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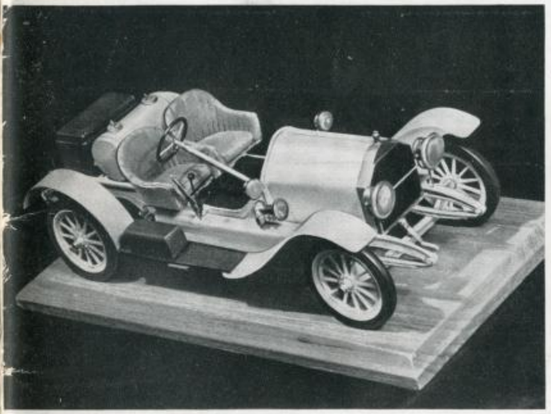

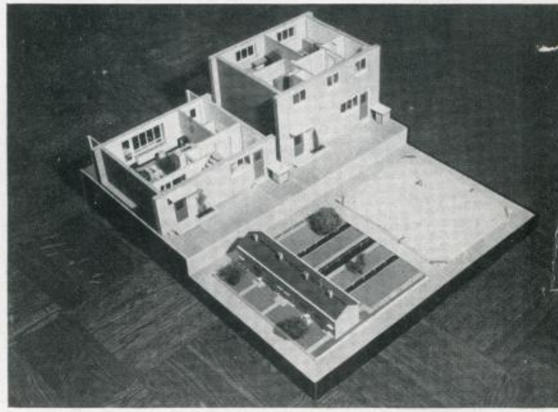

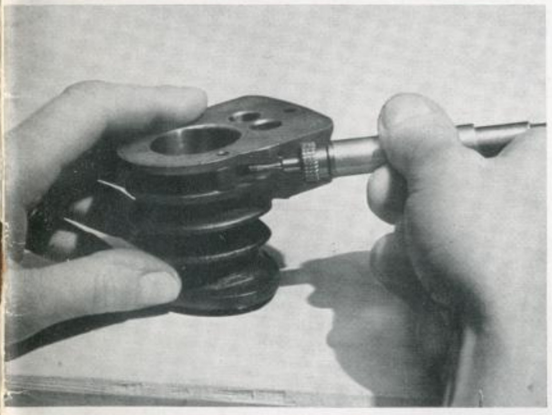

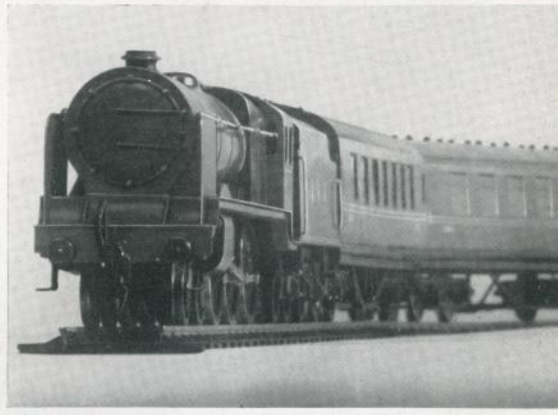

VOLUME 1 **NUMBER 5 (New Series)** **APRIL 1951**

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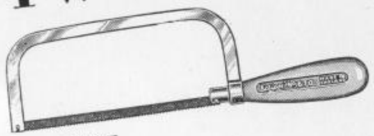

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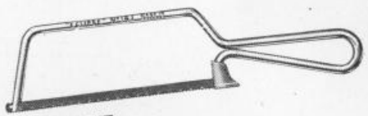

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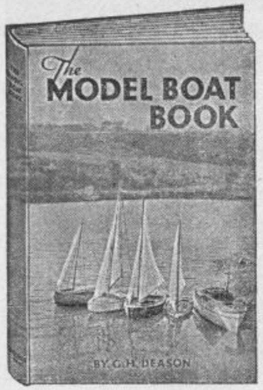

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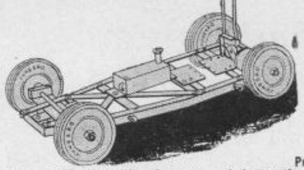

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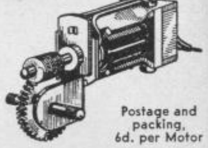

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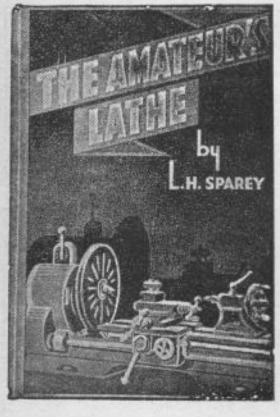

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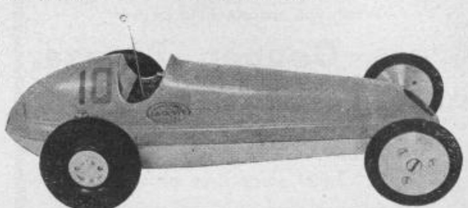

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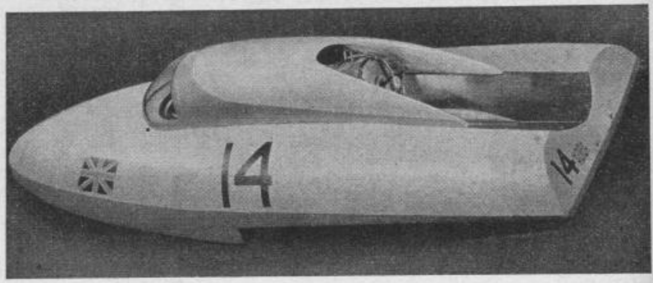

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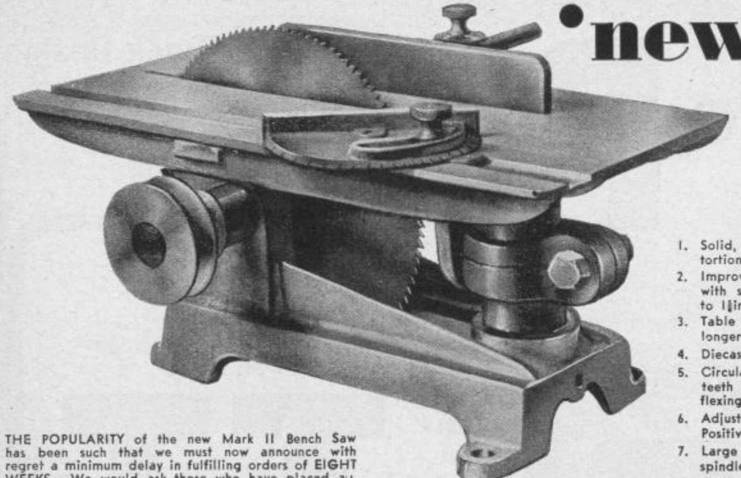

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Contents

VOLUME I No. 5 (New Series) APRIL 1951

BROADENING THE HORIZON

SINCE 1945, when the model car movement may be said to have taken shape and branched out as a hobby in its own right, progress has been limited to the intensive development of the cars and their engines. The results, viewed from a purely mechanical point of view, have been remarkable, but as is inevitable with development such as this, a certain amount of "inbreeding" has led the movement into a semi-static state, apparently quite satisfying to the zealots who practice their arts in the tuning shed, but leading to considerable criticism from those outside the magic circle. The true enthusiast is probably quite willing to say "so what?" and continue on his way, ignoring the fact that the "outsider" in question is sufficiently interested to criticise, and therefore a potential enthusiast himself, did he but see the signs of widening scope.

1951 looks like providing that widening interest, which may well carry the model car hobby to a far greater public than was ever visualised five years ago. The development of circuit racing, discussed elsewhere in this issue, should prove a decisive factor in this provided that it is tackled intelligently, and its growth guided on the right lines. It offers several great advantages. In the first place, it provides real racing, car against car, with all its attendant excitements. It will provide the spectator with continuing interest, and should prove a great draw to the mechanically-minded public, all of which will benefit the clubs concerned. It will offer plenty of scope to those club members with a bent for scenic work amongst whom judging by the work of the model railway clubs there is an amount of talent. Again due to its adaptability, this form of racing can be laid on either indoors or out, and where an outdoor site is preferred, the choice is much less limited, since the problem of levelling and the restriction imposed by shape of plot do not enter into the matter, for almost any small and neglected corner can be made to provide an interesting course.

Finally the cost to the individual builder, which has soared considerably where contest-worthy cable racing cars are concerned, need not be great, as models will be kept small, and every encouragement given to home constructors and lovers of realism.

ON THE COVER . . .

Top right: A "Santa Maria" model that really sails—to be fully described shortly. Centre left: G. H. Deason's Stutz Bearcat scale model featured in the next issue. Centre right: An architectural model of the new £950 house. Bottom left: Using dental drills in the workshop. Bottom right: Model Maker's 00 Gauge "Royal Scot".

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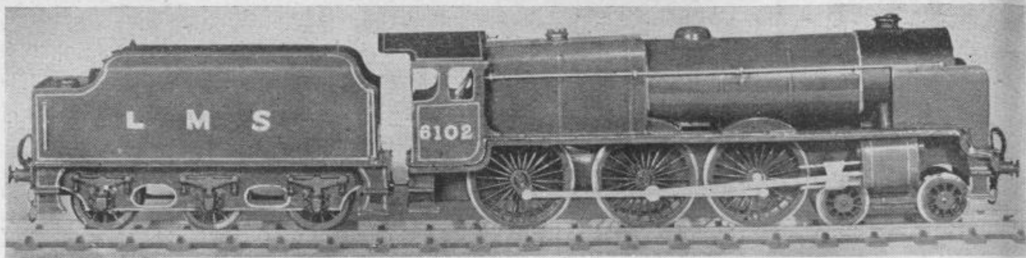
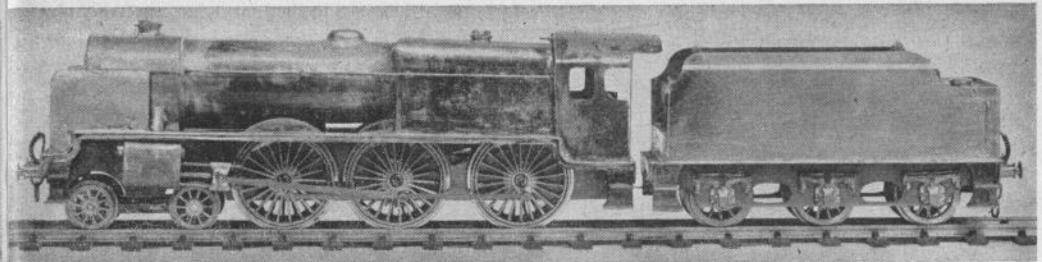




MAURICE J. BRETT DESCRIBES HOW

Model Maker Builds an 00 Royal Scot

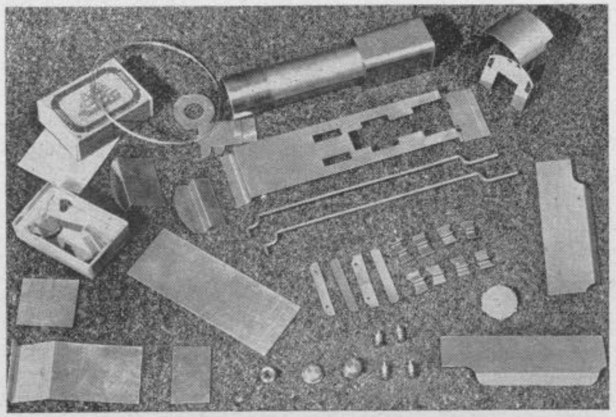
THIS is the first of a series of articles dealing with the building-up of our own *Model Maker* '00' gauge layout, and each month it is hoped to give an illustrated account of the work done. In this way, we hope to provide practical assistance to those who are thinking of starting a layout of their own.

Thanks are due to several members of the model trade who have provided short supply items quickly, given really practical help and advice, and sent small quantities required by return of post. The loco and tender kit and the mainframes to go with it, were kindly supplied by the makers H. Jamieson & Co., of Liskeard, Cornwall; most of the other parts for the engine, namely "Zenith" X3 motor and brush gear, Romford insulated driving wheels and tender wheels, Peco insulaxles, correct paints and transfers, etc., were supplied by ERG (Bournemouth) Ltd. The Gem coach kit was obtained from the manufacturers, G. E. Mellors.

Jamieson Loco Kit—"Royal Scot"

This kit is beautifully prepared and really needs a quiet evening by the fire sorting out the various parts, identifying them and generally thinking round ways and means. A lot of disappointment is saved in having everything read cut to shape; indeed, the price of 42/- for this kit is felt more and more to be money well spent as building progresses.

All the smaller gauge sheet metal parts are machine cut from nickel silver, the rest of the parts being in brass, apart from the diecast smokebox door. It is gratifying to be able to start building a model such as this, and know that you have all the best materials to hand, and all the parts precision cut so that they fit together without any annoying wangling. So far as completeness goes, one may say that the only thing not in the box is the necessary skill required to put it together. Certainly this is no job for the man who is horrified at the thought of wielding a soldering iron; on the other hand, anyone who enjoys soldering as I do, will find it a pleasure, especially if solderpaste and blowtorch are used in the initial stages. Instructions and assembly sketches are supplied, but it is advisable to obtain scale drawings such as those published by J. F. Roche, etc., to complete the model with full detail. Main frames, side frames and bogies, are not included in the kit but are supplied separately for either Romford or Zenith power units, and in either 16.5 or 18 mm. gauge.



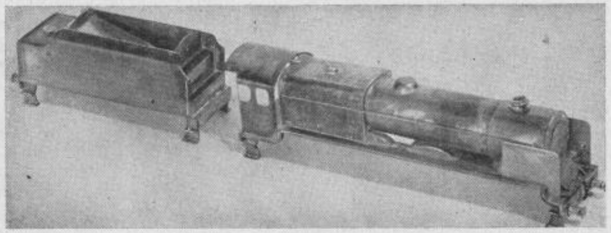
A brief description of the construction will not be amiss especially as I, for one, learnt a lot more about soldering in building this model. On reading through the instruction I came across a reference to solder paste. Now I have been for a long time a disciple of Bakers Fluid and Tinman's solder. I *had* heard of solder paint, but I was inclined to regard it as just one of those "new aids for soldering" which leave a horrible mess and an unsoldered joint.

However, I was at last tempted to try some and armed with a jar of "Fluxsolder" solderpaste and a "Target" blowtorch, set to work on the footplate. As we have no mains supply of coal gas, we decided to try Calor gas, and it worked wonders, so there is no excuse now even for caravan dwellers! Back to the footplate. The brass edging strips I painted with solderpaste, and clipped into place on the footplate. I found ordinary paper clips are excellent for this, as long as no solder is allowed to get on them otherwise they become just as firmly soldered to the footplate as the edging strip! When all was set, I applied the flame, working slowly up each edge, and after everything had been well fried and subsequently cooled, I removed the clips and found the strips cleanly and rigidly soldered. With great gusto and much enthusiasm I added the buffer beams, but encountered great difficulty in persuading the edging strips to stay put while I heated the beams until I realised that I should have to replace the clips for any later heating. Starting again, I put the steps in place, butting up against the beams and with all the clips on the footplate edging. A short application of the blowtorch on the beams and everything was firmly soldered this time without the edging coming adrift.

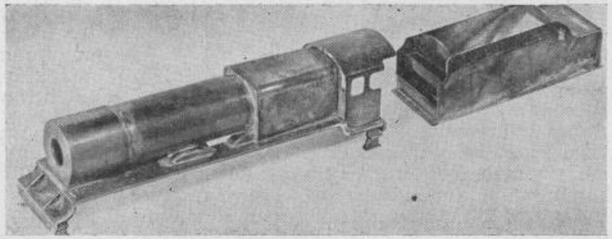
The cab, firebox, and the boiler and smokebox, were made up as three separate units, the blowtorch again being put to good use. The cab and the firebox were soldered to the footplate, this assembly requiring the use of a soldering iron, as the torch heated up too large an area to permit its further use. The solderpaste can just as easily be used with an iron as

Bottom left : The Jamieson kit spread out for inspection. Cabin and boiler parts shown together are actually separate items. The matchbox contains the smaller easily lost parts.

Heading pictures : On the right is the completed loco and tender ready for the paintshop. On the left is the finished model. A high degree of detail finish to valve gear and steam chests has not been attempted.

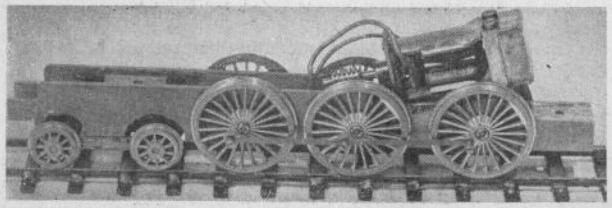


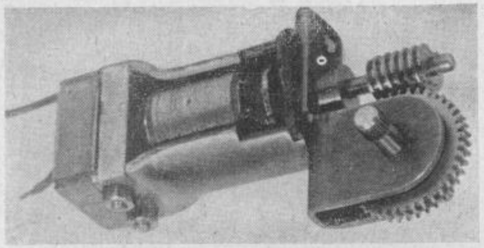
Loco and tender completed and ready for the fitting of frames—handrails have not been fixed to allow removal for ease of painting.



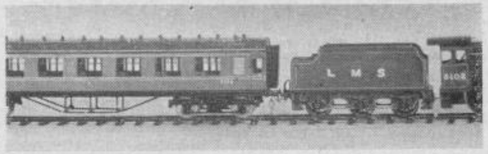
An earlier stage in building progress. Boiler cabin and tender have been assembled. Details remain to be added.

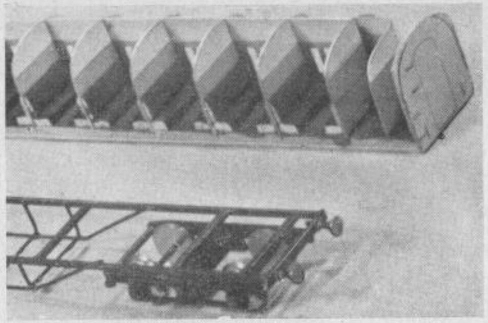
Below : Frames assembled, with driving wheels and bogie in place. Zenith motor has been located but not yet finally wired up as first tests were made with a car accumulator.





Above : The new Zenith motor, somewhat larger than fullsize. Below : The completed Gem coach attached to the Royal Scot. Bottom : Partly completed coach parts, showing construction methods.





with a torch, but progress is slower, therefore I reverted to my "old faithfuls" for the interior soldering. Before the boiler unit can be added it is necessary to build up the splashers and the projection pieces at the front of the footplate. The tender is another good example of how much easier and neater it is to use solderpaste. If the whole assembly is spot soldered together with an iron, and tightly bound with soft wire, the same methods as described for the engine footplate may be used with great success.

Mainframes and Motor Installation

Turning now to the mainframes, these can be supplied ready to assemble. The kit of parts include the the frame sides, spacers, motor mounting bracket, a pair of stretchers for attachment to the footplate, all fixing screws and complete instructions and sketches. Once again after spot soldering all the parts solderpaste and the blowtorch were used to complete the assembly. One point to note is that when using the new Zenith X3 motor instead of the older type, different assembly methods have to be adopted. The motor must be built into the unit before assembly is completed as the driving axle is an integral part of the motor. The axle as supplied has splined ends and if axles with squared ends for use with Romford-type wheels are required the original must be pressed out, first filing off the splines. The new axle will be a sliding fit in the worm wheel, therefore it must be sweated in, and this cannot be done with the motor in place in the frames.

The bogie frame and tender sideframes were made up in brass from the drawings although these parts can be obtained from the kit manufacturers. Cast wheels and Peco insulaxles were used for the tender and bogie, and I should like to make a point here, that whenever possible it is advisable to buy the wheels already pressed on to the axle, as it is no easy job to do this and get the wheels absolutely true. It is, of course, necessary when making up loco bogies, to press the wheels on to the axles after assembly, but in cases where outside axle boxes are used (e.g. tender, coach bogies, trucks), it is certainly better to buy the complete wheel and axle assembly.

A word or two about the dummy driving motion. This was kept extremely simple as Old Father Time looms large as one of the deciding factors in nearly all professional modelling. The coupling rods, connecting rods and piston rods were all made from 18 s.w.g. brass sheet, drilled first and cut out with a metal piercing saw. Coupling rods and one end of each con. rod were drilled to take 12 B.A. bolts, the other ends of the con. rods drilled for 16 B.A. bolts. The driving wheels were drilled and tapped 12 B.A., and cheesehead bolts with thin locknuts behind the wheels were used to secure the coupling and con. rods. The crosshead slides consisted of two lengths of 20 s.w.g. wire each side, soldered into the rear faces of the steam chests with a thin piece of tin bent over at each end around the wires, forming the crosshead. The tin is drilled in the middle to take a 16 B.A. bolt which is used to secure the con. rod to the crosshead. The brass piston rods are soldered to the front of the crosshead and move in and out of holes in the rear faces of the steam chests.

Painting

Painting was the next operation to consider. The first step after washing thoroughly to remove soldering fluid was to scrape off all the excess solder with a sharp penknife. This is important as a little painstaking care at this stage saves an awful lot of trouble later on. If all the minutest blobs of solder, etc., are not removed, the first coat of paint will be very rough. It is advisable to go over all the joints with very fine sandpaper to remove the little bits missed with the penknife.

The paints used were "Rocket" L.M.S. maroon and ERG eggshell finish black dope. As cellulose doesn't get on at all well with other types of paint, the black was applied first and then the maroon. The

(*Continued on page 319*)

Super TIGRE G.19 & G.20

TESTED BY LAWRENCE H. SPAREY

THE first Italian, and for that matter the first European motors to be submitted for engine analysis, are those of the current Super Tigre range, now in production under new management.

Readers will probably remember the famous Super Tigre GB.16b, 5.65 c.c. diesel which appeared with various forms of induction design during 1947-49, and was probably the most powerful diesel to go into quantity production. That mark, produced by the Osam company at Bologna, gained great popularity amongst stunt control-line fliers the world over, and became known for two outstanding features. Firstly its characteristic misfire which was always accompanied by a puff of smoky exhaust, and more important, its robust construction was such that even though in use at a time when all stunt flights terminated in an undesirable manner, the GB 16b always seemed to survive the airframe.

Recently the manufacturing rights for Super-Tigre engines were taken over by the Micromeccanica Saturno at Bologna and the three types described herewith put into production.

THE G.19A or B.—Retaining the robust characteristics of its predecessors, but successfully eliminating the old tendency towards misfiring, the G.19 can be obtained in either diesel or glowplug form. Still featuring the twin transfer passage, and one-piece cylinder body/crankcase die casting, it bears little further resemblance to the earlier designs.

The exhaust is via four separate ports, disposed one on each side of the transfer ports, the piston is now flat topped and fitted with two rings, and the carburetter is of voluminous proportions and fitted for rotary shaft induction between the two ballrace bearings. Each of these features may be considered somewhat unique, especially the use of rings on the light alloy piston of the G.19A diesel, and reflect ingenuity on the part of the designer Signor Garofali.

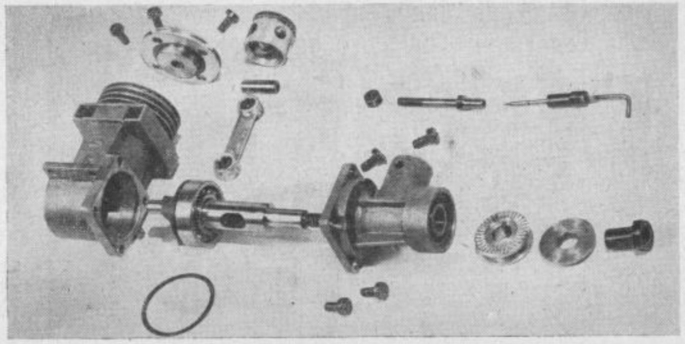
By reducing the capacity to 4.82 c.c. from the 5.65 c.c. earlier designs, the Super Tigre can now compete in the more accommodating 5 c.c. competition class in Italy, where in the diesel form it has already become popular with racing enthusiasts. It has won control-line speed contests, one at 86 m.p.h., as a glowplug engine.

There would seem to be little doubt that with increased experience, Italian modellers should be able to rival the speed figures of other countries if they make full use of the good horsepower that the G.19 can quite easily produce. The maximum .485 b.h.p. compares most favourably with other 5 c.c. engines tested in the analysis. If anything, the diesel version may have an even better b.h.p. figure, though at much lower r.p.m. than the glowplug G.19B tested.

Most thoughtfully, the manufacturers provide a large clock key with each diesel. This is used to vary compression by turning the neat square-ended contra-piston screw. Another feature of the G.19 is a detachable screw plug in the rear of the crankcase which can be quickly replaced by the cut-out valve provided with earlier Super Tigre engines.

THE G.20.—Using a large diameter crankshaft and huge carburetter intake as on the G.19, the smaller G.20 is one of the first glowplugged 2.5 c.c. engines to be mass produced, if not the very first. It is also the most powerful motor of that capacity yet tested in this series, and even rivals several leading 3.5 c.c.s, falling short by .02 b.h.p. or so, despite the concession of 1 c.c. capacity.

Its fuel consumption also merits comment for its economy, and, combined with "first time" starting qualities, it should be an ideal engine for Class 2.5 racing, a size which is growing in popularity amongst the Continental model car fraternity for much the same reasons that have hastened its growth in this country.



The G.19B dismantled displays to advantage its large diameter crankshaft and twin ball-races which contribute greatly to the total 8.6 ounce weight. The flat topped piston has two rings, and two extra holes to contribute to the normalt transfer passage system. Four separate exhaust ports are unconventional features. Unmachined exterior parts are fin:shed with an attractive grey sand-blasted effect.

Apart from the induction system mentioned above, Signor Garofali appears to have employed many of the better features in current racing engine design and has produced the smallest engine yet seen with two piston rings. The additional service of supplying three alternative carburetter venturis is something one might have expected much earlier in the post-war engine market and is to be recommended to other manufacturers. The difference in flexibility and performance between the racing and stunt venturies provided, more than justifies their introduction with the engine.

Availability.—Difficulties arising out of Internation monetary exchange can be overcome by the correct approach through proper channels. An Import Licence is necessary and an International Money Order may be applied for through the local post office. Both items give little difficulty if correctly negotiated. We would suggest that intending British purchasers first contact the manufacturers for their advice, and remember that Purchase Tax and Import Duty collectively add approximately 50 per cent to the cost of the engine when it arrives in Great Britain.

The cost in Italy of the G.19 series is 8,500 Italian Lira (£4/18/-) and the G.20 5,800 Italian Lira (£3/7/-).

TEST

Engine: Super Tigre G.19B, 5 c.c. Glowplug.

Fuel: Mercury No. 5.

Starting: This engine starts easily with needle valve at around 4 turns open, but a prime with fuel on the piston makes things easier. Engine was started by pulley and cord for testing purposes, when no priming was found necessary.

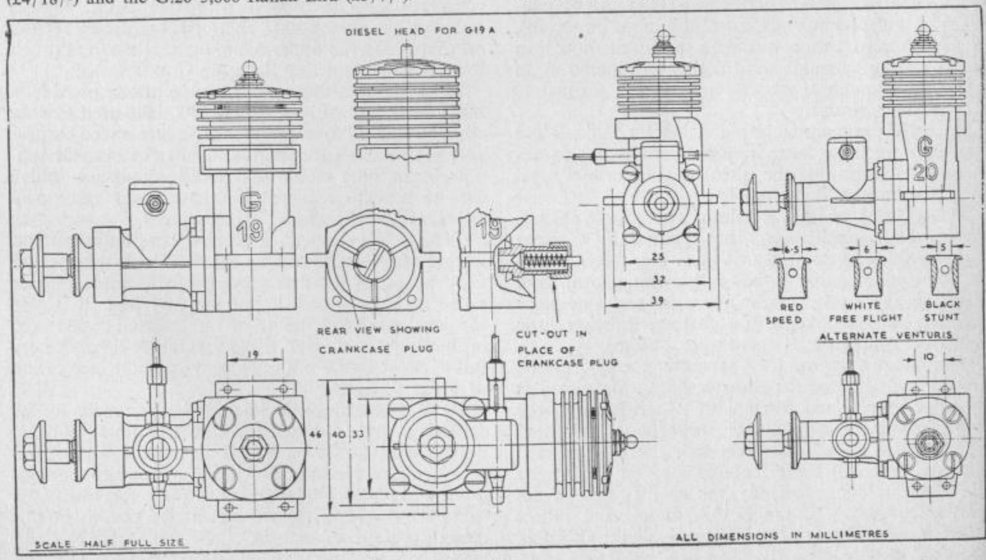
Running: Extremely good over a wide speed range; not unduly sensitive to needle control.

B.H.P.: As will be seen from the curve, tests were recorded at speeds between 5,000 r.p.m. and 15,300 r.p.m. It was not found possible to reach the manufacturers figure of .56 b.h.p. at 15,500 r.p.m. but a very excellent result of .485 b.h.p. at 13,300 r.p.m. was attained. Between 11,000 and 14,600 r.p.m. the curve is exceptionally flat, and the engine may be considered to be performing well at all speeds between these limits.

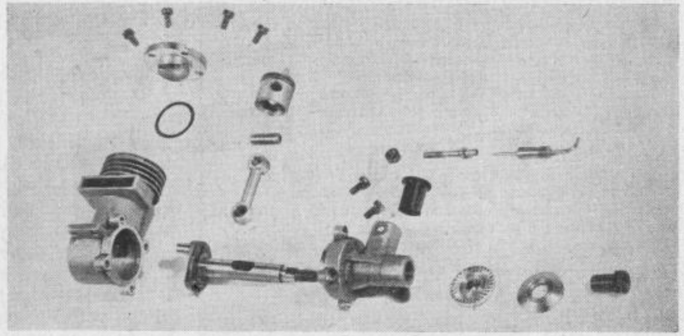
Checked Weight: 8.6 ozs. (less tank).

Power/Weight Ratio: .9 b.h.p./lb.

