

# Hobbies

## WEEKLY



VOL. 114

NUMBER 2951

## Step-by-step instructions for making A JET-PROPELLED HYDROPLANE

A model designed by R. H. Warring

**A**LTHOUGH only a tiny model, this hydroplane operates on the modern principle of 'three-point' suspension where the whole of the weight of the craft is supported by three 'points' or small planing surfaces, contributing a minimum of water resistance and thus making for maximum speed. Almost all the really fast full size speedboats work on this principle.

### Planing

Only a few square feet of hull surface are actually in contact with the water at top speed, yet the planing force produced is sufficient to support several tons in weight. And just to be ultra-modern, our model is jet-propelled—using the popular Jetex '50' solid fuel motor which is capable of generating a thrust in excess of 0.5 ounces.

The plans are reproduced full size, so the necessary patterns can be traced directly off the drawing. The constructional sketches detail the main stages in assembly.

Start by tracing the full plan outline on to  $\frac{1}{8}$  in. plywood. Cut this out very carefully to shape and on it mark the position of the Jetex mounting clip.

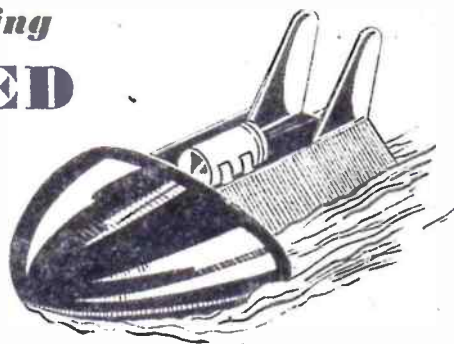
Full-size plans are on page 127

This can be screwed down to the ply, insulating the wood with a strip of asbestos paper, if desired.

Now cut former A, former B, and four off former C, all from  $\frac{1}{8}$  in. balsa. Two 3 in. lengths of  $\frac{1}{8}$  in. by  $\frac{1}{8}$  in. balsa strip are also required with one edge chamfered off at an angle, as indicated on the plan. Cement all the formers and these strips in their respective positions on top of the ply. Use ordinary balsa cement for this as it is both waterproof and quick drying.

### Covering the Hull Front

The front of the hull is then completely covered in with  $\frac{1}{8}$  in. sheet balsa, cementing well and pinning in place until set, if necessary. Make sure that this forms a watertight compartment. If you have any trouble in bending balsa sheet to the shape required, try planing with strips of  $\frac{1}{8}$  in. balsa about  $\frac{1}{8}$  in. wide, as an alternative method. If you have the



right quality sheet it will be easy to complete in one stage.

### Leave Motor Tunnel

Now cover in the after body with  $\frac{1}{8}$  in. sheet, leaving a tunnel down the middle where the Jetex motor goes. Give all parts two or three coatings of grain filler and glasspaper down perfectly smooth before adding the sheet balsa fins to complete the upper hull assembly. The edges of these fins can be rounded slightly with glasspaper. In the diagrams the Jetex clip, initially screwed in place, has been omitted for the sake of clarity.

The underbody of the hull is completed by the addition of two blocks of light balsa. These are first cut to a wedge shape and then securely cemented in place, as shown. When set, they are trimmed down to the outline of the ply member. Treat the sponson blocks liberally with grain filler and glasspaper down smooth.

The whole hull will benefit from two

All correspondence should be addressed to The Editor, Hobbies Weekly, Dereham, Norfolk.

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or three coats of coloured cellulose dope of lacquer, applied carefully and allowed to dry thoroughly. Rub down and polish to a glass-like finish, particularly on the under surfaces.

Now clip the Jetex unit in place and check the trim of your completed model in the water. It should balance out approximately as shown in the

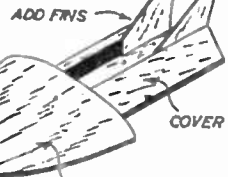
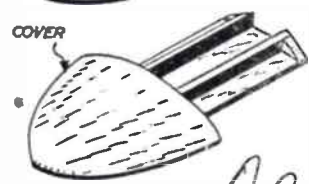
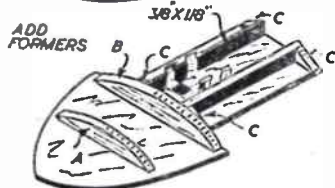
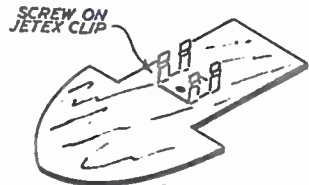
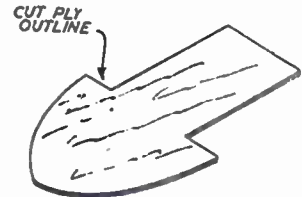
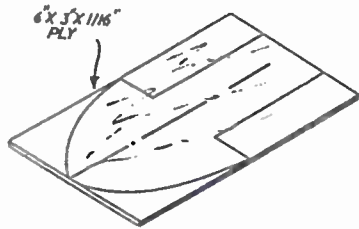
diagram, well submerged. The stern should be sitting down in the water to a fairly marked degree.

When the Jetex motor is loaded and fired the boat will pick up speed very slowly at first, but the water forces will be lifting the bows still farther out of the water. In a matter of seconds the hull will begin to ride up on the bottom

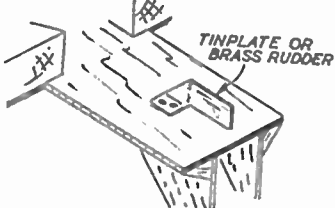
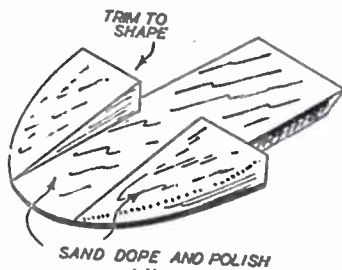
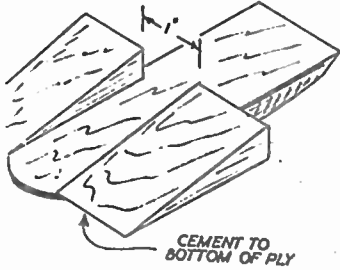
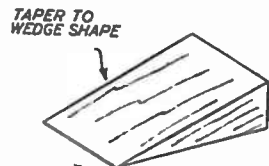
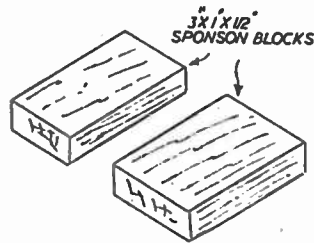
of the sponsons, balanced by the extreme aft portion of the underbody skimming the surface in true three-point suspension style.

The actual path followed may be a little erratic without a water rudder. A suitable rudder can be made quite easily

(Continued on page 119)

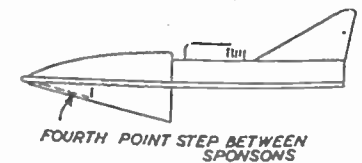
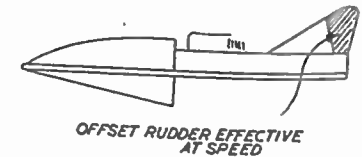
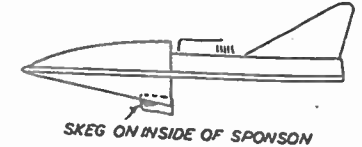
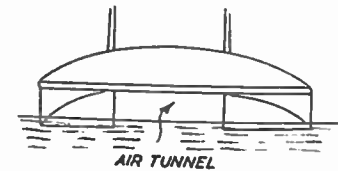
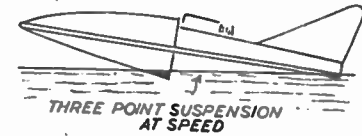


SAND AND FILL



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All the stages in construction are shown clearly in these drawings



## FOR THE GARDENER

# PREPARING LOAM & COMPOST

FOR the final potting add to twelve parts of loam, not too finely chopped, three parts of old well-decayed cattle manure, one part wood-ashes—reads the gardening manual.

