HOBBIES WEEKLY

MARCH 20th 1957 VOL. 123 NUMBER 3203

IN THIS ISSUE

Full details for building

SESQUI

(PBK14 Mk 2)

Designed by P. W. Blandford

EQUIPPED AS A TWO-SEATER, THE CANOE IS ROOMY AND SAFE FOR TWO YOUNG PEOPLE, OR AN ADULT AND CHILD

THE original PBK14 canoe, which was first published in *Hobbies Weekly*, was built by many hundreds of readers, and we received reports of many ambitious trips, including the crossing of the English Channel. 'Sesqui' is a redesigned canoe with the same overall sizes, but incorporating many improvements, giving an even better canoe, which is actually simpler and cheaper to build.

The canoe is intended as a roomy single-seater, or as a craft for father and son (the name means 'one and a half'), or as a two-seater for young people. There is room for touring kit, and when you have the necessary skill, you can confidently use it to shoot rapids or make coastal trips. Construction is straightforward and only the usual handyman's tools are needed. Two boys should be able to build the canoe in less than forty working hours, at a cost of less than £10.

This article contains complete instructions, but drawings are, of necessity, small; and the reader will find the job very much easier if the plans are bought, as all of the shaped parts are drawn full size.

The general drawing is on page 415.
Full-size plans available (see page 403)

The first parts to make are the seven frames and the two end posts. All of these are cut from ¾in. plywood which is bonded with a synthetic resin glue. The best type is a marine grade, which is marked 'B.S.S. 1088', but 'exterior' grade is also suitable. Do not use ordinary plywood, which will not with-

stand damp conditions. If the plans are bought, put the full-size drawing over carbon paper and mark out the shapes.

If the canoe is to be built without the plans, make a full-size drawing of the outlines (Fig. 1), preferably drawing each frame complete and separate. Mark round the insides of the frames, about 2ins. in, as shown, for frames 2 and 6. Frames 3, 4, 5, and 6 are notched 10ins. wide for the bottom boards, but at frame 2 the boards rest on a strip of wood (see General Drawing).

The lengthwise parts may be any straight-grained softwood. Spruce is lightest, but rather expensive. Parana pine is a cheaper alternative. Mahogany is suitable, but do not use a heavy hardwood, such as oak or ash. All of the joints are held with brass screws and synthetic resin glue, such as Cascamite One-shot or Aerolite 306.

Make the hog (A) (General drawing).

The framework varnished and the hull canvas fitted, ready for fixing the keel and bilge keels, followed by the deck.

MATERIALS REQUIRED

Wood — softwood, such as spruce or pine, except where marked. Sizes are finished widths and thicknesses, but lengths are full.

Part	Name	No. reqd.	Length	Width	Thickness
A	Hog	1	12ft 7ins.	1½ins	¾in.
B	Gunwale	2	14ft. 6ins.	1½ins.	¾in.
C	Coaming frame	2	6ft. 7ins.	⅞in.	½in.
D	Deck stringer, forward	1	3ft. 8ins.	1½ins.	¾in.
E	Deck stringer, aft	2	4ft. 0ins.	1½ins.	¾in.
F	Stringers	6	14ft. 6ins.	⅞in.	¾in.
G	Bottom boards	4	6ft. 5ins.	2ins.	⅜in.
H	Keel	1	13ft. 0ins.	⅞in.	⅜in.
I	Bilge keels	2	7ft. 0ins.	⅝in.	½in.
J	Bilge (optional)	2	4ft. 0ins.	⅝in.	½in.
K	Rubbing strips	2	14ft. 6ins.	⅞in.	Half-round
L	Cockpit coaming	2	7ft. 0ins.	3ins.	⅜in. mahogany
—	Cockpit coaming	1	1ft. 6ins.	3ins.	⅜in. mahogany
M	Back rests	4	8ins.	2ins.	¼in. ash
—	Back rest	1	6ins.	⅞in.	¾in. ash
—	Back rest	1	1ft. 6ins.	⅞in.	¾in. ash

Small parts may be cut from waste from large parts.

Frames: ⅜in. marine (B.S.S. 1088) or exterior plywood, as on full-size drawing. A piece 29ins. ×52ins. will cut all parts.

Canvas: Hull — one piece 15 ozs. proofed canvas 14ft. 6ins. × 42ins. Deck — one piece 10 ozs. proofed canvas 14ft. 6ins. × 30ins. (or cut both from one piece 15 ozs. canvas 72ins. wide).

Metal: Back rest brackets cut from brass — back, 4½ins. × ⅞in. × ⅛in. front, 4½ins. × 1⅛ins. × ⅛in. End covers — brass, 2 pieces 18ins. × ⅜in. × ⅛.

Sundries: Paint — approx. 1½ pints undercoat, 1½ pints top coat, marine or good household type.

Varnish — 1 quart marine grade.

Tacks — ¼lb. of ⅜in. copper tacks.

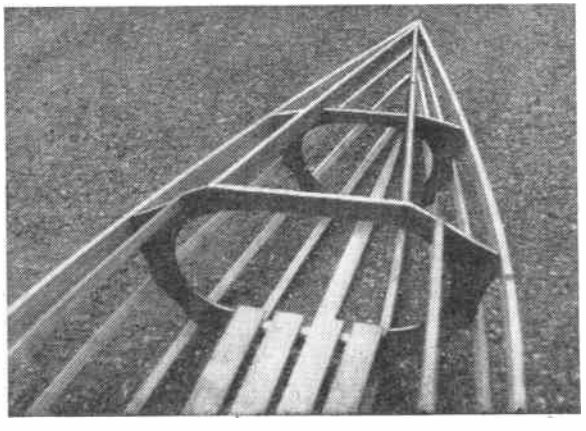
Adhesives — 1 pack Aerolite 306 or Cascamite One-shot. 1 can Bostik C or 252.

Screws (brass, countersunk) — 1½ins. × 12 gauge, 4 only (back rests). 1in. × 5 or 6 gauge, 1½ gross (main construction). ⅞in. × 5 or 6 gauge, 8 dozen (rubbing strips, coaming). ½in. × 4 gauge, 2 dozen (metal fittings).

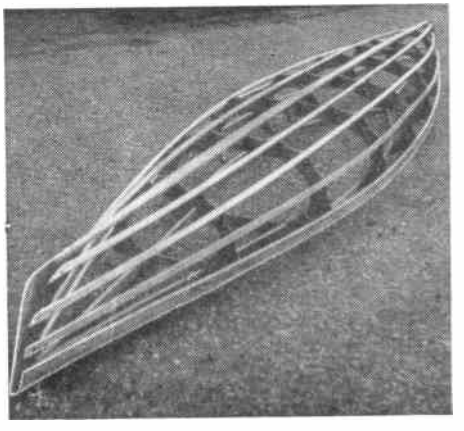
Select a straight piece, mark it out, and taper the ends. Fix the frames and end posts by screws from below, and check that the frames are square across and upright before the glue starts to set. To ensure the canoe being built true, this assembly must be supported on something stiff. Ideally, this is a stout plank (Fig. 2), but the hog may be screwed to the floor or to a long bench. The plank is only needed for a few hours and will not be damaged, so a suitable one might be borrowed.

Stretch a string between the end posts and see that the parts line-up. Fix both gunwales (B) next, starting at frame 4 and progressing towards the ends, keeping opposite sides in step. Use the string to see that the framework does not distort and check that distances between frames along the gunwales are the same each side. At the ends, cut off the gunwales and bevel their inner surfaces to glue and screw to the end posts.

Bend the coaming frame strips (C) into place, fitting them into the notches on frames 2 and 6 and screwing and gluing to the open frames, using short pieces of wood in the corners to increase the gluing area. Fit deck stringers (D) and (E) in the same way. At the stern stringers (E) must be planed thinner to fit between the gunwales, and at frame 6 notched into the slots. Stringer (D) needs a small block of wood to support it on the forward side of frame 2.



Left—The stern end of the framework, with the bottom boards in position showing frames 6 and 7.



Right—The completed framework, inverted and viewed from the stern.

Up to this stage, care must be taken to see that the framework does not get pushed out of straight, but once these parts are fitted there is little risk of distortion. The upper stringer (F) may be fitted at each side, in the same way as the gunwales, then the framework removed from the building slab and turned over. Support it evenly and fit the other stringers. At the ends do not try to twist the lower stringers too much, but cut diagonally across them to fit against the end posts (General Drawing). There is no exact location for them, but see that they follow a fair curve from the last frames.

Make the bottom boards (G), using four waste pieces from the ends of stringers as crosspieces (Fig. 3). The two locating blocks stand up between the middle boards and hold them in with wood or metal turnbuttons.

