10th JUNE 1939 VOL. 108 NUMBER 3319

THE ORIGINAL 'DO-IT-YOURSELF' MAGAZINE

HOBBIES weekly

FOR ALL HOME CRAFTSMEN

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MIND BREAK FOR THE BEACH

PHOTOGRAPHY

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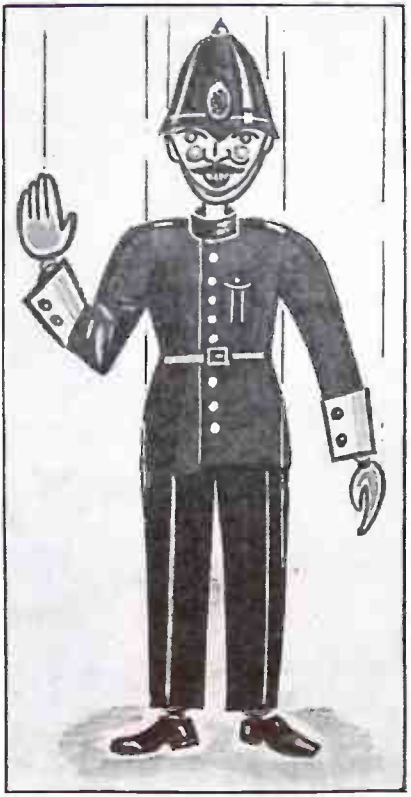
ETC, ETC.



Full details for making these fascinating fully-jointed

STRING PUPPETS

Hobbies

Up-to-the-minute ideas

Practical designs

Pleasing and profitable things to make

5d

OUR pen friend service has become very popular. But would all readers please remember the following important points. *A*–Enclose a 3d. stamp for reply. *B*–Print (not write) your name, address and age clearly in top left-hand corner of paper. *C*–

MORE FRIENDS FOR YOU — *By R.L.C.*

Mention hobby interests and the country from which you desire friends.

Linda Rock

Here are more suggestions. William Armstrong of Killypaddy, Lisnaskea, Enniskillen, Co. Fermanagh, N. Ireland, collects stamps, match labels and coins.

He said recently: 'I have been a regular reader now for many years and find Collectors' Club a great help to me.'

William is willing to exchange stamps and labels with readers throughout the world.

Ken Fowler of 57 Radford Place, Sheffield, 3, is 12 years of age. He collects stamps and wishes to exchange duplicates with other readers.

Glynn Taylor lives at 57 Boundary Road, Cheadle, Cheshire. He has a fine stamp collection and would like to exchange British Colonials with other readers.

Keith Davies of 10 Elgin Road, Sutton, Surrey, is well known to many of us. He collects all items of interest. Keith is training for hotel management at the Grosvenor Hotel, Londen. He is a free-lance journalist and would like pen friends from any country.

Many of our female readers have asked for pen friends. Here are some reliable hobbyists who have recently become regular readers of *Hobbies Weekly* and who are highly recommended:- Mrs. J. J. Burger, Happy Camp, California, U.S.A. — collects stamps, match labels and post cards; Betty Robinson, 45 Hartley Street, Cairns, North Queensland, Australia; Linda Rock, 33 Passmore Street, Westminster, London.

Ken Fowler

Keith Davies

William Armstrong

Glynn Taylor

THE first thing to master in the pole jump is the take-off, so that the vaulter can give all his attention to the business of getting over the bar. While practising to get his distance, he should also be learning how to leave the ground.

The pole is planted firmly, the vaulter springs into the air, guiding his body by means of his arms and the pole. The legs must shoot up into the air and act as a sort of fulcrum to keep the chest clear of the bar.

When actually going over, the body must swing so that it faces the bar. The momentum of the run and the spring should have carried the feet into the air and given the body the required half turn. Just before the moment of clearance, the arms should lift, the back straighten, the legs drop down and the body drop over the bar.

THE POLE VAULT

The vault is somewhat of a gymnastic feat, requiring great strength in special muscles of the arms and shoulders. It must be remembered that in vaulting, as in similar field events, form often counts far more than natural ability. To succeed as a college or club athlete, perfection in form must be the first consideration.

MAKING STRINGED MARIONETTES

THE stringed marionette is, to both the artist and the craftsman, the highest form of puppetry. The heights of caricature and fantasy to which it can rise are far above those possible in other forms.

By C. Somerville

The marionette is a jointed figure controlled from above by strings, and may vary in size from a few inches to several feet. The puppet described here is 16ins. high and is made entirely in wood. Though puppets can be made from odds and ends with simple joints, these are rarely as effective as the fully-jointed wooden figure. This puppet has been so designed that, though requiring no specialised knowledge, it gives a high degree of satisfaction when carefully made.

A deterrent in the eyes of many would-be puppeteers is the skill necessary in the carving and jointing of a marionette. This puppet requires no wood carving skill since the limbs and body are built up from shapes cut in either plywood or yellow pine planks. Balsa is not recommended since it is too light and makes for complication in jointing.

The completed marionette is shown at Fig. 1, and full-size patterns for body and limb components are shown on page 165.

The course to be adopted can be readily followed if the construction of one simple part, say the upper arm (C), is considered. Two sections of pattern (C1) are cut out in wood ⅜ins. thick, a fretsaw being used. Similarly, pattern (C2) is cut in ¼in. wood. The three portions are glued, assembled and clamped as seen in Fig. 2. When the glue is thoroughly dry, the clamps are removed and the composite block is shaped using chisel, spokeshave, file or any shaping tool, and finally finished with glasspaper.

Similarly the lower arms (Fig. 2), and the legs (Fig. 3), are cut out, glued and shaped. The body pieces are treated in exactly the same way, except that they are assembled on ½in. dowel (Fig. 4), to give added strength. The feet are made equally easily, the patterns being shown at Fig. 5. The hands should be individual to the character of the puppet, and the basic pattern (Fig. 6), may be adapted as wished. The outlines, one to four, are cut in ¼in. plywood and each finger is rounded. Then the four slips are glued and clamped as shown. When dry the waste portions are cut away, and all square edges rounded off.

The torso (E) is joined to the pelvis (F) at the centre, by a cord, leather thong or bootlace. The legs are attached to the pelvis by a leather strip glued into sawcuts in the upper leg (G) and suspended

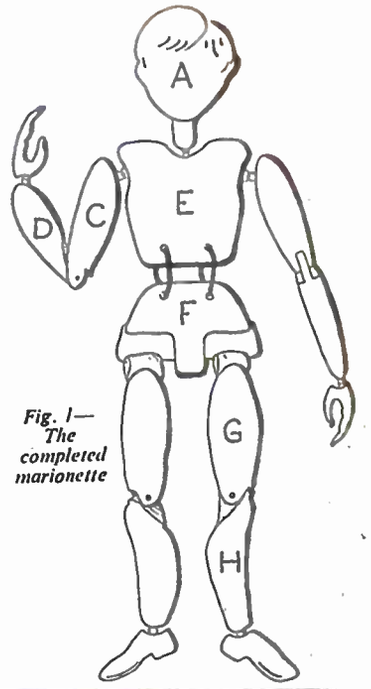


Fig. 1— The completed marionette

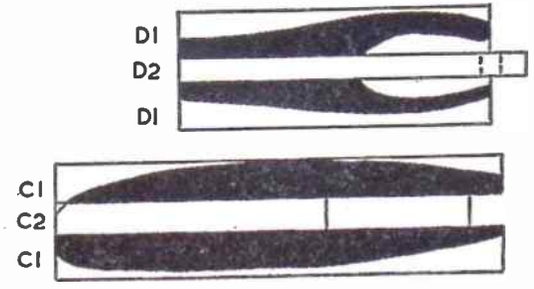


Fig. 2—Assembly of the arms

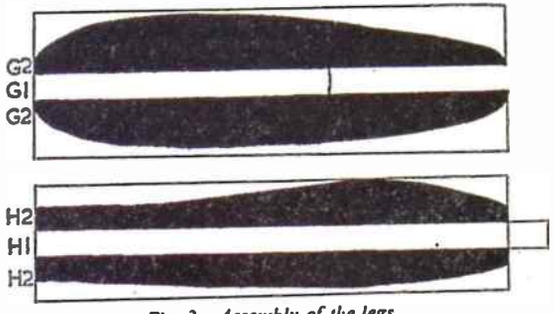


Fig 3—Assembly of the legs

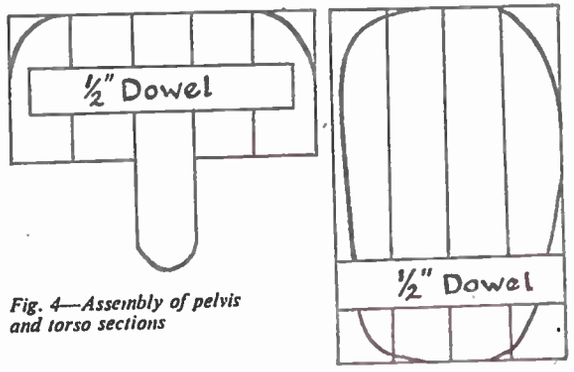


Fig. 4—Assembly of pelvis and torso sections

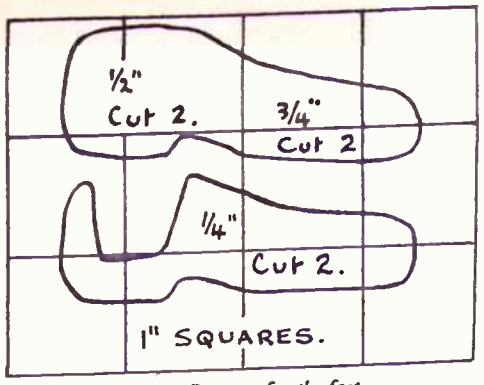


Fig. 5—Patterns for the feet

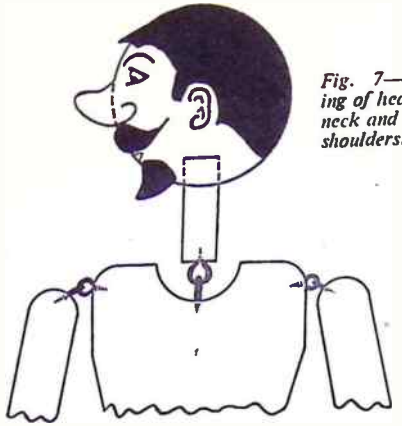


Fig. 7—Jointing of head, neck and shoulders.

upon a wire running from each side and through the bottom projection of the pelvis (Fig. 8). The knee joint is a limited tongue and groove joint, pivoted on a panel pin. The ankle joint is a screw-eye, also pivoted on a panel pin in the slot in the foot.

The jointing for the arms is very simple, the shoulder (Fig. 7) and wrist joints being interlocked screw-eyes. The screw eyes to use are the very small brass ones used in rigging model boats. The elbow joint is merely a reversal of the knee joint.

The basic head shape, a sphere or egg

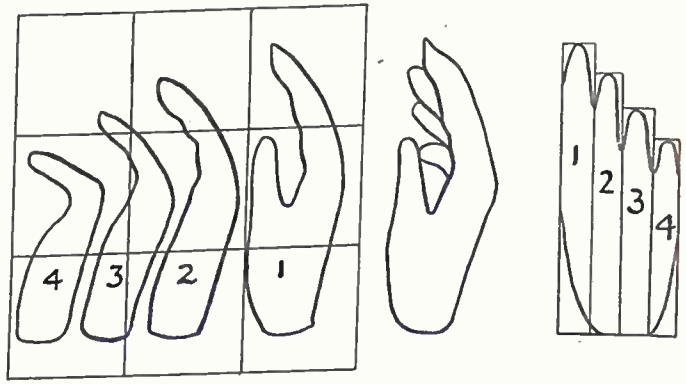


Fig. 6—Assembly of the hand

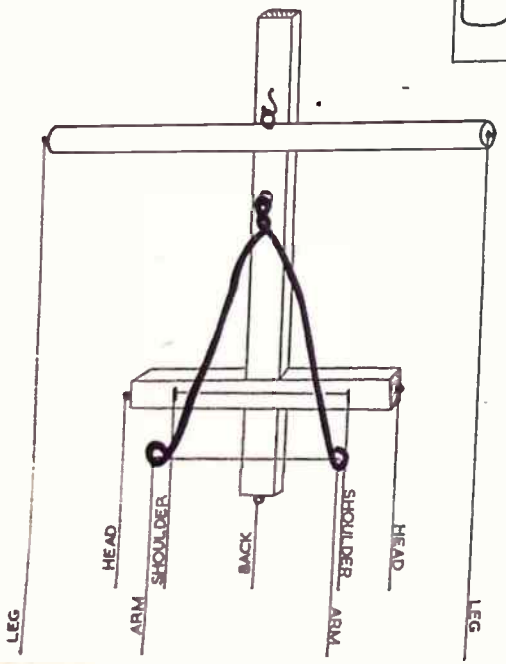


Fig. 9—The control

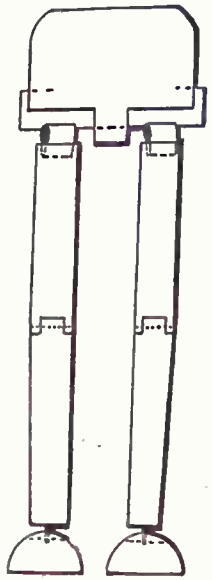


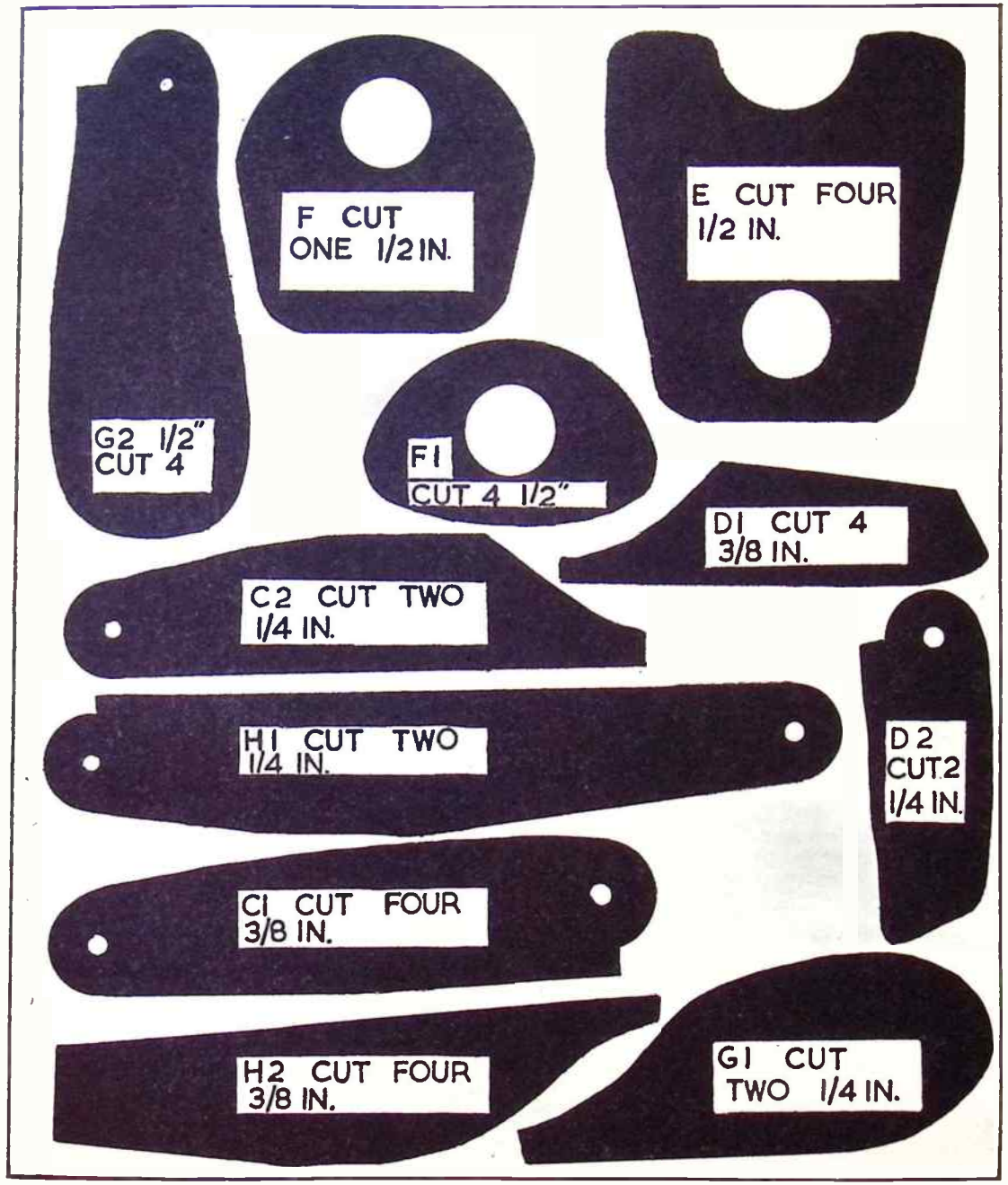
Fig. 8—Leg joints

shape, is turned on a lathe from soft pine, redwood or any other moderately soft wood. The neck is 1in. long and can be turned as part of the head or it may be a dowel rod glued into the head later. Should you have no facilities for wood turning, there are various sizes of wooden balls available from any Hobbies branch or stockist, the 2½in. diameter ones being ideal.

