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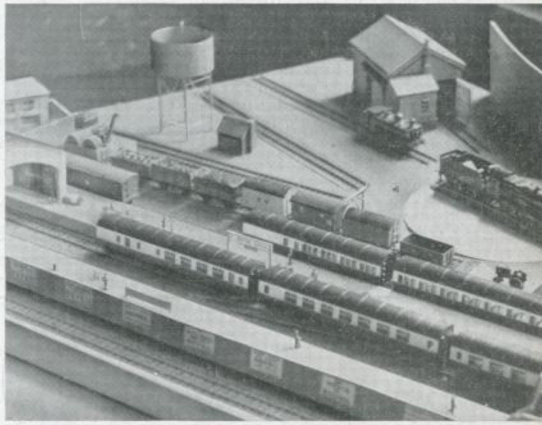

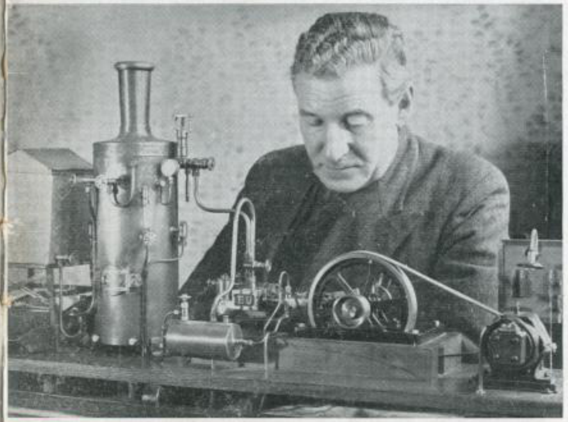

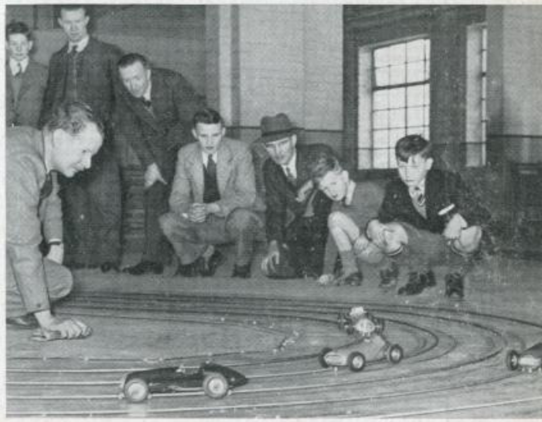

VOLUME 1 NUMBER 7 (New Series) JUNE 1951

IN THIS ISSUE : Preview of New Model Car Road Racing Circuit : Eight-cylinder Model Car : Improved Vane Steering Gear : 00 Gauge Rolling Stock Construction : Making Station Name Boards : Layout Designing for Miniature Railways : A Hooded Camera Screen : Small Machine Vise : Honing Device : "Festive" Marblehead Yacht Pt. II : An Experimental Model Yacht Design : The Clockwork Alfa-Romeo : 5 c.c. Racing Engine : Modelling Windmills : Making Model Buildings : More Architectural Gems from the Richold Collection : Racing Austin as Prototype : Thunderbolt World Record Solid Model Car : Features : News

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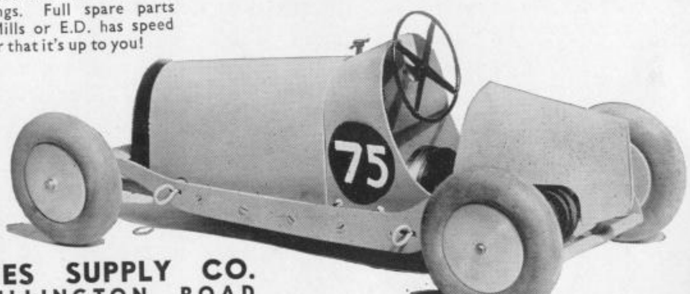

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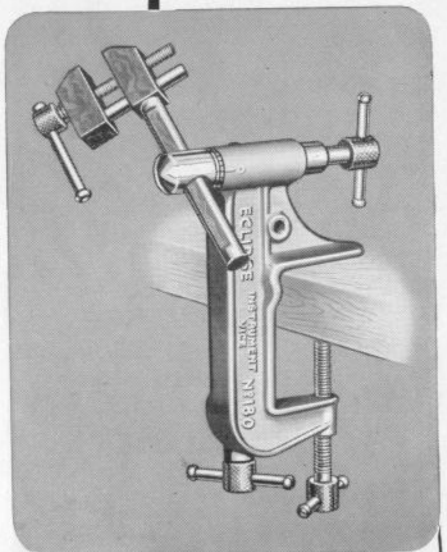

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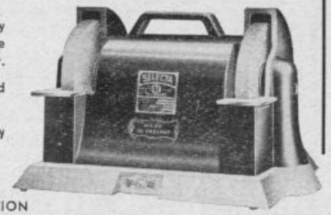

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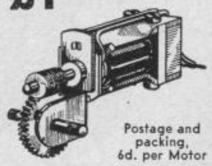

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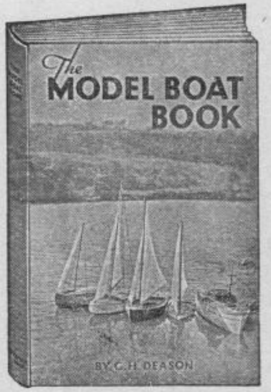

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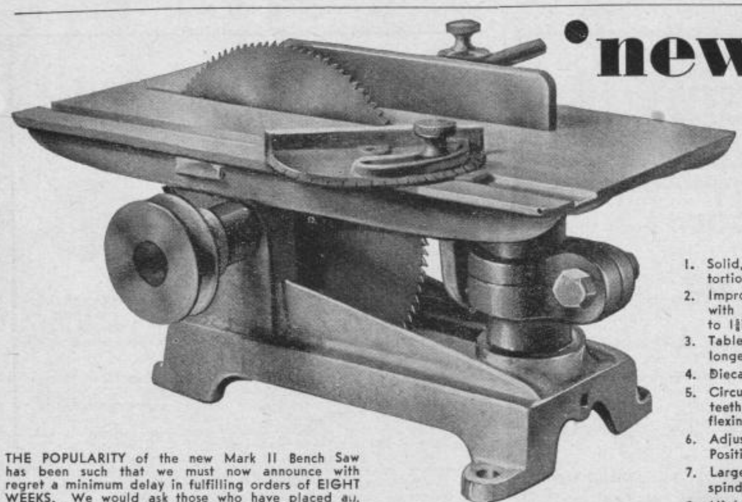

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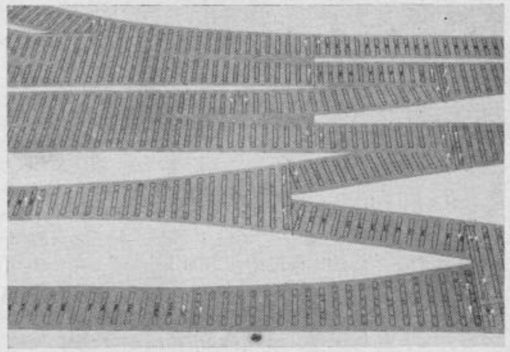

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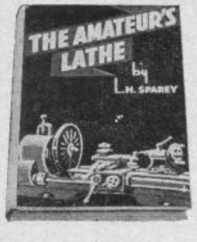

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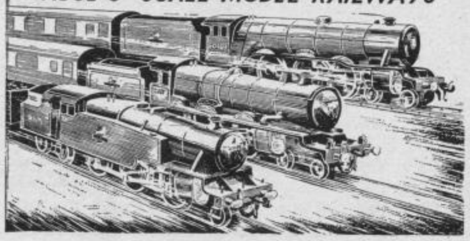

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" No. 34 6" " " "	4	17	4
" No. 32 2½" self-centring scroll "	4	19	0
" No. 30y 4" 4-jaw self-centring, G-scroll	6	16	0
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Contents

VOLUME I No. 7 (New Series) JUNE 1951

OUR READERS TELL US HOW AND WHAT

THIS issue is the seventh since incorporating *The Model Mechanic* and *Model Cars* to form the one larger magazine *Model Maker*, and during the past six months we have been receiving an average of thirty or forty letters a week from our readers, of which at least half contained constructive suggestions. These suggestions ranged from the fantastic, through the impractical, to a solid basis of sound notions for our improvement. May we thank all those who have taken the trouble to write.

In this number we introduce one of the best suggestions sent in, namely that we should endeavour to group the varied types of modelling under sections. In this way the fervid enthusiast can turn first to his own speciality, and only when he has digested that turn to other departments of lesser immediate interest. Such a layout means, of course, that items of general interest or outstanding photography may be found at the very end of the issue instead of occupying pride of place as the "opener" of the month, or filling our centre-spread where artistic presentation is less fettered by problems of printing. As it is not always possible to cut off our contributors just as they reach the bottom of the page this improved method of presentation will retain some degree of flexibility, but for the most part each section will appear under its appropriate heading, for which our artist has designed a series of small identifying blocks, typical of the subject matter following.

Issue by issue, it is obvious that some section or other will have more pages devoted to it than another. If your section is a little smaller this issue than the other fellow's please remember that next month or the month after the position may well be reversed. There is, too, another even more welcome approach to the question of personal short measure. That is to sit down straight away and produce a contribution from your own experience to fill up any gaps in our coverage.

Many suggestions have been made for future features, amongst them articles on aluminium brazing for model makers, working model submarines, a new cabin cruiser, diorama models, designing one's own ideal house or bungalow in model form, working model fireboats, a funicular railway, miniature bottle ships, a free-running hill climb model car, beginner features on all model making aspects, in fact something of nearly everything.

ON THE COVER . . .

Top right: Working model Post Mill to be described in our July issue. Centre left: Prospect of Fleetwood Yachting Pool, scene of so many famous contests. Centre right: A Model Railway layout from the High Wycombe exhibition photographed by normal window lighting. Bottom left: Steam-driven electric generating set, a model built by Mr. E. G. Uphill of Harrow & Wembley S.M.E. Bottom right: Tryout of the Meteor Club's new model car Road Racing Circuit.

(Photos: Fleetwood — G. Honnest-Redlich; Generating Set — N. Dyer; Others — "Model Maker".)

model SAILING CRAFT

PART II OF W. J. DANIELS' MARBLEHEAD YACHT

FESTIVE

Owing to the heavy commitments of our modelmaking department in completing special models for the Festival of Britain, it has not been possible to provide step-by-step building pictures for this instalment of "Festive". However, Part III will be enlarged and contain detailed close-ups of all points of difficulty encountered in the light of correspondence that we have received.

YOU will notice that on the cross-section plan that lines have been drawn at various angles crossing each section. These are used by the designer for ensuring the fairness of the curves around the hull as by setting off at each section from the centre line the distance of each inter-section and testing whether a true curve can be drawn through each point.

These lines will also give the builder an idea for the run of the planking. It will be seen that by starting at the garboard that the first plank will be wider at the ends than at the centre. Take a piece of the planking of sufficient length and width to reach the recess in stem and stern piece, one edge of which must be dead straight, and fit it in position. It will be found that the angle at each end can be marked and cut to fit into the rebate. It will overlap the underface of keel, but this can easily be cut down to the level of keel after fixing. The plank for the other side can be marked out using the first as a template. Having made the first planks they can now be fixed by glueing and pinning as before described, with fine copper nails with cardboard washers under the heads. This will enable the pins to be withdrawn after the glue has thoroughly set.

The rest of the planking must now be determined. The most economical way is to have a wide board and cut each plank separately, and proceed as follows. Mark off from the cross-section plan the point at which the diagonal lines cross each mould, and taking a strip of planking about 1 in. wide, make one edge straight and tack it lightly on each mould at the lower diagonal position. This is known as the spiling plank. You must determine how many planks you will take to cover up to this point. Measure each distance and by dividing these by the number of planks you have decided to use, you will have the width of each plank on each section.

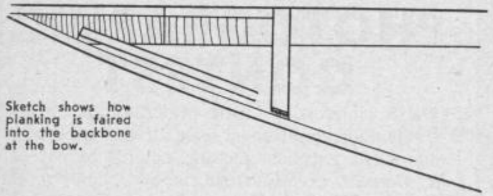
If you bend your spiling plank round the frame so that it lies flat on each rib you will notice that the inner edge will not lie parallel to the edge of the plank already in position. Take your dividers and setting them at the widest gap prick off points on each mould from the edge of the first plank to the edge of the spiling plank. Place the board from which you are going to cut your planks on a flat surface and draw a line through these points and cut to the line. Now set off the width that the plank is to be at each mould and draw a line through these points. A hardwood spline $\frac{3}{8}$ in. x $\frac{1}{4}$ in. will take the curve nicely. You now cut to this line. You have now to fit it to the angle at each end to set properly in the rebate, and after repeating it for the other side glue and fasten each in position as before described. It should be arranged that the last plank of the topside is wider that those below it for appearance. Having completed the planking there will be a gap between the top plank and inwhale between each rib. This gap should be filled in with strips, the same depth as the inwhale at each point. The fin is the next job. The simplest way for the beginner and for the expert also, is to take pieces of timber of the same thickness as shown on the design slightly longer than the length of each layer, which will be noted, are as long as from the top of the forward end to the top of the lower face aft.

All these pieces should be as wide as the largest cross-section dimension. You now arrange them on your drawing so as to cover the outline of the fin and mark off each section all round both faces and sides. Gauge a line down the centre of each piece and either number or letter each for identification.

On the top face of each lay off the shape. Square off the ends to the sides of each piece and placing them together so that section lines coincide, draw the outline of the fin on the side. Cut out square to the profile. The position of the bolt holes should now be marked and drilled before glueing. Two bolts of $\frac{3}{16}$ in. drawn brass rod will be sufficient. Now cut the widest waterline piece to the shape. It is best to saw about $\frac{1}{8}$ in. from the line and trim down to it with chisel or small block plane. You now place this piece face downwards on the next one and mark the shape of it, care being taken that the centre line and cross sections are in correct position. This layer can now be sawn, care being taken to keep outside the line and then trim the upper face to its correct shape.

The reason for this procedure is obvious, as if you saw to the shape of each upper face the under face will not be wide enough to cover the one beneath it. This procedure is, of course, only necessary in the case of a bulb fin.

Having cut each layer for the keel appendage they



Sketch shows how planking is faired into the backbone at the bow.

should now be glued in position. It is most important that they should not shift in glueing. In order to ensure this, drill a hole at each end to take the panel pin at sliding fit, and placing the lower two layers together drive the pin in leaving sufficient to get hold of the end to withdraw it later. Then apply the glue and locate it again with the pin holes and clamp the two layers together. Then proceed with each other layer in rotation one at a time. This can, of course, be going on at intervals whilst other operations are proceeding. After they are all glued in position it is a simple matter to shape the fin to the designed lines.

Having finished the planking the hull must be very carefully glass-papered to take off any unevenness. Take No. 1 glasspaper and wrap it around a piece of thin wood about a foot long and thin enough to take the curvature of the shape of hull, and paper until all glue and projections are removed. This, of course, after removing all copper pins. An extra fine surface can be obtained with carborundum medium paper.

The boat can now be taken off the building board. First remove all screws holding the cross-pieces and that at the stem. The cross-pieces can now be detached from the moulds but leave the latter in position until the deck beams are fitted and fixed permanently. The moulds can then be removed. The skeg should now be made and fitted. The latter should be grooved at the after edge to receive the brass tube as later described. The groove will be of a radius to properly seat the outside of the tube. The skeg is to be $\frac{1}{4}$ in. thick, and a well-seasoned piece of mahogany should be used. It can either be fitted by glueing and screwing to the backbone or by slotting the latter and letting it in. The latter method is perhaps the more advisable.

The next thing is to fit the deck beams. These will be just long enough to reach the inside of the inwhale at their correct position and fixed by glueing triangular pieces as sketched. The amount of rise on each is shown by the mid-deck sheer line. After all are in position they should give a fair curve to the deck fore and aft along centre line.

The deck which is to be of 1/10th in. mahogany, should be papered smooth on each side. It is necessary to glue reinforcing pieces on the underside to take the deck fittings such as the sheet travellers jib rack, etc. These will vary according to whether

The author's successful A Class Yacht "Prelude" running with spinnaker. Note particularly the perfect wave formation. Sailing of this quality is to be expected of "Festive" which, by a process of evolution in design, carried out over several craft, will possess some of those characteristics usually only to be expected of larger yachts.

Braine or Vane steering is to be used. If the latter, an extra strong deck beam should be fitted to take the Vane pintle.

The hatch opening should be marked out, and on the underside a piece obtained from cutting out the deck is used to make a frame $\frac{3}{4}$ in. wide around the the opening. Before glueing-on, glue a piece of fine cloth on between the frame and the deck. This will prevent splitting after the opening is cut out. Proceed the same with the mast opening, cutting the openings in the reinforcing piece. These openings in the actual deck should be made after the glue is set. Two coats of varnish should be applied to the underside. Cut the hole in deck for stern tube after the varnish is dry.

The upper side of deck should be prepared and finished before any of the reinforcements are fixed at the underside, otherwise you will have difficulty in smoothing the surface evenly.

If obechi is used, which is inclined to discolour when varnish is applied, it is advisable first to seal it by a mixture of turps and varnish with a little white flat paint. This should be rubbed in with a pad and allowed to dry thoroughly. After which it can be finally papered ready for lining. The line is done after the deck is fixed in position and will be described later.

PHOTOGRAPHIC CONTEST

THIS interesting little International Class Dinghy, built to a scale of one-twelfth, is one of two excellent pictures entered by Mr. A. W. Bennett, of Maidstone, in our photographic contest. The technical quality of the print is beyond criticism, in fact, our problems would all be solved if contributors would maintain so high a standard! But, for the benefit of our entrants, we are sure Mr. Bennett will have no objection to our using his picture to point a lesson. On the left-hand side it will be seen the background is dark and without shadow, but on the right there is a certain obtrusion from the brickwork. Had the whole boat been moved about 2 ft. to be directly in front of the dark doorway a far more pleasing picture would have resulted. Normally, our art department would air-brush the undesirable background to a neutral tint; a process which, carried out forty or fifty times, makes hard work of an issue! The moral of this picture then, is choose your backgrounds, and get them well out of focus to avoid any jarring note. Dark doorways for light subjects, or low angle pictures to get sky backgrounds for darker objects can usually be found without any need to put up any special backcloth.

HISTORY AND DEVELOPMENT OF MODEL YACHTS

(Continued from page 399)

helm control, (b) main sheet control, (c) jib control, quite independent and progressive in action. The jib control should be capable of holding the jib a'weather to assist going about which is the usual practice when sailing full-size boats.

Let me take a concrete example of the advantages of radio control as applied to model yachts.

On my own sailing water the prevailing wind and a belt of trees make it very difficult to sail a triangular course without coming ashore five or six times for a re-trim and re-set of the Braine gear.

Consider how much more interesting it would be if we could sail this same course as if we had a live crew on board.

The effects of every increase in wind pressure, every variation in direction and every deflection owing to the presence of belts of trees could be met and corrected with precision by means of radio control. Each buoy marking the course could be rounded, controlled gybing turns executed accurately and the model brought over the finishing line between two predetermined points.

If radio controlled yacht racing is to come into its own, as it surely will, it must be possible to race several boats one against the other. Single boat sailing is only a stunt.

To do this, each model must be controlled by a separate wavelength. Now watch these boats racing for the first buoy, jockeying for position under perfect control; they gybe round off on a fresh tack and away to the next buoy on a close-hauled beat, round they go and then on a broad reach to the finishing line, each skipper at the controls jockeying for position avoiding foulings with his fellow competitors in exactly the same way as if a live crew were on board.

How this three-point control is to be arranged I must leave to the radio expert.

My suggestions may be revolutionary and not acceptable to the purist, but I maintain that progress in this direction cannot be long delayed, and one day, perhaps in the near future, we shall see upon the Round Pond itself, or at Fleetwood, a radio controlled yacht making rings around a 1951 International Champion.

If I have succeeded in arousing interest in a proposed XP Class vessel, fully radio controlled, I shall be very well satisfied.

My Editor has warned me that I must be prepared to be thrown to the lions for my temerity in voicing my opinions upon this absorbing subject. So be it. I have had my say and now await judgment and criticism, but please let it be constructive even if hostile.

History & Development of Model Yachts

PART III

BERNARD REEVE, M.S.N.R. DISCUSSES FUTURE DESIGN & RADIO CONTROL

NOW what of the future, both as regards hull form, shape of spars and sails, and control of the model as a whole.

This is a highly controversial subject and many of the views expressed herein may not be acceptable to some of my more experienced, and may I be permitted to add, conservative readers. I fully realise that I am open to be shot at by those who may have a greater grasp of the subject than I have, but this is all to the good for if my critics will propound their theories constructively in reply to this article I feel we are well on the way to the production of better and faster boats.

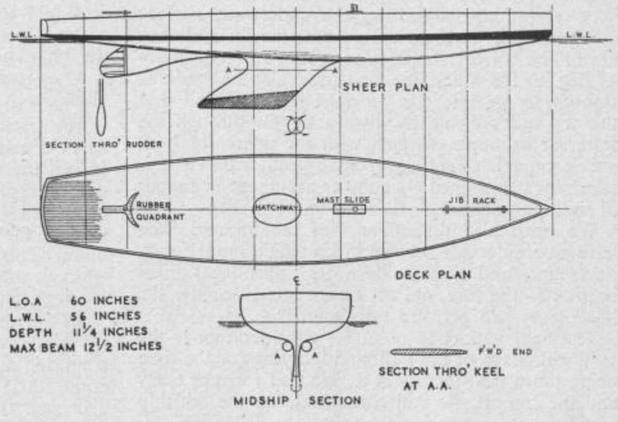


FIG.1 SUGGESTED DESIGN FOR X.P. CLASS MODEL YACHT

Most model yachtsmen will agree that our existing rating rules, excellent though they be in many respects, do not allow for progressive development. In point of fact every class of model yachts, with the possible exception of the "M" Class, are so hedged about by such a rigid set of rules as to debar the designer from incorporating new ideas into hull form or shape of sail.

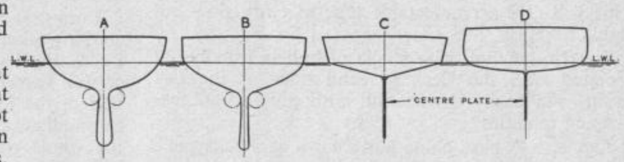


FIG.2 TYPICAL HULL SECTIONS

I am not quibbling over the stringency of the present rating rules as such, as any highly competitive sport, especially one of international status such as yacht racing, must be governed by inflexible rules if the sport is to be kept clean, and no useful purpose would be served by altering the existing rating rules unless it was to improve the breed as a whole.

In order to foster the spirit of competitive design, whose sole object would be to improve upon existing models, I would suggest to the M.Y.A. that they sponsor the creation of a special experimental class to be known as the XP Class open to boats whose only restrictions would be 4.5 beams to a length, such length not to exceed 60 in. L.O.A. This would be necessary to exclude the freak type of craft, either the once popular, but short-lived "plank on edge" vessel, or the ultra light displacement skimming dish type, for we are not after speed at any price, but are aiming to produce a healthy type of boat capable of putting up a maximum performance under any set of normal conditions; a model embodying the latest ideas in hydrodynamics and aerodynamics, unfettered by any rating rules, until the design had been proved in practice and accepted by a panel of experts appointed by the M.Y.A. for that purpose.

At the end of each season an XP Championship Race would be held open to all approved boats and the improvement incorporated in existing class, or existing rating rules altered to allow such improvement to be incorporated in future models, after agreement by the panel of experts.

A Utopian dream maybe, but I maintain this is the only way to improve, if such a thing is possible, the existing types of model racing yachts.

I know only too well the thinness of the ice upon which I am skating and inviting the wrath of the M.Y.A., if they deign to notice my remarks. Nevertheless I feel sure I shall be upheld by many model yachtsmen who feel, as I do, that our designs are stagnating, and who really have the advancement of the sport at heart and that their healthy and constructive criticism can do so much in the interest of improved design, so now let us get down to facts.

HULL FORM.—We have two points to consider in arriving at the shape our experimental hull is to take. Firstly, it must be sailed upon the longest possible water line when heeled to obtain maximum speed. Secondly, as the wetted area of the fin and skeg is approx. one-third of the underwater surface of the model, we must ensure that the fin and skeg are of the correct shape, have a fine entry of about 45 deg. to the water line, and must also be made as smooth as possible, for we must bear in mind that this fin and skeg nearly always travels through the water at an angle, varying with the degree of heel, and is capable of setting up many eddies unless it is carefully streamlined — another argument in favour of sailing upright.

We must also remember that the fin and skeg have a considerable bearing in keeping a model upon its course, and these underwater appendages must be true to the fore and aft centre line otherwise the boat never will perform satisfactorily.

The next important point for consideration is the sectional shape of the hull, and ignoring for the time being those vital factors in design and forward entry and the run aft, we will concentrate on the midship section.

I have set out below the salient features of the midship sections illustrated in Fig. 1.

Fig. 1a.—The old-fashioned round-cheeked hull. This will give a comfortable type of craft, slow but stable.

Fig. 1b.—A hull with shape of hull is usually associated with the sleek graceful lines of the fast yacht. An easily driven hull with quite good seakeeping qualities.

Fig. 1c.—A hard chine hull known as a "sharpie", sometimes built with a double chine, easy and cheap to build. A boat with a hull of this shape must be sailed more or less upright as if the chine is buried a heavy resistance will be set up and the boat becomes sluggish. Under favourable conditions the hull will rise and plane over the surface of the water.

Fig. 1d.—This is the hull form of the International Dinghy type, made famous by that great designer and helmsman Uffa Fox. It is known as the hard bilged type.

This is an excellent racing type of hull which must be sailed upright otherwise it becomes dangerous. If heeled beyond a certain angle stability quickly goes and wind pressure on the weather side of the hull assists the inevitable capsize. They are always fitted with buoyancy tanks and their crews adopt almost circus-like antics to keep their boats sailing. They are exciting craft to sail, but do not make good models.

Our problem is, therefore, to design a hull with a fairly flat floor with most of the support in the fin, with no fore and aft overhangs so as to give a maximum water line and with all underwater parts carefully streamlined.

In many models the fin is of bulbous form, but I contend that this is a mistake. A fin should have a very fine entry with its thickest part two-thirds from the fore end and not tapering until the after end of the skeg is reached; the final taper, which should be abrupt, being at the trailing edge of the rudder.

Actual towing tests have proved that this form of fin, skeg and rudder causes less disturbance than the blunt nosed keel, and as disturbance or eddies denotes resistance to be overcome by effort we must eliminate it insofar as lies within our power.

Most rudders have parallel tapered blades, but here again tests have indicated that such rudders are apt to set up undesirable eddies under the hull. To overcome this the rudder should be slightly bulbous in a vertical plane, thin at the top, the cord increasing towards the base of the blade where it is at its maximum. This shape of blade gives a greater turning effort at a lesser angle than the orthodox shape like an elongated letter D.

As our model must be sailed heeled when beating we must avoid burying the lee coaming, as in this condition a very great resistance is set up. To overcome this I have shown the experimental hull with a hogged sheer. Much controversy has been caused in the yachting press by the adoption of this reversed sheer by some designers. It is said to be ugly, to spoil the grace of line, to serve no useful purpose, and many other accusations are made against it.

Doubtless at first sight it is a little startling and certainly unorthodox, but so are all innovations. Prejudice dies hard and many years ago quite a number of well-known yachtsmen were against the introduction of the Marconi mast with its high aspect ratio Bermudian sail, predicting broken masts, and labelled the whole rig as dangerous in the extreme, giving it but a few months of life. How wrong they were!

We now have to decide upon the actual midship section of our hull, and I have compromised between sections B and D, which should give a fast powerful hull of light displacement, easy to drive, yet stiff and stable, and capable of planing under favourable conditions.

Let me make it quite clear that the profile drawing shown in Fig. 2 is not put forward as a scientifically designed hull, but is given to form the basis of a design and to illustrate the ideas and theories I have been discussing whose sole object is to lay the foundations of a suggested experimental hull.

SAILS.—The gaff rigged yacht is as dead as the dodo, its place having been taken by the Bermudian sail with its high aspect ratio. A certain amount of efficiency is lost, however, with this type of sail as the last few inches at the peak have little driving power. This loss can be partially overcome by the use of a bent mast, i.e. one whose tip curves towards the leach of the sail. But this does not entirely do away with this loss as I will explain later.

The M.Y.A. limit the bow of the leach and the length and numbers of battens used in the leach. This detracts from the efficiency of the sail in no small measure.