Remarks: This engine is probably the sturdiest that we have yet encountered, and no concessions seem to have been made to reliability in order to save metal or cramp design. In spite of this, the power/weight ratio is very good, so that we have an engine which should give long life and reliability with an excellent power output.



The 2.5 c.c. Super Tigre G.20 incorporates many features relevant to larger racing motor design. The die-cast piston is fitted with two beautifully made rings, and has the high domed head design generally found in 10 c.c. racing motors. The cylinder head is shaped to accommodate the piston, and the sturdy connecting rod is bushed at the big end. A large diameter ball-race is fitted in the main bearing.



GENERAL CONSTRUCTIONAL DATA

Name: Super Tigre G.19B.

Manufacturers: Micromeccanica Saturno, Via Fabri 4, Bologna, Italy.

Retail Price: 8,500 Italian Lira (£4/18/-).

Type: Glowplug.

Specified Fuel: 66 per cent. Methanol, 33 per cent. Castor oil.

Capacity: 4.82 c.c., .29 cu. in.

Weight: 8.5 oz.

Mounting: Beam, upright or inverted.

Bore: 19 mm. *Stroke*: 17 mm.

Cylinder: Special iron lapped sleeve pressed into die cast body.

Cylinder Head: Light alloy, plain unfinned (diesel version has cooling fins).

Crankcase: Light alloy, gravity die casting.

Piston: Light alloy, two steel rings.

Connecting Rod: Light alloy, bushed each end.

Crankshaft: Large diameter, hollowed.

Main Bearing: Ballraces each end of shaft.

Induction: Rotary shaft inlet valve.

Special Features: Robust construction, large intake area, four exhaust ports.

TEST

Engine: Super Tigre G.20, 2.5 c.c. Glowplug.

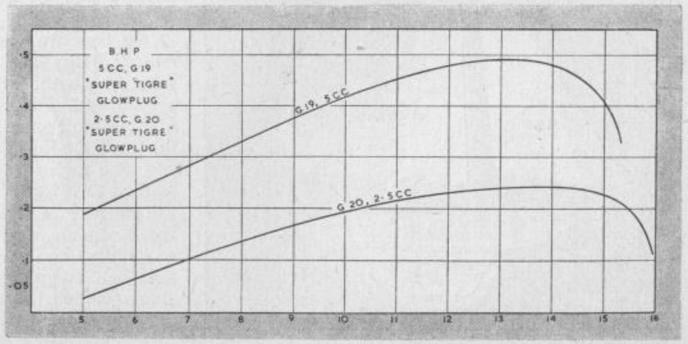
Fuel: Mercury No. 5.

Starting: The engine is supplied with three types of plastic venturi tubes which may be fitted into the air intake of the carburetter. One, coloured red is for racing purposes; one black, for stunt flying, while a white one is recommended for general model operation. The engine was run-in using the black venturi and starting was excellent with good flexibility of needle control. Tests were undertaken with the red venturi in position, and starting was still excellent though the engine was faster and more sensitive to needle control.

Running: All that could be desired over a wide speed range.

B.H.P.: The results from this engine are rather exceptional, not only for the high power output, but for the remarkably flat curve obtained. We thus see that between speeds of 10,500 r.p.m. and 15,000 r.p.m. the variation in output is only .04 b.h.p. so that the engine may be considered efficient over a range of 5,000 r.p.m.!

Maximum output was found to lie somewhere in the region of 14,000 r.p.m. but the extreme flatness of the curve at this point makes it difficult to pin-point within a few hundred r.p.m. The exceptional figure of .24 b.h.p. was recorded, which falls little short of the maker's claim of .25 b.h.p. at 15,500 r.p.m. At this speed, however, our results showed that the output was down to about .15 b.h.p.



Checked Weight: 4.4 ozs (less tank).

Power/Weight Ratio: .872 b.hp./lb.

Remarks: The sturdy construction which is a characteristic of the G.19 is again evident in this smaller edition. This naturally results in an engine of greater weight than we have come to expect in a unit of this capacity. In spite of this, power/weight ratio is high, and long service should again be coupled with excellent performance.

GENERAL CONSTRUCTIONAL DATA

Name: Super Tigre G.20.

Retail Price: 5,800 Italian Lira (£3/7/-).

Type: Glowplug.

Specified Fuel: 66 per cent methanol, 33 per cent castor oil.

Capacity: 2.46 c.c., .15 cu. in.

Weight: 4.25 oz.

Mounting: Beam, upright or inverted.

Bore: 15 mm. *Stroke:* 14 mm.

Cylinder: Special iron lapped sleeve pressed into die cast body.

Cylinder Head: Light alloy, unfinned.

Crankcase: Light alloy, gravity die-casting.

Piston: Light alloy, with two steel rings.

Connecting Rod: Light alloy, bushed at big end.

Crankshaft: Large diameter, hollowed.

Main Bearing: Ballrace at web end.

Induction: Rotary shaft inlet valve.

Special Features: Robust construction, Single transfer passage. Single exhaust port, large bore intake for interchangeable venturis.

History & Development of Model Yachts

"History and Development of Model Yachts" is the first of a new series by Bernard Reeve, M.S.N.R., and provides interesting comparisons with the scientifically built models of today. His next article will deal with more modern types, describing each with notes on displacement, sail areas and rating rules. There will also be some instructions to the beginner on sailing with the Braine steering gear.

A further article will cover the future of the sport, including observations on the possibilities of some extension in the use of radio control for model yachts. A design of the author's embodying ideas for a new experimental class of model should provide additional interest.

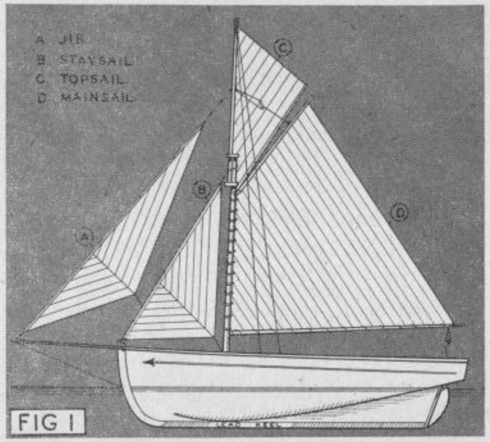


FIG 1

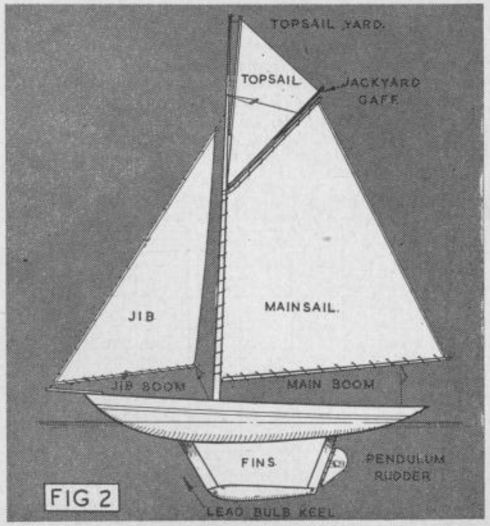


FIG 2

HOW old is the pastime of building model sailing boats? I very much doubt whether there is any individual who would be prepared to answer this question with any degree of chronological accuracy for the art is lost in the mists of time.

Proof of its antiquity has been confirmed by finds in the tombs of the Egyptian Pharaohs as far back as the XII Dynasty; some of the best examples coming from the tomb of Tutankhamen. It is doubtful whether these models were ever intended to be sailed; it is far more likely that they were the forerunners of the votive ship models one sees suspended from the roofs of many Continental churches.

Models have also been found during excavations in the Near East whose age is authoritatively stated to be 10,000 years. Similarly, at Ur of the Chaldeans an exquisitely modelled nine-oared canoe of silver was found. Antiquarians dated this model at 3500 B.C. This is, of course, of purely academic interest, and is only included here to show that our hobby is one of the oldest in the world.

In order to trace the development of the modern sailing model it is only necessary to go back to the beginning of the present century for this appears to be the date when actual sailing models came into prominence in any numbers on an organised basis. Fig. 1 illustrates a model of this period. Its design was based upon a smack or small coaster, and the science of naval architecture as applied to model yachts did not enter into the scheme of things. Usually the model was carved from a solid block of yellow pine until it pleased the eye. It was cutter rigged, the main mast fitted with a topmast and the main sail attached by means of mast hoops, as in the prototype.

These boats must have been very difficult to sail on a straight course as there was no attempt to balance the sails to the hull, and of course, there was no such thing as automatic steering. The rudder was usually fitted with a tiller which engaged with a toothed rack on the deck.

The next step was one in the right direction (Fig. 2) for here we see a model designed specially for racing. Many of my older readers will remember these craft with their metal fins to which was attached a bulb keel. They were sloop rigged and fitted with a single pole mast together with a boom and gaff, to which the sails were laced. Steering had advanced and now took the form of a brass pendulum rudder hooked to the after end of the back fin.

This type of rudder is shown in Fig. 6 and consisted of plate, usually of 16 gauge brass. This plate was slotted and carried a screwed rod upon which a lead ball was threaded. This ball could be moved along the rod to any desired position, according to the course being sailed. The action of this, and other types of swing rudders, is such that as the boat heels over when the wind hardens, the rudder swings over thus applying more helm, bringing the model back on her course.

When running before the wind the weight was screwed right to the end. With the wind on the beam, i.e. reaching, the ball would be near the stern post end.

When beating, i.e. sailing into the wind, it was usually possible to dispense with the rudder altogether as under this condition the model would sail a true course provided the hull had no vices, such as twisted fins, or other defects in building.

Designers now began to take a more active interest in the design of models for racing purposes, and to apply a modicum of science which for years past had been devoted only to full-sized yachts. In fact one began to see the influence of the yacht architect's half models. Fig. 3 shows a further advance in design. Here we have a more modern type of canoe body with a full wooden keel. The model was still a gaff rigged sloop with sails laced to their respective booms and the rudder was still of the swing type, but of a different pattern, details of which are shown in Fig. 7.

It was usual at this time for the model yachtsman to carry about half a dozen of these rudders of varying weights to meet all conditions of weather and course. Another version of the swing-type rudder is shown in Fig. 5. This consisted of a nicely fitted stock and blade balanced on a pintle bearing. The lead weight was adjustable along the length of the tiller—which pointed aft—and its action was such that as the boat heeled the weight swung to the side heeled with varying pressure according to the position of the weight, thus putting the rudder a'weather and acting in the same way as the brass rudder previously described, but with more pressure.

An event now took place which revolutionised the handling of model racing yachts. Just prior to the first World War Mr. G. Braine of the M.Y.S.A. invented the automatic steering gear bearing his name. Its success was immediate for models fitted with the old-fashioned swing rudders which were erratic or completely unmanageable under certain conditions of wind now behaved as well-bred yachts should.

Although this gear is well known to all model yachtsmen there may be many newcomers to the sport not so familiar with it and for their benefit I have illustrated the gear in Fig. 8 which is a diagrammatic layout and not drawn to scale. This device consists of a metal quadrant (1) shaped as shown attached to the rudder head by means of a 6 B.A. screw. Immediately behind the tail of the quadrant is a metal slide (2) which travels the full length of the guide. The rubber cord (3) is anchored to the after

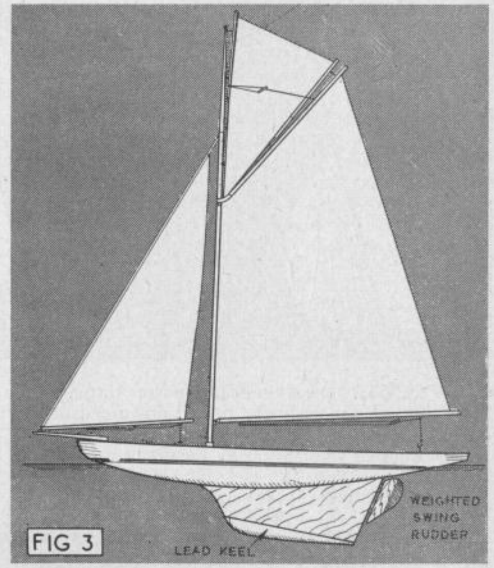


FIG 3

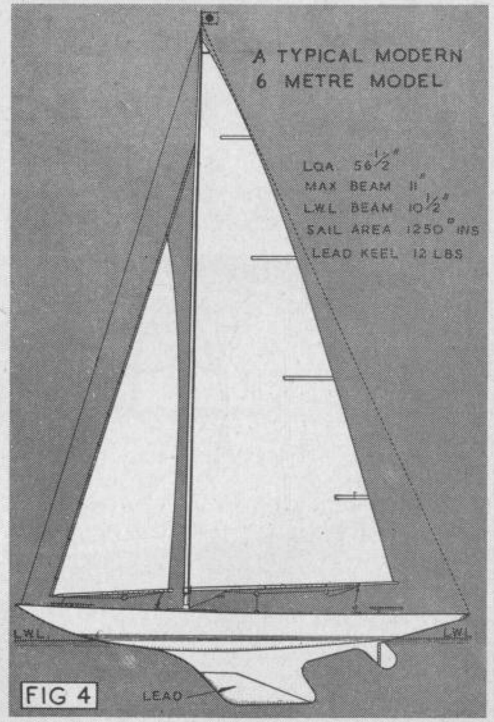
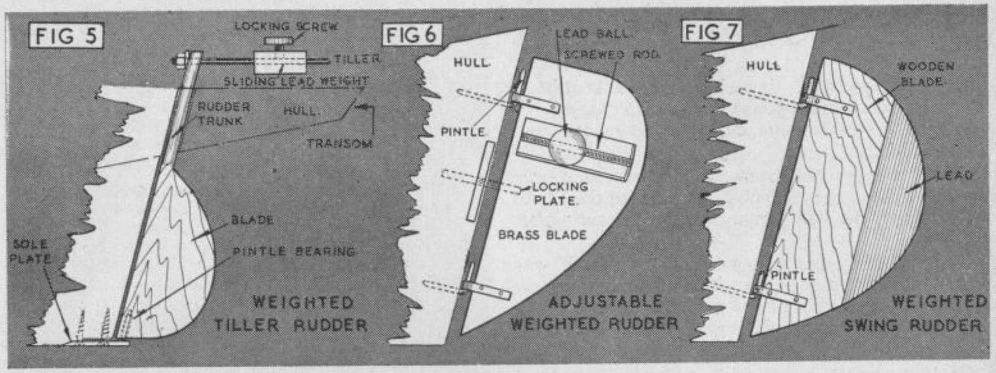


FIG 4



end of the deck and is double. It passes through the slide, through a hole in the turned down end of the quadrant, passes on either side of the rudder head and is adjusted for tension by means of a cord and bowsie (4)

A pair of pulleys (5) are screwed to the deck, using a link so that they can swing freely. These are for the steering lines (6). Looking at the main-boom (7) it will be observed that there is a jack line to which are attached two circular bowsies (8), one for the steering lines and the other for the beating sheet.

The steering lines, which must be exactly equal in length, are connected to the inner bowsie, pass through a ring on the boom, through the pulleys and are attached to a pair of quadrant hooks which engage with one or other of the holes drilled in the fore end of the quadrant.

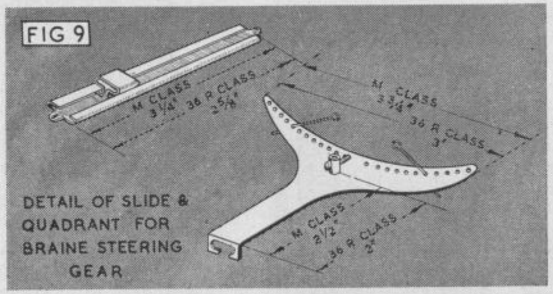
Astride of the quadrant will be seen the main horse (10) and traveller (11) to which is attached the beating sheet (9). This is only used when sailing close-hauled, the Braine gear being slacked right out and not operative when sailing under these conditions.

It is usual to calibrate the main boom as shown so that the correct setting of running lines and beating sheet can be repeated.

It is of the utmost importance to see that the rudder is completely free in the trunk, not loose, for the rudder must be free to return to the central position as soon as pressure is released. The accepted method of doing this is to drill a $\frac{1}{16}$ in. clearance hole $\frac{1}{8}$ in. into the lower end of the rudder stock and make a pointed bearing of $\frac{1}{16}$ in. rod soldered to a sole plate screwed to the bottom of the skeg.

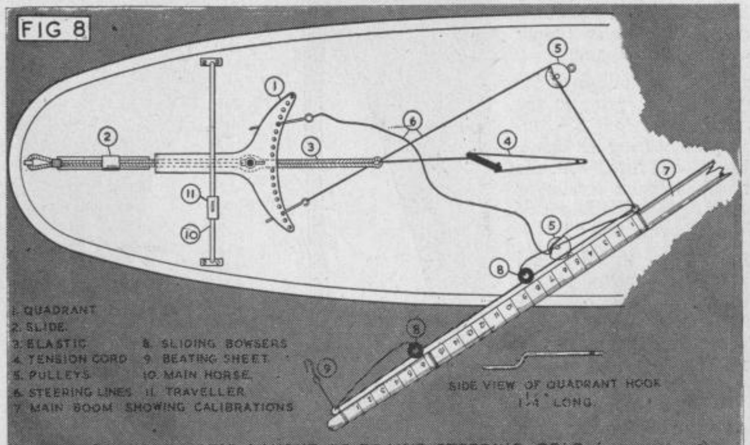
Fig. 9 gives details of the Braine gear dimensioned for "M" Class and 36 in. R Class models.

FIG 9



DETAIL OF SLIDE & QUADRANT FOR BRAINE STEERING GEAR

FIG 8



DIAGRAMMATIC LAYOUT OF BRAINE STEERING GEAR (NOT TO SCALE)

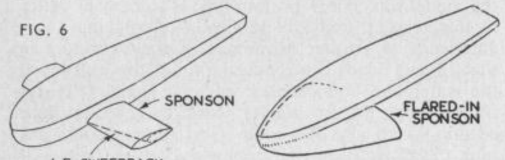
Model Speedboat Hull Design

PART II

BY A. M. COLBRIDGE

Frequently, then, a local widening of the beam is used, in effect the incorporation of a sponson (Fig 6). The sponson, pure and simple, is a sort of stub wing projecting from the sides of the hull. For various reasons it is desirable that the leading edge be swept back and so often the sponson is roughly triangular in form sweeping out from the nose lines of the hull. This is a typical form of racing boat hull which has given very satisfactory results, where the angle of sweepback is large. Theoretically it would appear that the best angle of sweepback is in the region of 30 deg., although there is no apparent harm in exceeding this.

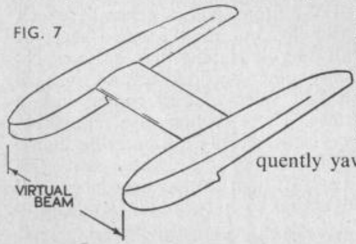
FIG. 6



The sponson-type hull has very good planing characteristics, and usually good longitudinal stability, unless it is badly shaped so that it can dig in and dive the hull. All the stability features overlap, and it is difficult to differentiate one from another, but we shall deal with longitudinal stability in more detail a little later on.

The final hull type which can be considered as giving maximum lateral stability is the twin-float layout where vertical centre of gravity position is of relatively small consequence (Fig. 7). Here the complete hull is really two separate hulls or floats joined by a suitable deck or fairing which normally rides completely free of the water. On or in this fairing can be mounted the power unit. With proper float design and wide float spacing this type should give little or no lateral stability troubles. Any instability is more likely to result from longitudinal instability resulting in porpoising or one float digging in and consequently yawing the boat.

FIG. 7



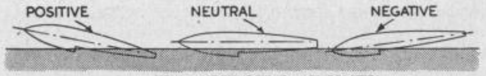


FIG. 8 TRIM ATTITUDES EXAGGERATED

The actual longitudinal attitude the boat will assume on the water will depend on the relative positions of the centre of buoyancy and the centre of gravity (Fig. 8). If the centre of buoyancy is in front of the centre of gravity the hull will trim by the stern. Centre of buoyancy behind the centre of gravity will give a trim by the nose, whilst when the two coincide the trim will be neutral.

FIG. 9 PLANING FORCES INCREASE POSITIVE TRIM

Of the three it seems that a trim by the stern of about 2 to 3 degrees is best, which means a slightly smaller afterbody submerged volume. When planing, the water forces on the forebody will then most likely give a further rotating movement to increase the running attitude to some 4 to 5 degrees trim by the stern which will keep the bows nicely up.

Planing attitude is obviously important and there are three possible sources of longitudinal instability. An exaggerated trim by stern, for example, may tend to bound the model off the water, or the aerodynamic life generated by the forebody may have the same effect. Trimming by the nose the bows may tend to dig into any wave and possibly carry the whole boat under water. A further possible instability is porpoising where the hull rocks up and down about its lateral axis, first nose up, then nose down, and so on, this movement being progressive until the boat eventually overturns or dives under.

Porpoising is a peculiar fault and one which is not always readily eliminated when it occurs. Improper hull design, exaggerated trimming attitudes and step location relative to C.G. position are contributory causes, and a change of C.G. is apparently the simplest cure, although an inherent design characteristic, such as a low length: beam ratio, may be the primary cause. A reasonable hull *length* is desirable for longitudinal stability and so with a single hull a broad, reasonably long but very shallow hull is the logical outcome.

On generalisations the twin-hull layout would appear to be very much superior. A narrow (actual) beam, as possible with twin hulls, gives low resistance at planing speeds, a broad beam high resistance when planing. Greater length is also possible with the twin-float layout for improved longitudinal stability. However, with the very broad hull there is a considerable suction pressure at the step when planing which can be a help in holding the hull on the water. Ideally, it would appear that the length on the water line needs to be some four to six times the beam for good longitudinal stability—a figure which is seldom achieved in practice on account of the proportionately broad beam required for other reasons. Here the sponson type hull offers a suitable compromise between these two conflicting requirements.

The location and size of the step is also a matter of considerable importance although, contrary to popular belief, it does not appear that the depth of the step is particularly critical. A deep step, however, improves planing and so it is as well to err on this side.

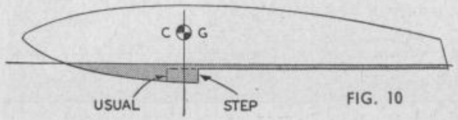


FIG. 10

Another apparent anomaly is that on theoretical grounds the step should be located behind the centre of gravity (Fig. 10), although in practice the reverse is usually true, or attempts are made to get the step on the centre of gravity line. And step location is important for proper planing and stability.

The difficulty associated with an aft location for the step on model hulls appears to be that the forces on the forebody developed during planing are apt to become excessive and give an exaggerated trim by stern attitude. On meeting a wave or small disturbance the hull is thrown completely out of the water. Also, using high power, there is not the necessity for a large planing surface since the operational speed is high and so once again a compromise solution is reached with the step rather forward of the centre of gravity. Some designers have, indeed, carried this to extremes. Others have preferred to work the step as near to the centre of gravity as possible.

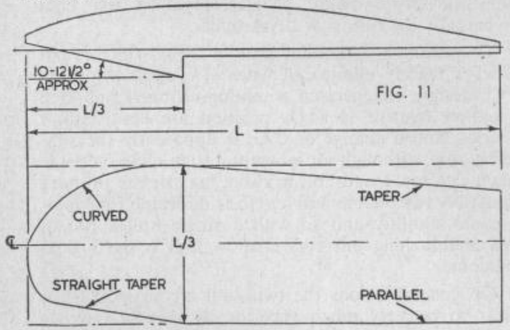


FIG. 11

The various shapes and proportions of hulls which can be evolved around the basic general rules for stability and performance are numerous, but in the main fall into two definite types, with variations on these. For the smaller models, and indeed retained in the larger sizes, is the simple scow type which generally takes the form as shown in Fig. 11. Construction is simple for the hull is generally slabsided. A broad beam is employed and the step is a simple rectangular affair the full width of the beam.

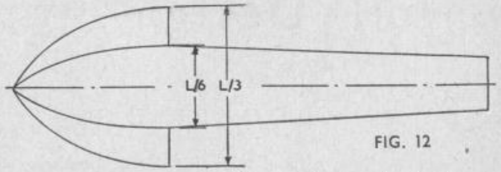


FIG. 12

The development of this, used more in the larger hulls, is the fitting of sponsons—or rather, the incorporation of sponsons in the hull line, to get increased beam locally in the region of the step (Fig. 12). The main hull then preserves a greater fineness ratio, and the top may be rounded or streamlined off. In both types, however, the basic underwater cross section is still rectangular.

The purely rectangular float or hull is simple and straightforward, and has good planing characteristics. Its major fault from the point of running is that water tends to run up the sides at speed and make the model wet. The V-bottom type is somewhat better in this respect, and still retains good planing characteristics. A further advantage of the V-bottom is that impact loads are reduced should the hull leave the water and bounce back on to it again. It is definitely superior for model work to another float section which also has quite good planing and running characteristics—the rounded bottom type. All of these are shown in Fig. 13. The latter, in fact, could be classified as definitely unsuitable for speed work on single hulls.

FIG. 13

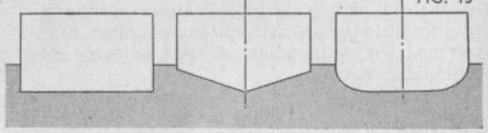
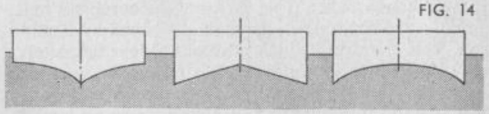


FIG. 14

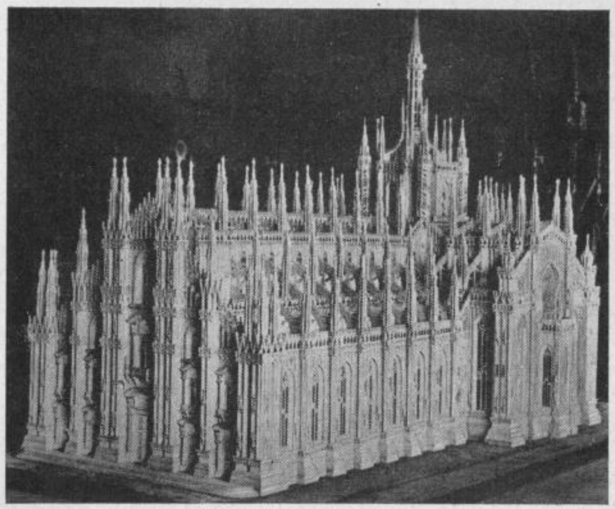


Three further sections are shown in Fig. 14. The first has a curved V-bottom, and is generally excellent as regards running, but throws out a sheet of water, and overall drag at planing may be unexpectedly high. The two other sections feature concave bottoms, one straight sided and the other with a curved undersurface. These sections are reputed to run and plane very satisfactorily but be rather harsh in action. Nevertheless they have been used with considerable success. At high planing speeds the hull approximates somewhat to a twin-hull design with

(*Continued on page* 298)

A Gem

FROM THE RICHOLD COLLECTION



THE model shown in the accompanying illustration is valued at £20,000 and is considered to be the most remarkable piece of miniature architectural work in the world.

A replica of the Milan cathedral—which in its turn is spoken of as the "eighth wonder of the world" — the model is a masterpiece of faithful reproduction, being complete to the last of its 126 spires—each of which is surmounted by a cross or statue. Over 8,000 separate pieces were used in the construction, and the work took just on five years. White holly is used throughout and the dimensions are 5 ft. long, 3 ft. wide and 3½ ft. high.

The windows are glazed with stained glass and by switching off all external lights and switching on lamps inside the building a charming and wonderful effect is obtained.

Completed in 1898 this remarkable piece of work lay for the first 25 years of its life stored away in the home of its maker, but since 1934 is has been on public exhibition in every part of the country. During this time it has been inspected by over 1,000,000 persons and has travelled more than 100,000 miles. Despite the necessary handlings (it has been in and out of its case a thousand times) the model is as perfect as the day it left the hands of the craftsman—not a piece is displaced, not a sign of warp or twist has made itself manifest.

Glue has been used throughout, and it is a surprising fact considering the various atmospheric conditions which have been experienced, that no parts have ever come adrift—a testimony to the very perfect method of glueing adopted. The model came very near to destruction however, during the war. It was being stored in the goods station at Brighton under one of the platforms. A bomb fell very near, but when the case containing the model was dug out from the debris, all was found to be well.

This remarkable piece of work comes from the hands of a Yorkshireman—Mr. Richard Old. Born in Staithes (North Riding) Mr. Old moved at an early age to Middlesbrough and it was here in a small room lit only by oil and candles, that the model took shape and grew.

An ardent craftsman, Mr. Old, during 32 years of incessant spare time work turned out some 767 models which are now massed together as the "Richold Collection".

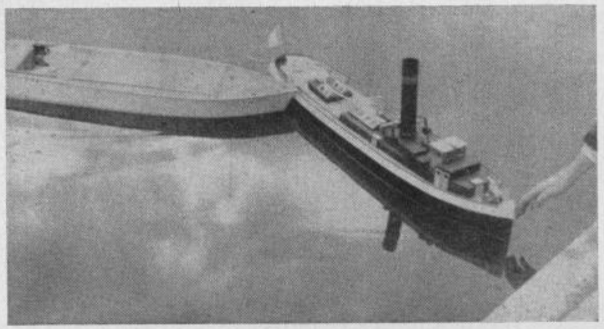
Quite a number of the efforts are as pretentious as the Milan miniature, though this is regarded as the queen of the set. Thus we find a perfect replica of the Ulm cathedral made to a scale of 1 in 60. This is no less than 9 ft. high, 8 ft. long, and 3 ft. wide. It took 4½ years to build, eight different kinds of wood are used, and it is the largest model in the collection. St. Paul's cathedral also appears, and a particularly fine model of Chartreuse Monastery. This latter is scaled to 1 in 50, has over 4,000 pieces, and took four years in the making. St. Paul's has not so many pieces and is scaled to 1 in 150.