The nose and ears can be cut from wood and glued on, or they can be modelled in plastic wood or a mixture of sawdust and glue. Depressions for the eyes and some flattening of the cheeks can be easily done with a file and makes for better characterisation. Felt, wool or string makes excellent puppet hair, and can be glued on to the head, and then trimmed to style. Details of a typical head are illustrated at Fig. 7. Poster colours or oil paints are used for painting the head, which should be done boldly, using bright colours and avoiding small detail. Remember to paint the neck, for when you come to dress the puppet you

● **Continued on page 172**

FULL-SIZE PATTERNS FOR A PUPPET



Transfer shapes by carbon paper to thickness of wood indicated and cut out with a fretsaw

Radio Control Models — 9

VEHICLES AND AIRCRAFT

By 'Radio Mech'

THE radio transmitters and receiver already described can be used to guide a model truck, armoured car, tank, or other vehicle, and this type of model may be preferred in some cases because it can be run indoors, or in the garden. The actual radio equipment will be very easy to operate in these circumstances, because the range will seldom exceed several yards. As a result, a low power transmitter can be used, and adjustment of the receiver and relay will be very easy indeed.

The same radio equipment (transmitter and receiver) may also be used to control a model plane. Radio control is sometimes used with large model gliders, but is most frequently fitted in a diesel model. Small model planes cannot carry the apparatus. As the model flies away the signal reaching the receiver grows weaker, and for this reason very careful adjustment of receiver and relay will be needed, or control of the model may be lost. The equipment should be tested on the ground, in advance, to discover the maximum safe range, and the plane should then be flown within this limit.

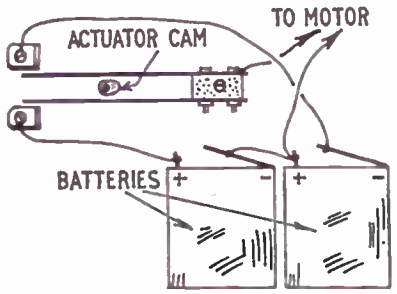


Fig. 1—Motor reversing with stop position

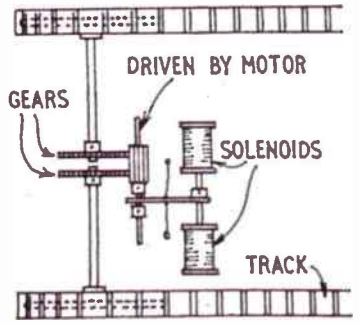


Fig. 3—Steering a model tank

Suitable guide devices for models of this kind can be made up as described here. With vehicles, Meccano worms, gears and other parts will prove extremely useful, but for a plane, the lightest possible items must be used.

Reversing from actuator

A control actuator has been described in which the actuator spindle could be made to take up any one of four positions, a cross-arm being released by a magnetic catch. This type of actuator can control a miniature electric motor of reversing type, which will steer the vehicle.

A small cam is a push fit on the actuator spindle, as explained for 'Off' switching in a model boat. Instead of using one contact only, two contact strips are fixed each side of the cam, as in Fig. 1. In two positions of the cam, these strips do not touch the brackets. In each of the other two positions, one strip is pressed into contact with its bracket.

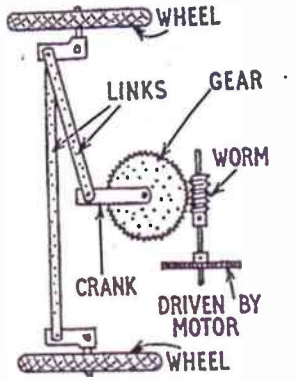


Fig. 2—Vehicle steering system

Two small batteries are used, wired in opposite polarity. When the actuator cam is in the position shown in Fig. 1, the steerage motor will not be running. One-quarter of a turn of the cam will make the motor run in one direction. A further quarter turn will stop the motor, while another quarter turn will reverse the motor. This sequence is repeated as often as required.

The thin contact strips can be bolted to a small insulated block. The contact brackets must be insulated from the body of the clockwork motor. There is, of course, no use now for the steerage wire fitted to the actuator crank, which originally controlled the boat rudder.

Vehicle steering can be arranged as shown in Fig. 2. A considerable reduction ratio is necessary between the motor and crank and this can be obtained by two stages of worm gearing, with large gears, or by using smaller gears and worms, and a gear or belt reduction drive from the motor.

The very small, midget type of motor will easily give enough turning power, if the reduction drive runs freely. Current is only taken while the wheels are being moved, for steering.

The motor is wired to the contacts in Fig. 1, and the usual propulsion motor drives the model along. Keying the transmitter will give the following control positions for the actuator:

1. Steering motor off.
2. Steering motor turning model to right.
3. Steering motor off.
4. Steering motor turning model to left.

With positions 1 and 3, the wheels of the model may be straight, or set to give any required curve either way. Unrequired positions can be passed through before the model responds, as explained. It can thus be guided about in any manner required. A reduction drive which will turn the crank from a central position to one side in roughly 5 seconds will be convenient. Using batteries of smaller voltage, or adding a resistance in series with the motor, will cut down its speed, if necessary.

Exactly the same method may be used for steering a large boat, the crank working the rudder through a link.

Tracked models

When steering is provided in these, it is usually obtained by throwing one track out of gear. The model then begins to slew round, again running straight when both tracks are driving.

A satisfactory method of arranging this is shown in Fig. 3. When the model is running straight ahead, both gears are driven together by the pinion, which is fixed to a spindle driven by the propulsion motor. This drive, from motor to spindle, may consist of two stages of gears or belts, or a single worm drive, and the usual speed control resistance may be wired in series with the motor.

The actual steering system does not use another motor. Instead, the drive pinion is held so that it engages both gears, this being done by a strip loose between pinion and a collar. This strip is held centrally by thin elastic, as shown. When one solenoid is energised, the strip moves the pinion out of engagement with one gear. If current flows in the other solenoid instead, the pinion is drawn the other way.

Only a very small movement (say ¼in. in all, at the most) will be required, and the solenoids can take current from the main driving battery. For 6V., each magnet can have some 400 to 600 turns or so of 28 SWG or similar wire.

One magnet is connected to one of the contact brackets in Fig. 1, and the other magnet to the second bracket. Either solenoid can then be energized at will, or the circuit to both may be interrupted, for straight ahead running (both gears engaged).

As there is no real use for both 'off' positions of the actuator cam, one position can open contacts wired to the propulsion motor, as explained for a model boat. This will then stop the model so that it can be started up from rest, and halted, as desired.

Aircraft control

Because of the ease with which a model plane may be lost or damaged, great care should be given to see that all the control equipment works properly, and everything should be tested before each flight.

Control to make the model climb or descend is also needed, in addition to turning, and this makes the operation of the transmitter key more difficult. A really good flying model is also needed.

Fig. 4 shows a control unit with six positions, three for the rudder, and three for elevators. This would give turning each way, as well as straight flying, and descending, in addition to level flight.

The actuator or escapement disc has six teeth, and can thus be left in any one of six positions. Each time the transmitter is keyed, the escapement disc turns one tooth, or one-sixth of a revolution. A good length of twisted rubber will provide turning power, to keep weight down, and will allow quite a large number of operations, before re-winding is needed.

One disc on the same spindle controls the position of the rudder, a thread being attached to a thin metal strip bearing on the perimeter of the disc. When this strip rests against the section 'A' the rudder is straight. This will be so for three positions of the actuator. In a similar way, the second strip rests upon the edge of the elevator disc, and controls the elevators through a thread. Both threads are kept taut by light springs pulling rudder and elevators. When the portion 'B' of the elevator disc is against the strip, the elevators are adjusted for

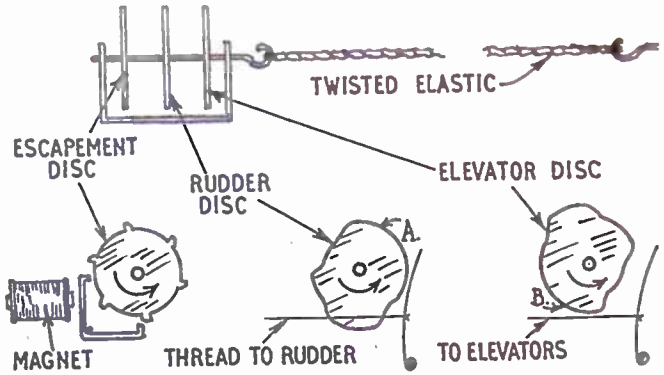


Fig. 4—Control unit for aircraft

level flight. This will be so for the three remaining positions of the actuator.

Both discs turn together, and this gives six positions, any of which can be selected by keying the transmitter. These give flying as follows:

1. Rudder straight plane climbing.
2. Rudder straight, level flight.
3. Rudder straight, plane descending.
4. Level flight, rudder to left.
5. Level flight, rudder straight.
6. Level flight, rudder to right.

It will be seen that when the rudder is being controlled the plane is held in level flight by the portion 'B' of the elevator disc, which does not change in radius. Similarly, the portion 'A' of the rudder disc holds the craft in straight flight when the plane is climbing or descending. It is usual for simple diesel powered models to run until all the fuel is exhausted, and the engine stops. At this point, the plane should be turned into a suitable position for landing, and should glide to a safe landing, in level flight, exactly as with a craft without radio control.

With the radio receiver switched off, and rudder and elevators positioned for straight, level flight, the plane should fly well, exactly as would an airworthy model having no radio control. The aerial may be stretched between rudder and mainplane. The control threads are best adjusted to give moderate degrees of climb and turn, as they can be altered to give sharper control afterwards, when it is found that the model responds well.

Next week, in the last article in this series on Model Control, 'Radio Mech' describes transistor and other circuits.

CHEMISTRY AT HOME

THE residues remaining from the preparation of various gases are generally thrown away on finishing the experiment. This is wasteful, for they contain, or will yield, useful chemicals.

For instance, in the residue from hydrogen generation there is zinc sulphate. Similarly, the residue from the preparation of hydrogen sulphide contains ferrous chloride, which may be used for making ferric chloride. By working up residues future expenditure can be saved.

A series of bottles should therefore be kept, each appropriately labelled, and any residue obtained poured into its individual bottle. When fair amounts have accumulated they can be worked up to top up your stocks of basic reagents.

Before pouring off into its bottle the solution obtained from zinc and dilute sulphuric acid in your hydrogen generator, be sure that there is still some undissolved metal. If it has all dissolved, add more until some remains. This ensures that no free sulphuric acid is left. To obtain zinc sulphate, filter the solution and boil it to low bulk over wire gauze until the liquid is syrupy. After standing overnight for complete crystallisation to take place, remove the crystals to a porous brick to dry. Any liquid remaining in the evaporating basin can be returned to the residues bottle and worked up as part of the next batch.

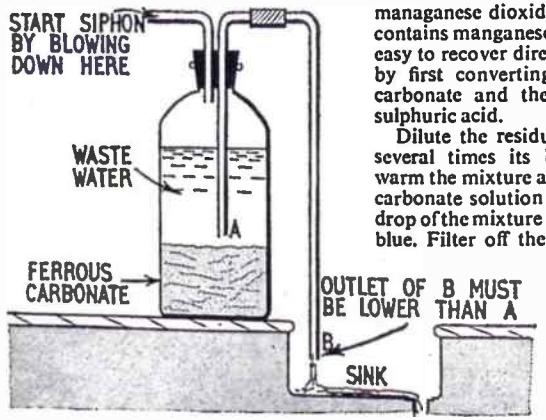
Three-part process

Similarly, where hydrogen sulphide has been generated from ferrous sulphide and dilute hydrochloric acid some ferrous sulphide must remain undissolved before pouring the solution into its residues bottle. To work up this residue, first filter the solution. The filtrate is a solution of ferrous chloride. To obtain ferric chloride from this we adopt a simple three-part process, first converting it into ferrous carbonate, oxidising this by means of air to hydrated ferric oxide and then dissolving this in hydrochloric acid to form ferric chloride.

The ferrous chloride solution is strong and should be diluted with five or more volumes of water. To this add sodium carbonate solution until a drop of the filtered mixture gives an alkaline reaction, that is, until it turns red litmus paper blue. A dirty greenish precipitate of ferrous carbonate appears. Wash this by decantation in a large bottle fitted with a siphon, as shown in the diagram, until one wash water gives no turbidity with silver nitrate solution.

The ferrous carbonate has now to be oxidised by means of air. This is done by filtering it off, transferring the sludge to a shallow dish and evaporating to dryness in a not too hot oven. The ferrous carbonate changes into brown hydrated ferric oxide.

The hydrated ferric oxide is then converted into ferric chloride by putting it in a flask heated in a water bath and adding dilute hydrochloric acid until only a little of the oxide remains undissolved. The filtered solution of ferric chloride so obtained may then either be kept as solution — whose strength, however, will be unknown — or better boiled to low bulk over wire gauze and then taken to dryness on a water bath.



Washing ferrous carbonate with the help of a siphon

Bottle it while still warm, for it is deliquescent. It is preferable to aim for the dry substance, since you can then make up a solution of definite strength by dissolving a weighed amount in a definite volume of water.

When chlorine has been generated from manganese dioxide and hydrochloric acid, manganese chloride may be obtained from the residue. Filter off the excess of manganese dioxide and evaporate the filtrate to dryness. Manganese chloride remains. This should be pink. If it has a more or less brown shade it contains iron, which is often present as an impurity in the original manganese dioxide. It may largely be removed by heating the product to low redness, cooling, dissolving, filtering and evaporating until crystals begin to appear on the surface of the hot liquid. On cooling and standing overnight pink crystals of manganese chloride separate and may be removed and dried on a porous brick.

'Oxygen mixture', consisting of potassium chlorate and manganese dioxide, is converted, during the heating which produces the oxygen, into potassium chloride. The manganese dioxide is there as a catalyst and is therefore unchanged at the end of the reaction. To obtain the potassium chloride, heat each 10

MAKE CHEMICALS FROM WASTE

grams of the residue with 30 c.c. of water, filter hot and allow to cool and stand a few hours. Filter from any deposit of unchanged potassium chlorate and evaporate the filtrate to dryness. White potassium chloride remains.

The residue from bromine preparation from a mixture of potassium bromide, managanese dioxide and sulphuric acid, contains manganese sulphate. This is not easy to recover direct, but it can be done by first converting it into manganese carbonate and then dissolving this in sulphuric acid.

Dilute the residue by pouring it into several times its bulk of cold water, warm the mixture and filter. Add sodium carbonate solution to the filtrate until a drop of the mixture turns red litmus paper blue. Filter off the precipitated manganese carbonate and wash it by decantation until a few c.c. of one wash water no longer give a turbidity with strontium nitrate solution.

Filter off the manganese carbonate and dissolve the sludge in dilute sulphuric acid, while taking care that a little remains undissolved. Evaporate the filtered solution of manganese sulphate so obtained to dryness and then heat to low redness to decompose any iron present as an impurity.

Redissolve the cooled product in a little water, filter and evaporate until a drop taken up on a cold glass rod crystallises at once. On then cooling and standing overnight crystals of manganese sulphate remain, which can be removed and dried on a porous brick.

Copper nitrate may be recovered from the residue from making nitric oxide from copper and nitric acid. Filter the blue solution from excess copper metal and evaporate to dryness on a water bath.

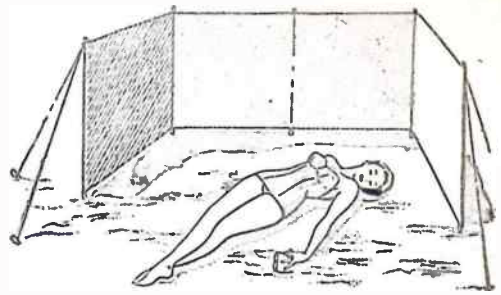
Lead nitrate heated to make nitrogen peroxide leaves a residue of lead monoxide. This may still contain undecomposed lead nitrate, but as this is soluble in water, whereas lead monoxide is not, purification is easy. Simply heat the residue with water, pour off the liquid and again heat the oxide with more water. Finally, filter off the lead monoxide and dry it.