As we are going to ignore all rules in the search for efficiency for our XP model we must alter the shape of our existing type of sail while still keeping to the Bermudian basic shape. Before doing so I must digress for a moment, and explain the action of a yacht's sail in relation to the wind.

The uninitiated is apt to think that wind pressure on the weather side of the sail provides the driving force. This is partly true when running before the wind, but not on other points of sailing. It is a building up of negative pressure on the lee side of the sail caused by air flow over the sail that exerts the greatest force as any of my readers who may be interested in model aircraft can testify, for after all a yacht's sail is, or should be, a true aerofoil set in a vertical plane.

A perfect example of this theory can be seen in many of our full-size racing yachts whose Genoa jibs are sheeted home well abaft the mast, in some cases as much as three-quarters the length of the main boom. This causes a very large area of low pressure to be built up with a subsequent increase in speed. As Lt.-Col. C. E. Bowden, A.I.Mech.E., so ably points out, Nature has provided a splendid example of the aerofoil in the shape of an albatross wing. Given a wing of this shape in a vertical plane and we have the ideal high aspect ratio sail.

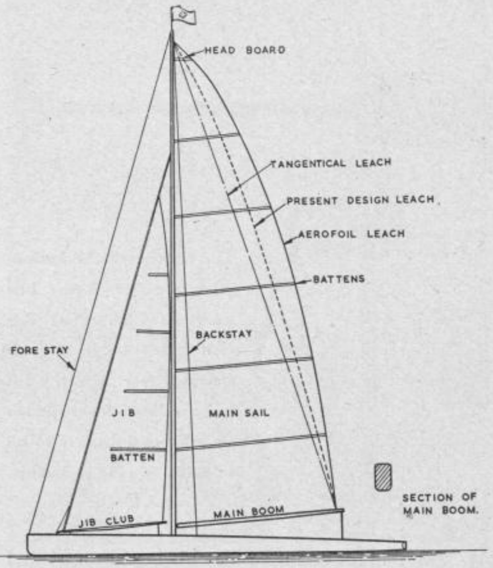


FIG.3 SUGGESTED SAIL PLAN FOR X.P CLASS MODEL YACHT

How are we to achieve this ideal? By scrapping existing rules and shaping our sails as I have shown in Fig. 3. In order to preserve the curvature of the leach and to allow the sail to arch in the centre we must make use of full width battens, thin in the centres and thicker at the ends. There should be plenty of lift in the main boom to prevent the lower portion of the sail being blanketed by the hull when the model is heeled in a breeze. So much for the main sail. To obtain maximum efficiency in the jib we should arrange for it to overlap the main boom for a quarter of the main boom length; the foot of the jib being one-third of the length of the main sail.

FIG.4 SECTION OF STREAMLINED MAST

Unfortunately we are unable to do this as we have no crew on board to pass the clew of the jib around the fore side of the mast when going about.

A slight gain in efficiency can be obtained by shaping the main boom as shown, this will assist air flow, and by streamlining the mast and recessing the jackline in a groove on its after side, again improving the air flow.

RADIO CONTROL.—Before I commence to air my views upon this very vexed subject I wish to make it quite clear that I am no radio expert. Much of what I shall write may be pure nonsense, much may be impossible for I can only state what I expect radio control to do and leave its practical application to the experts.

Many of my model yachting readers will recall that on August Bank Holiday of last year the Radio Controlled Models Society held a Regatta at Fleetwood and demonstrated radio control as applied to model yachts. An "A" Class vessel negotiated a buoy-marked course with accuracy and under perfect control.

I know that the purist views with horror any form of mechanical control as applied to model sailing yachts, but they cheerfully accept the Braine steering gear and the vane self-tacking gear. Surely these are mechanical devices, especially the vane gear with its present complicated train of gears.

My contention is that if we are to reach perfection we must emulate as closely as possible the effects of human control, and the only way to do this is to instal radio control of helm and sheet. But such controls must be progressive, i.e. capable of fine adjustment over the whole range of movement, not just hard over to port, central and hard over to starboard.

The ideal would be a three-point operation: (a)

(*continued on page* 396)

A New Vane Steering Gear

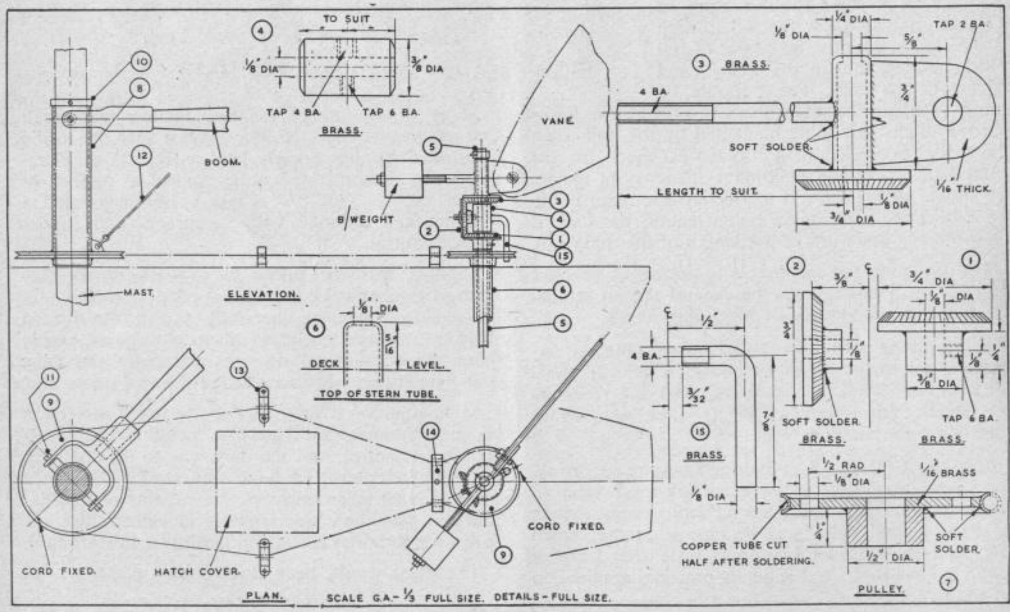
BY S. ELPHEE

The author who is a prominent member of the Birmingham Club offers this well tested design of vane steering gear, which with its simplified construction should appeal strongly to all would-be vane exponents.

A VISIT to the pondside these days will reveal that many model yachts are controlled by vane steering gears. There are many designs, all using the simple lever principle. These vane gears are lightly constructed and delicately balanced. The major difficulty with this type of vane gear is to construct one that is self-tacking without obtaining the necessary reacting force to operate the rudder from a weight. Another point about these vane gears is that they have to be set by the sailer for each different course sailed.

The vane gear I wish to introduce to readers does not require to be set independently by the sailer, the setting is done automatically when the main sail of the yacht is adjusted. It is self-tacking by using a rubber gye acting upon the main boom in the normal way. As will be seen from the drawing this gear is robust and not easily upset.

This vane gear has three bevel gears (1), (2) and (3). Gear (1) is fixed to the rudder post by means of a grub screw. Gear (2) engages with gears (1) and (3) and is free on a shaft carried on a distance piece (4) which is in turn free to rotate on the rudder post (5). A collar is fixed at the top of the rudder post (by



means of a grub screw) to keep the gears in mesh. The grooved pulley (7) is mounted on the rudder tube (6) and is free to rotate. A pin anchored in the distance piece (4) engages in a hole on the pulley (7).

Now we come to the goose neck, which consists of a length of tube (8) soldered to a pulley (9). This assembly is free to rotate about the mast and is kept in position by means of a collar (10) fixed to the mast.

The boom is free to pivot up and down on pins (11), its movement being restricted by the kicking strap (12). A length of cord is fixed to pulley (9) and running through guides (13) and (14) is fixed to pulley (7). Guides (13) are used to tension the cord.

To set the vane gear, the boom vane and rudder should be central fore and aft. From the drawing it will be seen that any movement of the boom is transferred through pulley (7) to gear wheel (2), which (if you hold the rudder central) will rotate gear (3) and the vane. Now if you hold boom (as when sailing) you are holding gear (2) in its new position, but since gear wheel (2) is free to rotate about its own axis, it is possible for the vane to transmit any movement to the rudder. In other words, the relative position of the rudder and vane has been altered, still leaving the vane to operate the rudder.

This type of vane gear corrects two sets of conditions presented when sailing a model yacht.

1. The amount of helm required due to the position of the centre of effort of the sails tending to turn the boat into the wind when reaching and running. This I term permanent helm.

2. The helm required due to the relative speeds of the wind and the yacht.

The helm required for condition (1) at different angles of sail position is obtained by pulleys (9) and (7), being of different diameters. The helm required for condition (2) is obtained in the normal way, direct from the vane through gears (3), (2) and (1), the main sail holding gear (2) in position, and the vane and rudder reacting upon it.

When designing this type of vane gear, the ratio of the two pulleys (9) and (7) is perhaps the most tricky to arrive at.

The writer's prototype is fitted to a model, the mast position, angle of rudder, and boom when running being known. With this information one can arrive at the gear ratio required to rotate the vane 180 deg. (plus the angle of the rudder) when the boom is moved to the running position. Now since gear wheels (1), (2) and (3) are of the same diameters the gear ratio between gear (3) and distance-piece (4) which is connected to pulley (7) is 2:1. Therefore when the boom is rotated to the running position it has to rotate pulley (7) 90 deg. plus half the angle of rudder required to run the boat before the wind without using a spinaker. To do this the centres of the holes in cord guide (14) should be less than the diameter of pulley (7). It will be seen that when the boat is set for a reach, that you now have half the permanent

Vane steering is becoming more and more the fashionable gear for contest sailing. Here is seen R. Pilling's "Westwind" (644) third prize winner in last year's "Daily Despatch" contest, and on the leeward board J. Anyon's "Marion" (315) both so equipped.

helm required for running and proportionally less when beating, until the boom is amidships, when you get none. This set of conditions is open to debate, but the writer maintains that it is more consistent than can be obtained by the average sailer setting an independent type of vane, and certainly saves time when retrimming.

Since this type of vane gear has more friction losses than some others a balanced rudder is used and the vane gear area increased. It is only necessary to balance the vane itself.

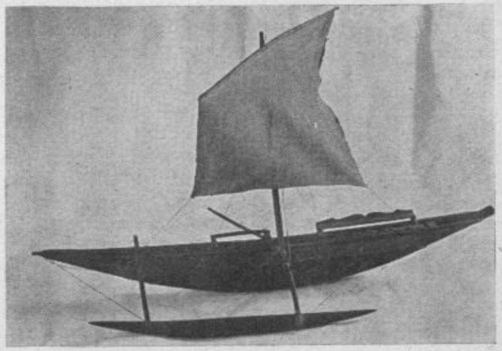
A few notes on construction. The gear wheels may be of any convenient diameter approx. 3/4 in., and should be of brass with fairly fine teeth. Care should be taken in the length of distance-piece (4) so that the gears do not mesh too deeply. (This causes friction or binding.)

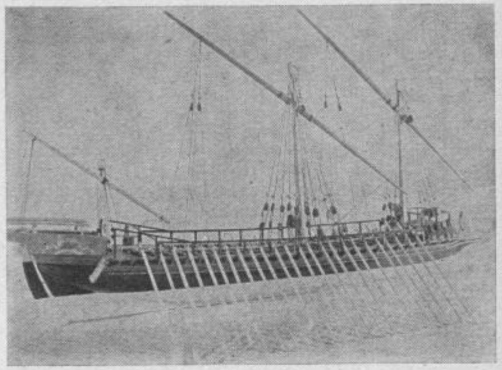
The distance-piece is of hard brass, the connecting arm being screwed and soft soldered in position. The pin for gear wheel (2) should be of stainless steel screwed into the distance-piece with a small split pin and washer to keep it in correct mesh. A highly polished stainless steel rod 1/8 in. dia., should form the rudder post (5). A hard brass thrust washer between gear (1) and the stern tube may be fitted instead of a pintle. It is important that all parts are a good running fit without too much play. The pulleys can be made without the aid of a lathe as shown in detail drawing. Detail dimensions of the goose neck assembly are not given as they will differ with each boat.

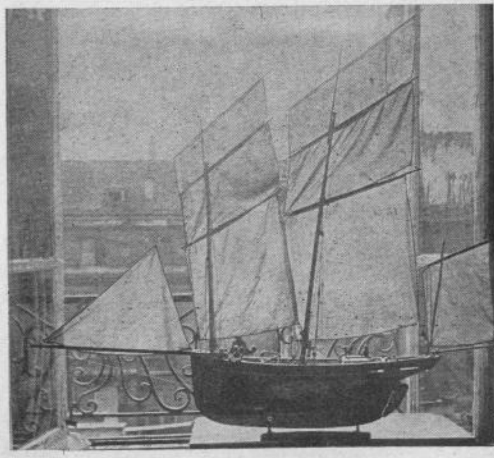
Power & Sail from France

WE are indebted to our French contemporary *Modele Reduit de Bateau* for this selection of the activities of our friends overseas. Below may be seen the line-up for a recent Paris contest for powered scale models, where the ever popular air/sea rescue launch seems to be in the majority, though a number of interesting cabin cruisers, and what appears to be a steam yacht will be noted in the background.

The other illustrations depict part of a range of special craft of historic or unusual interest. Top picture is of a Singapore Pirogue, or sailing canoe with outrigger, fullsize examples of which have made some fantastic voyages. Then comes a XVIIth century French galley, to which minor felons were condemned. Finally, we have a typical Granville Bisquine modelled on the *Sainte-Marie*, a queerly rigged but quite efficient fishing vessel.







EXHIBITION SHIP MODELLERS WILL LEARN FROM

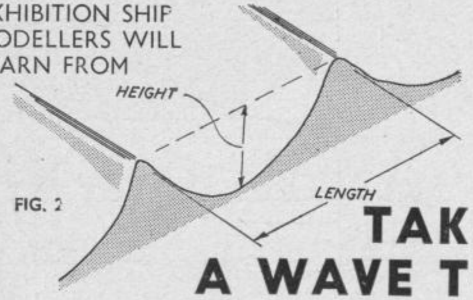


FIG. 2

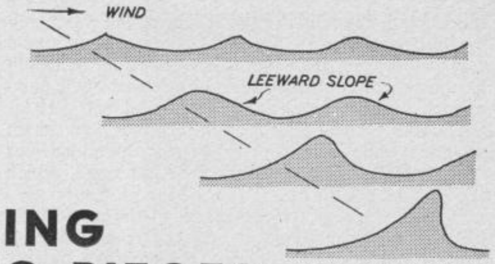


FIG. 1

TAKING A WAVE TO PIECES

IN the nautical manner a "sea" is nothing more than a wave or a series of waves. The normal appearance of the sea in motion, in fact. The individual waves which make up the "sea" can be a matter of inches high, or many feet. It is, in fact, a debatable point as to just how high a "sea" or wave can get, and some fantastic claims have been made in this direction. And the power behind a really large wave is considerable.

It is easy to over-estimate the height of a wave by visual observation, particularly from the deck of a vessel ploughing through a heavy sea. The normal maximum for a really big sea is in the order of 30 ft. to 40 ft. for the largest waves with the general average very much lower—something like 15 ft. to 20 ft. in height. And a wave 30 ft. high can exert a pressure of nearly one ton for every square foot of its surface. In exposed positions and in deep water, wave "pressure" may reach 2 tons per sq. ft. of vertical surface in its way.

The power of destruction of any wave is directly proportional to the height of the wave and is greatest when the crest of the wave breaks. Just why a wave builds up to a maximum height and then breaks into a foaming mass or crest can be explained in a simple manner. It is a common misconception, however, that all waves in a heavy sea develop crests. This is not so, as any accurate seascape painting or picture will show. Probably no more than one in five waves do develop a white crest. The rest subside without breaking. In shallow water, and particularly near a shore line there are other factors tending to make more individual waves break and the picture may be somewhat different.

In open water with a gale force or stronger wind the speed of a big sea may be anything up to 15 knots. The sea as a whole may be rolling along, but certainly not at this speed. It is only the humps or waves which will be driving along at 15 knots or so. High seas or waves and a strong wind are inescapably bound together. Given the strong wind then the waves are bound to follow.

The build-up of a wave is illustrated simply in Fig. 1 where the small hump first formed has approximately equal slopes on both windward and leeward side. As this is driven along and built up still more the leeward slope becomes steeper and steeper until finally it is nearly vertical. The mass is then unstable and then either collapses and subsides or, if the height is sufficient, the mass of water at the top of the wave rolls over at the apex and breaks into a crest.

Cresting is aided in shallow water, or by the sea striking an obstruction as this slows the leeward side of the wave and thus aggravating the tendency for the top mass to roll over the peak and break up.

The height of a wave is the true vertical height from the lowest valley or trough to the height of the crest, whereas the length is the distance from crest to crest of adjacent waves (Fig. 2). The width or sideways extent of the wave is relatively unimportant as regards analysing the motion and properties of various waves.

Wave formations do follow a number of general rules and waves, as such, may also be divided into two main classes. There is a "seaman's rule" that the length of a wave is generally between seven and ten times the height of the wave, but scientists have analysed wave forms in more specific terms. The waves themselves are classified as either "first order waves" or waves of translation; or "second order waves" or waves of oscillation. Open sea waves are of the second kind, but become "first order waves" on reaching shallow water. The waves common to sea shores are "first order waves".

With first order waves, height is restricted and the whole of the wave is moving forwards. Only the particles in the trough of each wave are at rest. The wave form follows that of known mathematical curves—a cycloid when the height of the wave approaches one-third of its length, and a prolate cycloid in longer waves or proportionately smaller height. No wave will reach a height of greater than one-third of its length without breaking.

Open sea waves—or "waves of the second order" are all cycloidal in form, and a typical wave form can readily be drawn out. Knowing the height and length of the wave a very good approximation to its shape is given by the simple geometric construction shown in Fig. 3. A circle is drawn, the diameter of this circle being equal to the height of the wave, and the circumference divided into a number of equal parts. A tangent base line is drawn, equal in length to the length of the wave, to the same scale, and divided into the same number of equal parts. Horizontal and vertical construction lines are then drawn as shown and the intersection of corresponding lines represent points on the outline of the wave, which can thus be drawn in.

In the same way the movement of the particles of a wave can be analysed geometrically, as in Fig. 4. This shows how the intensity of the wave quickly drops below the surface. A wave 10 ft. high and 30 ft. long, for example, would only disturb the water 6 in. at a depth of 10 ft. below the surface. A 10 ft. wave 100 ft. long, incidentally, would agitate or disturb the water to an extent of 18 in. The actual relationship calculated for a depth equal to the length of the wave is equivalent to a disturbance of only about 1/500th of the surface disturbance. This is interesting for it shows clearly that sub-surface craft and marine life is likely to be very little troubled by the state

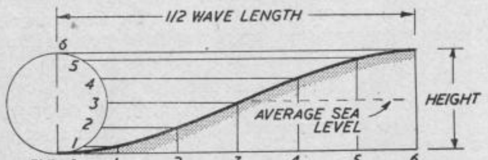


FIG. 3

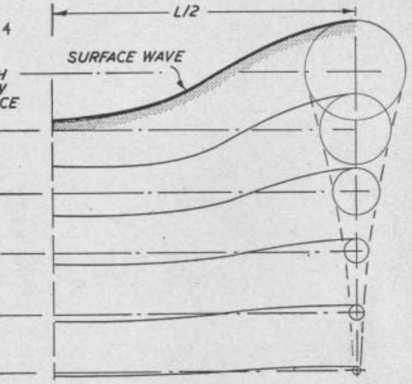


FIG. 4

of the surface sea.

Finally, we quote three formulae for wave velocity, based on the relative proportion of wave length to depth of water.

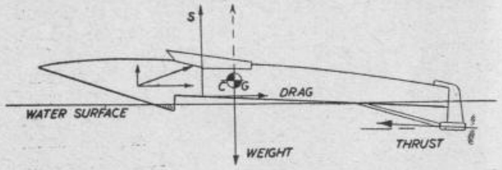
Velocity = $1.818\sqrt{L}$ ...... where L is less than D

Velocity = $\sqrt{[32.17D\,(1 + 3\,H/D)]}$ ...... where L is greater than D, but less than 1,000 D

Velocity = $\sqrt{32.17D}$ ...... where L is greater than 1,000 D

L = length of wave in feet.
D = depth of water in feet.
H = height of wave in feet.

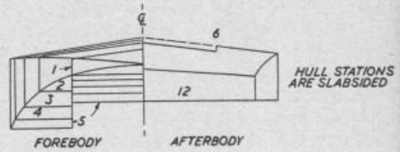
Italian Model Power Boat Practice



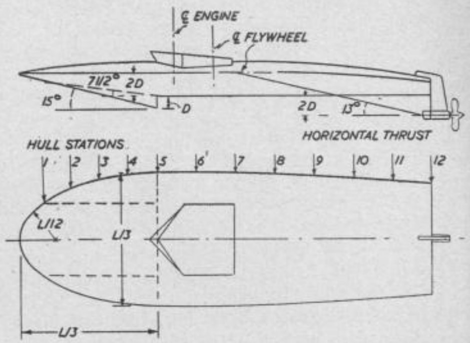
THE model illustrated was chosen as fairly typical of modern Italian practice. It features a simple hydroplane-type hull with in-built sponsons, a type which appears to be well favoured by Continental modellers. Performance figures given, claim a speed of 78.2 km./hr. (48.6 m.p.h.) with a two-bladed propeller, 2.95 in. dia.; and 62.7 km./hr. (39 m.p.h.) with a three-bladed propeller 2.36 in. dia. The motor is a GB. 17b diesel.

Construction is straightforward, the hull being slabsided with plywood formers and birch stringers. The skin is also of thin plywood. An interesting point is that both the motor and the propeller are mounted horizontally, with two universal joints, as shown. The motor is mounted immediately behind the step.

Hull beam is almost exactly one-third of the hull



length and maximum beam occurs one-third back along the length of the hull. The forebody is very blunt in plan view. In side elevation the forebody taper is carried to a point, deck and bottom lines being slightly convex.



small gauge MINIATURE RAILWAYS

The Kessex Railways

E. L. KILLICK DISCUSSES THE BACKGROUND HISTORY WHICH LED ULTIMATELY TO THE DEVELOPMENT OF THE KESSEX RAILWAYS WHICH WILL BE DESCRIBED FROM TIME TO TIME IN "MODEL MAKER", AND PROVIDE A HAPPY BASIS OF FACT AND FICTION ON WHICH A PRACTICAL MODEL RAILWAY LAYOUT CAN BE ESTABLISHED.

AS contradictory as it may sound the Kessex Railways are both fact and fiction. Fiction, since the location of the railways on an island off the East Coast of Britain, is but a flight of imagination to provide a realistic background and setting for the fact, which is two outdoor '0' gauge lines, and an indoor '00' layout.

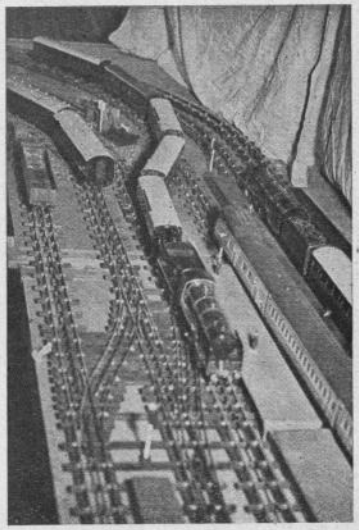
The description of the planning, construction, and operating of these railways is to be presented as a story, in a manner which may not be unique, but at least is one of the less usual methods generally adopted. Each chapter will be written as if it is a report of the life of a "real" railway, followed by explanatory notes linking up the various "news items" with the actual work on the model itself. In addition there will be useful and interesting information on the various methods of construction used and results of any experimental methods tried.

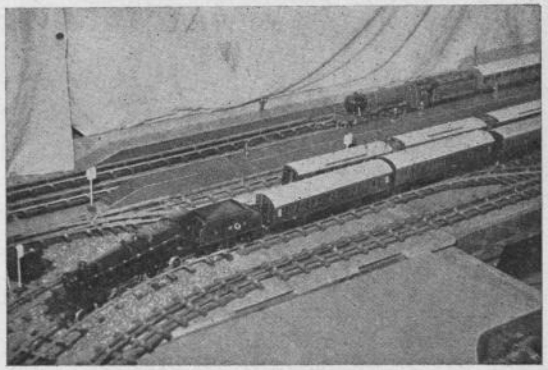
These railways are the result of many years of pipe dreaming on my part, and I feel that a short account of my model railway activities up to the present time may be appropriate at this stage.

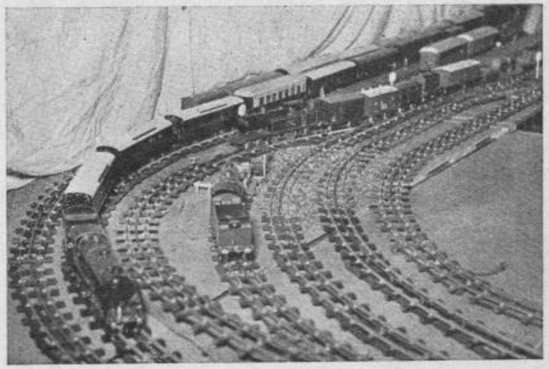
I think I was "born to model railways", inasmuch as my father bought a quantity of tinplate track, wagons and coaches, with one clockwork loco, within a few months of my arrival in this world, almost 40 years ago.

As soon as I was old enough to know how to wind up the engine I was permitted the use of the railway, but only a few times a year, on such occasions as Christmas or birthdays. As the years went by more frequent use was permitted, until the happy day when an all-the-year-round use was granted. During these early years the interest in railways had steadily grown and even although most things which occurred during that time are no longer contained in my memory, I can clearly remember spending many hours watching trains.

I can also remember when out walking with my parents, shuffling my feet along the ground,



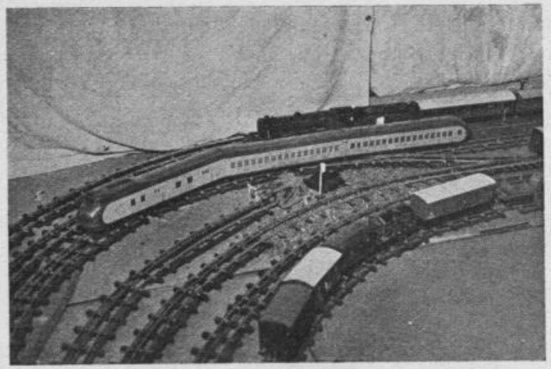




Top right: The Schools loco about to enter the "slow" line platform.

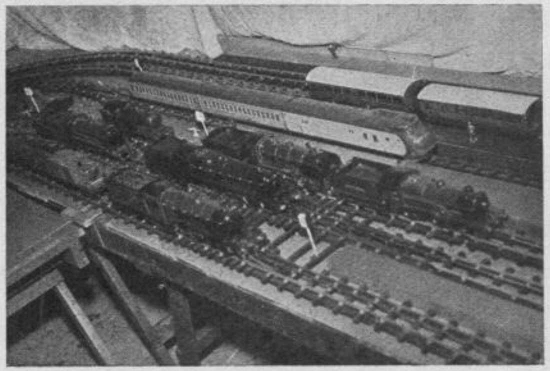
Centre: The Princess Elizabeth leaving the slow platform, with the Flying Scotsman passing through on a fast non-stop train.

Bottom: A two-coach electric in the bay, with the Schools climbing the bank hauled by the 4-4-2 tank.

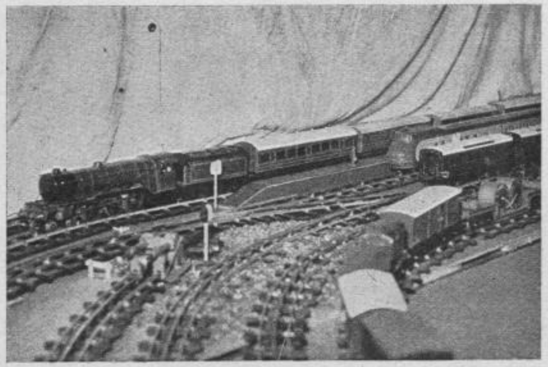


Above : The Diesel Flyer leaving the bay platform. The Princess Elizabeth, at the head of a main line train, is in the background.

Below : Some of the locomotive stud, including The Flying Scotsman, Schools and Midland Compound. The Diesel three-coach train is just arriving at the bay platform.



Below : The ballasted portion of the track in foreground. Diesel train is in the bay, while last two coaches of a S.R. train are at the slow platform. Flying Scotsman heads train standing at the fast platform.



making what I considered "train noises" and using my small walking stick as a piston rod. After I had worn out my shoe leather in about a quarter the time I was expected to take to do so, and on several occasions had a "mechanical failure" with the piston rod, involving certain damage to the legs of whoever was walking next to me, this practice was frowned upon, and had to cease. Not to be outdone, I found other ways too numerous to mention, of simulating railway movements, and it was not long before I wanted to build a model railway which looked and ran like a real one.

