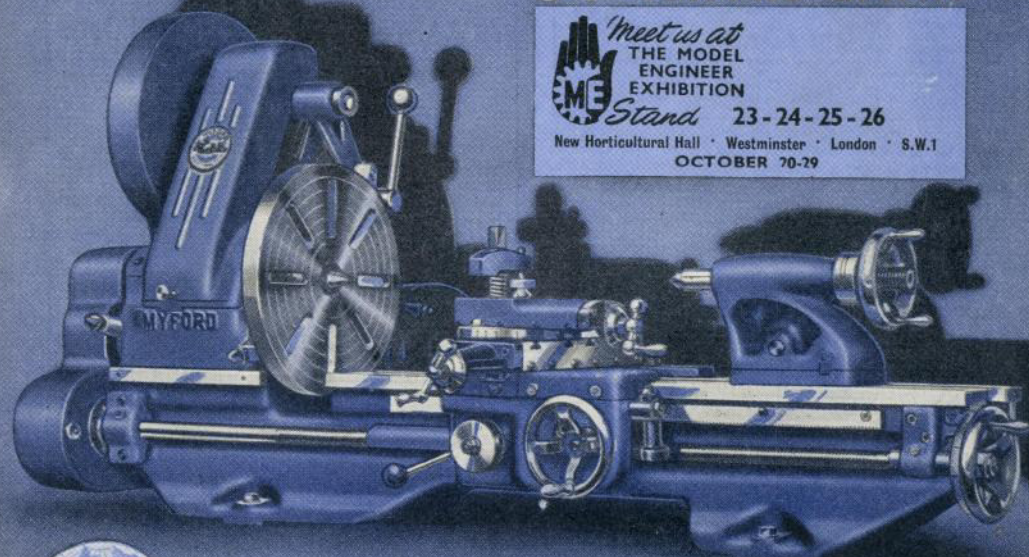


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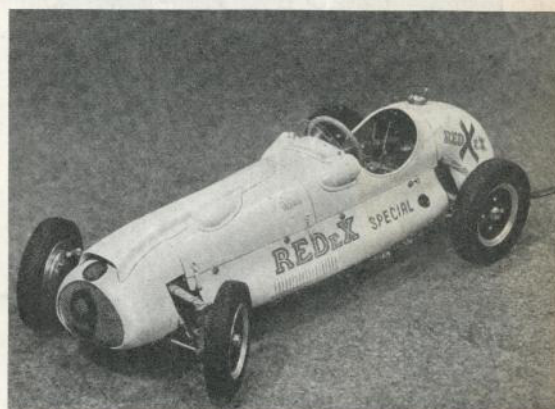
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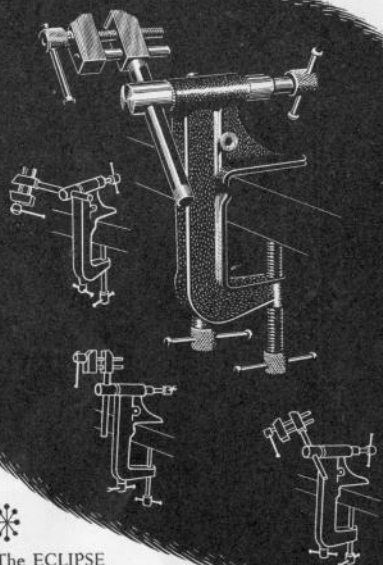
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IN THIS ISSUE : Admiral's Barge - Radio Control Details : A Class Yacht Championships Report : "Hippotas" a New A Class Design : Simple Locomotive Regulator : 000 versus TT Gauge Preventing Derailments : Building a Model Garage : Mechanics of the Vane Gear : Freelance Trawler Stanton Railway Rolling Stock : Model Yacht Design : Electrostatic Machine : Electrically Propelled Dellow Model : Cooper-Bristol Special Model : Ian Moore's 5 cc. Speed Model Car Model Car Miscellany and Round the Clubs : Cooper-Bristol as Prototype : Features : Trade Reports

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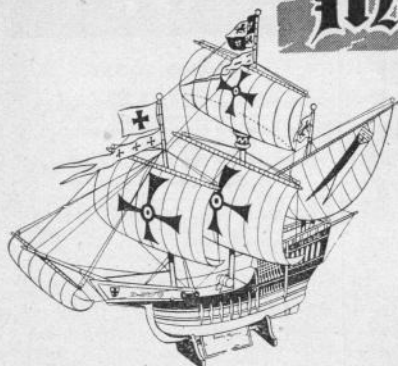
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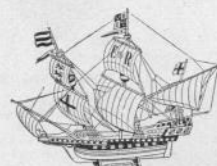
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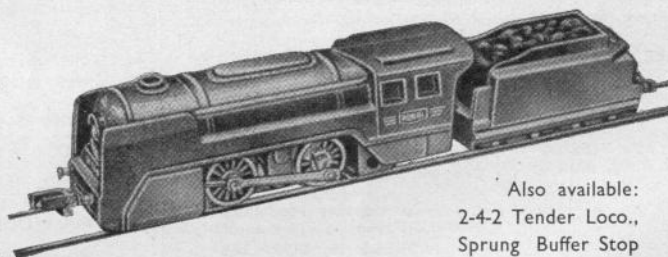
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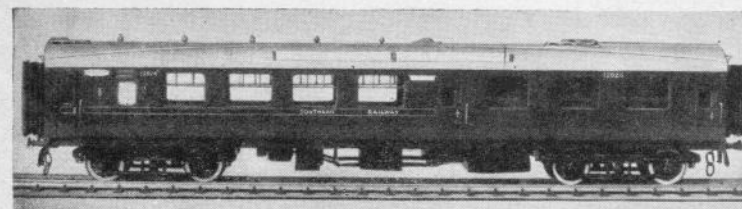
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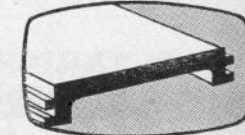
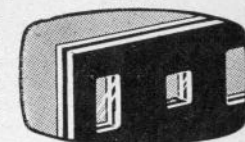
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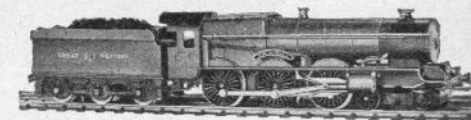
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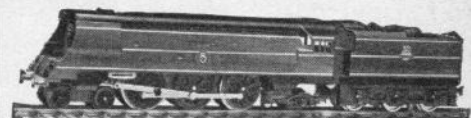
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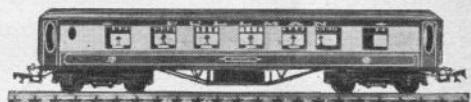
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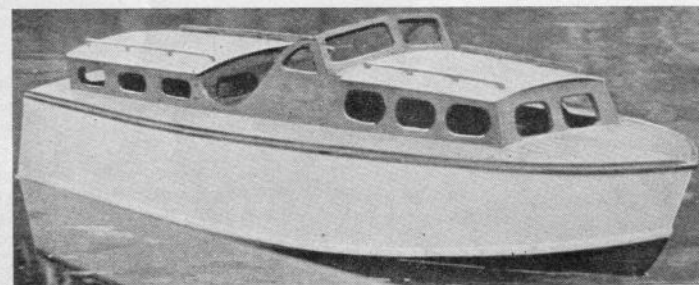
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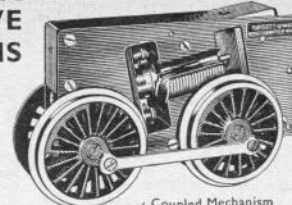
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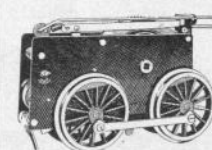


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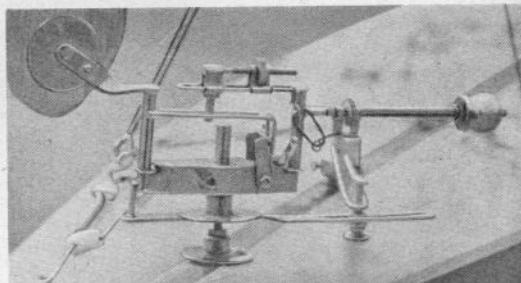
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FOR ALL MODEL MAKERS

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VOLUME 2 No. 23

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The Cost of Things

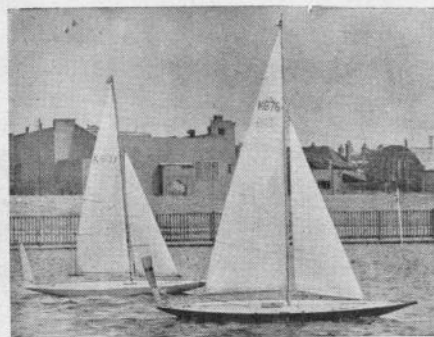
IN a world where prices seem so constantly to be rising it is source of considerable satisfaction to think just how much pleasure can be still obtained ridiculously cheaply by the modelmaker. A large proportion of all models that are made can be said to be the by-product of waste, being made almost entirely from unconsidered oddments that would otherwise have been thrown away. Again a small piece of wood hardly enough to light a fire can, by the magic of a modeller's hands, be turned into a thing of beauty in the shape of a tiny ship model, a statuette, or any one of a multitude of things.