Though not a laboratory residue, rain water, of which we receive overgenerous supplies, can be put to good use. As it contains none of the calcium and magnesium salts which cause hardness in water, it makes a good substitute for distilled water and may be used for all ordinary purposes after it has been filtered from dust and grit. It contains small amounts of dissolved gases, but these are of no consequence in the laboratory. (L.A.F.)

● Continued on page 169

A WIND BREAK BATHING TENT

MAKE IT TO USE AT THE SEASIDE



SUNBATHE in comfort with this combined wind break and bathing tent. The screen illustrated is useful when on holiday or on weekend visits to the seaside. It is folded or rolled up when not in use and can be stowed away in quite a small space. It can be carried on a bicycle.

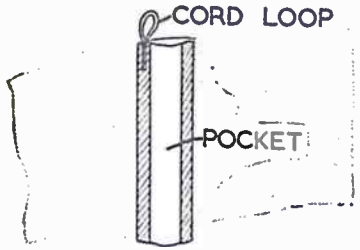


Fig. 1

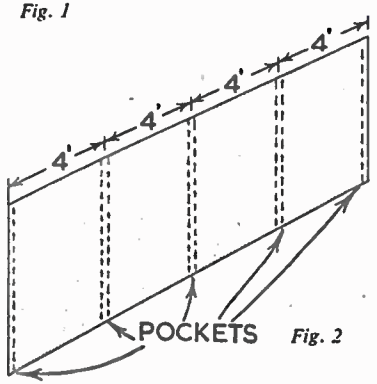


Fig. 2

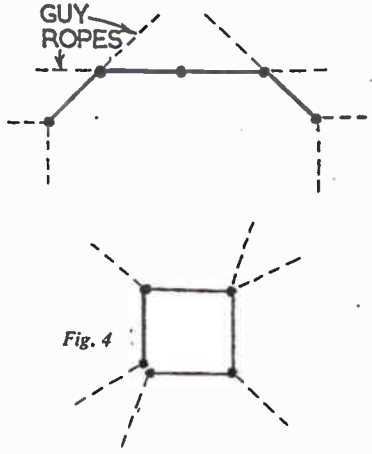


Fig. 4

If the screen is carried by car it can be made of heavy, long lasting materials such as canvas, but otherwise a lighter material may be used. The kind of material is not critical provided it gives protection from wind and at the same time forms an effective screen when changing.

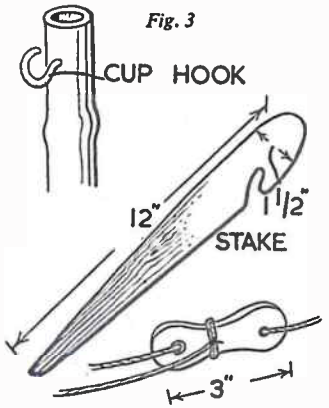


Fig. 3

The material should be about 54ins. to 60ins. wide and 16ft. long. Five pockets are made as indicated in Figs. 1 and 2 and a cord loop is provided at the top of each pocket. The posts are 6ft. long canes which slip right through the pockets and are pushed into the sand or ground. The loops in the material go over cup hooks, Fig. 3, in the tops of the canes and prevent the material from slipping down. The canes are pushed about 12ins. into the ground and further support is given by small stakes and guy ropes.

Adjustable clews and stakes may be made from wood as shown in Fig. 3. The guys are looped at the ends and are slipped over the tops of the canes, resting on the cup hooks.

The diagram in Fig. 4 shows how the screen and guys are arranged. For the wind break eight guys will be needed. To enter the tent, unhook two or three of the loops and lower the canvas sufficiently to step over. When the canvas is hooked back in position it gives adequate cover for changing.

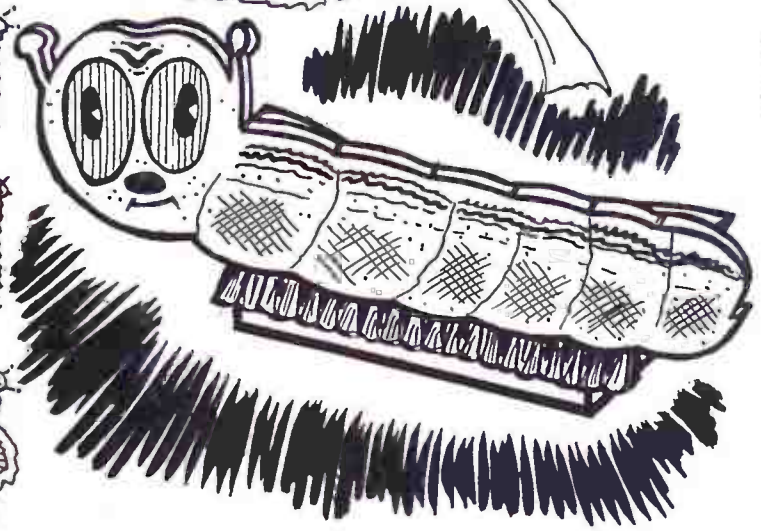
Clews and stakes should be treated with wood preservative, otherwise the only precaution necessary is to see that the screen is not put away wet or damp. (M.h.)

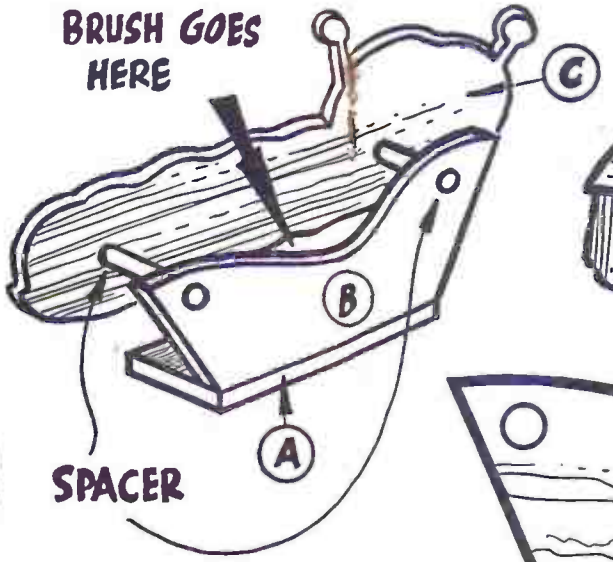
● Continued from page 168

Chemicals from Waste

CENTIPEDE SID

ONE PEST THAT DOESN'T NEED A "BRUSH-OFF"





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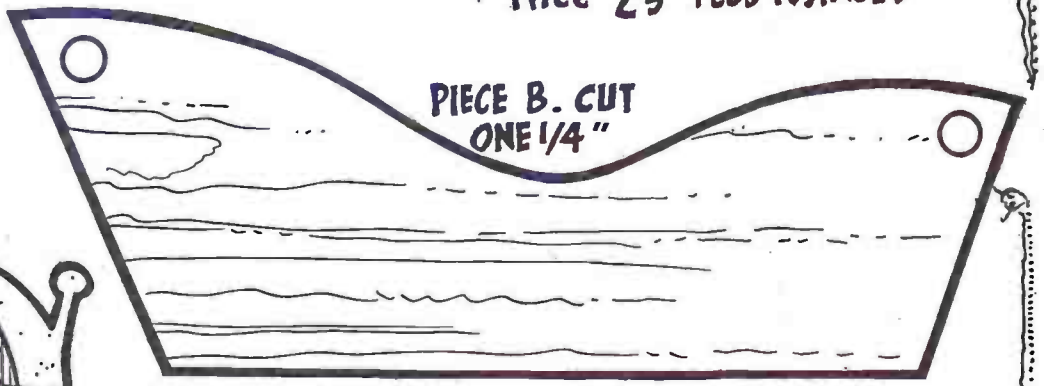
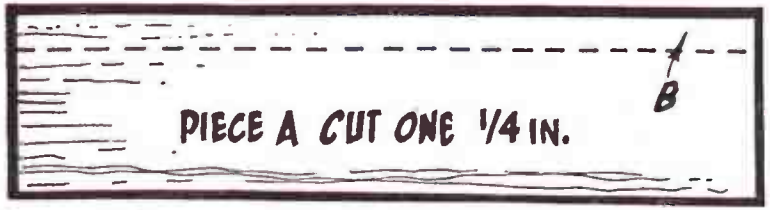
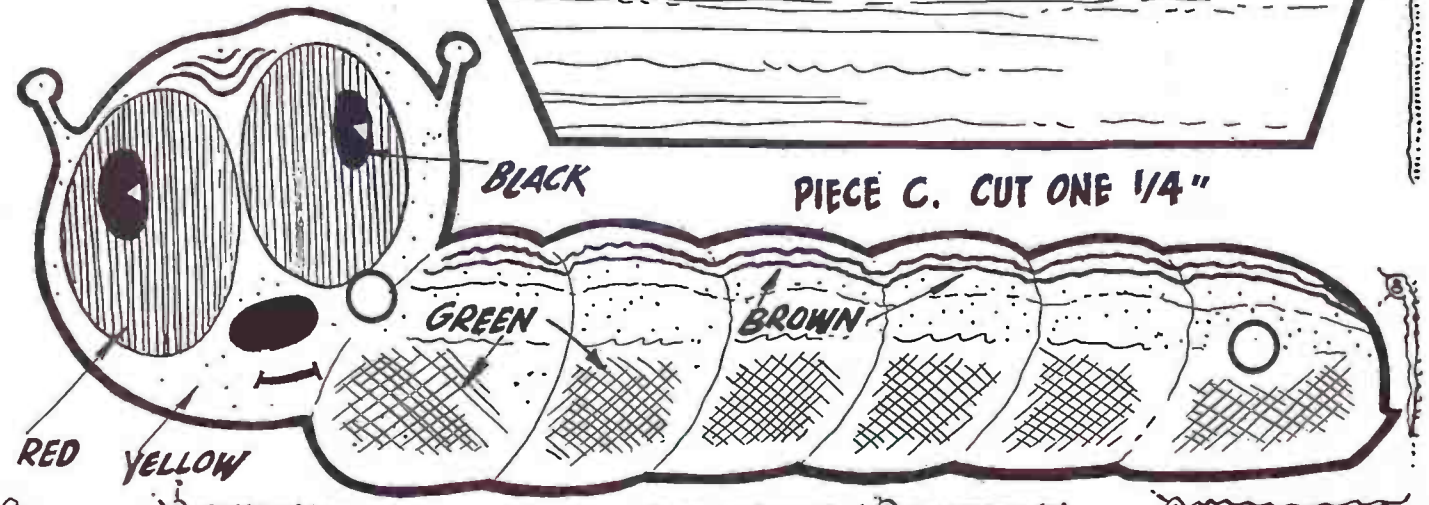


SPACERS ONE OF EACH 1/4" ROD





HANDYMAN'S PROJECT

FOR keeping the hands clean when stoking up the living room fire, or lifting clothes from the boiler on wash days, a pair of tongs is indispensable. A simple pattern of tongs which can be made at home with items, mostly from the junk box, is described here.

Tongs need a spring to keep the jaws apart, and for this purpose use can be made of a spring paper clip of the common type, to be bought at any stationer's. For the tongs here mentioned, the clip measures 1¾ins. long, but larger or smaller kinds would suit if the width of the legs were amended in proportion.

The legs (A) are cut to the dimensions given from hardwood, ½in. to ⅝in. thickness (Fig. 1). That portion of each leg, reduced to 1in., should have its top side edges rounded off a little (not too much) for comfortable handling. If the tongs are required for lifting wet clothing from the wash boiler, the more usual metal claw jaws may be considered unsuitable, as liable to rust, and also to tear the clothes. Instead, therefore, wooden jaws are substituted. These are simply strips of the hardwood, ½in. wide, screwed at the bottom of the legs. Use brass screws and bevel off the strips, as at (A).

For handling coal, metal jaws are made. These are shown at (B), rear and side view. They are 1in. by 2½in. strips of stout sheet metal, with teeth filed at one end, and bent inwards. These might be cut out from a disused strip hinge, if sheet metal is not available. Another method would be to utilise an old mild steel hinge (C), 2½ins. long. This should have its knuckle cut out, the two leaves left being screwed together side by side, and filed and bent as at (B). Drill for screw holes as necessary, and screw to the inside of the legs.

The legs are now fixed to the finger grips of the clip and there secured with a screw bolt of suitable size. The length of these bolts should not exceed ¾in. or they prove difficult to get in position. First, in each leg, bore a hole through for the bolt to pass. The position of the hole is important, as the edge of the leg must butt up against the spring, as at (D), in Fig. 2, to prevent it shifting sideways. The distance given for the hole will, in most cases, be about correct, but it would be as well to test by laying the leg in position on the finger grip, and running a pencil round the hole in the grip to mark its place on the leg.

To fix, first drop a small metal washer over the bolt, then pass it through the hole in finger grip, then through the leg to the outside. Thread a nut on, and twist it up tight. Treat both legs alike, when both should be firmly attached to the spring, with no tendency to move sideways. Fig. 2 (E), shows the inside face of one leg, and how the bolt is first secured through one of the finger grips of the paper clip. (W.J.E.)

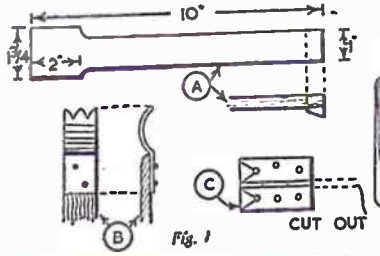


Fig. 1

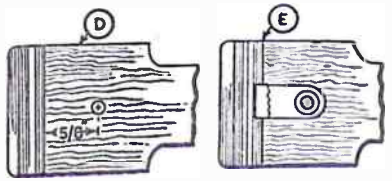


Fig. 2

● Continued from page 164

Marionette Control

may find it shows well above the collar.

Before dressing, put small brass screw-eyes just above each knee, one in the back, and one on each shoulder. These latter should be as wide apart as possible. These are to take the strings which will eventually support the puppet.

The great secret about dressing a marionette is to use easily flexible material, and to leave it loose round all joints. Drawing pins and glue are frequently used to hold the clothes in position, the former often being used for decorative purposes. Buttons can be made of small beads, nail heads or brass paper rivets. In cases where hemming is tricky it suffices to run a little of the now widely sold fabric glues along the edge of the material. One last point — use as little material as possible. If only a shirt front is to show beneath a coat, then do not make the complete shirt, make the front only and glue it on.

Almost every puppeteer has his own type of wooden control to which all the strings of the figure are attached. The English Upright control shown in Fig. 9 is very suitable for larger puppets. It consists of a wooden dowel about 8 or 9ins. long and a crossbar fixed firmly on about 2ins. from the bottom. The end of a wire hook projects slightly in front, and on this is suspended a detachable leg bar. Between the crossbar and leg bar, a large screw-eye is put in and through this runs a wire which is twisted so that it cannot come out, yet is still free to swing. The two ends are bent into small loops through which the hand strings are threaded.

Hold the control upright between the hand wire and the leg bar. The hand wire rests on the middle finger, with which it can be moved. To make the figure bow tilt the control forward. The leg-bar should be taken off by the free hand for walking.

When stringing a puppet start with the head and then make all other strings just taut when the puppet is in a normal position. Use No. 18 carpet thread for the strings, either black, brown or dark green.

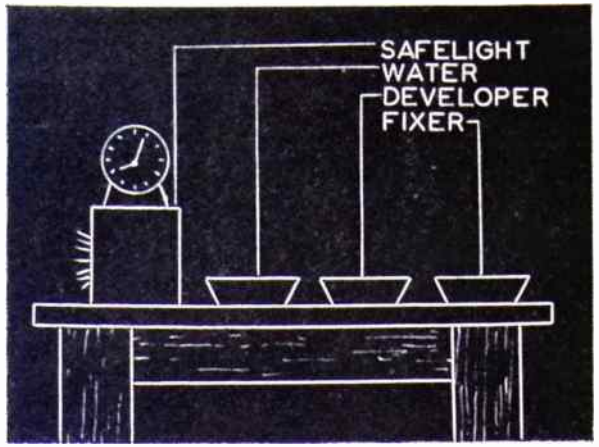
Small screw-eyes are set behind the ears for the head strings, and holes drilled for the hand strings. The screw-eyes under the clothes can be reached by a threaded needle. Leg strings are fitted about ½in. above the knee joint.