First I tried building it on ground level, but with neither knowledge nor experience in such matters I quickly decided against such practice.

Next I decided on outdoor shelving about 2 ft. wide with rising and falling sections rather like a scenic railway. This shelving was filled with soil from which cuttings, embankments, bridges, roads, and fields were built. For a short time this was a fair success, although I used tinplate rail, painted and fitted with wooden sleepers under and between the tin. Cuttings suffered landslides, followed by much rain doing similar damage, and finally so added to the weight on the supports of the frame as to cause severe alterations to their original shape. It was then decided that an indoor layout was to be desired.

Fortunately at this time a shed which had been used as a garage was being sold fairly cheaply, and this was bought and re-erected on the site of the now dismantled "Shelf Railway". This shed measured approx. 12 ft. x 8 ft., but an extension added to the end gave a final space of 18 ft. 6 in. x 8 ft. After much planning it was decided to increase the width to 12 ft., and a layout came into being.

All track was still tinplate, with a maximum curve and point radius of 2 ft. Loco stud consisted of two S.R. "L" Class, one L.N.E.R. "Shire" Class, one 0-4-0 T., one 4-4-2 T., all clockwork, and two Bowman steam 4-4-0 tenders and engines. These steam locos, although running on "0" gauge, were to scale of about 10 mm. to the foot, but were much too powerful to use, and were soon parted with.

The next addition was six L.M.C. wooden litho S.R. corridor coaches, but it was found impossible to run them round 2 ft. radius curves, and they were not used until about two years ago!

This layout, with certain changes, lasted until 1937, when I moved to a home of my own, and it was then dismantled and packed away.

(*Continued on page* 424)

Improving the Miniature Railway Layout

H. A. ROBINSON WRITES ON MAKING STATION AND OTHER TYPES OF NAME-BOARDS

IT is surprising how many boards conveying one message or another there are to be found on railways. Station name-boards, of course, head the list, but besides these we have "whistle boards", "catch point boards", "Beware of the Trains" signs and the like, while some systems employ grade boards in the place of the small grade posts, with the grade lines and appropriate numbers painted on.

All these things are invariably finished with white lettering or numbers on a jet black base, and are difficult to hand-produce in model sizes satisfactorily. But by using a photographic method it is quite possible to turn out the most diminutive of signs with accuracy. Moreover, numbers of the same sign, as say, "Beware of the Trains", can be made at speed and all identical.

There are two ways, using a camera, that the job can be done, either by:

(1) direct photography;

(2) reducing from a tracing paper "negative".

Both ways, on suitable printing paper, a splendid miniature reproduction of the words or sign in question can be obtained which is then pasted on to a piece of card and set in the desired position.

To take the direct photograph method first. Here one can either photograph a real full-sized board, or in the case of station names, which modellers often like to invent themselves, photograph your drawing of such on card.

If possible it is good to get the board on to the film exactly the size it is needed for the model so that prints can be obtained by direct contact printing—there being then no need to resort to an enlarger. Here the camera with a focussing screen scores, for the image on the ground-glass can be made to fit exactly between two points previously marked, and showing the desired dimension.

To get your own station names, these should be drawn out on a large piece of white card—the letters being outlined first and the surround then blacked in so that they stand out in white. Some care should be taken to get the edges clean, but this need not be carried to being finicky as in the great reduction

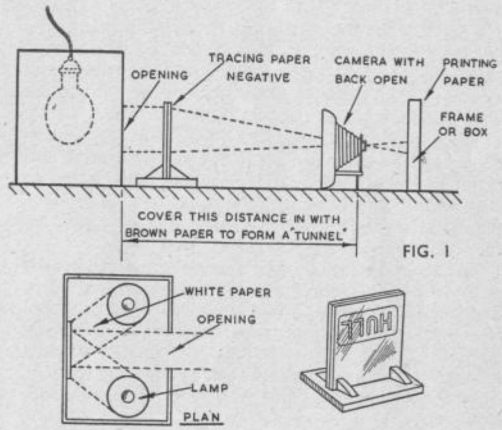
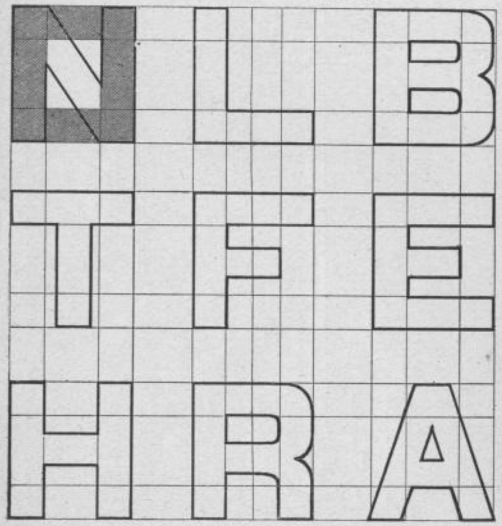


FIG. I

FIG. 2



most inequalities disappear—the main thing, however, is to keep the width of the bars making the letters the same throughout.

In the taking, the exposure should be short and the development about twice as long as normal. This will produce a harsh contrasty negative, but this is just what is wanted for the purpose. "Soft" negatives of low contrast are useless. When printing, contrasty paper should be used.

If you have not got a screen camera the size to which anything will appear on a film relative to its distance away can be worked out. First find a coefficient R which is the fraction given by the size of the desired image over the size of the object. Thus if you want the sign on the film to be 3 in. long, and as you have drawn it on the card it is 12 in., then R would be 3/12 or ¼.

The distance the card must be away is then given by the simple formula $f/R + f$, where f is the focal length of the lens—generally shown on the metal surround. The distance given is from the card to the lens, not the card to the film.

When photographing one's own drawings, several names can be often got on to the same negative and printed together. All that is necessary then being to cut them up and paste on sections of card. The signs put together thus must of course all be needed to the same scale.

The second method of producing miniature boards is by reduction from a tracing paper negative. Here the general idea is to draw the desired word or words on a rectangle of cellophane, tracing paper or tracing cloth that is as big as the negative usually worked through the instrument, and then by carrying the lens right forward, project this tracing on paper the desired size.

To get the lens right forward on the older bellows enlargers is quite simple, and the most diminutive of reproductions can be produced with certainty, but with newer instruments it may be necessary to improvise some method of holding the lens in the correct position, but this is usually not too difficult.

Actually, without a proper enlarger, an arrangement can be fixed up using a camera lens that will give the reduced projections. Printing paper, lens, negative and lamp-house are located as shown (Fig. 1). The "negative" is held between two pieces of glass fixed vertically to a base while the lens is held in the camera which has its back open or taken right off. The lamp-house can be any box with a hole in the side of such a size that it allows a flood of light to fall on the rectangle of tracing paper, and nowhere else. To get an even "flood", two lamps must be slung, one each side of the opening and right in front of the opening on the further side of the tin must be a sheet of white card. This card then becomes brilliantly lit and it is the reflected light from it that passes out. Having everything fixed the space between the lens and negative, and negative and box must be roughly covered with thick wrapping paper so that a "tunnel" is formed down which the light passes.

As before the paper can be pinned up to the side of a box placed before the camera. Exposure with this arrangement, which is in effect a reflecting enlarger, will be longer than with a proper instrument, but trial strips will show how long the lens should be left open to get a good black and white result.

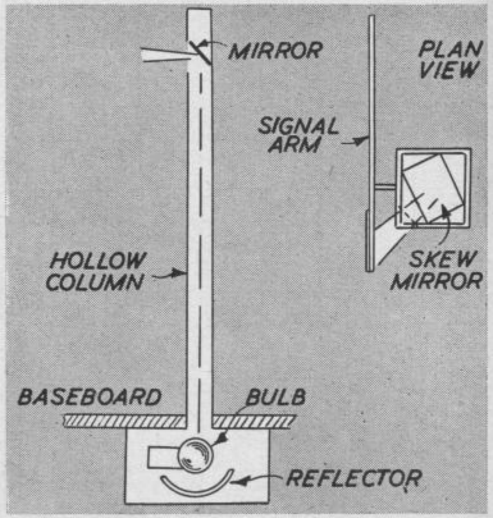
In mounting the words obtained on cards, use a photographic mountant; not glue or ordinary paste. This is because the latter soon works through the photographic paper and you would find the white letters turning red or otherwise showing stains.

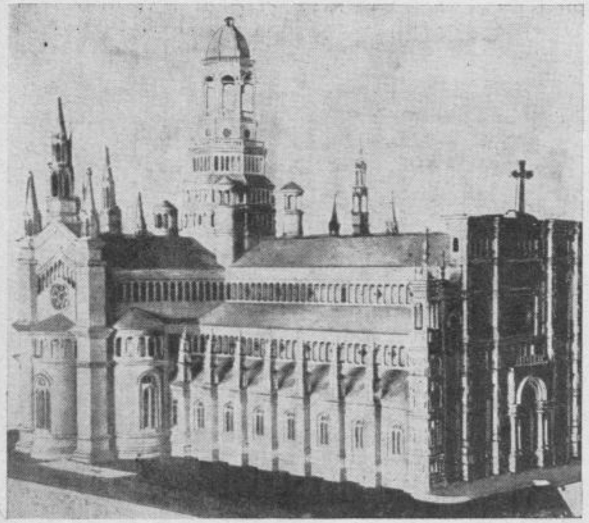
The lettering used on railways is invariably of the square type and so it is not hard to work with as most of the lines can be ruled (see Fig. 2). If in doubt about the shape of any given letter it is better to go and have a look at some nearby board rather than guess.

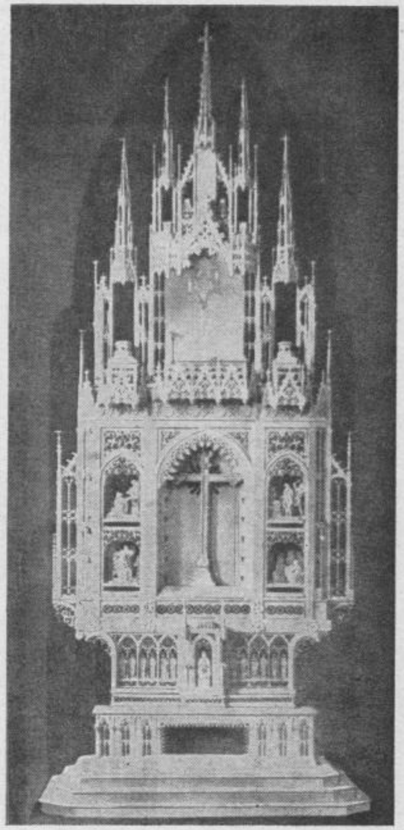
INDIRECT SIGNAL LIGHTING

DIFFICULTY is experienced in arranging any form of lighting for signals in 00 gauge railway layouts owing to the very small size of the signals themselves. Even pea bulbs are rather too large for the job.

The system of using indirect lighting, as shown in the drawing, can often be applied. The source of light is below the baseboard or "ground level" and is directed upwards through a hollow column carrying the signal. A small scrap of mirror surface at the top, set at an angle of 45 deg., then reflects this light on to the coloured segments of the signal arm. Skewing the mirror slightly will allow it to be housed in the signal column and still reflect light on to the end of the signal.







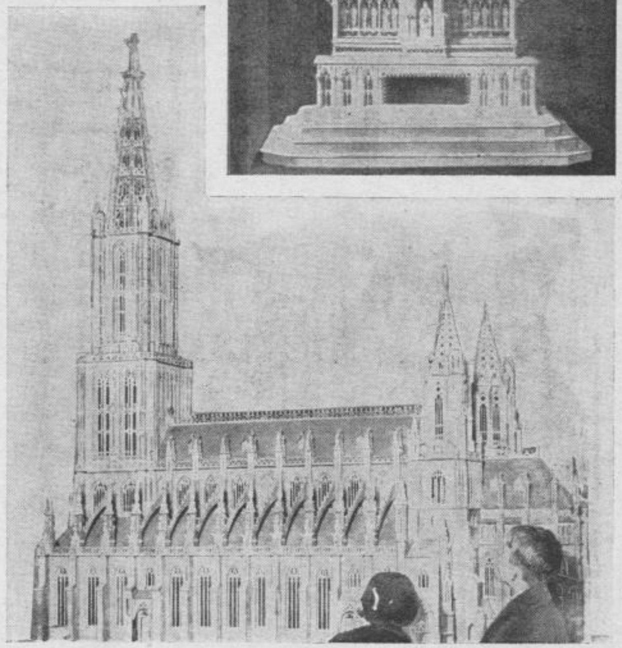
More Gems FROM THE RICHOLD COLLECTION

OUR recent article on the model of Milan Cathedral from the Richold Collection has produced so wide a correspondence from home and overseas that we are offering a few more selections from this truly monumental array of architectural models.

The model above depicts Chartreuse Monastery whence first came the famous liqueur. Scale is one-fiftieth and no less than 4,000 pieces were used in its construction—two thousand being used in the ornate frontage alone. Building time, four years: entirely built of sycamore with the exception of a little cottonwood round the bows of the windows.

On the right is The Great Altar, St. Peter's, Rome, standing 7 ft. high. Made of maple, cottonwood, sycamore, white holly and white chestnut. This is considered the most intricate piece in the collection and took two and a half years to build.

Below, right, is a one-sixtieth scale model of Ulm Cathedral, 8 ft. long, 3 ft. wide, and 9 ft. high. Eight different woods are used including the rare lacewood. Others are amarynth, satin walnut and black walnut. This is the largest of Richard Old's models and took four and a half years to make.



Scale Rolling Stock for 4 mm.

THIS ARTICLE BY A. H. DADD, B.Sc. IS THE FIRST OF A SERIES PRESENTING THE LESS USUAL TYPES OF ROLLING STOCK FOR '00' GAUGE (4 MM.) WHICH ARE NOT NORMALLY AVAILABLE AS COMMERCIAL CONSTRUCTIONAL SETS. THE DRAWING IS FULLSIZE AND READY FOR YOU TO MAKE A START NOW.

WITH the standardisation of rolling stock and motive power on our railways, which is now in progress, in a short space of time much of the variety of types, which provide such excellent modelling material, will be lost. The nationalisation of industries, and in particular coal, is having a similar effect. Those long lines of coal wagons, painted in their various colours and styles, and which help to provide variety on model railways, will slowly disappear. Indeed, much of the older stock formerly running on our small private lines, has already been destroyed, and many interesting prototypes have been lost.

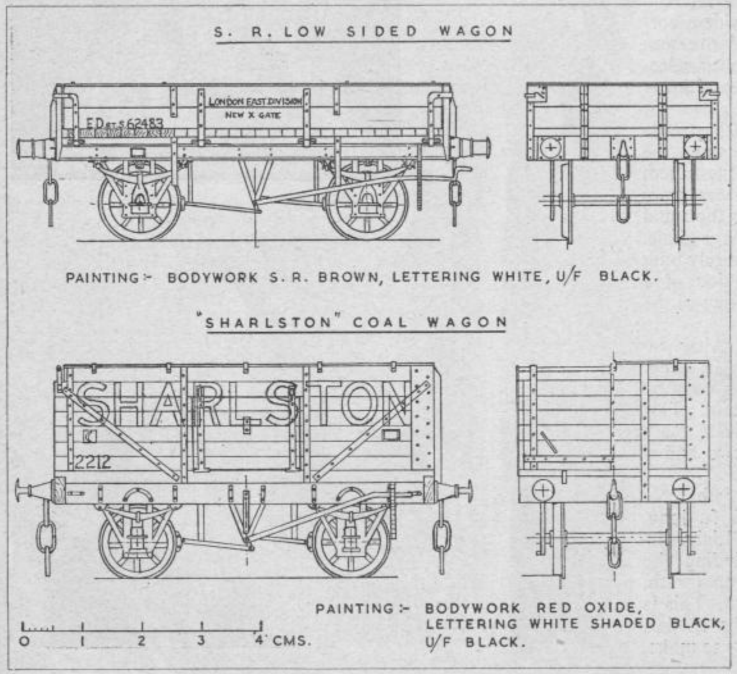
It is primarily to provide drawing and photographs of some of these, that this series of articles is being prepared. However, new types of stock will be included from time to time where they are of particular interest to modellers.

In addition to drawings, notes on construction will be included so that anyone with only a little knowledge of modelling will be able to build his own fully detailed rolling stock. The construction methods described although essentially for 4 mm. scale, will in most cases apply equally well to 7 mm. scale, and of course, the drawings can be scaled up for the larger size without much difficulty.

Drawings for two wagons are reproduced this month. The first is a typical example of the type of coal wagon in use at the present time. It is included because it is a suitable prototype on which to describe the construction of fully detailed model wagons. In addition it is relatively simple, in that standard commercial components may be used throughout, whilst it is attractive. The second is a low-sided wagon with a few unusual features to add variety to your stock.

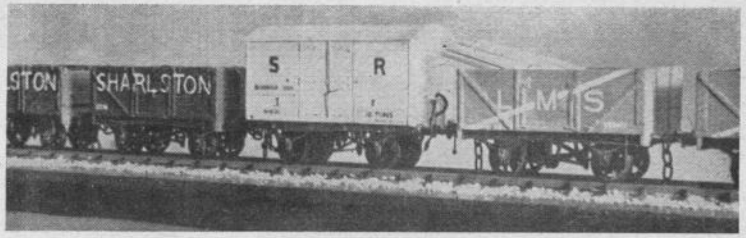
"Sharlston" Private Owners Coal Wagon

Three materials present themselves as suitable for modelling wagons, and we will consider the merits of each. Metal, usually brass or nickel silver, is popular and has the one big advantage that, once completed, the wagon is more or less indestructible. The cost of the wagon is rather high, and the time required for construction is more than that which the average modeller can spare if he wishes to have a layout running in a reasonable time. It is, of course, practically essential to use this method for the new all-steel prototypes, as no amount of work will ever make wagons constructed from other materials have that "metallic" look.

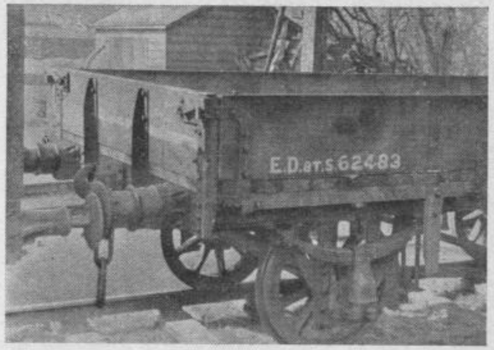


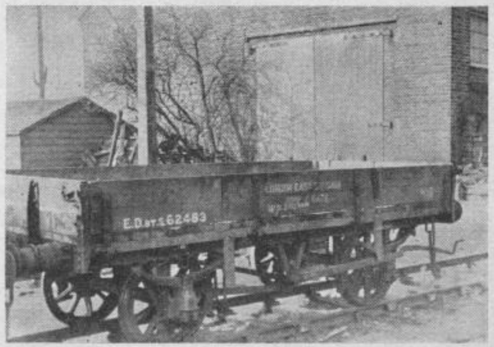
Cardboard has always been popular, mainly owing to its very low cost. It has many disadvantages, namely, it is not strong, it easily loses its shape, and where raw edges are exposed, these are liable to be bent and become frayed. Painting, if one is careful, presents little difficulty, providing a good quality card is used.

Lastly, we have wood, which appears to be the most suitable of all. Many modellers use plywood (the thin material usually sold as millimetre ply, but varying greatly in thickness), but an excellent alternative, which is easier to use and probably superior in that it retains its shape indefinitely, is obechi. This can be obtained in sheet form $\frac{1}{16}$ in. thick. The only disadvantage is the rather deep grain. The wagons shown in Fig. 1 were constructed from this material. Before use, the grain must be filled with grain filler, and the sheet sanded down to give a fine smooth surface. This is a relatively quick job and an excellent painting surface is obtained. The sanding will also reduce the thickness of the sheet to between $\frac{1}{32}$ in. and $\frac{3}{64}$ in., which is about right for 4 mm. scale.



Heading : Wagons constructed according to the method described.
Top centre : Model of the Sharlston coal wagon showing end door detail.
Lower centre : A close-up of the full size low sided wagon showing end detail and arrangement of hinges on the sides.
Bottom : Another shot of the full size S.R. low sided open wagon.





From this sheet, cut out the sides and ends and scribe them to indicate the planking. This can conveniently be done with the point of a compass or dart. Do not make the lines too deep, or they will appear too prominent in the finished product. Frame up the wagon accurately and add the floor, which for preference should be cut from $\frac{3}{32}$ in. thick obechi. Glue all joints. This is entirely satisfactory and no pinning is necessary.

The strapping and corner plates may be made from cardboard or the thin brass strip which is available cut in one and two millimetre widths from all the leading manufacturers. The latter can also be obtained with imitation rivets or bolt heads, and in spite of the fact that these are spaced too far apart, the finished appearance is very satisfactory. This strapping is glued to the wood using a glue that does not crack when it dries. Note the metal capping to the sides and ends. This is made from the same material.

The end door detail is clearly shown in Fig. 2. The flaps of the hinge are made from brass strapping which, after glueing in position, are bent round a piece of 26 s.w.g. wire which acts as the hinge. In the prototype, this is supported by two short pieces of iron bolted to the sides of the wagon. These can be made from 1 mm. strip brass and glued in position as before.

The opposite end of the wagon has the usual double wood beams running from the top to the bottom covering the buffer beam. Make them of $\frac{3}{64}$ in. square obechi, and cover with a strip of riveted strapping to give the bolt head detail.

This completes the bodywork, and we are now ready to add the underframes. Two methods are open to us here. It is possible to purchase quite cheaply,

(*Continued on page* 414)

On the Right Track

A REGULAR FEATURE OF INTEREST TO ALL OO GAUGE FANS BY R. WATKINS-PITCHFORD

Trackwork Without Tears

THOSE who have followed the earlier notes in this series will remember that we advocated the laying down of a set of good proprietary trains—such as the Hornby Dublo—as being the best possible introduction to the hobby.

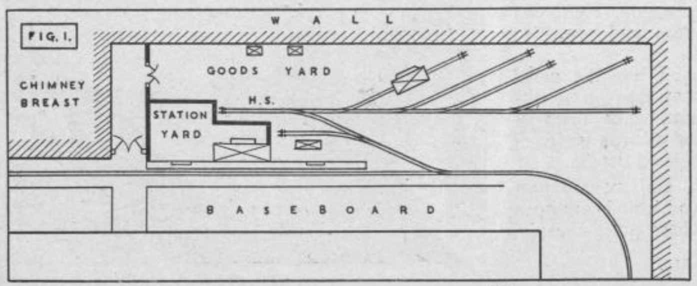
Where the layout of a model railway is concerned—by which we mean here the track plan—practical experience is the best teacher; one had almost said "the only teacher". It is not until trains are actually operated and some attempt is made to run to a time-table that the layout is submitted to the acid test.

Consider Fig. 1 for example. At first sight this may seem workable enough. But if we came to operate such a layout, we should find that it just would not work. If a goods train of any reasonable length approached the station round the curve and wished to shunt its trucks into the yard for loading and unloading, it would have to leave part of the train blocking the main line, while the loco took two or three trucks at a time and shunted them into the yard.

It could not clear the main line by taking the entire train at one bit, because the spur HS is not long enough. A goods train approaching from the other direction (single line assumed to carry two-way working) would be in even worse plight, because the loco would be "locked" in the yard by the few trucks it had brought in.

If we fell into an elementary trap of this kind it would be no great hardship, using proprietary "portable" track units, to break up the layout and clip the rail sections together again in some alternative layout which avoided these difficulties.

But if we had spent some weeks of spare time in putting down this layout in carefully laid "permanent way" and did not discover our fault until running the trains and were then called upon to tear up all our beautiful trackwork, it would be, to say the least of it, heartbreaking.



On the writer's own Norchester and South Leigh Railway, the whole of Wessington Station and its precincts had, at one time, to be re-designed and re-laid in order to afford a vital additional inch and a half on one of the tracks. Not only so, but the 24-hour time-table that had taken two of us over two years to compile had to be revised. But the results justified the trouble, because it meant that the UP expresses (of five coaches) could be passed in Wessington Station in safety by the DOWN ditto, whereas, before the alteration, the UP had to carry a slip coach which it shed at the previous station of East Drome. This in turn meant that throughout the 24 hours covered by the time-table, a succession of slipped coaches accumulated at East Drome until they could be worked back to their Depot.

One would have said that the Civil Engineer (in the person of your humble servant) should have foreseen all this when originally planning the layout and that he should, accordingly, have designed his Wessington Station so that the loop road was long enough for two full length trains to pass in safety.

But the moral is that faults and weaknesses in layout design often escape notice on the drawing board and are revealed only too painfully when the trains start to run. Wherefore it is the wise part in one's early days to employ portable clip-together track units, whereby at least the more elementary mistakes can be corrected without undue trouble and expense.

In extenuation it can only be said that in the days when the Norchester-South Leigh track was laid (circa 1936) there were no such ingenious aids as the Foundation Tapes and Point Plans with which the Peco people have today revolutionised the entire approach to the matter of track laying.

The drill in those days for laying home-constructed track was first to make a rough sketch of the floor space in the loft or room destined to house the railway, next, having decided upon the general lines of the layout, the plan of the baseboard was decided, a fairly accurate scale drawing was then made (preferably on squared paper so that distances between any two points could readily be laid off) and when the track layout had been drawn in on successive sheets of this paper, it was scaled up to actual size and drawn in upon the surface of the baseboard, first with chalk that could readily be rubbed out in the case of mistakes, and finally in soft black pencil lines which showed the actual position of all rails, including check rails, wing rails and crossing noses (or "frogs"). The only other requisite was a large bottle of back-ache lotion.

Nowadays, with the help of these Foundation Tapes and Point Plans, the whole job is infinitely simplified. They consist of strips of dark grey paper of substantial quality, upon which are printed the outlines of sleepers bearing small dots showing the positions of the chairs or other rail fixing.

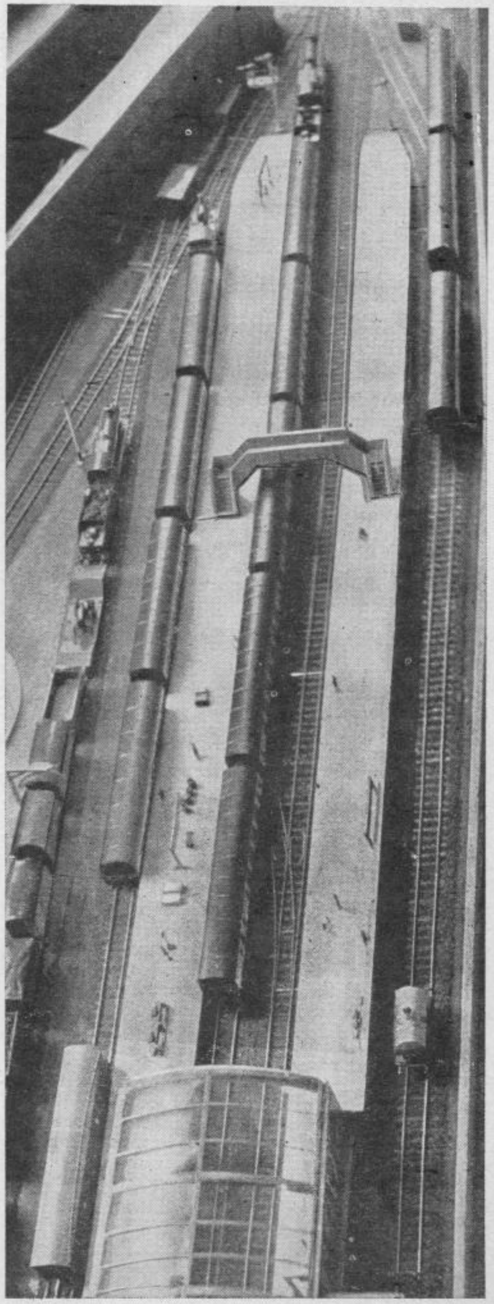
For straight track the Foundation Tape consists of a strip 18 in. long. When trimmed with a razor blade and straight edge to the dotted lines, these strips show the correct width of the track bed (i.e. the ballast). When two such strips are laid edge to edge, they automatically give the correct "six-foot way" spacing (of 50 mm. between track centres) that should separate adjacent roads. If a four-way track is being laid with the Slows on the outsides, it will be sufficient for each Slow to be separated from its corresponding Through by this standard spacing, but in practice the UP and the DOWN Through roads in the middle, upon which trains travel in opposing directions, would normally be spaced wider, say, 60 to 80 mm. between track centres.