Some 75 different woods have been used in making the models, and their added values are estimated at £500. Forty-two ordinary woods are employed, twelve that are described as rare, and eleven as very rare. Among the latter are Gum Wood, Amarinth, Cedar of Lebanon, Hungarian Ash, and Borneo Rosewood. Among the rare woods are Tupla, Magnolia, Lance Wood and Padouk.

By profession Mr. Old was a cabinet-maker, to which he later added the allied trade of organ-maker, and all his modelling was carried out after hours. So keen was he on his miniatures that he seldom went to bed before 2 a.m., and on occasion stayed up right through the night. Each model of any size was given its own packing case (and there are 128 of these) but so small was his house at Middlesbrough that he had to work out minutely how to get each one into the road.

The models eventually overflowed into every room and some of those that were constructed on the upper floor could only be got out by going through a window—the frame of which had first to be removed. As the collection grew Mr. Old put down the details of removal on paper and these now exist as an interesting, but no longer wanted book of rules.

Add this Freelance Model Tug to Your Fleet



Model rescue! Scene from French "Mini-watt" radio control contest. The launch is retrieving the tug that had broken down in mid-pond.

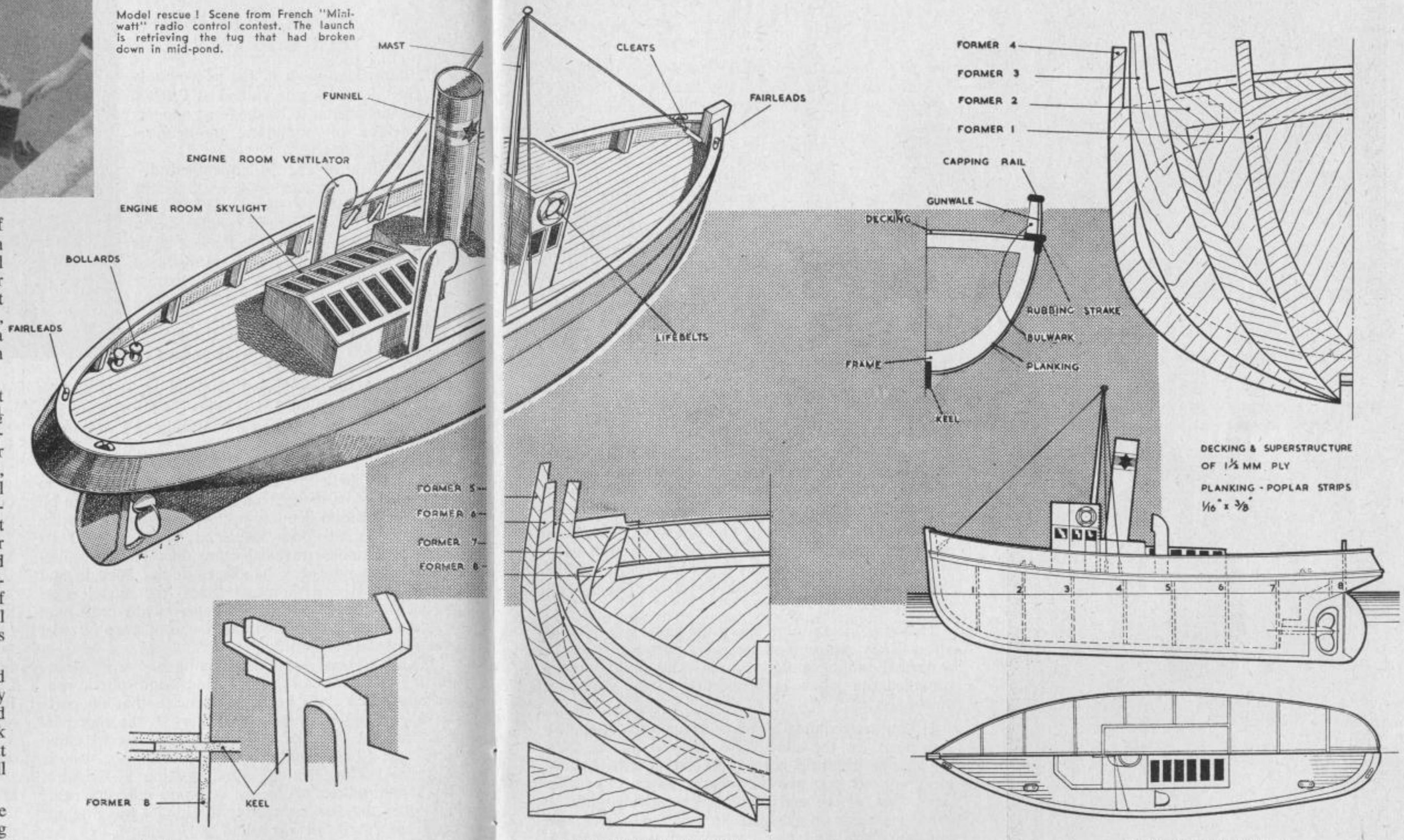
THE ugly ducklings of the seas have an appeal of their own, so that we are surprised that such craft as tramp steamers and tugs have found so small a place in model makers' affections, where sleek river cruisers, naval craft and speed boats hold almost undisputed sway. Nevertheless when, rarely enough, such a model appears at the pondside it attracts a welcome degree of attention, perhaps by very reason of its novelty.

The tug we are offering is quite small, being about 2 ft. 4 in. in overall length, with a beam of approx. $7\frac{1}{2}$ in. The "bread-and-butter" method of hull construction has been passed over in favour of planking over frames which is not only stronger and lighter but, in our opinion, far more interesting a constructional method. Poplar was used in the original as it happened to be the most readily available wood, but there is nothing to prevent the use of bass, pine or even balsa of a suitable grade. Superstructure and decking is more satisfactory if made of thin three-ply, but even here some latitude is offered, and if cedar or "cigar-box" woods is available it can well be used, strengthened with small gussetting blocks fitted in the interior of the deckhouse, etc.

Much of the realistic appearance of the finished boat depends on the finish. Full-size tugs are usually painted in strictly utilitarian colours of dull reds and blacks or dark greens. It is a pity to have too spick and span a finish, an air of use is imparted by matt rather than gloss paint, it will not stand up so well to immersion in water.

Deck fittings, fairleads, cleats and bollards can be either made up with brass wire, sheet and a soldering iron, or can be purchased ready-made for a few pence. The engine room skylight can be readily built up with two sheets of celluloid the size of the whole skylight, sandwiched between two fretted-out sheets of thin three-ply of $\frac{1}{16}$ in. and $\frac{1}{32}$ in. These are cemented together and clenched with small brass panel pins.

No mention has been made of motive power for the tug. This is essentially a matter of choice. Simplest installation is undoubtedly one of the smaller electric motors produced specially for marine use. Batteries will help in adjusting trim. A small diesel engine of under 1 c.c. capacity will be the most popular choice, for example, the little Mills .75 c.c. or the Amco .87 c.c. would be quite large enough to provide adequate scale speed, and an astonishing degree of strength in pulling out of weeds on occasion. To give access to engines the engine room skylight should be removable or the whole of the decking can be made detachable if preferred.



DETAILS OF THE COUNTER

FORMERS APPROX. HALF SIZE

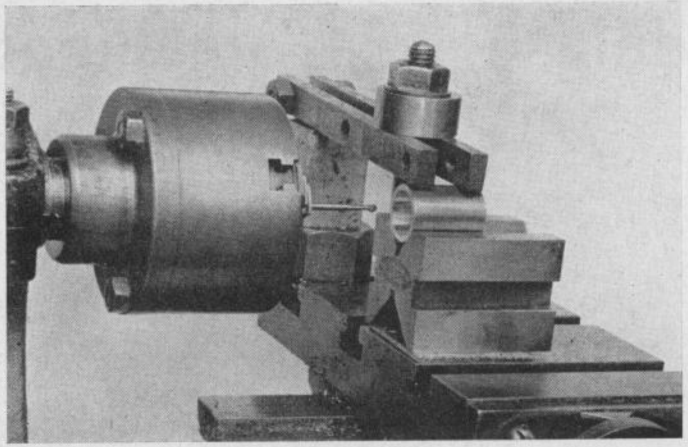
APPROX. ONE-EIGHTH SCALE

Propeller must be matched to whatever form of power unit is installed. Here again it can be bought ready-made or built up at home. If made at home it is suggested the blades are made of brass sheet soldered to a streamlined boss. Having twisted the two blades to the estimated angle it will be necessary to conduct several test runs to discover the most efficient angle.

For those experimenting with radio controlled boats, this little tug offers a delightful "test-bed". There is ample room for the installation of all necessary apparatus, particularly if one of the smaller proprietory receivers is installed. A full and quite ambitious range of movements is comparatively simple on craft of this nature as opposed to the simpler movements recommended for model aircraft. Left and right rudder, start, stop, half speed and half speed astern are all practical.

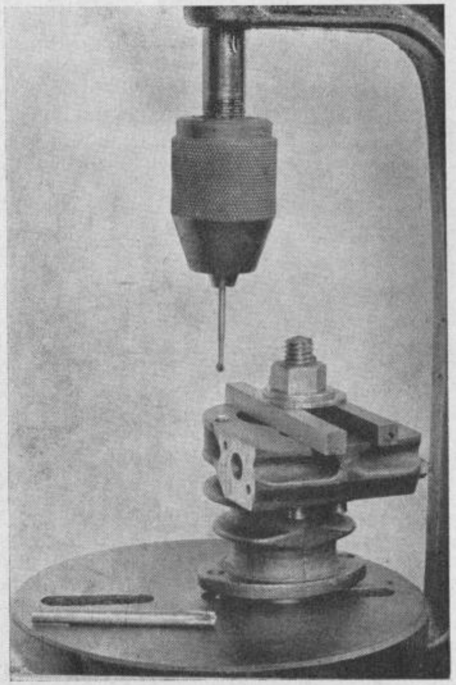
. . . An Unsuspected . . . Friend

INTRODUCED BY L. C. MASON



Above : Using a ball ended burr in the lathe to mill an oil groove along the inside of a bearing bush.

Below : The broken tap technique. Drilling out the broken tap end with a ball ended burr.



HAVE you been to the dentist lately? It is almost worth while making an appointment straight away, for the sake of the help he can give you in the workshop.

Perhaps you have painful memories of teeth being drilled, when you will remember he fitted what he calls a "burr" in a movable drill-head and proceeded with the excavating. The photograph shows a typical group of these burrs. They come in all shapes and sizes, and with both long and short stems. They are made of top quality steel, and the close-up picture shows them to be very near relatives of the familiar workshop milling cutters. The outer enamel on teeth is extremely hard, so that it does not require a lot of use with one of these cutters before it is too blunt for comfortable use by the dentist. When it reaches that stage, he throws it away. You will find though, that it is still plenty sharp enough to put up an impressive performance on mild steel.

On your next visit, ask him for a few discarded ones. He will think you crazy, of course, but when you explain what you want them for he will produce you some with the amused air of one humouring the eccentric.

However, never mind that—the gain is very much yours. They can be used for every purpose for which a normal milling cutter is used, plus a lot more—provided the job is in proportion to the cutter, of course.

If you are building a steam engine, involving cutting ports for the slide valve, try out one of these for shaping the port corners. It makes a beautifully clean job. If you get one of the larger cylindrical ones, look at the end under a magnifying glass. It even has teeth on the end. In other words, it is a miniature side and face cutter, and you can use it for tiny end-milling jobs. You will also see that the cutting edges are notched into teeth. You can ignore this, because the teeth are cut screw-wise, so that in spite of a series of teeth the cut is still smooth. Owing to the extremely small depth of tooth it will require frequent clearing, but it gets there in no uncertain fashion.

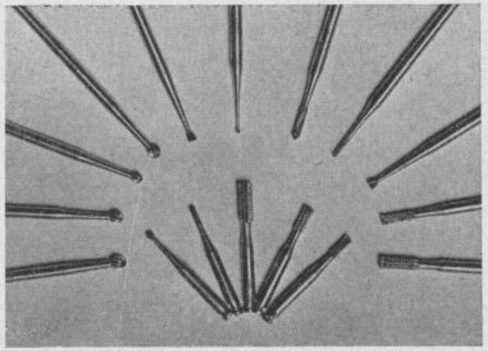
One type—shown in the close-up—has a ball-ended head, with comparatively large cutting edges. This one too, will cut when used as an end-mill. For rounding the hollow in the top of a tappet where a petrol engine push rod will seat; for the bottom of that deep, narrow slot forming the transfer port in that two-stroke—it might be made for the job!

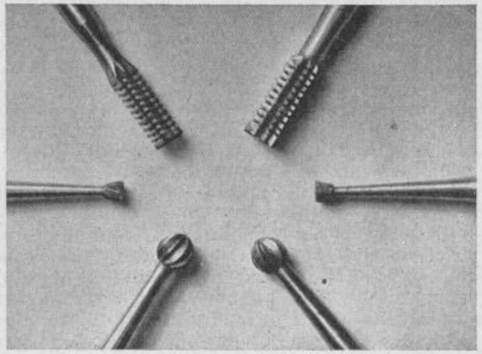
Have you ever broken a small tap off flush, when tapping the last hole in a casting? Quite so! You will know of several ways of dealing with that, but many of them are not a practical proposition in sizes like 6 B.A.

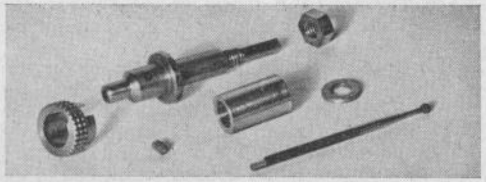
Here again, the dentist's tool can save the day. Select a small round-ended burr, and start in to drill straight down the core of the broken tap end. They are hard enough to drill quite normally straight through an unsoftened tap! If you pick the right size, all that will be left of the tap end is a fragile coil in the threads already cut. This can easily be broken up with a stout needle and the fragments shaken out. A fully machined experimental chuck body in solid steel was saved in this way, when the author was unlucky enough to break off a 2 B.A. tap flush, leaving about ½ in. in the hole.

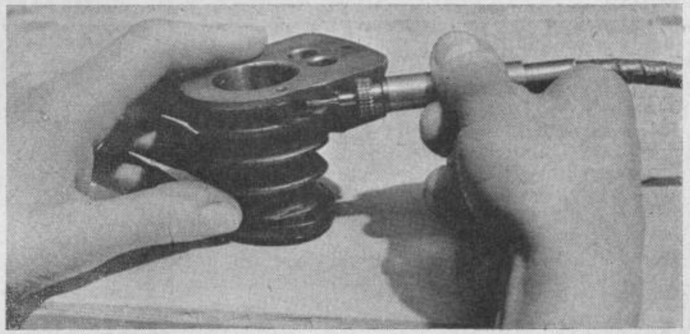
Of the drills shown in the photo, you will notice that the long ones have parallel round stems, while the short ones have a keep groove and driving flat on the holding end. These appear to be a standard size, as burrs from several sources all mike up the same. This suggests that a small holder for hand use, driven by a light flexible shaft, would be very useful. Such a tool is shown in the drawing and photos. It is machined up from the solid in mild steel, and when driven by the flexible drive of an ex-R.A.F. radio tuning control, makes a workshop addition with scores of uses.

One is in the cleaning up of those inaccessible little nooks and crevices in castings. A little freehand smoothing down makes a world of difference to the







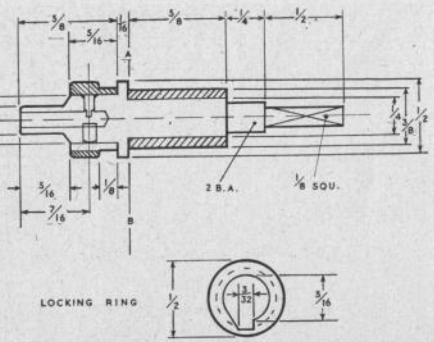


Top : Group of typical dental burrs, showing assorted shapes of cutter heads, and two standard sizes.

Upper centre : The ends that cut. What a few of the more common shapes are really like.

Lower centre : Holder for short burrs dissembled, showing components. In the foreground is the special D-bit made from a long-stemmed burr.

Bottom : Cleaning up a casting with a rough burr in the hand holder.



appearance of a casting which is machined elsewhere. With some of the smaller burrs—smaller than a pin-head, some of them—it is most fascinating to try some fancy engraving on odd pieces of metal plate.

And on the subject of engraving, this should prove a useful tool to the people who do small carving. A minute figurehead in hardwood or bone for a miniature old-time ship model should not be beyond the skill of some ship modellers. Mounted in the toolpost and driven either by a flexible shaft or overhead gear, it could be a useful accessory to the ornamental turner, too.

The actual holder is comparatively simple to make, being straightforward turning and drilling. Take care to keep holes true to size and truly in line. Material required is $2\frac{1}{16}$ in. of $\frac{1}{2}$ in. round mild steel. The part of the drawing to the right of the line A-B comprises that part forming the bearing and drive end. In this case it consists of a $\frac{5}{8}$ in. length of $\frac{1}{4}$ in. dia. journal, a $\frac{1}{4}$ in. length of 2 B.A. thread for a retaining washer and nut, and a $\frac{1}{2}$ in. length of $\frac{1}{8}$ in. square for the drive.

Chuck the rod in the 4-jaw and machine up this end first, to suit your own ideas and facilities for driving. The journal runs in a phosphor bronze bush and is retained by a steel washer clamped against the end of the journal by a 2 B.A. nut. The bush is a light press fit in a turned housing on the end of the flexible drive casing, thereby holding the whole unit together.

To machine the outer end, reverse the job in the chuck, gripping it truly by the journal. Turn to shape outside and centre the end very lightly. The shanks of both types of burr are .092 in. dia.; this is 13 s.w.g. There is no drill available exactly this size, even in the metric sizes. The nearest is No. 43 (.089) or No. 42 (.0935). This gives a choice of procedures. You can either drill No. 42 and have the burr $1\frac{1}{2}$ thou. slack, or drill No. 43 and ream out dead to size. The latter is best, and is easier than it may sound. Merely select the least useful looking burr having a long shank, and make a "D-bit" reamer out of the driving end of the shank. File it down to the familiar D-section for $\frac{3}{16}$ in. or so, making it exactly .046 in. thick. Harden and temper to straw colour, as for silver steel. Touch up the cutting edge with a light rub of the flat on a carborundum slip, and there you are.

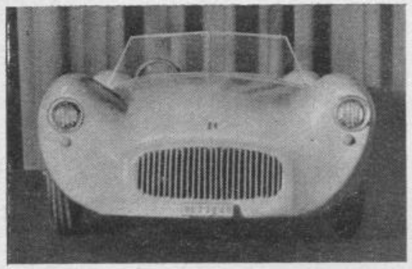
Drill, or drill and ream to $\frac{9}{16}$ in. deep. Remove from the chuck and cross drill the $\frac{5}{16}$ in. dia. where shown, $\frac{1}{16}$ in. right through. Open up one side to $\frac{3}{32}$ in. and slightly countersink the other $\frac{1}{16}$ in. hole. Insert a short burr in its hole, and peg into the $\frac{3}{32}$ in. hole a stub of $\frac{3}{32}$ in. silver steel rod, nicely flat on its inner end. This will be a plug to bear on the flat of the burr and drive it. Turn the burr round until it is felt that the plug is bearing squarely on the flat, then mark around the plug where it should be cut off and filed down flat to fit flush with the $\frac{5}{16}$ in. dia. of the holder.

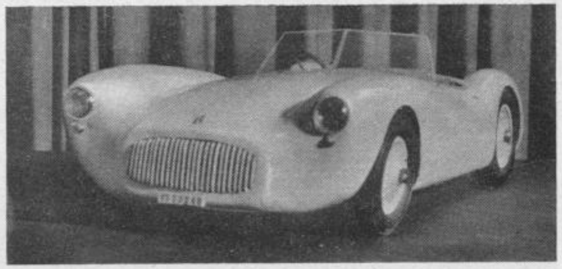
The $\frac{1}{16}$ in. hole the other side houses a pin, the inner end of which is filed to a screwdriver shape until it engages snugly in the keep groove of the burr. Knitting needle is suitable for this, softened and reduced if necessary to a tightish fit in the hole. Adjust the pin in its hole until it retains the burr firmly. Turning the burr to bring the flat opposite the pin should free it for withdrawal. When this position for the pin is arrived at, sweat the pin in place with a tiny fillet of solder in the countersink, and file off flush.

The driving plug is held in position by a knurled ring round the holder body. File a square bottomed "keyway" in the ring, $\frac{3}{32}$ in. wide, so that when the burr is turned to release it from the retaining pin, the flat will act like a cam and lift the plug into the ring keyway.

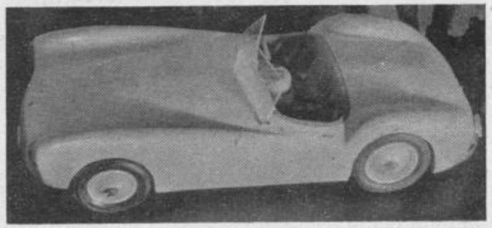
On inserting the burr, it is presented flat to the pin, turned to engage the pin in the keep groove, and then the driving plug locked down by turning the ring. The keyway in the ring is sloped off on one side, so that turning the ring wedges the plug home.

Adjust the thin skirt of the ring so that it grips the holder securely, then nothing can fly off in use.





Model Cars in SWITZERLAND



ENCOURAGING NEWS OF MODEL CAR PROGRESS BY THE SWISS MODEL CLUB

BY M. PHILIP ROCHAT, OF BASLE

NOT to be outdone by the fast development of model car racing in Italy, as reported in our March issue, we now learn that the Swiss Model Car Club is making fine progress in a quiet and modest way, typical of the usual attention to detail in precision work that has so long been associated with the mark "Swiss Made".

Our correspondent, M. Philip Rochat of Basle, gives an interesting account of their initial club activities, entirely devoted to the construction of a good group of cars, on the principle that when they have the cars to race then will be the most suitable time to worry about the provision of a track. Potential owners of premises or sites are far more likely to be responsive when they can actually see the models that would be using them. If the fine shots of our friend's freelance Mille Miglia model are a fair example of the trend in Switzerland, then we feel sure there will be no difficulty in finding a wide range of alternative sites on offer!

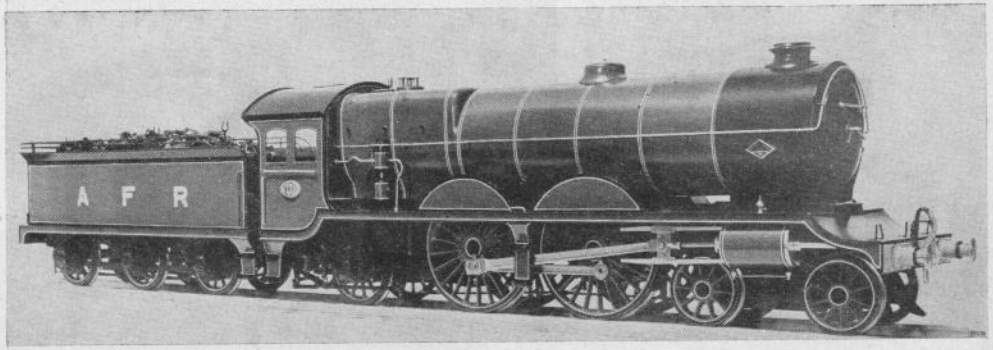
In addition to the car illustrated M. Rochat has a "kitchen table" — how that phrase does crop up, it might almost justify founding a K.T. Club!—Maserati 4CLT, mixed up, as he puts it, with an Alfa 158. The body is of balsa and the chassis in light metal. Front and rear suspension is independent. Transmission has been something of a problem as the driving wheels are sprung vertically. A French Micron of 10 c.c. capacity is intended for this car, but until improved workshop facilities are available in a new house—lucky man!—this engine is being run in as the power unit of the Mille Miglia type illustrated. This model has a balsa body, while chassis is strongly constructed of plywood in a manner reminiscent of our own Managing Editor's early SS100 model, now in honourable retirement. Engine is built in vertically between seat and dashboard, and fitted with an Italian centrifugal clutch. The driving axle is not sprung; but i.f.s. is embodied by means of two transverse flat springs. Overall length is 21 in., width 9 in. Finally his stable is completed with a Thimbledrome—though we are not informed whether this is of the powered or whip variety.

Model clubs in Switzerland—we speak in particular of aeromodelling clubs we have visited—are generally more practically organised than equivalent British bodies. Membership is usually to some extent governed by the extent of the workshop equipment that can be used at the club headquarters. In this connection some of the Swiss tool manufacturers have been very generous, though it must be remembered that model aircraft clubs have a strong governing body to plead for them, a facility that would be lacking to the model car fraternity as yet. However, once the initial batch of cars is ready we have no doubt there will be substantial canvassing of likely sponsors.

Our friend M. Rochat expressed some diffidence in writing to us in English, and in case other would-be correspondents are reluctant to write for the same reason, we would assure our overseas readers that we can cope with virtually any European language—though we will not guarantee to reply in it! May we also add, in case copies of *Model Maker* reach more distant lands that we will do our very best with Russian. But please, foreign correspondents, remember our linguistic difficulties and write clearly—or better still type your news—while photographs overcome the most intricate of national barriers.

On the Right Track

A REGULAR FEATURE OF INTEREST TO ALL 00 GAUGE FANS BY R. WATKINS-PITCHFORD



A MODEL railway purports to be a model of an actual railway. But since, in 00 gauge, it requires 70 ft. of run to represent one mile of prototype, and since there are very few railway systems in real life that are only a mile long, it follows that we have to resort to a special technique of make-believe in order to make our model railway look and operate in a convincing manner. There are some respects in which we must try to emulate the real thing. For example, our model railway should at least give the impression that it exists for the purpose of transporting passengers and goods from some point of departure to some destination—trains should not obviously and blatantly wander round in a circle or oval, passing through the same station every few seconds. On the other hand a real railway runs in as direct a line as may be from terminus to terminus. It is stretched out in a more or less straight line for perhaps several hundred miles.

In the case of our model, as we have seen, even if we had the 70 ft. available in which to represent but one mile, the layout would lose interest to the spectator, because only a small section of the track could be viewed at a time. So here is a case where we must deliberately depart from any attempt to make a faithful copy of a real railway and employ one or more of the various methods of "condensing" our railway system within the confines of our picture frame.

There are many dodges and "tricks of the trade" by which experienced model railwaymen manage to convey the impression of realism and so overcome the limitations imposed by small space, and it is here that the art of layout comes in.

What we try to do within the limits of our small space is to put down a track that shall both look natural and also permit trains to be run in a purposeful manner.

There is a very real art in achieving both scenic and operating realism and, like the other arts, it demands first a modicum of native ability or "flair", and second, some keen observation and practical experience.

A successful layout is essentially an expression of the constructor's personality in terms of model railway technique and he need no more expect to master this art of self-expression at the first attempt than a student would hope to produce a best seller in his first essay.

The over ambitious attempt based upon inadequate grounding is responsible for many a disappointment, and many a project abandoned in mid-air.

To have a chance of being successful and satisfying, a model railway layout needs to be approached as though it were a story in the writing. There is the general theme, be it love, adventure or crime; there is the plot, the scene and the period in which the action takes place; there is the manner in which the story is unfolded, and there are the countless devices of description and dialogue which give character and finish to the work as a whole. So with our model railway. We must first decide—subject always to the limitations of our available space—whether we are going to model a section of main line, or a country branch line, or a large passenger terminus, or a marshalling yard, or a mountain railway. Then we must decide upon the type of country in which our railway runs; will it start at an inland city and terminate at a seaport with docks; or will it serve an agricultural or an industrial countryside? Again shall we lay down ferro-concrete stations of modern design and run "British Railways" locos and stock in their latest liveries, or is our layout to represent, say, a section of the old L. & N.W. Railway circa 1910, with locos and stock and buildings to suit? Is it going to be possible to run a time table of goods, express passenger and suburban trains, or must we be content merely to parade our trains and locos for inspection and—we hope—admiration? And when these knotty problems have been solved to our satisfaction, we must still decide on such matters as whether we use two-rail, or three-rail, or stud contact electrification; whether we are going to equip our layout with correctly placed and operated signals, or remote controlled; and so on whether points are to be hand operated, through a formidable list.

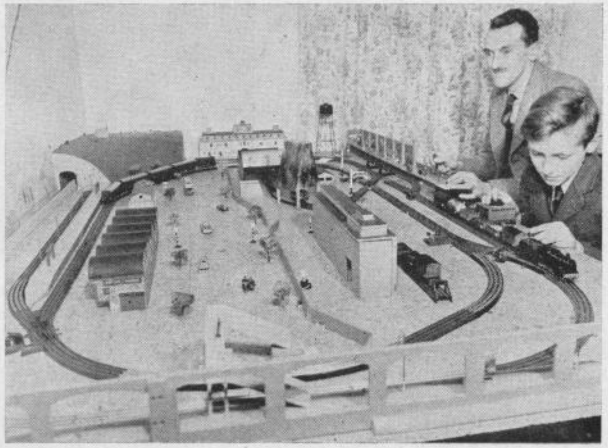
No one will pretend that every one of these many problems must be solved down to the ultimate detail before work of any sort is begun. On the other hand the effort and time entailed in laying down a model railway, in making te baseboard, the scenic effects, the buildings and lineside equipment and, possibly, the locos and rolling stock, is very considerable, and it is a heartbreaking business to have to scrap a lot of good work because the initial planning was skimped.

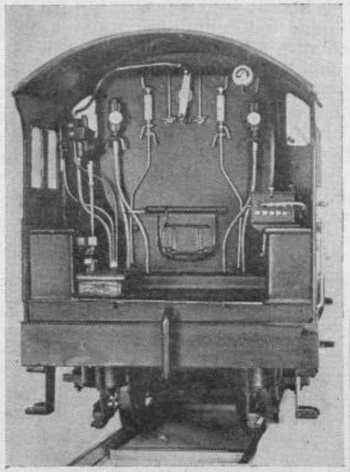
And the initial planning can only be done properly when the constructor has acquired a certain amount of practical experience. Book reading and the advice of friends are all very well so far as they go, but they cannot take the place of practical experience. This gives rise to a question along the following lines: "If I must have practical experience" asks the constructor "before I can plan a layout, on what sort of a layout do I get the practical experience?"