Clean up the framework with glasspaper, making sure all exposed edges are well-rounded, then varnish all the woodwork. Use a marine varnish, and give two — or preferably three — coats. Do not use household varnish, which will not stand up to conditions afloat. Paint may be used, if preferred, but varnish is smarter, and may be cheaper.

The usual skin for this type of canoe is a 15 ozs. proofed canvas for the hull, protected by two coats of paint, and a lighter proofed canvas for the deck. It is sometimes more economical to buy a wide piece of 15 ozs. canvas and cut the deck and hull side by side. There are also some rubberized fabrics which are suitable. They are smoother and do not require painting, but are mostly dearer. There may be some suitable plastic fabrics, but many of them tend to shrink and harden with age.

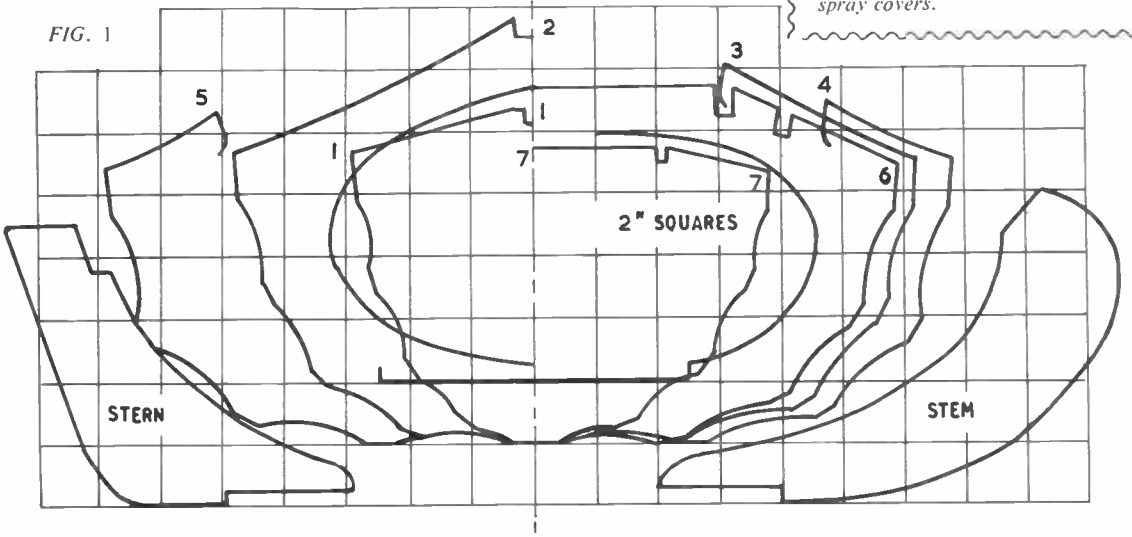
SESQUI (PBK14 Mk 2)

FULL-SIZE DRAWINGS

The designer is the owner of the copyright in this canoe. Readers may build craft to this design for their own or club use, but anyone wishing to build for sale should first communicate with the designer

Instructions given in this article are complete, but the work will be simplified if a set of plans is bought from Hobbies Ltd., Dereham, Norfolk; price 12/6 (post free). These include full-size drawings of the frames and other shaped parts, together with all other drawings and instructions, as well as instructions for making accessories, including sailing gear, trolley and spray covers.

FIG. 1



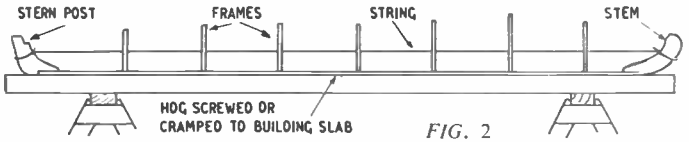


FIG. 2

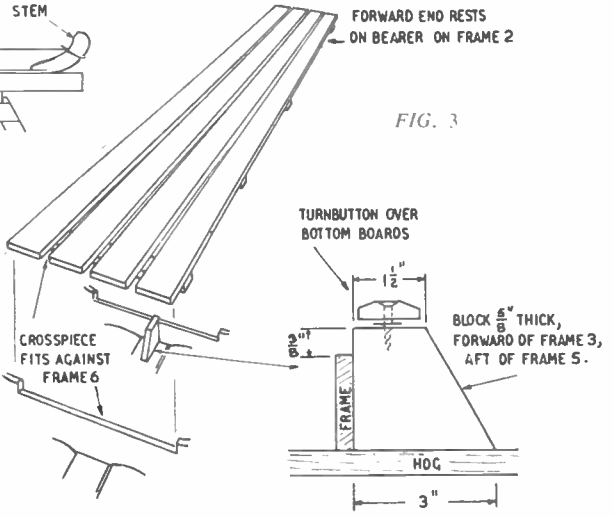


FIG. 3

Next week P. W. Blandford will describe how to cover 'Sesqui' with canvas and make the paddles, etc. The Free Design will be for an electric lamp with a novel design in the form of a guardsman drummer.

No camera is needed

AN EASY COPYING METHOD

YOU can easily make facsimile copies of drawings, maps, pictures or prints by means of the reflective process which does not require a camera or other apparatus. All that is needed is some single weight photographic paper, preferably of the hard grade to produce contrasty 'negatives', developing solution and an electric light. The work is done in the darkroom with the aid of the usual safelight.

By S. H. Longbottom

A drawing for copying is laid on a piece of stout cardboard with a piece of photographic paper on top, the sensitive side being in contact with the printed surface. To ensure firm contact between the two, lay a piece of glass on top, perhaps held down with the assistance of weights. This firm contact is most essential, or the resulting image will be blurred.

Various types of paper require modified treatment, so where the paper is transparent tracing, lay a sheet of white paper underneath. If there is printing on the other side of the page lay a sheet of black paper, or stiff cardboard.

The drawing and paper so prepared are now exposed to a strong electric light, e.g. 100 watt lamp, arranged so as to introduce a yellow filter between light and paper, the purpose of which is to improve the contrast. You may use a piece of yellow glass, celluloid or cellulose wrapping. If the lamp is fixed temporarily in a box, a small window can be cut out and covered with a piece of the filter material. If you possess an enlarger, the filter may be placed in the negative carrier and the whole used for making the exposure.

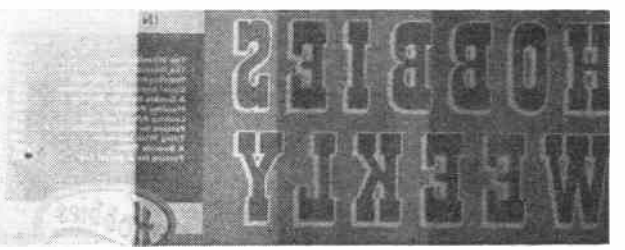
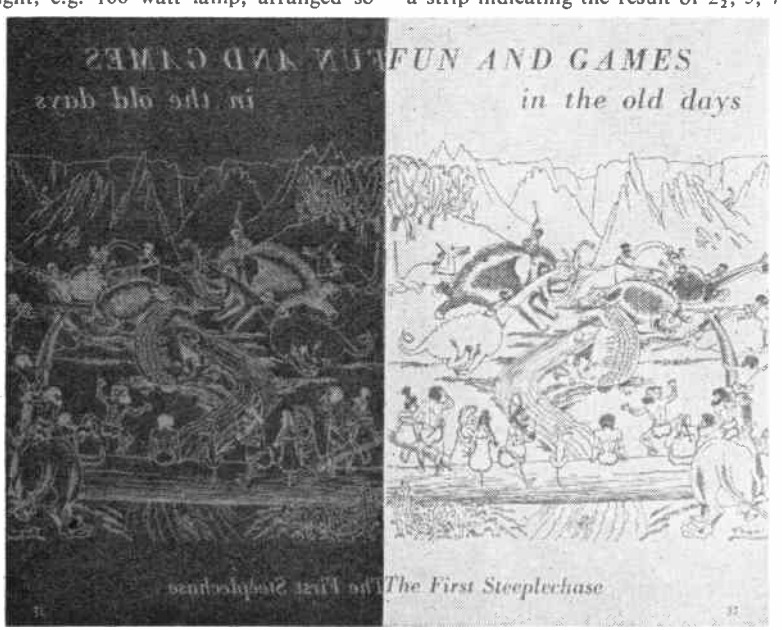


Fig. 1—Test prints

The next step is making a test strip to determine the correct exposure for our negative. In Fig. 1 you will observe four different densities. The whole strip was first exposed for 2½ seconds. The first section, on the left, was then covered by a piece of card and a further exposure of 2½ seconds made. By repeating this process a second and third time a strip indicating the result of 2½, 5, 7½ and 10 seconds exposure helps to discover the correct exposure required. In this instance 7½ seconds was found to be correct, but it should be appreciated that different results will be obtained with different lighting.