Such may be considered extreme cases where pleasure and sometimes profit is gained from absolute zero, but there are innumerable other instances where a modest outlay—less than the cost of a couple of theatre seats—can be the basis of long and absorbing occupation, and ultimately a model worth very many times more than the first cost. Particularly is this true in railway modelling, where construction kits costing little more than material value plus labour of preliminary shaping, can be turned into elegant locomotives, handsome rolling stock, or delightful scenery. In railway modelling, too, every foot of track and every new addition to the fleet of locomotives, rolling stock, and the like can be reckoned as a form of investment for, more than any other branch of model interest, the locomotive fan can always realise a good price for his operating layout when he decides to change to fine scale, another scale, or must reorganise to fit a new workshop or railway room.

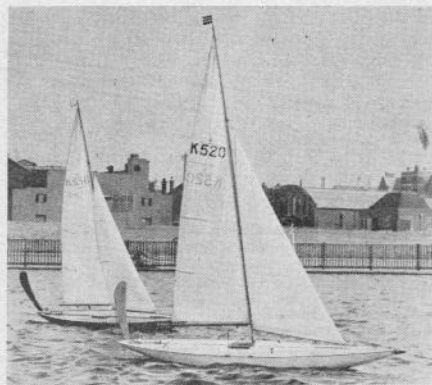
But let us rest content with the thought that modelmaking remains one of the cheapest pastimes, giving the most in leisure enjoyment, the satisfaction of personal achievement, and a delight in technical skill, without any real concern as to the financial aspects or otherwise resulting from our labours.

ON THE COVER . . .

Top left: Mr. A. R. Casebrook at work on rolling stock for the Stanton Railway. Centre left: Another Geoffrey Porter model, this time of an old-time fire engine. Centre right: 1 1/8th scale model of Mike Hawthorn's Cooper-Bristol. Bottom left: B. H. Priest's Yeoman, triumphant with spinnaker filled at Gosport. Bottom right: Model tugs at a recent club open regatta organised by the Oldham Society of M.E.



Top: B. H. Priest (r.) and mate Edwards with winning *Yeoman*. Above: *Moonraker* and *Yeoman*. Below: *Reville* and *Highlight*.



IT was not until the last board of the last heat that *Yeoman* established a two point lead over *Scamp* to win the British Empire Open A Class Championship at Gosport on Saturday, August 16. The final heat began with *Scamp* leading by one point, so that *Yeoman* had to win, and *Scamp*

British Empire Open A Class Championship

HELD AT GOSPORT 11/18TH AUGUST

had to lose for the lead to change. *Yeoman* sailed first and won comfortably, leaving *Scamp* against the stern competition of near-leader *Mouette*. The latter won and left the owner-skippered, built and designed *Yeoman* to take the cup back to Birkenhead for the first time in the history of the event.

That old veteran *Flame* was a worthy third and might easily have notched another victory to add to her forty odd firsts; quite what this boat has, no one can say, but after nearly twenty years it can still take on the best of modern boats in spite of its admittedly "long-way-after" Alexander construction by Larry Dawson when a lad of seventeen.

A number of new boats made their appearance in this year's contest, including *Vito* from Denmark, sailed by last year's winner, Kai Ipsen. It failed to repeat *Revanche's* performance last year at Fleetwood and did not qualify for the final. It was a beautiful boat, but the skipper may have lacked experience of its eccentricities under lake conditions, for Danish sailing is for the most part in open water. Most interesting of the newcomers was *Lynx*, designed by H. B. Tucker, and sailed by D. Macdonald of Y.M.6m.O.A. This was the lightest boat in the contest at 45 lb., with the narrowest beam at 12½ in. and suffered a displacement penalty in consequence. In light airs it was superb and sailed away from hand faster than anything on the lake. It sported a set of sails in light crinoline, a substance in heavier gauge usually associated with lampshade making, but apparently highly suitable for yacht sails, though not pure white, but a shade of light yellow-cream.

Vanity Fair entered by J. Meir of Birmingham and built by Levison to the late Howard Nash's *Fantasy II* design, adds yet another to the *Fantasy* fleet, others being E. Marsh's *Grenadier* and D. Pinsent's *Psyche* with, of course, the original *Fantasy I*, still in the capable hands of N. D. Hatfield with a great London reputation. *Vanity Fair* appears to display slight modifications from the other *Fantasy* boats, notably in the sheer, but the builder claims that this is exactly to the

original design, and may be a trick of painting that gives this appearance.

Most courageous entrant was undoubtedly R. Eland of the recently formed Exeter Club, with his *City of Exeter*, the first A Class boat from that part of the world, which proved far too

sluggish for the class of sailing it was up against and failed to collect a single point in the divisional heats. However, its owner has gathered a fund of useful information on building and sailing, and we hope to see him back again next year with a more formidable craft!

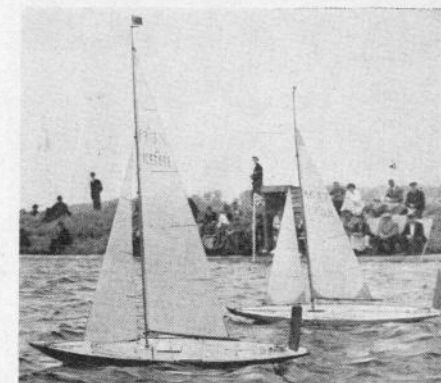
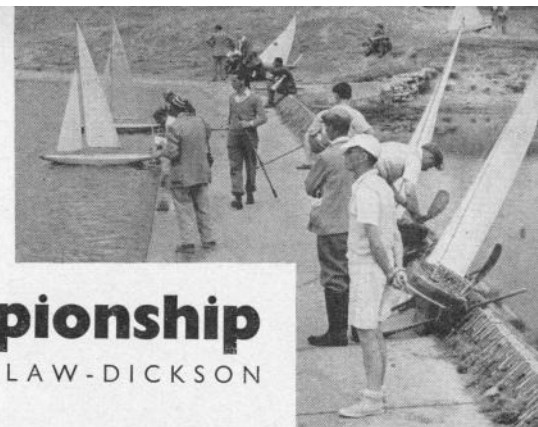
Mouette, skippered by A. J. Clark of Bourneville, was interesting as a design of that great model yachtsman, the late W. H. Davey, and was always dangerous—in effect her last-minute victory over *Scamp* was the decisive factor in putting *Yeoman* at the top of the list, and could have won herself with a few more points in the last half dozen boards.

Major G. B. Lee had the only other skipper-designed boat in the final with his *Reveille*, built some ten years ago. In light airs this boat is still capable of a good performance, but a spate of lost boards on the first day made her chances remote, and perhaps discouraged her skipper.

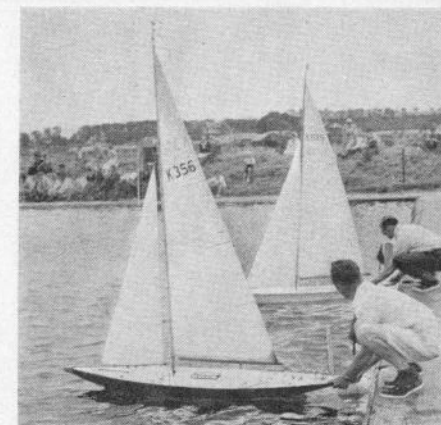
Sailing conditions through the week were nearly ideal though, of course, not suited to every boat. For the finals the wind freshened until spinnakers were very much in evidence nicely filled. The increasing use of colours for these sails gives a pleasing air of Cowes. All that is needed is a nice blue and white striped sail, or a *Bluebottle* blue mainsail to complete the picture.

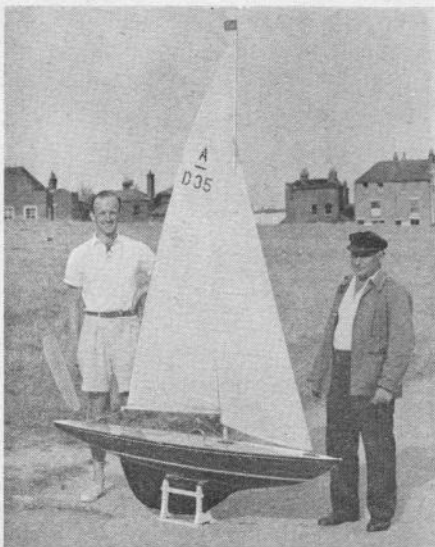
All boats in the final carried Vane gear, in a variety of designs, from the very simple to the extremely complex, one or two with additional Braine attachments to work in conjunction. One boat—in the earlier heats—had a balsa and tissue covered feather for lightness, like a model aeroplane wing. Kai Ipsen's *Vito* had a particularly neat and simple layout of Vane, as had winner *Yeoman* and, of course, *Scamp*. These are illustrated on another page.

