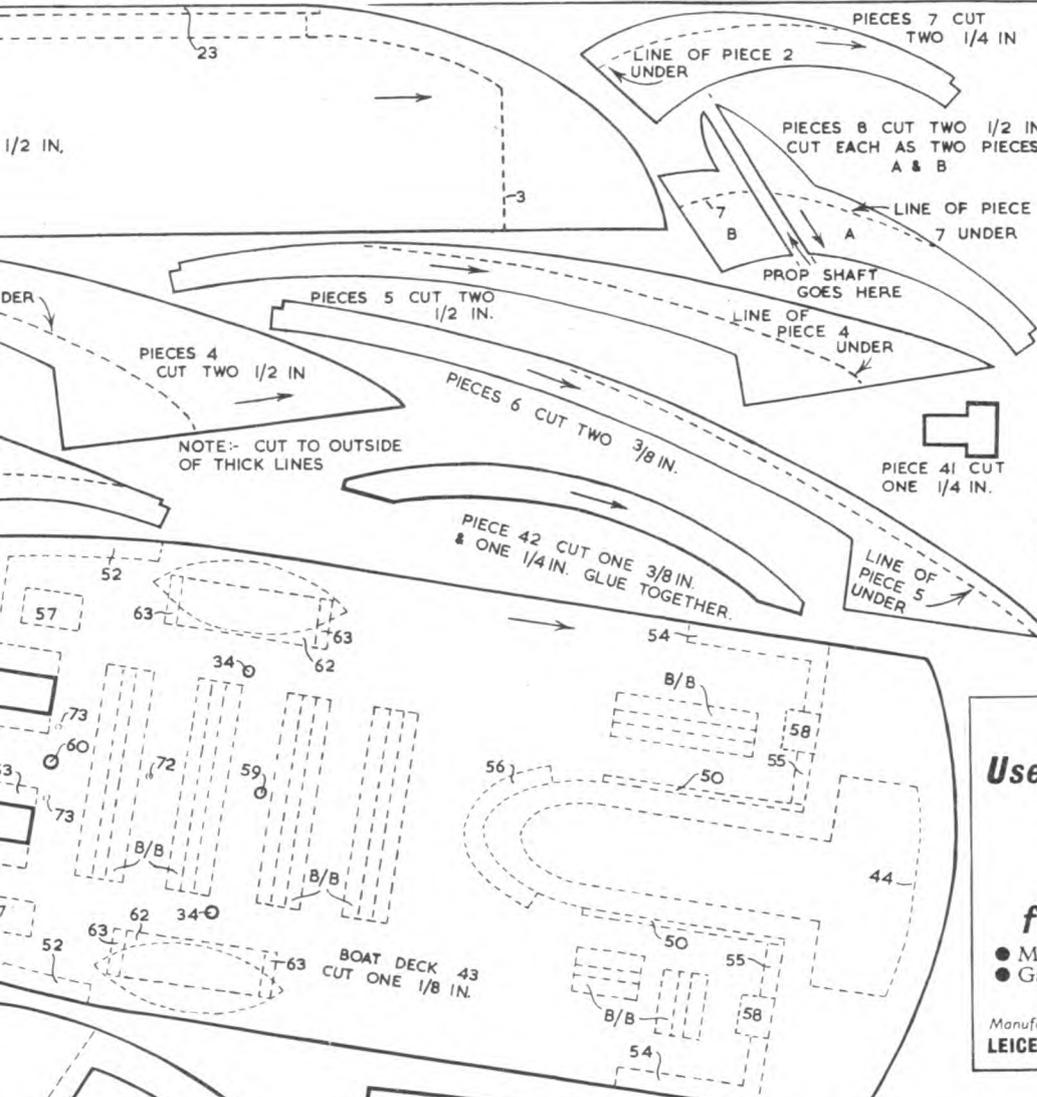
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