Any popular paper developer may be used for making the negative, providing it is a little stronger than usual, again to improve the contrast. For example, if the normal dilution is one part of developer to three parts water, it is preferable that only two parts of water be added. The paper negative should be fully developed, giving the image a decidedly dark appearance, yet contrasty when viewed by transmitted light, that is when held against the light and viewed through the back. The test strip previously mentioned should reveal this quite distinctly, while the accompanying illustrations should be some guide as to the appearance of the negative.

After development the prints are fixed, washed and dried in the normal manner, when you may decide whether to use them in this state or proceed a stage further by making positive prints.



On the left is a negative made from a line drawing in the pages of an old book and on the right is the positive copy

Reversed image

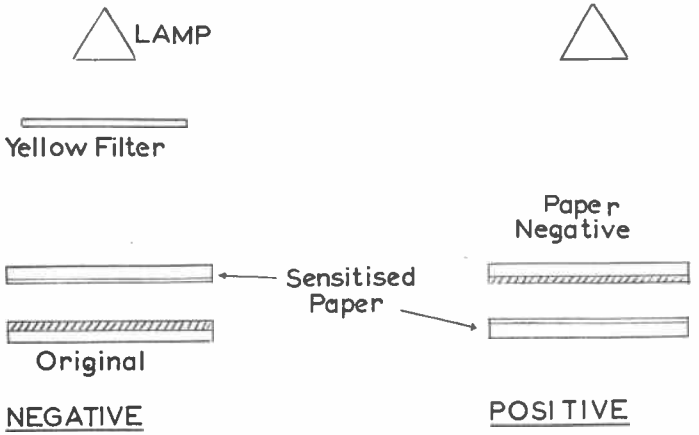
It will be appreciated that the negatives now have a reversed image, with the black lettering appearing in white, but you can read all the printed matter through a mirror, or through the back of the print when held to the light. If positive prints exactly like the original are required it is quite easy to produce any number from our paper 'negatives'.

Make these positive prints in the same manner as when using the ordinary celluloid negative, by transmitted light passing through to the sensitised paper. Hence the need for using single weight papers which are much thinner than the heavy weight grades. You may use a printing frame if it will accommodate the negative, otherwise you may resort to the original method of placing a piece of clear glass and weights on the paper. Note this essential difference in

making the positive prints. The new sheet of sensitized paper is laid on a flat surface, the negative on top but with both sensitive surfaces in contact with each other, the glass being laid on both. The light passes through the negative on to the paper underneath to produce the print. Moreover, there is no need to use a yellow filter for making the positive, but considerably more exposure is required.

In the illustrations shown, the first negatives were only exposed for 7½ seconds, using a yellow filter. When making the positive we have to allow for the fact that the light has to pass through the paper and the time taken — without the filter — was 45 seconds. Make another test strip to decide the correct amount of exposure required, using a strong developer as before.

Any type of black and white printed matter can be copied in this way once you have made the intial tests to match your own lighting arrangements, while coloured pictures will be reproduced in slightly different tones.

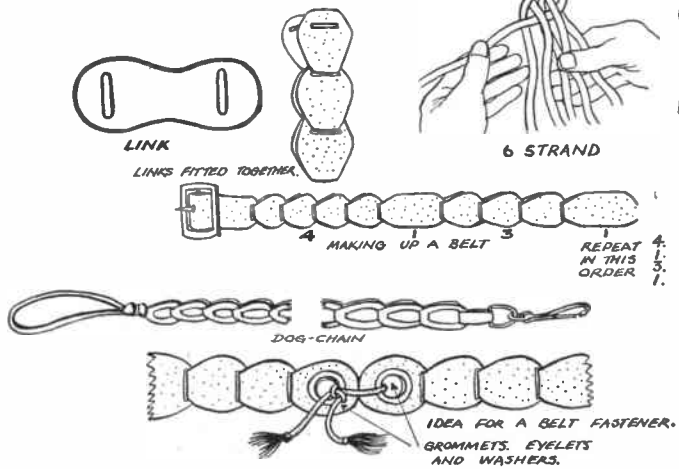


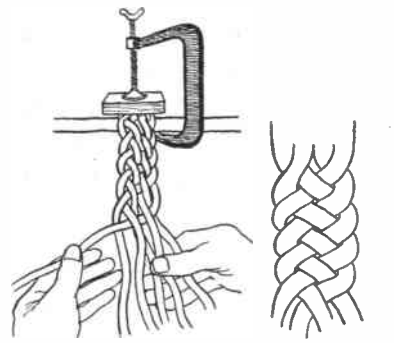
When copying a map from a book, it is best to lay a piece of thin opaque card underneath the page to ensure a firm, level contact with the photographic paper, and this cannot be over emphasized if you wish to produce clear images. Once the paper negatives have been made they will last indefinitely, providing they have been properly fixed and washed, and kept flat.

LEATHER BELTS AND BRAIDING

VARIOUS types of straps and belts can be made from leather. One very simple and useful shape is the link as illustrated. Link belts are not braided although their appearance is somewhat similar to that of a braided belt.

Firstly, pieces of leather are cut to the required sizes. Next, cut vertical slits in the rounded ends. The pieces are pulled through each other, as shown, and then fitted into position. Continue inserting links until the desired length has been reached. When making the slits in the leather, it would be advisable when cutting the left slit to slant the knife to the right and vice versa. This method will make the leather lie better and so give a much neater appearance to the finished article. The buckle parts are fitted between the last links of each end, and the leather stitched.





Braided straps are suitable for attachment to many leatherwork articles and the method of braiding is useful to know. Articles such as dog leads, belts, tassels, lanyards, etc., may also be easily braided.

The material used for braiding is thonging, and this is obtainable in suitable lengths from leather stores. The cross-over braiding method may be used for belts. An even number of strands such as four, six, eight, etc., is required.

Before commencing to braid, fasten the leather to a table or bench with a clamp. Take the first strand on the right-hand side and weave it over the second, under the third, over the fourth, under the fifth and over the sixth (see illustration). Take the next strand on the right-hand side and weave it across. This, you will notice was the second strand when you began and it will now be lying over the first strand on the left-hand side as indicated by the strand which is held in the left-hand (see illustration). Always the strand which is woven from the right lies over the last strand on the left.

SOLUTION TO CROSSWORD No.

Across: 1. Ever. 4. Version. 8. Epic. 9. Oral. 10. Shivery. 12. Agio. 13. Ere. 14. Press. 16. Consult. 19. Erratum. 22. Paste. 25. Sue. 26. Adit. 27. Essence. 28. Hair. 29. Ergo. 30. Etchers. 31. Rues.

Down: 2. Virago. 3. Relays. 4. Visible. 5. Echo. 6. Sever. 7. Ogres. 11. Erect. 15. Sum. 16. Cap. 17. Nisus. 18. Traders. 20. Author. 21. Umpire. 23. Asset. 24. Teeth. 26. Acer.

RUNNING YOUR RAILWAY

by Regulator

FUSES AND CUT-OUTS

SOME means of immediately disconnecting the source of current is very desirable with a model railway, because de-railed trains or carriages can cause a direct short-circuit. If dry batteries provide current such a short-circuit will greatly reduce their life. The situation is more serious when an accumulator or mains unit is employed, as permanent damage can arise to these, due to the heavy current flowing.

It is thus best and safest to fit some arrangement which will guard against such difficulties. One of two methods is usual — a fuse, or a circuit-breaker or cut-out.

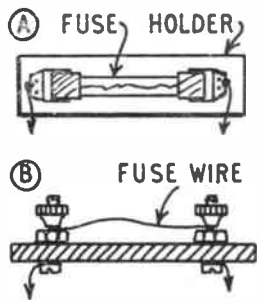


Fig. 1—Two types of fuse

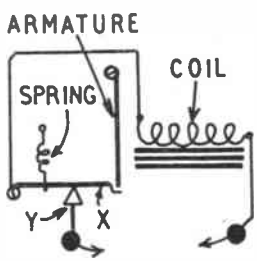


Fig. 2—Safety trip

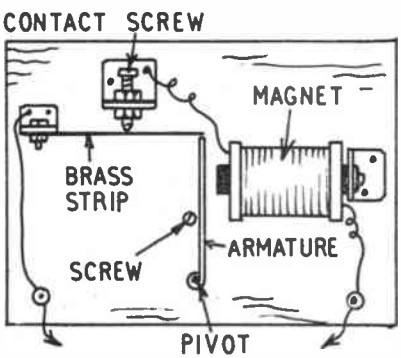


Fig. 3—Making a trip

The fuse is very satisfactory when trains are seldom de-railed, as the cost is extremely low. Two fuses are shown in Fig. 1, that at 'A' being of ready-made type. These clip into a holder, and a new fuse may be inserted in a few seconds. They have the disadvantage that each fuse costs several pence, so that replacements become quite expensive if many short-circuits arise. They can, however, be much recommended when the layout is so operated that the fuse is seldom caused to blow.