By courtesy of the finalists we include a table giving comparative data on all boats, in respect of L.O.A., L.W.L., weight and sail area of top suit, together with designers. It will be noted that Admiral Turner had no less than five boats sailing, with Alexander two, and the rest made up of single designers. It is encouraging that a com-



Top: General view of boats and crews at the lake. Above: Davey-designed *Mouette* and winner *Yeoman*. Below: N. D. Hatfield's *Fantasy* and P. G. Bird's *Prelude*, which did not quite get into the final





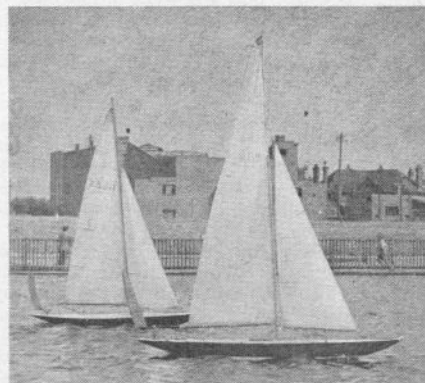
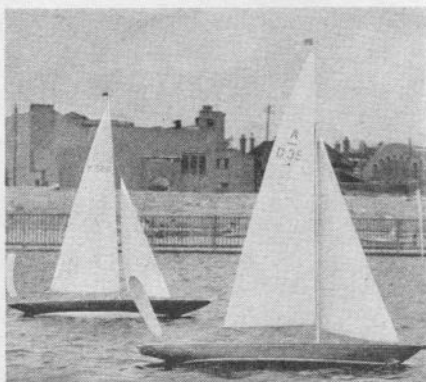
paratively recent boat should have won, particularly as it was an "own design" by the entrant. Had *Flame* won, as well she might, we do not know quite where our leading designers would have hidden their faces!

Our old friend, H. Boussy from France, was over again with *Zef*, but failed to reach the final. Indeed, there were many such surprises, such boats as the fancied *Fantasy*, the Daniels-designed *Jane*, and Littlejohn's first A-Class design, *Arabesque*, all failing to go the final stage.

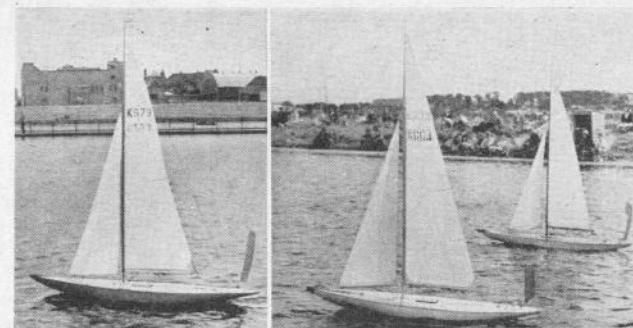
Racing throughout the meeting was exceptionally keen, many boards going by a length or less, with three dead heats. Some of the boats which had gone well in the divisional sailing failed to continue in that strain, leaders *Moonraker* and *Helios* both failing to find their form until Saturday by which time they had dropped too far behind to catch up, but none will disagree that the winning boats were all deserving of their places.

Organisation throughout was excellent, and visitors will have pleasant memories of Gosport hospitality, and the hard work put in by the officials in ensuring the success of the meeting.

No.	Name	Owner	Designer	LOA	LWL	Wt.	S/A	Div.	M	T	W	Th	F	S	Pts
637	YEOMAN	B. H. Priest	B. H. Priest	79	54½	51½	1510	A	15	11	17	15	38	32	70
530	SCAMP	L. K. Corrooin	Alexander	75.95	51.55	48.8	1629	A	15	23	13	11	37	31	68
471	FLAME	E. L. Dawson	Alexander (mod.)	71	51½	50½	1725	B	16	14	20	12	32	31½	63½
661	MOUETTE	A. J. Clark	W. H. Davey (late)	84	53½	54	1623	A	8	17	18	14	32	29	61
676	MOONRAKER	P. West	Turner	79	54	63	1646	B	25	13	18	9	26	34	60
611	ESTELLA	R. A. Jurd	Turner	76	53.4	60½	1673	B	22	10	15	13	37	19½	56½
681	LYNX	D. Macdonald	H. B. Tucker	72	54	45	1570	B	12	12	10	18	27	29	56
656	HIGHLIGHT	L. Davis	Turner	67½	55½	58	1514	A	10	23	8	17	27	26	53
580	HELIOS	W. Douglas	Turner	80½	55½	62½	1612	A	18	31	8	8	27	24½	51½
679	VANITY FAIR	J. Meir	Howard Nash (ex "Fantasy II")	79.5	54.6	53	1535	B	25	5	15	12	18	33	51
642	WILDFIRE	L. Paton	Turner	68½	54.9	65	1581	A	15	20	13	9	25	20½	45½
520	REVEILLE	Major G. B. Lee	Lee	82	54½	54½	1560	B	21	17	2	12	5	20	25



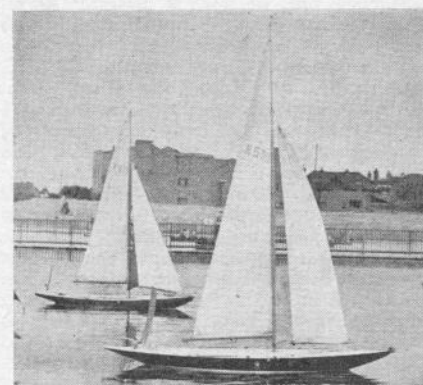
Left-hand page: Top: Kai Ipsen, 1951 winner from Denmark with his *Vito*, and on right French competitor Mons. Boussy. Bottom left: *Vito* and *Helios* in a qualifying round. Next, *Estella* and *Scamp*.

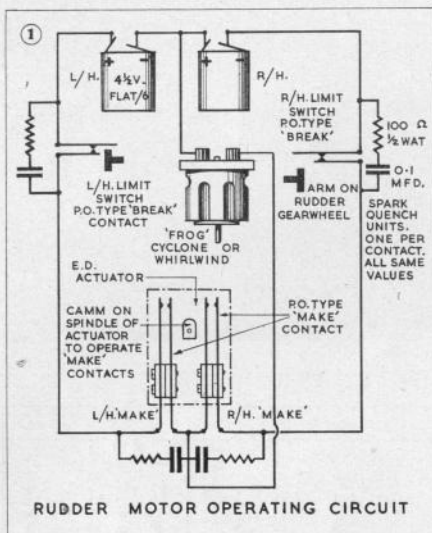


Right-hand page: Top, the Levison-built Howard Nash boat *Vanity Fair*, sailed by J. Meir. Next, non-qualifiers *Marian* from Felixstowe and *Pandora*, a Newcastle boat. At the bottom, *Scamp* and *Flame*, and L. K. Corrooin and mate adjusting *Scamp* on the lakeside.

NON-QUALIFYING BOATS

No.	Name	Owner	Club	Div.	M	T	W	Th	Pts.
356	FANTASY	N. D. Hatfield	Y.M.6m.D.A.	A	8	29	6	8	51
664	MARIAN	F. Shackleton	Felixstowe		10	22	9	6	47
D35	VITO	E. Johnsen	Denmark		12	16	7	12	47
671	ARABESQUE	J. Anderton	M.Y.S.A.		7	16	17	6	46
682	PANDORA	J. F. Craker	Newcastle		10	16	8	11	45
649	SCHEHERAZADE	W. E. Baker	Portsmouth		15	12	10	7	44
464	RHAPSODY	R. F. Tatchell	London		12	10	10	10	42
476	CHARM	C. M. Smith	Y.M.6m.O.A.		0	22	5	12	39
504	KIT	R. Gardner	Gosport		13	12	4	8	37
645	LANCER II	F. Knapman	Fleetwood		3	13	15	5	36
559	FIORA	A. McGruer	Helensburgh	B	7	13	3	8	31
615	PRELUDE	P. G. R. Bird	Nelson Gardens		2	9	7	13	31
684	CITY OF EXETER	R. Hand	Exeter		0	0	0	0	0
623	GRENADIER	E. Marsh	Birkenhead		19	8	15	9	51
654	PSYCHE	D. Pinsent	Paignton	B	10	11	12	15	49
531	THISTLE	J. Lapsley	Nottingham		20	11	5	10	46
673	JANE	R. S. Hawgood	Danson		16	13	8	7	44
604	BLACK EMPRESS	R. Bradley	Bolton		12	10	9	12	43
F24	ZEF	H. Boussy	France		12	13	7	10	42
581	TINKER BELL	R. Wells	Portsmouth		18	7	16	0	41
603	RAYO	H. N. Amlot	N. Liverpool		10	10	8	13	41
600	PREVAIL	P. Buchan	Aberdeen		22	8	2	7	39
622	MAVOURNEEN	K. E. Phelan	Hove and Brighton		20	3	5	7	35
415	RADIANT	S. Nicholls	Harwich and Dovercourt		15	6	3	8	32
477	COLIN	F. Shackleton	Bradford	C	14	7	7	3	31
461	EVENLODE	G. Matthews	Ryde		6	2	3	3	14





TESTING.—With only the engine and flywheel aboard, the model when in the water looks trimmed, and as soon as it starts moving at a moderate speed, owing to its hard chine design, the bow lifts considerably.

It was therefore decided to stow the radio and batteries in the forward compartment, which is perfectly water free, the bow when planing keeps all spray, etc., well away. So until the radio is installed, keep an equivalent weight forward (as can be seen from a photograph) a large stone was used for testing and proved to be about the weight required. The fuel tank which is large, capacity about 5 ozs., is fitted on starboard side forward in engine room, and so far appears to have made no difference to general trim.

The actual all up weight of the boat including radio, batteries, etc. is $11\frac{1}{2}$ lb. and it was found on power trials that the pitch on the E.D. prop ($1\frac{3}{4}$ in. dia. \times 4 in. pitch) was too great, so quite a lot was taken out (a smaller prop could easily be fitted) and the boat then behaved perfectly; it can be held in the water and engine adjustments may be made with ease. The 2.46 has enough power to make the model almost "take off" but at revs. of about 9,000 or less, the boat looks what it is, a trim naval craft, and behaves perfectly.