You will find walking the most difficult thing to make your puppet do, but that is a matter of practice. Practice will not make perfect, for one can continue improving one's manipulation after years of practice. You will find your puppet has a way of his own in doing things, and each different puppet you make will have its own individualities. One thing is certain, after only a little practice you can gain a reasonable skill and more than enough enjoyment to reward your efforts.

PROCESSING 'PAN' FILMS

DURING the last year or so photographic manufacturers appear to have ceased making the popular orthochromatic films widely used by amateurs, replacing them with the panchromatic variety. No doubt the latter reproduce all colours much more faithfully, but the amateur may be disturbed to find that development must be undertaken in total darkness, the ruby light being useless, and that he does not feel capable of such a task.

By S. H. Longbottom



This difficulty can be overcome by using a special safelight screen of dark green/blue supplied by dealers from size 7ins. by 5ins., a standard for most safelights. You should ask for an Ilford 908 GB (Green/Blue) screen, but note that when processing it is essential that the rays — which are, indeed, no more than a glow — do not shine directly on the film. In practice it will be found that the eyes very quickly accustom themselves to this restricted light, and after about ten minutes in the darkened room, it is easier to see the dishes, etc., even if in a shadowy form, than you may at first imagine.

As stated, the panchromatic film is sensitive to all colours, demanding a perfectly blacked-out darkroom to avoid any possibility of fogging and sometimes it is advisable to leave processing until nightfall. There is, however, no need to process in complete darkness, and the safelight mentioned may remain alight throughout, providing you remember to turn it away from the film. An investment in such a screen will be worthwhile if you like to process your own films, but for the occasional film it is possible to make a miniature safelight for use with a flashlamp bulb and battery. Obtain a small glass jar about 3ins. deep, with a screw-top lid, drilling a hole in the centre of the latter for a small bulb holder. Wires are led to the battery, a bulb inserted in the holder, and the glass base screwed into position. The latter should be covered with *very dark* blue/green material or painted on the outside in that colour.

The light penetrating such screens is very dim, but it can be said quite truthfully — and the writer has developed hundreds of films in this fashion — that after about ten minutes in a fully blackened room with only such a light, the eyes adjust themselves to the conditions, and can see the dishes quite plainly. This is something which has to be experienced to appreciate, yet it is even possible to see the progress of the image building up on the film.

You are, therefore, recommended to prepare your workbench in normal light, arranging your dishes in a set order as shown in the diagram, and almost touching, so that the chemicals do not spill when working from one to the other. The safelight is directed *away* from the working area, and can be left alight during the processing without ill effect. You are also advised to arrange that a clock or watch, with a luminous dial, stands before you, and that you work to the time and temperature tables of development as indicated by the manufacturers. In this respect it must be emphasised that constant agitation of the solution by see-saw development is much quicker than the tank method, but often some allowance is made for this in the prescribed tables, for any over development will produce negatives which are much too contrasted for success.

Bench layout

Reference to the diagram will show the layout of the working bench. First a dish of water for pre-soaking and rinsing, a dish for the developing solution and a dish for the fixing solution, with a clock for timing. By standing centrally in front of the set of dishes you also enjoy the advantage of being able to feel the positions by mere touch.

The routine is quite simple and we will assume that the equipment is prepared, the dishes filled with their respective solutions, and the temperature has been verified. It is most important that the developing solution is at the normal temperature of 68°; only a thermometer will verify this. If it is too cold, pour in a bottle and leave standing in a basin of hot water until the temperature rises sufficiently. In really cold weather the temperature can be maintained by placing the developing dish in another larger dish containing warm water.

The door has been closed and the windows sealed, so that we have only our tiny safelight, but, after waiting until the eyes have accustomed themselves we can break the seal of the film for processing. After unrolling the backing paper a short way we come across the free end of the film. Place a bulldog clip on this end immediately, after which the remainder of the film can be unrolled. You will discover that the other end of the film is stuck to the backing paper by means of a strip of adhesive tape. Tear off the film, fastening with a clip before it endeavours to tie itself into knots, which it will surely do if left to itself. We have to overcome this curling tendency before developing, so the remedy is to give a pre-soaking. If the film is now held with one end in each hand with the emulsion side downwards (this side has a natural tendency to curve inwards) and a little pressure applied to the back by the thumbs where it is held, the buckling will be obviated. The film should now be soaked in the clear water by running through in a see-saw fashion several times until it is pliable and in a manageable condition. Allow surplus water to drain, and you may proceed to the developing.

'See-saw' development

It is assumed that the temperature of the developing solution has been

checked and you are to use the time and temperature method of development. With your eye on the clock for the time of starting, one end of the film is immersed, emulsion side uppermost this time, in the liquid, and gradually pulled upwards as the other end descends. This is what we term see-saw development, a method used successfully long before the introduction of tanks. Many workers find it the most successful, not only because they can see the progress, but also because the solution is in constant, regular agitation and the chemicals do not sink to the bottom of the dish. A slow, steady action is required, for rapid up and down movements may cause bubbles to form in the developer which ultimately find their way to the surface of the film, preventing any chemical action should they remain.

When developing time is completed, the film is given a quick rinse in the plain water dish and then passed through the fixing bath until the creamy appearance has vanished, leaving the film in its customary black and transparent state. It should be noted that when the film has been in the fixing solution a few minutes and the developer then neutralised it becomes possible to allow more illumination and you can work with the aid of ordinary ruby light.

The film is washed thoroughly after fixing in running water for at least thirty minutes and then hung up to dry in a warm — but not hot — dust free atmosphere.

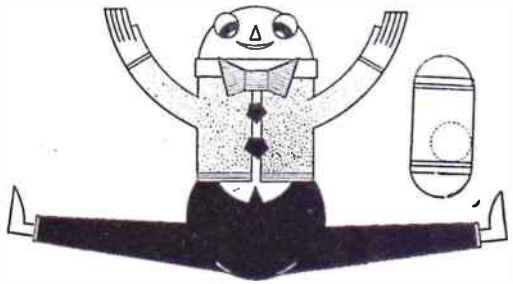
Here we would like to mention some other aids you may find useful in attaining successful processing, first of which is what is termed a wetting agent. This is a special substance which reduces surface tension and permits even spreading of liquid on the surface to be treated. When you withdraw a film from plain water you will find it covered with patches of globules, but large areas remain unaffected. If you add a wetting agent to the water you will find that the film is evenly wetted.

It is an obvious advantage to run the film through a bath of water containing a wetter which will speed the draining of the water from the film and avoid those tiny excesses in odd parts. A small bottle of this substance can be bought cheaply and is suitable for films and prints. Most photographic dealers will supply and a small bottle lasts a long while.

Scratch protection

We have only mentioned the fixing bath in brief terms, but remember you may use either plain hypo crystals, acid fixer or acid-hardening fixer. The latter hardens the film and not only permits drying at higher temperatures but also gives the emulsion added protection against scratching. Incidentally, it is possible to purchase chemicals for scratch proofing films if you wish to take this extra precaution, but in most instances the acid hardener fixer will be quite sufficient.

Amusing Jimmy, the Jumping Bean



If you sit the figure on the top of a sloping board and then give it a slight push, it will somersault downwards in a most entertaining fashion, owing to the behaviour of the rolling weight inside. Jimmy will also stand upon his head with ease when on a level surface. (A.E.W.)

THE elongated capsule with rounded ends, containing a free-to-move metal ball and commonly known as the Jumping Bean, is familiar to all. Young and old never fail to be intrigued by its antics as it somersaults down a tilted board in quite a lifelike manner. Schoolboys often manufacture Jumping Beans from scraps of metal foil, though most of the beans sold nowadays are made from plastic. Here is a grown-up version of the Jumping Bean which is well over sixty years old.

Jimmy is really a monster Jumping Bean made from a table tennis ball and a cardboard tube. Carefully cut a ball into two equal parts, using a razor blade to make the first incision and a small pair of scissors to complete the cut. Make a light cardboard tube 1½ins. long, with a circumference very slightly less than that of the half balls. Secure the tube with a strip of Sellotape. Fasten the half balls on to the ends of the tube, using Sellotape, but place a heavy ball bearing into the capsule before you finally seal it up. You will now have an outsize Jumping Bean which must be dressed and disguised to resemble a little toy man.

Make a pair of trousers for the figure, but let the trousers legs be horizontally outwards. Cut two pieces of cloth to size, sew up carefully and turn the miniature garment inside out. Glue the trousers on to one end of the body. Feet and shoes can be made in coloured paper and glued just inside the trousers legs. Use coloured paper to make a jacket and upward pointing arms. Glue the jacket and arms in place. Finally, decorate the face with paper eyes, nose, mouth and ears, and add a bow and buttons to the jacket. When you have finished, Jimmy Jumping Bean will be the joy of any small child.

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HOW TO LAY ROOFING FELT

IF you have just constructed a garden shed, garage, out-building, etc., and wish to make the roof weatherproof by applying some roofing felt, then the following notes may be of some value. Felting a roof is quite a simple job to do, and when tackled properly and conscientiously it will remain serviceable for many years.

By Finlay Kerr

Roofing felt is obtainable in rolls 12yds. long by 1yd. wide. Generally speaking, felt is sold only in rolls, but some large stores cater for the 'small jobber' and will cut smaller pieces of felt to suit your own requirements. When buying roofing felt always get the medium or thick grades which will give you longer service. The thin cheaper types of felt tear very easily, and although their initial cost is less, they are uneconomical in the long run.

Like linoleum, roofing felt stretches a little once it is rolled out, so to avoid bulging after it is laid, it is advisable to open it out on the lawn or path for a few hours before fixing it in position. This will give it a chance to get accustomed to outdoor conditions.

Roofing felt is quite easy to cut. The best tool to use for this task is a lino knife; the hooked part being specially suitable for cutting material of this nature. Lay a wooden straight-edge along the line of cut, and draw the knife towards you, using the straight-edge as a guide.

The roof surface must also be carefully prepared. Ensure that the heads of all nails are punched below the surface and that the roof boards are reasonably flat. Protruding nails and uneven boards will only damage the felt once it is laid.

It is a good plan also to give the roof boards a good coat of creosote or some other preservative first.

Start by laying the first length of felt horizontally across the roof at the bottom (or eaves). The felt should be bent about 2ins. over the ends and eaves and tacked in place. Use galvanised clout nails, which are specially suitable for this job: don't attempt to use any other type of nail as a substitute. Nail the first length along the edges and ends of the roof boards at 2in. intervals. When this is done, repeat with another length of felt, lapping this one over the top of the first length by at least 3ins., as shown in Fig. 1. Nail along the lapped

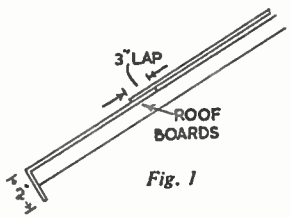


Fig. 1

joint at 2in. intervals. Continue in this way until you arrive at the ridge.

The illustration at Fig. 2 shows the treatment at the ridge. Don't carry the top sheet over the ridge on to the other slope. Instead, cut a strip of felt 12ins. wide and cap this over the ridge; 6ins. on each slope. Insert the nails at the bottom edges of this capping piece and not through the top.

To give additional protection to the felt against the wind, 1½in. by ½in. battens should be fixed at 2ft. 6ins. intervals up each slope as shown in the main illustration. When fixing these battens in position remember to use wood screws. Nailing is not satisfactory because if the timber warps or twists, the nails are liable to get eased out slightly and allow rain to penetrate under the felt. Screws, on the other hand, offer a much greater holding power. It is advisable also to creosote the battens before fixing to make them more resistant against the weather.

A slightly different treatment is necessary when felting a 'lean-to' — a single sloping roof built against a wall. The method of finishing off the top part where the roof meets the wall is to make a flashing from a strip of felt and tuck the upper edge into a joint in the brickwork, as shown in Fig. 3. Repoint the brickwork joint with a 1:3 cement/sand mortar filling.

Whenever possible, always try and avoid the use of vertical joints when laying roofing felt, because they can be rather troublesome. However, if you

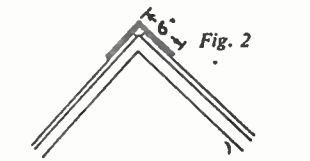


Fig. 2

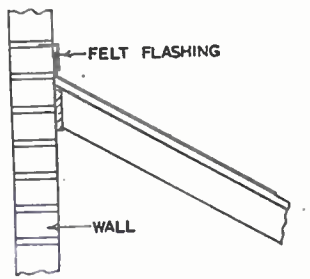


Fig. 3

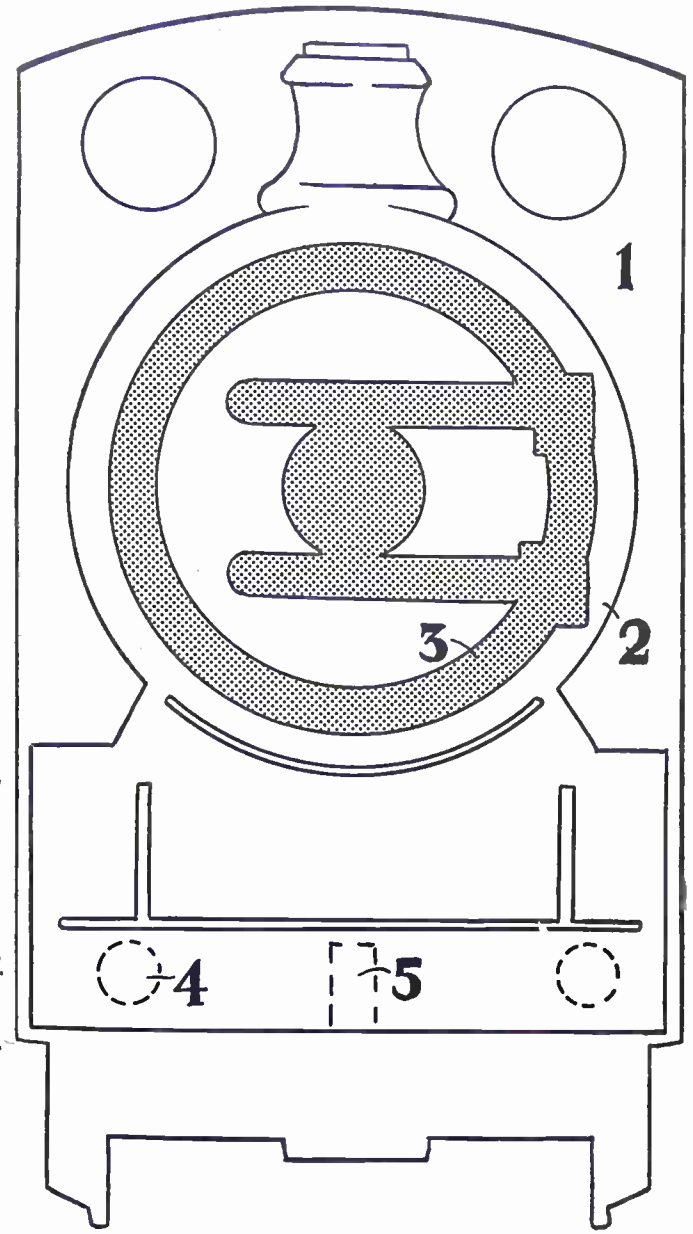
find that you must make a vertical joint, then make it with at least a 9ins. overlap.

Finally, bear in mind that it is best to tackle your felting jobs on a dry calm day. Working with long lengths of felt during windy spells can be rather tricky, and in some cases dangerous.

Next week the free design will be for making a delightful Weather House in the form of a Swiss Chalet. Make sure of your copy.

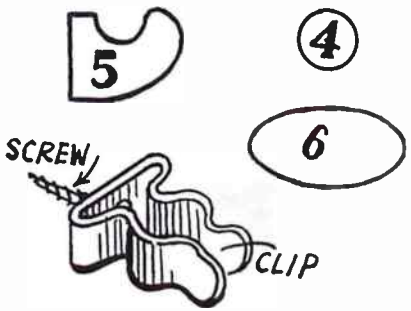
Full-size patterns

THE 'LOCO' EGG TIMER



CUT one each of pieces 1, 2, 3 and 5, and two of piece 4, from ¼in. wood. Glue piece 2 to piece 1, piece 3 to piece 2 and pieces 4 and 5 to piece 2. Paint with high gloss enamel and add the egg timer by means of the special clip illustrated. Screw a wall hanger on the back or add a strut from waste wood.

An egg timer and clip may be obtained from Hobbies Ltd., Dereham, Norfolk, price 1/1, postage 3d. (M.h.)