At first sight this seems to partake of the "Which came first the hen or the egg?" sort of query. But fortunately there is a way out, and the answer is to be found in buying a ready-made set of proprietary trains, such as the Hornby-Dublo. In the conditions of short supply obtaining today, it may not be possible to secure new equipment, but there are many advertisers, both trade and private, from whom good second-hand equipment may be obtained and since, if kept in reasonable conditions, these trains are always assured later on of a good market value, the outlay need not be considered excessive.

(*Continued on page* 318)

Heading left : A fine example of the Model Maker's art. This electrically driven '0' gauge North British Railway "Atlantic" Class Locomotive has been built by W. H. Foster, Esq., of Bradford, West Riding, for Edward Exley (Sales) & Co. Ltd. To be named "Bonnie Dundee", she is to run on the famous Ashdown Forest Railway of G. Drummond Lyell, Esq., Chairman of Edward Exley (Sales) Co. Ltd. (Inset) : shows the cab layout and controls of "Bonnie Dundee".



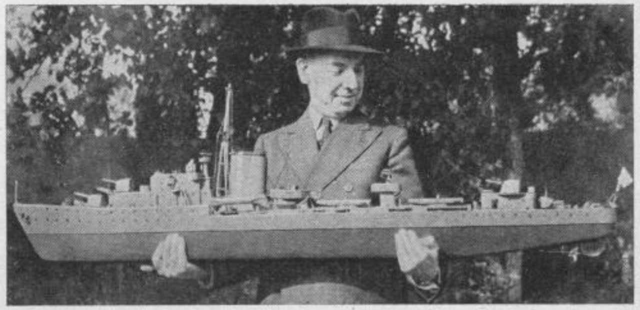


Top and Bottom pictures : A typical "Father and Son" layout ! Mr. Les Stacey and Christopher, of New Malden, Surrey, operating their "Newtown Railway", on the construction of which many happy hours have been spent. The baseboard measuring 8ft. by 5ft. consists of ½-inch Weyroc supported on a 2in. x 1in. framework and occupies a corner of the junior Director's bedroom. The layout provides for varied and interesting passenger and goods traffic movements and all buildings and scenic effects are home-made.

A MAN AND HIS MODELS

This month, for a change, a well-known ship modeller:

G. H. DAVIS



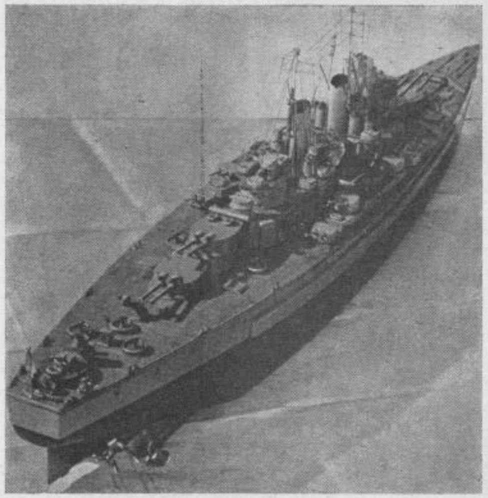
(Right) G. H. Davis with his Diploma-winning steam-powered destroyer "Javelin", the funnel of which was later modified, and (below) his fine 5ft. model of "H.M.S. Vanguard"

G. H. DAVIS is well-known to countless numbers of model makers all over the world for his diagrammatic drawings, not only of ships and aircraft, but all sorts of mechanical wonders, drawings that have been a feature of the *Illustrated London News* for over a quarter of a century.

A hobby through his life from the earliest days has been model making and his great love has been in that section devoted to ships. He was at the tender age of 12 when he purchased his first tin locomotive, one of those terrible affairs quite unlike the real thing, that delighted the youth of the last century.

Having left a trail of burning methylated spirit across the living room carpet on its maiden trip, this first mechanical possession of his had a short lift and resulted in a "tanning" from his Victorian parent.

The first model he made himself was a static reproduction of the first British destroyer, H.M.S. *Daring*, and it was sufficiently realistic to get a "notice" and a photo in the *Kensington News*, the local paper of the Royal Borough in which he was born. Thence onward he has always, in spasms, been making model ships. In between his interest in sport, in particular football and later, golf, he has in his spare time been making ships. The first real working model was that of a destroyer built round about 1907, then came other simple models that have long since disappeared.

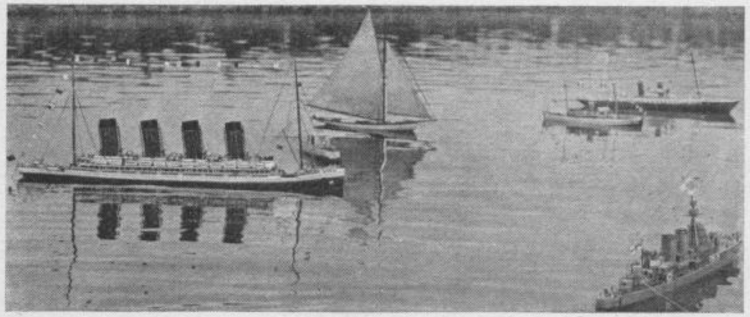


In 1910 he married, and during the first World War he served in the Royal Flying Corps (later the R.A.F.) and from odds and ends he had given him he built a very realistic racing car for his small son. By this time he had moved his home from London to Caversham, a suburb of Reading, and shortly after the close of hostilities he interested himself in the foundation of the Reading Model Boat Club. Meanwhile, a steam yacht (clockwork), a cross-Channel steamer (electric), and a speedboat (steam) had been built and reposed on the shelves of his workshop.

Reading at that time had only the river for model boat work, and with its steep banks and deep water, this was far from an ideal venue for experimental boat work.

So our friend got to work very energetically to interest the Reading Town Council in the building of a model boating lake, and thanks to his efforts this was built and opened by the Mayor of Reading in the presence of over 4,000 people in the summer of 1924. Meanwhile, Mr. Davis had been completing his famous model cruiser of the "C" Class which he named *Caversham*, and it was this beautiful little model that was used officially to open the lake by cutting the tape stretched across the water by means of a razor blade fastened on to where the jack-staff should normally be. That year the *Caversham* was also at the *Model Engineer* exhibition in the loan section. Later he left Caversham and moved to Ewell in Surrey, and amongst the models he produced in his workshop adjoining his house were several "steamers" including a 5 ft. destroyer that won a diploma at the M.E. Exhibition.

He also produced about this time, his famous take-to-pieces model of the liner *Queen Mary*. This he patented, and it was subsequently taken up by a famous firm of toy manufacturers and sold all over the world, in fact, over 200,000 models were sold.



(Left) The opening of the Reading Model Boat Lake, about to be performed by the cruiser "Caversham", seen in the right-hand corner. (Below) Rob Davis, later well known in motor cycling circles, at the wheel of his imposing racing car.

Through the second World War, Mr. Davis was too busily engaged as a War Correspondent to make models, though a very ingenious German "model" in the form of a flying bomb came to "roost" in the bottom of his garden and destroyed itself together with his workshop and most of his house, a Morrison shelter saving the lives of his wife and himself. This caused him to move to Brighton (where he lives today), and when Germany and Japan had ceased to trouble the world once more Mr. Davis turned in his spare moments to model making. In his flat was a large kitchen, and it is here, when as he says, "The wife is safely out of the way" he has installed his workshop and does his work. The first of his post-war model was a small 3 ft. model of the British battleship *Vanguard*, an electric model that won many endurance prizes.

About the same time he started to build his famous model of H.M.S. *Vanguard*, a "steamer" over 5 ft. long that won a Bronze at the *Model Engineer* Exhibition in 1948. Meanwhile, he had joined the Brighton & District Society of Model Engineers, and was largely responsible for promoting that well-known Society's first post-war exhibition.

Soon after the war Mr. Davis turned temporarily from ships to model racing cars, and he designed an early "racer" which appeared as a double-page drawing in the *Illustrated London News*.

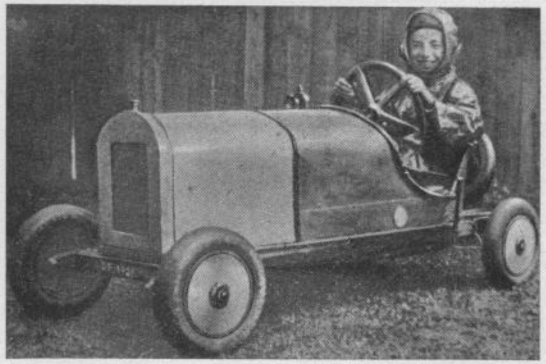
In the autumn of 1947 he was invited to become a member of the Committee which was responsible for the foundation of the Model Car Association. He built an early Dooling Special with a 10 c.c. Hornet motor from parts he imported from America, which did some running in a few small local events, but was unfortunately well over the stipulated 7 lb. weight limit and so did not take part in any "star" events. He then commenced a 5 c.c. car which is still under construction.

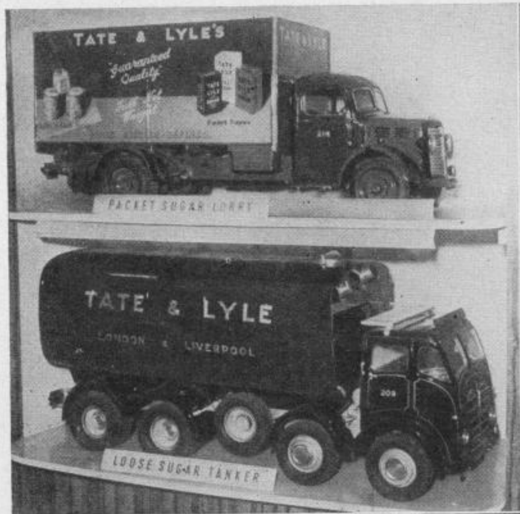
His later models built at Brighton, have been an electric model of a British "Battle" Class destroyer, a steam-powered model of a cargo-passenger liner, and the latest model which has only recently been completed is the *Amethyst*.

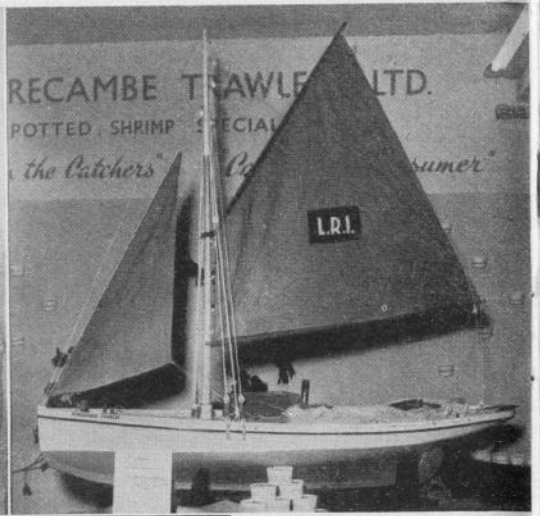
Mr. Davis is in the happy position of being able to obtain detailed drawings and plans owing to the fact that his drawings are so well known to all the great shipbuilders and the Admiralty, and also because he is a founder member of the Society of Marine Artists. Thus his models are famous for the accuracy of the details, such as all the deck gear, though he rarely provides his models with railings as he says he has found from long experience that these get so easily damaged when handling working models afloat.

Today Mr. Davis is Vice-Chairman of the Brighton & Hove Society of Model Engineers, and though in age he is "well into the 60's" he keeps himself well up-to-date, as witness the model "Space Rocket", some 6 ft. tall, that he designed and built in co-operation with two other members of the Brighton & Hove Society, and which formed a central feature of the exhibition held in Hove last summer, and has been not only featured in the Press here and in America, but was also seen in a recent issue of the Pathe Pictorial now being shown at dozens of cinemas throughout the British Isles.

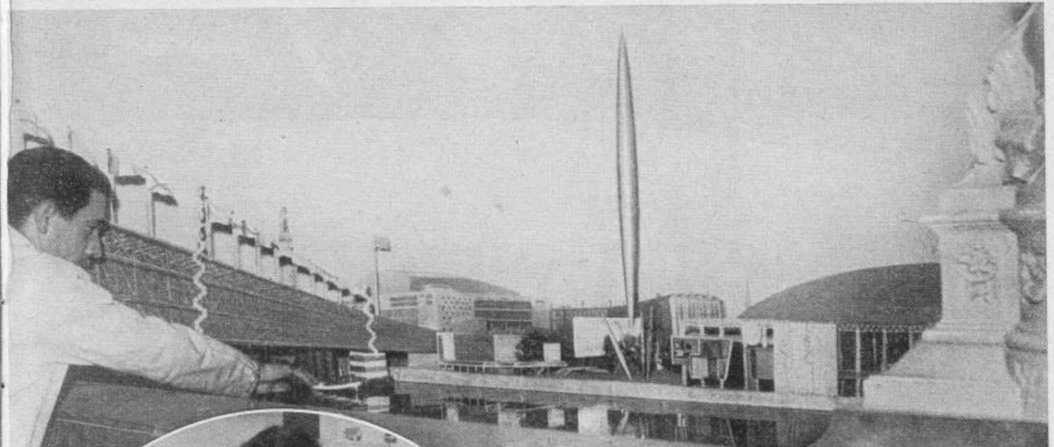
At the moment Mr. Davis has turned to a "Road Model", and has under construction a power driven model of a motor coach, 2 ft. 3 in. in length, which can be driven by a compression ignition motor, so geared down to give it a speed of approx. 6 m.p.h. This model will no doubt be on view at Brighton's Festival of Models at the Corn Exchange, Brighton, early in August next.







Models AT THE IDEAL HOME EXHIBITION



Top left: Two interesting lorries on the Tate & Lyle display.

Next: A model shrimp trawler on the Morecambe Trawlers Ltd. stand. Note the sail arrangement to give room for handling of trawl, and shrimp boiler on board.

Below left: The new Army! Typical Sergeants' Mess building modelled in thin ply, bristol board and wood.

Bottom left: Bricklayer revolving display photographed in movement behind glass. These constructional bricks have been used to model a replica of the Ideal Home village

Top right: Cross & Blackwell's impressive diorama of the South Bank Festival Exhibition, in full colour with boats in movement

Circle: Demonstration of old English Village Models designed by Smeaton-Stuart. Plaster replicas of famous and historic buildings are finished in colours by hand.

Bottom right: Whimsy kitchen designed by E. Mortemans for M.O.F. in forced perspective

You're telling us!

HERE'S WHAT PURCHASERS SAY OF THIS REMARKABLE LOCO KIT . . .

"I have just finished erecting the Prairie Tanker loco from the very splendid kit I received from you last Monday. With every detail shown in the written instructions and drawings it was a joy to build, and I must congratulate you for producing such a fine effort."
—J.W. of Wootton Bassett.

"Being a very ardent model railway enthusiast, particularly 00 gauge, I can honestly say that my entire layout consists of 80% Graham Farish products. By no means least is this splendid kit model of the Prairie Tanker, on which I really must congratulate you on such a fine achievement."
—F.J.A. of Castleford.

"I found great enjoyment in building it up, and anxiously await more news on your new models as and when they become available."—G.C. of Birmingham.

"The kit arrived safely, due I am sure to the excellent packing. Yesterday evening was the first opportunity I had to assemble the loco, and a very pleasant job it was. I congratulate you on the clear, concise instructions and the diagrams, and also the finish of the castings."
—E.S.G.H. of Oxford.

"I would like to congratulate you on the realism of the Prairie Tanker Loco, and the excellent method you have devised of assembly without tears.
—J.C.M.P. of Mayfield.

"I must congratulate you on producing such an excellent model as the Prairie Tanker kit. I have been a model railway enthusiast for several years, but your kit has been the most complete and easiest one that I have yet assembled.
—D.B. of Gillingham.

"May I congratulate you on your production. The various parts fitted together without any bother at all, thanks to the very lucid instructions."
—G.S.G. of Kent.

"I must begin by saying how easy this loco has been to erect. The hauling power of this loco is quite remarkable, and it will haul quite a few more coaches than my other loco will."
—R.W.K. of Canterbury.

"Just a short note to acknowledge receipt of my order. Every part arrived in excellent condition, and I may add that I am mighty pleased with the Prairie Tanker."
—H.E.H. of Middlesbrough.

"I had such pleasure in building the model and found it remarkably lifelike and to scale.—W.E.W. of Gillingham.

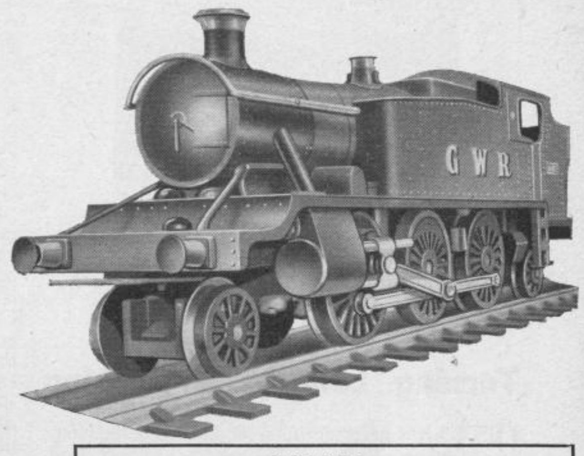
If you're not yet convinced— ask the man who owns one!

We knew it was good—we designed it specially to meet the needs of a very discriminating public—but we never expected such a volume of glowing praise as is reaching us daily ! The extracts of customer's letters, taken at random, and quoted above, speak volumes for the new Prairie Tanker Loco Kit—little we can say will add much of value except that it is designed from drawings kindly supplied by British Railways and is as near to scale as mass-production and modern equipment will achieve.

The NEW "OO" GAUGE PRAIRIE TANKER KIT *really is a winner!*

ABRIDGED SPECIFICATION:

★ Steam Chest and funnel capping are in bright copper exactly as prototype. Connecting rods, all wheels and cylinders are detachable.
★ Specially designed spring-loaded pony is instantly detachable.
★ The automatic centrifugal clutch ensures low starting current and long over-run prevents stopping on points.
★ Detachable motor has enclosed flywheel, self-aligning bearings, sprung current pickups and solid silver commutator contacts with NO Brushes or similar wearing parts.
★ The new, almost frictionless detachable gear-box eliminates the need for power-consuming worm gears.
★ Large capacity condenser reduces sparking and radio interferences.
★ Rubber tyres are fitted to one pair of driving wheels ensuring maximum tractive effort, without slip.
★ Loco is 12-V.D.C., directly reversing and is for either 2 rail track (or 3 rail to order).



PRICES:

Complete Kit of Parts. Unpainted :	Complete Kit of Parts. Body enamelled Black:	Complete Kit of Parts. Body Green & Black:
79/6	**84/-**	**89/-**
inc. purchase tax. With British Railways transfers.	inc. purchase tax. With British Railways transfers.	inc. purchase tax. With G.W.R. transfers.

Postage and Packing on all Kits 1/- extra.

We tell you

It's great fun building the Prairie Tanker, so easy, a couple of hours enjoyable and interesting work with a screwdriver and file, no soldering, drilling or tapping, and easily followed illustrated instructions clearly show each operation step by step. We claim that it is the finest job on the market —you, the purchasers tell us we're right ! And remember, new types, when produced, will incorporate the same standard parts as far as possible.

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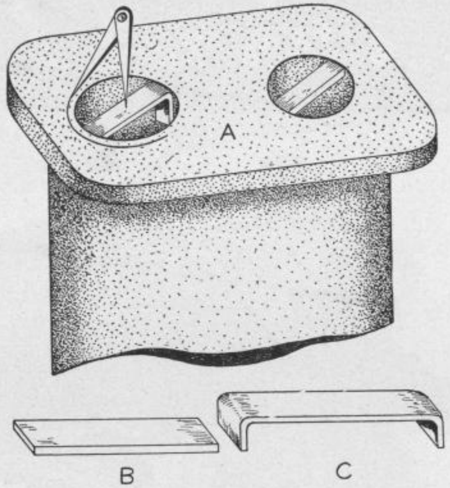
Don't delay sending your Order, supplies are being rapidly depleted by the increasing demands. The Prairie Tanker is obtainable by post only DIRECT from us. Cheques, Money Orders and Postal Orders must be made payable to FORMO PRODUCTS LTD. and crossed.

Make tracks for Formo — they make tracks for you!



Turning Lengths of Tubing

OFTEN it is necessary to skim the outside diameter of pieces of tubing which may be in brass, iron, or bronze, and for some jobs the pieces need to be highly polished. Many young turners seem to be a little shy in turning tubing, and the job can be quite tedious at times. The main trouble of course, in tube turning, is the setting up of tool chatter, and in order to cut this out and so produce a good surface with ease try the following method.

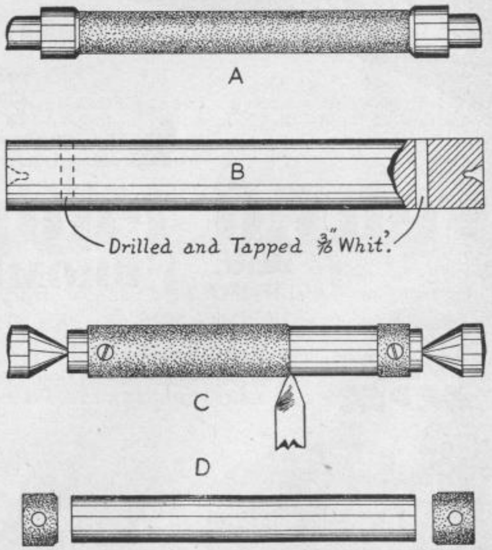
First, turn a piece of metal a nice fit in the tubing, and make sure to have the centres well made since the mandrel is sure to be required from time to time. Drill and tap the two holes as indicated in B, which should not be less than 3/16 in. Whitworth. The mandrel when turned and drilled should be stamped for size, and when not in use it should be placed away in the rack in order to preserve the centres. A length of tubing to be turned is drilled at the ends and held on the mandrel with two 3/16 in. screws. The job is now revolved between the lathe centres in the usual manner, and the tubing is turned with ease as indicated in view C.

If the mandrel is turned a good sliding fit in the tube it can readily be withdrawn. The fact that the mandrel is in contact with the bore of the tubing along its entire length reduces the danger of tool chatter to a minimum, and above all, the time taken to turn the pieces is reduced considerably. When the tube is finished the screws are removed and the mandrel taken out, and the ends cut off with a hacksaw as indicated in view D. It is, of course, possible to part the ends off, but if this is done it is best to pull round on the lathe belt and take care not to cut into the mandrel.

Marking off Bores

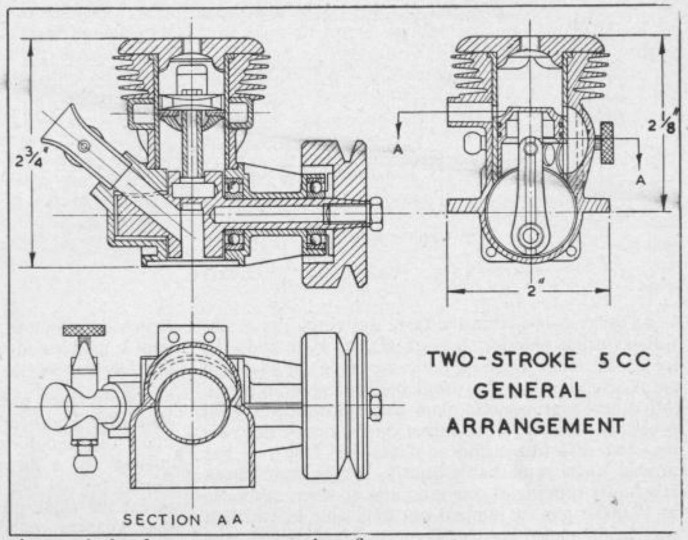
IT is often necessary to mark off the bore in a particular casting previous to machining. Clearly the bore opening needs some kind of bridge, into the centre of which is placed the divider point in order to scribe the size of the diameter. There are quite a number of ways to bridge the bore, but not all of them are really very reliable. Some model makers resort to the method of pushing a flat strip of wood into the bore, only to find one end slips almost at the first bit of pressure on the divider point. A slight improvement if a wooden strip is used is to choose hard wood, and make it a little more secure by tapping in a small wedge at each end. Wood, however, is not the best material to use.

A piece of lead strip is a much better kind of material to use, and a few pieces should always be kept handy in stock. The method of bridging the bore with lead strips, and scribing the bore diameter is indicated in A of the accompanying illustrations. One bore is shown with a piece of lead strip indicated at B, tapped in position, and the other bore shows the strip in position with the ends bent over as indicated at C. The ordinary strip is used quite extensively, and if care is taken in tapping it into the bore it will remain quite firm under ordinary pressure of the divider point. However, the method of bending over the edges as indicated at C, will make quite sure of a firm fixing, and once employed you will be tempted to make use of it at all times in marking off bores. Strips of lead bent over at the ends as described, can quite readily be made shorter or longer to use in varying size bores.



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

BY G. M. BARRY



THE engine to be described in these articles is not the result of any large scale testing and development work. It has, in fact, yet to be made. It is, however, a modified version of an earlier model, and, I think, an improved design. As the earlier job has proved reasonably successful, although only one decent model has been made, it was my intention to use it for these articles. But, as I know there were one or two details which called for modification, and as I honestly think the later, or Mark II, will be the better engine, I have decided, with no small misgivings, to offer it for your consideration and, I hope, construction. There may well be some serious shortcomings in the design itself, and in these articles. In the first case, I can only ask for your criticisms, or suggestions, and add that designers are notoriously blind to the faults of their own creations, although almost abnormally keen-sighted when viewing anything done by anyone else, which is remotely connected with their own particular field of operations! That goes for me too! I know there are at least two features of this particular design which are, at least, debatable, but they are quite easily modified, or omitted, if necessary, without interfering with the basic design. So much for case 1.

As to the articles, I can only say what so many have said before, and although I have hitherto thought it a poor excuse, I was not then trying to write myself. Now I know better. This is my first venture into print, and into published design and matter. I have tried to touch upon all salient points as lucidly and briefly as possible. I have no doubt that there may be errors and omissions. I realise too, that my methods may be somewhat crude. But I do hope that those who are skilled machinists will forgive any mistakes, and that those who are not so skilful will perhaps reap some benefit.

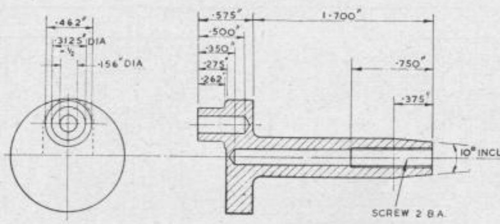
But, it is an engine that is wanted, not a lecture, so here goes.

The early model was designed in 1946, and modified, without ever having run, in 1947. It was hoped to go into production with it but, for various reasons, nothing came of it. The motor languished in my workshop for some time, and then I parted with it, and three of its brothers in various stages of completion, to a friend. This was at the end of 1949. He has had some quite good results from the "old original", .48 b.h.p. at 16,300 r.p.m., and a free running speed of 23,000 r.p.m. I personally think that peak b.h.p. should be at around 18,000 r.p.m. So there is still a long way to go. Incidentally, I do not, at the time of writing, know what fuel was used for the above figures, so they may not be as good as they seem.

This motor uses a cast iron sleeve, alloy interior piston, and is rather restricted in the transfer passage due mainly to difficulties in machining. By this, of course, I mean that I just did not "know how"—and I'm afraid I still do not! This will later become apparent. The Mark II differs in several ways, which will I hope, make for an improved performance. The main changes are (i) piston, (ii) transfer passage, (iii) rotary valve.

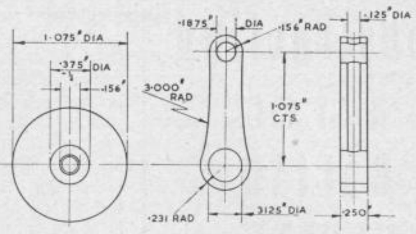
Of these the rotary valve is I think the most important as, if it works, it can be a great improvement. I hasten to add that it may very easily be replaced by the more orthodox disc type if thought desirable.

There are many different layouts which can be tried and perhaps adopted with this type of engine, and this is why I have chosen it, rather than a simpler but less versatile model.



PARTS TO BE CYANIDE HARDENED ·015" DEEP

PART Nº B 5/6. CRANKSHAFT. MILD STEEL.



PART Nº B 5/5 CONNECTING ROD
DURAL OR RR 56

As will be seen from the G.A. drawings, the motor follows usual practice. It is of .800 in. bore and .600 in. stroke, single exhaust port, one-piece cylinder and crankcase, and has the usual ballbearing crankshaft. All other bearings are plain and unbushed. It will probably be found to be rather on the heavy side, 8-9 oz., but reverting again to "Number One", it has proved to be remarkably sturdy. It has done about 100 hours running of one kind and another, and once at 17,000 r.p.m. it jumped out of a vice in which it was held, landed on the floor on it's flywheel, and spun and hopped madly around, till either the fuel ran out or the carb. came adrift. I have never been sure which, but I know that it suffered no ill effects, apart from a broken pin. This however, is by the way. The engine is glow-plugged, although spark ignition could be fitted, and compression ratio should work out at about 12:1, although this is, perhaps, rather on the high side. I am afraid I have not sufficinet experience to make any definite statement on this point and, anyway, so much depends on the fuel, the type of plug and other variables.

As it is supposed that for most builders (if any!) this will be a "one-off" job, no tolerances are given, except in isolated cases, such as the ballbearing housings. All dimensions are in inches ,and any tolerances in thousands. All drawings are American, or Third Angle Projection. If in doubt, work to drawing and not to instructed dimension. I hope that by the time we get around to them, a supply of castings for those bits which need them, will be available and that some at least, of these will be die cast. For this reason I am starting with those components which are made from stock metals and leaving the cast bits till later. I think that is everything so, after this lengthy and rather ambiguous preamble, I will make a start on what really matters.