For curved track there are six types of Foundation Tape printed, giving radii, respectively, of 2 ft. 0 in., 2 ft. 2 in., 2 ft. 8 in., 2 ft. 10 in., 3 ft. 0 in. and 3 ft. 2 in. Here again the tapes are trimmed with scissors along the curved dotted lines and laid edge to edge.

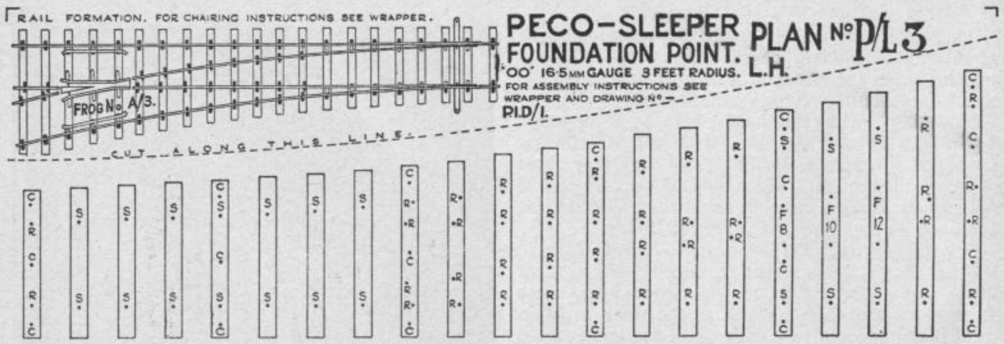
It will be seen that these tapes go in pairs, the 2 ft. 2 in. giving the correct radius for the outer track when the 2 ft. 0 in. is used for the inner and so on.

Generally, a sharper radius than 2 ft. 0 in. is not to be recommended, particularly for fast main line work, or where long coupled wheel base locos are used. However, should it be required, as on a small branch line or in a goods yard, to use a slightly sharper radius, it is a simple matter to snip out fine "vees" every two inches or so along the inner side of the curve and then bend the tape to the required radius, so that the "vee" snips close up. In the same way, should it be required to put down a curve for which no standard tape is provided, e.g. 2 ft. 6 in., the next larger radius of tape (in this case 2 ft. 8 in.) would be snipped out and bent in as necessary. Finally, for a curve of larger radius than 3 ft. 2 in., e.g. a section of transition curve of 3 ft. 8 in. radius, a length of straight tape would be snipped and bent as before.

Excluding the 45 deg. "Diamond" crossing and the 90 deg. Right Angle Crossing, there are no less than ten Point Plans. These cover simple Right Hand and Left Hand turnouts (or leads); a Trailing Crossover, a Facing Crossover and a combination of the



A realistic small gauge layout seen at the recent High Wycombe Exhibition. Of particular interest is the glass roofed station building seen in the bottom foreground. It is really difficult to prove that this is indeed a model picture. ("Model Maker" photograph).



These Foundation Tapes and Point Plans, numbering nineteen in all, provide for a very wide selection of track laying requirements and more still are possible by "fabrication". For example, a three-way point can be made up by cutting down the centre lines of a RH and a LH lead, backing them up and splicing in a straight section between the two curves. two (Scissors Crossover); a Left Hand Double Junction and a Right Hand ditto; a Double Slip (which may equally be used for a Single Slip or for a 5 deg. Crossing); and, finally, a Curved Y and a Straight Y.

But although, when the track layout is finally agreed upon, they can be used, as their name suggests, as the foundation upon which sleepers, chairs, rails and ballast are actually built up, it is in the preliminary laying out that they prove invaluable.

No longer is there any need for scaling up on to the baseboard with chalk and pencil lines. The tapes and plans themselves, representing accurately as they do the limits and proportions of the several parts, can be pinned down temporarily to the baseboard and moved around until by a process of trial and error the final result is attained.

It is helpful in this connection to pencil in, on the tapes and plans, lines representing the running rails. When the light strikes on them from a certain angle, these pencil lines show up on the grey paper like the polished heads of rails and give a fascinating preview of how our track work will finally look.

SCALE ROLLING STOCK FOR 4 m.m.

(*Continued from page 411*)

cast solebars with axle guards complete. They are very good if a little work is put in on them to clean up the detail. Alternatively, separate axle guard castings can be obtained, and the solebar can then be made of wood. Whichever method is chosen, glue the axle guards and solebars in position, not forgetting, of course, to include the wheels. Both types of castings have screw holes for fixing. These take "00" size screws, and for added strength it is advisable to screw the castings to the floor of the wagon. Thoroughly test the wagon for free running before proceeding further.

If cast solebars were used, these will also have the V-hanger and brake detail included. If separate axle guards were used, add the remaining details, cutting the parts from thin brass sheet. In both cases it will be necessary to add the brake handle and support.

The buffers, which are of the standard tapered type, are glued in position, and if desired they may be soldered to the solebar casting at the back. The fitting of the couplings depends of course, on the type used. Several automatic couplings are on the market, and instructions for fitting are included with them. If scale three-link couplings are used, they are inserted through the buffer beam and fixed to the wagon floor on the inside. The coupling itself is easily cut from 28 s.w.g. brass using 22 s.w.g. wire for the links.

The wagon is now ready for painting and lettering, notes on which will be included in our next article. The colour scheme is indicated on the drawing.

S.R. Low-Sided Wagon

This is built in a similar way to the "Sharlston" coal wagon, but the following points should be noted.

Both ends are identical and have two T-section supports. These must be cut from sheet brass and bent to shape. A steel channel section solebar is used on the prototype. This can be made from 3 mm. channel brass, or cast solebars of this type can be obtained. Note the brake handle shape.

The buffers are not standard type, but close to parallel loco style. If loco buffers are used, the extra detail can be incorporated. The slight taper and groove can be added by careful filing, or of course, the whole can be turned up if a lathe is available.

The wagon is dark S.R. brown with black underframes and white lettering. The letters, being small, can be done with a pen and paint thinned to the right consistency.

model ARCHITECTURE

BRIDGES

PT. II BY R. H. WARRING

IT is generally easy to classify a bridge on sight. Some of the outstanding examples of suspension bridges have already been mentioned and a selection of the largest are given diagrammatically in Fig. 8. These include some of the largest single-span structures in the world.

The Forth Bridge, typical of the cantilever type of bridge, is to be found duplicated in miniature throughout the world, although suspension bridges are now more the general rule for long spans and long bridges. An outstanding example of the steel arch "through" bridge is the Sydney Harbour bridge with a span of 1,650 ft. (Fig. 9). This is still not the largest single span steel arch bridge in the world. That distinction belongs to the Bayonne Bridge, New Jersey, completed in 1931, with a span just 15 ft. longer. Deck type bridges with a steel arch are to be found spanning deep gorges and canyons, the Zambesi Bridge in central Africa being a leading example, and also enjoying the distinction of being the bridge with the highest elevation in the world—400 ft. above the Zambesi River (Fig. 10). Other bridges are higher in height—the towers of the San Francisco-Oakland Bridge, for example, rise to a height of 750 ft. above the water — twice the height of St. Paul's cathedral.

Not all bridges are of the "fixed" type, however. It is obvious that in many cases rivers and navigable waterways must be left open for shipping, and where it is not possible to build up the height of the bridge to give sufficient clearance, some form of opening bridge must be used. Whenever possible this is avoided on account of the increased cost and complexity of construction, but in some cases it just has to be done. Larger bridges do not usually suffer in this respect. Initially they are designed with a high roadway level and adequate clearance. The proposed Narrows Bridge at New York, for example, will have the centre portion of the roadway 237 ft. above high water. That is the height engineers have calculated it had to be, irrespective of clearance or not! The twin supported towers will reach to 800 ft.

However, in the case of smaller bridges spanning relatively narrow waterways it is a different matter. Sometimes adequate clearance is impossible with a fixed bridge without an unnecessarily complicated extension of the original project, such as building up the side spans and entry roads. Here a bridge which will open is the only practical solution, and of these there are some five basic types. These are depicted in Fig. 10.

Of these, probably the swing bridge is the most common, the centre or swinging portion being of cantilever construction pivoted on a central pier. Next to this is the bascule—single or double—the hinged or lifting "leaf" of the bridge being counterbalanced so that the power necessary to raise it is minimised. Tower Bridge is an outstanding example of a double-bascule bridge. Each leaf weighs 1,200 tons and is

(*Continued on page 419*)

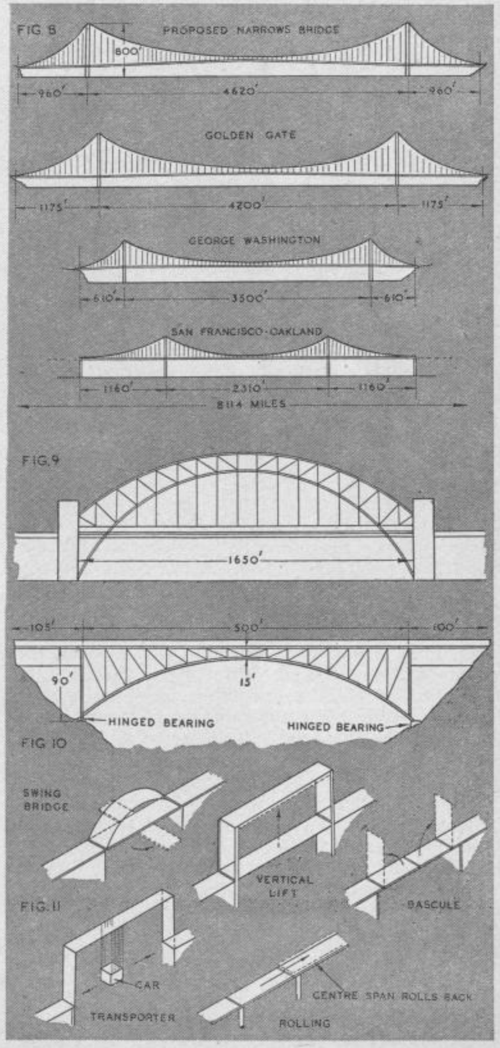


FIG. 1

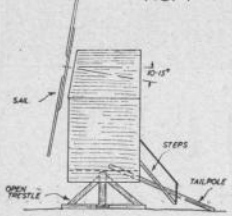


FIG. 2

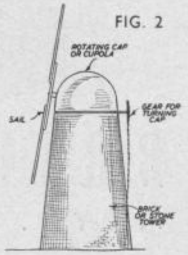


FIG. 3

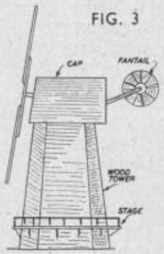


FIG. 4

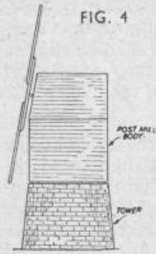
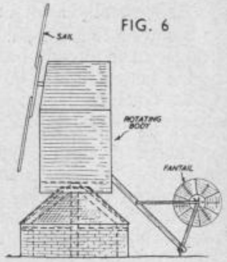


FIG. 6



Modelling Windmills

TYPES, CONSTRUCTION & OPERATION DESCRIBED BY R. H. WARRING

THE windmill, as such, is as obsolete as the windjammer, and is fast disappearing from our countryside. Many excellent specimens have been preserved and some indeed are still working, but there are dozens, even hundreds more, reduced to mere ruins. Even in Holland, the home of the windmill, in the popular sense, electric power has replaced the windmill for pumping and similar duties. By and large their best specimens are preserved mainly for historic interest, although again there are numerous small pumping mills in use. These the true windmill lover will dismiss as a mere "fan on a stick", however useful their purpose.

We venture to prophecy that anyone following this series and making the representative models which will be described, will develop a very real interest and seek further information on the subject. In this respect we can do no better than introduce to them the Society for the Protection of Ancient Buildings which has a special windmill and watermill section devoted to the interests of the windmill and, more particularly, their preservation.

As far as this country is concerned there used, once, to be hundreds of windmills dotted about the countryside. Sussex, Kent, Surrey, Essex, Suffolk, Lincolnshire, Norfolk, Cambridgeshire, and Buckinghamshire, probably being the most prolific, and in all these counties there are still numerous windmills to be found. The windmill "population" of the rest of the country is sparse by comparison.

Windmills came from Western Europe, and were originally all of one type, the *post mill* (Fig. 1). The whole box-like structure of the windmill body rested on, and could be rotated around, a large central pillar or post—hence the name. This post rested on, or was built into, two horizontal members, called crosstrees, resting on the ground and braced trestle fashion, to distribute the load.

Entrance to the mill was by means of a ladder extending to ground level. To turn the mill so that the sails faced into wind a long tailpole was fitted. This normally rested on or just above the ground "downwind". In the earlier mills this tailpole was lifted and carried round by hand to re-align the mill. Later a winch was added to the tailpole and short posts placed at intervals around the mill. A chain from the winch hooked over the nearest post, and the mill could be winched, progressively, into a new position.

In the middle of the 16th century another type of mill was introduced for the first time in Holland—the tower mill (Fig. 2). Here the main body of the mill is a fixed brick or stone structure with only the top or cap housing the windshaft, sails and gearing free to rotate on rollers on a track around the top of the body or tower.

The first tower mills were fitted with long poles attached to the cap extending downwards. These poles were grasped and carried round by hand to align the sails. Others subsequently utilised a chain wheel operating a rack and pinion to produce the necessary motion, the chain itself being winch or hand-operated.

On the same principle—a fixed body and rotating cap—came a further type of mill known as a *smock mill* (Fig. 3). The cross-section of the body has now become a six-, eight- or twelve-sided polygon and the material of construction, wood. Frequently, especially with the later smock mills, the wooden smock mill is mounted on a brick base, the brick and wood parts being separated by a staging or wooden gallery. Another gallery is sometimes added around the top of the tower (smock) just under the cap. The *tower mill* and the *smock mill* therefore, are similar in most respects, except that in the former case the body is constructed wholly of stone or brick and is usually circular in section. An octagonal section is most usual with smock mills with, of course the main or upper body of the mill being of wood. The wooden body of the post mill is invariably of rectangular section.

The fourth main type of mill is the *composite mill* where the body has the shape of a post mill, but is supported on a basement of brick, stone, or even

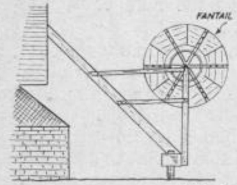


FIG. 5

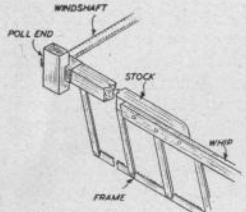


FIG. 7

Scale model of Suffolk Post Mill, powered with Minilec electric motor. This will be described in our next issue with step-by-step illustrations, and plans for both '0' and '00' gauge scale as a lineside model will be available.

wood, and the body revolves around this base in a similar manner to the cap of the tower or smock mill, i.e. on rollers, and not on a central post (Fig. 4). These mills are in the minority.

With these four main mill types in use it was left until the middle of the 18th century before the next major development. This was the method of turning the cap or a tower or smock mill automatically by fitting it with a small fan at right angles to the windshaft (Fig. 5). Should the windshaft of the mill be out of line with the wind direction there would be a sidewind against this fan, causing it to revolve. This motion was used to turn the cap as necessary to re-align the windshaft with the wind direction.

Most windmills subsequently adopted the "fantail", including the post mill, where the fantail was attached to the tail pole or on top of the entrance ladder.

The post mill also underwent another change at about this period. The trestle assembly was housed in with a circular brick or wooden-walled building and a conical roof extending to the post at the apex

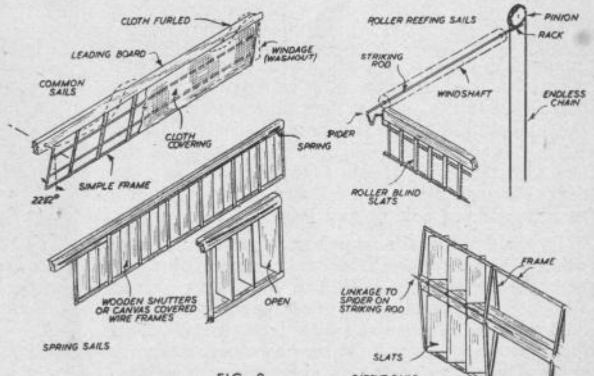


FIG. 8

(Fig. 6). This version is known as the post mill with roundhouse and fantail. It is, of course, merely a sub-type of the post mill.

The other general characteristics of windmills may be dealt with by describing the sails and the general method of gearing the windshaft to the millstones, etc., internally. Perhaps few modellers will attempt to reproduce internal working details, but since all mills follow very much the same system it is useful to appreciate their workings.

The sail is the name given to the whole of one of the revolving arms of a windmill, and consists of a *stock* or *middling* fastened to the windshaft. To the stock is usually bolted a lighter beam called the *whip* to extend the length of the sail and a framework is built up around this (Fig. 7). This framework carries simply a sailcloth of canvas which has to be furled and unfurled by hand from the ground (the sails being brought to a stop for this), known as a *common sail*, or wooden or canvas shutters which can be adjusted to the wind strength by means of a spring —*spring sails*—or automatically adjust themselves to the wind strength—*patent sails.*

The spring sail is made up of a number of wooden or canvas-covered wire frame shutters, hinged at one edge and connected to a common sail rod. A spring is attached to this rod and the tension arranged so that a certain wind pressure opens the shutters. Patent sails overcome some of the disadvantages of spring sails in that they can be adjusted with the sails rotating, and subsequently became the most popular type. As far as our modelling interest is concerned we can best summarise the main types diagrammatically (Fig. 8).

Most windmills have four sails, but this is by no means the absolute rule. Some have only two, whilst others have five, six or eight. There is one mill at Haverhill, Suffolk, which had a wheel replacing the normal sails, 50 ft. in diameter with 120 vanes each 5 ft. long and 1 ft. wide. Another mill had the sails mounted horizontally instead of vertically. One of this type was erected at Margate and later reproduced at Battersea.

The interior mechanism of all windmills follows very much the same pattern (Fig. 9). The windshaft mounted in the cap (or body, in the case of the post mill) is inclined downwards at an angle of between 8 deg. and 15 deg., so that the sails themselves rotate this amount out of the true vertical so as to get the full advantage of the wind, clear the body of the mill and also throw the weight back, checking any tendency for the sails to pull forward. The windshaft is usually made of oak, or cast iron.

To the front of the windshaft is attached a large wheel—the brakewheel. This, as its name implies, can be braked to stop the sails. This wheel then engages with a crown wheel called the wallower on the vertical mainshaft, from which the drive to the millstones themselves are taken off further gears known as great spurs. There may be one, two or more such spurs at different stages, depending on the number of millstones used, one pair on each floor.

The actual details of feeding and grinding the corn, beans, etc., are of some interest, and this part of the mechanism is detailed in Fig. 10. The grain is lifted to the top of the mill by suitable hoisting gear, usually deriving its power from a smaller wheel fitted at the rear end of the windshaft. In some mills, incidentally, this rear wheel drives its own pair of stones. Not all mills have this tail wheel.

The grain raised by the sack hoist is stored in bins, from whence it is fed into the hopper in the compartment or floor below. From the hopper the grain passes into the shoe (a trough), inclined at a small angle, but not sufficiently steep for the grain to run down it on its own. The angle of the shoe is regulated according to the type of grain to be ground. The shoe is pivoted at one end and then agitated or knocked from side to side by movement of the rotating damsel. This causes the grain to fall down the shoe into an iron cylinder or eye fitted in the upper or running millstone. The other stone, the bedstone, is fixed.

This method of feed allows the rate at which grain is fed to the stones to be governed by the speed of rotation of the stones, i.e. the speed of the shafting driven by the sails. Various refinements have been added, such as a bell alarm to warn of exhausted hoppers or a choked shoe (which have been a frequent cause of fire) and for automatic and semi-automatic adjustment of the space between the millstones. The latter is usually done with governors or "lift tenters" mounted on or driven off the stone spindle.

With all these various details in mind we can set about the construction of our models. The first of these to be described will be a typical post mill—a type much favoured in the Suffolk area.

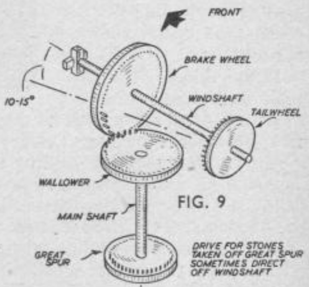


FIG. 9

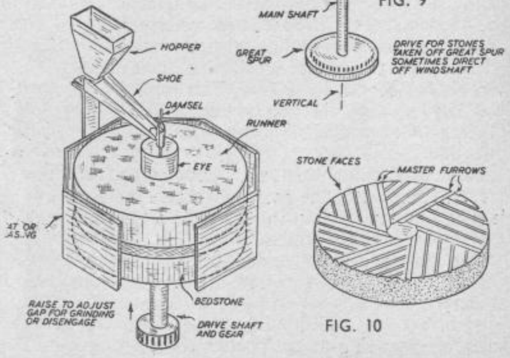
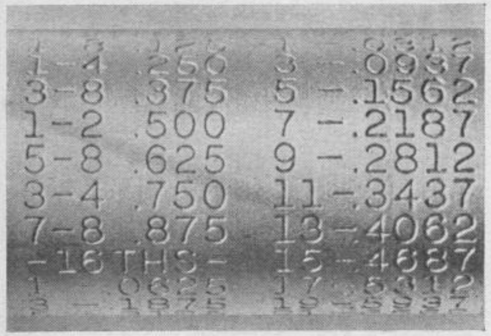
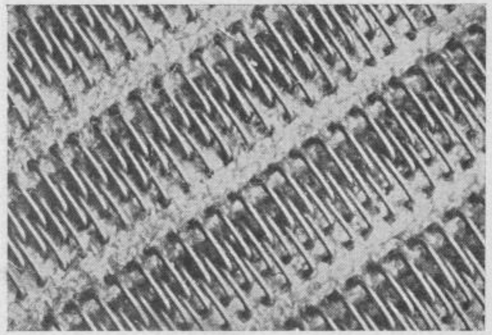


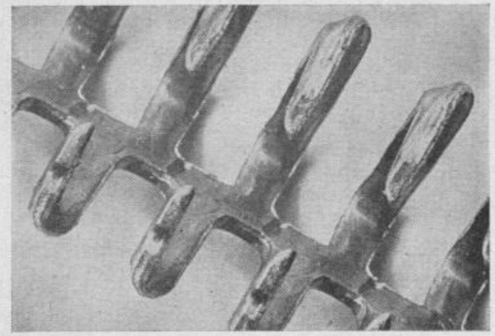
FIG. 10

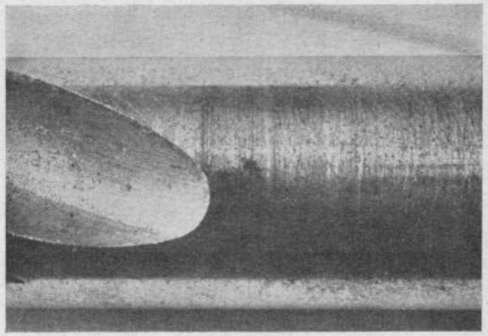
More Oddities

A FURTHER SELECTION OF ODDITIES TO TAX OUR READERS' INGENUITY. STARTING AT TOP RIGHT AND FOLLOWING CLOCKWISE IDENTIFY THESE COMMON WORKSHOP ARTICLES. SOLUTION PAGE 448.









BRIDGES

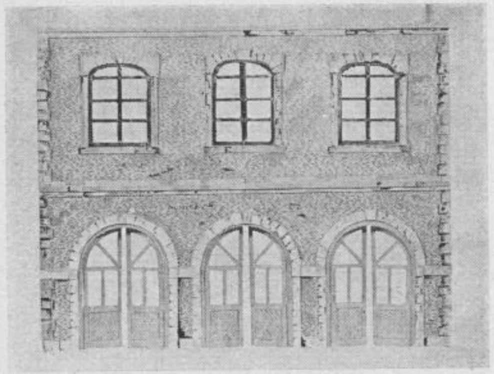
(*Continued from page 415*)

operated by power supplied from hydraulic accumulators working with a pressure of 850 lb. per sq. in. A similar bridge at Toledo, Ohio, is operated by four electric motors of 75 h.p. each. All bascule type bridges, incidentally, are direct descendents of the mediaeval drawbridge.

Of the lesser known types, there is the vertical lift bridge, where the whole horizontal bridge member is raised on towers to allow the passage of ships. Not many examples of these are to be found, but there are one or two in Holland. Just as rare, too, is the rolling bridge where the centre span is rolled back along the main roadway. One such example is to be found carrying the Brighton-Portsmouth railway across the River Arun at Ford, Sussex. The necessity for opening it seldom arises.

Finally there is the transporter bridge, again a comparative novelty and again only suited to handling light traffic. Here the main bridge member is built high enough to give adequate clearance whilst the "carrying" part of the bridge is itself transported on slings or cables from one side to the other and back again, somewhat akin to a floating bridge, but suspended in air.

One could, of course, also claim with some justification that the floating bridge is also a type of bridge. Used where there is only light traffic to be handled and the waterway must be kept relatively clear, floating bridges are quite economical. They are, however in the nature of ferry boats rather than bridges and their design more a job for the shipbuilder than the bridge engineer. The Woolwich ferry in London is one example, another at Southampton, and there is a similar well-loaded floating bridge-cum-ferry service operating in Amsterdam and handling considerable traffic at peak periods. To try to differentiate between when a floating bridge becomes a ship and not a bridge is a little difficult—especially as there is at least one fixed bridge which floats! This is across the River Derwent near Hobart, Tasmania, and is 3,160 ft. in length. The whole bridge is built up of a number of pontoon sections floating in the river, coupled to a vertical lift span at one end to allow the passage of vessels.



MAKING MODEL BUILDINGS

BY VICTOR SUTTON

THIS MONTH THE AUTHOR DISCUSSES BASIC STRUCTURES AND WINDOW TREATMENT

Illustrations portray the author's 1900 period Fire Station, in completed form on the left, and in two stages of construction on the right. In spite of cardboard walls, the basic wooden structure gives adequate strength. (Photos : Valerica Studios).

Materials Need Not Be Expensive

IN the making of model buildings one has such a wide field to cover. He may desire to make a scenic layout for his railway, he may, if inclined, make a model of a windmill, historic building, or a set of models of garages for his junior son to have and play with. It all depends on what you intend to do, but it will still be found interesting at all stages. I hope in later articles to explain the making of advertising models, panoramic models, full scenic models and exhibition ones.

Do not think that this building of models should cost you a lot. First of all, cardboard. Quite a bit of this can be saved from household cartons and small boxes can be collected. Bristol board and other pastel boards can be obtained at art shops. Photographic mounting boards can also be purchased in shops supplying photographic materials.

One needs a good stock of odd strip-wood, and I have found that a local builder will run you up some strip-wood from oddments of wood he has in hand for quite a nominal sum. I have made a model bungalow for a local building merchant before now to show the type of house he would be building. For this service I have a good supply of strip-wood. He also supplies me with odd blocks of wood which are very handy. You want to feel that you have plenty of wood for these jobs, and thus not stint the use of it.

One should also see the value of strips of cardboard. Even better in use than wood strip for outer ornamentation as I have shown in sketch No. 1. We can imagine this to be a buttress on a building, and then a doorway as one would find on an old building. The main part is wood block tacked to the cardboard framework. The edges of the door are then lined with half-round wood. This would continue up to the archway and this would then be finished in plastic wood which will shape well into the necessary curve.

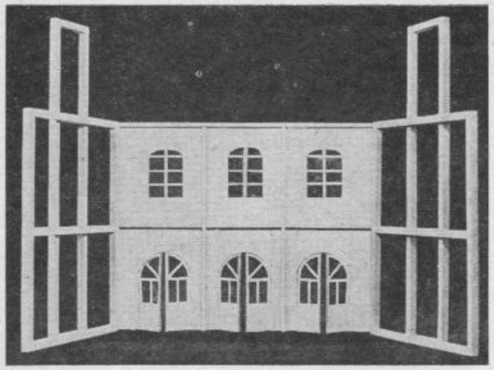
At the base of the buttress is fitted some cardboard $1\frac{1}{2}$ in. deep. Another layer is added on this $1\frac{3}{8}$ in. deep to give the ledge effect. If you want a heavier effect, then add several layers of thick card, and when firmly fixed sand down with fine sandpaper. If the corners are to be sharp, then score down at the bend. If rounded, then just bind round in the normal way. When turning into the corners marked "X" you may need to have this held with a pin until dry. Before fixing, mark in all the positions with a pencil because if you start to go crooked you will have to pull it all apart. You cannot straighten it afterwards as it will only bulge out.