The rudder area could easily be greatly reduced if required as at even fair speed, the boat turns in about 20 ft. with only 3/32 in. of either rudder on.

45 ft. Admira I's Barge

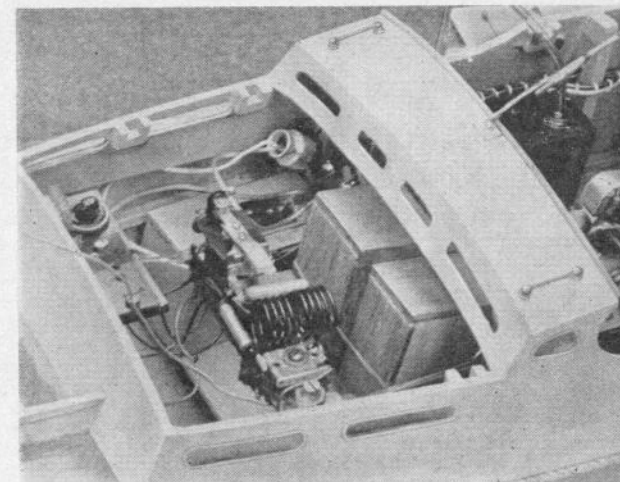
GENERAL DESCRIPTION OF THE RADIO AND INTER GEAR.—As this is primarily intended to be an article for the beginner and there has recently been a very good series of articles on radio control I will not delve into technicalities, sufficient to say that the more simple the layout in the model for the beginner, the more satisfactory will be the results obtained.

TRANSMITTER.—The transmitter that has been used recently with the model is the Flight Control Mk 4, and it has proved very successful, using a vertical aerial on our local boating lake which is over 100 yds. wide by 200 yds. long. It gives complete coverage over this area.

RECEIVER AND BATTERY LAYOUT, ETC.—The receiver in use is a home constructed version of the Ivy hard valve type, and in all respects has proved itself very reliable, although a beginner should be very careful when setting up this receiver, especially the relay, as it is extremely delicate. I personally have carried out a modification on this and am now using an E.D. Polarised Relay in its place. This being of higher resistance is more sensitive, and I think much easier to adjust, although a 5,000 ohm shunt has had to be used in parallel with the relay coil in order that we could attain a standing current of 5 ma. in the receiver (it also entailed the use of 90 v. H.T. instead of 67 to enable us to adjust the relay contacts to the centre of their range). It was found that the relay would respond to a current change of less than 0.1 mA. at 4.6 mA. standing current and on signal a drop to 2.0 mA. is obtained at well over 100 yds. so we have for this purpose more range than we want at present. The receiver is mounted in the forward compartment from four screw eyes, on rubber bands, with the control panel on the forward bulkhead, the L.T. which is a U.2 1.5 v. cell on the bottom boards, and the H.T., 90 v. Ever-Ready batteries ($67\frac{1}{2}$ and $22\frac{1}{2}$ v. in series) in a balsa box at the rear of the compartment, held in place by a rubber band round it from two of the screw eyes holding the receiver. The actuator batteries, 3 in. No. U.2 cells in series are stowed in another balsa box at rear of the compartment, starboard side of the H.T. batteries. The control panel should consist of a switch for the receiver, and another for the actuator circuit, and a two-pin socket for testing purposes, complete with a two-pin plug. This plug must be shorted out, and must be plugged into the socket when receiver has been tested.

P A R T 3

INSTALLATION OF
RADIO GEAR AND
RUDDER OPERATING
MECHANISM
TREATED FROM THE
"ORDINARY MAN'S"
POINT OF VIEW
BY E. G. COCKS



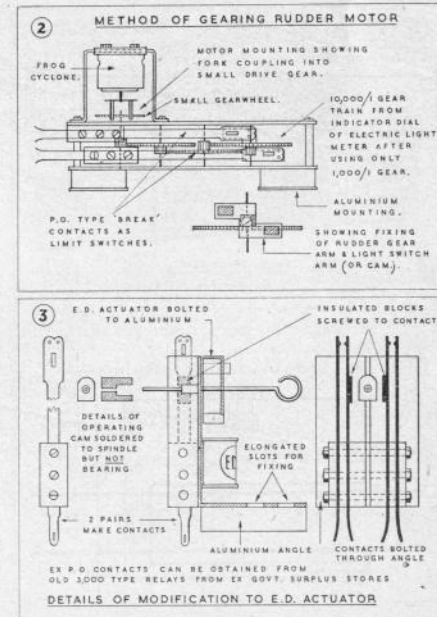
Hatch cover off showing the receiver in place. Type used is the well known "Ivy". Placed away from the engine as may be seen, no trouble whatever has been experienced from diesel fuel poured or spattered.

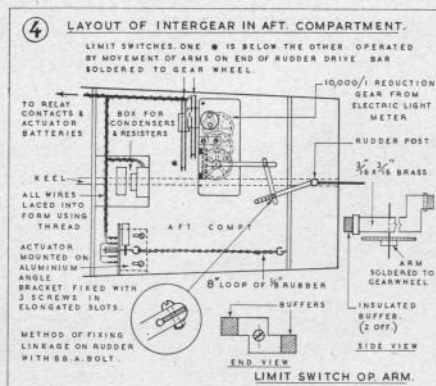
It has been found that to trim the model correctly, the steering motor batteries, which are two in number flat $4\frac{1}{2}$ v. torch batteries must be stowed forward, port side of the engine room, but as long as they are put into small balsa wood boxes and these well doped and painted, the fuel has no affect on them.

All wiring from the receiver to batteries should be laced into a neat cable form, as stray vibrating wires can cause instability, and hence inefficient control. Take the actuator leads away separately though as a form of their own, the aerial should be run out on its own too. All battery connections should be well soldered, i.e. wires joining the cells in series, and taken to two-pin sockets, with leads from receiver, rudder gear and actuator terminating on two-pin plugs, so making changing of batteries a simple matter.

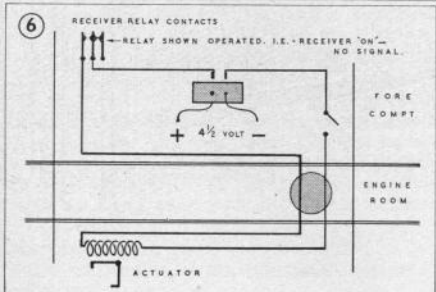
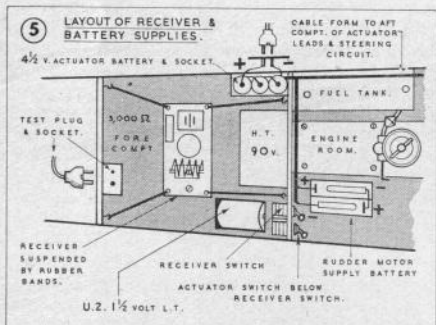
THE ACTUATOR is the E.D. current saving two pawl (sequence) type operated as already mentioned by 4½ v., and tensioned with one loop of $\frac{1}{8}$ rubber, 8 in., loop. This has given well over 200 movements without any trace of slip. This actuator has been modified to take two G.P.O. type "make" contacts, which are operated in turn as the sequence is gone through, by an eccentric brass sleeve, sweated on to the centre shaft of the actuator. The whole makes a very compact unit, as can be seen from the drawing (No. 3).

RUDDER CIRCUIT, ETC.—These contacts in turn complete the 4½ v. supply to a Frog "Cyclone" electric motor, which drives the rudder through





two limit contacts are fitted, one for each direction of rudder, these are G.P.O. type "break" contacts, and are broken by cam action when the rudder has moved a certain distance (see drawing No. 2). The present circuit allows for right and left rudder only, and works very satisfactorily. This gear allows for a rudder time movement of $2\frac{1}{2}$ sec. either side of the fore and aft position, until the limit of either movement is



reached, which is a total of 90 degrees. This enables a tight turn to be made if necessary, or if required a small movement of either rudder can be given with ease, allowing time to step over one unwanted position to give two steps in the same direction (for layout of rudder gear and actuator see drawing No. 4).

The rudder circuit (drawing No. 1), is quite simple, as can be seen from the diagram, which has been drawn pictorially to help the beginner. When the transmitter is keyed and, for instance, port rudder is the next direction of movement, circuit is as follows: Positive of left-hand battery, left-hand limit contact (normal), left-hand "make" contact (operated via receiver relay and actuator) through rudder motor, returning to battery negative (centre tap). The motor turns the rudder through the gearing, and when the limit is reached the left-hand limit contact is broken by the cam in the rudder gearing, this disconnects the circuit and the rudder motor stops, leaving the rudder hard over to port. The transmitter push has been held down during this interval, and when released, actuator restores to normal. The rudder, however, will remain over to port until the next impulse is received. When the next command is transmitted, the actuator operates again, this time in the starboard direction, and the circuit is now completed by the right-hand make contact, from positive of right-hand battery, through rudder motor, to right-hand make contact (operated) up through right-hand limit contact, to right-hand battery negative, and owing to the reversal of current through the rudder motor, it turns in the opposite direction and rudder moves to starboard.

The actuator circuit is quite simple and standard and is detailed in drawing No. 6. Note that one of the change-over contacts in the receiver relay is not used, this is the one that is made whilst the relay is in the operated position, it is when the relay is released that the centre contact changes over and operates the actuator circuit.