Part No. B5/5. Connecting Rod

The con-rod is made from duralumin or R.R.56. It is not bushed at either end, nor is any milling necessary, although if so desired it can be milled, by those who prefer an I-Section rod. If it is milled, the .125 in. dia. drilling must be omitted.

There are several ways of making this component, but the one I use and prefer is as follows. The method may seem crude to some, but it does work quite well, and it enables identical rods to be quickly and accurately produced.

Obtain three pieces of mild steel, 1½ in. x ½ in. x $\frac{3}{16}$ in. (or ¼ in.) thick. Mark pieces 1, 2, 3. On No. 1 mark out a con.-rod, as shown in drawing, or by cutting out a paper pattern, and sticking to plate. Centre pop at big and little ends (1.075 in. centres). Sweat the three pieces together as squarely as possible, keeping marked out piece to the top. Clamp pieces to lathe top slide on edge, so that centre line of rod is at lathe centre height. This can be checked by traversing across centre in headstock. By careful filing or packing of pieces, they can be set very accurately. Then check for parallelism, again by cross-traversing, but with an indicator on lathe bed, or held in chuck. Set true by swivelling the topslide. When square clamp piece and topslide securely and check again. A little extra care taken at this stage will be amply repaid, so do make sure of your settings. Drill big end .302 in. dia. (N drill), and without altering setting, ream .3125 in. dia. Repeat for little end, drilling .180 in. or .182 in. dia. (Nos. 15 and 14 drills) and ream .1875 in. dia. Remove pieces from topslide, and unsweat No. 3. Using scribing or pattern on No. 1 as guide, file Nos. 1 and 2 to shape, being careful to keep edges square. Unsweat, and have all three pieces case-hardened, or hardened right through depending on what steel has been used. This completes the jigs.

Take a piece of dural or R.R.56 bar, ½ in. x ¼ in. section and 1½ in. or more long. Clamp to No. 3 jig and drill and ream big and little ends, using either machine vice and drilling machine, or drill pad in tail stock. I use the latter, not having a drill. Remove No. 3 and put alloy stock between Nos. 1 and 2, using small pieces, about $\frac{5}{16}$ in. long, of .3125 in. dia. and .1875 in. dia. silver steel bar as dowel pins through big and little end drillings. Hold set-up in vice, and carefully file to shape, and finish by polishing edges. Remove Nos. 1 and 2 and dowels, and hold con-rod in 4-jaw chuck, by big end and with packing on jaws to prevent marking rod. Set up so that little end runs true and drill down through little end and con.-rod body to break through into big end, .125 in. dia. This will I think, be found much easier to do than it may sound, but this drilling may be omitted if desired, although it does lighten and strengthen the rod. If you have a drilling machine, the rod can be held in machine vice and, making sure that the rod is vertical, drilled as above. Remove rod from chuck or vice, and polish on piece of fine emery cloth, laid on flat surface, such as a piece of plate glass. If care has been taken in marking out and setting up, you should have a rod in which both big and little end holes are both square and parallel with each other, and with face of rod. This completes work on rod.

Part No. B5/6. Crankshaft

The crankshaft is made from mild steel. It may, of course, be made from nickel steel or other "high falutin" stuff, but unless the exact properties and heat treatment are known, this may lead to trouble. Mild steel is easy to machine and may be hardened quite easily, preferably by the cyanide process. The shaft can be made wholly in the 4-jaw chuck, but I prefer to make a simple jig—just in case! I use a back plate casting, but a simple aluminium casting could be made, as shown in sketch.

Hold casting in 3-jaw chuck by small boss, and face back and edge. Remove and change chuck jaws for outside set. Hold casting by large diameter, and finish machine boss and two faces. Bring up back centre, in tailstock, and press centre against casting, thus producing a small dimple. Remove casting, and centre pop dimple carefully and lightly. With centre pop as centre, scribe a .600 in. dia (.300 in. radius) circle on face of boss. Scribe a line through centre pop across face of boss, and carefully centre pop one of points where straight line cuts scribed circle. Clamp casting to faceplate, and set up so that central centre pop runs dead true. Remove faceplate and casting from lathe, and drill through casting and faceplate, two holes, .213 in. dia. on about 3 in. p.c.d., but *not* at 180 deg. to each other. Stagger them slightly. Then taper ream, for ¼ in. taper pins. Replace faceplate on lathe, slacken clamps and set up casting until outside centre pop runs true. Drill and bore .500 in. dia., being careful to keep to size. Remove casting from faceplate, cross drill .213 in. dia. to break into .500 in. dia. bore, and tap ¼ in. B.S.F. (or Whit.). Fit a ¼ in. grub screw or set screw in this hole, preferably a brass one, to avoid marking work. Take a piece of brass or dural bar, .625 in. dia., and hold in 3-jaw chuck, leaving 1.25 in. out. Turn to .500 in. dia. for 1.125 in. long, and drill and bore .375 in. dia. for 1.25 in. deep, chamfer end and part off 1.125 in. long. Hold lightly in chuck, and face and chamfer other end. Hold piece carefully in vice and saw cut longitudinally through one side. (I use an Eclipse Junior for this.) Remove all burrs. Jig and bush are now completed.

Take a piece of 1.125 in. dia. m/s bar, about 2.375 in. long, and hold in 3-jaw chuck, with 2.125 out. Centre drill, from tailstock, using small centre drill, and then bring up back centre to support piece, not forgetting to put a spot of oil on centre! Turn to 1.075 in. dia. over whole length. Take further roughing cuts for 1.675 in. length, until shaft is almost to size. Finish 1.7 in. long and .375 in. dia., with an .0625 in. radius tool, and finishing crank disc face, at same time.

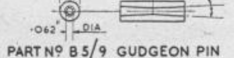
Set over topslide 5 deg., and turn a taper on end of shaft .375 in. long, being careful to see that tool edge is at centre height—otherwise taper will be barrel shaped. Remove back centre, fit drill chuck, and drill shaft .156 in. dia. for 1.925 in. depth. Tap this hole 2 B.A. for ¾ in. deep. Now finish shaft, face and edge of disc, using file and emery, to a super finish, and bring shaft diameter to .375 in. dia. — ½, testing with a ballrace until it is a nice push fit over length of shaft and just about .0125 in. clear of crank disc face. Remove piece from chuck.

Fit jig to faceplate, using taper pins to locate, and clamp in position. Put bush on shaft, and insert into .5 in. dia. hole in jig and clamp with grub or set screw. Centre drill from tailstock, and again bring up back centre, for support, although, if well clamped and fitted, this should not be necessary. Rough out shaft .325 in. dia., leaving disc .3125 in. thick. Face off disc to .3 in. thickness leaving step .462 in. dia. and .0125 in. thick. Finish shaft to .3125 in. dia. with .025 radius tool and face off step at same time. Face off end of shaft until it is .262 in. long from face of step. Drill .156 in. dia x .5 in. deep. Polish shaft and faces to a super finish and remove from chuck. Crankshaft may be balanced, as indicated by dotted lines on drawing, or by drilling. I consider that with a balanced crank, revs. will be up by about 1,000-1,500, but I am by no means certain that the power curve will go up too, or in proportion. As this is a rather debatable point I leave it to the constructor's own discretion, or as a matter for future experiment, but I myself, prefer a solid disc. When crankshaft is finish machined, it may be cyanide hardened .010 in. to .015 in. deep. This completes crankshaft.

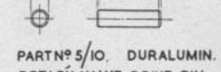
Part No. B5/10. Rotary Valve Drive Pin

This is made from duralumin bar .1875 in. dia. Chuck a piece of rod in the 3-jaw, leaving about .750 in. out. Turn to .156 in. dia. for .6 in. long, chamfer end .025 in. at 45 deg. and part off. Hold in chuck and chamfer other end as before, and with a fine file take about .002 in. off for length .125 in. This completes drive pin. It should be a nice push fit in crankshaft, and small end should fit rotary valve fairly easily, just in case there is any misalignment between crankshaft and rotary valve.

(To be continued next month)



PART Nº B 5/9 GUDGEON PIN
MILD STEEL (CYANIDE HARDEN)



PART Nº 5/10. DURALUMIN.
ROTARY VALVE DRIVE PIN.

VICTOR SUTTON
DESCRIBES HIS

Modern examples of the Fire Brigade attend a miniature blitz incident. This scenic model has proved its worth in assisting A.F.S. recruiting campaigns in Essex.

MINIATURE FIRE BRIGADE

I FIRST started to make fire engines when I was 10 years old. I made these in cardboard. There were periods after when I did not make any models at all, but in the last 20 years I think I have built up what may be the only collection of its kind in England. From the period 1666 to 1903 I have represented all I can find in the way of engines. These number eighteen. From 1903 to 1951 I have made another forty, and these include all those we knew in the war period. No two appliances are alike. All types are represented and include pumps, pump escapes, turntable ladders, water tenders, Home Office heavy pump units, Salvage Corps. tenders, hose-laying lorries, control car, petrol bowser, ambulance, emergency tender, kitchen and canteen. There is also the heavy breakdown lorry, telephone repair car and mobile workshop. I have another 25 reserve engines which I use in the blitz scene as these get scratched and knocked about.

Shown in the large photograph is a section of the blitz scene with appliances in action. Dams are erected and trailer pumps shown operating therefrom. Wreckage, debris and other features are all specially designed and painted to fit in the picture.

A further picture also shows the model in use in connection with recruiting for the fire service in Essex and this show has been put on at nine cinemas already. My models have also appeared in television in 1938, and again in Junior Picture Page last August.

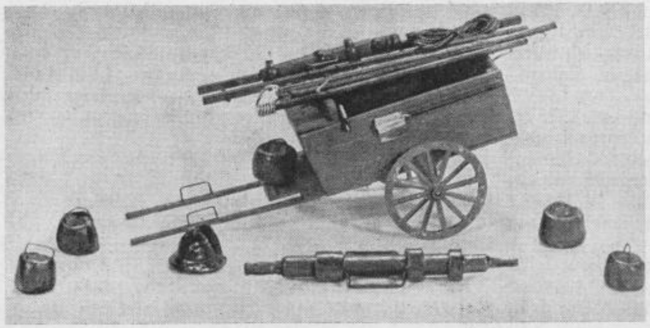
As a model maker I have always developed a keen sense for getting the right detail. I cannot emphasise this too much on my readers because I have really enjoyed every minute spent on getting these drawings and essential data.

The modern engines, 1903 to 1951 will follow in a later article, but for this one I am describing (with historical notes) my old-timers.

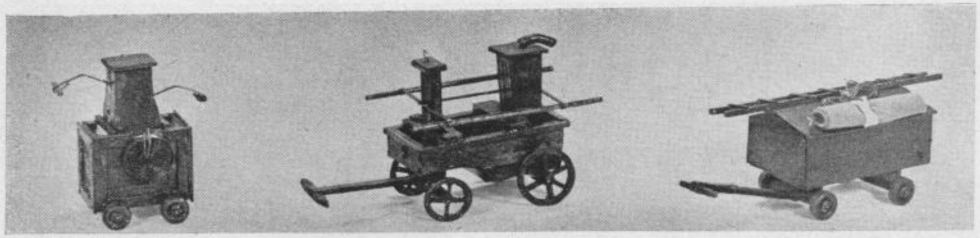
At the time of the Great Fire of London in 1666 there existed practically no fire fighting equipment whatever. They did, however, have heavy hand squirts operated by two men and squirted by another and replenishments of water were made in leather and riveted buckets as shown in my first picture. The men were some type of Cromwellian helmet. Axes were of the long handle woodman types(and prevention was mostly achieved by pulling down the next block of houses.

There was one insurance company in those days. The first competitor to this fire office arose in 1681 when the City of London opened a fire office. This office closed in 1683 due to lack of support.

There seems to be little fire protection in any organised way till 1683 when the Friendly Society of London formed as a Mutual Office first started with its own brigade.



A Fire Insurance Horse Engine of the 17th century. In foreground are displayed some of the equipment, including squirts, helmets and buckets in use at the time.



Left to right: The Windsor two-man manual, operated by the handles—note roll of hose attached. The "Parish Pump" or "Fourposter" manned by a clerical brigade. An early type handcart, with escape ladder.

In picture above you will see a quaint old manual found at Windsor Castle in 1735. It was operated by two men whilst some other supporters rushed for buckets of water.

Amusing stories are told of the six fire insurance companies flourishing at the close of the 17th century. They indulged in carts of all types and hues as I have shown in my next picture. Some were drawn by two horses and others, one. Buckets, squirts, slings and ladders were carried. In the event of a fire we presume that they all turned out. They then only saved your property if you were insured with their particular office. For this you had a Fire Mark exhibited on the wall. Those brigades not needed either went home or stopped to enjoy your blaze.

For those who could not afford to be insured there was the parish pump, generally known as a "four-poster" and maintained by the Ecclesiastical Commissioners. It was in the care of the churchwardens and overseers, and fires on a Sunday were not popular. This seems to be the first pump with a delivery hose operated by the man standing on the platform.

As you will see such simple appliances can all be made from oddments of wood, and the wheels cut with a fretsaw.

We now come to 1866 when we see the fine type of horse-drawn vehicles shown on the page, and readers will appreciate that practically no organised fire protection was planned for nearly 200 years.

My vehicles in the horse-drawn series are the hand-manual used by the fire insurance companies and then taken over by the London Fire Engines Establishment, the famous steamer and horse-drawn escape. The pumps were operated by 22 men working at the levers on the sides which unfold. They could deliver 100 gallons per minute acting on two single-acting pump units.

In this picture we see the first horse-drawn steam fire engine supplied to the London Fire Brigade in 1866. It was fitted with a "Field" tubular boiler, and had a single cylinder direct and double-acting pump with a capacity of 200 gallons per minute. This appliance carried six men and quite a quota of equipment.

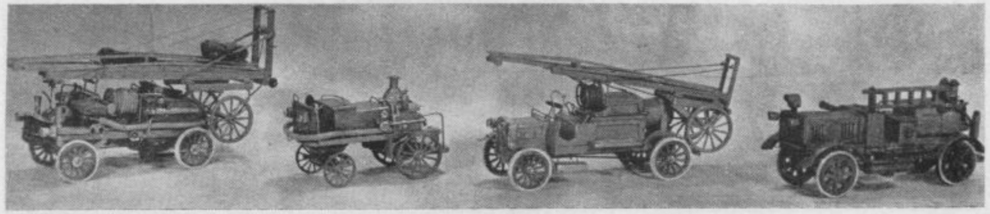
The escape shown on the left in an adaption of the first type, but with a rearrangement of the seats to allow the escape to be slung over the front.

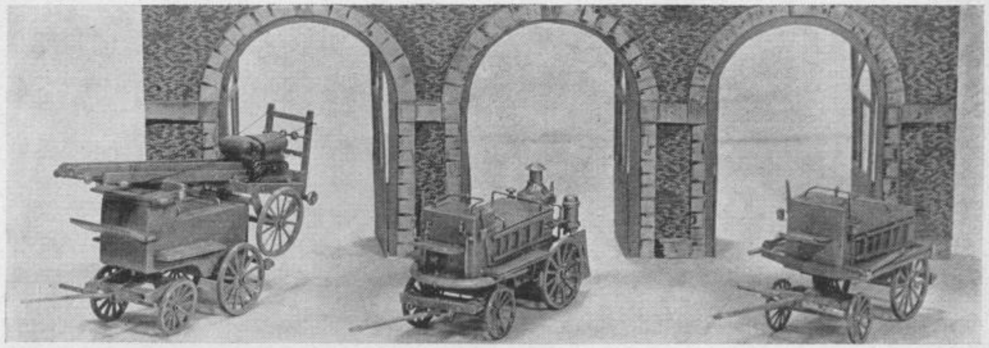
All these models were made in obechi wood, and three were cut out together with the fretsaw. Boiler and other steam sections were made with cotton reels or dowell rods well sandpapered to shape. Wheels I got off a toy cannon of the lead variety. Bits of wire, solid ship modelling parts, paper fasteners, lengths of thin wire, and solder, all help to make up the realistic fittings and embellishments so marked on a fire engine. Gold lining I do with thin strips of gummed gold paper. Escapes and ladders are again all obechi which we, as modellers know so well in all its small sizes. Panels on the lockers I make with $\frac{1}{16}$ in. thick photographic mounting card. Cut with a sharp razor—this gives the effective bevelled edge.

Picture below shows the first motor-propelled (steam) fire engine ever built, and that was in 1899.

Then just look at the next picture. Imagine this dashing to a fire at 28 m.p.h. without falling over. It was the first petrol automobile fire appliance ever made by Merryweathers of Greenwich in 1905. It had a first aid water cylinder of 60 gallons, a 50 ft. fire

Finchley's first petrol motored appliance, comprising hose tender, chemical engine, escape and Hatfield pump, circa 1904. An 1899 steam fire engine. Merryweathers' first petrol fire appliance dated 1905. Petrol fire pump as supplied to London Fire Brigade in 1908.





Right to left : Horse-drawn vehicles of circa 1866 : the Fire Insurance Hand Manual converted to horse-power, the famous steamer, subject of so many Victorian magazine illustrations, and the first horse-drawn escape ladder tender.

escape, and carried six men. It was chain driven. Simple to make because it is all built up on one long plank and that leaves plenty of space underneath for all the odd bits and pieces.

Finchley seems to have the first petrol motor combination, comprising chemical engine, hose tender, escape, and a powerful "Hatfield" fire pump. This model was first operated in 1904. It is an enjoyable model to make because one can improvise so much and use so much imagination in making an impressive, but thoroughly untidy, fire engine. I used wheels from the oddment box as used on galleons. Mudguards I made from the bands one takes off the fish paste pot. The escape supports were made from cycle spokes. Radiator can be made from a doubled-up section of the fine wire mesh used for fronts of meat safes. Sticks of solder are ideal for making the many twirling bits of pipe seen on such models. All the woodwork was in obechi and I found good use for some of the wood supplied by Messrs. Hobbies. This is ideal for making lockers, etc.

Perhaps the elegant design of the first petrol motor fire pump shown overleaf will bring back memories to older readers. This was supplied to the London Fire Brigade in 1908, and had a four-cylinder petrol motor of 50 h.p. This type was a step-up in pumping capacity because it is the first machine to pump 500 gallons per minute.

In all these models there is little the ardent model maker cannot do. He need not be an engineer, and needs very few tools. Metal parts are improvised by cardboard bands, small pins and wire and dowels. All seats I make in coloured passe-partout. I use "Paffra", "Britfix", and "Croid". All small sections are glued and a little pin inserted. Actually I knock tiny "Lil" pins in with a small hammer, and quite enjoy it because it saves splitting the wood. Try this next time and see if you can do it.

An Epidiascope for Club or Home Use

H. A. ROBINSON DESCRIBES ANOTHER USEFUL DESIGN

AN epidiascope (sometimes called a reflectoscope) is an interesting and useful thing to have, for with it greatly enlarged pictures of opaque objects can be thrown on a screen.

Given that you have a camera with a good lens it is not hard to make an epidiascope for home use which has quite a high degree of efficiency. The one described here was designed and constructed by the writer, and with it brightly illuminated reproductions of cigarette cards can be obtained on a screen measuring some 3 ft. across, which is a pretty good performance considering that a cigarette card is only $2\frac{11}{16}$ in. from end to end.

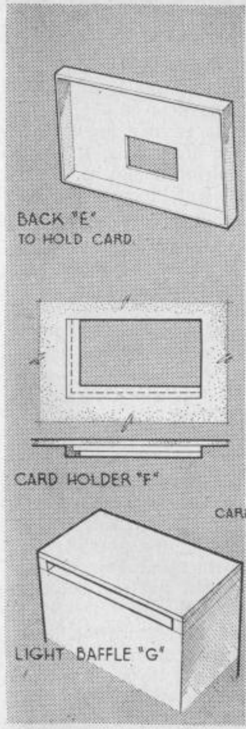
Before starting to make the instrument interested readers should study the illustrations and get a general idea of how it works. Electric lamps, it will be seen, throw a flood of light on to the item to be projected, and in front is a lens—supplied by a camera—through which reflected light from the surface passes to the screen where the picture is built up.

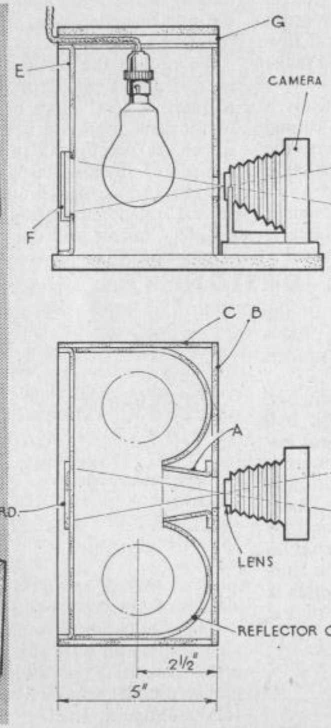
As reflected rays only are used it will be clear that the two essentials for success are a good flood of light on the item and a lens that lets through as much light as possible.

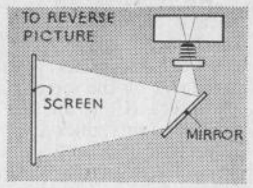
Appreciating the general principle, now take the camera which is going to supply the lens, and removing the back, open the shutter at "time" and make a few experiments with a candle.

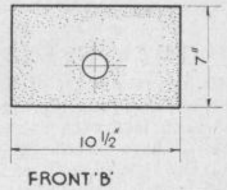
Hold the candle very steadily behind the camera and note how far it must be away from the lens to give a sharp image of the flame on a sheet of paper located about 6 ft. away. This distance when found will be the width (back to front) of the reflectoscope body, and will be about 5 in.

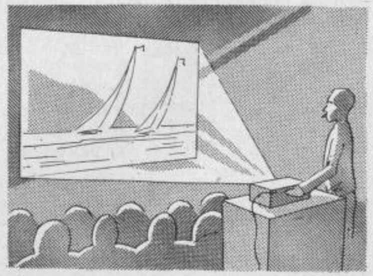
The body can be constructed of wood, but the writer made his with every success out of a very strong *card* box. If making with wood, cut from $\frac{1}{4}$ in. material a front piece (b) $10\frac{1}{2}$ in. x 7 in., two sides (c) 7 in. x 5 in., top, base and light baffle board (g) each $10\frac{1}{2}$ in. x 6 in.; also four triangular corner











pieces 7 in. x ½ in. x ½ in. Put these temporarily together with only a screw or two, as back and top will have to come away before final assembling, and then putting the box so made on some level surface place the camera at the centre of the front and mark where the lens comes; at this point bore a circular hole of ¾ in. dia.

Now make an open-ended card cone (a) 2¼ in. deep. This is fastened with paper clips at the level of the hole in the wood to two sheets of white 7 in. x 11 in. card, which, lying flat against the sides of the box are curved round as shown, being held with drawing pins at suitable points. Use as few pins as possible, as the cards lie best if more or less "sprung" into position. The smaller end of the cone is fastened to the wood round the hole by strips of cloth glued as seen in sketch.

Next fit the bulbs. This is done by boring two holes in the top board, 2¼ in. from side and front, at the centres of the circles made by the cards, and just large enough to take a double strand of electric cable. The lamps hang by the cable which can be raised or lowered to adjust them to the right height, this being with their brightest part level with the lens. Bands of insulating tape round the wire outside the holes keep the lamps to the required height.

The bulbs should hang nicely in the curved reflectors, and no direct rays must find their way down the cone, the purpose of which is to keep direct rays from the lens surface, as falling here they would make the image on the screen hazy.

A back (E) is all that is now needed; this is a sheet of fairly thick card with four borders turned down as shown, so that it can just be pushed into the open mouth of the box, where it holds by friction only.

In the card back, right opposite the cone, cut a rectangle a shade less than the size of a cigarette picture (horizontal).

For vertical cards, small snaps, etc., it is better to make extra backs, each having suitable openings, it being but a moments work to change from one to the other. Two other backs, one to take vertical cigarette cards, and the other (3¼ in. x 2¼ in.) snapshots, are really all that are needed generally.

Along the bottom and one side of the rectangle fasten lips of wood as shown (F), which enable the operator to insert his cards in the lower lip, and push them sideways till they "catch" in the side lip, where they hold quite well.

The apparatus is now ready and is placed on a flat board or table with the camera in position as indicated, the camera back, of course, being removed so that light can get right through to the screen, which should be a rectangle of fairly smooth white card tacked to a frame. Sharp focus is obtained by a slight movement of the camera and back holding the picture if necessary.

Efficient functioning is obtained on two 60-watt lamps, but of course, better illumination still is obtained with lamps of 100-watt; using the latter there is a tendency to get rather hot, but there is no real risk from this.

There is one fault that may be considered detrimental in the instruments just described, they are of the non-reversing type, that is they show the picture the wrong way round.

To project the picture the right way round, however, is a very simple matter; all that is necessary is to place a good piece of mirror at 45 deg. in front of the lens tube and operate at right angles to the screen, as per Fig. G in the illustration. If possible a piece of silver-surfaced mirror should be used for the purpose as this eliminates any danger of a slight second image appearing. But a *thin* rectangle of ordinary mirror will do.

MODEL SPEEDBOAT HULL DESIGN . . .

(*Continued from page 274*)

the centre portion of the hull actually clear of the water, thus reducing wetted area. A variation of this has, in fact, been used on many American models which have exceeded the 70 m.p.h. mark.

The type of hull referred to is illustrated in Fig. 15, and is virtually the standard "scow" type hull with sponsons. These sponsons, however, project below the bottom line of the main hull, so that in cross section the main hull is fitted with what are virtually outrigged floats. These floats (the sponsons) are not stepped in themselves but terminate at the normal step position (which is somewhat in front of the centre of gravity). When the boat is planing at high speed it is actually running on these two outrigged floats or sponsons only, with a consequent reduction in wetted area. A similar, but less successful design of this type is shown in Fig. 16.

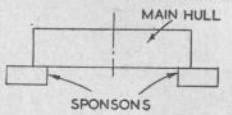


FIG. 15

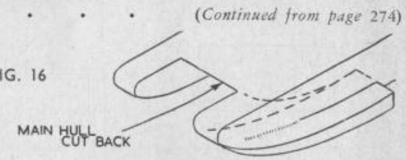
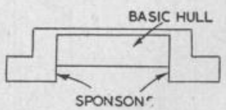


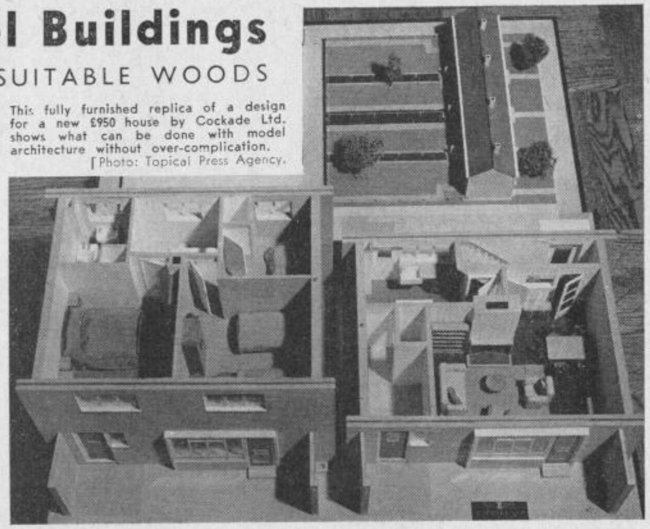
FIG. 16



These hulls approximate closely to twin-hulled design whilst still basically single hull craft. On theoretical grounds alone the twin-hull layout is excellent and in practice this fact has been well brought out in this country, at least.

Making Model Buildings

VICTOR SUTTON ON SUITABLE WOODS



This fully furnished replica of a design for a new £950 house by Cockade Ltd. shows what can be done with model architecture without over-complication. [Photo: Topical Press Agency.

IN making model buildings the reader may become confused on the subject of what to use in the way of materials. To avoid this I am only dealing with the question of the wood parts in this article.

First of all, any good model deserves a sound base—that is if it is to be a model quite on its own and not part of a layout. The best wood to use here is wallboard or hardboard which you can now get off-permit at the timber yard. All boards are inclined to bend, and therefore you must surround it with some 1 in. square quartering which is best screwed on. Nails will "jump" and the board and quartering come apart. The next difficulty is with the fitting of the model on the board. In sketch No. 1 is shown how a section of ½ in. x ⅛ in. wood is tacked down to the outline of the building. If the model is correctly built it will fix on this firmly.

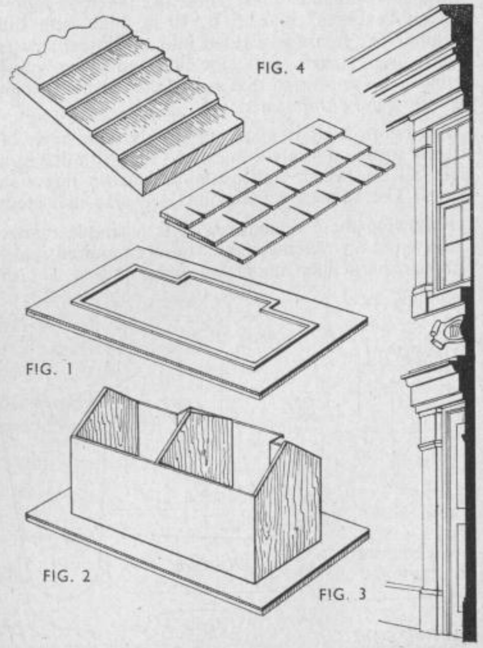
At this stage it is also wise to consider what parting walls you will be making. If you can get some plywood for these by all means use it. Cardboard is quite good for the main surfaces, but a good solid wood partition will hold much better. The main strain of the building will then fall on these.