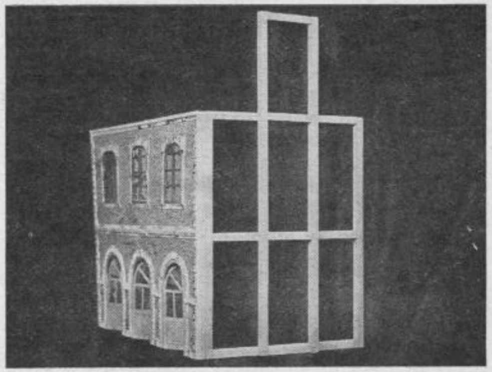
According to the building you have in hand, so you must adjust the various cardboard finishes. Probably another strip in $\frac{1}{4}$ in. will be needed before window level. Before starting a whole building I suggest that you might try out a small section similar to the one described. Give this a coat of thin grey flat paint or a thick coat of poster paint in grey or fawn. When finished you will be very surprised at what you have accomplished.

Getting that "Solid" Look

In making these buildings at all times see that every part is filled in, and I have shown this in sketch No. 2. Do not have any gaps where the structure members cross over, because if you do it means that the cardboard will flop in and give you a very unsightly inward bulge which will never make it look realistic. In fitting in small supports just make them large enough to hold firmly and not be forced in. The moment you force them the tension will throw the whole of the structure into a twisted mass which will not snap together when you want it to.

How often we see a wall in a model with no proper end. Sometimes the builder has just stuck a flat section on it to cover it up. Now see what a neater job can be made as shown in sketch No. 3. All this is done with a square of wood cut to slide over the wall section and fixed. On top we have a neatly sanded stone slab effect made from a flat piece of wood and





the rest is just done with the adding of some strips of cardboard to represent the usual stone effects. It does at least look like a completed wall.

In the making of a fairly large building I make up my wooden frame first. I draw this idea up on some graph paper because I can then see what it looks like. If the shape on paper suits me it does not always follow that the idea in framework effect will. Therefore, I tack this up lightly with a few tacks first. I often then alter it before I actually start to mount the cardboard.

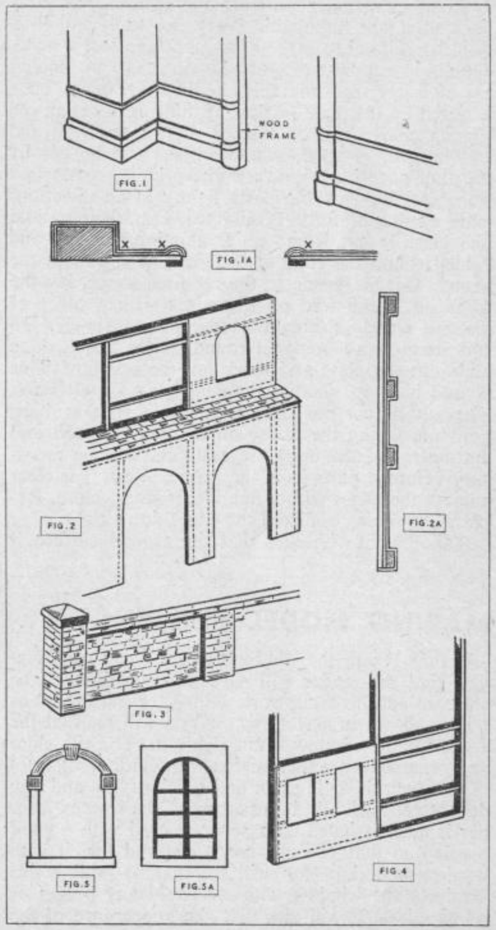
Do not think that all my precautions in this way are elaborate. They are not. This way I can take four sheets of card say 12 in. x 10 in., for example, place them on my framework and note that each edge will come on a beam as I must have somewhere to fix it. Having done this I can then start to draw, and paint my windows and doors. You will now see that I shall be working on the kitchen table in odd hours and in real comfort. I shall not be trying to paint on a flabby cardboard surface caused by the fact that I had tacked my sections on. The actual framework shown is a 1900 period fire station to be used with my old-time fire brigade. Wood used is $\frac{1}{2}$ in. x $\frac{1}{2}$ in. obechi.

In sketch No. 2 again I have shown another part of a building, this time the rear of the fire station mentioned above. Here you will see that I have dotted in additional struts against the doors. This means that the strain of fixing the doors with linen (my normal practice) is countered by these supports which I glue on and then strengthen with pins. No model will look well with a buckled door. Reinforce all doors with a little $\frac{1}{8}$ in. x $\frac{1}{8}$ in. stripwood assisted by some small pins.

Treatment of Windows

Few of us can paint round cardboard cut-out windows well, and I do suggest that readers will paint in all the edges of their windows before they ever fix them on. Therefore, in this case my fire station doors were painted before the window material was added,

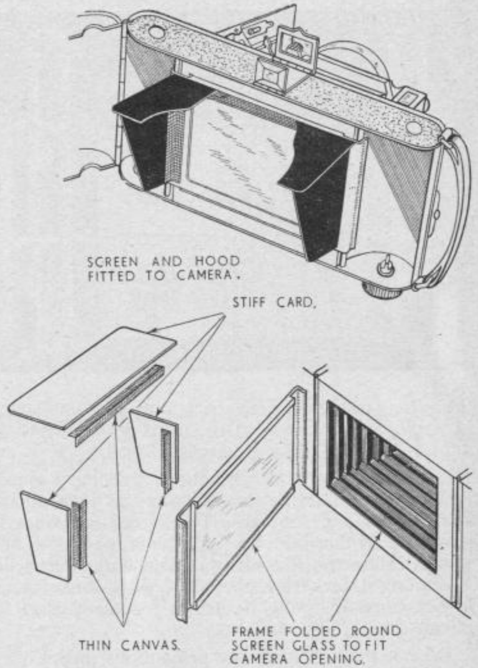
(*Continued on page* 422)



MAKING A HOODED CAMERA SCREEN

MANY who have folding cameras and who do not have a ground glass screen on which to compose a picture often envy those who have. Such a screen is very useful in photographing models especially when a supplementary lens is fitted to an ordinary snapshot camera to take close-up indoor pictures. To have such a screen made professionally is very expensive and a waste of money if the modeller can make one himself. The author had need of a ground screen and built the one shown in the sketches having found that to compose a clear picture in the small brilliant view-finder fitted to the camera was very difficult if not impossible. Very few tools and little skill is required to make a useful screen and a hood. Obtain first a piece of ground glass cut $\frac{1}{16}$ in. smaller on all sides than the aperture in the camera back covered by the plate or film. If difficult to get an old glass negative can be cleaned of old emulsion and cut to size. A good ground surface can be got by frosting one side with very fine grinding paste and kerosene oil. Rub the paste lightly in all directions until a soft matt finish is obtained. The frame to hold the glass is cut from $\frac{1}{32}$ in. aluminium sheet and folded round the edge of the glass as shown in the sketch. Cut the frame to the required shape, lay the glass on it and fold up the edges with a piece of smooth wood pushing the edge round slowly. Do not attempt to hammer it round. When this is done slide out the glass and mark out the aperture. This should be $\frac{1}{8}$ in. smaller than the glass on all sides. The author cut out the centre piece with a sharp penknife laying the frame on a piece of wood and cutting round the mark. Several cuts may be necessary before it parts from the frame. When it is clear smooth the edges with a fine file or emery cloth. Replace the screen and fold the edges down tight.

Take care to be sure that the ground surface is on the outside of the frame. If the measurements are correct the folded edges should pass inside the aperture and so bring the ground surface to the same position as is occupied by the film surface. When correct fold the ends round the film rollers just sufficient to hold the frame in place and to allow it being withdrawn easily. The hood is simple and is constructed from suitable card using canvas for hinges. The whole is stuck to the frame with "Bostick" cement. When finished the frame and hood is given a coat of dull black paint. Composition of pictures by this screen and hood is so vastly easier that it is well worth the time expended on making it.



MAKING MODEL BUILDINGS . . . .

(Continued from page 421)

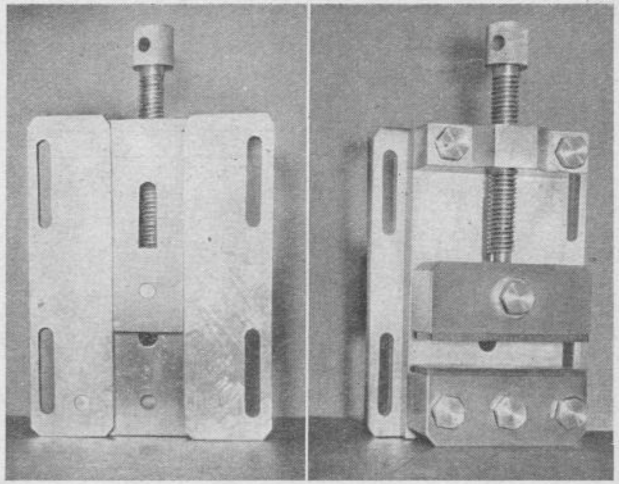
and thus I kept the windows clean. I can now suggest that the reader will save much patience if he starts to add his facia work with $\frac{1}{16}$ in. cardboard as I have shown in sketch No. 5. You will see that the space for the window is cut right out. The sill, sides and ornaments are then added with cardboard. I use "Dex" for this. It is clean and quick drying and you do not get unsightly blobs around. The window proper is then designed on a separate card with a good overlap so that you can cut it out and line it with window material. You will see that by adding this firmly to the window you will avoid any bulges or rough edges. It will also give the appearance of the sunken window which is in itself a great asset. If you want the window to appear deeper then add a beading of $\frac{1}{4}$ in. obechi all round. Here you have an ideal chance to use two-colour schemes for the windows because the dividing line is made for you with the relief effects. In sketch No. 5a you will see how the whole framework is made up looking at it in the side view.

There are hundreds of types of windows. Have a look along your High Street next time. Model making windows would not be boring, and a show of these at the next exhibition would shake the judges somewhat.

model maker IN THE WORKSHOP

A Small Machine Vise

BY J. A. MURRELL



A MACHINE vise is an important tool in the workshop, and after considering today's prices it was decided that mine would be "home-made".

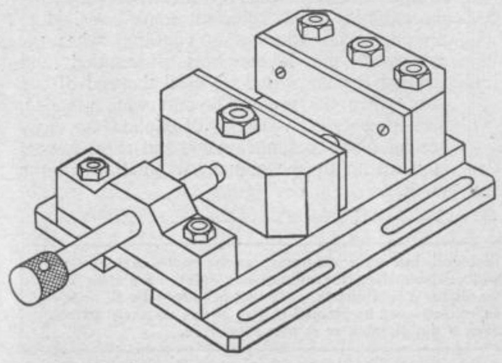
The material required for this job is as follows:

$5\frac{1}{2}$ in. x $1\frac{3}{4}$ in. x $\frac{1}{4}$ in. M.S.—2 pieces
$1\frac{1}{8}$ in. x 1 in. x $\frac{1}{4}$ in. M.S.—1 piece
$5\frac{1}{2}$ in. x 3 in. x $\frac{3}{4}$ in. M.S.—1 piece
3 in. x 1 in. x $\frac{1}{8}$ in. cast steel (jaws)—2 pieces
4 in. x $\frac{3}{4}$ in. dia. M.S.—1 piece
3 in. x $1\frac{1}{8}$ in. x $\frac{3}{4}$ in. M.S.—1 piece
3 in. x $1\frac{1}{4}$ in. x $1\frac{1}{8}$ in. M.S.—2 pieces

(As the $1\frac{1}{8}$ in. material for the jaws may be difficult to obtain, the jaws can be built up, as mine were, from $\frac{3}{4}$ in. x $\frac{3}{8}$ in. plate or any other combination you may have at hand.)

Base Plate.—Take the piece of $\frac{3}{8}$ in. plate, saw off $5\frac{1}{2}$ in. long, and file the ends square.

Scribe in the centre line and $1\frac{1}{2}$ in. from one end commence a slot $\frac{3}{8}$ in. wide, $2\frac{1}{4}$ in. long. The slot can be made by the usual drilling and filing process.



Feet.—Cut off the $\frac{1}{4}$ in. plate to size and file ends square. Take off two corners at 45 deg. as shown. Now scribe a line $\frac{3}{8}$ in. from the outside edge and mark out the $\frac{5}{16}$ in. slots as shown. Drill and file to shape.

Jaws.—Cut and file the jaws to shape 3 in. x $1\frac{1}{8}$ in. x $1\frac{1}{4}$ in., and cut off two corners at 45 deg. as shown. Drill the $\frac{3}{8}$ in. dia. holes, three in the fixed jaw and one centrally in the sliding jaw. Do not use a clearance drill as the bolts need to be a good fit.

The two pieces of cast steel can now be filed to shape and drilled and countersunk for $\frac{1}{8}$ in. Whit. screws. The serrations can be cut in with a small saw of three-square file.

Now drill and tap the jaws and screw the cast steel pieces into position.

End Plate.—This is a piece of mild steel 3 in. x $1\frac{1}{8}$ in. x $\frac{3}{4}$ in. Saw and file to shape as shown on drawing, making sure that the bottom edge is flat.

Mark out on the face the $\frac{1}{2}$ in. tapped hole, drill and tap $\frac{1}{2}$ in. Whitworth. Now drill the two $\frac{3}{8}$ in. bolt holes.

Assembly.—Firstly position the fixed jaw and mark through the centre hole on to the base plate, drill and tap $\frac{3}{8}$ in. B.S.F. Screw in bolt. Now drill the holes on either side $\frac{3}{8}$ in. dia.

Position the end plate and drill $\frac{3}{8}$ in. dia holes, through the base plate.

Next position the feet so as to give a 1 in. wide gap in the centre of the assembly. Mark the necessary holes two in each foot and drill and tap $\frac{3}{8}$ in. B.S.F. Fit the bolts and tighten hard home.

Sliding Nut.—This is just a piece of $1\frac{1}{4}$ in. x 1 in. x $\frac{1}{4}$ in. M.S. plate drilled and tapped centrally $\frac{3}{8}$ in. B.S.F. The nut slides in the gap between the feet.

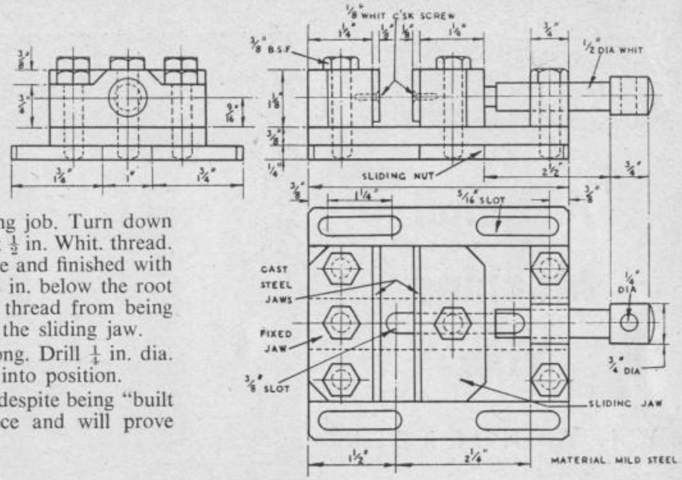
The sliding jaw can now be placed in position, the $\frac{3}{8}$ in. bolt passing through the base-plate slot and screwing into the sliding nut.

The bolt is adjusted until the jaw can just slide under a light pressure.

Screw.—This is a simple turning job. Turn down to $\frac{1}{2}$ in. dia. — $2\frac{1}{2}$ in. back and cut $\frac{1}{2}$ in. Whit. thread. The thread can be cut on the lathe and finished with a $\frac{1}{2}$ in. Whit. dia. Turn the first $\frac{1}{4}$ in. below the root dia. of the thread to prevent the thread from being bored over when in contact with the sliding jaw.

Part off to give a head $\frac{3}{4}$ in. long. Drill $\frac{1}{4}$ in. dia. hole for a tommy-bar. Fit screw into position.

The vise is now complete, and despite being "built up" has quite a good appearance and will prove very efficient in use.

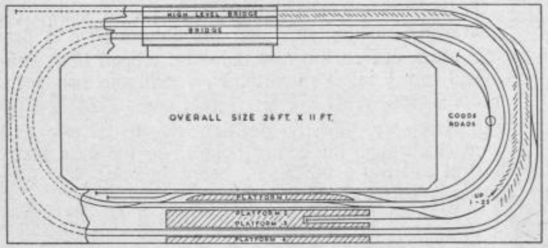


THE KESSEX RAILWAYS

(*Continued from page* 406)

Many layouts were designed for the roof space of my new residence, but in 1939 it was decided to lay an outdoor line once more, and build a 4 mm. layout in the roof. Before any of these schemes could be put into reality war was upon us, and for three years transport driving and fire service duty occupied all my time. In 1942 I joined the R.A.F. and took with me a number of books and magazine on model railways, and a quantity of drawing paper. Until my release in 1946 I spent much of my spare time drawing over a hundred plans, or variations of plans, for the indoor "00" line, which was to be a very extensive affair. When I returned to civilian life and decided to enter the retail model trade I found the cost of such a layout beyond me for at least some years, and all my time taken up making railways for other people.

I obtained at various times between 1946 and 1950 a quantity of "0" gauge track, wagons and coaches, and a dozen locos, all with electric motive power except one, which is a spirit-fired steam 2-6-0. The electric locos consist of three Pacifics, one 4-6-0, three 4-4-0's, one 0-4-4 T, one 2-4-2 T., one 4-4-2 T and three-coach diesel unit.

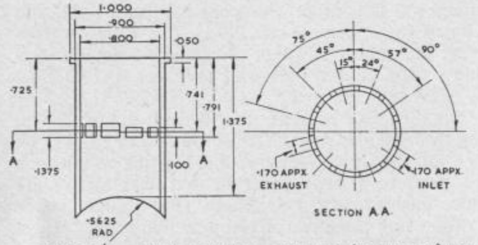


Some of the track and rolling stock was used on a layout built for a model engineering exhibition—some of the locos and stock are illustrated. This layout was unfortunately not completed due to lack of time when preparing the exhibition, but sufficient track was laid to provide a fair amount of running. After the exhibition the layout was dismantled and nothing further was done until the end of last year, when the present layouts were planned, and in the next issue I will explain the story behind these present layouts, and show how it is made to fit the actual surroundings of the models.

Constructing a 5 c.c. RACING ENGINE Pt. III

Continued from last month by

G. M. BARRY



PART No B5/7. CYLINDER LINER. CAST IRON (CENTRICAST) 1 OFF.

THIS component is made from cast iron. If you can do so, try and get some meehanite or centrifugally cast iron, as this is far more suitable for the job than the usual lamp-post variety. Apart from the filing out of the ports this needs some care; it is quite a straightforward job, and if the jig to be described is made and used, becomes positively simple. Though it is quite possible to locate and drill the holes for the ports in the actual liner, this does mean that each cylinder has to be made individually, and this can be rather a bind, should you need more than one cylinder liner. I think, therefore, that I am justified in describing the simple jig for drilling the holes and radiusing the end of the cylinder liner, as this does ensure accuracy, interchangeability and much more speed in making each liner.

The jig is made as follows. Obtain a piece of mild steel round bar, 1.125 in. or 1.1875 in. dia. and about $2\frac{1}{2}$ in. long. Chuck in 3-jaw, face end, and drill through from tailstock .3125 in. dia. Open out to .625 in. dia. or .750 in. dia., and then bore .900 in. dia. plus 5. (If you've already made a liner, bore jig till liner is just a nice push-fit. But I think it better to work to a fixed dimension, even in "one off" jobs, just in case you have to repeat.) Reverse jig tube in chuck and face off other end. Remove from chuck. Stand on end on surface plate and/or piece of plate glass, and with scribing block set at .725, scribe line around tube. Reset scriber at .741 in., and again scribe around tube. Place tube on V-block, set scribing block to centre of tube and scribe line along each side of tube.

There are several ways of drilling the holes in the jig—using either lathe or drilling machine, but I have only experience of two. The first method, using either lathe or drill, is as follows. Turn a two diameter stub mandrel from a piece of scrap material, about $\frac{1}{2}$ in. long and 1 in. dia. Chuck in 3-jaw and turn to .900 in. dia. plus 3 for .250 in. long. (This dia. should be a tight push fit in jig tube.) Reverse in chuck and turn other end to tight push fit in a 60T lathe changewheel. (This dia. will probably be around .625 in.) Press the changewheel on to the mandrel, then press mandrel into jig tube—in the end furthest away from the two scribed lines, making sure that the centre of a tooth on changewheel coincides as nearly as possible with the axially scribed lines on the jig tube. Clamp this assembly to a V-block and set it on topslide, so that axially scribed lines are at lathe centre height, and at 90 deg. to lathe axis. Set scribing block on lathe bed or on topslide or cross-slide, and adjust until scriber point is on centre line and so on centre of tooth. Mark this tooth and the one diametrically opposed to it, with chalk or grease pencil.

It is immaterial whether the exhaust or inlet holes are drilled first. However, we'll start with the exhaust. There are six ports, spaced at 30 deg. to each other. That is five teeth on changewheel. So it is necessary to turn the wheel through $17\frac{1}{2}$ teeth before drilling first hole. Loosen jig in V-block, turn wheel through 17 full teeth and reclamp. Advance assembly with cross-slide until lathe centre coincides with scribed line nearest face end of jig. Chuck a No. 16 drill (.177 in. dia.) in headstock chuck and using rack traverse or topslide, drill through one side of tube. Loosen tube in V-block and advance five teeth. Drill through again. Repeat until six holes are drilled. This completes exhaust port holes.

To do the inlet holes, loosen jig in V-block and turn until the second of the marked teeth coincides with scriber point. Advance cross-slide until scribed line farthest from free end of jig coincides with lathe centre.

Put No. 42 (.093 in. dia.) drill in chuck, and drill through one side of jig. Loosen clamp, and turn this five full teeth (which brings scriber point to a space between two teeth) and drill through. Loosen clamp, and turn through $5\frac{1}{2}$ teeth (which brings scriber point to a tooth tip) and drill again. Loosen clamp and turn back to marked tooth, and repeat in other direction. This gives five holes spaced at 33 deg. to each other. This completes the jig drilling.

Obviously the same set-up can be used in the drilling machine, when it becomes simpler and quicker. The second method uses the same change wheels and indexing, but the jig tube is held in the 3-jaw chuck, and the changewheel mounted on the end of the headstock spindle. A hand drill, or drilling spindle if you have one, is clamped to the topslide. So you can take your choice, or more probably—do it your own way!

Both methods are crude, but effective. Great accuracy of hole spacing is not essential, so a detent is not necessary and no special equipment is called for. There are two points to watch. One, do make sure that your setting up on scribed lines is reasonably accurate and true, and two, have as little as possible of the drills used projecting from the chuck, otherwise they will tend to wander, and the jig will be spoiled. Now chuck jig on 3-jaw, by end nearest to holes, and part off and face to 1.550 in. long. Reclamp in the V-block to topslide, and set up so that one of the axially scribed lines is at the top (180 deg. to lathe bed), the axis of the jig is at 90 deg. to lathe axis, and with the end just faced set in working position (to lathe centre) and set at centre height. Using a 1.125 in. dia. milling cutter in 3-jaw, or a flycutter set at .5625 in. radius in 4-jaw, or a boring tool set to this radius, radius end of jig to conform with cylinder liner drawing, i.e. until top of radius is 1.325 in. from other end of jig. This should have two flats, the thickness of the tube walls.

Remove jig from block, clean up, removing all burrs, etc., and preferably, case harden or harden right through. This is not essential. Jig is now completed.

Now the cylinder liner. I find it better and quicker to make several of these at once, rather than "one offs", and there is less waste. Obtain a piece of cast iron bar 1.125 in. dia. and 7.500 in. long (or longer). This will make about four liners. Chuck in 4-jaw leaving $7\frac{1}{4}$ in. out, and set to run fairly true. Centre drill from tailstock and bring up back centre for support. Rough down to 1.025 in. dia. to as near the chuck as possible, remove from chuck and saw into lengths of 1.725 to 1.750 in. keeping cut as square as possible. (Of course, these lengths may be nicked down in the lathe, using a narrow parting tool.) But I personally am one of those unfortunates who never seem to have any success with parting-off operations, and so I saw it! It saves a lot of wear and tear on my nerves!

Chuck a length in 3-jaw, face end, reverse in chuck and face off other end till piece is 1.656-5 in. long. Do the same to the other three pieces and retain last piece in chuck. Drill through .3125 in. dia., open out to .625 in. or .750 in. dia., or to the nearest size, less than .750 in., which you can drill. Repeat on other pieces, and again keep the last piece in chuck. Then, with boring tool on topslide, bore .799 in. dia. plus 1, using very fine feed for final cut and noting reading on cross-slide dial. Bore may be checked with a simple plug gauge—a 2 in. length of mild steel—turned to .798 in. dia. for 1 in. long and to .800 in. dia. for other length. When small end will just enter bore, take one more cut without altering cross-slide setting and if your previous cut has been light, you will just about be spot-on .199 in. dia. Remove from chuck and repeat on other pieces, using noted cross-slide setting (but it's as well to check before final cut—just in case).

Chuck a piece of brass bar .875 in. dia. by $2\frac{1}{2}$ in. long in 3-jaw, leaving 1.750 in. out. Turn to .800 in. dia., and then with very fine file, starting at tailstock end, produce a slight taper so that liner blanks are a nice push fit over their length. (Put a slight smear of oil on stub mandrel, or you may find it hard to get liners off!) Having made mandrel, put on a liner blank, turn to 1.00 in. dia. — 5 over whole length, and then turn to .900 in. dia. — 2 for length 1.606 in.

In other words, leave a 50-thou. shoulder on liner. Try for as fine a finish as possible. Remove from stub mandrel and repeat on other liner blanks. Put a blank in jig and file radius carefully. Being careful not to move in jig, hold in vice endways, and drill through exhaust and inlet holes, using hand drill. Repeat on other liners. Now stand liners on surface plate on flanged ends, and with holes as guide scribe two lines one above and one below exhaust ports .1375 in. apart and covering all holes. Scribe two more lines above and below inlet ports .100 in. apart, again covering all holes. Each pair of lines should, of course, be equidistant from hole centres. Now carefully file holes to rectangular shape as drawing, using scribed lines as guide, and leaving .05 in. to .062 in. between each port. All the liners may be done at this stage or not, depending on your own views on port sizes and timing. These quoted sizes give a normal opening of 65 deg. exhaust and 55 deg. inlet. Liner or liners may now be lapped to size, using an expanding lap, of aluminium, brass, copper or lead, and finishing with metal polish. So much has been written about this lapping process that I feel that anything I might say would merely be superfluous, and in any case, has been better said before. Lap liner until large end of plug gauge is a nice smooth fit in liner. This completes the cylinder liner.

(Part IV of this series will appear in the July issue.)

AN ELECTRIC MODEL CAR TRACK

by W. Boddy

WHILE the i.c.-engine car people have been perfecting their plans for circuit racing by means of rail tracks, Ivor Lewis of Oxford has taken out a provisional patent for a similar form of track, using electrically-driven racing cars.

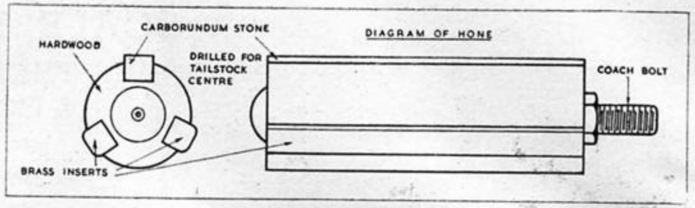
Lewis uses a single L-angle light alloy rail to guide each car, with brass strip for the return contact running alongside. His experimental layout is oblong, the two 20 ft. straights joined by sharp curves of 7 in. radius and two very short straights.

Current is fed from a mains-transformer via a rheostat speed controller. The cars at present in use are Woolworth's ex-clockwork racers containing Frog "Revmaster" electric motors driving the back wheels through reduction gearing. The side plates of the motors carry the gearing and axles. Steering is of the stub-axle type, two tiny ballraces mounted on the track rod engaging the flange of the guide rail and so steering the cars. To assist adhesion a ballast weight is carried in the nose of the car and the drive goes to one back wheel only, to give a differential effect.

The Woolworth's back wheels have been replaced

(Continued on page 432)

A Simple Honing Device



BUILDING a Stuart Turner No. 9 engine, and having bored the cylinder I found that it was not truly round, and not having any suitable material to hand to make a parallel lap, I resorted to the following arrangement for honing.

An ordinary coach bolt of suitable length and diameter was put through a piece of hardwood twice the length of the bore to be honed, and the nut screwed up tightly. The threaded end of the bolt was put in the three-jaw chuck, and the head of the bolt was centered using a slocombe centre drill in the tailstock chuck. The hone was not removed from the chuck till the job was completed. The next step was to turn the hardwood to about $\frac{1}{8}$ in. less than the cylinder bore. It was then divided into three equal parts, and three $\frac{1}{4}$ in. slots cut along the axis to a depth of $\frac{7}{32}$ in.