A much cheaper arrangement is shown at 'B'. Two small terminals are fixed to a strip of insulated material, and the fuse wire is held between these. When the fuse is blown it can be replaced in a short time, and the cost of the wire itself is quite insignificant. This method is thus much cheaper than the use of ready-made fuses.

Fuse to use

For maximum protection, the fuse should be of such a rating that it will blow immediately trouble arises. This means that its current rating will be as low as possible, yet not so low that the fuse breaks down when the train is switched on.

Ordinary copper wire of suitable gauge is satisfactory for fuses. A 1-amp fuse will give good protection, and ·002in. diameter wire, corresponding to 48 S.W.G., is suitable. If the train takes rather more current, a 2-amp fuse can be used. This may be ·0036, or 43 S.W.G. For larger models, or circuits operating several trains, the following wires may be used: 3-amp, ·0044, 41 S.W.G., 4-amp, ·0052, 39 S.W.G., 5-amp, ·006, 38 S.W.G.

Fuse wire can also be purchased on cards, with various ratings. For a given current rating, this wire will be rather thicker than the copper wire above, as it is made from various alloys which melt at low temperature.

There is no need to know the exact fuse rating, provided the fuse does not blow when switching on the train, yet *does* blow if the rails are shorted.

Cut-out trips

A kind of magnetic 'fuse' is quite often used, to avoid any need for replacing burnt-out wire, and the manner in which this works will become clear from Fig. 2.

The trip is wired in one lead to the model, exactly as when a fuse is used. Current passes through the coil of the magnet, and to 'X', the circuit being completed by contact 'Y'. A spring tries to draw 'X' away from 'Y', but as the end of 'X' rests upon the iron armature, contact is maintained.

The coil winding is of low resistance, and does not affect the normal running of the train. But when a short arises, a much heavier current flows. This draws the armature towards the core, and 'X' springs away from 'Y' thus interrupting the circuit. When the trouble has been cleared, the trip is reset by hand.

A magnetic cut-out of this type is easily made up, parts being arranged as shown in Fig. 3. The magnet is wound upon an iron core. A piece sawn off a large bolt, about 1in. long, will do well for this, the bolt being fitted to a bracket, for mounting. Two discs of thin wood or stout card are fixed to the core, which is covered with insulating tape or brown paper, before winding.

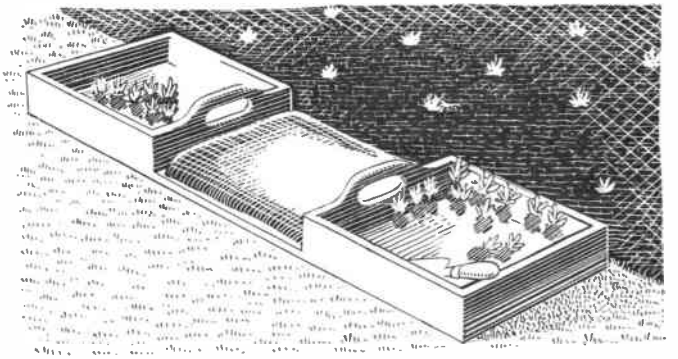
The armature is a strip of thin iron about 2ins. long and ¼in. wide, pivoted upon a small nail or screw, a spacing sleeve being put on so that the armature is level with the magnet core. A double thickness of 'tin' from a household can will do for this part. The free end should be filed smooth, and a stop screw is driven in so that the armature can only move about ⅛in. away from the magnet.

The thin brass strip is also about 2in. by ¼in. or so, and is bolted to a small bracket as shown. The contact screw is filed to a point, and held upon a further bracket by lock-nuts. The parts are so arranged that the screws bear lightly upon the brass strip, as indicated, when the trip is set. When the armature is moved towards the magnet, the end of the strip is released, and the strip springs away from the contact screw, breaking the circuit. The whole will work very easily, provided there are no rough edges upon the surfaces of the armature or strip, where they meet, to impede tripping.

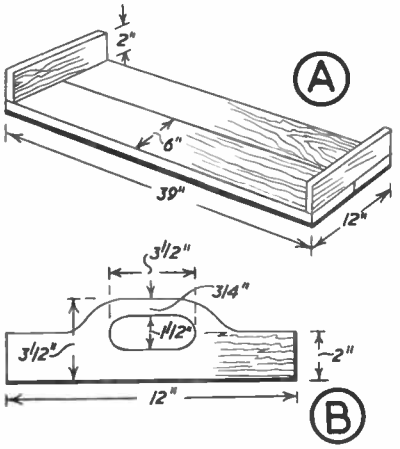
The magnet winding is not critical, and about 50 turns of 12 to 18 S.W.G. will suffice. If the trip tends to release when the train is switched on, some turns are removed from the magnet. It

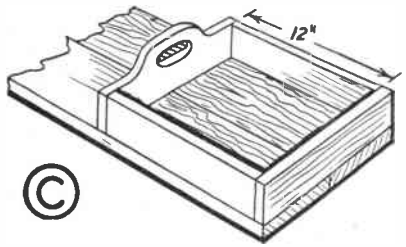
● **Continued on page 407**

GARDENER'S PLANTING OUT TRAY



PLANTING out seedlings in the spring or bulbs in the autumn provides plenty of work for the busy gardener. Anything which saves time, and makes the job easier will, no doubt, be welcome, especially if the gardener is also a housewife.





The gardening tray is arranged to provide two compartments for plants, labels, string, trowel or fertilisers, and a centre partition for a kneeling pad. The handles are placed conveniently for lifting, and it balances well even when the trays are full.

Use own measurements

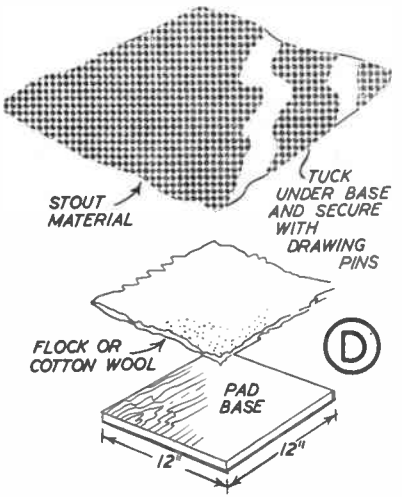
The measurements shown are suitable for most requirements, but these can be modified if necessary, and actual construction adapted to suit the wood available.

Start off as shown in (A), nailing the ends to the bottom, which consists of two pieces 6ins. wide, 39ins. long and ¾in. thick. The ends are cut from ½in. thick wood 12ins. long and 2ins. wide.

The handles are cut from ½in. or ¾in. wood to the shape shown in (B). Draw out the shape direct on to the wood and cut out with a fretsaw. This piece can now be used as a template for marking out the other handle.

When both pieces have been cut, the handgrips should be rounded off to give a comfortable hold for the fingers. Shaping can be done with a rasp or knife. Finish off by rubbing down with glasspaper.

The sides are shown at (C); they are cut from ¼in. wood and are 12ins. long and 2ins. deep. They are nailed to the bottom, ends and handles.



Kneeling pad

The construction of the kneeling pad is shown in the diagram (D). A piece of ¾in. thick wood is cut to size 12ins. by 12ins. On top of this is placed a pad of flock or cotton wool. Alternatively an old piece of blanket can be folded two or three times to make up a similar thickness. Finally cover with a piece of material large enough to tuck under all round. Secure underneath by means of drawing pins to allow easy removal for cleaning.

Before painting, the tray should be given one coat of wood preservative such as Cuprinol. This will keep the wood in good condition for many years. Give two coats of good quality paint to finish off. (M.h.)

● **Continued from page 406**

Running Your Railway

must release at once when the rails are shorted. If it does not, the armature may not move freely, or the brass strip may press too tightly against it. Or the space between armature and magnet may be too great.

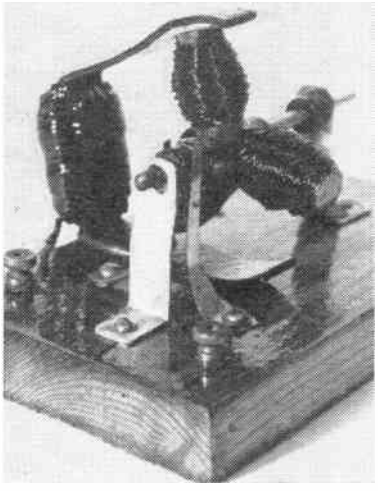
With very small models drawing very little current, especially from dry batteries, the trip can be much more sensitive, and 150 turns can be used. Thin wire is not suitable for the winding, because the resistance of the magnet would then prevent the train running well.