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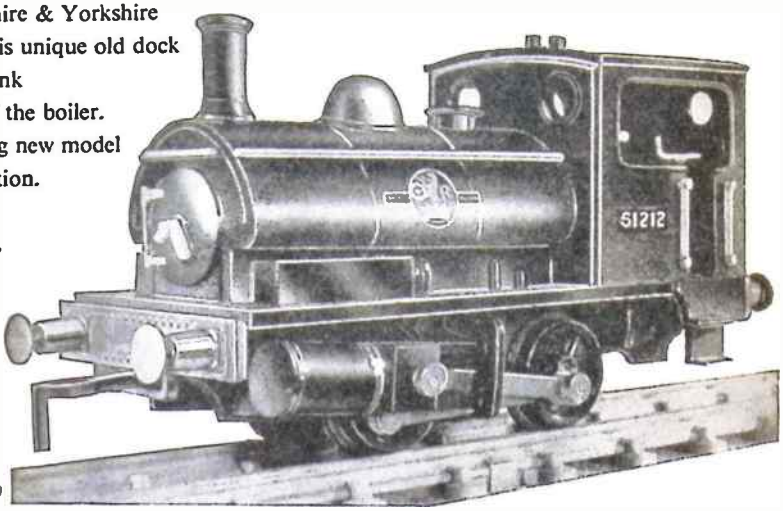

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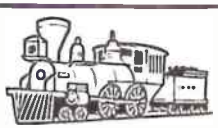
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KCM2

MANY useful grasses have been depicted on postage stamps. There is no plant more common than grass and none more useful. It feeds our sheep and cattle whose flesh forms part of our diet. Therefore we get our food indirectly from grass.

Sheep are depicted on the 1952 ½d. stamp of the Falkland Islands (1d.).

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The sugar-cane from whose sweet juice we get most of our sugar appears on a 1946, 40 cent stamp of Argentina (2d. used). Rice is a grain-plant which grows in warm countries such as India and China, Many of the people in India and China live on rice. The fields where it is grown must be covered with water at certain times of the year. This makes work in the 'paddy fields' very unhealthy. Natives are pictured planting rice on the 1949, 3 anna stamp of Burma (3d. used).

This short review of philatelic grasses is by no means exhaustive and it would be interesting to follow this instructive thematic sideline.

THEMATIC GRASSES

— By R.L.C.

Royal Dates on Stamps

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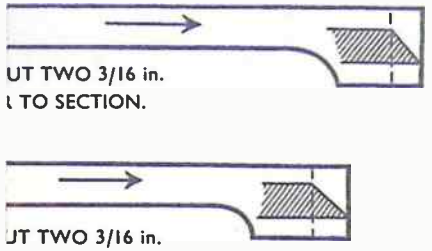
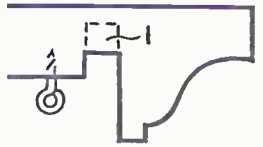
For confined spaces

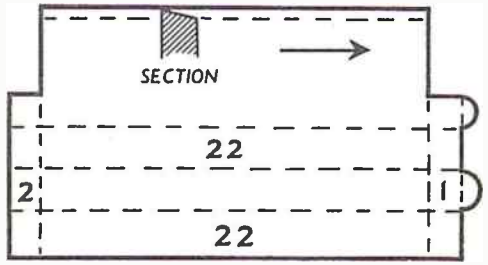




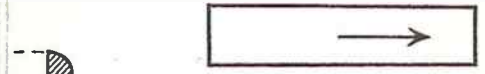
FINIALS 20.
CUT TWO 3/16 in.

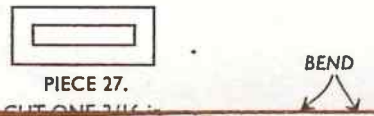
NDICATE
OF THE
WOOD.

SIZE. 5½ in. WIDE
5 in. HIGH
APPROX.



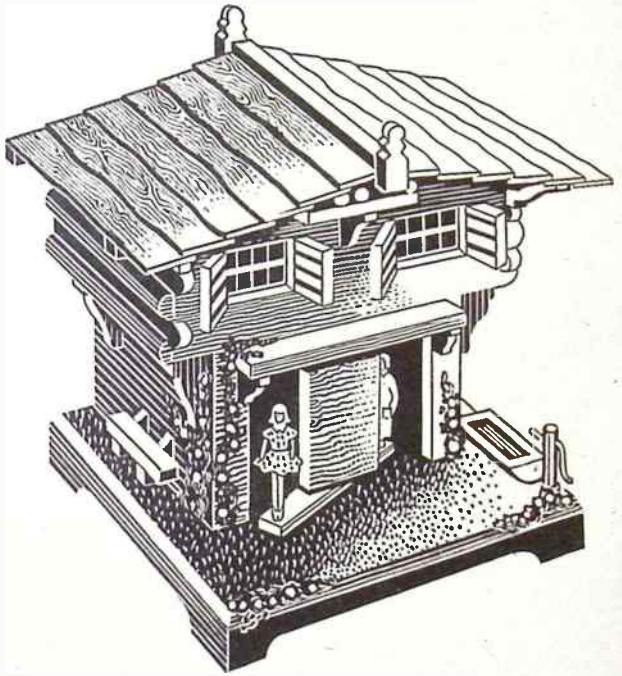
SIDES 3. CUT TWO 3/16 in.
CHAMFER TO SECTION.





Hobbies DESIGN No. 3320

SWISS CHALET WEATHERHOUSE



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

● Continued on page 186

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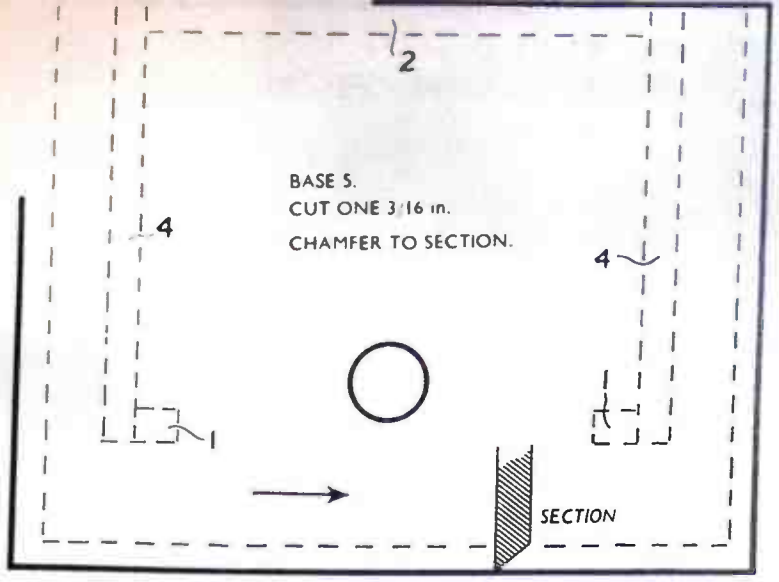
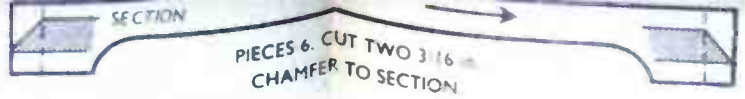
A KIT OF MATERIALS FOR MAKING THIS DESIGN IS SUPPLIED BY HOBBIES LIMITED, DEREHAM, NORFOLK. PRICE ON APPLICATION.

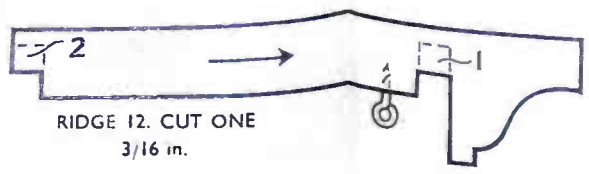


BASE 5.
CUT ONE 3/16 in.
CHAMFER TO SECTION.



PIECES 6. CUT TWO 3/16 in.
CHAMFER TO SECTION

PIECES 7. CUT TWO 3/16 in.

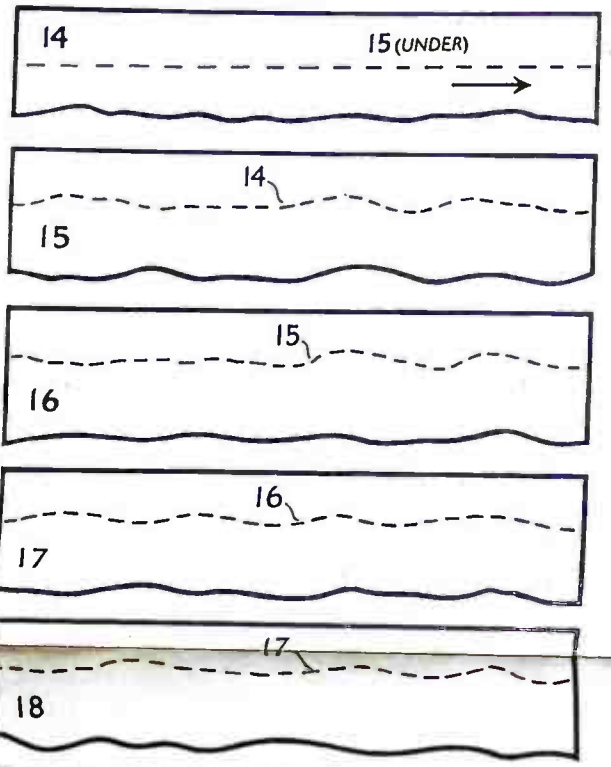


RIDGE 12. CUT ONE 3/16 in.

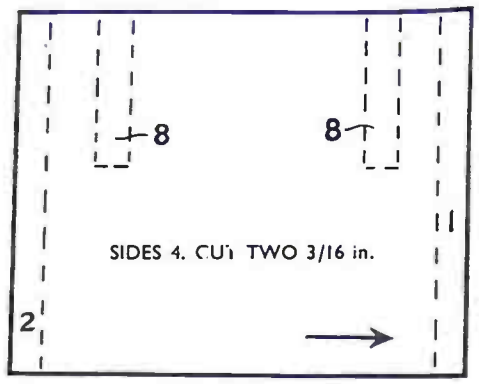
THE ARROWS INDICATE THE DIRECTION OF THE GRAIN OF THE WOOD.

FINIALS 20.
CUT TWO 3/16 in.

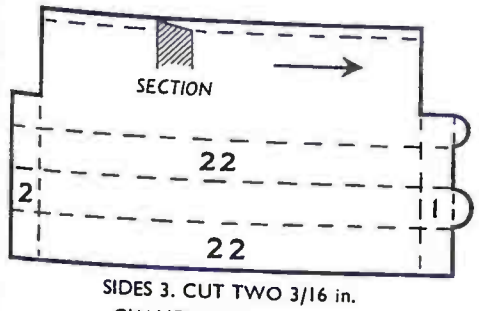
SIZE. 5½ in. WIDE
5 in. HIGH
APPROX.



ROOF PIECES 14 TO 19.
CUT TWO OF EACH 1/16 in.



SIDES 4. CUT TWO 3/16 in.

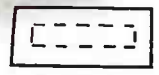


SIDES 3. CUT TWO 3/16 in.
CHAMFER TO SECTION.

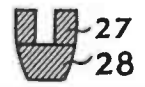
PIECES 22. CUT FOUR FROM HOBBIES No. 35 1/4 in. 1/2 ROUND BEADING.

SHELF 9. CUT ONE 3/16 in.

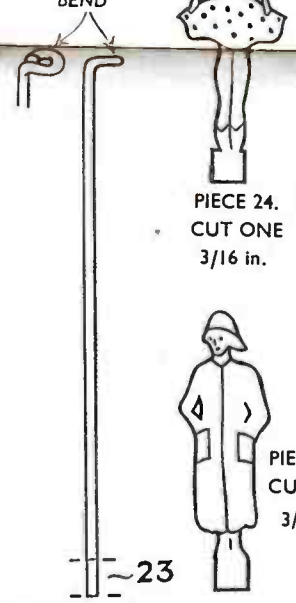
PIECE 27.



PIECE 28.
CUT ONE 3/16 in.



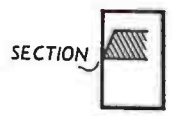
GLUE PIECES 27 & 28 TOGETHER AND SHAPE TO THIS SECTION.



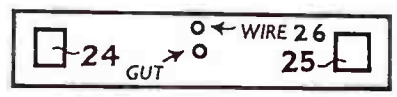
PIECE 26. CUT ONE FROM WIRE.

PIECE 24.
CUT ONE
3/16 in.

PIECE 25.
CUT ONE
3/16 in.

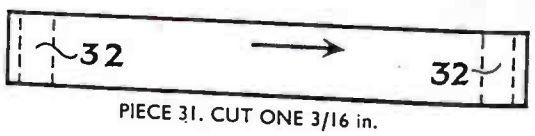


SHUTTERS 11.
CUT FOUR
3/16 in.
CHAMFER TO SECTION.

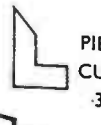


PIECE 23. CUT ONE 3/16 in.

BRACKETS 8.
CUT FOUR 3/16 in.



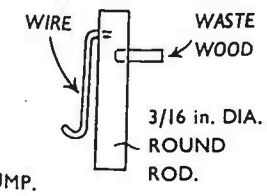
PIECE 31. CUT ONE 3/16 in.

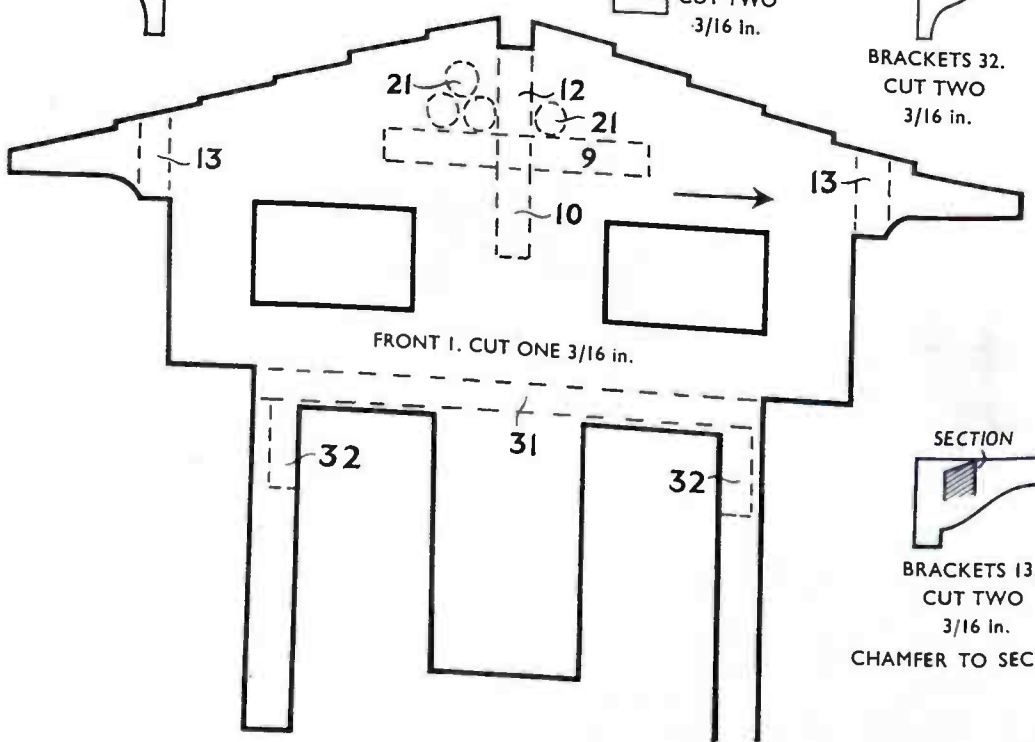


PIECES 30.
CUT TWO
3/16 in.

BRACKETS 32.
CUT TWO
3/16 in.

PUMP.
MAKE ONE.





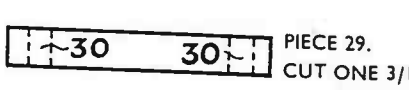
FRONT 1. CUT ONE 3/16 in.

PIECES 21.
CUT FOUR
FROM 3/16 in.
ROUND ROD.

BRACKETS 13.
CUT TWO
3/16 in.
CHAMFER TO SECTION

BRACKET 10.
CUT ONE 3/16 in.

BACK 2. CUT ONE 3/16 in.



PIECE 29.
CUT ONE 3/16 in.

WINDOWS. PAINT ON THIN CARD OR PAPER. PASTE IN POSITION.

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The sugar-cane from whose sweet juice we get most of our sugar appears on a 1946, 40 cent stamp of Argentina

THEMATIC GRASSES

— By R.L.C.

(2d. used). Rice is a grain-plant which grows in warm countries such as India and China, Many of the people in India and China live on rice. The fields where it is grown must be covered with water at certain times of the year. This makes work in the 'paddy fields' very unhealthy. Natives are pictured planting rice on the 1949, 3 anna stamp of Burma (3d. used).