The slots were cut by using a parting tool on its side in the toolpost and racking the saddle back and forth. The work was not turned to get the correct width but the tool was packed up from just below centre height for the first full cut to just above centre height for the last, the resultant slot being square.

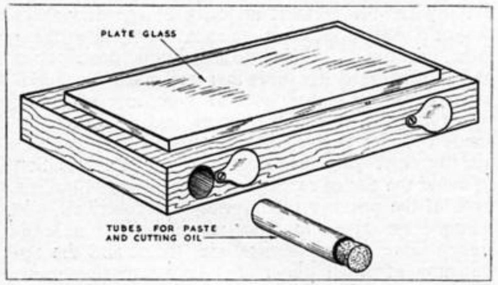
When the three slots had been cut, two pieces of $\frac{1}{4}$ in. square brass the full length of the wood were put in the vice and two of the corners in the same plane were rounded off, then pressed into two of the slots, and a $\frac{1}{4}$ in. square fine carborundum stone pressed into the third. The tailstock was pushed back and the cylinder was slipped over the extended barrel, and the tailstock centre was brought up to engage with the centre hole in the bolt head. A firm hold was taken of the cylinder and the lathe turned slowly by hand until the hone had entered the bore about $\frac{1}{4}$ in. The lathe was then switched on and the cylinder fed forward. Once it had passed over the length of the stone the pull of the abrasive action diminished, and the process was continued with a reciprocating action till no more abrasion seemed to be taking place, when the work was removed for examination.

This showed a marked improvement, but still not quite up to requirements, so a cigarette paper was cut into $\frac{1}{4}$in. strips and one piece was placed under each brass piece and the stone, then the above honing procedure repeated.

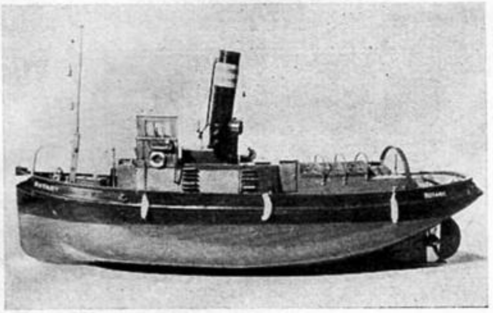
This seemed to bring the bore to the standard required, so it was washed free of all abrasive, and when the piston was made and entered into the bore no tight spots could be felt, and when one end of the cylinder was covered and the piston pulled smartly out it left the bore with a loud "pop".

This method may seem unorthodox and rather primitive, but it certainly gave me a really highly polished bore, and as far as I can tell with the instruments at my disposal, dead true.

Glass Sharpening Block



IT is not generally known, but an extremely keen edge can be given to small woodworking tools or tools for leatherwork and model making by finally finishing the edge on a glass block. The sketch shows such a block mounted as an ordinary oilstone. Very fine polishing powder mixed with kerosene is used as a cutting paste. For portability the powder and liquid is kept in corked tubes housed in the holes drilled in the base and fitted with swing covers. This allows the sharpening block to be carried about say to a club meeting or a friend's workshop, should it be needed. The base can be hardwood and the glass block $\frac{1}{4}$ in. or $\frac{3}{8}$ in. ground glass sheet cut to a suitable size, say, 7 in. x 2 in. The glass should be sunk half its thickness into the base. A touch of Durofix on sides and bottom will secure it. The tubes can be of metal, or glass test tubes will do. The holes bored in the base should be slightly larger in diameter to allow easy extraction. Covers can be made from thin brass sheet and fitted to the base with small round head wood screws. An advantage of this sharpening block is that being glass it can be wiped clean and dry, unlike the ordinary oilstone which once used contains oil and sludge in the surface no matter how well it is wiped. A cover should be fitted to protect the block from damage when not in use.



SCALE MODEL SHIPS

THEIR ENGINES & CONSTRUCTION

Bernard Reeve and P. W. Thomas
(Sidgwick & Jackson Ltd., 20/-).

G. H. DEASON REVIEWS THIS NOTABLE CONTRIBUTION TO THE MODELLERS' LIBRARY

Working model of the Tug "Rotary" built by an amateur of average ability with simple tools, as described and illustrated in "Scale Model Ships". (Photo by courtesy of the publishers).

SOME hobby books are factual and informative; others are pleasantly written and produced, and are in consequence a pleasure to read. When one volume combines these virtues, it becomes a well-thumbed favourite, worth a permanent place on the amateur craftsman's bookshelf, from which it is generally missing! Such a book is *Scale Model Ships* in the pages of which Bernard Reeve, M.S.N.R., well known to the readers of *Model Maker*, and P. W. Thomas, Assoc. I.E.E., lead the beginner in ship modelling through all the stages of producing a series of varied ships in miniature.

A few words of wisdom appear in the foreword, which might well find a place in every book on model making. "Patience and tenacity of purpose should be the watchwords, patience to carry out a tedious process which may mean so much to the ultimate result; tenacity of purpose never to know when you are beaten. You will have your setbacks and your failures, but both can be overcome by just a little more patience, just a little more skill, and just a little more care." This brief homily sets the tone.

The opening chapter deals with tools and equipment, and whilst it avoids the mistake of launching the novice with an optimistically inadequate kit, the bare minimum is clearly described for the benefit of those not too well supplied with cash, at the same time indicating those additional tools which are well worth a little sacrifice to possess. Such useful pieces of equipment as the authors' building board, cutting board and small mitre block are described for home construction, and information is given on the selection and source of supply of various materials.

Separate chapters deal with hull design and construction, and in the latter practically every known method of building a hull is described in detail, with notes on the suitability of each to various types and sizes of model craft. The constructional section covers cardboard and paper, carving from the solid timber, horizontal and vertical "bread-and-butter", small metal one-piece hulls and the more elaborate and realistic built-up hulls, of both hard chine and rib-and-plank.

A chapter is devoted to finishing, and here again the subject is dealt with very thoroughly, leaving the veriest beginner in no doubt at all as to the materials to use, where to obtain them, and how to use them to the best advantage.

Having covered the subject in general the authors get down to cases, and the construction of a variety of models in detail. First comes a section on cabin cruisers, a Broads type cabin boat *Ring of Light*, a twin-screw cruiser *Suzanne* by J. Samuel White & Co., of East Cowes, and one of Wm. Osborne & Co.'s fine *Eagle* class boats. The two first named are hard chine craft, *Gwen Eagle* having a round section hull. Step by step instructions for building *Ring of Light* by the rib and plank method follow.

Further chapters deal in detail with historical vessels, the exploration ship *Nimrod*, and the Trinity House vessel *Patricia* being selected for treatment, followed by commercial craft in the shape of two tugs, a deep sea trawler, the B.R. cross-channel steamer *Falaise*, and the cargo ship *Port Brisbane*, flagship of the Ports Line Ltd.

A final and extensive section of the book is devoted to power plants for model ships, and the writers have made an excellent job of it. Realising that by far the greatest majority of model makers do not possess a lathe, or at anyrate a metal working lathe, capable of working to fine limits, descriptions and dimensioned line drawings are given for building an electric motor, several types of oscillating steam engines, a simple turbine and a slide valve single cylinder engine, all with hand tools, and frequently employing ingenious methods of fabrication to avoid the use of castings. Various types of boilers, both of the pot and tube variety are described, and sections are given to flash steam boilers, a semi-rotary valve engine for use with them, and the application of small diesel engines for marine work.

The newest development in model ship operation, radio control, is not dealt with, but the authors may well be excused for this omission in a book which deals so exhaustively with so many other phases of the hobby! With 284 pages, including 119 line drawings and plates, *Scale Model Ships* represents first class value at £1 in these hard times, and should prove a constant companion to followers of this oldest and most fascinating model craft.

MODEL MAKER CHALLENGE CUP FOR MINIATURE RAILWAY LAYOUTS

We illustrate on these pages the two Twenty-five Guinea Trophies offered to our readers for Model Railway Layouts and to encourage the less experienced Model Yachting Skipper.

Particulars of Entries

1. Individual or group (club) entries eligible, either amateur or professional modellers.
2. All gauges up to and including 0 Gauge may be entered.
3. Superficial area of layout that may be entered is as follows:—

000	25 sq. ft.
00	50 sq. ft.
0	100 sq. ft.

Where layouts exceed this size a continuous area not greater than specified may be selected by the entrant and will be judged without consideration of that part not entered.

4. Each entry must comprise three items:—
   (i) Plan of layout showing track, lineside features, gradients and railway buildings, stating loft, basement, club premises or other general location.
   (ii) Photograph of layout in operation, or part thereof.
   (iii) Description not exceeding 500 words of purpose, objects, running and general operation of layout.

Scope of Award

5. The *Model Maker* Challenge Cup will be held for one year by winner and an annual cash award of Five Guineas will accompany it.
6. Winner will be the entrant of the layout that, in the opinion of the judges, represents the most outstanding model railway conception with regard to realism in construction, true railway practice in layout and operation, ingenious approach to problems of site, and skill in fabrication.

Latest Date for Submitting Entries

7. Entries will be accepted up to the last post on December 31st, 1951.

Conditions

8. No restrictive conditions—no entry fee.
9. The Judges' decision is final and legally binding.
10. *Model Maker* reserves the right to publish all or any of entry particulars submitted on payment of their usual fees.

Method of Judging

11. All entries will be considered by a panel consisting of one member of standing in the Model Railway Movement, one member of *Model Maker* staff, and a practising railway traffic expert (we trust that British Railways will co-operate in this matter).
12. A final selection of three "probables" will be personally inspected by at least two of the judging panel who will report back to the panel for the selection of the winner.

Presentation of the Award

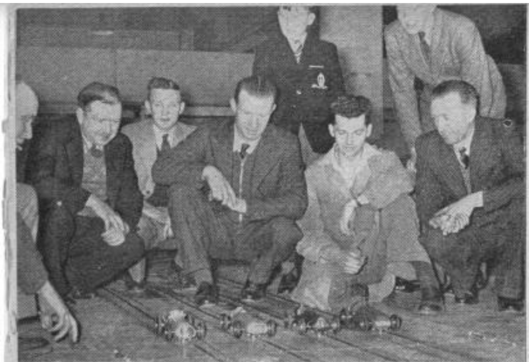
A suitable public occasion will be taken for the presentation of the year's award, details of which will be announced nearer the closing date of the contest.

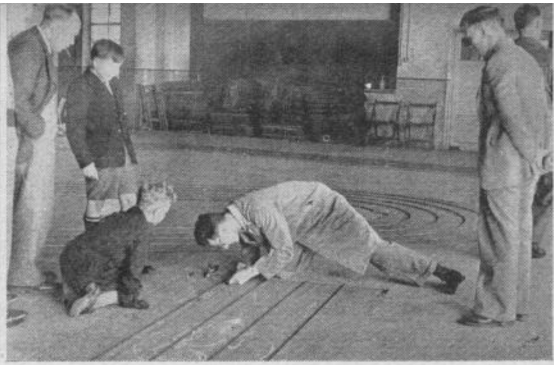
MODEL MAKER CHALLENGE CUP FOR NOVICE MODEL YACHT SKIPPERS

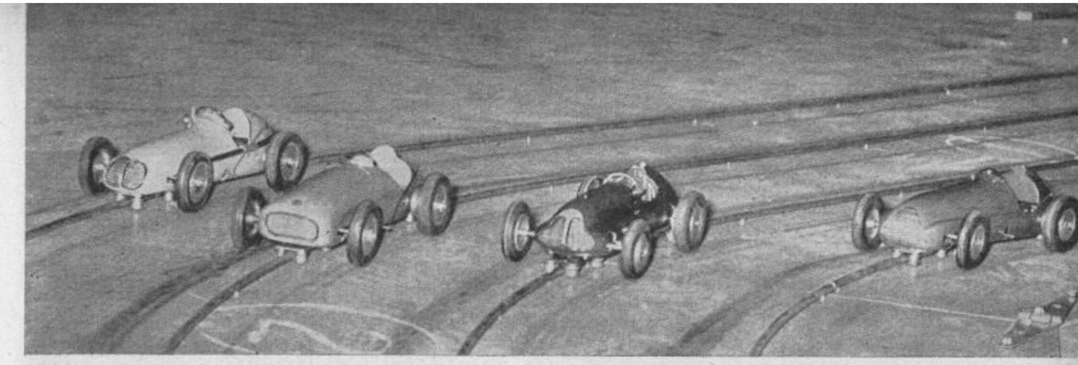
WE have been in touch with Mr. Seabrooke, Hon. Secretary of the Model Yachting Association, with regard to the presentation of the *Model Maker* Challenge Trophy. As sailing enthusiasts will doubtless be aware it is the policy of the M.Y.A. to restrict its own awards to the recognised National Events, clubs in their turn awarding trophies to their own members, or organising open events of less than National Championship status. For that reason any trophy that we may award must be presented directly by ourselves without becoming the responsibility of the M.Y.A.

We have suggested that our award of the Cup for one year, plus a cash prize of Five Guineas, should be made to the novice skipper, that is first or second year man, putting up the best performance in the six National Events. For the purpose of the contest all classes count as of equal merit. As most skippers confine their activities to one class of yacht it would be possible to have a tie—in which event the *junior*—or less experienced skipper would take precedence: or, if of equal seniority, it might be fairest to divide.

This suggestion has been put up to the Council of the M.Y.A. who will, we trust, favourably consider the matter at their June meeting.







ROAD RACING CIRCUIT

G. H. DEASON ATTENDS A PRIVATE SESSION OF THE METEOR CLUB'S

BRIGHT and early on Sunday, April 22nd, keen Meteorites were to be seen converging on the canteen at Messrs. Rists Cables Ltd., at Newcastle-under-Lyme, their purpose being to see the fruits of their months of devoted toil, the extent of which is described by F. G. Buck elsewhere in this issue. In other words they were going to have a trial bash on the new rail track. *Model Maker* was there bright and early too, but was beaten to it by H. C. Baigent and G. V. Walshaw, who had left Bournemouth at some grisly hour to cover the 190 miles by 9.30 a.m.!

The work of track assembly, whilst not precisely a matter of moments, was carried out with considerable despatch, and apart from the fact that a starting device had to be fitted, could have occupied less than half an hour, so well do the sections go together. The 200 ft. of "road", sinuous though they are, occupy a quite imposing floor area in the building that many enthusiasts will know as the site of the Meteor Club Open Day meetings.

Four rails are used, and four very trim cars were there and waiting to use them; a B.R.M., a 4 C.L.T. Maserati, an Alfa 158 and an E-Type E.R.A. The latter, however, was something of an interloper, being Gerry Buck's 2.5 c.c. job, which deputised for Harry Howlett's Ferrari, the owner of which was prevented by illness from appearing till late in the day. The cars were new, and their owners had everything to learn about handling them in this hitherto unexplored element, so a goodly part of the morning was devoted to finding the correct settings and practising the art of putting them on the rail at the starting point without "losing the motor".

First car away was the Maserati, evidently running under a Belgian licence and painted yellow. Its departure was somewhat premature, the starting trigger working "off" whilst it waited for its fellows on the line. It was allowed to proceed, amid cheers, however, and was so much encouraged thereby that throughout the rest of the day none of the other 1.5 c.c.'s could catch it!

Apart from this lapse the starting device worked excellently, and as owners became more expert in handling their cars, really impressive massed starts were made. The all-metal clutches performed faultlessly, and it was almost uncanny to see one or more cars waiting on the line for a recalcitrant starter, their engines buzzing merrily in the authentic haze of smoke, and entirely unattended by their owners for half a minute at a time! Then, when the last car was in position, the starter pulled back the "chocks" from the track side and the entire field moved off smoothly and realistically, accelerating hard to the first left hand bend.

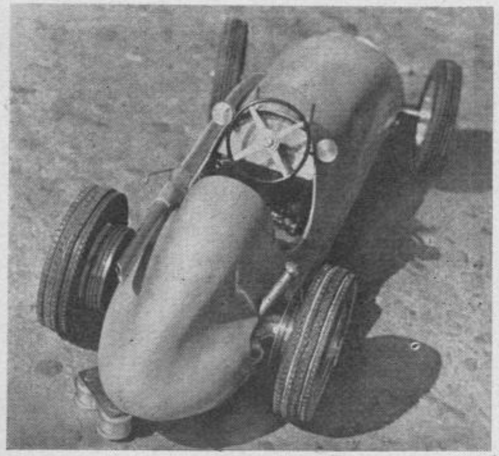
Tests were carried out to determine approximate lap speeds and fuel range. The average lap time of the fastest 1.5 c.c. car was around nine seconds, or about 17 m.p.h. which looks, and is, a great deal quicker than it sounds, bearing in mind that the course includes six corners, one of them a 3 ft. radius hairpin. On the other hand the 2.5 c.c. E.R.A. was considerably quicker, and although spectacular to a degree, looked quite ridiculously fast on the corners.

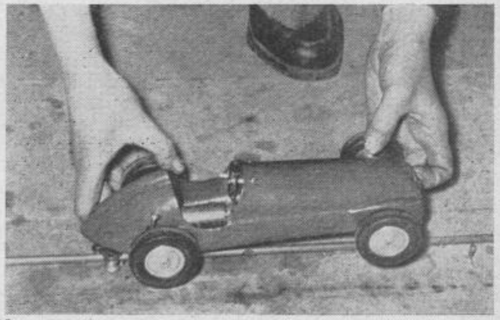
On the straights the cars behaved well, going down with just that degree of diminishing tail swing which lends colour to the road racing theme. Cornering was 100 per cent perfect, and no untoward incidents occurred, if one discounts the temporary lapse which late in the day led to two cars being found to be running on the same rail!

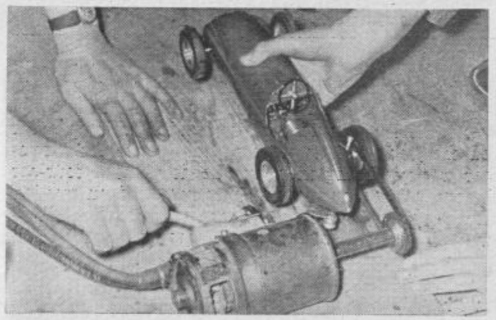
The starting device is extremely simple, consisting of flat steel strips passing under the track, from which four stops pass up through slots adjoining the guide rails, to bear against the off front guide pulley of each car. Thus the strip has only to be pulled sideways about $\frac{3}{4}$ in. to release the field, an arrangement which seems far superior to any form of visible starting gate, which is too reminiscent of the world of quadrupeds to have a place in car racing. Stop-

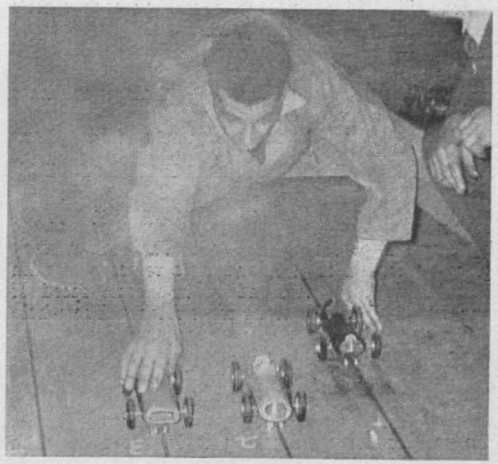
(Above) The Meteor Club grouped round the starting line, with H. C. Baigent about to operate the lever, and (Right) Gerry Buck puts in some last-minute work on the starting gear. (Below left) Note the detail incorporated in the cars. This Maserati carries steering wheel, instrument board, mirrors and exhaust system, and really looks the part. (Below Right) Placing a car on the rail. The notch for this purpose can be seen just below the steering wheel.

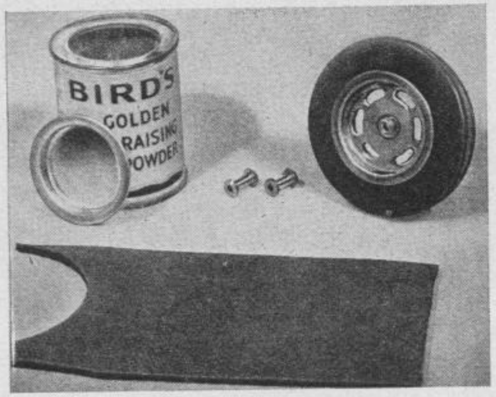
(Above) The four competing cars, Maserati, B.R.M., E.R.A. and Alfa-Romeo at the first bend from the start. The close spacing will be seen, just sufficient to allow the swinging tails to clear on the corners. (Below Left) Simple method of starting the engines, using leather belt over the pulley-brake-drum. (Below Right) "Enter The Demon King!" Gerry Buck, partially obscured by a haze of exhaust smoke, brings up the runners to the starting grid.







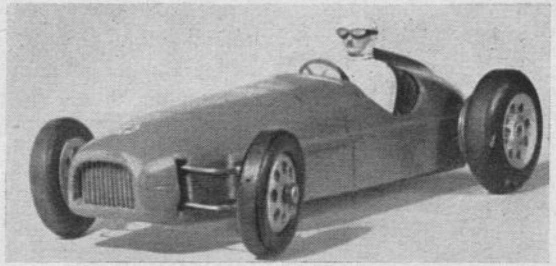




MAINLY FOR THE BEGINNER

by ''JUVAUTO''

(Opposite page) The homely components required to construct the wheel as shown, and (right) this neat plastic driver adds considerably to the realism of a racing model.



THE youngster, when he tackles the construction of a working model car, or any other mechanical model for that matter, usually finds that he is obliged to buy a certain number of parts which lack of skill and equipment prevent him from making for himself. Nine times out of ten he already possesses the motive power, an old diesel aero engine of modest capacity, or an electric motor perhaps, and probably this has been the real inspiration of the new model. There still remain a number of essential purchases, however, and these have a way of adding up to a total which completely upsets the balance of the average adolescent budget!

Assuming that he wishes to build himself a model racing car, which will work successfully and give him some round the pole running in the backyard or on the floor of the local Scouts' hut, his demands as to speed are extremely modest, and if the model has seen its best days in twelve months' time, what matter? He will have progressed to something more powerful and ambitious by then!

Chief among these items which spring to mind are gears and wheels. Gears of the type and specification demanded by the serious model car builder, often required to transmit upwards of 1 b.h.p. or even more, are precision products with prices to match, and a pair of bevels in nickel chrome steel can cost more than our youthful enthusiast's complete engine cost when new.

What alternative has he? In the first place his engine power output is probably quite puny and his skill in adjusting bevel gears is likely to be slight. In fact, it seems reasonable to suggest that he doesn't need steel gears at all, but can make do with the softer metals, which are easier to cut and therefore cheaper. The expectation of life of the complete job isn't all that lengthy, so less costly gears should live as long as the car! Mitre bevels are cheaper than ratio bevels, but a one-to-one ratio is rarely in keeping with the needs of the job, and something nearer two, or even three to one is more likely to give a satisfactory performance.

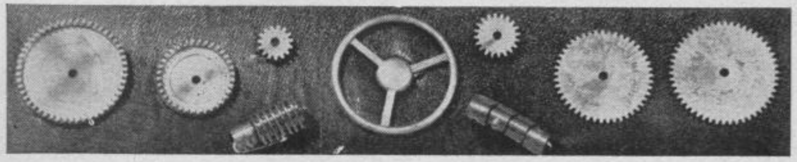
With this in mind I recently inspected with some interest the range of gears sold for builders of mechanical models by Juneero Ltd. A complete kit of assorted gears is packaged by this firm, priced at 8/-, containing spur gears of 50 and 45 teeth, 15 and 20 tooth pinions, 35 to 50 tooth contrate gears, and a $\frac{1}{2}$ in. dia. worm gear. Added to this assortment is a Juneero $1\frac{1}{2}$ in. dia. steering wheel. The worm gear is in brass, while the others are of an alloy of a type apparently akin to Masek. It is not suggested that these gears would be at all suitable for high duty work, but I have carried out a number of tests with pinion and contrate wheels, and found them soundly and accurately constructed and capable of transmitting quite reasonable power for a long period, if properly lubricated. This led me to feel that our junior constructor of moderate means might well do worse than try out the humble contrate gear if his purse won't run to bevels. They are easy to mesh, and are obtainable separately from Juneero dealers. Certainly where electric motor drive is used they should prove ideal, and a further application would be in the construction of working steering gear, etc. One drawback which arises is the very small diameter shafts they are bored to fit. The bosses are of reasonable size, however, and there should be no objection to drilling them oversize, and securing to their shafts by pinning.

Now as to wheels. There are some excellent and modestly priced wheels available, some of which have recently been described in *Model Maker*. Since even a few additional shillings may be a stumbling block, however, I recently experimented in this direction and produced a set of quite practical wheels from odds and ends, as follows. The press-in lids of Bird's Golden Raising Powder were salvaged from the household larder; the 6d. size have an overall diameter of $1\frac{7}{8}$ in. The centres of the lids were found, and punch-marked, radii scribed at 60 deg., and two concentric circles also scribed at $\frac{1}{2}$ in. and $\frac{5}{8}$ in. radii. A set of brass screwed bushes having a bore of $\frac{1}{8}$ in. were bought for a few pence from a radio shop, and the centres of the eight drilled out to take the bushes. Tyres were the next step, and for these I used an old sheet of $\frac{3}{16}$ in. rubber which had once graced a car running board. Alternatively, shoe soling material would make a good substitute. For each wheel I cut three rings of rubber, 3 in. in overall diameter, and having a centre hole a tight fit on the push-in portion of the lids.

A large flat washer is assembled on the screwed bush, which is then pushed through one lid. The three rings are assembled with a layer of Bostick between each and clamped by the other lid. The wheel is then completed by another flat washer and the nut of the bush screwed up tightly. To improve the general appearance, six kidney-shaped slots were drilled and filed out within the limits of the concentric circles previously scribed, and the result is a thoroughly practical wheel, similar to the Elektron racing wheels used on many modern 500 racers. Two other schemes suggest themselves. The rubber discs might be spaced apart by card or ply discs of about $\frac{1}{16}$ in. smaller diameter, thus giving the effect of a ribbed tread; and instead of the "cooling" slots, triangular tin webs could be soldered to the outer discs from rim to hub to represent the type of wheel fitted to the popular Cooper racers.

One final item: C. W. Luttman of the Model Shop, Ridley Place, Newcastle-on-Tyne, sent me two samples of his standard c/1 team racing pilots, suitably tricked out in racing garb, and one of these is shown on this page, gracing the cockpit of a Mills engined B.R.M. from the Editorial stable. I think you'll agree that he *does* improve the picture and the prices are modest, 2/5 for $1\frac{5}{16}$ in. shoulder width, and 3/0½ for $1\frac{3}{4}$ in. width, inclusive of tax. The figures are in plastic, and are supplied unpainted.

The kit of Juneero gears, with steering wheel and collars, will be found to have many uses in building mechanical models of various types, and can provide a wide range of ratios.



ROAD RACING TRY-OUT

(Continued from overleaf)

ping is carried out by means of the usual knock-off fuel taps, which gave no trouble.

The cars themselves were all fitted with Baigent diesel engines of the long stroke type, and starting, by means of a short loose belt from electric starter motor to one rear wheel was simplicity itself.

During the break for lunch an informal meeting was held to attempt to formulate a set of simple rules which would enable other clubs to work to a standard which will allow satisfactory racing on each other's circuits. The principal points were decided as follows:—

Track

(1) Rail to be standardised at $\frac{5}{16}$ in. diameter, either circular section tube or rod.

(2) Rails to be spaced at a minimum of 8 in. apart.

(3) Curves to have minimum radius of 3 ft. on inside rail.

(4) Rail spacers to allow 0.150 in. plus or minus 0.01 in. from running surface to underside of rail.

Cars

Cars *must* resemble a known prototype.

Wheel diameters must not exceed 2.75 in.

For the time being one class only will be recognised, for cars propelled by i.c. engines with a cubic capacity not exceeding 1.5 c.c. There is a possibility, however, of one or more smaller classes being recognised later.

Congratulations are certainly due to H. C. Baigent for his pioneer work on this scheme and to F. G. Buck and his associates for their hard work and enterprise in bringing the Meteor Club's road racing venture to practical reality.

AN ELECTRIC MODEL CAR TRACK

(Continued from page 426)

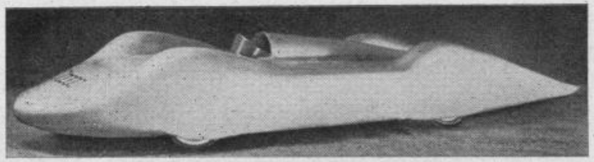
by new ones carrying $1\frac{3}{4}$ in. dia. rubber tyres, and the back axle is geared down 7 to 1. The present track gives a total run of 41 ft. and the cars get away with spinning driving wheel and attain a scale speed of approx. 65-70 m.p.h. along the straights. The whole point of the layout is that unless one cuts in time for the corners the cars leave the track in a most realistic manner, and if they do not they can still lose appreciable speed as the tail swings out and the contact of springy brass leaves the contact strip. At the corners the contact strip is increased in width so that slight tail slides do not cause loss of contact.