Such instructions are often misleading to the beginner; he turns to the dictionary and finds that loam is defined as—a mixture of clay, sand, and other earths, forming a soil fertile in proportion to the quantity of decayed animal and vegetable matter contained in it.

This indicates that all top soils are, technically speaking, loams. It would, however, be disastrous to use just any garden soil where 'loam' is required, since soils vary from extremely light to very heavy clay. To be reasonably successful with seedlings and plants in pots, the loam must be fairly light and easily crumbled—friable, to use the gardening phrase. Any manure added must be well decayed. If your soil answers to this description, it can safely be used for your requirements.

### For Chrysanthemums

Instructions advise you to use fibrous loam as a base for compost when potting on Chrysanthemums. Fibrous loam is obtained by rotting down turves cut from grass land.

These turves should be about 5ins. thick and are stacked upside down. They should be stacked when moist to assist in their decomposition. They should be covered in some way to prevent the stack becoming sodden. At the end of this article we shall describe an easily made cover for this purpose.

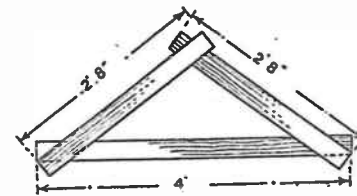


Fig. 2—Marking the frame

All grass pulled from the garden can be used in lieu of turves.

### Composts

As we have seen, the fertility of the soil is in proportion to the quantity of decayed animal and vegetable matter contained in it, but how does one acquire the decayed animal and vegetable matter? Horse, cow or pig manure,

sometimes poultry droppings, are all used to advantage, but the average gardener is unable to obtain any of these in quantity and must rely on vegetable matter. Correctly prepared, this is quite as good as farmyard manure and can hardly be distinguished from the latter.

For making good compost, all waste vegetation can be used. Lawn mowings, grass, weeds, leaves, docks, thistles, hedge cuttings, cabbage stalks, tomato haulms, pea haulms and potato tops, nettles, potato peelings and all kitchen waste can be used. A space should be cleared in the garden to take the heap of refuse.

Do not dig a pit since the process of decomposition is dependent upon the action of the air, and it is essential that the heap be built above ground level. To assist decomposition a good ac-

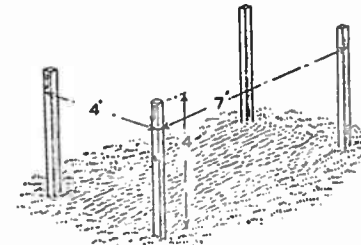


Fig. 1—Setting up the posts

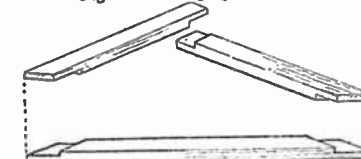


Fig. 3—The halving joints

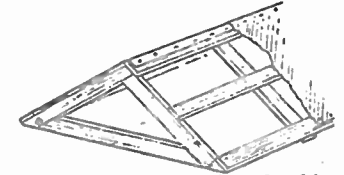
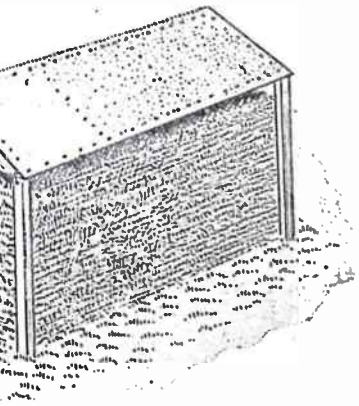


Fig. 4—Covering with roofing felt



celerator such as Fertosan should be used. A packet can be bought from your local seedsman for 1/6. A glance at the leaflet in the packet shows that it is 'a powder containing a carefully determined number of bacteria, bred on a special medium, and arrested or rendered dormant by a new process which ensures later activity. Accompanying these bacteria is a perfected food supply to carry them through the initial stages of growth, while at the same time increasing their voracity'.

Fertosan is absolutely harmless to livestock, poultry and domestic animals. The compost is ready for use in about five to six weeks.

Lightly fork over the site to permit good drainage and proceed to build the heap of refuse. First a layer about 12ins. deep should be placed in position and sprinkled with the accelerator which should be mixed according to the instructions in the packet. On the moistened heap spread a layer of ordinary soil about 1in. thick and repeat this process as refuse becomes available.

Place all couch grass, docks, thistles, coltsfoot, etc., in the centre of the heap where they will be quickly destroyed. The heap should not be stamped down but should be firmed with a fork, allowing the weight of the soil to do the rest.

### Making a Cover

To prevent the heaps getting sodden with rain it is better to erect a temporary cover of some kind. Four posts should be set in the ground, after creosoting the ends, as shown in

(Continued on page 116)

# Books to Read!

A review of interesting books for craftsmen which have been recently published. Obtainable through newsagents or book-sellers or direct from the publishers mentioned.

## Radio for Boys

by Edwin N. Bradley

THIS is a Junior 'Teach Yourself' book, and will be welcomed as an addition to the ever expanding list of these volumes. Apart from giving a very sound outline of radio and how receiving sets work, it contains full details of how to make a crystal set, a one-valve battery receiver, two, three and four valve battery receivers, a four valve battery superhet and an A.C. mains superhet. There is also a chapter on the construction of cabinets. In all, it provides a wealth of knowledge for the boy who wishes to learn something about wireless.

Published by the English University Press, St. Paul's House, Warwick Square, London, E.C.4—Price 6/-.

## Photography at School and College

by M. K. Kidd

THIS work from a Press famous for its books on photography has been specially written for active young people, and shows the short cuts not only to successful photography in general, but especially to the type of photograph they wish most to go in for. It is common knowledge that any really good book will teach you photography just as efficiently whatever your age, but it would be foolish to pretend that people at school and college are likely to be interested in the same sort of photography as an elderly gentleman looking for a quiet and relaxing hobby. In tackling the subject directly from the viewpoint of young people, the author has been able to by-pass those aspects

of the hobby which would only interest the elderly. The book tells you how to take first-rate pictures whatever your camera and whatever funds you happen to have. It also tells you the sort of equipment to pick—new or second-hand—or how to make your own. There are also chapters on processing, remedying faults and selling photographs.

Published by Focal Press Ltd., 31 Fitzroy Square, London, W.1—Price 7/6

## Teach Yourself Motoring

by Dudley Noble

MANY people who have never yet owned or even driven a car are likely to become motorists in the more or less near future, and it is, therefore, a good thing to learn as much as possible beforehand regarding driving and general maintenance and also about the manner in which a motor car functions. The purpose of this latest volume in the 'Teach Yourself' series is to explain as clearly and simply as possible, all that a motorist or potential motorist should know about a car and its use on the highway. It will teach the reader how to drive, how his vehicle works, and how it can be maintained in a fit condition for service.

Published by the English University Press, St. Paul's House, Warwick Square, London, E.C.4—Price 6/-.

## Making a Start in Photography

by John Bardsley, A.R.P.S.