There are now a few points I would like to make. Almost a year ago from now I decided to build this model and to radio control it. I have tried to explain how "I" built it and whatever criticisms there may be on the finer points the model has been proved. It is hardy, runs efficiently and well, and has taken some very hard knocks, even whilst under radio, and not a command was missed. My original ideas were proved and worked well, but when I became a member of the Eastbourne Model Power Boat Club and discussed points with other modellers, my ideas were modified entirely, and the results are here passed on for the benefit of all who want simple, efficient radio control of boats.

TAKING it by and large there are generally far more derailments on model systems than would ever be tolerated on a full-sized line. Considering that models are but the real thing taken down proportionately to a smaller size, the question arises, why should this be? A popular conception is that lack of weight is the cause of sundry track-leavings, but this contention breaks down before logic, for although a certain vehicle may be lighter than it should be in model tons, so are its neighbours. Too small flanges are also often erroneously blamed.

In considering any model problem one can never do better than first study the position as it is dealt with in full-sized practice. And in this particular case, we find that apart from carefully laid track, reasonable curves, check-rails, etc., derailments are combated in the full-sized vehicle by giving each wheel the ability to rise and fall in its axle-holding assemblage. In fact, this characteristic is the most important track-keeping factor any vehicle possesses. Far more important than weight, deep flanges and the like. Indeed, we might say that it is the vertical movement of wheels that keeps rolling stock consistently on the rails.

It is not hard to see why this is, for a low spot in the track being reached, the wheel passing over drops into it and thus keeps a strong flange grip on the rail despite the fact that the main body of the vehicle, held by its other points of support, still remains high. Without this vertical drop, a wheel passing over such a spot would also remain high, see B. Fig. 1, the flange thus being able to ride over the rail head and cause derailment.

A big quantity of small scale model stock fails lamentably in vertical wheel adjustment, for springs are entirely lacking and axles often run almost rigidly in their supporting boxes. Hence the reason for the disproportionate number of derailments on Lilliputian tracks.

No palliative quite takes the place of the spring and vertical guides, but in simple models, each wheel is often given the power to drop independently for a short distance by the elongation of the bearing aperture in the imitation guard. In a model I have before me now the opening for each axle end is in the form of a vertical slot $\frac{3}{32}$ in. wide and $\frac{5}{32}$ in. deep. This means that there is a

Fig. 1. Vertical movement of wheels to prevent derailment at low spots on track. At (B) wheel is rigidly held, but at (C) is free to grip track.

Fig. 2. Elongating the opening in an axle guard showing (2) original state, (1) elongated slot.

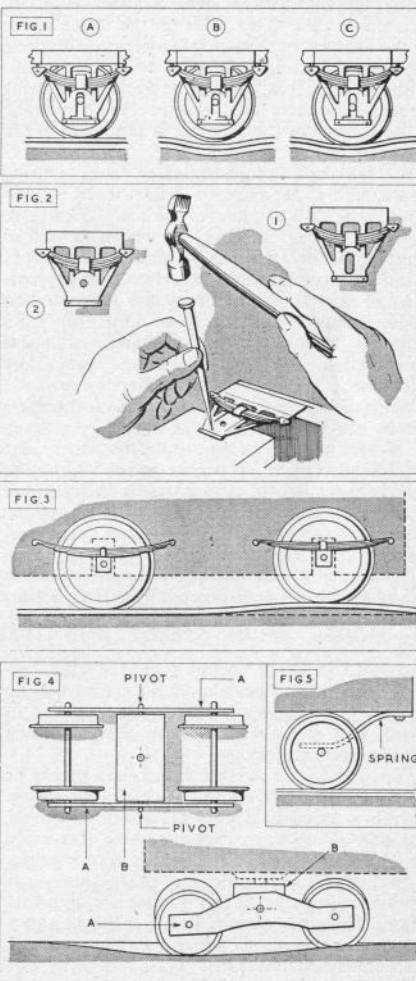
Fig. 3. Showing how in full size practice wheels are suspended on their springs and move in the vertical guides.

Fig. 4. Principle of the "compensated" bogey.

Fig. 5. Spring to ensure positive vertical drop.

Improving the Miniature Railway Layout

(1) CUTTING OUT DERAILMENTS
BY H. A. ROBINSON



possible drop of $\frac{1}{16}$ in., and while this may not seem very much, it does definitely produce better rail-keeping properties.

In models where slotting has not been introduced, and the surrounding metal allows of it, the axle opening in each guard can with advantage be deepened. This is best done by placing the guard on a block of wood firmly clamped to, and protruding from, the edge of a table so that the under guard can be accommodated below, and then placing a nail point just beneath the opening, gently tapping with a light hammer (Fig. 2). This produces a slight bulge on the inside which can be filed off and the metal so pierced. Working this way and using great care, a neat elongation of the existing bearing can be obtained. During the taking out there must, of course, be no widening of the channel or the axle will at times run out of alignment.

In full-sized vehicles, axles are virtually suspended by the springs and float freely up and down in the vertical guides of the guard assemblage as shown in Fig. 3. Thus the wheels as well as dropping below a normal position can rise above it and so accommodate themselves to high spots in a rail as well as low. Even with the very best model arrangements, wheels can only drop from a normal position, never rise above it, but this one-direction movement operating alone does help vehicle adhesion under all conditions.

With model bogies a simple wheel-dropping system can be, and is, used. Bogies so treated are spoken of as being "compensated." The side frames (a) Fig. 4, are not secured rigidly to the centre section (b) as is generally the case, but each is pivoted at its mid-point. Thus, in effect, it becomes a seesaw and the wheel at either end is able to move up and down with some degree of independence. Each wheel can also move vertically with respect to its companion on the farther side.

(2) MODEL TRAIN SPEEDS AND HOW TO GET THEM ANALYSED

MODEL railway operating can be often improved and made more interesting still by procedures not always entirely mechanical in nature, and speed-testing is an activity which falls into this category.

Tests can be for average end-to-end speeds or maximum speeds, when in the case of clockwork the train is tested after it has got into its maximum pace and before the power begins to noticeably ebb. For easy timing, a stop-watch is convenient, as the large hand indicating the seconds can instantly be brought to rest by pressure on a side button. Thus the seconds, and even fraction of a second, at which a train passes a certain point can be accurately established.

The compensated bogey does not meet every kind of track inequality, but it does give a safe passage over the more general dips and rises and can be considered quite an advance on the rigid framed type. With a fairly universal action at the bogey's main point of pivoting to the frame of the vehicle it will help, of course, if only one side frame is made to seesaw, but the best results are obtained when both sides are capable of the up and down movement.

In locomotives, or stock that runs on six wheels, also six-wheeled tenders, the quick vertical drop of at least one pair of wheels can be assured by setting a weak spring above the chosen axle as Fig. 5. This is a particularly good idea when a pair of wheels and axle are of light make. If reasonably heavy there is no need to assist the dropping action which will take place automatically. The point of contact between the spring and axle should be kept well lubricated, but even running dry the pressure of the spring is applied so near the centre of turning that the retarding effect is virtually negligible.

There are naturally other definite causes of derailment that have to be watched, but these it will be found are the exception rather than the rule. This kind have the advantage, however, that they can be generally traced and remedied. Thus too high speed on curves will cause centrifugal force to do its work while out-of-gauge wheels and out-of-gauge track can add their quotas of trouble. But it is the type of derailment that comes about on what seems perfectly laid track and with running gear apparently beyond reproach that cause the most irritation, and it is this kind of mishap which is entirely eliminated with the introduction of some arrangement for the vertical movement of wheels and axles. So any amount of effort to get one's stock right in this direction is more than worth while.

For train timing, one well-known writer on the model railway hobby suggests that the test run should not be less than 30 feet, but I have tested speeds over a shorter footage than this, accuracy being checked by making several runs under precisely the same conditions.

The first point before making any calculation is to find exactly how long it takes the train to pass over a perfectly measured length. For accuracy it is good to temporarily mark a sleeper with a touch of white paint or chalk at both ends of the run. This quite eliminates guess-work and the chance of "losing the place." Also it makes it very easy to see exactly when the locomotive is over the chosen spots.

A person with a stop-watch can make tests alone but a helper is useful. The train being tested should be started from a position ten feet away from the first mark of the run and in checking tests it must always be started from the same spot. Clockwork mechanisms too must in all cases have received the same number of turns or be taken up until the "feel" of the spring shows that equal tensions are being secured.

The train released, a step is taken to the first marked sleeper. You can always beat the train to it without having to be unduly nippy. With the second indicator at rest the stop-watch is held in the hand, the button moved immediately the front of the locomotive crosses the marked sleeper. The second hand will leap into life instantly and another quick step takes one to the other marked sleeper, the indicator finger being stopped as the engine buffer-beam crosses this farther point.

You now have by simple subtraction the number of seconds the train took in covering the test length. Make a number of runs and if things have been really carefully done it is probable that the various times obtained will vary only by the fraction of a second. However, add together the time of the runs and divide by the number of runs which will give the average time taken—and almost certainly a pretty accurate average at that.

Now as to the turning into model m.p.h. In dealing with gauge O we have a ratio to the full-sized of $1\frac{1}{4}$ in. to 4 ft. $8\frac{1}{2}$ in. (given by the gauges) which means that the test length in actual feet by 45.2 gives the length it would be in full-sized feet and divided by 5,280 in full-sized miles. Reducing the figures, this further means that multiplying the test length in actual feet by .0085 produces its equivalent length in full-sized miles.