Any sort of bend and curve can be laid out and very real skill would then be needed to keep a car on the track and not lose speed. At present a two-car track is being tried but Lewis plans a four-car layout, carried on wooden base mounted on trestles. He is confident that his somewhat modified "Rev-master" motors would run for 24 hours if called upon to do so; they will operate from a $4\frac{1}{2}$ volt dry battery, but this brings the speed of the cars down to 35-40 m.p.h.

An Amazing Auto-Union

AN EIGHT-CYLINDER GERMAN MODEL CAR PUBLISHED BY COURTESY OF MECHANIKUS

TRANSLATION BY H. PFEIL



THE number of people who are prepared to tackle the job of building a model car on truly big car lines is few and far between. The generally accepted model racing car is a drastically simplified affair of a functional chassis, with the engine connected to the driving wheels by the most convenient method that presents itself, and any resemblance to its full-sized counterpart being limited to its externally visible shape and details. This state of affairs has been brought about largely by the fetish that has been made of speed, and the be-all and end-all of a large percentage of models constructed in the last few years is the achievement of the maximum performance within the arbitrary limits of capacity classes, thus drifting far from the original path on which it was visualised that the hobby of model car building would progress.

Happily there exists an active and growing faction whose aims are still in line with the original ideals, although few of them can hope to go so far as the builder of the model about to be described.

We mentioned in our last issue the activities of the Modell-Motoren Club of Stuttgart, and referred to a notable model shown in the group picture in the feature referring to this active body. The model in question was a finely proportioned replica of the very special streamlined Auto-Union which was prepared for record work before the war, and driven by the late Bernot Rosemeyer. Externally this model might well be just another example of the streamlined shell enclosing a conventional "model race car", but a closer examination proves it to be very much otherwise.

Its builder, Wilhelm Jäger, of Gomaringen, in Southern Germany, is a model maker of considerable experience, and the Auto Union is the result of many months of painstaking work.

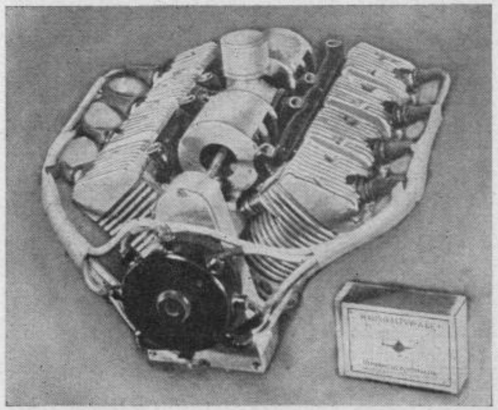
The original car had a 12-cylinder engine of V-formation, but the tackling of this project proved too much even for Herr Jäger, so he compromised by adhering to the V-formation, but limiting the number of cylinders to eight, and substituting side valves for the original o.h. camshafts. The engine is, in fact, modelled very much on the Ford V.8, and has its banks of cylinders at 90 deg. Being untrammelled by a maximum capacity, he chose a displacement of 7.5 c.c. per cylinder, giving a formidable total of 60 c.c. in a unit of comparatively compact design.

Before proceeding further, it should be said that there was no attempt to produce an engine of ultra-high output, and the builder quotes the power developed at the conservative figure of one horsepower at 3,000 r.p.m., which compares unfavourably with that of a modern 10 c.c. single cylinder racing two-stroke. This was a matter of secondary consideration, however, to the production of a model of authentic layout.

The cylinders are air-cooled by means of a blower, and have separately detachable heads of light alloy. Lubrication follows the lines of the original and is by a high pressure system, employing a miniature oil pump in the crankcase.

Ignition is by coil and battery, using two coils set between the cylinder banks. The distributor is mounted at the front of the engine, and the carburetter and its air-cleaner are carried centrally between the cylinders, flanked by the twin coils.*

A multi-disc friction clutch is fitted at the rear of the engine, and transmission is by shaft to a special three-speed gearbox mounted on the rear axle, as in the prototype, gears being of spur type, with three rings of gears to each gearwheel. Control of this gearbox, as will be seen in the chassis picture, is by a short right-hand gear lever working through a long rod passing along the chassis. We understand, however, that the builder is not satisfied with the transmission arrangements, and now has another version under construction, reputed to have a miniature oil-hydraulic coupling system in lieu of the multi-plate clutch.



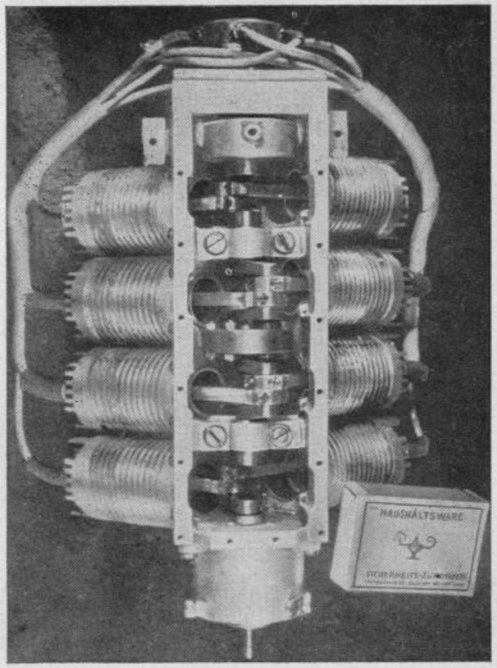
The chassis is of tubular construction, embodying the central torsion tube, and all wheels are independently sprung by the Porche system. The car is fitted with working brakes, operating by drums on the driving wheels only, controlled by cable from the cockpit, and scale steering employs a worm gear steering box. To complete the chassis, wire wheels of reasonably realistic appearance are fitted, although these are almost entirely concealed by the enveloping bodywork, which is of aluminium alloy, and to judge from the photographs, beautifully finished, and the cockpit furnishings have been carefully and accurately carried out.

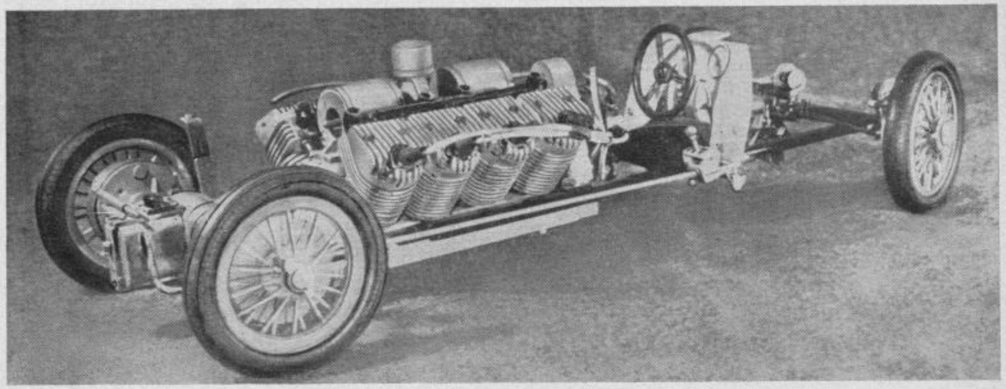
Having achieved this masterpiece of model building one might excuse Herr Jäger if he put it in a showcase and rested on his laurels, but this is far from his intention. The little Auto Union has in fact been on exhibition at the premises of Rommler and Affelt, a well known German hobby business, where it naturally created no small stir, but it is destined to be raced this season in open competition with the more conventional models in the Stuttgart Club. This *debut* is likely to take place on the occasion of the West German Horticultural Show some time in May or June. Herr Pfeil, of Mechanikus, to whom we are indebted for this description, assures us that as the Auto Union is by no means a straightforward car to race, a highly skilled pit crew will be essential to service the car, and competitors as well as spectators can be sure of a unique experience in miniature car racing. We believe him!

The builder is now fully occupied with the design of a racing engine on "conventional" lines for his club, which it is understood, will be of about 2.5 c.c.

Whether or not readers approve of the racing of cars of this size, they will congratulate Herr Jäger on his skill and enterprise in reproducing this fine *formula libre* model and, what is more, making it work!

**This is as described by our correspondent, but a close examination of an enlarged picture suggests that the cooling blower is set between the cylinders, driven by shaft from the timing case.*—Ed.



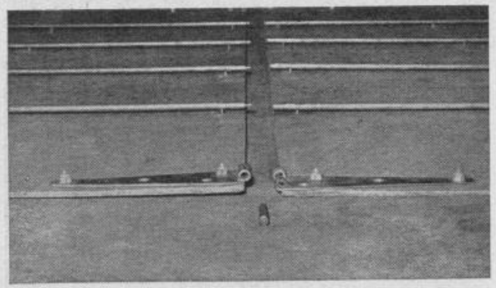


(Left) Chassis, showing engine and rear mounted three-speed gearbox. (Right) The complete car with bodywork fitted, and two views of the power-unit. In the lower picture the oil-pump and split big-ends can be seen.

The Meteor Club's RACING CIRCUIT

A combined effort described by F. G. BUCK

Photographed by F. A. BUCK



ON looking back, it seems certain that a calendar was the start of it all! To mark the beginning of 1950 a large envelope arrived on the writer's door-mat one morning, and was found to contain a calendar adorned with a photograph of a most realistic looking 4 CLT Maserati, which proved to have been built by one Henri C. Baigent of Bournemouth and from whom the "30 days hath September" etc., had been sent.

This proved to be the beginning of a series of long range chats and discussions on model car racing in general, but the 2.5 c.c. department in particular, and goodness only knows how much ink found its way on to paper! It was during the course of this correspondence that Henri C. made known the idea he'd developed, for running more than one car at a time on a circuit which could incorporate practically any hazard from an oil-soaked hairpin bend to a miniature mountain. Moreover, it was not just an idea on paper or in imagination; he had actually built a couple of cars for the job—*and they worked*!

About this time the writer was beginning to realise that he was getting a little tired of cars that went round and round and round, and being forced to look less and less like cars in the process. Ten years represented quite a good innings, and most phases of cable racing had been sampled, so it was with very much interest that the possibilities of Mr. Baigent's scheme were explored, and found to be full of promise.

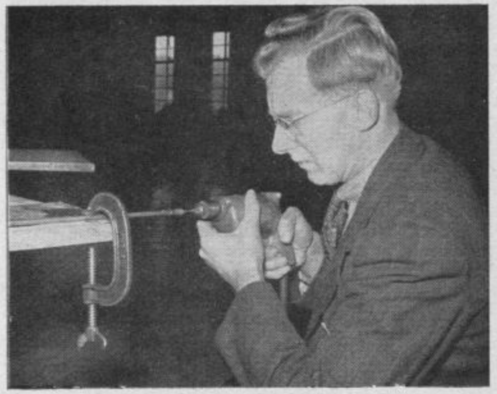
Our worthy Ed. has already set forth many of these possibilities, so it is not intended to discuss them further here, but so intriguing was the prospect that the writer laid down a short single track and soon had running thereon an experimental 2.5 c.c. car supplied by H.C.B., which had been converted from cable to guide-rail operation.

Inserting the 6BA screws from below, the screws passing through baseboard and spacer into the tapped rail.

(Left) Track sections are joined by means of strap hinges and dowels in the rail-ends, similar to tinplate railway track.

(Left) The circuit takes shape. The working committee grouped round a completed section.

(Right) A general view of the circuit laid on the Canteen floor at Messrs. Rist's Wires and Cables Ltd.



(Right) Harry Howlett drills rail ends for jointing dowels, using a power drill and a jig.

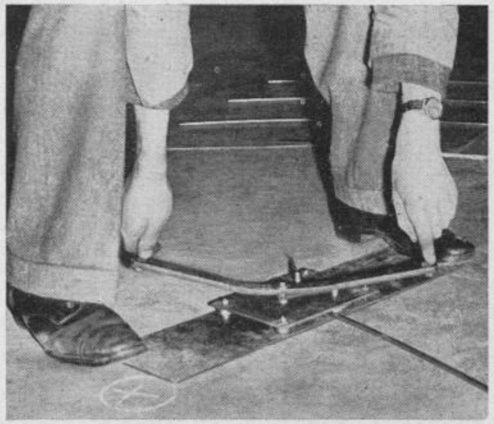
Using the rail-spacing jig whilst sawing off rails to length. This jig was later found to be unnecessary.

The sight of this car scuttling frantically round the tiny circuit was highly exciting, and a demonstration was soon given to the writer's close friend, Harry Howlett, who was also immediately impressed. Here, we considered, really *was* something! Deep discussions as to ways and means followed, and more ink was used in the areas of Bournemouth and Stoke-on-Trent! With many of the details of the construction of a portable track more or less settled, a scale drawing was prepared at Harry's house, and the stage was set for presentation to the other members of the Meteor Club.

Another demonstration run, another discussion, and the club voted unanimously to go ahead with construction of a full-size four-lane portable track of almost 200 ft., and with permission being granted to store the track sections on their premises by the club's "fairy godmother" firm of Messrs. Rists' Wires & Cables Ltd., orders were placed for the various materials. Practically the whole of this work was carried through by Harry Howlett, who also "carried the can" for the time being as far as the various payments were concerned.

After considering various alternative rail sections it was evident that the original one of $\frac{5}{16}$ in. dia. round, as specified by H.C.B. was the best, and close on 1,000 ft. of this size bright mild steel was purchased; $\frac{5}{16}$ in. tube would also have been suitable, but as it was unobtainable locally was not considered.

The next and most important item, as well as by far the most expensive, was the boarding on which



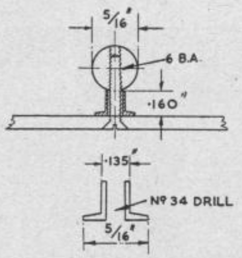
The home-made bending jig, drawing of which appears next month.

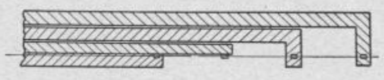
the guide rails were to be laid. The possibilities of plywood were investigated, but soon found to be well-nigh hopeless, both on the score of cost and availability, so attention was fixed on a brand of Swedish hardboard, which *was* obtainable locally, and in sections which suited our purpose admirably.

Various tests on samples, including soaking in paraffin and oil were encouraging, and with some trepidation the plunge was made and the necessary amount purchased, the cost of which amounted to nearly £25. This was by far the most costly item, the rail itself costing about £5.

The problem of fixing the rail to the board had already been solved and this was done by means of 6 B.A. countersunk-head steel screws, passing through the board from the underneath, through a spacer and into the rail which had been drilled and tapped to suit.

So far so good, and the next question was spacers—*spacers*! By now, Henri B. had had a small two-lane track working in a Bournemouth store (see February '51 *Model Maker*) and he suggested that a distance of 2 ft. between each fixing point might prove enough, and for a permanent track this may well be correct. Our track, however, was portable and therefore liable to develop "waves" in the boards which would play havoc with rail clearance. The first section to be laid was, in fact, tried with the 2 ft. fixing points, but the clearance was obviously not constant and after considering the issue with this dimension reduced to 18 in., it was finally decided to "play safe" and make it 12 in.—or alternatively 1 ft.!





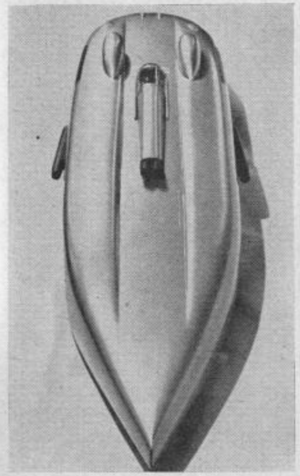
ARRANGEMENT OF PEGS FOR RELEASING CARS ON STARTING LINE.

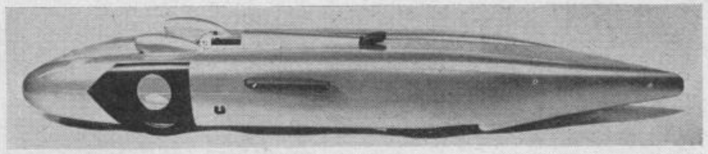
The number of spacers required, however, was doubled, and about 900 were estimated to be required. In view of the fact that two of the members produced about a couple of dozen between them on their centre lathes during a two or three hour "session" it was obvious that this method of production was pretty grim to say the least, so the aid of a local engineer was enlisted who, as a favour to the club, produced the required number at a very reasonable price on a small capstan. These spacers incidentally, were steel and the dimensions are now standardised as per drawing. It should also be pointed out that the height tolerance of plus or minus .010 in. is to allow for this variation *between individual tracks* and *not* individual spacers which should be held to as close a limit as possible. Our own spacers are set to the maximum height of .150 in. to give room for clearance should any "waves" develop.

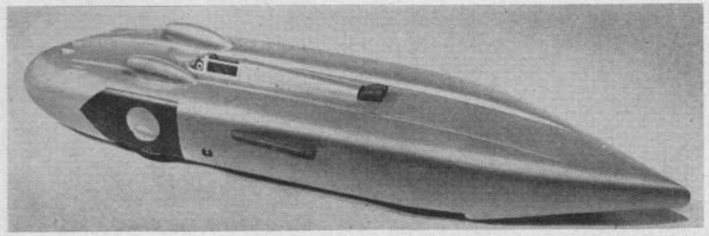
Another item that had been planned well in advance was the method of joining the various sections. This had to be so arranged as to be capable of speedy and accurate assembly, and was accomplished by means of 6 in. strap hinges from which the hinge pin had been made removable, and the drilling and pegging of the rail ends at the joint, much after the manner of "Hornby" model railway lines (see photo). The hinges were bolted to each end of the sections in an assembled state, and steel 2 B.A. csk. head screws were used here in conjunction with self-locking nuts. These hinges, or locking plates as they now became, were obviously placed well clear of the cars' wheels. The rail pegs or dowels were made from 10 gauge piano wire and were driven tightly into one end drilled $\frac{1}{8}$ in., leaving approx. $\frac{3}{16}$ in., and the opposite end was drilled clearance with a No. 29 drill. A simple jig was made which slipped over the end of the rail to centralise the drill, and was subsequently hardened throughout to resist wear.

The actual drilling of the nearly 900 6 B.A. tapping holes in the rail was an operation that demanded great precision, and to accomplish this a small $\frac{1}{4}$ in. capacity motorised drill press was adapted (to be illustrated next month.—Ed.) used in conjunction with another hardened jig. A No. 42 drill was used to ease the burden of the tappers, for every hole was tapped by hand, and it is to their credit that a mere half-dozen or so 6 B.A. taps were irrevocably "bent".

This article will be concluded next month







Eyston's "THUNDERBOLT"

AN EXHIBITION MODEL BY MAURICE BRETT

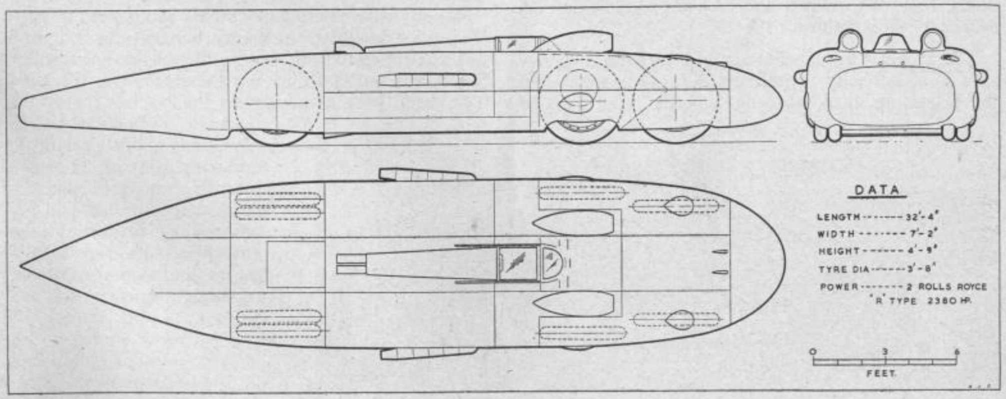
THE average man's opening remark on seeing this model for the first time are, "What is it, a boat?" All I can say is, don't blame me. I didn't design it! The Thunderbolt certainly was a remarkable vehicle though, in many ways apart from its looks. However this is meant to be a description of the model so we won't go into that.

As to why it was built, Messrs. Rolls Royce Ltd., required the model for their collection, representing Rolls Royce engined land, sea and air transport, for the forthcoming Festival of Britain exhibition at Derby. Other model exhibits include a comprehensive range of well-known aircraft, dating from 1916 onwards, a companion model of Campbell's boat *Bluebird* and several models of Rolls Royce cars, arranged in show cases with panoramic backgrounds.

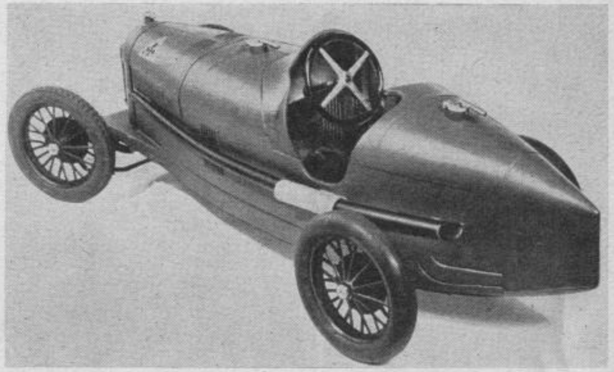
There will also be quarter-scale models of the more famous of the Rolls Royce aero engines, starting with the Hawk which was their first successful engine. Photos of this model, together with photos of the quarter scale Merlin which has been constructed in company with "Thunderbolt" will appear in a future issue.

Scale was fixed at 1 in. to 1 ft. to tie up with the Bluebird model which has been made for Rolls Royce by Vospers, who, it will be remembered, built the full-size boat. At first some doubt existed as to which version of "Thunderbolt" was required as it appeared in three distinct forms. The original version in 1937, had a "flattened octagonal shaped" radiator intake, short head rest fairing, no cockpit cover and a large fin. It was modified for 1938 by having more streamlined radiator and supercharger air intakes, a cockpit hood, lengthened headrest, fairing into the inner pair of exhaust pipes, large outer exhaust manifolds, and lengthened tail fairing and fin. Later in 1938, it was streamlined even more, by

continued on page 445



That P2 Alfa Romeo!



'MODEL MAKER' BRINGS OUT A RARE SPECIMEN FROM THE STAFF COLLECTION

BY G. H. DEASON

(Right and below) Two views of the renovated clockwork P.2 Alfa Romeo, an imposing model twenty inches in length. New hub-caps and radiator filler cap remain to be made.

"WANTED, clockwork P.2 Alfa Romeo, any reasonable price paid!" Just what had this 25 year old toy, that it should have grown into a much sought after collector's piece? This often-seen appeal in the classified ads. of model journals prompts the thought that many younger readers may never have seen one of these rare little cars, and it might even be that the anxious advertisers haven't, either!

In a very early number of *Model Cars* I described it amongst a series of "Vintage" models, but since the issue in question is now a collectors' item itself, perhaps a short re-cap may not be out of place.

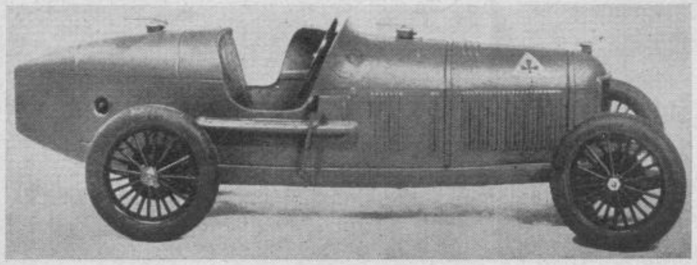
The clockwork version of the P.2 first appeared in high class toy shops in the middle 'twenties, soon after the full-sized cars had swept the road racing Championship of Europe into the bag. These P.2's were the first true Grand Prix cars made by Alfa Romeo, and in the hands of drivers like Ascari (father of Alberto of contemporary fame), were practically invincible. They were really beautiful in form, particularly in tail view (I have included a picture of the model's classic posterior), and I recall standing wrapt in admiration for about an hour, gazing at one of the real jobs when it was on view at Selfridges in a racing car exhibition in 1925.

The model was, I believe, made in France, partly as a joint publicity venture by Alfas, Michelins and the Excelsior shock absorber concern, who assisted with the cost of the dies for the press work. They sold in considerable numbers at 35/-, and were extremely good value even in those days.

The metal bodies were very creditable replicas of the real thing, with staggered seating and the wind deflecting scuttle extended on the mechanic's side. The steering worked through a rack and pinion, and dummy front springs were naturally fitted with very realistic Excelsior shock absorbers. Quick opening caps of correct pattern figure on all filling orifices, leather bonnet straps, a radiator stoneguard, and the authentic Alfa Romeo medallion all added to reality, and the bonnet carried the famous cloverleaf in a triangle. The specimen in my possession has no starting handle, but I believe that this was an original fitting. Oddly enough no instruments appear on the dashboard.

The wheels were an ingenious attempt to reproduce the wire variety by means of metal pressings, the rather coarse spokes being of V-section. The wheels themselves were detachable, with knock-off hub caps, and the Michelin tyres, now board-hard with age, were the narrow section of the period. The two plain rear tyres are not the originals.

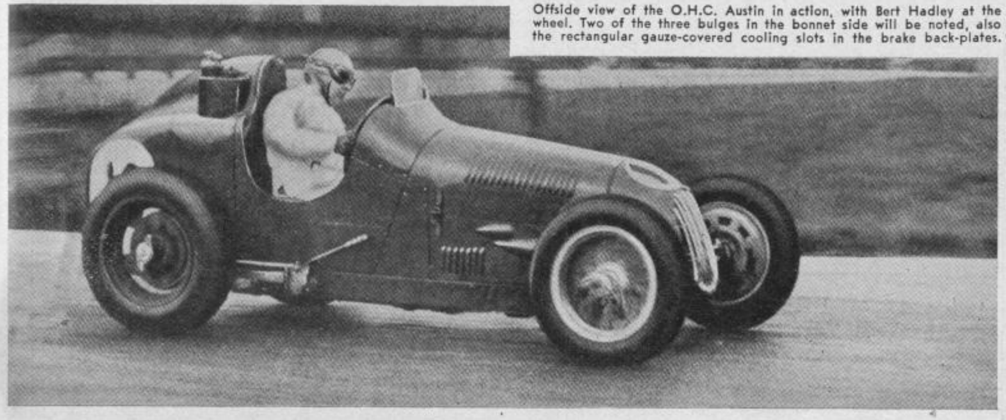
A hefty side-winding clockwork motor was mounted on a triangular undertray beneath the tail and was controlled (off and on) by the outside handbrake. Speed was not startling, but the clockwork P.2 must have been very satisfying to the youngsters of the 'twenties, somewhat starved of good models with a motoring flavour. I have recently renovated and repainted the specimen in my possession, preferring the authentic Alfa red to the rather "bathroom" white of its original finish.



Model Maker Photos.