THIS, as its title indicates, is rather more likely to appeal to our

readers as it is addressed to those who wish to graduate to a full understanding of the more complex techniques of photography, as well as to the amateur who intends to develop and print his own snapshots. Some of the underlying theory of photography has been introduced on the assumption that the reader will find more enjoyment and understanding in the work if he realises the principles on which it is based.

Published by Chapman & Hall, 37 Essex Street, London, W.C.2—Price 9/6.

## Hobbies for the Handicapped

by C. V. Jackson

HERE is a book designed to present, in as practical a manner as possible, a selection of interesting pastimes to help the physically handicapped, the aged, or the convalescent, to find some relief from the monotony of their daily round. The value of occupational therapy is now fully recognised, and by providing the maimed or invalid with suitable forms of craft work, their thoughts are diverted from their own immediate distress.

Published by Matsons Publications, St. Ives, Hunts.—Price 5/-.

## Tropical Fish Keeping

IN this book, directions are given which will enable the beginner to set up and maintain a tropical aquarium. The book will also help him to obtain maximum enjoyment from this fascinating hobby. It is comprehensive, informative, and includes four attractive colour plates of various tropical fish.

Published by Spratts Patent Ltd., 41-47 Bow Road, London, E.3—Price 1/6.

## Covering

shown in Fig. 3. Use a tenon or a small hand-saw for this purpose and then screw or nail the pieces together.

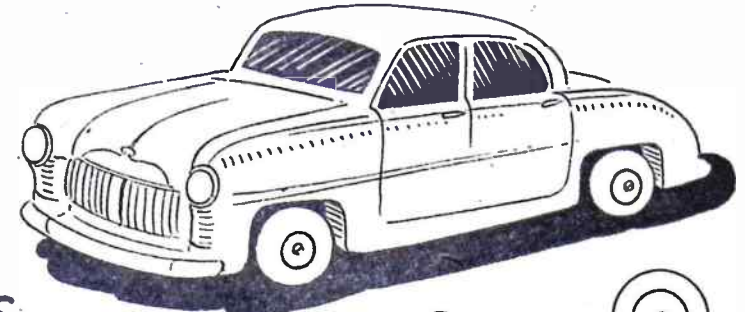
Two such frames should be constructed, one for each end of the cover. The two end frames are joined by six long splines as shown by Fig. 4. The size of these should be about 2ins. to 3ins. wide and 1/2in. thick. The length is according to the size of heap and the exact distance overall of the supporting posts. Bracing pieces can be nailed underneath at intervals.

The ideal material for covering is ordinary roofing felt which can be purchased at your local ironmonger's or builders' merchant. The felt should be tacked on to the frames as shown, overlapping 1in. or 2ins. at the ridge. In average weather, the cover can be rested on the posts without any fastening, but to avoid mishap in rough weather it is advisable to fix screw eyes and hooks as shown in Figs. 1 and 4.

Finish off by giving a coat of paint or creosote to preserve the woodwork and the cover will give satisfactory service for years.

# Make This Miniature Saloon Car

FROM ODDMENTS OF WOOD

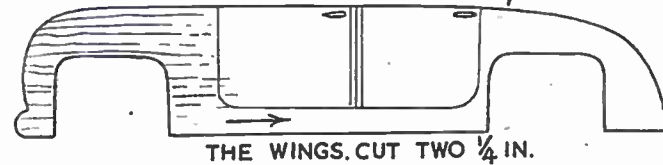


## A NEW SERIES

THE TOP EDGE SHOULD BE ROUNDED (SEE FRONT VIEW)

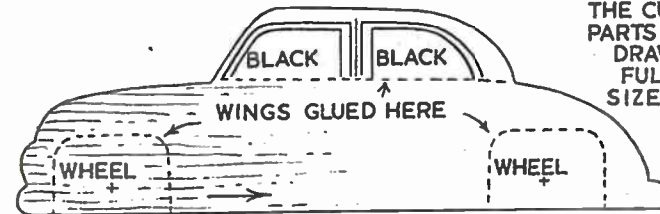
HEADLAMPS CUT TWO FROM THIN CARD

WHEELS CUT FOUR FROM 1/2 IN. DIA. ROUND ROD. PAINT

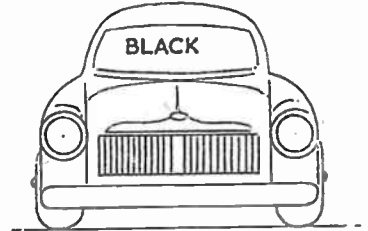


THE WINGS CUT TWO 1/4 IN.

THE CUT-OUT PARTS ARE DRAWN FULL SIZE



THE BODY CUT TWO 1/2 IN.



FRONT VIEW SHOWING HOW WINGS, BONNET AND SALOON ROOF ARE SHAPED

AS our heading indicates, we are commencing this week a new series of miniature toys to follow the popular Toy Train Set recently completed in *Hobbies Weekly*.

There will be a large range of distinctive vehicles, from the saloon car shown here to larger and more detailed lorries and buses. After a few of the cars have been dealt with, we shall give details of a garage which can also be used as a box in which to store them.

The keynote in all these toys will be ease of construction. It is quite easy to cut out and shape several of these miniature cars in one evening, and since odd wood can be used up, the costs are negligible.

The two shapes are shown actual size and they should be traced on to the appropriate thickness of wood. Keep the grain in the direction shown by the

arrows. Glue the two body pieces together and round off the bonnet, the windscreen and the roof. Now cut out the two 'wing' pieces and round off as indicated in the picture of the finished car and in the front view. Glue these, one on each side of the body. Note that in a car of this size only rough shaping is necessary.

Our picture shows how the appearance can be enhanced by the addition of painted lines to represent doors and handles, radiator grill, etc., but these details will be left to the discretion of the worker. The little toy will look quite realistic even without the finer details. Smooth off the bumpers so that they appear to be all one piece.

The wheels can be drawn on to 1/2in. wood with compasses, or can be cut direct from 1/2in. diameter round rod. In either case, be sure to drill a hole

exactly in the centre of each before fixing to the body by means of a slender 1/16in. roundhead screw.

To cut the wheels true, the dowel rod should be held in a mitre block and the 1/2in. lengths cut with a tenon saw. Round off the wheels and lay aside for painting.

Use glossy enamels to finish, and choose a light blue or green. The windscreen and windows, which should be painted black, will then show up clearly. Match the wheels with the body colour, and paint the rims, which represent the tyres, dark grey.

The radiator grill and the door handles can be white or aluminium and the lines are added in pencil. Cut the headlamps from thin card and glue to the front as shown. Then screw the wheels in place and the car is ready for use.

## PREPARING LOAM AND COMPOST

(Continued from page 115)

Fig. 1. They could be conveniently cut from 2in. square wood, but anything at hand could be used. We have suggested a few measurements, but these will depend upon the size of heap you wish to cover.

Once the posts have been erected and roughly squared up you can commence to make the cover part. Three pieces of wood about 3ins. wide and 1/2in. thick are laid across each other as shown in Fig. 2. Mark these positions with a pencil and cut the halving joints as

# RECORDING AND PLAYBACK

VARIOUS units which can be made for the tape recorder have been described in past issues and the actual processes of recording and reproducing are now to be dealt with. At the same time some of the most frequent troubles which may arise will be dealt with, as a guide which should enable them to be overcome.