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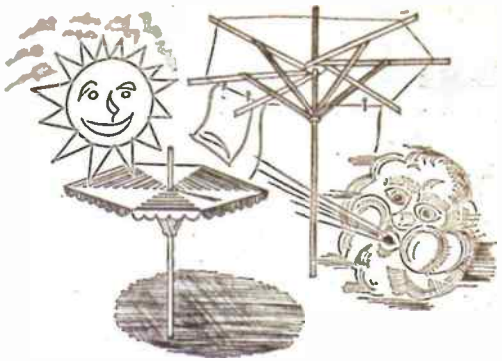
For confined spaces

A REVOLVING CLOTHES LINE

(ALSO USEFUL AS A SUNSHADE)

By Karl Albers



IT is often a problem to dry washing in a confined space, but even where there is a lot of room in the garden, or yard, a revolving clothes line may be welcomed.

In the first instance it saves a lot of room, and secondly it is no longer necessary to carry the laundry basket up and down a far reaching clothes line.

The revolving clothes line described in this article has three lines 12ins. apart and an outer diameter of about eleven feet. At this dimension an approximate length of 80ft. of line is accommodated.

Drill ¼in. diameter holes into the pipe at the positions indicated in the elevation sketch. The holes are 9ins. apart in order that the height of the line can be adjusted to convenience.

Dig a hole for the pipe at a desired position in your garden or yard, the required size of the hole to be 18ins. by 18ins. by 2ft. 3ins. deep. Grease or oil the bottom of the galvanized pipe. Place the pipe into the hole, set upright and secure in this position. Fill in concrete around the pipe. Turn the pipe just before the concrete sets hard, and withdraw the pipe when the concrete has set.

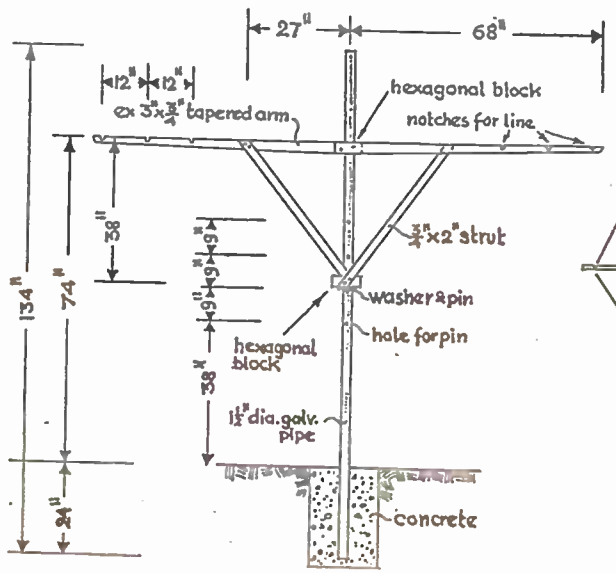
MATERIALS REQUIRED

No. 1. 1¼ins. diameter galvanised pipe, 11ft. 2ins. long.
No. 6. 3ins. by ¾in. wooden strips, each 6ft. long.
No. 6. 2ins. by ¾in. wooden strips, each 4ft. long.
No. 2. 2ins. thick wooden blocks of hexagon shape, 7ins. diameter.
No. 36. 1¼in. long wood screws.
and about two buckets full of concrete.
Straight grained pine or western cedar is most suitable.

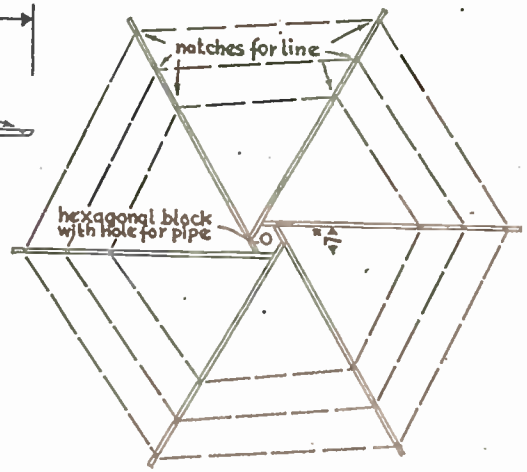
Drill holes into the centre of each of the hexagon shaped blocks, making the holes a bit larger than the outside diameter of the pipe — about ¼in. all round.

Taper off the 3in. by ¾in. strips down to 1½in. by ¾in. at the ends. These strips will form the arms. Screw one arm to the hexagonal top block. Put the pipe through the top block and also place the other block into position on the pipe. Mark out one of the 2in. by ¾in. strips to serve as a strut. See the elevation sketch for the position of the struts. Now you can cut all other struts and arms to exactly the same length and shape. Drill and countersink for two screws at each joint.

Screw all arms to the top block, after the pipe has been removed from the blocks. Take the top portion and place upside-down on to the ground. Begin



ELEVATION



VIEW OF UNDERSIDE

the screwing-on of the struts by first fixing two struts opposite to each other,

● Continued on page 186

Instructions for making

SWISS CHALET WEATHERHOUSE

A NOVEL weather indicator which tells when it is going to rain by the action of two charming little figures, makes an excellent idea for a gift and is always acceptable.

Set in a charming Swiss chalet, the appearance of the appropriate figure outside gives an indication of what kind of weather to expect. It is arranged so that when the girl is outside, fine weather is indicated, and if rain is in the offing, the young boy emerges and the girl goes inside. As the humidity in the air alters, so the figures change position. This is brought about by the natural property of a piece of gut which stretches when dampened and so turns, and when dry it contracts and reverses. The kit supplied by Hobbies Ltd, includes a suitable piece of gut for this purpose.

It is, of course, a matter of which direction the gut turns that brings out the appropriate figure, and to ensure accuracy a trial should be made with the indicator assembled outside the chalet and before the actual figures have been fixed on their platform.

All the cutting and assembly is straightforward, and there should be no difficulty in making up this novel design. All parts are shown full size on the design sheet, and they should be traced and transferred to their appropriate thicknesses of wood and cut out cleanly with a fretsaw.

Commence assembly with the base as shown in Fig. 1, gluing pieces 6 and 7 underneath piece 5 after mitring at the corners.

Continue by erecting the front, back and sides. Pieces 4 are glued to the front (1) and back (2), and the upper sides (3) are similarly glued in position as shown in Fig. 2. The pieces of No. 35 half-round beading (22) can also be added at this stage, and pieces of waste ¼in. wood should be glued behind the window openings.

Fig. 3 shows how the catgut is attached to the ridge piece (12) by means of a small screw-eye. The length of gut is adjusted so that when the ridge piece is in position, the platform for the figures swings just clear of the floor. At this stage test the twisting action of the gut as already mentioned, before gluing the ridge piece in place. The addition of the finials (20) and wire stabiliser is also shown in Fig. 3.

Continue with the roof as shown in Fig. 4, by gluing pieces 14 to 19 in place, overlapping each other up to the ridge. The projecting pieces 13 are glued underneath pieces 18 in the front.

The chalet can now be glued in position on the base before adding other adornments such as the shelf and bracket (9 and 10), wood logs (21), pump and trough, seat, window shutters, etc., shown in Fig. 5.

In applying the finish the aim should be to give a 'weathered' look to the chalet. Stain can be diluted to give a variety of shades, particularly to the roof and sides. An intelligent use of various colours of paint will also do much to enhance the picturesqueness of the model. Floral decorations can be fashioned from plastic wood or painted on, and the windows are painted as shown on the design sheet.

● Continued on page 185

KIT FOR ONLY 5/-

Kit No. 3320 for making the Swiss Chalet Weatherhouse contains panels of wood, round rod, beading, wire and catgut, etc. Costing only 5/-, kits are obtainable from all Hobbies branches or from Hobbies Ltd, Dereham, Norfolk (post 1/6 extra).

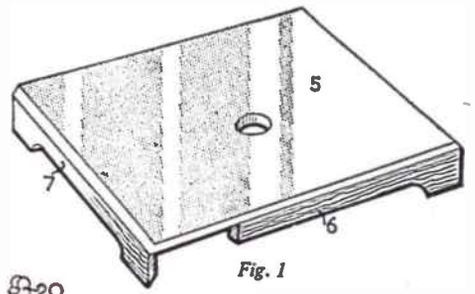


Fig. 1

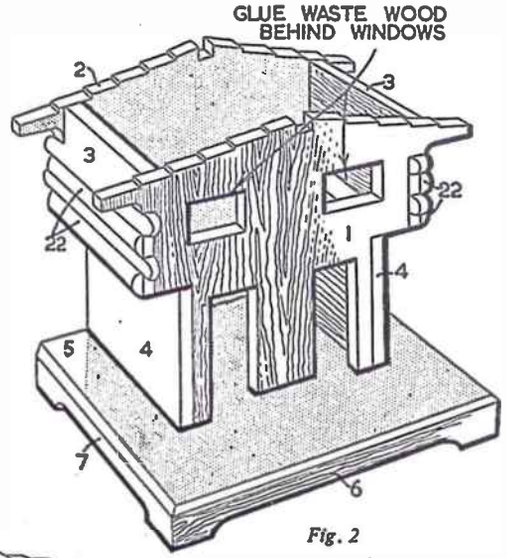


Fig. 2

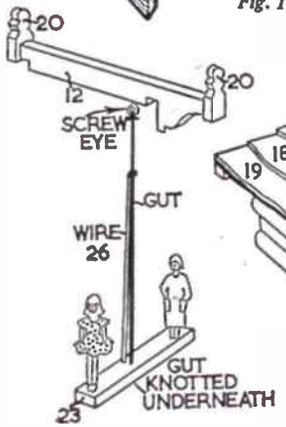


Fig. 3

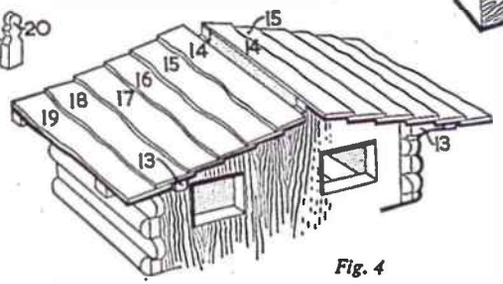


Fig. 4

A SAFETY KEY BOARD

KEYS have a knack of getting lost just when wanted, and it is most annoying to have to hunt for the garage key in order to put the car away or get the cycle out.

By keeping all the important keys carefully labelled and all together in a convenient place there will be no fear of this happening and much time will also be saved.

By A. F. Taylor

Make this very useful key board and have them all available in a handy position for all the members of the family. Each key is attached to a special label which indicates where it belongs only when it is in position on the board. Therefore if a stranger got hold of a key he would not know where it fitted, and this is an added safeguard.

By making the label of transparent perspex, the name, which is written only on the board, can be read through it when it is in its proper slot. On the end of the label, however, will be found some dots which correspond with the numbers 1 to 5 on the board to ensure that it is placed in the proper slot.

Our board has been designed to hold five keys, but it can easily be altered to take more or less if needed. The baseboard is ¼in. plywood or it could be a similar thickness of hardboard, and the size for a five-key board is 11ins. long and 3ins. wide.

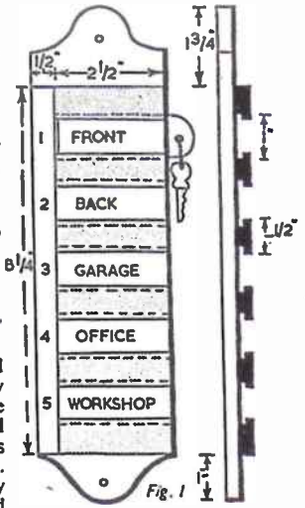


Fig. 1

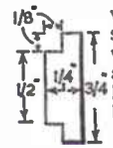


Fig. 2

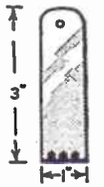


Fig. 3

Fig. 1. shows the lay-out together with all measurements. Down the left side is a strip of ¼in. ply or hardboard which carries the figures 1 to 5, and also acts as a stop for the key labels. It is 8¼ins long and ¼in. wide, and is glued to the board as shown.

The runners for the key labels, six in number, are 2½ins. long ¾in. wide and ¼in. thick. Make the rebate ¼in. wide and ¼in. deep and this is done on both sides of four runners and on one side of the remaining two which are placed at the top and bottom respectively.

Glue the runners in position and secure with panel pins from the back, leaving a space of 1in. between each for the labels to slide in easily.

For the labels use transparent perspex having a thickness of about ⅛in. and cut these to the shape shown in Fig. 3. In the rounded end drill a hole large enough to take the cord which is attached to the key.

The dots on the other end are made by drilling half way through the material. A dab of paint placed in each sink will then make each stand out very clearly. Different colours can be used in order to aid in the identification of the keys.

Now paint in the numbers 1 to 5 down the left side and also the names which will show through the key labels. Drill a hole in the top of the board for fixing it to the wall in a convenient position and finish off with a coat of varnish.

● Continued from page 184

Swiss Chalet Weatherhouse

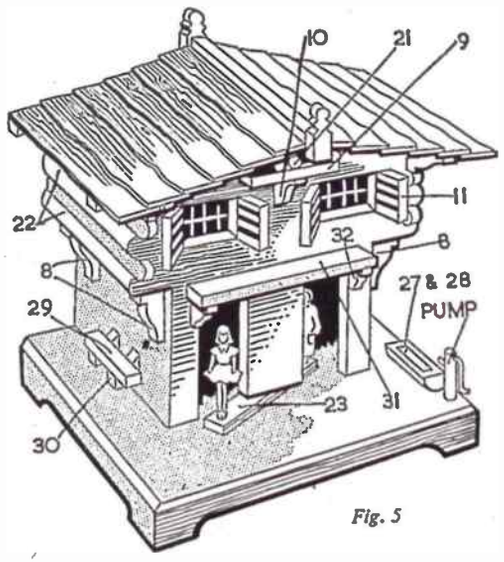


Fig. 5

Problem by 'Mystifier'

THE CHANGING REELS

HERE is a neat little trick for you to perform using cotton reels and a paper tube. First of all we will give the method of presentation, indicating the secret and mechanics of the effect later.

The performer brings forward five

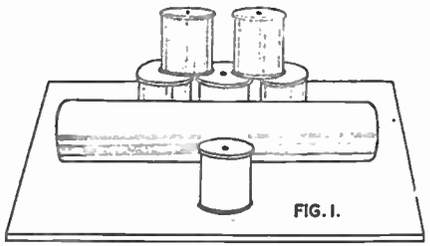


FIG. 1.

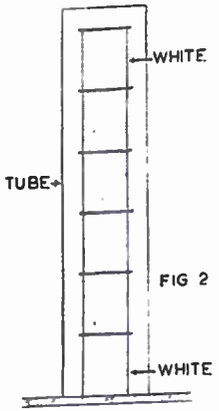


FIG 2

cotton reels on a little tray, ultimately stacking them one on top of the other with a solitary white reel at the top. He then takes a tube of paper, which is just wide enough in diameter to slip over the reels and long enough to cover them entirely from view of the audience. The tube is passed over the stacked reels but after removal of this tube the white reel is found to have been transferred to the bottom of the stack!

Six reels needed

Actually there are six reels used for this trick, and you will need two white ones and four of any other colour, but preferably dark to show the contrast. Before presenting the trick the reels should be stacked on the little tray in the form of a pyramid as shown in Fig. 1, with the sixth white reel at the rear so that it is unseen by your audience. As a further precaution against observation of this reel you may lay the prepared tube of paper flat on the tray between the pyramid and the odd white reel. As stated, this paper tube must be wide enough to slip over the reels, yet not too slack — you will see why later — and long enough to hide *six* reels when stacked one on top of the other. So much for the few properties required, but you are advised to read the following routine carefully and to practise before presenting.

You commence the trick by displaying the tube of paper, passing a wand through the opening, or even allowing an inspection, displaying your empty hands in the accustomed manner.

Having displayed the paper tube you next stand it vertically on the tray so that it covers the odd white reel which has been placed behind the pyramid of five reels. Now take up the five reels, which may also be offered for inspection, stacking into a pile *so that the white one is on top*. You must draw the attention of your audience to this fact and then drop the entire stack into the vertical tube. If you wish to drop the reels in separately you may do so, showing that the white reel is the last one.

You may now explain that the trick is to transfer the white reel from the top to the bottom of the stack, a difficult task even with the help of your wand and a few magic words.