PROTOTYPE PARADE No. 31
DESCRIBED BY G. H. DEASON

744 c.c. O.H.C. AUSTIN



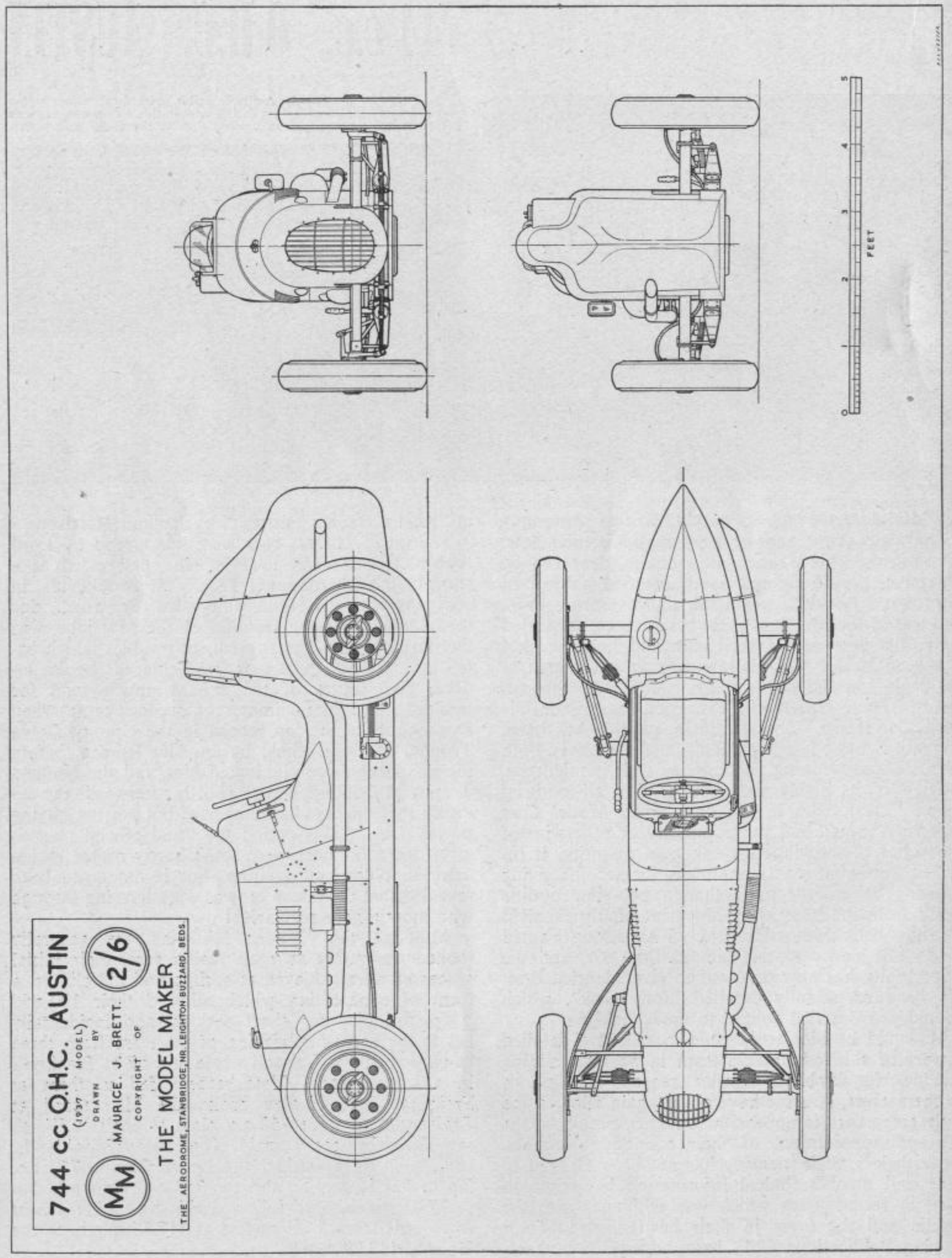
Offside view of the O.H.C. Austin in action, with Bert Hadley at the wheel. Two of the three bulges in the bonnet side will be noted, also the rectangular gauze-covered cooling slots in the brake back-plates.

SOME older readers, on turning to this page, may possibly grope beneath their seats for their hats, murmuring "This is where we came in, dear!" True the o.h.c. Austin figured as the second subject of "Prototype Parade", way back in November, 1946, and was in fact the first of the series to be illustrated with a line drawing. Let me hastily add, however, that it is NOT *Model Maker's* intention to start again at the beginning and, so to speak, run the film through again! There is, nevertheless, good reason for this particular repeat. The Austin in question has been, and still is most popular among model makers, both in scale and working versions, as well it might be, in view of its highly successful though all-too-brief career. Dealt with in the days when *Model Cars* was very young, and the popularity or otherwise of the series of drawings an unknown quantity, it received somewhat scanty treatment, the accompanying drawing being little more than a two-view outline taken from the body shop blueprint kindly supplied by the Austin Motor Co. Ltd. I have long wanted to do full justice to this famous little car, and the opportunity has now occurred to give Maurice Brett his head on a fully detailed "four view", which should prove a real delight to model makers.

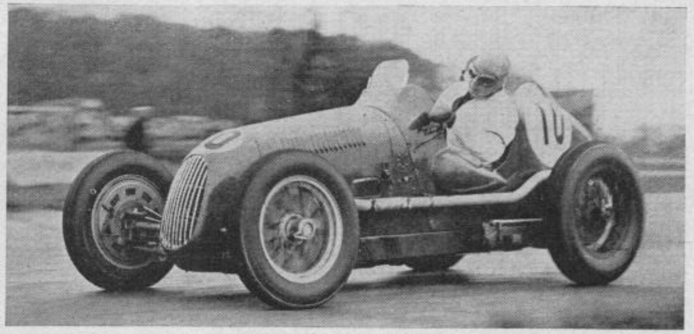
It would be nice to be able to record a detailed history of the redoubtable team in post-war racing but alas, for doubtless excellent reasons only known to themselves, Austins have never again allowed the little green cars to appear on a racing circuit, to the great disappointment of their countless admirers. Nevertheless, their memory has not been allowed to fade and much technical information has come to light in recent years which was withheld from the public and the press in their heyday, and Motor Racing Publications Ltd., have added to the facts in "Austin Racing History," by Roland Harrison.

The o.h.c. 744 c.c. cars were announced by Lord Austin himself early in 1936, and first raced as a team in the International Trophy at Brooklands, in company with the earlier side-valve car, which, due to the usual teething troubles of the new jobs, was the only finisher. The subsequent troubles which befell the cars before success was achieved should, indeed, give critics of the B.R.M. much food for thought! The first glimmer of success came when Dodson broke the lap record in the County Down Trophy, previously held by an Alfa Romeo, before the jinx once more eliminated him, and the Nuffield Trophy at Donington Park shortly afterwards proved afresh that the cars had the speed but not the staying power. During this period the usual official reasons given for retirement were those hardy motor racing annuals, plugs and ignition, but it has since been revealed that the piston crowns were burning through with monotonous regularity!

Although the "Works" Austins are generally looked on purely as road racing cars, their initial successes were achieved at sprints and hill climbs, a form of competition which allowed their 100-odd b.h.p. full play for short periods, and incidentally led to the early diminishing of the team from three to two when Pat Driscoll wrote one off at Blackwell in a severe crash. Class records fell to them at Freiburg, Bert Hadley broke the hill record at Craigantlet, and the 750 c.c. class at Shelsley Walsh saw Goodacre score again. Then came Brooklands. Charlie Dodson pushed the Outer Circuit 750 c.c. lap to 121.14 m.p.h., and the 750 c.c. mountain lap to 77.02 m.p.h., and followed this by taking a host of records from 5 kilometers at 117.55 m.p.h. to the Hour at 113.99 m.p.h.



(Right) The Austin at Redgate Corner, Donington Park, and (below) a paddock shot, showing the front axle layout and hinged flap for the cockpit.



Real reliability still eluded the new cars, until the very end of the season, when the trouble was traced to fuel surge, and consequent starvation and the inevitable piston trouble, caused by the single float chambers. Modified to twin chambers the troubles ceased and the future brought a glittering series of successes in both road and track races, the story of which was sketched in my earlier article, and which in any case is well remembered history to most enthusiasts. The o.h.c. Austin's final appearance was in the Imperial Trophy at the Crystal Palace in August, 1939, when Bert Hadley scored a last resounding victory before the war removed these charming little racing cars for good.

In appearance the cars were more than usually attractive, as apart from their trim and efficient lines, they appealed to the imagination by their very diminutive size and excellent proportions. The bodies were *just* wide enough to house the driver, and the headrest really *was* a headrest, and not merely a support for the back collar-stud, as is so often the case with present-day cars. On the sole occasion when I was able to insinuate myself into the cockpit of one (not a word to the Austin Motor Co. about this, by the way!) I was tremendously impressed by the feeling of mastery suggested by the compact placing of the controls, and in particular by the astonishing degree of visibility afforded by the slim, sloping bonnet. Not only both front wheels but both brake-drums were visible, and one felt that the front wheels were almost within reach of one's hand.

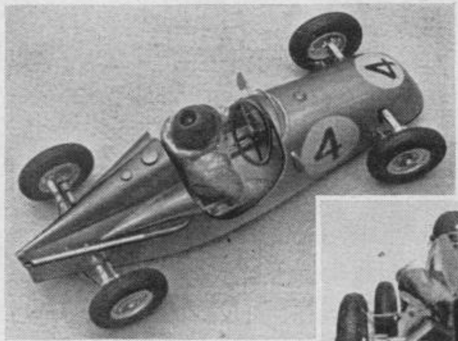
The accompanying four-view drawing of the 1937 version will give model makers most of the details they require, but a note or two on the somewhat confusing variations will not be out of place. In 1936 and 1937 the cars had the normal radiator grilles with vertical bars, and external radiator filler caps with quick action levers as in the drawing. The bonnet side louvres were positioned towards the rear edge, and were nine in number, of extractor type, i.e. facing rearwards. In 1938 the bonnets were altered somewhat, the radiator fillers being concealed, and additional louvres and cooling slots were cut round the radiator fairing. For a time, in at least one of the cars, a shallow forward-facing scoop was fitted over the top slot above the grille. For the 1939 season the old arrangement of outside fillers appeared again, with a bonnet-line similar to the original, but additional louvres were cut in the bonnet sides and on either side of the bonnet crown. The fuel-filler on Hadley's car was carried on the top of the headrest fairing. No alterations were made to the main components throughout the team's career. The deep channel section frames had tubular cross members, the centre one being extended beyond the side members to carry the rear springs. The twin camshaft engine had a Roots type Murray Jamieson supercharger, carried at the rear, above the gearbox, and the transmission line was lowered 4 in. and stepped up to the rear axle by spur gears.

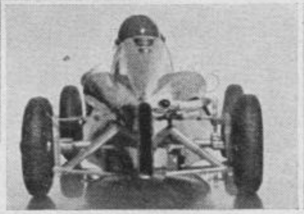
Brakes were cable operated, with 10 in. drums at the rear, and $12\frac{1}{2}$ in. drums in front.

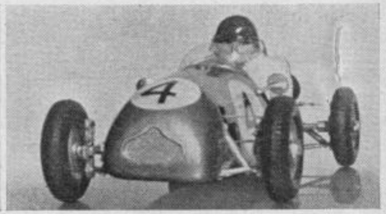
The hand brake was external, as shown in the photograph, and the short gear lever was on the driver's left with a bulge in the cockpit side for hand clearance. Tyres were 5.25 x 16, and on occasion twin rear wheels were fitted for sprints and short races. Colour scheme was dark green with silver wheels.

A .5 c.c. COOPER "Five Hundred"

BY G. B. McSTEA







Three views of the diminutive Cooper 500, which is powered by an Allbon 0.5 c.c. Dart Diesel engine, cunningly concealed inside the driver. Contra-piston adjustment is made through the hole in the driver's crash-helmet. Note the cleverly constructed damper struts, and the excellent degree of realism which the writer has achieved in a model of very small proportions.

Photos by Leslie H. Buckland

HAVING come by a set of wheels fitted with 1½ in. dia. tyres which originally came from a child's electrically driven car, I noticed their fairly close resemblance to the light alloy wheels of the Coopers, and there and then decided on building a small Cooper, having a wheelbase of 6 in., that was to cost me as little as possible—as it turned out, under £4 with engine.

The Cooper being a much-photographed car, it was not difficult to draw up plans for a model, including a built-up chassis, working steering and an independent suspension system.

Perhaps independent suspension isn't necessary on such a small model, but as with all makes of the 500 class, it is simple to construct and most certainly adds to realism in the finished model.

The chassis main side members were made simply from 0 gauge rail lengths and bolted on to the front and rear suspension boxes shaped from thin sheet brass. These suspension boxes carry the transverse leaf springs which were built from three strips of nickel silver to give rigidity, the fourth and lower spring being from phosphor bronze strip, the springs being shackled together by narrow phosphor bronze strip. These transverse springs are attached to the axle beams, which were bent into the required shape from 00 gauge rail.

The front suspension is fully operative, the construction in principle being the same as on the real Coopers. Wishbones are from small gauge copper tubing flattened at either end and drilled to take 12 B.A. bolts. Dampers were made from brass tubing, the one being a close sliding fit within the other and tension being taken up by fine weak springs.

The steering is by rack and pinion incorporating divided track rods; a necessity with independent suspension. King pins within the axle beams work on the stub axles which were a relic of the car that supplied the wheels.

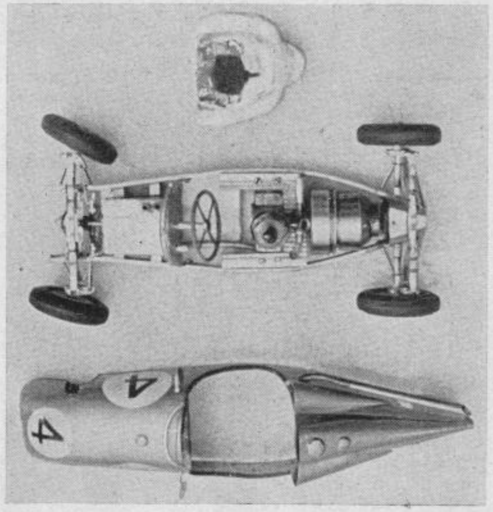
Incidentally, to accommodate the petrol tank in such a small car the steering column had to pass clean through the petrol tank situated between the front chassis members. The tank is bushed for this purpose with small bore brass tubing. The steering wheel is four-spoke, and bound with "Dental Floss". Coopers now use a lightweight three-spoked wheel of their own design.

Rear suspension is constructionally the same as for the front except that it is only a dummy as regards independence, thus doing away with universal joints altogether. The suspension box is much longer than at the front to accommodate the very small bevel gears which were obtained complete with their bearings from an ancient angled "dental handpiece". These gears are exceptionally strong and have a beautifully smooth running action. Perhaps a novelty of this rear drive is that it is a completely floating unit consisting of bevel gears connected directly on to the clutch cage, which has just sufficient clearance to run smoothly over the flywheel, so that at rest the clutch is resting directly on the flywheel. The flywheel itself is drilled to accommodate ⅛ in. ball bearings which, when running, are flung out and partially engage in the clutch cage. Thus the drive is taken up slowly and smoothly. This system does away with any reduction gearing. The efficiency of the clutch can be increased by the addition of more ball bearings in the flywheel. I have used only two ball bearings and find things quite satisfactory.

The engine used is the Allbon Dart of .5 c.c. and is easily camouflaged by a dummy driver. The exhaust gases pass through outlets in the region of the man's kidneys! Also the man has an exhaust duct within his midriff to carry away further gases from the 360 deg. portage of this particular engine. The man is made from brass sheet, padded with adhesive plaster and given a white overall in plaster of Paris bandage, then painted. The head, face, and crash helmet are carved in one piece from a cotton reel, the hole in the centre being used to accommodate the screw for adjusting the contra piston.

The body is a one-piece affair made from copper gauze and brass sheet, all being made by the method as described in last month's *Model Maker*.

The finish is in pale metallic blue and details include dash, wind shield, dummy filler caps and mirrors of the motor cycle type. The dummy exhaust is from brass tubing and expanding curtain wire, lightly tinned and polished to give a chromed effect finish.



The Cooper with body and driver removed. The steering column passes through the fuel-tank, in a brass tube. The interesting clutch and bevel drive arrangement is described in the article.

EYSTON'S THUNDERBOLT

continued from page 439

having the fin and radiator removed, and a new nose fitted. The radiator incidentally was replaced for cooling purposes by large blocks of ice! It was the later version which was eventually modelled as can be seen from the photographs.

Construction is of wood, lime being used for this purpose, as it is excellent for carving and general handling, and the close grain ensures a good surface without an excess of filling to do. The bulk of the body was made up of seven pieces of lime, so arranged that the majority of joints coincided with panel lines. This was to ensure that if any subsequent opening of joints occurs it won't look badly out of place. No less than 37 woodscrews were used when glueing up, in the hopes of preventing any movement of the wood, but you can never be really certain that it won't move eventually.

The seven pieces were made up as follows: One large piece, the full width of the body comprising the lower half, extending from the tail to the rear of the nose fairing and to which the other pieces were screwed. The top half of the body was formed by five pieces, one each side from the nose fairing to the tail fairing, with two blocks forming the centre portion leaving a gap for the cockpit. The top half of the tail fairing was in one piece as was the complete nose fairing. When everything had been glued and screwed together the body was left for about three or four weeks before a start was made on surfacing to allow any movement at the joints to show itself. One joint did in fact open up after a week or so, but this was successfully filled and no further trouble has been encountered. Wheels, supercharger intakes and exhausts were all made or turned from lime while the cockpit cover and windscreen, the louvres and the small intakes on the nose, were moulded in Celastoid. The fully detailed cockpit is lined with aluminium foil, and includes steering wheel, instrument panel, gear-change lever, airbrake lever and seat.

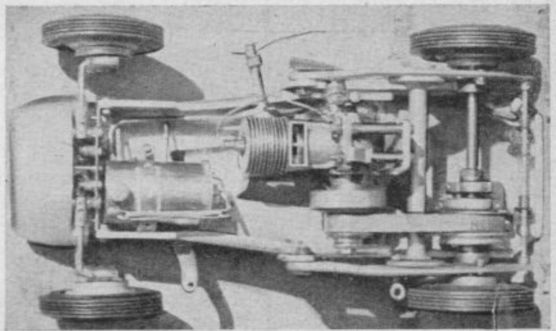
The finish is unpolished aluminium dope with matt black "arrow heads" on each side. These last were painted on the original to aid the timekeepers as trouble in seeing it had been encountered.

The surface was built up with Titanine E.6 grey filler and Titanine stoppering, which last is an almost indispensible aid to solid modelling. The first coat was brushed on and after a thorough stoppering, the model was sandpapered down to the bare wood. Another coat of filler was sprayed on and lightly rubbed down after which a coat of filler mixed with black dope was applied, the darker colouring being used to assist in the final rubbing down stage. Three thick coats of plain filler were then sprayed on and final rubbing down commenced. Two grades of Durex abrasive paper 280c and 400, were used with plenty of water. After rubbing down, final details were added and body panels scored, and the finishing colour put on. As the finish was not meant to be highly glossy, only undercoat aluminium dope was used, three coats being applied and lightly polished with Hendon polish.

The data on the cockpit details was obtained from *Autocar* sectional drawings and photos. No works drawings were available, and the drawings for the model were made up from a number of excellent photos supplied by Rolls Royce.

OSAM SPECIAL

By ING. SILIPPO MANCINI



THE Mk. 4 car is my fourth effort in car construction. The Mk. 1 won the 1st National Meeting in Turin at the speed of 84.32 k.p.h. (September, 1949) after having crashed two days before and having been rebuilt.

Mk. 2 was a battered edition of Mk. 1, but led a very unhappy life. Again, two days before the meeting in July, 1950, it crashed and was rebuilt in time to start. Without any test run, it was placed 7th, and I won't tell you the speed! At the Milan Grand Prix in October, 1950, it placed 9th.

Mk. 3 is an experimental and tempermental bevel drive on which I should learn the push stick method of starting. Up to now it has started nicely by throwing it on the track, provided this was very smooth, I owe the learning of this system to Mr. E. J. Pickard of the Edmonton Model Car Club who visited me last year and whom I hope to see again this year.

The main features of Mark 4 are a frame made from U-section aluminium bar, bent and lightened wherever possible. The whole frame is soldered. An aluminium mount is made from sheet, which holls the engine with the cylinder lying down and crankshaft crossways on the frame. This mount can be moved forward and backward by loosening two bolts which run in oblong holes in the lower flat sides of the frame.

The rear suspension system consists of two parallel arms pivoted on the sides of the chassis and held together by a tubular member. The arms are of sheet dural and the tubular member of aluminium tubing. On this sub-assembly are bolted the two ball-bearing seatings for the rear axle. At the rear end the two side members are again connected by a steel rod which gives further rigidity to the group and holds the two short rods around which are held two spiral springs working under compression.

The transmission system is composed of a pulley on the engine shaft, turned from bronze bar and incorporating the flywheel; and of another pulley running freely through a large ballbearing, on the rear axle. This pulley becomes rigid with the driving axle by action of a centrifugal clutch (a sketch of it was published in the August issue of *Model Cars*). The belt is a "Hevaloid" of rubber-impregnated cotton fabric, with no joint.

The ratio is 1:1.5 for the time being, but I expect to lower it if I should use a faster engine. The front suspension system is built up mostly of Meccano parts and works on the cross parallelogram independent principle; springing is by spiral springs in tension.

The whole sub-assembly is bolted to the chassis via four bolts and will come off all in one piece. The engine is an O.S.A.M. G.B. 176 which I have transformed from compression ignition to glowplug; it has also undergone a certain amount of souping-up (Americanism!). It sounds very purposeful and it gives out a fairly good amount of r.p.m. Wheels are turned from dural and make use of Pirelli tyres, which up to now have stood up very nicely, being made of very good rubber composition and being very light. Front tyres are 90 mm. diameter, rear ones are 100 mm.

The bodywork is beaten from 0.9 mm. thick aluminium sheeting and consisting of three pieces which have been soldered together. The whole body will clamp itself on to the chassis simply by pushing it on. The radiator shell is carved from light poplar wood and attached to the front suspension plate by three wood screws.

The fuel system (which, as readers will notice, is the last thing mentioned) is really the novelty. It consists of a syringe, built up from brass tubing (turned and polished inside), one end of the cylinder being fixed, the other is screwed on. The piston consists of two dural discs with a Vipla (synthetic resin) disc held in between. The stem protrudes from the screwed end of the cylinder and holds a cross member to which are hooked several rubber bands on either end of it. The rubber bands are hooked on to the cylinder body.

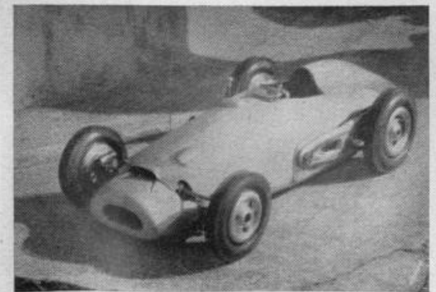
By this time, if they've been able to understand my halting English, readers will have at least guessed how the contraption should work. One pulls out the stem, fills the cylinder with fuel, screws on the filling cap and then lets go of the stem. This will create a pressure on the fuel and though it is not by far constant, it will do away with centrifugal force and with air bubbles in the fuel pipe.

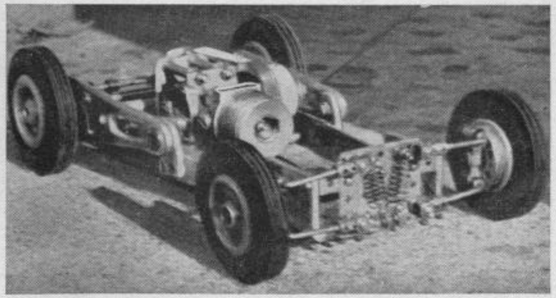
Carburetter jet setting is, of course, quite different from that used with atmospheric tanks, but one learns quickly; in the first part of the stem run pressure varies little as I've experienced by letting fuel run out of the pipe horizontally and watching the place when the squirt hits a flat horizontal surface placed below and ahead of the pipe opening.

Between this tank and the carburetter jet there is, of course, a needle-type shut-off worked by the usual steel wire antenna.

On my second run the car did 100 k.p.h. (you must remember that speeds are around this mark in Italy). I am now working to ascertain which is the best pressure for the fuel system, and I can easily graduate it by adding or by taking off rubber bands from the hooks. I am also trying to lighten the car, because it weighs about 8 lb., which is, of course, too much, but I prefer working down on weight better than having to add it.

On the other hand the car is perfectly stable even on rough tracks, and does not seem unduly sluggish in acceleration.





DOPE & CASTOR

By JERRY CANN

AND still the news of fresh tracks comes along! Latest information to hand in this direction is from Mrs. G. Batten, who tells me that the West Dorset Club has obtained permission from a local farmer to build a 70 ft. track on his land. It isn't quite as simple as that, however, as the Ministry of Town & Country Planning comes into it, and their sanction is now awaited before the earth begins to fly in the Bridport area.

Further advanced are the preparations of the Nottingham M.R.C.C., whose Hon. Comp.-Secretary is W. K. Crow, of 51 Graylands Road, Bilborough, Nottingham. His bulletin states that the club track is practically complete and will most probably be in action by the time these words appear. The Nottingham track is 70 ft. diameter, and is equipped with all the usual amenities of safety fence and electric timing, and buses pass within 300 yds. of the site. This is four miles from the city centre, and is so situated that there is little likelihood of restrictions on running.

The Sunderland M.E. Society's Car Section, who run their 1951 Open Meeting on Whit Monday, have recently applied a "brush finish" to their track at Barley Mow Park, which it is hoped will materially boost speeds by means of better wheel grip. If any sensational increases in m.p.h. do occur I shall be including them next month.

Talking of Sunderland, F. C. Cook of that Club has taken on the Vice-chairmanship of the Model Car Association in succession to F. G. Buck, who retired at the annual general meeting. Apart from this change the officers of the Association remain as before.

Cyril Catchpole won the main competition at Surrey's opening meeting, at which Alec Snelling also put in a cracking run with his 2.5 c.c. Special at 76 m.p.h. Electrical timing was not used, so unfortunately records cannot be claimed. A visiting American 10 c.c. model clocked 120 m.p.h., so Surrey should be well satisfied with their new track surface at Chertsey Mead.

The Surrey Club has invited members of the Medway, Maidenhead, Chiltern and Portsmouth clubs to a "do" on June 17th, and it is hoped to arrange an inter-club affair with the Pioneers on July 15th, when the Z.N. Cup is run for. The Surrey track has wintered well, and is in fine condition. Electrical timing is laid on, and visitors will receive a warm welcome. Hon. Sec.'s address is 26 Rutland Court, Queen's Drive, W.3.

Don't forget the Scottish Speed Championship on June 17th, at Riverside Drive, Dundee. New Comp.-Sec. is Andy Hutton, c/o Drysdale, 13 Albert Square, Dundee, who is keen to foster Anglo-Scottish competitions, and will be delighted to hear from intending entrants. Last year's winner was F. G. Buck. The championship meet starts at 1.30 p.m. Incidentally, Andy speaks of a possible rail track for Dundee, and cars are already under construction by members.

B.O.A.C. are staging an exhibition and track meeting at Heston Aerodrome on June 9th, and Derby's Open Day happens on June 24th, so a lively month is in prospect.

Edmonton's new track at Pickett's Lock Lane was officially christened on Whit Monday, and *Model Maker* will be publishing an illustrated report next month. In the meantime new records are likely to be announced shortly as a result of some very fast motoring on the Surrey track on Whit Saturday by L. Garrod, C. M. Catchpole and Alec Snelling.

Model Car Meetings at Eaton Bray

THE many model car enthusiasts who have come to regard at least one Eaton Bray meeting as an essential part of the competition year will be pleased to know that two major fixtures are being staged this summer.

The B.M.C.C. have in the past organised six meetings per season, thus catering for competitors who had no club tracks of their own. The steady increase in the number of "home" tracks, however, plus the rising cost of travelling to the multiplicity of Open meetings in all parts of the country, has led to the decision to group the major trophy meetings into two dates.

The Austin Trophy and the M.G. Trophy for 10 c.c. and 2.5 c.c. models respectively will be run for on Sunday, July 22nd, and to embrance the other classes, special awards will be given for 5 c.c. and 1.5 c.c. models.

On Sunday, September 23rd, the Russell Trophy for scale type models of all capacities will be run concurrently with the Jaguar Trophy, both these being handicap events, with scale points added in the case of the Russell Trophy.

The donors of the Drysdale Trophy have expressed the wish to transfer this award to the new rail track racing, and at a later date regulations for a team contest for rail racing cars will be published.

By holding these competitions later than usual the organisers hope to be blessed with better weather than has so far been in evidence in 1951, so make a note of the dates —July 22nd and September 23rd. Morning practice will be arranged and racing will start at 2 p.m. under M.C.A. rules.

OFF THE RAILS !

Many readers will have noted our mis-captioning of the railway layout on last month's cover, though mercifully few of them brought it to our attention ! This layout is, of course, Mr. P. B. Denny's of Ealing, and shows the builder adjusting a loco on the track. Mr. Bryant's layout is the tiny '000' Highland Railway described in "Small Fry".

ODDITIES - SOLUTIONS

Here are the solutions : How right were you ?

Reading clockwise : Top right hand — back of a piece of file card. Bottom right — end of flute on ½ in. twist drill. Bottom left — length of alligator type fastener for flat belt. Top left — the easiest — part of the decimal equivalent scale on a 'mike' thimble.

SOME OF OUR JULY "MODEL MAKER" FEATURES . . . . .

A long "Festive" Marblehead instalment replete with pictures. First of the Windmill series of step-by-step instructional articles for a Post Mill. More of the Kessex Railways. Other '0' and '00' Regular Features. Ancient Egyptian Diorama Model. A Dark-room Timer to make at home. Workshop Tips and Accessories. Model car features include Whitsun "Opens", Hill-climb Special, Ulster Aston Martin as prototype, 2½ c.c. scale Alfa Romeo, and 5 c.c. scale Connaught. Wheeled Shopping carrier—a useful domestic "bribe".

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