### Programme Choice

With a microphone any ordinary item can be recorded, such as musical and vocal items, speeches, conversations, and so on. Types of microphone and amplifiers have been dealt with before, and will not now be treated in detail. Cheap surplus (or even home-made) microphones can be satisfactory for general purposes, but if high quality of reproduction is required, then a microphone of better class is necessary. Moving coil, crystal, and ribbon micro-

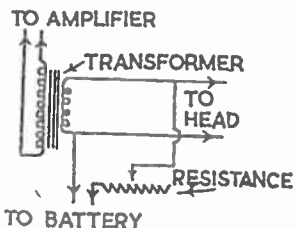


Fig. 1—Bias circuit for recording head

phones are of such a type, the latter giving a very small output, so that additional amplification becomes necessary. If there is any doubt about the microphone, it can be tested by feeding the amplifier directly from it, while an acquaintance listens to the sounds reproduced on a speaker in another room. The microphone must be coupled to the amplifier correctly. Normally, a moving coil microphone requires a transformer; a carbon microphone needs both transformer and battery, while a ribbon microphone needs a special transformer suited to its impedance.

In the event of distortion arising when playing back a recorded item, it is wise to see that this is not arising because of the microphone or amplifier. The tape can only record the signal fed to it, and if this signal is distorted, reproduction from the tape will be distorted also.

It is also possible to record radio programmes, taking the signal from a radio receiver. Such recordings must be for private use only, otherwise copy-

right regulations relating to broadcast material will be infringed.

### The Process of Recording

The general set-up of equipment will be as shown in Fig. 3. The tape must run smoothly, and at a regular speed. Speeds have been given, but there is a great deal of latitude, here. The faster the tape moves, the better will be reproduction (within limits), especially

This article completes our series on Magnetic Recording. The other contributions appeared in the issues of October 24th, 1951, December 5th, 1951 and February 20th, 1952. Back numbers are available, price 5d. each, post free.

of higher frequencies. With a set length of tape, however, a slower speed will give a longer playing time. The speed can normally be less for speech than for musical items, because the tonal range is reduced. The tape should in any case be played back at the same speed as that used when recording.

Volume needs to be controlled, during recording, either by keeping the person recording at a set distance from the microphone, or by adjusting the volume control on the amplifier. Insufficient output into the recording head will give weak reproduction. On the other hand, when magnetic saturation of the tape is arising, a further increase in signal strength would be useless, and more likely to cause distortion.

When recording is complete, the tape is wound back to its beginning. This can be done by hand, in the simpler type of unit. Other units may have a motor for this purpose. When thus re-wound, the recording is ready for subsequent reproduction.

### Bias During Recording

The application of bias to the recording head improves results, and one of the simplest possible methods is that shown in Fig. 1. Here, the value of steady direct current flowing through the head can be adjusted by the variable resistance. The higher the value of this resistance, the better; but the higher it is in value the more voltage is required from the battery. The user must, therefore, decide whether he wishes to use a small or large battery. With a small battery, the resistor has to be low in value, in order that sufficient current can flow through the head windings,

and this has a shunting effect on the head, reducing efficiency. The transformer secondary should not be of too low resistance, otherwise most of the current will flow through it, instead of through the head.

In better-class equipment bias is usually provided by an oscillator working above audio-frequency, and a circuit for such a unit is shown in Fig. 2. Here, the strength of the bias current is again adjustable by the 2,000 ohm resistor. The bias resistor in the cathode circuit of the valve will have to depend upon the valve used; something between 200 and 500 ohms will be usual. The power supplies can often be obtained from the power-supply section of the amplifier itself.

### Playing Back

The tape is run past the head exactly as when recording. The same head may be used for both recording and playback, though different heads are often employed, since this avoids the need for switching or other means of transferring the head from one circuit position to the other.

Assuming that the recording took

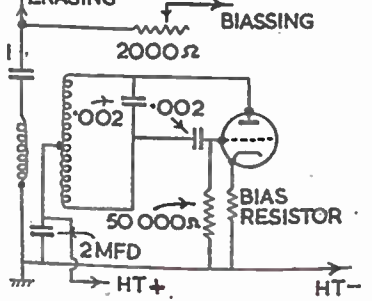


Fig. 2—Oscillator for bias and erasing

place at a satisfactory level, the volume of reproduction will depend primarily upon the degree of amplification which the amplifier provides. A small amplifier will, of course, only give a comparatively small output. The tape may be played an indefinite number of times.

### Irregularities

Irregularities in volume and tone can arise from the tape moving unevenly. Hum may arise from the motor, inducing eddy currents in the head, if the former is electrically driven from A.C. mains. Hum could also be recorded into the tape with the signal; if so, this points to a fault during recording, probably in the amplifier.

### Erasing

When no further use exists for the recording, it may be wiped off the tape by passing the latter through a magnetic field of sufficient strength to saturate the tape. In simple apparatus, this magnetic field can be obtained from a powerful permanent-magnet. An electromagnet fed from direct-current can also be used. In better-class equipment, an oscillator is used, and that shown in Fig. 2 will fill this purpose. (The valve should be of the Power type, to get a signal of sufficient strength). If such an oscillator is used, its full output is fed into the erasing head, the tape being run by the latter. The same head may be used for this purpose, if necessary.

Incomplete erasing will result in weak signals being heard when the tape is again passed by the head, the latter being connected to the amplifier in the usual manner. When erasing is complete, no signal should remain. Direct-current erasing seems generally to increase background noise, above that with erasing by high-frequency oscillations.

### Tonal Quality

Tape, especially if running at low speed, tends to give somewhat poor volume of the higher frequencies, thereby causing a certain amount of tonal unbalance. This can be corrected

by using conventional tone-control circuits in the amplifier. Such tonal correction can be applied during both recording and play-back.

A cause of poor high-note response lies in the gap of the head being too wide, and this is especially likely with home-made units. A home-made head can function satisfactorily, but the

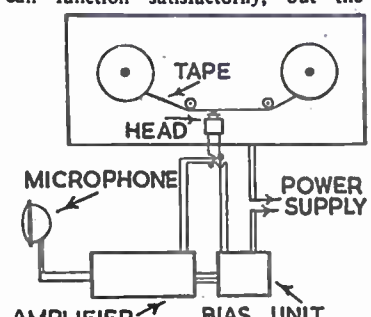


Fig. 3—Diagram of equipment

greatest possible care should be given to its construction.

### Background Noises

In addition to the causes already mentioned, friction between the tape surface and the poles of the head can cause a high background noise, since

this is amplified by the amplifier itself, together with the desired signal. To overcome this, the surface of the head should be absolutely smooth, and may with advantage be polished to a mirror-like surface at the point where the tape runs.

Carbon microphones tend to create rather a high background noise, though they are somewhat used because of their sensitivity. Solid construction of moving parts, and correct operating conditions will keep background noise down. It will often be found necessary to connect a resistor of 100 ohms or so in series with the head, while recording, to eliminate resonant peaks, but this must depend upon the standard of reproduction which is to be maintained. Further reduction in spurious noises of a high-frequency character can be obtained by employing a top-note tone control arrangement such as that often used in receivers and (with radiogram amplifiers. With this arrangement actual quality of reproduction is to some extent sacrificed by reducing the high-note response, the overall effect being one of improvement, when the background noise is primarily of a high-toned or 'scratchy' nature. A .05 mfd. condenser and 25,000 ohm variable resistor in parallel with the speaker transformer primary is suitable for this type of tone-control. (382)

## Final details for making our JET-PROPELLED HYDROPLANE

(Continued from page 114)

from a strip of tin or thin brass, bent as shown in the sketches and screwed to the ply underbody. This will be effective at both low and high speeds, so never use too much offset on it.