All stripwood to be used should be cleaned up and planed. Irregular and rough wood strips will only make a bump where it should be smooth. I myself always use obechi in all my vehicles and buildings because of the very useful sizes and the finish. It is handy for trimming edges, it bends well, is free from blemishes, and will take paint and poster shades. In the thin $\frac{1}{16}$ in. x ¼ in. it is ideal for the ends for gables and weather boarding. Window sills, door supports, steps and so on, will all come out of ¼ in. x ⅛ in. and ½ in. x ⅛ in. There is no need to stock too many sizes. Work out the sizes you want and remember that you can then cut the required widths as you want them. Quite a bit of this you can do with the stiff backed razor blade instead of the saw.

I do not advocate the use of balsa wood much in this type of building because it is much too fragile.

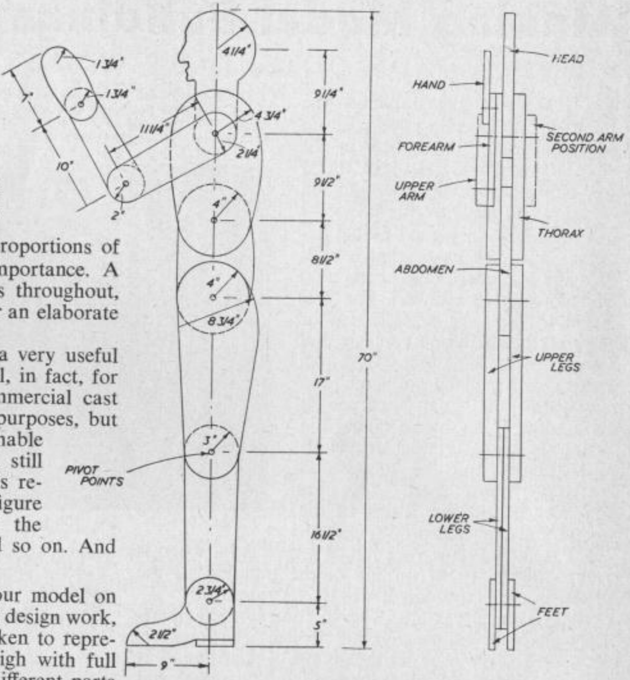
Dowel rod can be had from all model shops and suppliers, and sizes from ⅛ in. up to ½ in. are most suitable. A few of the small sizes and one or two of the larger would be ample stock for many years to come. You will be surprised how this can be used in many ways such as stays across to keep the model together. The larger dowel will do for door posts and architectural effects. Chimney stacks also have to be considered.

Fretwood is now in good supply and here you have a good solid wood (unlike plywood) which will be ideal for cutting out archways, doorways and other scenic effects. (*Continued on page* 310)



A "Normal Man" for Cockpit or Cabin

The parts below are exactly right for one-twelfth scale (1in. to the foot) and can be traced off. Other scales can be obtained by simple proportion.



TO model makers in particular, the proportions of the human figure are of some importance. A scale model demands scale proportions throughout, whether it be a simple chair or table, or an elaborate ship or motor vehicle.

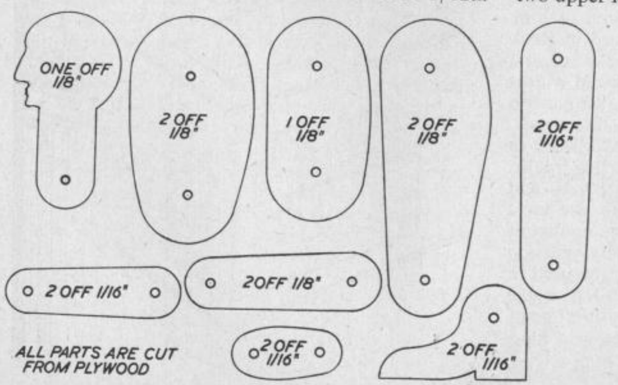
A "scale model man", therefore, is a very useful reference item—almost an essential tool, in fact, for some branches of model making. Commercial cast figures may be all very well for some purposes, but more often than not they are unobtainable in the particular scale required and, still more important, they are rigid. What is required is a correctly proportioned figure which can be adjusted to any of the normal positions—standing, sitting, and so on. And such a figure is very simple to make.

For the proportions we have based our model on the standard dimensions used for aircraft design work, with a few simplifications. These are taken to represent an "average" man, 5 ft. 10 in. high with full clothing. The figure is divided into 15 different parts—nine basic parts with the arm and leg parts duplicated—so pivoted that any of the normal human postures can be duplicated.

The figure itself is made up simply of a series of circular arcs and straight lines, and the main diagram gives all the salient dimensions of such a figure in inches. The various pivot points are also indicated.

Following these dimensions it is a simple matter to draw out an "average man" to any required scale. For our particular model we have chosen 1/12th scale, and a complete set of full-size parts are given for this figure. These are fretted out from $\frac{1}{8}$ in. and $\frac{1}{16}$ in. plywood, as detailed—one off each of the head and abdomen, and two off each of the limb components, and the thorax.

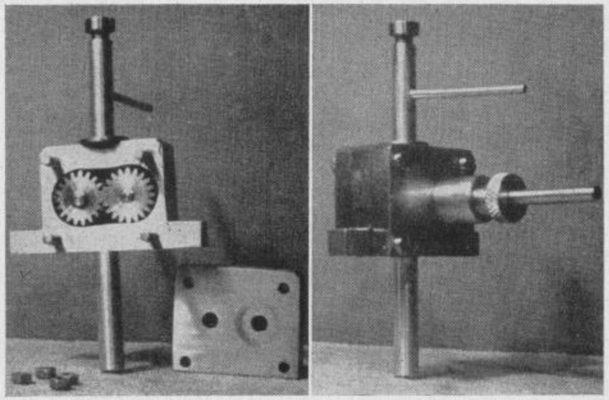
The model is then simply assembled with screws or pins through the pivot points. The head and abdomen assemble between the two thorax parts, the upper pivot point also carrying the upper arms. The two upper legs pivot to the lower end of the abdomen, whilst the extremities of the limbs pivot to the main limb members. All pivots should be stiff so that the figure can be set to, and retain, a definite position.



Such a figure can be used to determine the correct scale position of the control pedals and steering wheel in a model car, for example, or to properly proportion a table and chair set. In fact, application to the model maker is endless. And also it is a very accurate scale model man that you have made for reference. His correct "width", incidentally, is $19\frac{1}{2}$ in. across the shoulders and $15\frac{1}{2}$ in. across the seat, with a sitting height—from seat level to the top of the head—of 37 in.

A Simple "Suds" Pump

BY J. A. MURRELL



THE small gear wheel pump shown in the drawing is very simple to construct, yet very efficient as a "cooiant" pump suitable for a small lathe.

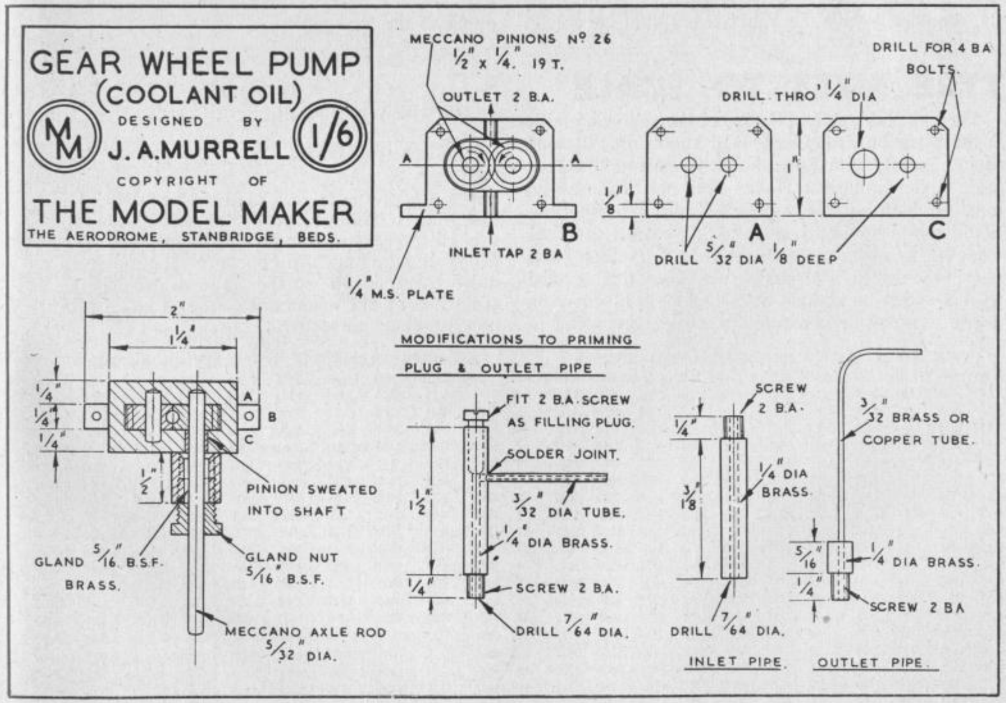
Running at 2,000-2,500 r.p.m. this pump will give a steady flow of oil from a $\frac{3}{32}$ in. dia. pipe at a height of 15 in. above the pump. Admittedly the flow of oil is not great, but this system is far more efficient that the "brush method" as a continuous flow of oil can be directed into the cutting edge of the tool, where it is needed.

The material needed is as follows:—

No. 26 Meccano pinions $\frac{1}{2}$ in. x $\frac{1}{4}$ in. x 19T (2 in No.)
3 in. Meccano axle rod (1 in No.)
4 B.A. Nuts and Bolts $\frac{7}{8}$ in. long (4 in No.)
$\frac{1}{4}$ in. M.S. Plate 1 in. x $1\frac{1}{4}$ in. (2 pieces)
Ditto 1 in. x 2 in. (1 piece)
2 in. x $\frac{1}{2}$ in. dia. Brass Rod (1 piece)
$2\frac{1}{2}$ in. x $\frac{1}{4}$ in. dia. Brass Rod (1 piece)
3 in. of $\frac{3}{32}$ in. dia. steam pipe — brass or copper (1 piece).

Construction

First file $\frac{1}{4}$ in. M.S. plates to shape (rough), drill



bolt holes, assemble the three plates and then file assembly to shape.

Dismantle, and taking centre plate B first, scribe centre line on plate B. Now mesh the two pinions from which the bosses must first be turned off, and placing them centrally in the plate mark through one of them, and drill $\frac{5}{32}$ in. dia. right through. (The Meccano axle is a nice running fit in a $\frac{5}{32}$ in. dia. hole.)

Put the axle through the pinion and the hole in the plate B, mesh the second pinion, not too deeply, mark through and drill the second hole.

Using plate B as a jig, drill plate A, each hole $\frac{1}{8}$ in. deep (see drawing). Similarly with plate C. One of the holes in C must now be opened up to $\frac{1}{4}$ in. dia. and drilled right through.

Next open both holes in B to $\frac{1}{2}$ in. dia. The pinions are catalogued as $\frac{1}{2}$ in. dia., but I found that they were $\frac{9}{16}$ in. dia.

If your drilling machine will take a $\frac{9}{16}$ in. drill, use it, if not file the holes until the pinions revolve freely.

Cut $\frac{1}{2}$ in. off the axle; this will make the small spindle. Sweat one pinion into the long spindle allowing $\frac{3}{64}$ in. to protrude through the pinion. The other pinion can be left free on the short spindle.

Now for the gland and gland nut. Chuck the $\frac{1}{2}$ in. dia. brass, turn one end down to $\frac{1}{4}$ in. dia. to fit into plate C. Drill through $\frac{5}{32}$ in. and part off $\frac{1}{2}$ in. from the shoulder. Whilst the $\frac{1}{2}$ in. bar is still in the chuck, turn out the gland nut, screw $\frac{5}{16}$ in. dia. B.S.F., knurl the head and part off.

Now rechuck the gland, open the $\frac{5}{32}$ in. hole and tap $\frac{5}{16}$ in. B.S.F. The gland can now be sweated into plate C.

Drill and tap 2 B.A. the outlet and inlet holes in plate B and assemble the pump. Make sure that the faces are flat and give each a smear of grease to make an airtight joint.

The gland can be packed with three or four turns of greased string.

The inlet and outlet pipes can now be made and fitted. If the connections are not oil tight when tested, small leather washers can be fitted.

The pulley can be a 1 in. Meccano pulley, though these are rather fragile, and I suggest that one be turned from a scrap end of bar.

The drive can be taken from the countershaft by a "gut" belt or even a leather bootlace. When the pump was first tested the drive was a piece of string, the ends of which were knotted together!

The feed pipe end of the rig-up can be made from a piece of $\frac{3}{32}$ in. dia. pipe sweated into a small tap, perhaps an old steamcock, and fixed to the saddle of the lathe by a fixture similar to a scribing block, the pipe taking the place of the scriber.

A small rubber or plastic pipe can connect the pump to the feed pipe.

TYRE SIZES TO SCALE

. . . A table by IAN CRAIG

The painstaking compilation of the following table is the work of C. I. Craig, well known in full-sized racing, mainly with Bugattis, in the past, and a keen scale model enthusiast. He has been one of those who have prodded us most regularly to provide information down to the last detail, and he certainly practises what he preaches! We learn from him that he is also in the throes of producing a similar table devoted to scale sizes of various bolts and nuts in common use in automobile construction, so we are going to be left with very little excuse for getting these things wrong.

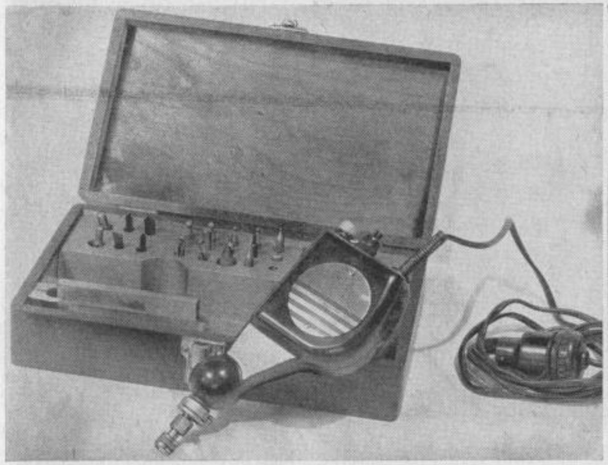
The question of tyre sizes is one on which many modellers go astray, for the full-sized articles themselves are produced in a confusing variety of sizes, and when it comes to producing small scale replicas it is all too easy to ruin an otherwise good model by fitting it with out-of-proportion "boots". It is too much to expect the model trade to provide the list given below, but readers can at least make up their own products correctly.

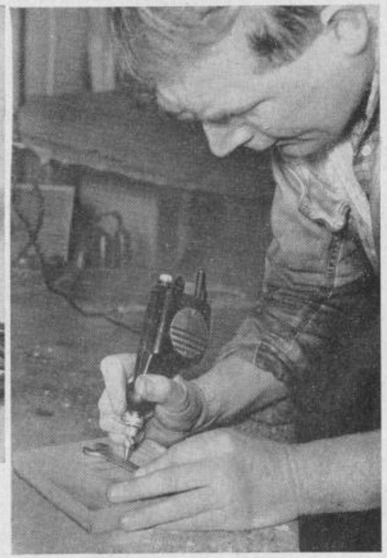
FULL SIZE SECTIONS TO SCALE IN INCHES

1/1	1/32nd	1/30th	1/25th	1/24th	1/20th	1/16th	1/15th	1/12th	1/10th	1/8th
3.00	.0937	.1000	.1200	.1250	.1500	.1875	.2000	.2500	.3000	.5370
3.25	.1015	.1085	.1300	.1354	.1625	.2000	.2016	.2708	.3250	.4062
3.50	.1093	.1166	.1400	.1458	.1750	.2187	.2333	.2916	.3500	.4375
3.75	.1171	.1250	.1500	.1565	.1875	.2343	.2500	.3125	.3750	.4687
4.00	.1250	.1333	.1600	.1666	.2000	.2500	.2666	.3333	.4000	.5000
4.25	.1328	.1416	.1700	.1770	.2125	.2656	.2833	.3541	.4250	.5312
4.50	.1406	.1500	.1800	.1875	.2250	.2812	.3000	.3750	.4500	.5625
4.75	.1484	.1583	.1900	.1979	.2375	.2968	.3166	.3958	.4750	.5937
5.00	.1562	.1666	.2000	.2083	.2500	.3125	.3333	.4166	.5000	.6250
5.25	.1640	.1750	.2100	.2187	.2625	.3281	.3500	.4375	.5250	.6562
5.50	.1718	.1866	.2200	.2291	.2750	.3437	.3666	.4583	.5500	.6875
5.75	.1796	.1916	.2300	.2395	.2875	.3593	.3833	.4791	.5750	.7187
6.00	.1875	.2000	.2400	.2500	.3000	.3750	.4000	.5000	.6000	.7500
6.25	.1953	.2083	.2500	.2604	.3125	.3906	.4166	.5208	.6250	.7812
6.50	.2031	.2166	.2600	.2708	.3250	.4062	.4333	.5416	.6500	.8125
6.75	.2109	.2250	.2700	.2812	.3375	.4218	.4500	.5625	.6750	.8437
7.00	.2187	.2333	.2800	.2916	.3500	.4375	.4666	.5833	.7000	.8750
7.25	.2265	.2416	.2900	.3020	.3625	.4531	.4833	.6041	.7250	.9062
7.50	.2346	.2500	.3000	.3125	.3750	.4687	.5000	.6250	.7500	.9375

FULL SIZE DIAMETERS TO SCALE IN INCHES

1/1	1/32nd	1/30th	1/25th	1/24th	1/20th	1/16th	1/15th	1/12th	1/10th	1/8th
14	.4375	.4666	.5600	.5833	.7000	.8750	.9333	1.1666	1.4000	1.7500
15	.4687	.5000	.6000	.6250	.7500	.9375	1.0000	1.2500	1.5000	1.8750
16	.5000	.5333	.6400	.6566	.8000	1.0000	1.0666	1.3333	1.6000	2.0000
17	.5312	.5666	.6800	.7083	.8500	1.0625	1.1333	1.4166	1.7000	2.1250
18	.5625	.6000	.7200	.7500	.9000	1.1250	1.2000	1.5000	1.8000	2.2500
19	.5937	.6333	.7600	.7916	.9500	1.1875	1.2666	1.5833	1.9000	2.3750
20	.6250	.6666	.8000	.8333	1.0000	1.2500	1.3333	1.6666	2.0000	2.5000
21	.6562	.7000	.8400	.8750	1.0500	1.3125	1.4000	1.7500	2.1000	2.6250
22	.6875	.7333	.8800	.9166	1.1000	1.3750	1.4666	1.8333	2.2000	2.7500
23	.7187	.7666	.9200	.9583	1.1500	1.4375	1.5333	1.9166	2.3000	2.8750
24	.7500	.8000	.9600	1.0000	1.2000	1.5000	1.6000	2.0000	2.4000	3.0000
25	.7806	.8333	1.0000	1.0416	1.2500	1.5625	1.6666	2.0833	2.5000	3.1250
26	.8125	.8666	1.0400	1.0833	1.3000	1.6250	1.7333	2.1750	2.6000	3.2500
27	.8437	.9000	1.0800	1.1250	1.3500	1.6875	1.8000	2.2500	2.7000	3.3750
28	.8750	.9333	1.1200	1.1666	1.4000	1.7500	1.8666	2.3333	2.8000	3.5000
29	.9062	.9666	1.1600	1.2083	1.4500	1.8125	1.9333	2.4166	2.9000	3.6250
30	.9375	1.0000	1.2000	1.2500	1.5000	1.8750	2.0000	2.5000	3.0000	3.7500
31	.9687	1.3333	1.2400	1.2916	1.5500	1.9375	2.0666	2.5833	3.1000	3.8750
32	1.0000	1.6666	1.2800	1.3333	1.6000	2.0000	2.1333	2.6666	3.2000	4.0000





THE BURGESS VIBRO TOOL

ON TEST BY MODEL MAKER STAFF

THIS very versatile and comprehensive tool was recently tested by model makers in our workshops. Briefly, the tool is an electric carving, gouging, engraving, embossing and cutting instrument worked on the principle of vibration.

The de luxe tool which we tested, consisted of the main handle which incorporates the motor and adjuster; four chisel attachments, two knives, two engraving points, one abrasive point, five ball points, six leather tools, one foot gauge for use with the cutting knives, and one oil stone, all packed in a neat wooden case.

The tool is held in much the same manner as one holds a fountain pen, the appropriate tool being fitted into the chuck, gentle pressure is all that is required for most jobs.

We found our best attempts with the tool were when engraving on soft metal; thin sheets of copper, brass or aluminium can be very easily worked, and certainly the tool is a great labour saver in this type of work.

For embossing soft metal we used one of the small ball points, and an extremely attractive design was worked in a very short time, and, perhaps most important, with a minimum of pressure.

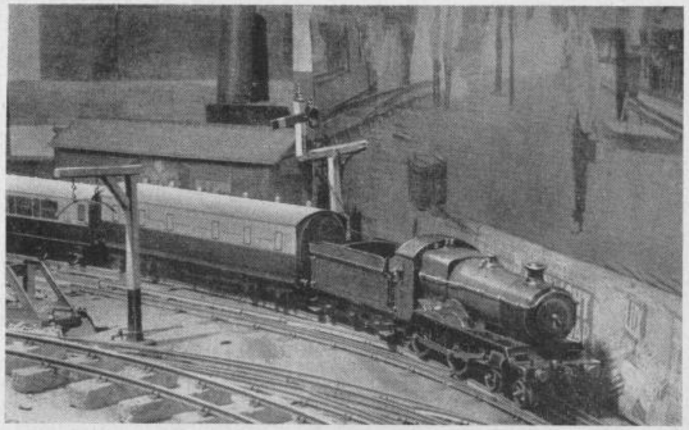
Plastic is also a very good medium for using with the Vibro tool; very attractive designs can be etched on trays or jewellery. For this work the point attachment is used.

Wood carving can also be successfully accomplished using the various chisels, but great care must be taken to ensure suitable wood is used. Best results were obtained when using boxwood and maple; care must be taken to avoid pressing too hard on the wood or a pitted surface will result.

The tool is compact, well produced, and a very useful addition to any workshop, providing a reasonable method of speeding up repetition work. At 97/6 it is a very good "buy". As a last comment on the tool, we can only add that we took such a fancy to the sample sent for test that it is now on the permanent workshop "strength".

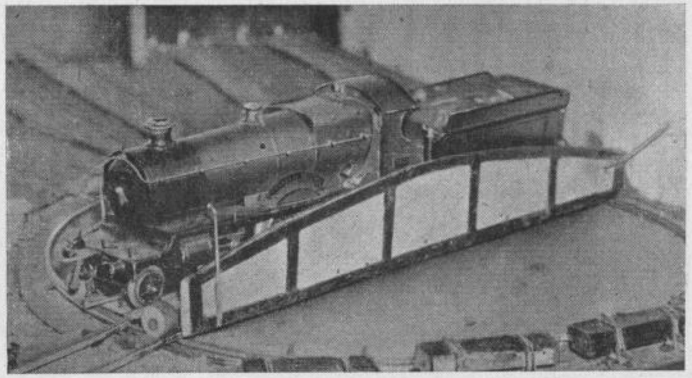
Top right: Marking a spanner for identification. Tool is here gripped quite firmly in use. Top left : The De Luxe set in its stout wooden box—note receptacles for tools, with spare hole for diamond bit if added subsequently, and oil stone in foreground.

Right : Cameo carving in wood with one of the chisel attachments. This illustration shows the very light pressure desirable in working wood.



Improving the Miniature Railway Layout

H. A. ROBINSON'S REGULAR FEATURE



Left: A scene on the author's Rock Ferry Model Railway. Taken with H. & D. 1200 plate. Illumination two 60 watt lamps at 5 ft. Exposure ten minutes at f.32. Above: On the turntable, taken with one 60-watt lamp, other particulars as before.

Model Railway Photography

PHOTOGRAPHING model railways is not quite so easy as making snaps out-of-doors, but with care quite good results can be obtained with even the cheapest of cameras.

The trouble with what we might call "simple cameras" is that they will not render in sharp focus items that are less than 7 or 8 ft. away, and at this range (and over) models come out very tiny. If these instruments are "stopped down", however, to their limit they can be moved two or three feet closer in, as the smaller opening has increased the "depth of field", that is, has brought items nearer to the lens into satisfactory definition.

This way of taking still yields rather small pictures of the models, but the negatives will be sharp and will enlarge well.

When working with a very small stop, a long time exposure will have to be given, and during this the camera must be on something rigid. Just how long the exposure should be depends on how near to the window the models are, whether the room is dark or light, the time of day and year, etc. But a typical exposure for midday, in March or August (room well lighted) would be three to four minutes with a Verichrome film (i.e. about 600 H & D) and an aperture of f32. This time could be halved for May and June or if one of the faster films is employed.

When using other apertures than f32 it must be remembered that when a stop number is increased, or reduced, the exposure varies according to the *square* of the difference; thus f64 will require four times the exposure of f32.

By giving really long exposures good photographs can be secured at night with ordinary room electric lights, and the writer has had many excellent pictures by using two 60-watt lamps at a range of 4-5 ft. and giving 10 to 15 minutes' exposure—the film being 1300 H & D and the stop f32. When making a really long exposure like this it will be found that quite a number of minutes either side of a correct exposure makes little difference.

Actually, taking at a fair distance and then enlarging as suggested gives a better perspective than any other method. Also the enlarging tends to soften the pictures, which in the opinion of some improves the general appearance of a model photograph. It certainly takes away the "tinny" impression.

Big stops and short exposures may be very convenient but there is no doubt that more brilliant and sparkling negatives are obtained by using small stops and long exposures.

The fault with a lot of model railway pictures is that there has been an attempt to include too much. This is a great mistake and results in a confusion which worries the eye when viewing as a whole, although section by section they may be quite interesting. The crowded negative, if very sharp, can, however, form a good base from which to enlarge "bits", that in their turn may make very excellent pictures, but generally speaking, it is better to restrict compositions to only a few pieces of model "stock" and to a limited section of track.

Unwanted areas on and around the layout can generally be masked off with advantage, for carpet, rugs or brown paper artistically arranged can be made to look like hills or rugged country.

Lighting should be evened out as much as possible, but the main source must be from behind the camera and to one side; be careful, however, that the shadow of the camera does not fall on the model. Sheets can be used to act as reflectors to carry light into dark corners and generally to assist in the levelling-up process, and sometimes artificial light can be used to boost daylight in these places.

If you do your own developing aim for rather soft negatives, full of detail (obtained easiest by full exposure and a short time in the developer), but the strength of a negative will depend on the particular printing paper for which it is intended, negatives for printing-out-paper having to be stronger and more "plucky" than for gaslight. "Water bath" development gives good results and prevents "harshness", that is a too great range of contrasts between the highlights and shadow which produces a "soot and whitewash print"—a very common fault with beginners' photographs of models.

With regard to arranging the models, this should be given some attention. Most model vehicles suffer from the fact that the couplings are too long, being out of scale. This inaccuracy is allowed to permit fingers to get in between the stock when joining up, but in a photograph the appearance is that the vehicles are standing yards from one another. A better effect can be obtained, therefore, by not connecting the couplings at all and then pushing the vehicles as near together as they will go.

Alignment must also be watched as model wheels seldom fit tightly on the rails, and a train of model vehicles set casually on the track will generally be found to be slightly zig-zagged.

Owing to the diminutive size this will not be very apparent as the model stands before you, but photographed from the three-quarters position, and then enlarged, the whole train will be found to seem twisted to various angles right down its length, which, of course, gives a very unrealistic appearance, as one of the characteristics of a real train is the smooth contours it present. The photographer can prevent this by carefully lining up the vehicles, and while he is doing this he should be watchful for dips or bumps in the track, which while again being almost unnoticeable when viewing from above, can give to an enlarged picture of a train from rail level a most distressing appearance of "rough riding". End-on or three-quarter viewing always tends to magnify these inaccuracies.

The inclusion of model figures is possible at the cost of a few pence, as sets of porters, passengers, etc., are on the market. These miniature people add wonderfully to the realism of a finished photograph and are worth acquiring. They should be arranged in suitable positions but these will suggest themselves as a scene is built up. A model driver leaning out of the side of a locomotive cab, and a guard in the open back of a brake van give particularly good effects.

Unless taken under ideal conditions bright spots are sure to be reflected from polished or high enamelled surfaces, but they can be toned down by a little "retouching" on the print.

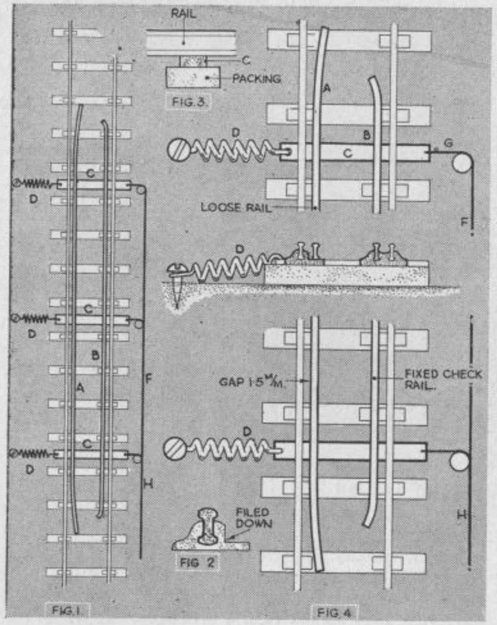
Regarding possible positions for stock, trains entering stations, locomotives near water towers or sheds, and goods vehicles in goods yards are all quite in order, but avoid joining the "Pullmans" to coal trucks or showing them standing half out of the loco depot as these things would worry the more critical observer. This aspect of the art, however, we think need not be stressed, as we are sure the model railway enthusiast will be as keen as anyone else to have his engines and rolling stock in just the right place.

Clockwork Train Control

In the easy and realistic control of model trains electricity has a great pull over clockwork. Indeed, by dividing an electric system into a good number of isolated circuits, each with its own switch, almost uncannily lifelike train-movements can be obtained. Also by putting in simple rheostats, the actual speeds can be regulated—and best fact of all, these controls can be applied from positions right away from the trains.