A fairly large surge of current always arises when an electric motor is switched on, and this will tend to trip the cut-out if it is too sensitive. Should this arise, turns may be removed from the magnet, as explained. Alternatively, the train may be started up slowly with a resistance controller, which will avoid a big current surge.

Some protective device, either fuse or cut-out, is very much to be recommended with any battery or accumulator-operated layout. When a mains unit is employed, as will be explained, it becomes almost a necessity, to avoid damage to transformer or rectifier.

Build it yourself

TRIPOLAR MODEL MOTOR



By 'Modeller'

IT is possible to build a useful model motor, which can be used for driving purposes, and which will run well from dry battery, accumulator, or a mains transformer. The motor described here has 3 poles, which makes it self-starting, and it can also be reversed if necessary, though no switch is included in the present instance for this.

The motor has both armature and field magnet of wound type, which means that it will run from both A.C. and D.C. If a permanent horseshoe magnet should be to hand, this can replace the wound field magnet. The motor will then run from D.C. only, but may be reversed by changing over battery connections, to reverse polarity. If such a permanent magnet is used, the size of the armature poles should be adjusted to suit, so that they will just rotate within the magnet limbs, with about $\frac{1}{16}$in. clearance.

Armature

Tripolar armatures are never easy to construct, but that used here is not unduly difficult, as the cores consist of three 1in. sections, including heads, sawn off three iron bolts about $\frac{1}{4}$in. in diameter. These bolts will only cost a few pence from an ironmonger. The three pieces are filed at an angle, so that they will meet as shown in Fig. 1, a notch being filed to accommodate the axle. If initial sawing has been a little inaccurate, the pieces should be filed so that they are all the same length.

The axle may be a length of steel rod, knitting needle, or a spindle from a constructional toy, about 3$\frac{1}{2}$ins. long. A small spirit lamp or blowlamp is necessary for soldering. This can be made by threading a dozen or so lengths of string or wool through a $\frac{1}{4}$in. hole in the screw-cap of a small bottle, and filling with meths.

The surfaces to be soldered must be clean and bright. Each armature piece is heated in the lamp flame and solder melted upon the surfaces to be joined. Cored solder will not require any additional flux. The axle is similarly treated.

It is now necessary to hold the three pieces, with axle, in their correct positions. This can be done by resting the three cores on a small tin lid, which has a $\frac{1}{4}$in. hole in the centre, through which the axle passes. The whole is then heated until the solder melts, and additional solder is added until any cracks are filled. The heat is then removed, and the armature allowed to cool undisturbed.

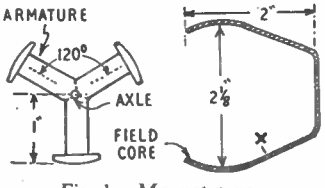


Fig. 1—Magnet cores

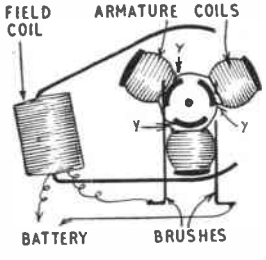


Fig. 3—Connecting diagram

If it does not balance when finished, a little filing will compensate for this. An unbalanced armature will vibrate when running.

Field Magnet

This is bent to the shape and size shown in Fig. 1, a strip of soft iron about $\frac{1}{2}$in. wide and $\frac{1}{8}$in. thick being used. A hole is drilled at (X) so that the core can be screwed to the baseboard. The straight portion is then covered with brown paper or tape, and about 600 turns of 26 or 28 S.W.G. wire wound on. The same S.W.G. may be used for both armature and field, and it can be cotton or enamel covered. With the latter, care is necessary that the enamel is not scratched away, so that any turns short to each other, or to the core. This is particularly necessary when winding the armature.

The wire should be wound on very tightly, turns evenly side by side. If a layer of Cellotape is put on after each layer of wire, this will simplify winding and keep the turns in place.

Each pole of the armature has the same number of turns — at least 200 on each pole. The actual number which can be held depends on the gauge and type of wire, but having plenty of turns will increase efficiency. The poles are covered with insulating tape before winding. With enamel wire there must be no rough edges to break the insulation.

The poles must be wound in the same direction, when viewing them individually from their outer ends. To do

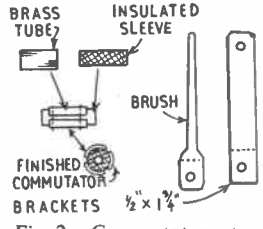


Fig. 2—Commutator, etc.

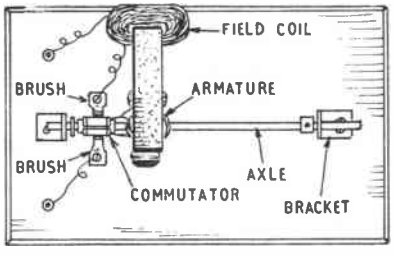


Fig. 4—Plan of motor

this, the armature is best held in the left hand, where poles and axle join. The first pole can now be wound with the right hand, the turns being counted. When the first pole is finished, a loop about 1in. long is made in the wire. The armature is now turned one-third, to wind the second pole. When this is done, another loop is made, and the third pole is wound. Each winding must be in the same direction, or the motor cannot run. The end of the last winding is joined to the beginning of the first. This point, and the loops, are scraped ready

for soldering. It is a good plan to varnish the windings and leave to dry, as this will prevent turns coming loose.

Other Items

Two brushes are required, preferably cut from thin brass, and two bearing brackets about the size shown in Fig. 2. The wooden base is 3ins. by 5ins. by ½in. thick. The bearings are drilled to provide a running fit for the axle.

The commutator consists of three segments insulated from the axle. It needs to be at least ½in. long, but should not be larger in diameter than necessary. The insulated sleeve can be of wood, ebonite, or glued brown paper, of such a size that the brass tube is a push fit upon it. The tube is then carefully sawn into three segments, these being bound with glued thread to hold them in position. A clear space is left for the brushes to run, and also enough projection for soldering the leads in place.

When finished, the commutator is turned so that its segments are opposite the armature coils, as shown in Fig. 3. The three loops formed between the armature windings are now soldered to the segments, at (Y), as shown. Each connection is exactly similar to the others, consisting of the beginning of one winding, and the end of the next.

The parts are arranged as in Fig. 4, so that the armature rotates between the poles of the field magnet. Though the motor will run with quite a large space here, power and speed will be increased by having only a very small gap between armature and field poles.

Both brushes bear lightly upon the commutator, and lateral movement of the axle is prevented by a washer and collar. So that the motor may run at maximum speed the commutator segments must be in correct relationship to the armature poles. If the commutator is a tight push-fit on the axle, it can be rotated a few degrees either way, in relation to the armature poles, to find the position which gives best running. This has quite a large effect upon results.

Connections

Two terminals are fixed to the baseboard for external connections. If it is wished to run the motor in the opposite direction, the two leads from the field winding are reversed. If a permanent magnet has been fitted, as mentioned, the two brushes are simply wired to the terminals, as no field coil will be present.

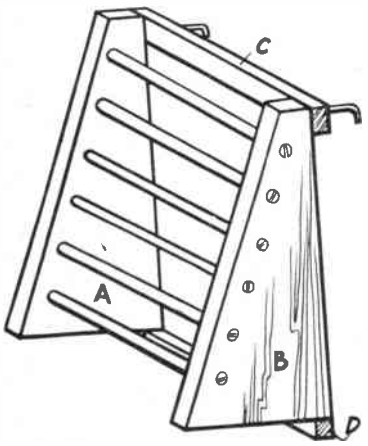
Wound as explained, the motor can be run from 6–12 V. Very low voltages will reduce power and speed considerably. Most economical running will be from a mains transformer, with A.C. mains only.

Reduction gearing

As with all electric motors, considerable reduction gearing is necessary with the average model, so that the motor may turn at full speed. Gearing, worms, or light belts can be used for this. The initial drive should be free-running, or friction will reduce speed. If necessary, the latter can be governed by fitting a resistance controller in one lead to the motor.

It is possible to run the motor on half voltage by wiring the field and brushes in parallel, instead of in series. The current consumption will then be doubled. With a given voltage, this form of connection will give more power than the series method, but with less economical running.

Clothes Rack for the Airing Cupboard



THIS is a simple design for a clothes airer which makes use of the narrow space found in most airing cupboards by the side of the hot water cylinder. Its construction should not present the average handyman with any difficulties if the instructions are followed carefully.

The size of the airer will, of course, have to be made to fit the individual cupboard space, but the design will remain basically the same.