At speed the hull actually forms a tunnel for the air and it is the air, in fact, which is supporting much of the total weight. Slight inaccuracies of construction can often make a boat—model or full size—unstable at such an attitude. If the model shows any tendency to roll to one side—and this is not due to excessive rudder offset—then a cure can probably be brought about by carving the bottom of the sponsons to a dihedral angle. This dihedral must be the same on both sides. Most modern full size three-point suspension hulls now employ moderate dihedral angles for improved stability.

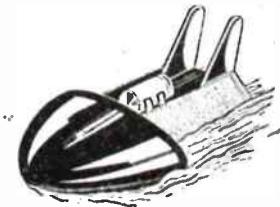
Another method sometimes used to stabilise a fast hull is to fit a small fixed fin or skeg to the inside of one or both of the sponsons. This is lined up with the centre line of the hull and assists in keeping a straight course.

One very interesting experiment which

can be carried out with this model is to use the fins to give a turning effect after a certain period of delay. If one or both fins are bent to give a rudder effect, this will be negligible at low speeds, but become quite powerful as the top speed is approached. It is possible, with practice, to set the fins so that the speedboat at first holds a perfectly straight path, then makes a complete circle at high speed to head back in the direction from which it was launched. The wide beam makes the hull reasonably stable in turns so that high speed turns can be attempted without fear of overturning.

### On Choppy Water

Performance on choppy water can be improved by the addition of an extra step between the sponsons, as shown in the final sketch. This is a V-shaped wedge which acts as a fourth suspension point at high speeds, breaking down the airflow over the bottom of the hull and preventing excessive aerodynamic lift being generated. In practical terms, this means that a fourth suspension

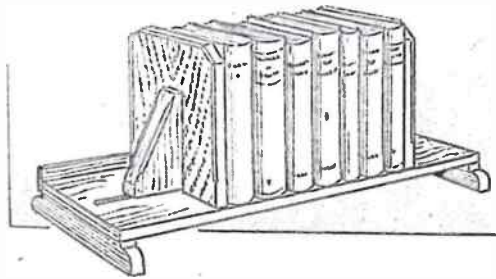


point is of use in correcting a tendency for the hull to leap clean off the surface of the water, or rear right up and, perhaps, topple over backwards.

The lighter this little boat can be made the better will be its performance. For a really fast model, use balsa instead of ply for the base, attaching the Jetex clip to a small scrap of ply which is then cemented to the balsa bottom. Choose light grade wood for the sponsons—or even hollow them out for additional weight saving—and wax polish the hull all over. A really smooth surface finish, particularly over the underbody, will save a lot of drag. Light weight will mean that the model will reach its planing attitude in less time and will need still less area of hull in contact with the water to support it. (393)

Keep your volumes tidy in

# An Adjustable Book Stand



be made of thicker wood, say, about 1in. or a little less, and be cut to the full length, i.e. 4½ins. The bottom ½in. is rebated each side to leave a tongue, just ½in. thick, which should fit the space between the boards nicely. Reduce the length of the tongue to 1½ins. by sawing ½in. off it at the outside ends. Cut the whole to the shape shown, and stop chamfer the sloping back edge, as a little ornamentation.

The side view shows the slide with its tongue in the space where it works. Cut a 1½in. disc of fretwood for each slide, and bore a screw hole in the centre.

THE book stand illustrated has been specially designed to hold a limited number of books, and will be found particularly useful to those who may possess a few particular volumes (prize books, perhaps) they may care to house separately. It is adjustable to the full extent of its capacity, which may be 12 or more volumes, according to thickness, of course. Any wood can be employed for its construction, and the result is a neat and handy compendium for the book lover.

The stand comprises a base portion, with a pair of sliding book-ends to keep the volumes erect and tidy. The stand is shown in Fig. 1, and consists, as can be seen, of two boards, spaced apart, secured to a foot at each end, the feet being shown separately, for dimensional purposes.

### Feet First

Cut the feet first from ½in. wood, and as it is important that the space between the boards should be regular throughout its length, the projecting central bit must be exactly the same width (½in.) on both feet. A good plan here is to clamp both together, and square lines across, ½in. apart, both, and saw down on the lines of the pair together. The remainder of the shaping is quite simple. Cut the two boards, which should be 2½ins. wide each, and ½in. thick, to the length given, or a little longer if a greater capacity is desired, and glue and nail to the feet. Cut a strip of wood, ½in. thick and 1in. wide, the same length as the boards, and nail this to the back board as a stop to prevent the books being pushed too far back. This is shown at (A), and should have its bottom edge bevelled off a little to make it less obtrusive side view.

The book-ends are attached to slides, which work in the space between the boards. One of these is illustrated in Fig. 2, end and side view. These should

The best finish to the completed article will depend on the quality of wood used to make it. If nothing better than deal is available, an undercoat, followed by a coat of hard glossy paint or enamel, would be as good as anything. Any colour would suit in this case. A good quality white wood could be stained mahogany or walnut, and polished or varnished. Oak could, of course, be varnished or wax polished, as preferred. In all cases, take care the polish or varnish is quite hard before placing the books on it. (397)

CUTTING LIST	
Boards (2).	1ft. 6ins. by 2½ins. by ½in.
Feet (2).	7½ins. by 1in. by ½in.
Strip (A).	1ft. 6ins. by 1in. by ½in.
Slides (2).	4½ins. by 2ins. by ½in.
Book-ends (2).	6ins. by 6ins. by ½in.

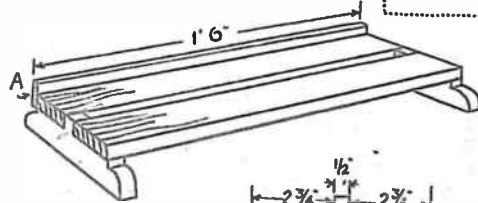


Fig. 1

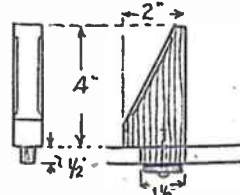


Fig. 2

For each disc, cut a circle the same diameter, of baize or cloth, lay on the discs, and drive a round-headed brass screw through disc and cloth, into the centre of the tongue above. This should act as a check, and keep the slides in whatever position they may be moved to. If they fail to do this, take a shaving off the bottom edge of the tongue, so that the discs get a better grip.

### The Book-Ends

The actual book-ends are shown in Fig. 3. Cut these from ½in. wood to the size given, saw off the upper corners, and chamfer the outside corner edges, stopping the chamfers 1in. from the bottom corners. Fix these to the slides with two screws to each, well countersunk. As it is undesirable for the bottom edges of these book-ends to scrape the boards as they are moved along, it is better to fix them just a shade above them. This is easily achieved by just laying a strip of writing paper under them as they are screwed to the slides, and afterwards, of course, removing it.

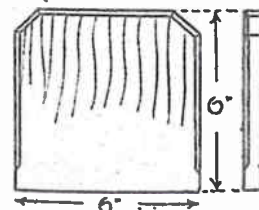


Fig. 3

**Coming Attractions:**

Constructional details for a Garden Table.

More Flying Model Aircraft.

A Model Launch

Design Sheets for an Electric Lamp Bracket, Doll's Cot, etc. etc.

## Part 2

# THE ART OF STENCILLING

HAVING dealt freely in the first part of this article with the tools used, the preparation of stencil paper, etc., we continue here with the subject of designing and cutting. In the previous article the beginner was advised to draw out a few simple border designs as practice items. We now show him how to cut them.