Clockwork trains have in the main to be handled, and a clockwork mechanism is generally full on or full off, there being no middle speeds or coasting effects. Certain controls can however, be introduced into a clockwork system, but those which work on to the trip lever for stopping and reversing on the under side of the engine, are violent in action and bring a train to a sudden stop. Long trains can even become derailed with the jerk.

Automatic stopping is definitely required at certain locations on a clockwork system, as at the end of a terminal platform. Of this there is no doubt. But it should be a gradual slackening off in speed not a sudden locking of the wheels. And this can be obtained by fitting "retarders" as used in goods yards in connection with "hump" shunting. A retarder can be employed with or without a trip lever at the end.



Including a trip lever, a train can enter a terminal platform, be gradually slowed down, and clicked to a complete stop at the very end with great precision.

Retarders are used in "hump-shunting" yards for the slowing down of trucks running free, to a workable speed, and the retardation is secured by bars which press up against the inner side of the wheels—much as would a check rail that was too tightly set.

The general idea of a retarder for a model line is shown in Fig. 1. The long rail (a) presses against the inner surfaces of the wheels at that side, thus producing friction and a check, but not of a sudden nature. It is about 1 ft. long.

On the further side is the check-rail (b). This is fixed and of normal make-up, standard check-rail chairs being used if possible. The rail (a) is so fitted that it is able to come up to 1.5 mm. from, but not touch, the running rail. This is made feasible by using over the length cast chairs with the inner sides filed down to a square front as shown (Fig. 2). Success of the retarder depends on fine adjusting, and the aim is to get (a) to bear on the wheels while still leaving a narrow channel for the flanges to pass along. The average flange width is 1.5 mm., and if these happen to be any thicker on a train the only effect (as described in a moment) is to push the bar out a little further against its spring.

As important as it is that the retarder bar must be close to the running rail, it must never touch as this will cause the wheels to ride up. The small opening however, is sufficient to allow the entrance of "the thin edge of the wedge" so to speak.

The only wheels that ever tend to rise on this arrangement are those of the very light bogeys fitted to some less expensive locomotives. But these bogeys are always a law unto themselves, and in any case the check-rail on the other side quite eliminates the danger of derailment.

Rail (a) is winged at each end but with a much more gentle slope than is usual, which constrains the wheels to the very narrow channel they are entering without any undue jar. For perfect working, therefore, it is obvious that the length of rail used for a retarder must be particularly straight without any suggestion of buckle.

Now as to how we make the rail (a) move. First, the length is soldered to three strips (c), which are about as long as sleepers. The joining is carried out so that any necessary blob of solder is on the inner side, the outside which touches up to the square faces of the running rail chairs being cleaned out squarely. For these cross bars short lengths of discarded rail will do well as this solders easily to more of itself. Care must be taken to see that the three bars are in the same horizontal plane. Having to bend them down after soldering will tend to warp the retarder and reduce its efficiency.

The rail with its strips is now placed under the running rails and packed up as Fig. 3 with a thin piece of metal till the bars just touch the underside of these and will slip comfortably sideways.

Taking apart temporarily, drill holes in the ends of the crossbars (one in each end) to take the springs (d) and release wire (f).

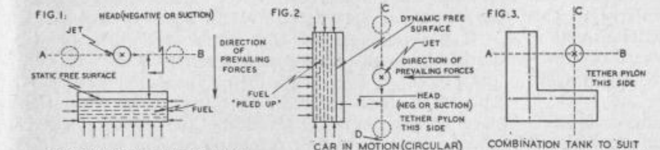
The former are wired to the bar at the retarder side and pulled out to screws in the baseboard to give such a tension that the retarder is kept tight up to the filed-off chairs, but not so tight that it cannot be prised out a little by the passing flanges. If necessary some little experimentation should be put in till just the right tension is secured. Properly set the retarder should bring a train to the stop, but not before the locomotive has run through. If therefore the arrangement is being used at the end of a terminal platform a trip lever might be added with advantage just beyond, to give the final check. When used out on the running tracks, and there is some latitude in space, the trip lever need not be included.

Now having got our train stopped in the retarder we must have some way of releasing it, and this is done by a lever which applies a pull to the other ends of the crossbars.

To the further ends, wires are attached as (g), the three being wound into one strand at (h), before passing on to the point from where they are operated.

(To be continued)

"PROFESSOR" ON *Designing Fuel Tanks by Graphical Methods*



CAR AT REST OR STATIC CONDITIONS

CAR IN MOTION (CIRCULAR) OR DYNAMIC CONDITIONS

COMBINATION TANK TO SUIT STATIC & DYNAMIC CONDITIONS

IT is now several years since the described graphical construction to facilitate fuel tank designing was first evolved, but, assurance has been given that this is just the kind of information which should be provided in the pages of *Model Maker*, since the bugbear of centrifugal force is still with us, and moreover is likely to remain for no short time.

Though the present article is written particularly for the benefit of model car racing enthusiasts, it should be obvious that the construction described is equally applicable to all forms of circular course racing.

The actual construction can be dispensed with in but a few lines—both from the printing and drawing angle!—but it has been noticed that many of the difficulties experienced by the beginner and some experts in the fuel tank department, are largely due to the failure to appreciate the basic principles involved.

It is not proposed to give a long treatise on these basic principles, since several excellent articles on the subject have already appeared, but in view of the importance of them, and also for the benefit of new readers, it is felt that repetition is, to a certain extent, a necessity.

To the experts let it be made clear at this stage that the type of tank dealt with is the centrifugal (or anti-centrifugal) tank in its simplest forms and derivatives, for, after all it is, or should be, the beginners who need the guidance.

It is assumed that the reader is familiar with the general principles governing the satisfactory operation of model internal combustion and/or compression ignition engines, and will therefore be aware that certain engines function best with gravity fuel feed to the jet, others are at their best with suction fuel feed, whilst the remainder prefer to have the fuel feed level with the jet. The respective fuel heads for these conditions are namely positive, negative and zero, such heads being measured perpendicular to the free surface of the fuel.

The method of solution is similar, regardless of the type of fuel feed required, so that during the initial stages of the description the more common "suction" feed will be used as an illustration, whilst in the latter stages all types of fuel feed will be dealt with in detail.

It will also be known that during a run the level of fuel within the tank will fall, and therefore for consistent operations throughout the run the variation between initial and final fuel levels must be relatively small. Consideration of this factor therefore, leads to the application of a shallow tank, the length of which is as long as permissible.

However, this is by no means the governing factor, since up to the present only a stationary or "static" condition has been considered, in which case the only prevailing force is that due to "gravity" acting vertically downwards. In practice, when dealing with circular course racing, at anything other than a relative "crawl", a further force takes precedence which acts horizontally outwards from the centre of the track, and is due to centrifugal action.

A state of affairs then exists which is analagous to the suspension of the car by the bridle with the axles in the vertical plane, only in reality being much worse, depending upon the magnitude of the "G" or centrifugal force factor at the speeds and radii under consideration. Conditions are now referred to as "Dynamic", and it will be seen that the fuel in this case is actually supported by the "outer" wall of the fuel tank.

Under "dynamic" conditions, the shallow tank previously referred to becomes equivalent to a narrow deep tank, which would have consequent toll on the consistency of running, even further impaired and exaggerated by the action of the "G" factor.

Fig. 1 shows a cross sectional view of a venturi jet and fuel tank under static conditions. The shallow tank is preferred, and it will be appreciated that if the jet assembly is moved anywhere about the plane AB represented by a dotted line, the static head will be unaltered and running unimpaired. Since the direction of the prevailing forces is vertically downwards, the portions of the tank (neglecting the sides) which are actually supporting the fuel are the two sides and the bottom, the only "free" surface therefore being the upper surface of the fuel. This it may be said is obvious, but it is emphasised since much confusion is often shown due to a failure to appreciate the manner in which it is derived when considering dynamic conditions.

In Fig. 2 the same features have been reproduced, but in a rearranged manner to suit dynamic conditions, the height of the jet above the datum line, the cross section of the tank and the physical head of fuel being similar. It will, however, be seen that the tank now has the longer edge in the vertical plane, but this is logical, since the prevailing force is now outward, and the fuel variation must therefore be least in this direction. Support to the fuel in this instance is given by the outer side and the top and bottom of the tank, and therefore the dynamic free surface of the fuel is the innermost surface. The dynamic head is measured perpendicularly to this surface or in actual fact in a horizontal direction. Movement of the jet assembly in an upward or downward direction anywhere on the plane CD will again not affect the initial fuel head.

Now it is obvious that whereas static conditions must be satisfied, dynamic conditions are of even greater importance and must also be satisfied. The logical step is therefore to combine the features of both Fig. 1 and Fig. 2, and this has been done in Fig. 3.

The tank it will be seen has assumed an L-shape at least from consideration of the fuel contents under both conditions, the vertical limb being on the side of the tank furthermost from the tethering pylon, and, since from static conditions the jet assembly must lie somewhere on the plane AB, and from dynamic conditions it must lie somewhere on the plane CD, the only place equally suitable for both conditions will be at the intersection of these planes, which, of course, on a cross-section can only be represented by a point.

This then is the manner in which the centrifugal tank was first derived, the static cross-sectional area at a particular section always being made equal to the dynamic cross-sectional area at the same section, and furthermore, the respective fuel heads perpendicular to the free surfaces also being made equal.

The actual geometrical construction evolved is based on two operations, firstly the conversion of a particular rectangle to one of similar area, and one known or assessed dimension, and secondly the positioning of these rectangles to give equivalent heads from a consideration of the locus of the jet.

In Fig. 4 the given rectangle ABCD is converted to a rectangle of similar area, the required width of which is to be W. The construction is illustrated in six stages:—

(a) Draw the given rectangle ABCD to scale.
(b) Draw parallel line distant W from side AD produced. Cutting side DC at E and the base AB at J.
(c) Produce right hand side BC.
(d) Draw line from A through point E, intersecting BC produced at F.
(e) Draw parallel line to base through F meeting AD produced at H. Point at which parallel line width W cuts horizontal line is named G.
(f) Required rectangle is AJGH to similar scale as ABCD.

It is suggested that readers should verify these methods to their own satisfaction by taking suitable examples and checking results by calculation.

Two separate sequences have been used by way of illustration, it being considered that any other probable combination can be readily solved from a knowledge of the foregoing.

The second construction is much more simple, but no less important and is concerned with the loci of both static and dynamic free surfaces with respect to the jet for varying equivalent heads of fuel.

It has been agreed that static free surfaces are horizontal whilst dynamic free surfaces are vertical, the respective fuel heads being measured perpendicularly to these surfaces, consideration in the latter case being given to the position of the tethering pylon, which, if the previous convention is to be followed, is considered to be the right hand side of the jet.

In Fig. 6 the jet has again been marked by a small cross, and in order to find the required locus, in stage (a) it is obvious that for zero fuel heads both the dynamic (vertical) free surface and the static (horizontal) free surface will intersect at the jet, thus the jet is a point on the required locus.

Stage (b) shows both static and dynamic free surfaces for "suction" feeds of ½ in. and 1 in. respectively, further points on the locus being again at the intersection of the respective surfaces.

Similarly, in stage (c) the "gravity" feed free surfaces for heads of ½ in. and 1 in. are shown and two further points on the locus obtained at the respective intersections.

Stage (d) shows the points linked by a heavy dotted line which is the locus of the intersection of static and dynamic free surfaces for equivalent fuel heads and which it will be seen is a line at 45 deg. to horizontal (or vertical) passing through the jet itself.

A further point is worthy of mention, since it is as well to have at least one reasonably constant dimension to work from if at all possible, this being that the vertical limb of the L should not be wider than ½ in.

In practice of course, the actual size of the tank is governed by the space available, and is often a question of compromise, but it is assumed that the majority of car builders would prefer to fit a tank within a reasonable body rather than build a tank and make the body to suit.

However, taking a simple case first, it is assumed

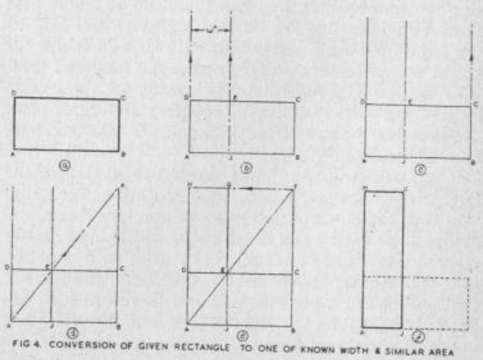
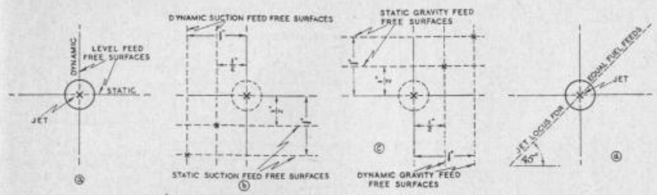


FIG 4. CONVERSION OF GIVEN RECTANGLE TO ONE OF KNOWN WIDTH & SIMILAR AREA



JET LOCUS FOR EQUAL STATIC AND DYNAMIC FUEL FEEDS. FIG. 6

that the car body is such that no real restrictions are imposed either in regard to the dimensions of the fuel tank or the manner in which fuel is to be fed that is, suction, gravity of level head. Level head fuel feed is the type most generally required and has been used for this example for which Fig. 7 shows a stage by stage construction:—

(a) Draw to scale the jet position relative to the bottom of the car, and also a rough outline of the body at this section, though for this particular example this is not absolutely necessary.

(b) Draw a vertical line through the jet E from the bottom of the car and a parallel line ½ in. distant from it on the furthermost side from the tethering pylon, cutting the base line at B and A respectively.

(c) In this instance with jet about 1 in. above the bottom, the vertical limb would not normally be more than 1½ in. above the jet—draw horizontal line DC produced towards the pylon at this height.

(d) Draw a line from A passing through the jet and cutting DC produced at F.

(e) Drop a perpendicular from F cutting the horizontal line through the jet at G and the base line at H.

(f) Required L-shape tank, see later notes.

For a second example (Fig. 8) it is assumed that a suction feed of ¼ in. is necessary in order to provide access of air to venturi, and furthermore that the top of the body provides a further restriction.

(a) Draw to scale jet position, body base and outline at particular cross section.

(b) Draw a line at 45 deg. passing through the jet from the base.

(c) Draw two vertical lines distant ¼ in. and ¼ in. plus ½ in. on the appropriate side of the jet.

(d) Draw horizontal line towards the pylon allowing sufficient clearance below the upper bodyline restriction.

(e) Draw a horizontal line through the junction of the ¼ in. line with the 45 deg. locus line.

(f) Draw line from junction of ¾ in. line with base, passing through the junction referred to in (e) and cutting the upper horizontal line.

(g) Draw a perpendicular from the latter point to the base line.

(h) Outline of L-shape tank.

The final example is shown in Fig. 9. Here it is assumed that the actual venturi passes through a carved wooden body and the jet position in cross section is actually within the bounds of one side. A "gravity" feed is thus a necessity. The illustration is again shown in eight stages, and in view of the fact that written stages have accompanied the previous two examples it is felt that they can be omitted in in this instance. A noteworthy feature of this example is that the final tank section is such that it automatically resolves itself into the form of a rectangle.

Three examples have now been given and though it is admitted that there still remain other combinations of circumstances, it is considered that the general application of the method has been stressed sufficiently, and that with intelligent use any such problem can be successfully tackled.

Two sections at least should be taken from each tank, unless the body is such that a completely parallel sided tank can be used, in the case of a normal layout the rearmost section being tackled first and then the front end, taking care that both the dynamic free surface and the static free surface are common to each section, the former of course, being vertical and parallel to the centre line of the car, whilst the latter must be level and at right angles to the former. These points are illustrated in Fig. 10.

Though L-shaped tanks have been derived in two of the examples whilst the latter example resolved itself to a rectangle, it is emphasised that the L-shape

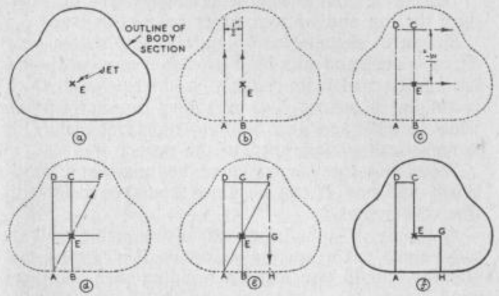


FIG 7. EXAMPLE I.

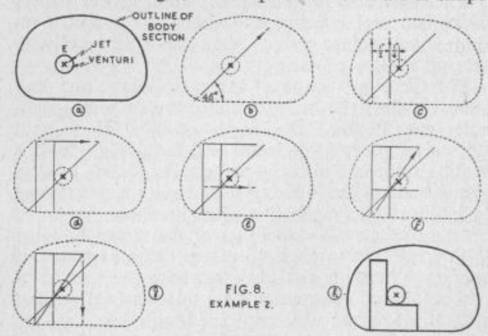


FIG. 8. EXAMPLE 2.

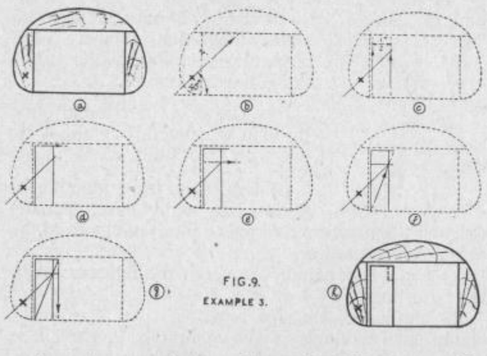


FIG. 9. EXAMPLE 3.

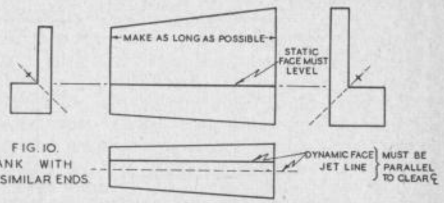


FIG. 10. TANK WITH DISSIMILAR ENDS

need not in every instance be retained. It is generally believed that the reasons for adopting an actual L-shape are principally to avoid impedence of the flow of air to the venturi and also for cooling purposes in relation to the cooling fins.

The actual L-shape arrived at, must therefore be treated in the form that it actually takes, that is as the junction of two free surfaces, and modifications can be made in the actual shape of the fuel tank.

A word of warning would probably not be amiss. Assuming that the tank itself has been designed the number of pipes associated with the average fuel tank is astronomical and would put the normal steam organ to shame, but all these pipes serve, or should serve a useful purpose, some control the static fuel level others ensure that a pressure at least equivalent to atmospheric is maintained in the free air space, some function as balances between the vertical and horizontal limbs whilst others serve to supply fuel to the engine.

The tyro is therefore strongly advised to study one or two good examples of "plumbing" before adding pipes *ad lib*, otherwise he is likely to become extremely unpopular the first time he attempts to gyrate, since improperly placed pipes can cause fuel to be thrown on to the surface of the track due to fuel surges.

Briefly the supply pipe should be taken from the rear lower corner of the tank furthermost from the pylon, whilst filler pipes should be so placed that during acceleration or retardation when fuel pile-up occurs at the back and front of the tank respectively, no discharge of fuel takes place.

MAKING MODEL BUILDINGS

(Continued from page 299)

If you know a local builder he will, very often allow you to pick up a bag of oddments which would otherwise go on the fire. I have picked up white chestnut, sycamore and satin walnut and have made the best use of them in my work.

Blocks of wood are also most useful as a stand-by for use in the case of steps, and so on.

Plywood oddments should be collected as these are useful for interior fitments, doors, alcoves and other smaller parts which look best in wood than in cardboard.

There are also on the market wood veneer papers which are very effective and should be mounted on thin wood before using. You can fix these with seccotine, Gloy or Grip-fix.

For the construction of larger buildings one may want to effect the heavy architecture of some particular age. In the sketch is shown how this is built up with 1 in. x $\frac{1}{2}$ in. wood and mouldings. In this build-up one can also use the smaller woods in strip mentioned earlier. This type of model is interesting to build and very effective when on show.

One of the main difficulties of the model building is that it is apt to come to pieces, large expanses of roof may bend in and also you have the trouble of expansion and contraction. For this reason I suggest that all roofs are well reinforced with $\frac{1}{4}$ in. x $\frac{1}{4}$ in. obechi strips. This is very important because once the model is made and a defect develops you will have to take it all to pieces to put it right.

It would be a good plan, in all cases to prepare a plan of the proposed model and then decide just where you are going to use wood and cardboard. According to the length of any particular section you will then be able to see what strain there is likely to be.

Pieces of plywood used in the model should be carefully trued, otherwise if not, the shape will be put out of alignment right from the start.

Do not set out the windows and doors in wood until the top and bottom edges have been trued.

Shown in sketch No. 4 you will note that a very effective roof and one far better than any cardboard one can be made with suitably sized strip wood which is set on in strips. Also is shown another version which is cut out with a knife to represent tiles. This is realistically overlapped in the proper way.

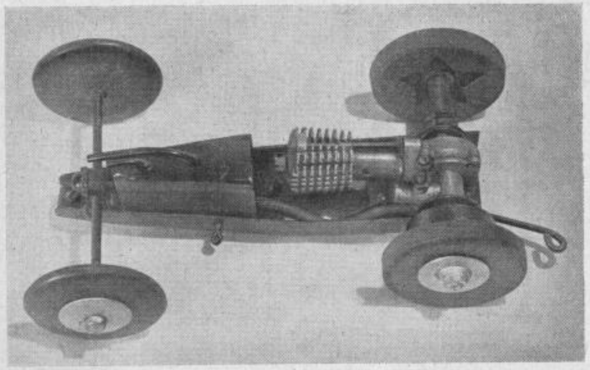
Wood has the advantage of holding where cardboard will not. It can be glued and then held with fine veneer pins.

A supply of $\frac{1}{16}$ in. plywood, if obtainable, will always come in for making stairways. It is also a good standby should you make a building with a hipped roof.

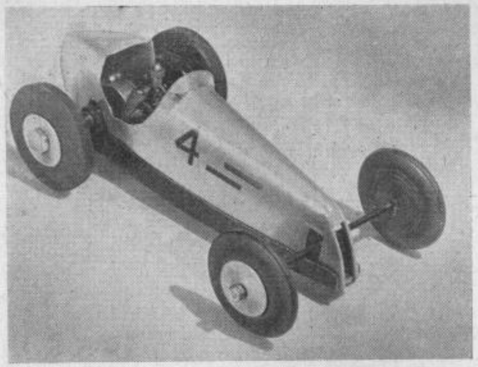
BUILT FOR UNDER THREE POUNDS

The FROG SPECIAL

BY J. J. ROGERS



Model Maker Photos



The author constructed this simple little car chiefly to demonstrate model car racing to incredulous work-mates and using whatever materials came to hand. The model was timed to do 30.1 *m.p.h. on an improvised track, using standard fuel.*

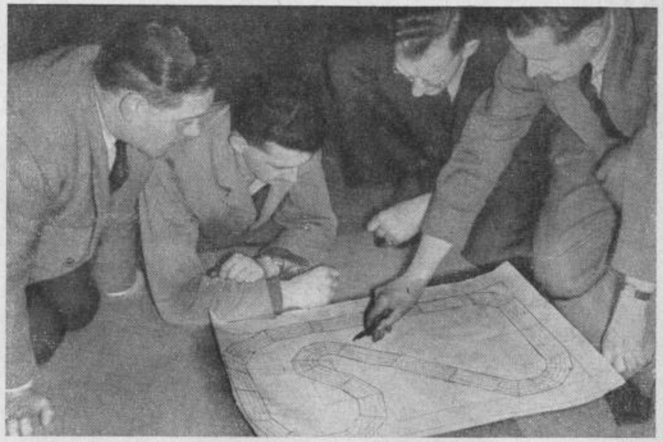
THE chassis was made up from 20g. mild steel sheet on the snip and weld principle, the near-side flange was increased in height at the rear end and a $\frac{7}{16}$ in. dia. hole was drilled to take the main bearing housing of the engine. This hole acts as a mounting point for the engine.

The next problem was the idler rear wheel and its attachments. This was solved by finding a bush from an antique type of windscreen wiper, which was then brazed to the off side of the chassis on the top edge of the chassis flange. A strut of mild steel was then welded to the base of the chassis and brazed to the outer end of the bush to form a triangular structure. The idler axle is a $\frac{1}{4}$ in. dia. bolt, the head of which has been reduced in size. This bolt was put through the bush via the aforesaid $\frac{7}{16}$ in. hole. The idler wheel, a 2 in. dia. rubber heel, is then secured to the axle by two nuts, one on either side. So much for the rear end. The next item for treatment was the front axle, which was dealt with by using the top half of a Morris 8 self-starter switch arm. These switches have a rotating collar at the top end which holds the pull-wire from the dash. The top part of this arm was cut off and the hole which takes the pull-wire was bored out to $\frac{1}{8}$ in. dia., the mild steel portion was bent to an L-shape, a $\frac{1}{8}$ in. dia. hole was bored in the foot, and a corresponding hole drilled in the front of the chassis, and the support bolted into position. A length of $\frac{1}{8}$ in. steel rod is inserted in the hole in the rotating collar, and is secured by the screw which originally locked the starter wire. A pair of 2 in. dia. streamlined aero wheels complete the front end, which is fully swinging!

The "urge" department, a Frog 100 diesel, was then violently attacked with a Junior hacksaw and various files. The bulkhead tank was cut off and the crankcase was left naked and unashamed. The cylinder head was cut off just above the exhaust stubs, and slotted lengthwise (in the hope of better cooling). The cylinder was turned through 90 deg. to bring the transfer ports in line with the direction of rotation of the crank. The engine was then fitted into the chassis by two angle brackets on the lower cylinder head stud, one against the crankcase and one at the top of the head. The main bearing housing fits into the $\frac{7}{16}$ in. dia. hole in the chassis flange, holding the motor firmly in position. The flywheel is fitted to the crankshaft, then the other rubber heel, then a body washer and finally the spinner nut. A fuel tank of shim brass was soldered up and fitted in front of the engine. Tether brackets completed the chassis.

Coach building was tackled with the aid of a pair of snips and a soldering iron, a body was fabricated (any resemblance to any type of motor car was purely accidental), and after being filed up was given three coats of primer and three coats of colour. Numbers, etc., were transferred on, and the result—I'll let you judge for yourself. The total time taken, about 24 hours, and cost about 58/-, including engine, dope and transfers.

Rail Track Developments



Here is the Meteor Club's "working committee" clustered round the plan of their latest project, a portable road-racing circuit with plenty of interest and guide rails for four cars. The Club hopes to stage some real racing this season, and enthusiasm is running high amongst members, who are sharing the constructional work between them.

Photo by F. A. Buck

THE first thought on rail tracks is the urgent necessity of finding something else to call them! "Rail track" suggests something far too rigid and constricted and altogether too closely allied to a Giant Racer in an amusement park. Has anyone any suggestions? Bear in mind that the object is to get away from "tracks" to miniature road circuits, the full-sized counterparts of which are never referred to as "tracks" in the best regulated circles!

Now to come down to individual activities. Our illustration shows that hard working body of men, the Meteor Club, clustering round the drawing of their proposed circuit, which is now taking material shape, and should be ready for a tryout in the very near future. The construction of this job is to be the subject of a special article in *Model Maker* when the tests have proved successful, and all the continuity sequences have been gathered together and sorted out. The work is going forward on a community basis, everybody doing his bit. As we have already stated, the whole layout is to be sectional and portable, and its general shape can be seen in the picture. Full details are not yet available, but we understand that the guide rails at $\frac{5}{16}$ in. dia. steel rod, and not tube as originally suggested.

Equal rail length is likely to provide a pretty problem for designers, as "mass starts" must be regarded as essential to the fun, probably using some form of starting gate against which the cars will be held stationary until the gate swings up to release them. "Staggered" starts would not only detract from the spectacle, but would be something of a headache for the handicappers!

We have heard it argued that there will be no need to take the slight differences in length of course travelled into consideration, as provided that the guide rails are kept parallel the retarding effect of the smaller radii of the inside positions will automatically and proportionately compensate for this. Whether this is true in theory or not we cannot say at this stage, but in practice it probably won't work out quite like that. Unless a figure eight, with or without a flyover is arranged, an equal number of right and left hand turns cannot be arranged, so there remains the solution of setting the "inside" car (i.e. the car which takes the majority of inside turns) one or more increased radius turns when it is taking the curves in the outside position. In other words, one rail will "run out" to a greater degree than the rail inside it. At this stage doubtless the school of thought previously mentioned will maintain that the easing of the turn will cancel out the increased distance, but it seems as though at this early stage you pay your money and you take your choice, and it will add to the interest of the early meetings.

At this stage, too, the question of maximum engine size is still being debated. The Chiltern Club intends to fix the limit at 1 c.c., whilst the originator of it all, H. C. Baigent, feels strongly that 1½ c.c. cars can be quite practical propositions. All concerned, happily, are determined at all costs to keep to realism in the cars, which are to be recognisable sports or racing types, fitted with clutches. This in itself is undoubtedly a cause for congratulation, and it is to be hoped that no drift will be permitted towards the absurdities that cable racing has allowed to develop.

An interesting question which can only be solved by actual trial when such a course has been built is the effect of a longish straight on a model travelling fairly fast. It seems possible that with rear wheel drive a certain amount of lateral chatter or swing might be set up, which in a fast model might cause trouble. Even more interesting will be the effect of entering a sharpish curve at the end of such a straight! Both the rail fixings and the guide wheel attachments on the car are likely to take a pasting under such circumstances.