Now speed is always distance divided by time taken. As the time taken was in seconds it must be divided by 3,600 to bring it to hours. Thus the speed of the train in m.p.h.

$$= \text{Length of run in actual feet} \times .0085$$

$$\frac{\text{Time taken in seconds} \div 3,600}{\text{Length of run in actual feet}} \times 30.6$$

$$\text{or } \frac{\text{Time taken in seconds}}{30.6}$$

30.6 can be taken as a constant for all gauge O speed calculations while the constant for HO works out to .60. Thus finally then we get that the speed of any gauge O train is given by:

$$\frac{\text{Length of test run (actual)}}{\text{Time taken (seconds)}} \times 30.6$$

and any HO train by:—

$$\frac{\text{Length of test run (actual)}}{\text{Time taken (seconds)}} \times 60$$

End-to-end runs can be worked out in just the same way. Here the train should be allowed to make a natural start and only be manually stopped (if necessary) when some predetermined point on the terminal platform of the arrival terminus has been passed. To add to the interest and to give lasting technical data about the item of motive power and stock, a complete record of the tests should be made. Tests too should be carried out under varying conditions of loads. Thus locomotives running light, with medium weighted trains and with heavy trains can be dealt with.

And just a footnote. If you have not given this matter of model speeds any particular thought before, you will be surprised how fast model locomotives, especially clockwork, will go. Indeed, some manufacturers gear their products up to a rather ridiculous degree and speeds well over the hundred m.p.h. are very common.

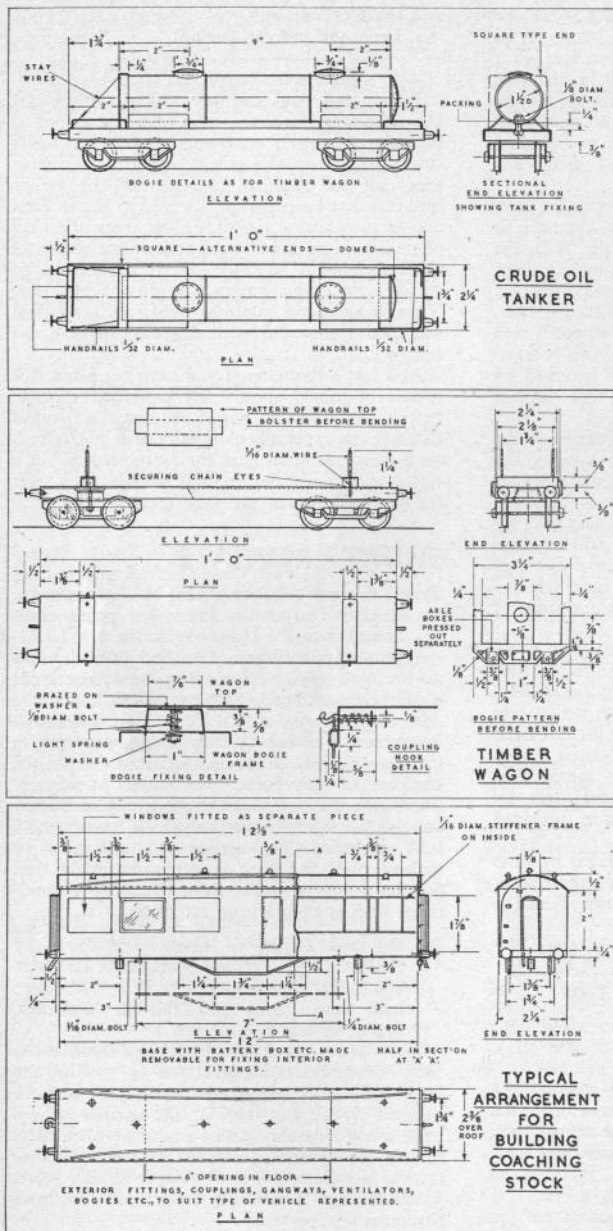
SHORT REVIEWS

Teach Yourself Modelcraft, by H. S. COLEMAN. English Universities Press. 181 pages, cloth bound, size $7 \times 4\frac{1}{2}$ in. Price, 6s.

It is always satisfactory to find publishers in a—for them—new field of enterprise who seek out a competent author to tackle it. As Editor of the *Modelcraft Magazine* Mr. H. S. Coleman knows his subject, and has skilfully managed to get an immense amount of information into the limited compass of the book. We found particularly interesting the pages on the modelling of human and animal figures—matters which have usually been neglected. The novice will find much to enthuse him, and keen modelmakers might well pass on a copy or two to those friends who sometimes scoff at their leisure activities.

Building and Laying O Gauge Trackwork, by E. F. CARTER. Percival Marshall & Co. Ltd. 105 pages, cloth bound, size $7\frac{1}{4} \times 4\frac{1}{2}$ in. Inset half tone plates and full-out drawings. Price, 9s. 6d.

Mr. Carter can always be replied upon to be both interesting and instructive. In view of the larger scale of O gauge the possibilities of more detailed tracklaying than in the smaller gauges make a book like this almost a necessity. Added to this is the increasing interest in small outdoor layout, stimulated by the example at this year's Model Railway Exhibition, which makes this book particularly opportune.



STANTON RAILWAY

PART 2 · ROLLING STOCK

BY A. R. CASEBROOK

HALF the enjoyment of model railroading is the designing and construction of one's own rolling stock and accessories.

Not only does it afford much pleasure, it is an outlet for the imaginative mind of the model maker.

Apart from the pleasure derived from home construction, the cost of rolling stock is reduced substantially, this means a greater and more varied stock can be operated.

The finished colour and lettering can be of one's own choice, this alone improves any model railroad.

Wagons can be designed to carry an assortment of loads.

Heading photograph shows unfinished models of a saloon coach and buffet car, these are fitted with knuckle couplers, and when complete will have telescopic gangways.

Finished colour will be plum red and cream and lettered "Stanton Railways."

Photographs two and three show a ten-ton timber wagon, and an unfinished crude oil tanker, both will be finished in plum red and grey. All types are fitted with sprung four-wheel bogies, axles run in grease-filled boxes.

For those that wish to purchase fittings (bogies, couplers, etc.), there are on the market a wide range at prices to suit all pockets. I prefer to use brass and good quality tin-plate; if these are not available, zinc well cleaned can be used.

Remember when using this metal, the over-application of a soldering iron can result in burn marks and often holes.

It is equally important to use a good quality soldering spirit, and don't forget to wipe each joint immediately, in fact I always wash models in cold water and dry well in a warm oven.

Zinc is a metal which does not retain its strength when worked in room temperature.

Bends have a tendency to weaken the metal; care should be exercised during this operation.

Zinc has a permanent grain after being rolled into sheets, and should never be cut into strips across the grain.

Zinc is unlike most metals, it will expand when heat is applied, but it does not contract, for this reason it is unsuitable for some types of model making.

Mark out all measurements in one operation using a steel rule and scribe, if possible this should be done on one sheet of metal. Mistakes in measurements are easily made if a number of pieces of metal are used.

After marking out, cut and finish to size by hand, a good quality file should be used.

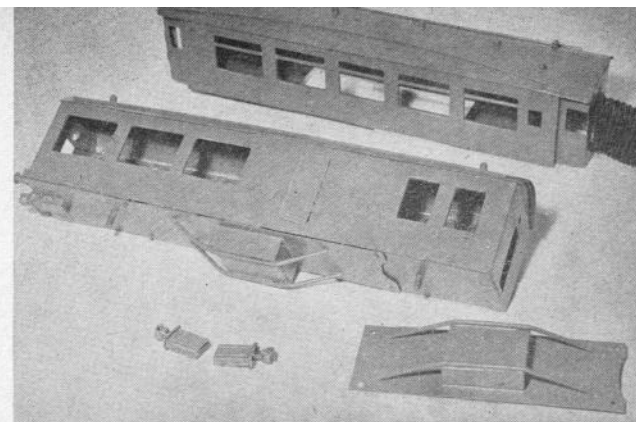
When filing clamp metal between two pieces of wood and hold in vice to prevent metal buckling and being bruised, this not always apparent till a coat of paint is applied.

When removing metal for windows and doors, clamp metal on a steel plate or block; if a good

sharp chisel is used a clean cut is obtained without buckling, finish by hand, before next cutting operation, remove any surplus metal on plate or block.

Some of these remarks may seem superfluous to the experienced metal worker, but I can assure you that many good models are spoilt through lack of observing these simple rules.

It is advisable to assemble sections in some form of jig, this ensures finished model will be square.



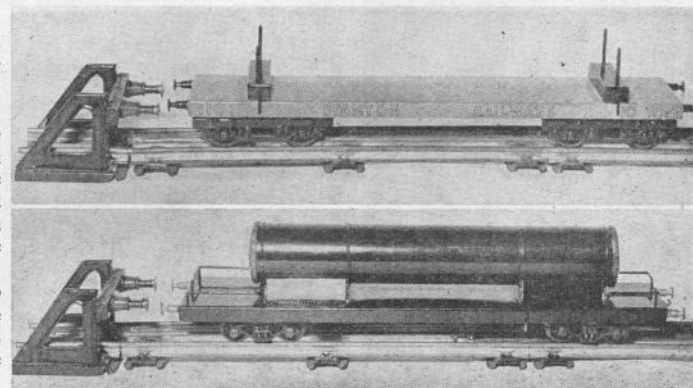
One method is to cut slots in a piece of wood to hold sections in the required position, solder can then be applied to the inside (Fig. 1). If necessary, corners can be filled with a metal filling on the outside, and rounded off with a fine cut file, when painted this has a very pleasing appearance.