Lay the prepared outlined stencil on

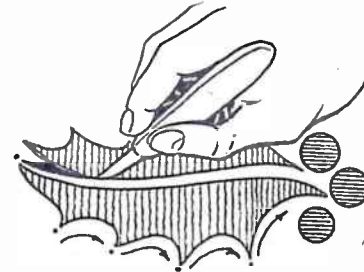


Fig. 1—The method of cutting points, etc.

the board or glass, whichever has been adapted for use, and proceed to cut as required. Hold the knife almost upright and press firmly so that a clean cut is made right through the paper at one operation. Do not make a second cut on the one line in case the knife should 'run off', so ruining the edge. Wherever possible keep the wrist resting on the paper, and draw the knife towards it with finger and thumb.

Do not pin the stencil plate to the board, but hold it firmly in place by the left hand. This should stretch the paper tight during the cutting. Try to get clean cuts and sharp corners and points, the latter by cutting away from the points as illustrated in Fig. 1. In this drawing the arrows show the direction of the cuts from the point of commencement. When cutting straight lines of any appreciable length, use a hardwood or metal straightedge.

Fig. 4—Examples of stencil-cut numerals and letters, which should prove useful for showcards. The remaining letters of the alphabet can be easily worked out once the principle of placing the 'ties' has been mastered

### Importance of 'Ties'

The important part played by the 'ties' must be remembered at all times when designing and cutting stencil plates. A design relies upon their position and number. For instance, take a letter O. The interior centre piece would drop out altogether were it not held adequately by its 'ties'.

In the practice stencil shown in Fig. 2 strap crossings themselves form the 'ties', and these must be wide enough to support the solid interior pieces. When a design such as Fig. 2 is used the 'over' and 'under' parts of the strapwork must be carefully worked out beforehand.

Note, too, that the larger the design in overall size, the wider must be the 'ties'.

A step further in designing and cutting is given in Fig. 3. Here is shown a simple free line design, including some small openings in addition to larger ones. Note that the flower part of the design is treated as a symmetrical outline, one-half being drawn in on the paper first and this then traced on to thinner paper and transferred over to form the second half of

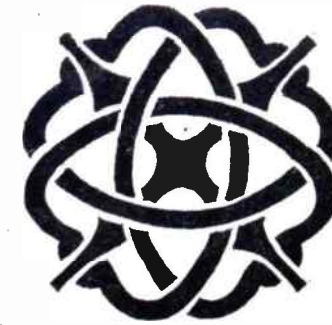


Fig. 2—How 'strap' crossings can be arranged and cut

the outline. This is a simple means, indeed, of making an effective stencil.

The lower half of this design consists of easy strokes to form the leafwork. The crossings of the scrolls should be noted.

The stencilled part-alphabet and numerals in Fig. 4 should be found most useful when printing showcards and window tickets. The outlines are in a more or less ornamental fashion. Study the three lines and note the 'ties'. In the two characters shown in the middle as 5 and 8, simple block figures are given, showing where the 'ties' are introduced. Block lettering can easily be designed

(Continued on page 124)



Fig. 3—A simple free-line design

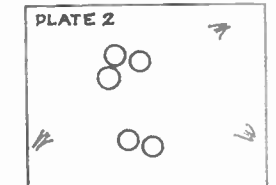
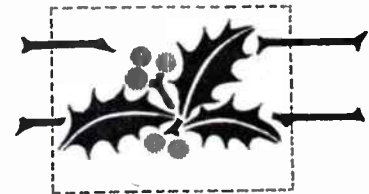
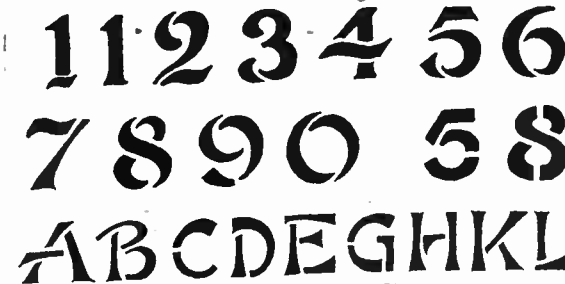


Fig. 5—A repeat design showing method of registration for two-colour printing



# You don't need to be an expert to make these POWERED-BICYCLE ACCESSORIES

An increasing number of bicycles are being converted into auto-cycles with the addition of small two-stroke engines of one kind or another. These engines are reliable and most economical to run, and are particularly useful to people (especially older folk) who must have some means of transport over a distance to and from work.

Once the initial outlay (between £20 and £30) for the engine has been met there is little further expense, and no time is lost in getting it fitted to the bicycle. However, there are one or two

sheet iron advertisement plate from a shop-front might serve. Old 5 gallon oil drums (any tractor depot or garage may have some of these) are another source of supply for sheet metal of about the right thickness. Cut out two pieces about 10ins. by 8ins. and bring home for further work.

### Remove Old Paint

Any old paint must be burned off, by placing the plates in a hot coal fire for a few minutes, or by use of a blowlamp. Do not allow the metal to become red-hot, and when cooled, mark out

bolts riveted at the lower edge, and which protrude through holes drilled in the front mudguard top. The slot in the bolts in which the plate is riveted is cut with a fine hacksaw. The rear plate is simply held with two  $\frac{3}{8}$  in. bolts with a shaped hardwood block between it and the mudguard—see Fig. 3.

Before finally fitting the number plates to the machine they must, of course, be painted black, two coats, with a good quality enamel. Make sure that this black paint is not a by-product of tar, otherwise the white paint lettering which will go on top will be discoloured.

Use a fairly thick flat white paint for the lettering, put on with a sign-writer's brush, having a little turpentine handy to thin the paint as and when required. Two coats of white will be required for the numbers to cover the black paint.

### Lighting System

It is suggested that this should provide for a rear light supplied from the front lamp battery or dynamo, rather than a rear lamp having a separate battery. The rear lamp, being small and light, can then be mounted on the outer corner of the rear number plate as shown in Fig. 3.

It is important that the fuel mixture should be kept free from dust and grit when pouring into the petrol tank, and for this purpose a straining funnel should be provided. Sheet metal taken from a National Dried Milk tin is excellent material, and can be soldered up with the aid of an acid flux quite easily. Remember to glasspaper off the thin covering of paint from one side of the tin where the solder is to run. Approximate sizes to be cut with the shears are shown in the sketch; and a small piece of fine petrol gauze should be purchased (about 6d.) from a garage stores. Cut this to the necessary diameter and carefully solder in the bottom of the cone, after the lower tube has been soldered on. The edge of the gauze should be covered with a run of solder all round, but flux should only be added exactly where the solder is required, as the gauze takes up molten solder very easily; careless soldering would soon clog much of the area of the gauze.

Incidentally, it is advisable to mix the fuel—petrol with oil—in the open for safety. Much trouble may be avoided by using only the oils specified by the

manufacturers of the particular engine, and in particular the right proportion of oil to petrol is most important. The writer knows of two instances where an excess of oil is being used with the petrol, causing smoky running, difficult

### Better Way

A much better way is to make up a spare tank from a National Dried Milk tin as shown at Fig. 5. This will hold nearly 3 pints of fuel. All the seams must be well soldered, and the lid well fixed by running a bead of solder round the inside corner. After flux, a lump of solder may be dropped in the tin through the filler hole, and the tin held

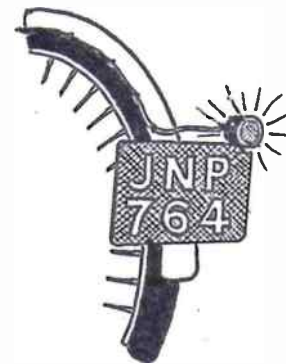


Fig. 3—Details of the rear number plate and light

starting, and more frequent decarbonising.