The two side pieces (A) and (B) are made from 1in. material and can be cut from one board 8ins. wide. These two pieces taper from 1in. wide at the top to 7ins. wide at the base. The length should be about 36ins. After these side pieces have been cut and smoothed, a line should be drawn down the sloping side 1½ins. in from the edge and marked off 2ins. down from the top and every 6ins. after that.

Insert dowels

Holes for ¾in. dowel should be bored at these marks. The dowel rails can next be fitted. A good method of doing this is to saw a slot in each end of the dowel, dip in glue, insert in holes and then drive in small wedges, care being taken to do this across the grain of the side pieces to prevent splitting.

When the rails have been fitted, a piece of 2ins. by 1in. (C on the diagram) is screwed to the back of pieces (A) and (B) at the top by means of four screws. Into this piece of wood are screwed two square hooks, two screw eyes being screwed into the side of the airing cupboard to match. The rack is then hung in position and a mark made where the bottom of the side pieces come to. A piece of 2ins. by 1in. (rail D) is then fastened to the side of the airing cupboard *slightly higher* than these marks, so that this piece takes the weight of the rack.

When deciding the position of the rack remember that clothes will hang down *below* the bottom rail. The whole job can now be glasspapered and painted with enamel or left natural wood.

If two additional screw eyes are screwed into the airing cupboard door, the rack can be lifted out and hung on these to make emptying and fitting much easier. (P.P.)

● **Continued from page 410**

MODEL TRUCK

the side-members. Insert a piece of ⅜in. dowelling-rod and saw off the ends flush with the outside faces of the side-members.

Two more strips of wood, each 4½ins. long by ¾in. wide by ¼in. thick, radiused ⅜in. at both ends and drilled ⅜in. diameter on the same centres (Fig. 8), are required as side-members for the lifting mechanism. Place one alongside the outside face of each of the front lugs, lining up the four holes, and insert a length of ⅜in. diameter dowelling-rod. Cut off the ends flush with the outside face of each of the two side-members. Line-up the holes in the opposite ends of the side-members with the slots in the chassis-side-members and insert another length of ⅜in. diameter dowelling-rod. Leave ¼in. at each end protruding beyond the chassis-side-members.

Black the chassis, wheel rims — to represent tyres, doors, radiator and cooling vents on each side of the bonnet, and paint the remainder of the upper works post-office red.

The lifting mechanism is not only easy and effective in operation but acts as a locking device when the body of the truck is in the down position. (C.L.M.)

Made from 'odds and ends'

MODEL TIPPING TRUCK

MODEL-MAKING is, perhaps, the most fascinating hobby in the world. Given a reasonable measure of imagination, one can adapt almost any idea from practical everyday life, as, for instance, the simplified tipping truck detailed in the accompanying illustrations.

The materials for making it are few and simple. They include wood from a discarded soap box, a short length of dowelling rod, an empty cocoa tin, a few scraps of cellophane, a few nails, glasspaper, and a short length of stiff wire.

Now let us start off with the chassis-frame. The first requirement is two strips of wood 14⅝ins. long by ¾in. wide by ¼in. thick. Remove the corner at one end to a depth of ¾in., and put a ⅜in. radius on the corner diagonally opposite. At the same centre, drill a ⅜in. diameter hole. Then, at a distance of 5⅜ins. from the opposite end, and with centres 3⅜ins. apart, drill two more holes ⅜in. diameter through the thickness of the wood. Cut away the wood between the holes to form a slot ⅜in. wide. The result should be as shown at Fig. 3.

The bonnet consists of a solid block of wood 3ins. long by 4ins. wide by 2ins. thick. Put a ½in. radius along the front top edge (Fig. 1) and along the two top side edges (Fig. 4).

Cut two more strips of wood, this time 4½ins. long by ¾in. wide by ¼in. thick, for the axles. Glasspaper smooth these, the bonnet and the two side-members. Place the side-members in position (Figs. 1 and 2) parallel 3½ins. apart and glue on the bonnet with the front edge level with those of the side-members. Glue the axles in position also — the front 1¾ins. back and the rear 2¾ins. forward — leaving ⅛in. of the end of each protruding beyond the chassis.

The driver's cab consists of two side-pieces cut to shape from ¼in. thick wood, as shown at Fig. 5, a back piece 3½ins. square by ¼in. thick, the floor 4ins. long by 2ins. wide by ¼in. thick, and the roof 3½ins. long by 1⅝ins. wide by ¼in. thick. Glasspaper smooth these also and, to produce the most realistic effect, stick a scrap of cellophane over the windscreen and window openings. It will be necessary — when the cab is erected — to put a suitable radius on the front top edge of the roof.

Four discs 2½ins. diameter, cut from ¼in. thick wood are now required for the wheels. Use large dome-headed tacks (Figs. 1 and 2) to attach to the axles.

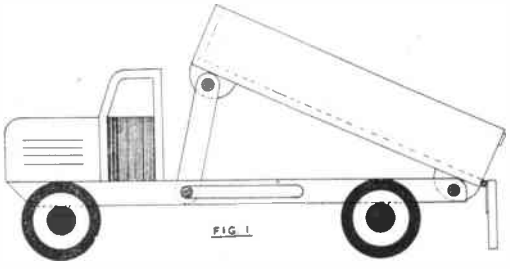


FIG. 1

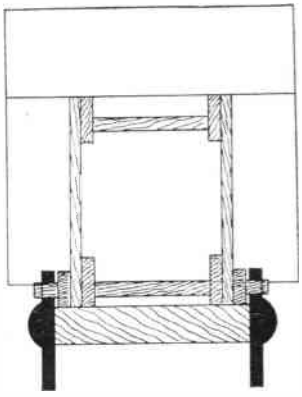


FIG. 2.

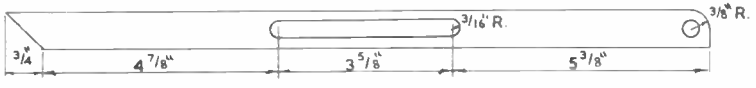


FIG. 3.

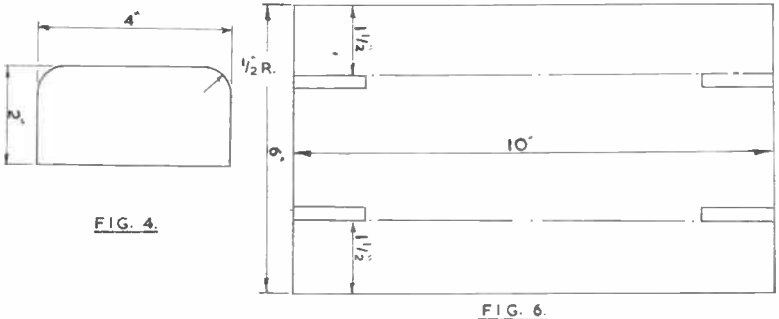


FIG. 4.

FIG. 6.

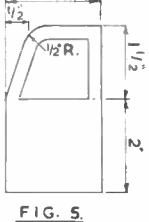


FIG. 5.

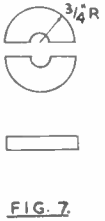


FIG. 7.

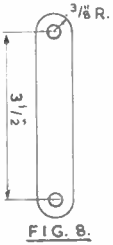


FIG. 8.

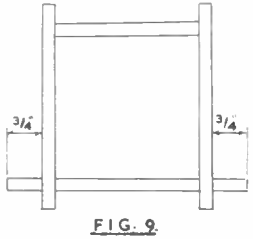


FIG. 9.

For the body of the lorry, a piece of wood 10ins. long by 6ins. wide by ¼in. thick is necessary. Two side-boards 10ins. long by 2ins. wide by ¼in. thick, and two end-boards 6ins. long by 2ins. wide by ¼in. thick are also needed. Cut two discs 1½ins. diameter from ¼in. thick wood and drill a ⅜in. diameter hole through the centre of each. Divided, as shown at Fig. 6, they form the four lugs required.

Again glasspaper smooth all the parts, and assemble the front end and two side-boards of the body. Glue also the four lugs in place on the underside of the body (Fig. 6). Attach the tail-board by passing a suitable length of wire through the two eyelets screwed into the end face of the base-board in line with two more eyelets formed by bending over the protruding ends of a couple of metal strips nailed to the tail-board, as shown at Fig. 1. Hook over the ends of the wire to secure. Two more metal strips pivoting on the top end faces of the side-boards like turn-buttons hold the tail-board in the up-position.