After saying the magic words take hold of the tube at the top, where the six reels stand as shown in Fig. 2, so that the finger and thumb of the right hand grip the top white reel concealed within. Slide the tube off vertically still gripping the reel thus revealing the piled stack with a white reel at the bottom. Tilt the tube quickly into the air — still retaining your hold — and the white reel will drop into the palm of your right hand as you release your grip. Almost at the same time the left hand must take the tube which can be shown as empty!

It sometimes creates a distraction to toss the tube to some member of the audience while you take the opportunity of turning the right side of the body away from the audience, allowing you to dispose of the cotton reel by dropping it into the jacket pocket. When the right side is turned away from the audience the quick action of disposing of the reel will be unseen if all movements are co-ordinated, but in some circumstances it may be necessary to proceed more calmly, placing the hand into the pocket for a handkerchief (while disposing of the reel) to mop the brow after such an exhausting feat!

The mechanics of this little trick are really quite simple but for successful performance it is essential that you understand the method and carefully practise many times so that the tilting of the tube upwards, taking by the left hand and disposal of the white reel appear automatic and natural movements. The surprise of the audience will amply repay your efforts.

● **Continued from page 183**

Revolving Clothes Line

then screw on all the remaining struts.

It may be found difficult to get all the arms into one true level plane, and the remedy for this is to work on block and arms upside down on a level concrete or wooden base. You may also find it difficult to screw the last arm into position. This can be overcome by drilling the holes through this last arm at a slant, in order that you may be able to get at the last two screws from above or from below the arm next to it.

Treat the wood with a preservative, such as Presotim or Cuprinol (not creosote). The timber can have sawn edges only, but the better job is to plane them and to chamfer all edges.

There are several ways to secure the line in position. In this example the arms have been notched out. A wire pin, or a small bolt is placed through one of the holes in the pipe to hold the wooden framework for the revolving clothes line in the desired position (i.e. height).

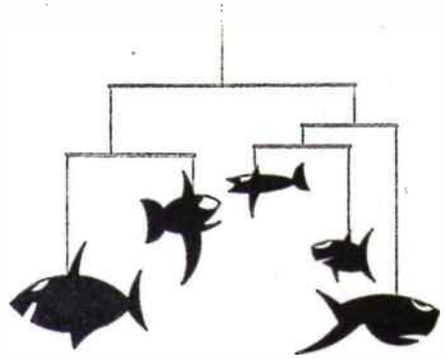
In most households the washing-line is only required once a week, so our revolving clothes line may play a dual purpose. Turn it into a sunshade, under which you can sit in a deck-chair.

The wooden top structure (see Fig. 2) will serve as a template to cut out suitable sections of canvas for the top cover. Cut six triangles, making a seam over each arm. An edging strip can be made of differently coloured material.

The completed canvas top simply rests on the top supported by the wooden arms and by the clothes line itself.

HOW TO MAKE EXCITING MOBILES

Described By A. E. Ward



MOBILES are darkly silhouetted or brightly coloured objects suspended upon wires or threads, which perform a perpetual aerial ballet in response to the slight air currents in the rooms where they are hung.

A mobile is like a kaleidoscope in space, its variously shaped parts never repeating the same pattern exactly. A well constructed mobile is intriguing and as soothing to the nerves as a tank of goldfish. In fact, the commonest subject for a mobile is swimming fishes. If you are artistic you can copy the gay colours and fantastic shapes of exotic fishes and make them float about in the air with all the mystery and enchantment of an underwater fairyland.

There is nothing difficult about making a mobile. Why not prove it for yourself by constructing a simple mobile of the swimming fishes type. You will need some thin, good quality black or coloured cardboard, a few strips of ¼in. thick balsa wood and some black cotton. Draw out the two fairly large fish shapes (A) and (B) shown in Fig. 1, on the cardboard and cut them out, using sharp scissors. Suspend these at different heights, on lengths of cotton, from each end of a one foot length of balsa strip. The cotton can be glued into place, or threaded through the cardboard and balsa, using a needle and the cotton lengths knotted where required (Fig. 2).

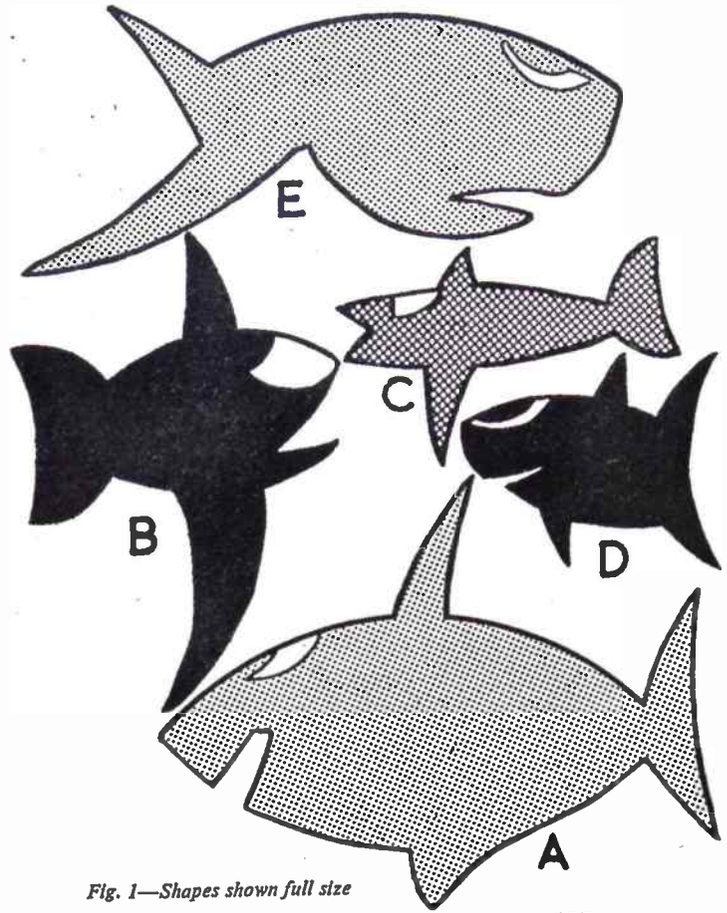


Fig. 1—Shapes shown full size

Cut out the smaller fishes (C) and (D) and suspend them, upon short threads, from each end of a 9in. long strip of balsa. Make fish (E) roughly as heavy as both fishes (C) and (D) together with their supporting strip. Suspend the supporting strip of fishes (C) and (D) from a short thread, so that the strip hangs horizontally. You may need to trim away little pieces of (C) or (D) to achieve the correct balance. Join the short thread to one end of a 10in. long balsa strip. To the other end of the 10in.

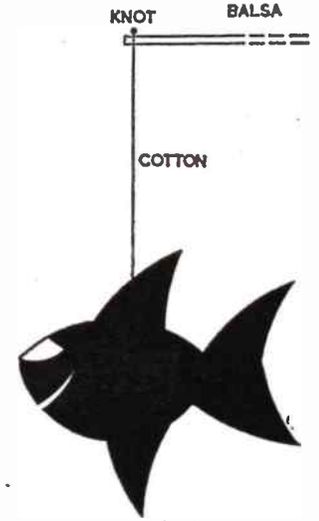


Fig. 2

strip fix fish (E) on a longer thread. Suspend the 10in. strip from a short length of cotton, so that fishes (C) and (D) balance fish (E) and the 10in. strip is also horizontal. Again you may need to trim away pieces of the various fishes to achieve even balance.

Moved by air currents

Suspend the supporting strip of fishes (A) and (B) from a fairly short length of cotton, adjust the balance so that the strip is horizontal, and fix the thread to one end of a two foot strip of balsa. Suspend fishes (C), (D) and (E) from the other end of the long strip. Now suspend the long strip upon a long piece of cotton and let the whole mobile hang from a lampshade while you adjust the balance of every part. All the supporting strips should be horizontal. Stand back and watch your completed mobile come to life as the cardboard fishes are moved about by the air currents in the room.

You will realise that the secret of success in making mobiles is, largely, in the achievement of perfect balance between the various parts.

If the mobile described has interested you, no doubt you will wish to make

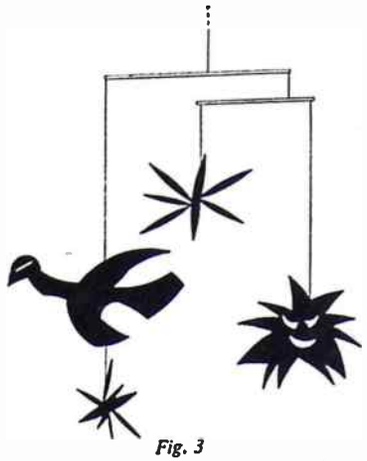


Fig. 3

other mobiles of your own design. Shapes fashioned from metal, chicken wire, balsa or plywood can be suspended from supporting pieces made of stout wire, bamboo, twigs or even drinking straws. Pieces of coloured wool, cloth strips and Christmas decorations can all be utilized. Little frames, within which small shapes are suspended, may be hung upon the supporting pieces and you might arrange matters so that suspended fragments of coloured glass or metal ring together in stronger air currents.

Challenge to imagination

Of course, colour is an important element to consider in an attractive mobile, though do not make the mistake of using too many colours at once. Parts may be painted different colours on both sides to produce effects of changing hues. Black shapes, enlivened with a single form coloured bright yellow make mysterious, abstract compositions.

Subjects for your mobiles may include falling leaves, dancers, birds and weird flying machines and compositions of abstract shapes (Fig. 3) will offer a challenge to your imagination. Mobiles are often used as decorations in large shops and many advertisers have used them to draw attention to their products.

Cut-out characters from story books will make suitable mobiles to hang in a child's bedroom or nursery, where they will give great pleasure.

Entertaining 'Flip the Cone' Game

Described by

T. S. Richmond

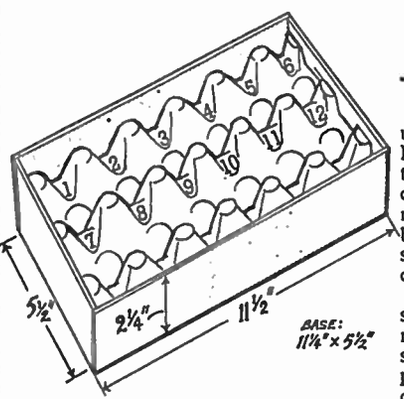
APROVED favourite presented in a new and novel form, this 'Flipper Hand' is easily made in wood, while the 'target' is improvised from an egg tray fitted into the score box.

Competitors, striking the arm of the flipper hand, direct cardboard cones into numbered compartments of the score target.

First make up the 'Flipper Hand' cone launcher, consisting of parts (H) and (S) (shown full size on pattern page), and 2¼in. square pivot block (P), mounted to base piece (B). This base piece, cut from ¼in. soft wood, measures 10ins. by 2¼ins. Transfer patterns of shapes (H) and (S) on to ¼in. 3-ply wood. Extend length of arm of flipper hand (H) at (X) by 2¼ins. to make complete length of 9¾ins.

Cut out hand and arm piece and two of bearers (S) with fretsaw. Cut the slot to accommodate the pivot rod with a tenon saw. Cut the 3¼in. long pivot from ¼in. metal rod, and with the rod fitted neatly in the slot, glue and nail the block (P) to underside of flipper hand arm. This should be fixed 2¼ins. from end of arm. Holes in supports (S) are drilled a loose fit for pivoting ends of the rod. With parts (H), (P) and (S) assembled, glue and nail supports in alignment, 2ins. from one end of base (B).

Missiles used in the game, consist of cardboard discs of 5ins. diameter cut out and formed into cones. A full-size pattern of (C) is included on facing page and a number of these, transferred on to thin, flexible card are cut out with scissors. Form discs into 2¼in. cones, as shown, securing with glue and staples, or Sellotape.



The target box housing the 'egg tray' score compartments

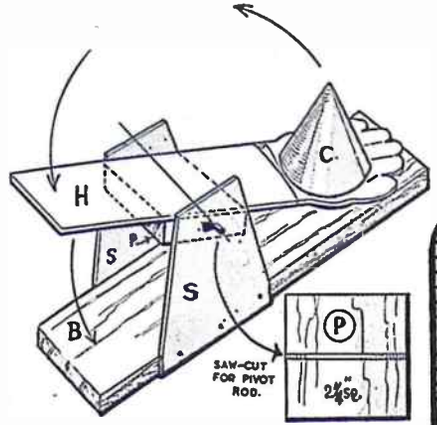
PATTERNS ON PAGE 189

Glasspaper smooth the flipper hand unit before painting in plastic enamel. Paint hand pink, adding finger and thumb markings when dry with darker colour. Paint arm blue or other colour to represent the sleeve of garment. Paint base and uprights in darker or same shade of colour used on arm. The cones can also be decoratively coloured.

Make up the target unit consisting of sides and ends cut from ¼in. material and glued around base piece of same or slightly thicker wood. Compartments for housing correctly-aimed cones are provided by an egg tray section. Cut a 12-compartment section to fit neatly inside the prepared box and add score numbers against each hole.

'FLIP THE CONE' GAME PATTERNS

(See page 188)



LAUNCHER ASSEMBLY

Radio Control of Models — 10

Transistor and Other Circuits

SOME further notes on adjusting the model control equipment which has been described should be helpful. A transistor receiver may also be more convenient than the valve set, in a very small model, and for short range working.

With the transmitters described, no adjustment is necessary, except tuning into the 27 mc/s model control band, as explained. The transmitter should be tuned fairly accurately *before* connecting up an aerial, to avoid causing interference by radiating a signal of wrong wavelength. Final, exact tuning should be done after connecting the aerial, because using the latter slightly changes the transmitter frequency.

By 'Radio Mech'

When testing the equipment indoors, with a valve receiver, no aerial need be fitted to the transmitter. For greater range, or for adjusting a transistor receiver, a short aerial will be needed. This can be a metal rod, standing vertically, or single strand or flexible wire may be used. When the wire is too thin, or too long, to stand alone, it may be supported by a string loop attached to any convenient object. Out of doors, a thin bamboo cane may be used to hold up the top of the wire.

The actual length of the transmitting aerial can be from a few inches up to approximately 8ft. 6ins. As the aerial is increased in length, the power radiated also increases. It can thus be adjusted to suit circumstances. For example, a long aerial would be unnecessary when testing at short range, or for a small pond, unless an insensitive transistor receiver were used. Rod aerials, in 1ft. sections, or of telescopic type, are very handy because they will stand alone, and can be collapsed or taken apart for transport.

Signal strength meter

If experiments are made with transmitters and aerials, it is helpful to make up a meter which will show the strength of the signal actually radiated. This unit consists of a coil, tuned to 27 mc/s, a crystal diode as used in crystal sets, and a 0–50 or 0–100 microamp meter, wired as in Fig. 1, with a condenser of 100pF to ·05μF or so across the meter.

The coil can be made as described for transmitter or receiver, that is, 9 turns of 18 S.W.G. or similar wire, self-supporting, ¾in. outside diameter, and turns spaced so that the winding is about 1in. long. For tuning, a beehive pre-set may be used, or a small 20pF or similar variable condenser, with control knob, can be fitted instead. If a calibration mark is made, as explained for the bulb meter, the unit will also show when the transmitter is on the correct frequency.

The signal strength meter aerial can be a single rod, or wire 9ins. to 18ins. or so long. Remember that changing this aerial will slightly alter tuning.

In use, the unit is taken a short distance from the transmitter, and tuned for maximum reading on the meter. If the pointer tends to move backwards, reverse connections to the diode or meter. With a 1-valve transmitter, the unit can be up to 5 yards or so from the transmitter, this being increased to about 20 yards with a 2-valve transmitter.

Changes to the transmitter aerial which increase the power radiated will at once be shown, because the distant meter will give a higher reading. A friend to call out meter readings is helpful. The transmitter aerial may have one sliding section, allowing length to be adjusted from about 8ft. to 8ft. 9ins. As the aerial length is adjusted to a fraction of a wavelength of the transmitted signal, a rise in power will be indicated by the distant meter, this again falling off as the aerial is made too long.

Using a resonant aerial length in this way is useful for maximum range. For average working, however, there is no need to use any particular length of aerial.

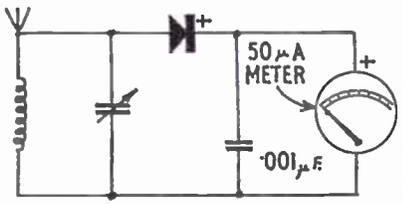


Fig. 1—Signal strength meter.

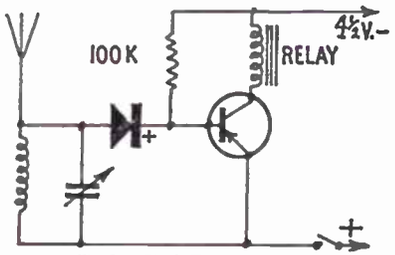


Fig. 2— Single Transistor circuit

Do not take the signal strength meter very near a powerful transmitter, without first de-tuning it, or disconnecting the meter, or it may be damaged.