### Long Range Petrol Tank

The writer's machine carries sufficient fuel for about 75 miles. On a long journey of, say, 50 or 70 miles out, it thus becomes necessary to refill before returning. Many garages, unfortunately, do not look with favour upon the man who draws in for a mere quart of petrol and a few gills of oil which must be mixed with it before pouring into the tank! Again, some petrol stations use oil measures for this mixing job, which occasionally contain dirt and grit at the bottom which is a great danger to these small engines. A pint or so of extra petrol can be carried in a ('drop-off tank') bottle which may be thrown away afterwards.

over a gas jet, slowly turning it round at an angle. The filler cap and body is taken from a screw-top tin, cut out and riveted and soldered in place. Make the small rivets from nails. The four strap lugs are made from 16 S.W.G. wire and soldered in place. Remember

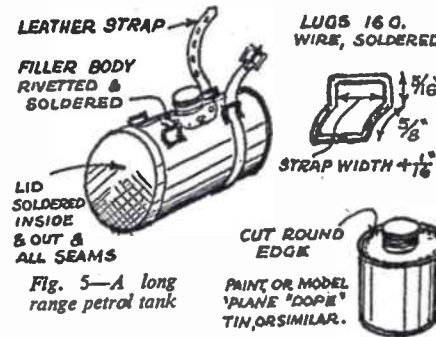


Fig. 5—A long range petrol tank

to wash off all acid flux after soldering, as this causes corrosion.

Two straps are provided which go right round the tank to hold it up under the crossbar of the bicycle. If the tank has a tendency to slip along the bar towards the rider, two extra lugs may be soldered on the front end of the tank and a small strap provided to loop round the steering column. It should be a simple matter to devise alternative means for carrying the tank on a ladies' machine, however.

### Choke Control

The choke on the popular Cycle-master 'Magic Wheel' can only be opened (after closing for starting up in cold weather) for normal running by stopping and dismounting. If a pull-wire, with a ring at the top end, is fitted to the small flange of the choke disc (Fig. 6) and carried up beneath and just in front of the saddle, it is a simple matter to pull the wire smartly, thus opening the choke without the delay of dismounting.

It will be necessary to turn the carburettor intake head round slightly if the line of pull is not quite right. This idea may be applied to other auxiliary cycle engines which do not provide any form of choke control without dismounting the machine. (380)

### About Screws

A screw when used in wood requires a guiding hole and this must be made with a bradawl or gimlet, the former answering for quite small screws and the latter being necessary for larger ones. The depth and width of the hole for the screw depends on the hardness of the wood and the size of the screw. In very hard oak, for example, it is sometimes necessary to make the hole as deep as the screw is long.

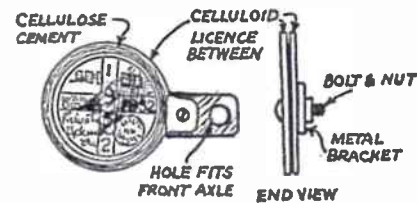


Fig. 1—A serviceable licence holder

extra items which must be added before the machine can be taken out on the road. A driving licence must be taken out by the owner, and a road fund licence secured (both from the County Council), which means the fitting of registration number plates fore and aft of the machine. There must also be a road fund licence holder fitted—usually to the front wheel fork or axle. There is no reason why the average handyman should not make some of these fittings himself and thus save some of the expense in converting his bicycle into a light motor-bike.

### Licence Holder

The licence holder is probably best purchased with the engine, at a cost of about 3/6, although it is possible to make a quite serviceable one from two discs of stiff celluloid slightly larger than the diameter of the licence outer circle. Fig. 1 shows how flanges are left on the celluloid which are bolted to a metal bracket which fits on the front axle. The licence is fixed between the celluloid pieces by running a very thin line of celluloid cement around the edges. Unless one has the materials on hand, of course, it is more economical to purchase the holder ready made.

The registration number plates can be fabricated at a total cost of about 1/- if the pieces of sheet metal can be found—on a scrap heap—or an old

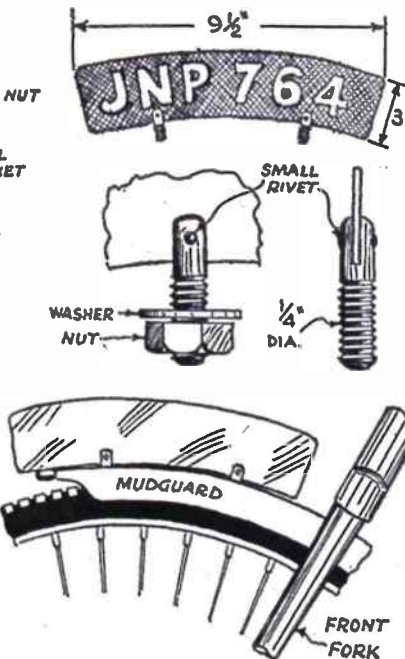
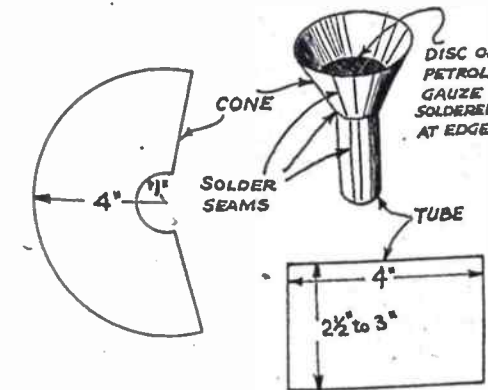


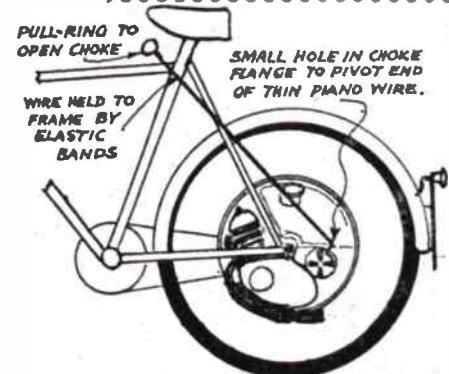
Fig. 2—Details of the front number plate

with a scribe the front and rear plates as shown at Figs. 2 and 3 and cut out with tinman's shears. If the metal is rather thin the plates can be stiffened by allowing for a  $\frac{1}{16}$  in. turn-over at the edges, which may be tapped down with a small hammer on a vice-top. Smooth off all sharp edges with a fine file, and glasspaper and emery the surfaces clean; then mark out and drill the  $\frac{3}{16}$  in. holes on the rear plate.

The sketches explain the fixings of the plates to the bicycle. The front plate is mounted on two  $\frac{1}{16}$  in. diameter



(Left) Fig. 4—How to make a petrol straining funnel



(Right) Fig. 6—Making a choke control for the 'Cyclemaster' motor



battery, connected by suitable clips, etc. is usually used when starting, actual running being continued by means of small dry cells in the model.

### Writing on Cellophane

**I HAVE** a 35 mm. film strip projector, and wish to project writing, drawings, etc. of my own in ink on cellophane paper as it is transparent and so ideal for projection. But I find the paper will not take the ink. Is there any solution I could soak the paper in, or, perhaps, something I could add to the ink to make it stay on? (M.E.—Lincoln).

**T**O overcome your difficulty, you could use printers' ink with a fairly heavy gum content. Or probably if you mix ordinary ink with gum arabic—it will adhere on most kinds of transparent materials such as cellophane.