Place the body in position on the chassis and line-up the holes in the two rear lugs with those at the back end of

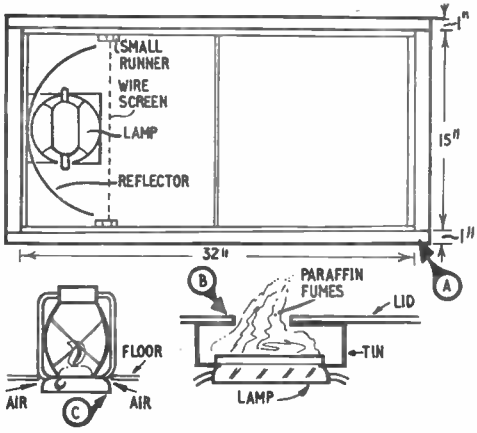
● **Continued on page 409**

Rear your own fowls

Easy-to-build Chicken Brooder

IN September, point-of-lay pullets will cost between twenty-five to thirty shillings each, whereas day-old pullets now cost three to four shillings. Obviously it is far cheaper, and incidentally, more satisfying to rear your own pullets from chicks to provide a steady supply of fresh eggs next winter.

In this article I am going to show how a brooder, capable of rearing twelve chicks, can be made very cheaply. The one I made runs off a paraffin lamp but the heating system can easily be adapted to run off an electric bulb.



One compartment of the orange box is to be the actual brooder, the other will be a small run.

Cut a hole about 6ins. by 6ins. in the bottom of the middle wall of the orange box. This is to give the chicks access to the run.

Nail the 2ins. by 1in. strips around the top of the box, so that there is a flat 1in. ledge all around the top.

Place the hurricane lantern in the middle at the end of the box and mark out a square so that the base of the lantern slips through the hole and no sides of the lantern rest on the sides of the square.

The lantern can be kept upright by hooking the handle over a nail fixed in the rear wall.

The spaces around the base of the lantern will let in all the fresh air required.

Netting 'guard'

Cover over any slits in the sides with scrap-wood on the outside, the tops of orange boxes are very useful here.

To prevent the chicks from being too close to the lamp a frame of ½in. mesh wire netting is made and placed in front of the lamp. The netting can either be nailed to the sides of the box, with the loose ends of the wire on the lantern side of the brooder or a frame made which is held upright by two short runners fixed to the sides of the box.

Beat out the sides of a large tin into a semi circular arc. This is placed behind the lantern and will reflect the light and heat on to the chicks.

Next take your plywood. This should lie comfortably on the top of the brooder. A handle can be fitted but the top need not be hinged.

Cut two holes in the lid, each about 1in. across. One is a spy hole over which a small piece of glass can be fitted with Sellotape. The other is to allow the paraffin fumes to escape, but will not be needed, of course, if an electric bulb is employed. Take a tin, the diameter of which is a little larger than the top of the lantern and cut a hole about 1in. across in it.

The tin should be shallow enough to fit over the top of the lantern, while the lid lies flat on the brooder.

Screw the tin on to the lid so that the two holes coincide.

Finally, nail a piece of thick material over the hole in the centre partition of the brooder, having first cut several vertical strips in it. This will keep the warmth in, but allow the chicks to come out into the run.

Additional warmth will be provided if the inside of the brooder on the chickens' side of the wire is lined with several thicknesses of newspaper.

As the chicks get bigger, a run should be placed at the end of the orange box, which should be kept in an outhouse, away from draughts, and stood on four bricks.

MAIN ITEMS REQUIRED

1 strong orange box — 2ft. 6ins. by 1ft. 3ins. by 1ft.
1 hurricane lantern (12ins. high approximately)
1 piece plywood — 16ins. by 16ins.
2 strips 2ins. by 1in. each 2ft. 8ins. long
2 strips 2ins. by 1in. each 1ft. 3ins. long
1 strip ½in. wire mesh — 1ft. 3ins. long.
1 large tin

Add another box

When the chicks are three weeks old it will be found that they will not all fit into the brooder at night. All one has to do is to fix another box on top and extend the fumes outlet, so that half of the chicks can roost on the lid. The rising warm air should keep them quite warm until they are old enough to go into a chicken house.

The temperature of the brooder should be 95°F. for day old chicks and afterwards 90°F. After the chicks have settled down they should not huddle up to the light, nor should they keep right away from it. When they spread themselves over the floor, the temperature is just right.

The lamp will need filling twice a day, costing about sixpence a week to run.

When one considers that a broody hen is liable to tread on some of her chicks when she first receives them — an expensive habit at four shillings a time — I think that there is a lot to be said for this type of brooder. (R.E.G.)

Weather Glass Formula

THIS is the traditional formula for the 'storm' or 'weather' phials which used to be attached to old barometers, or sold as separate items.

The actual 'weather glass' consists of a sealed glass tube or phial filled with a colourless liquid. With changing weather the appearance of the solution also changes, and thus forecasts coming conditions. For most reliable results the 'weather glass' is exposed to a north light and hung in a sheltered position shaded from direct sunlight.

In bright conditions, continuing fine, the solution is quite clear. The appearance of crystals in the tube heralds the approach of changing conditions, the larger the crystals appear in the tube, the colder the weather will be.

Threads of Crystals forming in the upper part of the tube indicate winds. Crystals forming at the bottom indicate frost, large flakes of crystals snow or cloudy weather. If the solution is dull, but with no definite crystal formation, thunder is probable.

Constituents of the solution:—

2 drachms	camphor
½ drachm	potassium nitrate
½ drachm	ammonium chloride
2 fluid ozs.	water
2 fluid ozs.	absolute alcohol

(R.H.W.)

-not for LOVE or MONEY

Now is the time to buy Micromodels that will be 'out of print' and unobtainable for love or money very shortly. Many sets are scarce and may never be reprinted: our presses will be busy producing *entirely new subjects* in demand, whilst the old favourites will acquire the scarcity value of collectors pieces.

Send stamped addressed envelope for current Illustrated descriptive List.

Micromodels

3 (H) Racquet Court
FLEET STREET, LONDON, E.C.4

YOUR BARGAINS

2/6 1 gross asst. P.K. Self-tapping Screws.
2/6 1 gross asst. B.A. Screws and Nuts.
2/6 1 gross asst. Wood Screws.
2/6 1 gross asst. Split Pins, Fibre and Spring Washers.

AIRCRAFT INSTRUMENTS

4/6 Altimeters.
4/6 Air Speed Indicator.
4/6 Oxygen Flow Indicator.
4/6 Boost Gauge.
2/6 Dimmer Switches (Rheostats).
2/6 Doz. Carbon Motor Brushes, ¼" × ¼" × ⅛". (6d. postage per item. Free over 10/-)
230 volt A.C. Motors, 1/6 h.p. 45/- each.

BEAL SURPLUS STORES
17 Broad St, Brighton, Sussex

BRASS, COPPER, DURAL, ALUMINIUM, BRONZE

ROD, BAR, SHEET, TUBE, STRIP, WIRE
3,000 STANDARD STOCK SIZES
No Quantity too small. List on Application
H. ROLLET & Co. Ltd.
6 CHESHAM PLACE, LONDON, S.W.1
Also at
Liverpool, Manchester, Leeds, Birmingham

HOW TO STOP SMOKING

and permanently overcome that ceaseless craving for tobacco. Save money, safeguard health. Send stamp for details of the world-famous inexpensive Stanley Treatment for tobacco habit

THE STANLEY INSTITUTE LTD (Dept. 30)
12 Bridewell Place, London E.C.4

---

* GREAT CAMPING OFFER *

RIDGE TENT SENT FOR 4/-

BRAND NEW de luxe 'Safety' Tent. All colours. Complete. Ideal cyclists, campers. Length 7' 3" sleeping base × 4' 6" wide × 3' 6" high × 12" walls, all approx. Weight 3¼ lb. Cash 55/-, or 4/- deposit and 6/- monthly. WITH FLYSHEET 83/6, or 9/3 deposit and 9/9 monthly. Both carriage 2/6. LISTS OTHER EQUIPMENT, TENTS, CLOTHING, ETC., TERMS.

BRAND NEW U.S.A. OFFICER'S SLEEPING BAG

MADE IN THE U.S.A. These are a gen. American issue, not to be confused with spurious imitations on the market. Real 100% wool inner zipped down the front, with an additional free waterproof outer, you can sleep in the open. Comfortable, warm, rolls into easy carrying pack. 29/11, post etc. 2/6. LISTS, TENTS, TERMS.

HEADQUARTER & GENERAL SUPPLIES LTD.
(HOBW/51), 196-200 Coldharbour Lane Loughboro Junction, London, S.E.5
Open all day Saturday. 1 p.m. Wednesday.

STOP SMOKING!! Quick guaranteed remedy. Free testing sample!! — Triumph Remedies (H), Exeter.