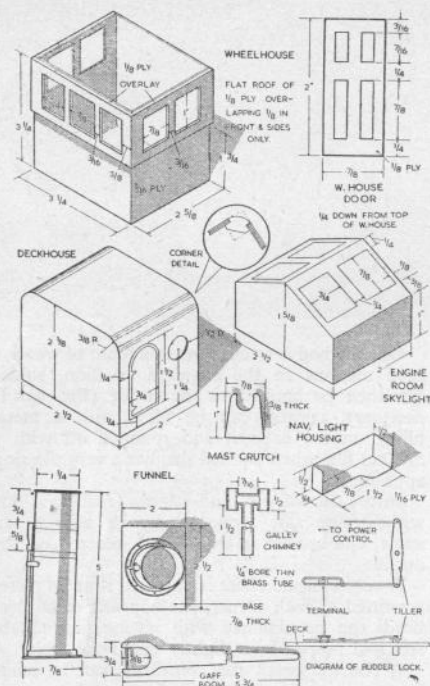
In the case of vans and wagons (coaches if one wishes), the side sections may be bent to an angle, end section fit inside and soldered on the outside.

A very realistic effect is obtained if angle plates are fitted at each corner, the appearance of rivet heads can be obtained with sewing pins cut to size and tapped in a slightly under-size hole.

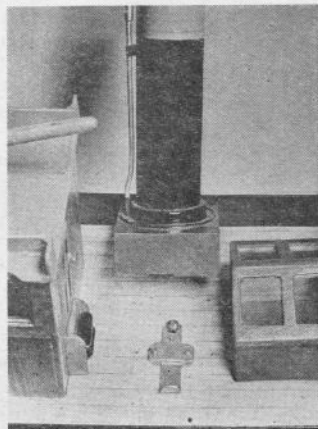
A realistic coach roof ventilator can be made from an air gun slug: drill slug and fix to roof with a sewing pin soldered on the underside. To obtain correct shape for coach roof, roll metal on a hard surface with a piece of pipe till the required bend is obtained, us a back to front rolling pin action.

STANTON RAILWAY TURNTABLE WILL BE DESCRIBED NEXT IN THIS SERIES

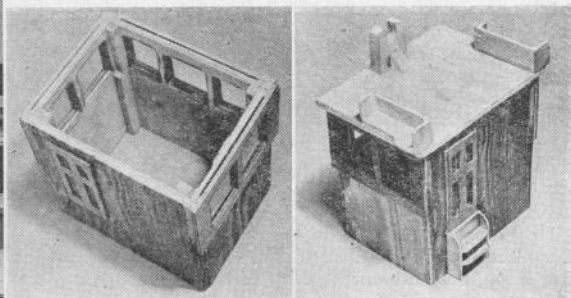




Below: Method of fixing deck. The sliding fork piece is housed under the mounting of the funnel—tilted back here to show the fixture.



Below and right: Two stages in the construction of wheelhouse and built-up fittings



A FREELANCE PART II BY

IN building a composite type of hull such as this one, the position of the ribs does not appear to be critical to an inch or so. In fact, it would probably prove a convenience later to position them with regard to what has to be stowed in the hull.

The $\frac{1}{8}$ in. plywood deck rests on $\frac{1}{4} \times \frac{1}{4}$ in. strips steamed and bent to fit the hull shape and glued in position. No. 2 $\frac{3}{8}$ in. brass screws hold the two end deck sections, while the middle portion is detachable. The whole deck was cut out in one piece, and then cut across with a fretsaw at two convenient places after adjusting the fit to the hull shape. The fixed deck forward carries the mast fixture and as large a hatch as possible, while the stern portion carries the lifeboat in its cradle. All the other deck fittings come away with the movable centre piece. The fixed after portion of deck covers the fixing for the rudder tube. This comes up through the middle of a $\frac{3}{8}$ in. square thin brass plate screwed down to the upper surface of the bread and butter stern. The plate was screwed in position round the tube, then the tube and plate soldered together after adjusting the tube vertically for up and down play on the rudder. A strip of $\frac{3}{8} \times \frac{1}{4}$ in. brass screwed to the skeg provides a bottom rudder bearing, while the upper end of the spindle protrudes through a clearance hole in the deck to receive the tiller.

In the middle of the centre deck beam is a round-headed screw. A clearance hole in the deck allows the screw head to pop through when the deck is in place. A small sliding strip, forked at one end, engages the screw so that when the forked end is under the screw head the deck is

TRAWLER L. C. MASON

FULL SIZE WORKING
DRAWINGS ARE NOW
READY OF L. C. MASON'S
FREELANCE TRAWLER
WHICH MAKES UP INTO
A MODEL OF 27 in. L.O.A.
AND BEAM OF 6 in. POST
FREE FROM THE PUB-
LISHERS, PRICE 5/-

locked in place. A narrow bridge piece, packed up to give the strip free movement, locates the strip. End movement of the strip is restricted by a tiny brass pin—actually a shoe brad clipped short—which is soldered to the strip and stops it sliding farther out when it is free of the screw. The whole catch is hidden under the funnel base which is hollowed out to clear it. All that is seen of the catch on deck is the bent-up end for finger grip, lying close to the funnel block. This block, $\frac{1}{4}$ in. thick, and all the other deck fittings are held by $\frac{3}{8}$ in. screws from underneath.

The funnel itself is simply rolled up from sheet tin on a $1\frac{1}{4}$ in. former, and soldered down the joint. A piece of stirrup-pump barrel was pressed into service for the former. The top rim is a length of 16 g. copper wire soldered round the edge and filed flat, while the mounting flange is a "Casco" glue tin lid cut out to receive the funnel into which it is soldered. $\frac{1}{4}$ in. cabinet pins attach it to the block.

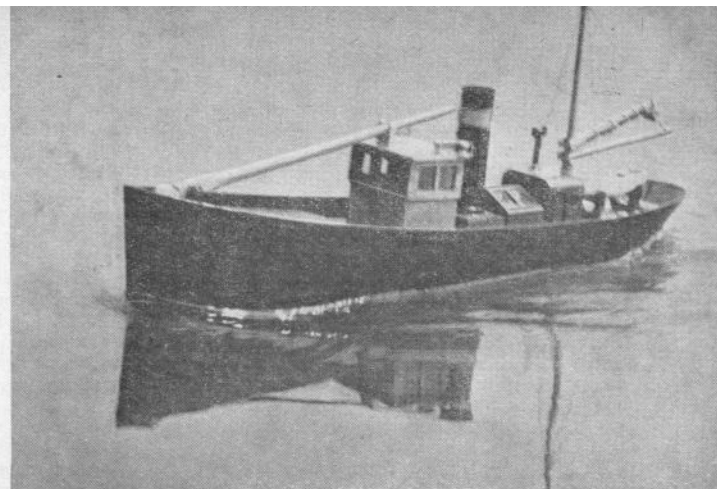
Wheelhouse, engine room skylight and deckhouse aft, are all built up from $\frac{1}{8}$ in. ply, and have $\frac{1}{4} \times \frac{1}{4}$ in. strips glued across inside, flush with the bottom edges, to take the fixing screws from underneath. Thin sheet celluloid was used for glazing. Trawler wheelhouses often have the upper half quite elaborately grained and varnished, and this portion too is often slightly larger than the bottom half. An overlay of $\frac{1}{8}$ in. ply reproduces this quite nicely, and by removing the back layer of the ply behind the frames, a convenient slot is produced for inserting celluloid windows. The photo shows the general idea.

Spars were shaped with penknife and sandpaper from pieces of straight and close-grained wood of suitable length. Almost any "make" would probably do here, as they carry no weight.

The mizzen mast—if it is a mizzen mast on

these boats—is glued to the rear wall of the deckhouse. The rigging here is of the simplest, consisting merely of stays either side secured to eyelets in the deck. In the real thing, the boom appears to be rigged to act as a davit for hoisting the lifeboat outboard, but to include this would very much restrict the movement of the detachable deck, or else make it a troublesome business to unship each time. The movable deck could be extended to include the boat, but in this case we had ideas about installing a small steering motor under the forward edge of the fixed portion. For a long time no suitable material was forthcoming for the sail, but at last we found the very thing—a piece of dull brown silk from the cover of a scrapped umbrella. The sail was hemmed roughly to shape, and cut deep enough to give the right sized roll when permanently furled. Rigging here again is of the simplest, being thin twine with a coat of shellac varnish to give the tanned effect.

Steering on the grown-up version is via chains and rods from the wheelhouse to a double tiller on the deck. This tiller is reproduced on the model, a $\frac{3}{64}$ in. hole being drilled in the end of each arm. The top of the $\frac{3}{16}$ in. rudder spindle is threaded 2 B.A., and the tiller screwed on, being locked with a 4 B.A. nut turned down to half thickness and tapped out 2 B.A. We decided we could utilise each end of the tiller for optional steering gears by means of stiff operating wires. On the port side is a hand-set lockable control, while on the starboard side will be fitted the power operated control. The ends of the wires bend sharply down at right angles, the short vertical ends dropping into the holes in the tiller. A slight "set" in the spring wires prevents them coming out, while allowing either one to be lifted out to disconnect whichever system is not in use. The locking end of the hand control wire



is bent into a long narrow loop which passes under a small terminal mounted on the deck. Slacking off the terminal allows the rudder to be moved as required. The terminal could no doubt be disguised as a bollard, or something.