### Pick-up Trouble

**I HAVE** a portable gramophone pick-up, but when plugged into the set nothing comes through the loudspeaker, also the pick-up does not give a clear production; it gives a rattling sound. I must tell you this portable gramophone has been dropped. I have traced the circuit for loose wires, but all secure. One of the wires for the pick-up from the transformer is screened. Are the two wires in the pick-up arm to the transformer, special wire? (L.D.—Blyth).

**A**S a transformer is used in your pick-up circuit, the latter is probably of the piezo crystal type. The crystal may have been fractured when the gramophone was dropped; especially if a needle was in the pick-up. You should, therefore, examine the pick-up for this trouble. Such a fracture would also cause the distortion mentioned. Alternatively, it is just possible that the armature has stuck, or its rubber mountings perished, in which case an easy repair would be possible. Any thin flexible wire would do for the pick-up connections.

the design. Within this square, just the five berries are traced and transferred to the stencil plate paper and cut out. This will make stencil plate No. 2 and will be used after the leaves are finished. On this plate must be drawn very accurately, in ink or pencil, just the tips of the three leaves. Then, when the stencil is laid on over the leaves stencil (No. 1) these leaves can be seen through the paper and the berries stencil moved about until the registering marks fit exactly at the tips of the leaves. It only remains then to brush in the red pigment.

We intend dealing with a three-colour stencil in our next instalment. (393)

fractured, and this might be responsible. Any competent service engineer could test the valves if you cannot do this yourself. It seems likely that if you test the filaments for continuity, one or more valves will be found to have been burned out. If the valves are in order, then it can only be assumed that some wiring has been incorrectly modified in the changes that you made. If you have added a volume control, this could cause signals to cease, if the control bush is in contact with the metal chassis or a bracket fitted to the chassis, if it so happens that the control is of a type with the slider common to the spindle, electrically. If so, the control should be mounted with insulated washers.

### About Coil Ignition

**CAN** you give me particulars of a coil ignition of a 6 c.c. petrol engine? (D.J.—Clacton).

**T**HE standard coil ignition circuit for a single cylinder engine consists simply of an ignition (or spark) coil, with secondary wired to engine and plug. The primary is wired to a battery and contact-breaker, operated by a cam on the flywheel axle, with a 2-stroke or through a 2:1 reduction drive, with a 4-stroke. The contacts of the contact-breaker should just begin to open when the piston is about 1/20th inch above top dead centre, when the engine is turned in the direction which it will run. If you are using it in a model plane or small boat you will need to use a midget ignition coil, and this is best obtained from the suppliers of the engine. In such cases, a larger external

## THE ART OF STENCILLING

(Continued from page 121)

but the 'ties' should be thickened up for the sake of strength.

### Two-Colour Stencils

Now a word about two- and three-colour stencils. It will readily be understood that a separate plate must be done for each colour, and that, therefore, the job will be to so place each plate that they 'register' properly one with another.

The design must first be made as a

whole, perhaps in outline only, and roughly painted in to obtain an idea of the finished effect when the stencil is cut. Such a design is given in Fig. 5—a simple holly and berry design which will print up brilliantly in green and red. Incidentally such a design could well be used to make stencilled paper streamers for Christmas decoration where a repeat stencilled pattern can easily be carried out.

Note the dotted square formed round

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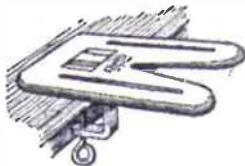
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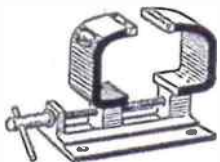


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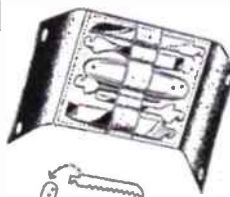
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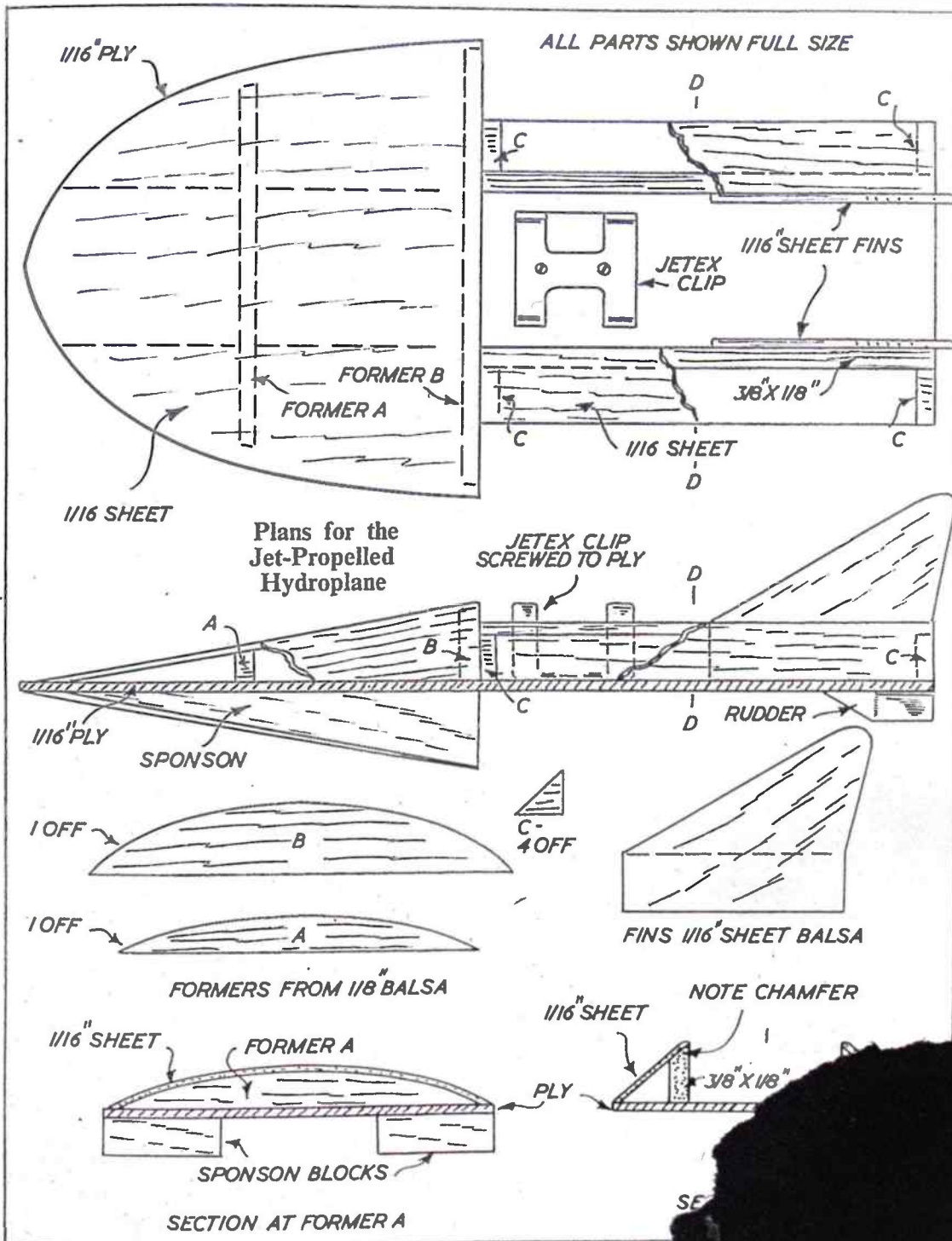
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