LEARN it as you do it — we provide practical equipment combined with instruction in Radio, Television, Electricity, Mechanics, Chemistry, Photography, etc. — Write for full details to E.M.I. Institutes, Dept. HW47, London, W.4.

---

100 DIFFERENT stamps free! Request ½d. upwards discount approvals. — Bush, 53 Newlyn Way, Parkstone, Dorset.

STAMPS FREE — Empire Packet including Pictorials and Victorians with approvals. — Robert J. Peck, 7A Kemp Road, Bournemouth.

MUSICAL BOX MOVEMENTS

14/9d. ONLY

Complete kits 21/6d.

SAE for details:—
SWISSCROSS CO., Dept. B,
116 Winifred Rd., COULSDON, SURREY

GENUINE Swiss Musical Movements. The best and largest selection of tunes in the country, lowest prices 16/3 each. Genuine Thorens Movements, 22/9 each. All guaranteed. P & P, 9d. extra on all orders. — Richardson & Forder, HW, 5 Chapel Place, White Hart Lane, London, N.17.

SWISS MUSICAL MOVEMENTS. Before you buy send 2d. stamp for our illustrated brochure —Metwood Accessories (Dept. HW), Church St., Wolverton, Bucks. (Trade enquiries invited.)

'PAINTSPRAYING' HANDBOOK. Covers Car, Industrial & Flock Spraying. 3/6, post 4d. Catalogue of our Cellulose and Paints and all Allied Sundries 2½d. — Leonard Brooks Ltd., 81 Oak Road, Harold Wood, Essex.

The Handy Paint in Tubes

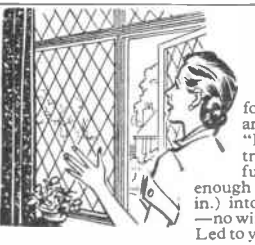
1/-
PER TUBE
In 13 lovely colours and clear varnish

Starlon is perfect for handicrafts and small painting jobs. Quick drying. No btush marks. Brilliant finish. No waste–you squeeze out exactly the quantity required.

Starlon

PLASTIC ENAMEL PAINT

Obtainable at handicraft shops everywhere
STARLINE, SOUTHEND-ON-SEA, ESSEX



DECRA-LED

T.V. demonstrated from B.I.F.

LEADED WINDOWS

are worth looking into. . .

for brighter windows that last a lifetime and add pounds to the value of your house. "Do-It-Yourself" with Decra-Led and transform your plain windows into beautiful Leaded Lights. A 10/- kit contains enough material to convert 3 panes (30 in. × 18 in.) into diamond leaded lights. No glass to cut —no windows to take out. You simply fix Decra-Led to your existing windows—inside or outside

Full scale working drawings available —send for price list and name of nearest stockist

Ideal Home Exhibition, Stand 424
Empire Hall, March 6 – 30

From your local dealer or, if unobtainable locally, from:
NORTH WESTERN LEAD CO. LTD. DEPT I
JUNCTION ST., HYDE, CHESHIRE TEL: HYDE 1234

Serial No ★ 1329
BRITISH
GOOD HOUSEKEEPING INSTITUTE
GUARANTEES
REFUND OF MONEY OR REPLACEMENT IF NOT IN CONFORMITY WITH THE INSTITUTE'S STANDARDS

HARDHITTING *ACCURATE*

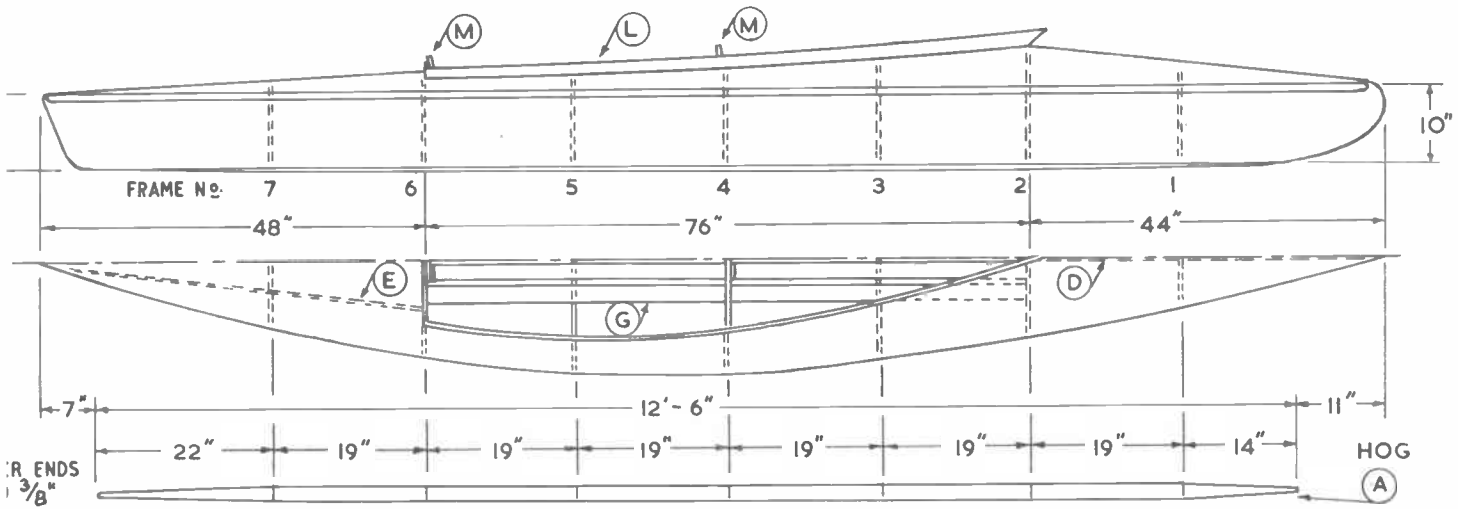
Webley AIR PISTOLS

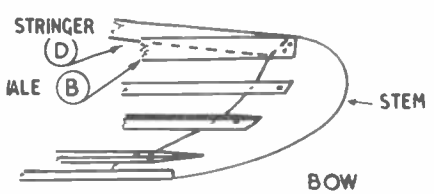
AIR RIFLES · ACCESSORIES

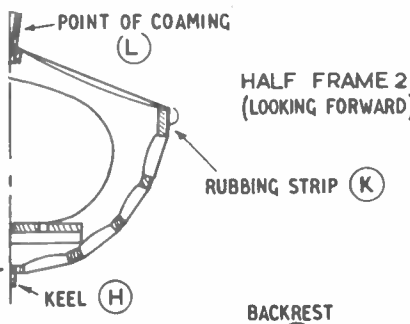
Write for Catalogue
WEBLEY & SCOTT Ltd., 166 WEAMAN ST., BIRMINGHAM, ENGLAND

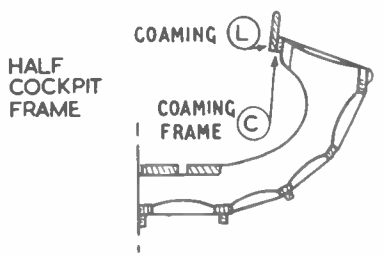
BE TALLER

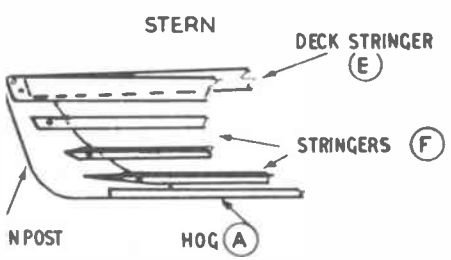
in 12 days or money back. New gland and spinal discovery increases height 2 to 5 inches. 'I have gained 4½ inches in height. My weight increased from 9-stone 4-lb. to 10-stone 3½-lb.'—P.D. 'Increased 3 inches'.—H.G. Guaranteed harmless. Full course 10/- (or $1.50). Air Mail 16/3. Details 2d. Sent under plain cover. **J. H. MORLEY, 28 (H/166) Dean Rd., London, N.W.2. Practical Courses, all subjects. List free.**

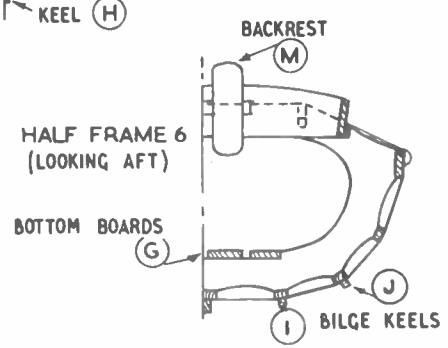












HOBBIES WEEKLY

SESQUI

P.B.K. 14 MK. 2 CANOE

14FT. CANVAS-COVERED,
ONE OR TWO SEATER.

DESIGNED BY P.W.BLANDFORD

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.