1-valve set adjustments

When making receiver adjustments, it is very helpful if a friend will open and close the transmitter key at one or two second intervals. Receiver adjustments can then be made with and without a signal. A clockwork device can be made which will open and close a pair of contacts wired in the H.T. circuit, thereby automatically keying the transmitter. The surplus 'master contactor' will do this, giving ½-second pulses each second.

Initially, the receiver potentiometer may be set at full value. The transmitter signal should then be found on slowly turning the trimmer. A vertical aerial about 12ins. long will do well for these adjustments. Tuning is quite critical, as the signal will be almost lost if the trimmer is set even a little off the correct point. Correct tuning is that which gives the lowest current reading on the receiver H.T. meter, with the transmitter ardiating.

An insulated tool at least 4ins. long must be used for tuning,as the proximity of the hand, or a metal blade, will alter tuning.

The receiver meter should now rise and fall each time the transmitter is keyed. This current change will be from almost zero, up to 1½mA or so, near the transmitter. As the receiver is carried away from the transmitter, the minimum current will be higher. At a distance, the meter may show 1·4mA, and 1·5mA, representing a current change of only ·1mA, which is near the minimum which can be relied upon to operate the relay.

Final adjustments to tuning and potentiometer should be at a distance, to secure the greatest *current change*. A friend to key the transmitter, or a clockwork keying device, is almost essential. Working adjustments should be made with the receiver in the model, with its aerial in position.

The 1-valve receiver described gives very easy, reliable working at short range, with a current change of 1mA or more, which will work the relay strongly, but adjustments become more and more exact as the distance is increased.

A little experiment with the relay, with the meter, potentiometer and dry battery wired in series, will be worth while. It should be so adjusted that the maximum receiver current *just* holds the armature against the magnets. When this current falls, the armature will then be released.

Adjusting the armature tension screw will change the current required to draw down the armature. It should click firmly backwards and forwards with a current change of ½mA. That is, be held at 1½mA, and released at 1mA.

When wired to the receiver, the armature should work well each time the transmitter is keyed. The receiver should then be carried farther and farther from the transmitter, the relay being readjusted as required to keep it working. The gap between contacts, and tension, will become very slight, when the relay is working with a small current change.

As with the receiver tuning, working at short range is very easy. But the care with which adjustments are made will govern the maximum range at which the model can be controlled.

Transistor receiver

If a permanent magnet microamp relay is wired in the place of the meter, in Fig. 1, this will provide a receiver capable of working at short range. However, such relays are costly, and not easy to construct.

A larger current change can be obtained by wiring a transistor as in Fig. 2 and the ordinary receiver type of relay will then work. This circuit gives a current change of 1mA or so near the transmitter. But this soon falls off, at increased distance, and the circuit is thus only suitable for a few yards, at maximum. It would do for the control of a small model in a room. With some transistors, the resistor may be changed in value with advantage. The tuned circuit can be as described.

A 2-transistor circuit as recommended by Brimar for the TS3 and TJ3 transistors is shown in Fig. 3. It does not work satisfactorily with some cheap surplus transistors. Sufficient current change is obtainable to work even a low resistance relay strongly.

Transistor circuits are not really suitable for long distance control of a model. They are best for very short range, and small models having insufficient space for a valve set, and batteries.

With a circuit such as that in Fig. 2, current may rise when the transmitter is keyed (not falling, as with the 1-valve receiver). This depends on the way the diode is wired in. It does not make any difference to the actual working of the model, as it is only necessary to change over to the second set of relay contacts. But if it is not known that the armature may be drawn towards the magnets, when the transmitter is keyed (instead of released) some confusion may arise.

A valve may be used to increase the current change, one circuit being shown in Fig. 4. This has the advantage that cheap surplus valves such as the 3S4, etc., will operate. However, the range achieved with the diode and valve, in this circuit, is much less than with the 1-valve receiver. The latter costs more to build, on the other hand, because of the special valve.

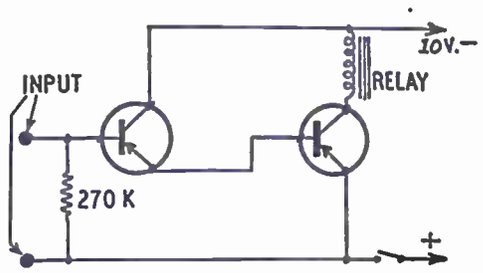


Fig. 3 — Two-Transistor amplifier

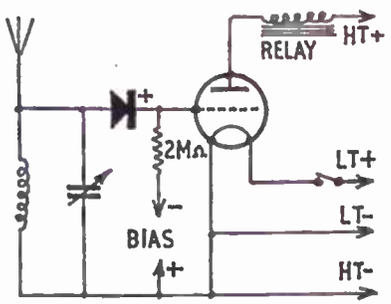


Fig. 4 — A valve amplifier

Valve amplifier

In Fig. 4, bias is adjusted so that the valve passes a normal anode current. When the transmitter is keyed, the diode makes the valve grid more positive, increasing the anode current, which works the relay. A fairly large H.T. voltage is necessary, when a considerable change in anode current is possible. High amplification pentodes work best, the screen grid being wired to H.T. positive.

A valve amplifier of this kind is also used with a 1-valve receiver. A current change of only a fraction of a milliamp in the receiver valve is then amplified, giving strong movement of the relay. Such an amplifier is most useful when using an ordinary surplus type valve in the receiver. Such valves cannot give the large change of current which is obtained with the special gas-filled valve, so that the adjustment of the relay becomes extremely difficult, unless an amplifier is used. The valve amplifier circuit cannot be carried in a small model, because it must have separate H.T. and L.T. batteries. A 1-valve receiver, with 1-valve amplifier, thus needs two sets of batteries.

Transmitter and receiver to use

If a receiver with gas-filled valve is to be used, a 1-valve transmitter will do well, for any average pond. The single valve transmitter is also powerful enough for the *short* range control of a transistor receiver.

The 2-valve transmitter gives a much more powerful signal. It is thus better for long range control of a valve receiver, or for the easier working, at moderate range, of a transistor receiver. The 2-valve circuit can be used as a 1-valve circuit by withdrawing one valve and re-tuning back to frequency.

For simplicity of adjustment at good range, the 1-valve receiver with gas-filled valve, as described, is recommended. If only short range is needed, an ordinary (that is, not gas-filled) valve may be fitted. Adjustments are then more critical.

The transistor receiver circuits are not intended for long distance working, but do for small ponds, indoors, or in the garden. In all cases, the same actuator, or steering and control devices, may be used.

When the relay is adjusted to an extremely sensitive condition, it may be heard vibrating, with 1-valve receivers. This can be cured by wiring a ·1μF condenser in parallel with the magnets.

This is the last article in the series on Radio Control of Models. Previous issues detailing the making of transmitter, receiver, etc., from the Editor, price 5d. each, plus postage.

★★★★★★★★★★★★★★★★
★ ★
★ Next week we shall give details ★
★ for building a beginner's 2-transis- ★
★ tor set which is very compact and ★
★ requires no soldering. Also how to ★
★ make jet-powered racing cars with ★
★ balloons, marquetry jewellery and ★
★ other projects for the modeller and ★
★ handyman. ★
★ ★
★ MAKE SURE OF YOUR COPY ★
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WITH ROD & LINE

FLOATS FOR SEA ANGLERS

By 'Kingfisher'

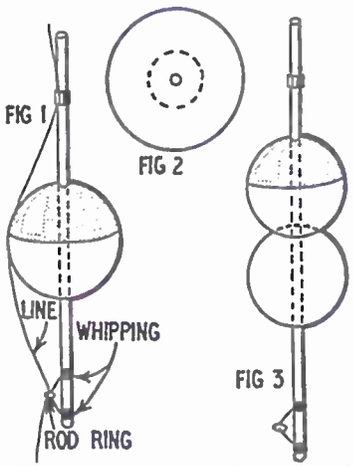
SO far I have kept to items which mainly concern the freshwater fisherman but this week I think we should give a little space to those anglers who live on or near the coast and are chiefly interested in sea fishing. There are numerous tackle items for sea fishing which one can make on the kitchen table, as it were, and at very little cost.

Floats, for instance, of a size used in the sea can be costly, so I propose to show how to make two floats, the larger of which will carry quite a lot of weight and costs only a few pence to make. The smaller one, of course, carries less weight but also costs even less.

For the two floats your 'building kit' will consist of three table-tennis balls, two lengths of $\frac{3}{16}$in. wood dowelling, a couple of small rod rings (the stand-off type are the best), and two valve caps. We will start with the smaller float.

The first job is to bore a hole through the ball and you must continue this so that it comes out *exactly* opposite. This hole should be slightly smaller than the diameter of your dowelling so that the latter is a tight fit.

The length of the dowel should be seven or eight inches and the size, not being critical, can be to your own ideas provided that you do not make it too short. This is pushed through the ball and out at the opposite side and then rounded liberally with waterproof cement to prevent the entry of water.



Next operation is to whip on the rod ring at the bottom end of the dowel. This is to take the line and I use a rod ring in preference to a loop so that the line is not pulled into the side of the ball too much. The bottom half of the ball can be left white and the top can be painted in a colour of your own fancy. Here I recommend the use of fluorescent enamel which shows up the float very well when in the water. The finished float should appear as in Fig. 1.

To make the larger float, bore a hole through a table tennis ball and mark a ring on a second ball with a compass. This ring should be just over 1in. in diameter. Bore a hole from the centre of this circle through the ball (Fig. 2).

Now carefully cut out the marked circle with a razor blade and you will have a ball with a small hole at one side and a hole just over 1in. diameter at the other.

The dowelling for this float should be a couple of inches longer. The complete ball is pushed on to the dowel and is cemented at a point two-thirds of the way down. The second ball is now pushed on the dowel so that the larger hole sits on the first ball, to which it is cemented. This must be done carefully in order to leave no gap for entry of water. The dowel is also cemented in and the float is ready for the addition of the rod ring whipping and painting. The float should appear as in Fig. 3.

It is obvious that this float will carry a lot more weight than the first one. Incidentally, although these are two good floats for sea fishing I should add that they are useful when live-baiting for pike and they are buoyant enough to carry quite a large bait.

Musical Drinking Straws

DRINKING straws provide the main material for the construction of a variety of instructive sound toys.

Begin by making a straw trumpet as follows. Squeeze flat about $\frac{1}{2}$in. of one end of a drinking straw and use scissors to trim away a fraction from each corner of the flattened part. Place the straw between your lips with the twin 'reeds' just inside your mouth, and blow. As the air inside the straw is caused to vibrate the instrument will give out a curious low pitched sound. Keep your lips as dry as possible.

You can make trumpets capable of producing higher pitched notes by using shorter lengths of straw. The rule to remember is that the shorter the column of air which is set in vibration, the higher will be the pitch of the note obtained. If you wish to sound a really low pitched note make a long pipe by carefully telescoping two or more straws together. You may care to make a flute by piercing some holes along a single straw pipe. Place your fingers over the holes and uncover them one at a time as you play your instrument to produce notes of different pitch. If you are very patient you will be able to play a simple tune.

To imitate the principle of the trombone in which different notes are obtained by varying the tube length of the instrument, you will need a straw trumpet as already described and an 8in. length of glass tubing to fit over the straw. Play different notes upon your toy trombone by sliding the glass tube to and fro as you blow steadily into the mouthpiece. If you use a small glass funnel as a 'slider' your sounds will be remarkably amplified. Indeed, all drinking straw instruments can be improved by adding a funnel as an amplifier.

Why not form an orchestra with your friends by giving each of them a straw trumpet tuned to a different note of a musical scale. You, as the conductor, can point with your baton to the instrumentalist whose note is required next and together your band can play a tune. The result should be highly entertaining and will provide a very amusing interlude at a party.

(A.E.W.)

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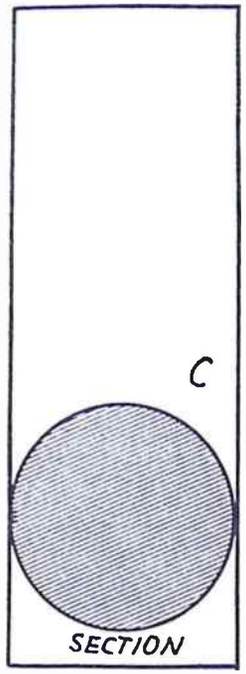
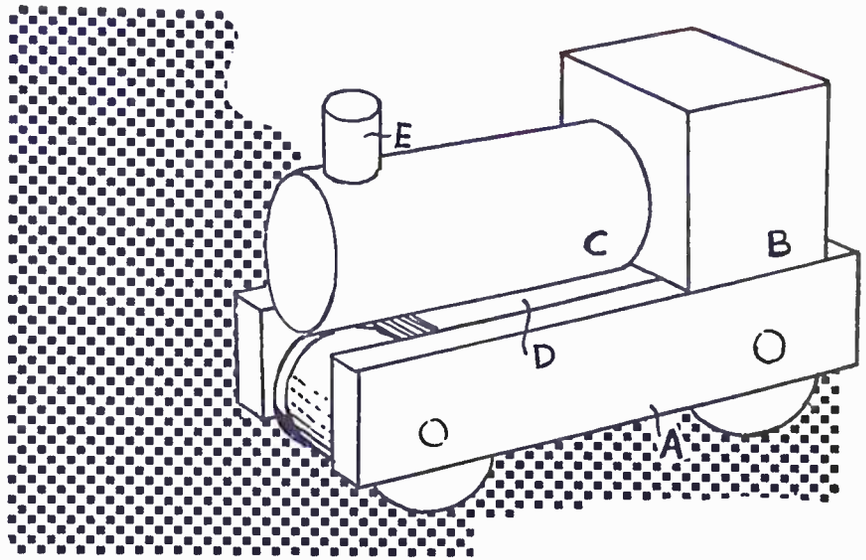
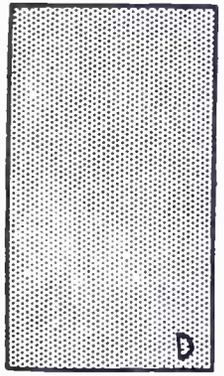
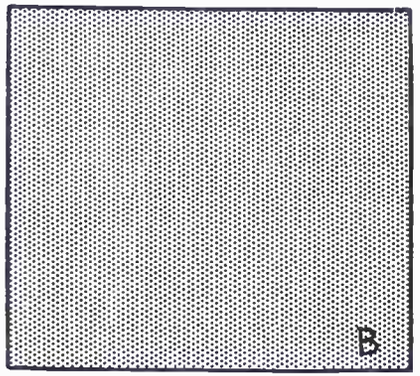
COTTON REEL ENGINE

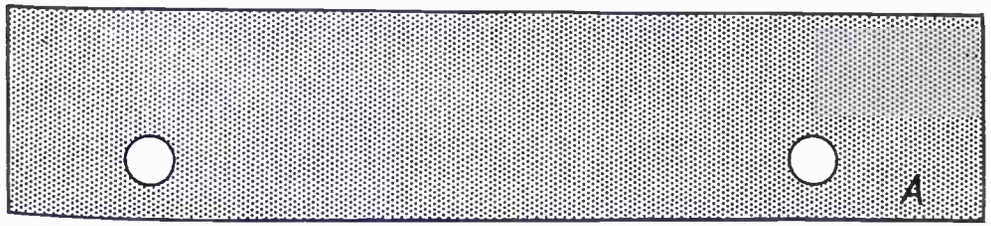




USE THESE PATTERNS







CUT two sides (A) from ¼in. wood, using a fretsaw, and glue the block (D) between them. The block (D) is cut 1¼ins. thick, so that the pieces (A) will be 1¼ins. apart.

The block (B) is 1½ins. thick and the piece (C) is cut from round rod about 1¼ins. diameter. Both pieces are glued in position shown by the sketch. Make the funnel from ½in. round rod. Axles of round rod go through the two cotton reels and are glued into pieces (A). The diameter of the axles will depend upon the size of the hole in the cotton reels.

Any type of cotton reel may be used if adjustment is made to the overall size of the engine. (M.p.)

Printed by BALDING & MANSELL, LTD., London and Wisbech, and Published for the Proprietors, HOBBIES LTD., by HORACE MARSHALL & SON, LTD., Temple House, Tallis Street, E.C.4. Sole Agents for Australia and New Zealand: Gordon & Gotch (A'sia) Ltd. For South Africa: Central News Agency Ltd. Registered for transmission by Canadian Magazine Post.