(*Continued on page* 317)

PROTOTYPE PARADE No. 29

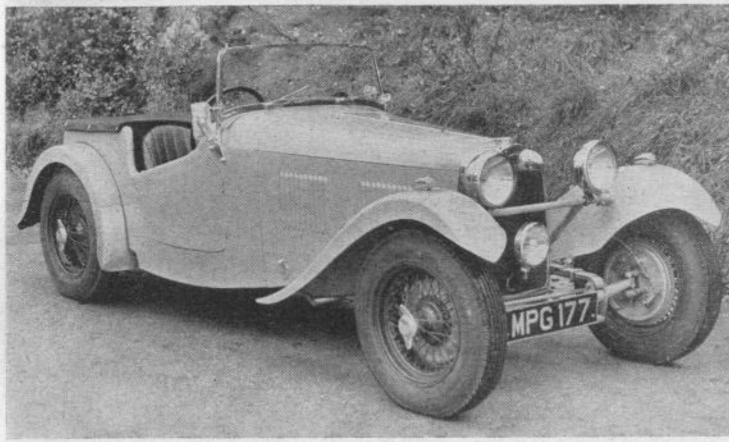


Photo by Bernard Alfieri Ltd.

(Left) Every inch a motor car the 1½ litre H.R.G. combines the strong character of the vintage vehicle with the performance of the modern. This fine picture shows how much the H.R.G. has to offer the model maker who wishes to 'build' his model car, rather than to 'carve it from the solid'. Detail work is straightforward but interesting.

The 1½ Litre H.R.G.

described by G. H. DEASON

IN 1937 I had the good fortune to ride in and to drive a car which had just caused no small flutter in motoring circles by its performance figures under Press road-test conditions. The car was a 1½ litre H.R.G., then in the capable hands of Anthony Curtis, whose Antone loud-speakers are a prominent feature of present day racing meetings. It was an experience which left vivid memories, for from the outset this sporting motor car has had a personality all its own. One item in those performance figures gives the key to its character; 0-60 m.p.h. and back to rest in 18 seconds. This, remember, was no racing car, but a 12 h.p. production model with full touring equipment.

Today, very little changed, the H.R.G. is unique in being the last surviving British sports car in the old tradition, a final and by no means crumbling bastion against the sweeping tide of enveloping tinware, soft suspension, torque converters and electrically-controlled hoods. Maybe it is the champion of a lost cause, but it can count amongst its defenders some of the most critical and knowledgeable of motorists.

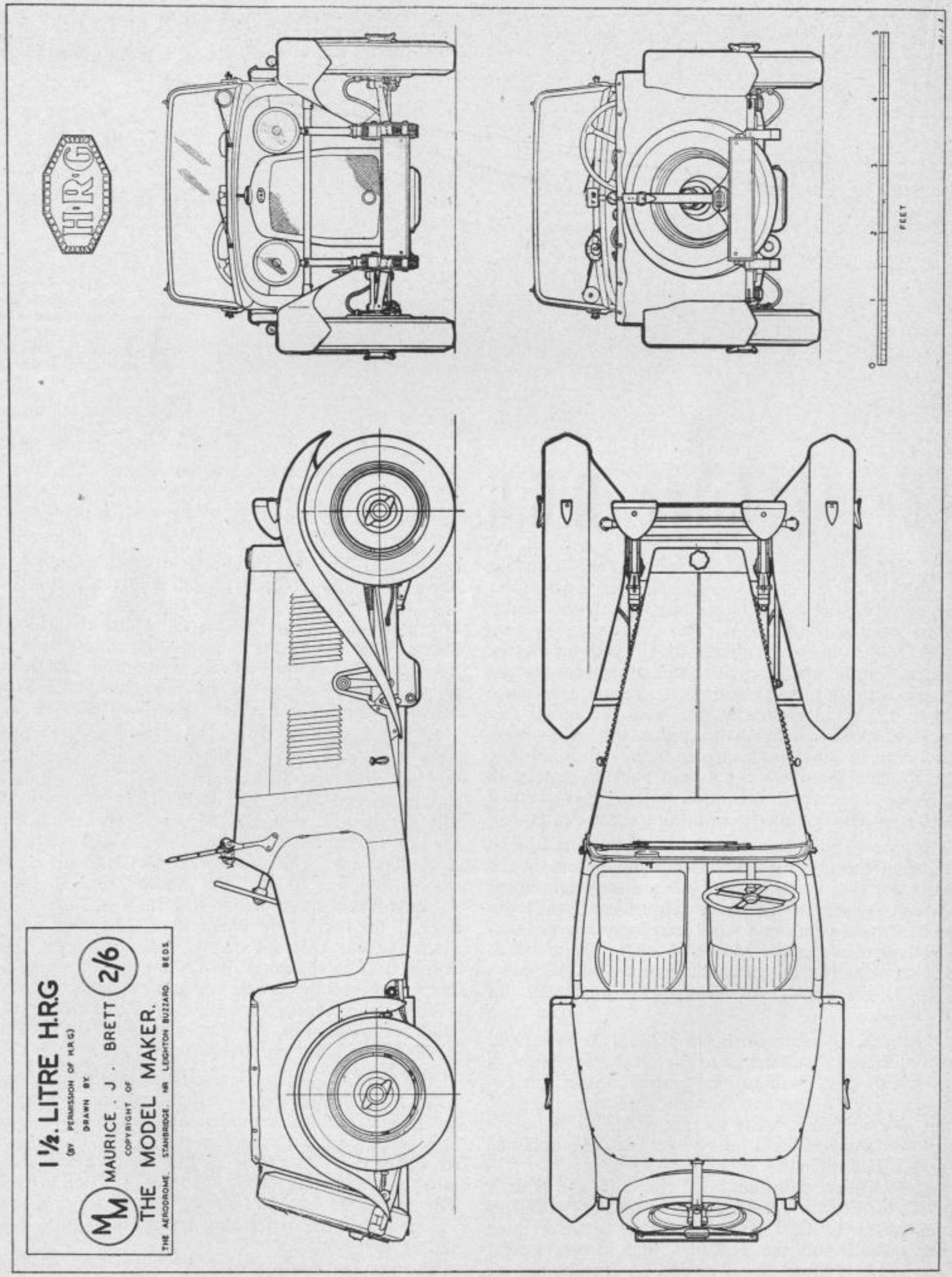
Let it not be thought however, that its behaviour suffers from its adherence to the older conception of the sports car. Perhaps the fairest comparison between driving a "modern" vehicle of comparable price and size and such a car as this would be the playing of a piano concerto on a player piano and playing it on a Bechstein.

Most readers will know that the G. of the H.R.G. stands for Godfrey, and that the same H. R. Godfrey was the G. of G.N. The connection between these simple facts and the H.R.G.'s high power/weight ratio is not difficult to trace, and an examination of the present day H.R.G. reveals distinct traces of its illustrious ancestry. True, the chain driven part of the G.N. departed with Archie Frazer Nash, to blossom afresh in the car of that name, whilst the H.R.G. transmission is by the conventional shaft, but the front end, the simple chassis frame and the determined weight saving by the elimination of non-essentials are all in the G.N. tradition.

In appearance the H.R.G. has changed very little from the classic style of the mid-thirties. Originally the fuel tank was an exposed "slab" type, which is now concealed within the coachwork, with an outside filler on the near side, but the spare wheel still graces the tail, untrammelled by any tinware and ready for immediate use. The radiator is unashamedly a radiator, and has resisted the modern urge to creep forward ahead of the front wheels. It is, in fact, set back to the rear of the wheel rims, a position which gives the car that thoroughly satisfying look. The bonnet lifts in the good old-fashioned way to reveal the works, and the simple wings do their job without adding unnecessarily to weight or acreage of metal. High-set headlamps are uncowled, and the folding screen is plain, flat and adequate.

The front axle is tubular and has only the slightest kick-up to the eyes carrying the king pins, and quarter elliptic springs, mounted above the frame, are attached above it by anchor plates, the lower ends of which carry the ends of the radius arms, these latter incorporating shock absorbers of friction type. The rear axle has half-elliptic suspension, in conjunction with an underslung frame, the spring ends sliding in trunnions.

The driving compartment can only be described



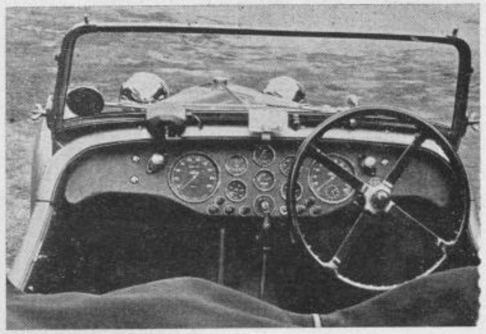
by that overworked word "businesslike". The facia board has escaped the attentions of the "stylising" experts, and, as in a racing car, everything is there for a purpose. The gear lever and "fly-off" brake are central, the former having abandoned its original visible gate, and having bowed to present day ham-fistedness by the addition of synchromesh operation. Five-inch speedometer and rev. counter faces flank 2 in. dials of oil pressure and temperature gauges, water temperature, ammeter, fuel gauge and vacuum gauge. The speedo. reads to 100 m.p.h., and the rev. counter to 6,000 r.p.m. Pull out controls are arranged in line below the instruments. The accelerator pedal is on the right, and the seats are of pleated leather bucket type.

Cable operated brakes have large drums, and tyres are 600 x 16 and 5.50 x 16 respectively. The wheelbase is 8 ft. 7½ in. and the front and rear track 4 ft. and 3 ft. 9 in.

The power unit of the original pre-war H.R.G. was the push-rod o.h.v. Meadows, but present day production models are fitted with Singer engines, in two sizes, 1,100 c.c. and 1,500 c.c., both being of the o.h. camshaft type, and modified to the special requirements of the car. Twin S.U. carburetters and the four branch exhaust manifold are on the near side, whilst dynamo, distributor and oil filter are on the offside. There is provision for a fan, which is not normally required in this country, the water being circulated by a belt-driven pump.

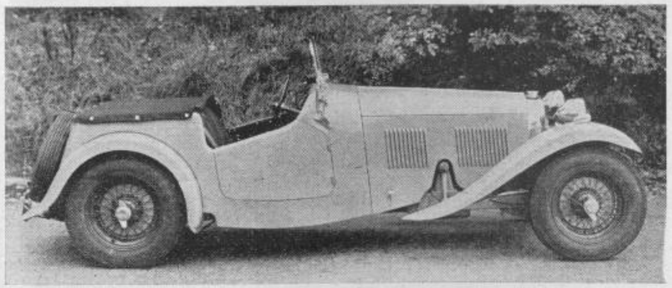
Body details include inside door handles, forward hinges to the cutaway doors, a tonneau cover concealing a large luggage compartment, and a massive tie bar between the front wings.

The H. R. G. is nothing if not versatile, and may with equal facility be used for shopping, driven effortlessly on a 400 mile journey, or entered for a sporting trial, a speed hill-climb or a sports car race at Goodwood. In private owners' hands it has had innumerable successes in events of this kind, and has also distinguished itself in Rallies and high speed long distance trials of the Alpine variety, where its road holding, acceleration and general handiness has stood it in good stead.



It has appeared in other guises than as a "conventional" sports car, and most readers will be familiar with the "Aerodynamic" H.R.G. which was marketed shortly after the war. This was externally very much in the modern tradition, although the chassis was basically similar to the standard production. In addition, some very stark sports racing models were prepared for Continental racing, again unlike the standard two-seater in appearance. Peter Clark had successful seasons, first with "Aerodynamics", with which he ran second at Chimay, and in 1949 with the "Monaco" bodied versions, his team mates Fairman and Thompson winning their class in the first post-war G.P. d'Endurance at Le Mans. In the 1949 Production car race at Silverstone H.R.G. managed first, second and fourth places, in the 1,500 c.c. class, and won it again in 1950. In sprints and hill-climbs their successes have been too many to catalogue, but an outstanding performer on a standard type two-seater in this sphere was E. J. Newton, who drove with great abandon to gain many a class win.

I have chosen to describe and illustrate the conventional sports two-seater in its 1½ litre form, not only because it is the most characteristic, but because this is a somewhat neglected type amongst model makers, who might well give it more attention. C. W. Field has produced a nice powered version, but I can think of no other "non-aerodynamic" model that has so far appeared.



(Above) A clear picture of the instruments and controls. Flanking the instruments are two barrel shaped dash lamps, and on the scuttle are the screen-wiper motor and mirror.

Photos by Bernard Alfieri Ltd.

(Left) Plain lines and set back radiator enhance the charm of this side view. Note the bonnet cut-away for the steering drop-arm.

Another Model from the KITCHEN TABLE

BY A. J. BOWLER

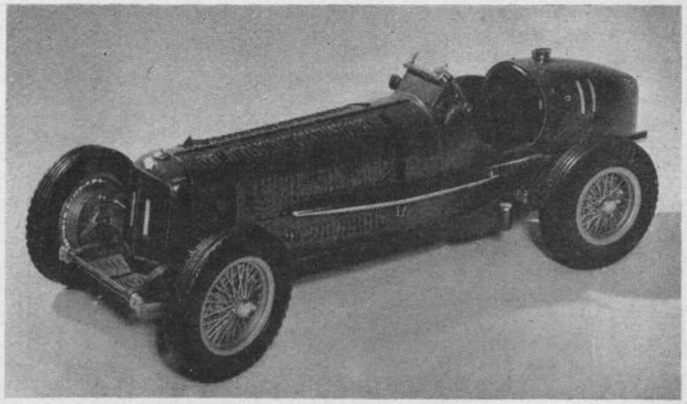


Photo : United Photographers

THE fortunate enthusiast who can look at the world of model making from the other side of his adequately equipped workshop is apt to regard the "kitchen table specialist" as a being very different from himself, from whom little more than a mere suggestion of model competence can be expected—poor fellow!! We are therefore particularly happy to be able to present this pleasing contribution from Mr. A. J. Bowler, all made on the kitchen table.

This one-tenth scale replica from the ever-popular E.R.A. stable is actually a first model made under the most adverse conditions—in a two-room flat: which, while it may be of untold value as living accommodation leaves little space for a workshop. We can therefore well imagine the builder being shooed from his vantage point every hour or two for essential meals and other domestic necessities.

In submitting the illustration, our correspondent gives some details of what actually went into the model. Body, we learn is of copper, made from an old roof flashing; while the tailpiece is of hardwood. Wheels were roughed out by a friend on his lathe, and finished off in a hand-drill in the kitchen, the spokes being ordinary household pins. All parts were soft soldered over the gas stove. The filler cap started life as the hinge of a pair of spectacles. The cockpit is complete with pedals and instruments, while the steering wheel is authentic, with the correct number of spokes made from needles. The only parts purchased were the rear tyres, the front pair being made up as they are of smaller section than the rear and impossible to buy. Front wheels steer from the king-pins and the bonnet opens. All that remains to complete the car is a dummy engine, now under way. Hub caps, exhaust pipe and fittings are all plated.

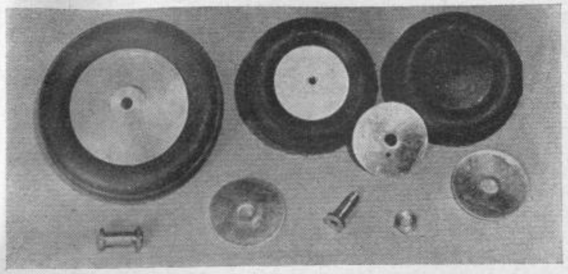
We salute this modelling adventurer on achieving a result that many more fortunately situated might have reason to envy! We are hardly surprised to find that in addition to showing us this example of his work he is full of practical suggestions for the benefit of his, and others', future projects.

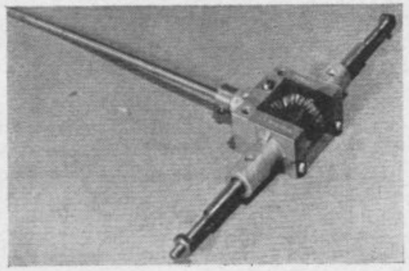
He suggests that, in selected cases, we might elaborate our prototype drawings, which give only scale outlines and a bare minimum of details, to include sketches of such items, front and rear suspension systems, cockpit details, dampers, filler caps, badges, spokes per wheel, tyre sizes and indeed all those delightful little extras that make the difference between a likeness and a replica!

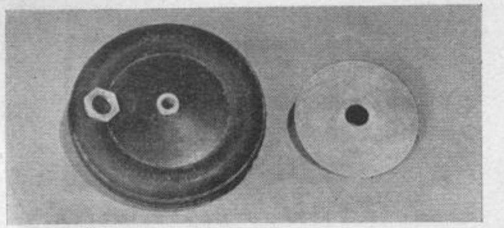
His heartcry, that if only his interest lay in model locomotives, he could profitably obtain all the information he required with a platform ticket at Paddington Station, but is rather reduced to hitchhiking to Italy to obtain details of the Alfa 158 rear suspension.

We have indeed, answered one of his problems in this very issue, with C. Ian Craig's exhaustive analysis of tyre sizes—to be followed by a similar table on nuts and bolts, but the question remains just how many other "purists" would welcome really detailed drawings? To produce them is not impossible, it is solely a matter of man-hours, provided we can gain access to the vehicle in point. Such a series would have to be more expensive than our normal monthly half-crown drawing: probably optional detail sheets would cost another five shillings. Moreover, it would take a long time to build up a representative series, so that would-be builders might have to be content with what was offered for a time, rather than insist on their own particular one being covered at once.

It will help our future policy if interested scale model car builders would drop us a postcard expressing interest, giving say half-a-dozen cars that would be of special interest to them. We will then get the wheels turning. . . .







BITS and PIECES

THE popularity of the small model racing car is growing apace, and to meet the growing demand for ready-machined parts by those without lathes and other elaborate equipment J. S. Wreford Ltd., have produced a number of items which should solve many problems without overstraining the pocket of the constructor. We are frequently approached by readers who are making a modest beginning in the hobby, whose purses will not run to the expensive high precision equipment which is regarded as essential by the more ambitious builders of competition models. These enquirers usually need the main machine parts such as clutches, gearboxes and wheels, round which they can construct a satisfactory model which will give them trouble-free running and will form an introduction to something more elaborate. Often too, the success of the first model will fire the ambition to make more of the next one in the home workshop, and thus these early small successes lead to more enthusiastic converts. The parts described and illustrated should fill this need admirably.

A self-contained rear axle and bevel gear unit suitable for models of 1 to 1.5 c.c., has been sent for our inspection, and seems to be a very practical component, selling at 17/6. This little unit embodies a $\frac{1}{8}$ in. dia. propeller shaft and $\frac{3}{16}$ in. axle, and the steel bevel gears provide a reduction of 1.5:1. Plain bearings are used, but it should be possible to incorporate ballraces if the builder so desires. The weight is under 2 oz. Wheels to suit these axles cost 6/- per set of four, and are of solid rubber, 2 in. in diameter, provided with discs and sets of bushes.

These should prove very suitable either for small rail or cable racing models. Well finished $2\frac{3}{4}$ in. dia. wheels of similar construction can be had for 12/6 per set. The construction of these is such that they should prove perfectly adequate for use on a high speed lightweight model, as they will defy the effect of centrifugal force, and their weight is under 2 oz. per wheel.

A practical flywheel clutch, designed to fit the popular EDBee, .75 Mills and 1.49 c.c. Allbon, but readily adaptable to other smaller engines, can also be had from J. S. Wreford Ltd., price 17/6. This is of the type in which the driven member carries the shoes, and is not fully "energised" until the car itself is pushed off with the engine running. The diameter of the flywheel is $1\frac{1}{2}$ in. All these components with the exception of the $2\frac{3}{4}$ in. wheels are featured in the well known "Half Pint" car kit. The address of the makers is 25 North Street, Romford, Essex.

Rail Track Developments

(Continued from page 312)

We referred last month to the recommendation by H. C. Baigent and F. G. Buck that nothing less than $\frac{5}{16}$ in. tube should be used for the faster courses. Last week we had a visit from P. D. Macdiarmid, who is deep in the preparation of the Chiltern Club's track scheme. "Mac" holds different views, and is plumping for heavy gauge $\frac{1}{4}$ in. o.d. copper tube. He had a sample section with him, and is confident that with frequent fixing points such a rail will take anything the cars can give it. The Chiltern circuit, which is also portable, is to be in sections of about 4 ft. to 5 ft. long, having four rails spaced 7 in. apart on a 3 ft. wide base, and the length is scheduled as 110 ft. Timing is planned to be electric, using short lengths of insulated rail which will be "bridged" by the competing cars. Rail fixing is to be by means of lengths of steel studding, with an adjustable spacer nut between rail and base. The overall height of rail from running surface is $\frac{3}{8}$ in., and cars with wheelbases of about 6 in. are visualised.

From all of which it will be seen that enthusiasm is running high amongst the clubs which are taking up this new idea, as indeed well it may be, for we believe that it may put a quite new complexion on model car racing.

DOPE & CASTOR

By JERRY CANN

THE Edmonton M.C.C.'s third annual dinner and dance went with its usual gusto on 17th February and eighty members and guests were present. Table decorations were in keeping with the occasion, the racers themselves being called into use for the purpose. Guest of honour was Mr. Rossiter, of Rego Clothiers, who has done so much in the past to assist the club by providing it with an excellent indoor track on the firm's premises.

A nice appreciation of Jack Pickard's hard work as Hon. Secretary was shown by the presentation to him of a stopwatch and a cheque by fellow club members. Jack very sportingly made over the cheque to the club funds. Another presentation of note during the dinner was that of a large wooden comb to E. P. Zere, in recognition of his services to the club!

Carl Wainwright tells me that the Leicester Mini Car Club have recently concluded their series of five events for the Bob Gerard Trophy and replica, a particularly handsome piece of silverware. A thoroughly exciting tussle developed for first place, only one point separating H. Stevens, the ultimate winner, from runner-up P. Smith. An excellent point about this series is the fact that only one out of the five events in which points score for the trophy is a matter of pure speed, thus bringing almost all owners of power models into the fun and giving them a chance to be among the leaders.

Once again the Leicester Home Life Exhibition placed a stand at the disposal of the club, and Lt.-Col. Headley Briggs gave a cup for the best model car. This was netted by Carl Wainwright with his Alfette, now powered with a Dooling 29 motor. To add to the interest, Bob Gerard loaned his E.R.A. which graced the Leicester Mini stand, and tried very hard to look as if it fitted into Home Life, the little pet!

Bob Gerard holds the Leicester Mini-Club's 10 c.c. record at 86.75 m.p.h. with his Rowell Sabre, Carl Wainwright the 5 c.c. class at 60 m.p.h. with his Maserati, and M. Maurice the 2.5 c.c. class at 46 m.p.h. This represents good going on a 35 ft. dia. track on a garage floor. Carl is off to America again in April, when he hopes to contact Howard Frank again, and see some more of the game over there. He is also visiting the Channel Islands, and intends to take a model or two with him, having spotted a likely track on his last trip.

Club Secretaries bent on increasing their membership and contacting interested beginners should keep an eye on their local cinemas for the showing of "To Please a Lady", the motor racing film in connection with which *Model Maker* is organising an extensive competition. By co-operating with the cinema managements, many keen recruits may be brought permanently into the fold.

The A.G.M. of the Model Car Association will have been held at Derby on March 18th, and the dust nicely settled again by the time these words appear. An ordinary delegates' meeting is to precede the A.G.M. at which the competition rules published in our last issue are to be chewed over and ratified, or not, as the case may be.

Further Open Meetings on the calendar since last month are Blackpool's inaugural meeting on July 8th and two "Open" dates at Hooton on May 27th and September 16th.

A busy little session on rail racing took place in these offices the other day, when H. C. Baigent, C. V. Walshaw and P. D. MacDiarmid arrived to talk things over, and in the middle of the "meeting" Harry Howlett chipped in by 'phone with reports of the progress at the Stoke-on-Trent end. Amongst other interesting items on the impromptu agenda was Henri Baigent's scheme for a "Road Star" on real road racing points lines, and he even provided a sketch of the trophy he visualised.

At the moment much thought is being applied to the problem of a device for bringing up the finishing order by means of numbers over the appropriate "tracks" in order that, when the cars have crossed the line for the last lap, perhaps in a tight bunch, there will remain visual evidence of the order in which they did it! This may seem a trifle premature

ON THE RIGHT TRACK . . . (*Continued from page 283*)

It will not be necessary to buy a very extensive equipment, nor need any attempt be made to put down a "permanent" layout in the sense of complete scenic effects.

On the contrary, if occasional access can be obtained to a large dining or table-tennis table, a fresh layout should be put down at each session and a comparison made as to the shunting and traffic handling facilities afforded by the various track plans. The outstanding advantage of these trains of the Hornby type is that the track units of straight and curved sections, points and crossings can be clipped together and assembled into a layout in the matter of an hour or so. Thereafter the time can be spent in gaining the invaluable experience of getting the trains moving, in learning the controls, in gauging the platform lengths necessary to accommodate various types of train, in shunting, marshalling and carrying out other railway manoeuvres.

After some acquaintance with these trains, the constructor will probably become aware of the limitations imposed by curves which are of fixed radius and—in the interests of table-top use—are of sharper radius than desirable in "scale" track. But this slight drawback will easily be remedied when the time comes to lay down a permanent way and, meanwhile, the experience gained by actually having operated the trains and tried out various alternative forms of layout will form the best possible background for making a serious approach to the hobby.

'MODEL MAKER'

MODEL OF THE YEAR

PHOTOGRAPHIC CONTEST

AT this time of year our National Press usually announces a variety of photographic contests for bathing beauties, bonnie bairns, or any number of variations on a similar theme, so that we feel our readers, too, should have an opportunity of wielding their cameras profitably during the summer months. We are therefore inaugurating our "Model of the Year" contest, for which we invite the submission of model photographs.

To give equal chances to all branches of model making we have split our contest into six sub-sections covering the main branches, of which three are mainly for outdoor shots, while the remainder will be of more interest to those concentrating on the careful indoor set-up.

Each month we shall publish a selection of entries submitted, whilst our Christmas number will contain the "Models of the Year". Thus each section will have an opportunity of winning its sectional prize, with an absolute winner at the finish. We shall select the monthly winners ourselves, but the finalists will be submitted to one of the leading photographic supply companies for their unbiased judgment.

Entries should be submitted not less than 6 in. x 4 in. in size with name and address of entrant on back, together with a short description of the model. There is no need for the model depicted to be the work of the entrant, though some particulars of the builder will naturally be of interest in captioning the picture. All are eligible and there are no entrance fees.

Section I.—Model Railways, including individual models, scenic layouts, lineside buildings, of any gauge, indoor or outdoor.

Section II.—Model Sailing Craft, individual models, sailing pictures, regattas, or exhibition models.

Section III.—Model Powered Craft, speedboats, scale ships, working or exhibition models.

Section IV.—Model Cars, scale models, racing cars, indoor or outdoor pictures.

Section V.—Close-up section showing detail work on any class of model or home workshop set-up.

Section VI.—Workshop interiors, showing work in progress on a model, or home workshop in use, with model maker at work.

All pictures used paid for at 10/6, with best of the month at £1/1/-. Five 10/6 prizes monthly plus £1/1/- prize.

Each month's winner goes into final with further prizes of £5/5/-, £3/3/-, and £1/10/- for "pictures of the year", plus consolations of 10/6 for three next best.

MODEL MAKER BUILDS AN '00' GAUGE 'ROYAL SCOT' (*Continued from page 266*)

"Rocket" paint is very slow drying (our's took two days to dry thoroughly) so the model must be left somewhere away from dust and other pests. Unfortunately I didn't put the tender sufficiently far away to prevent some kind friend leaving an excellent set of fingerprints all over it, so I had to repaint the whole thing. Lining was done with a tracing pen and yellow dope, this method ensuring a good clean finish as can be seen from the illustrations of the finished model. The handrails along the boiler were not finally fixed till after the engine was painted, as they get in the way otherwise.

Gem Coach Kit

Similar in respect of quality and completeness to the loco kit just described, but not in the amount of skill required to assemble, the Gem kit makes up into a very neat, accurate scale model. Price, including bogies and chassis is 27/6½d. The parts of the body-kit include a finished one-piece card sides and roof, painted and lined, with all window openings cut out. Corridor and compartment partitions, coach ends, and the floor plan are printed on stiff card, while the floor is ready shaped in wood with wooden strips for the seats and seat backs. Ventilators, corridor connections and celluloid for the windows complete the kit. Construction is simplicity itself. The card parts are cut out and painted, the corridor and compartment partitions fit together eggbox fashion, and are glued into ready-cut slots in the floor. Seats are cut to length from the strips of wood, and fitted in place after painting and the card sides and roof bent to shape and glued in. It's just as easy as that! Addition of the remaining details and the chassis and bogies complete the assembly, making up a very quiet, smooth running coach, fit to grace the most accurate of scale layouts.

CLASSIFIED ADVERTISEMENTS

PRIVATE: Minimum 18 words 3s. and 2d. per word for each subsequent word.

TRADE: Minimum 18 words 6s. and 4d. per word for each subsequent word.

Box numbers are permissible—to count as 6 words when costing the advertisement.

COPY should be sent to the Classified Advertisement Dept. "The Model Maker", Billington Road, Stanbridge, Beds.

WANTED: *The Model Car News,* Vols. 1, 2 and 3, bound or unbound, but must be absolutely in perfect printers mint condition including photographic front covers. Box No. 51.

EARN Cash Spare Time making scale model bungalows at home. Top rates paid. Send stamped addressed envelope for free details. Bennett Models, 10 Duncan Road, Richmond, Surrey.

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FULL Samples, lists, patterns, for model makers, toymakers and home handymen. Advice given on all branches. Get your copy now. Full set 2/6. Sutton Models, Billericay, Essex.

WANTED: Hornby, Trix, Hornby-Dublo, Graham Farish or similar train sets, 200 in stock. Exchanges. Hattons, 136 Smithdown Road, Liverpool 15.

BRAND NEW: M&E Twin Cam Austin Race Car fitted 5 c.c. engine. Ready for track, £11. Cost £19. Box 58.

FOR SALE: Brand new unused Baigent-built super 4 CLT/48 type Maserati model race car. Beautifully complete in every detail, powered by a special 2.5 c.c. diesel engine and guaranteed 75 m.p.h. Reason for disposal—illness. Box 57.

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