The foremast pivots on a $\frac{1}{8}$ in. steel pin in its fixture, and can be erected and locked in place by inserting a second pin. It is worth while making up mast and fixture complete before fixing to the deck, so as to make sure that the length clears the funnel when the mast is lowered, and also that it falls squarely in its crutch on the wheelhouse roof. The siren is a scrap of $\frac{3}{16}$ in. round brass rod, drilled and sweated on top of a steam pipe of 12 g. tinned copper wire. Aluminium paint and/or asbestos cord lagging seems a popular finish on the real thing here, and the tinned surface of the wire looks the part. Navigation lights were turned up from $\frac{1}{16}$ in. lengths of $\frac{3}{16}$ in. dia. round aluminium rod and given a touch of the appropriate colour paint on the bulbous centre portion representing the glass. A $\frac{1}{16}$ in. hole drilled axially before parting off allows them to be neatly fixed with a cabinet pin in their holders, the pin being just long

enough to go through the bottom board of the holder and into the wheelhouse roof.

The fender at the bows is made up from thin twine as a short length of "chinese knitting" or "tattooing." The "mate" undertook this personally, via the usual cotton reel and four tacks, so as a result, we look somewhat unseamanlike in having to sail with the fender outboard in full view.

The only "must" about the final colour scheme is the black hull; all the other bits and pieces vary quite a bit. Much use seems to be made of that rust-red priming coat colour, so the deck house, skylight, funnel mounting and inside the bulwarks were done with that colour. A little experimenting with black added to post office red produced the right tint. Warning: it doesn't want half as much black as you might expect! Hull below water line is red. Funnel is black, also the hatch cover and lifeboat cradle. Wheelhouse roofs seem generally to be light coloured—sometimes white—so we did ours light grey, having some to hand. We used the same grey for a funnel band, edged with red top and bottom. The lifeboat is white, with masts, spars and wheelhouse very lightly stained and varnished.

LOCOMOTIVE CONTROLLER (CONTINUED FROM PAGE 667)

rings E as in Fig. 2, which shows the pieces in part section. The method of bending the metal forming the brush should be noted. The upturned portion fits tightly against a flat filed on the rim of the disc and this is sufficient to prevent the brushes turning when the disc is rotated. Both contacts and the slider are cut from spring brass strip taken from old dry batteries and the rubbing surfaces are slightly rounded to give a smooth action. The spindle is $\frac{1}{8}$ in. dia., reduced to $\frac{3}{16}$ in. where it enters the bush in the baseplate, the shoulder serving to take the thrust of the contacts all of which tend to lift C upwards. The outside of the bush can be threaded $\frac{3}{16}$ in. \times 26 TPI for fixing after the manner of a radio component. The end of the spindle is threaded 4 B.A. and the disc is held to this by a locknut.

A piece of asbestos-cement sheet $\frac{1}{8}$ in. thick by $\frac{3}{4}$ in. wide is used for the resistance former. The edges are carefully rounded, a slight depression is made in the middle of the top edge to define the "off" position and $\frac{1}{16}$ in. holes are drilled through which the ends of the wire can be passed. The former is fixed to the base by two brass angle brackets. The tops of these extend beyond the top edge of the former to make stops for the slider.

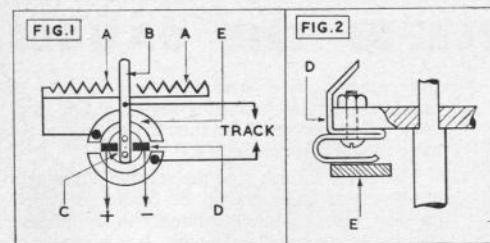
For a 12-volt system and a loco taking about 1 amp. each resistance can be 2½ yds. of 26 SWG nickel chrome wire. Start the winding at the middle of the former by making a small loop,

passing this through one of the $\frac{1}{16}$ in. holes and then pushing the free end of the wire through the loop to form an anchorage. Wind the wire closely and as tight and even as possible. When both resistances are wound varnish with shellac and bake hard. Then lightly file a smooth track on the top edge being careful not to cut through or loosen any turns.

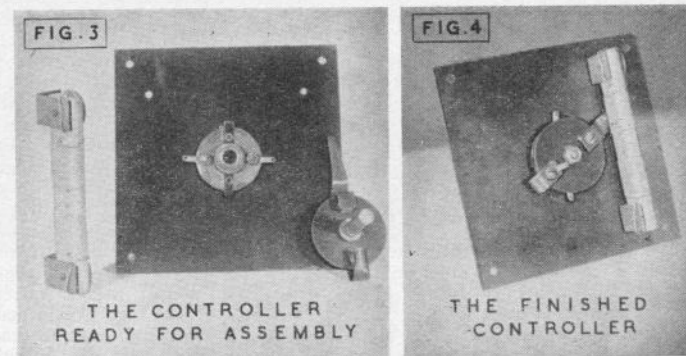
Assembling

Mount the former by screws through the brackets and use these also as clamps for the outer ends of the wire. Join both brackets by a copper wire and extend this to one of the contact rings. Next insert the spindle in its bush and lock the disc in place with a nut. Adjust the brushes to make reliable contact with the rings and take flex leads from them to the power supply. The leads should be twisted so that they turn about the centre of the spindle as this will avoid breakage in use. Add a further pair of flex leads to make contact with the track at one end and the slider and contact ring at the other. Smoothness of working can be improved by a little blacklead applied to the rubbing surfaces.

Various modifications of this design will suggest themselves. The fitting of terminals to the various leads or the use of a curved former for the resistance in place of the straight one shown, are examples. So long as the mechanical action is not disturbed any such alterations can safely be made.



IN RESPONSE TO REQUESTS FROM MANY READERS H.H.J. PROVIDES A SIMPLE & NEAT CONTROLLER



A PIECE of apparatus needed for the working electric railway is a controller of the speed and direction of the locos. This can be easily made as the following notes endeavour to show.

The controller is designed for a two-rail system but will work on three rail also. It will stop, start, reverse and control the speed of a loco in either direction, because the necessary on-off switch, reversing switch and variable resistance are all included.

The Circuit

The drawing, Fig. 1, gives the circuit diagram. Two equal resistances A are fixed so that a slider B can travel over either. In the position shown the slider is not making contact with either resistance and the controller is therefore in the "stop" position. The slider is fixed to a bakelite disc C that can be turned by means of a spindle and knob. The spindle must not be in contact with the slider. Two further contacts D are fixed to the disc. These are in the form of spring brushes and make contact with the two half rings E. The gap between these rings is a little wider than the contacts and is filled with a piece of bakelite so that the contacts can ride easily over the gap. One of the rings is connected to the outer end of the two resistances and the other to one side of

the track. The slider goes to the other side of the track and the two brushes are connected to the power supply.

With the slider in the position shown no current can reach the track or either rail. When the slider is moved to the right, the positive brush makes contact with the ring joined to the resistance and the negative brush to the ring going directly to the track. Further movement of the slider brings it into contact with the resistance at its free end so a low voltage is applied to the loco. Still further movement reduces the resistance in circuit and the loco speeds up until the resistance is all out of circuit. Movement in the reverse direction slows and finally stops the loco. Further movement to the left reverses the current connection to the two rings and then brings into circuit the left-hand resistance so speeding up the loco in the reverse direction.

Construction

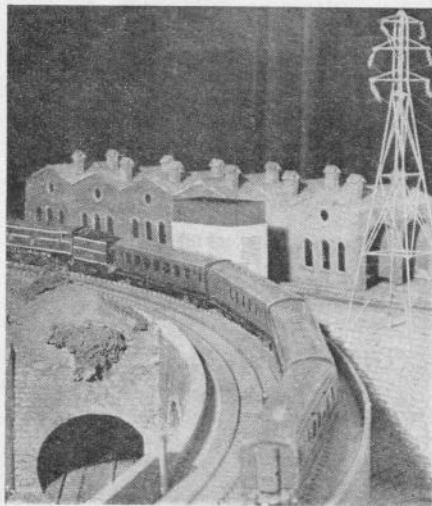
The controller is built on a 4 in. sq. piece of $\frac{1}{8}$ in. bakelite, but good dry plywood will do instead. The rings E are made from a $1\frac{1}{2}$ in. dia. brass washer, bolted out to 1 in. dia. The disc C is also of bakelite $1\frac{1}{2}$ in. dia. and the contacts D are bent under the disc to make contact with the

(Continued on page 666)

000 THE BATTLE OF THE GAUGES

V. **TT** A GOOD deal has been written about "TT" gauge. Given that present-day conditions tend to focus interest on ways and means of getting a model railway into the smallest possible space, this is natural. But I am not so sure that the time has yet come for "TT" to be regarded as the only possible scale below HO. It has been implied that "000," or 2 mm. scale, is one for specialists. I am not so sure.

Granted, very little progress has been made so far in putting 2 mm. scale components on the market, while on the Continent and in the U.S.A. "TT" gauge is an established commercial proposition. But American "TT" items are not available in this country, through normal channels, and the German product, even if it eventually includes models of British prototypes, can hardly cater for all requirements. And in any case, it looks as if the international situation and its attendant economic difficulties will hinder any commercial development, in this country, of any new scale, whether it be "TT" or "000." In sum, the man who builds a layout in either of these scales will have to accept the fact that most of it will have to be home-built, unless he is prepared to restrict himself to the Continental die-cast rolling stock. Either way this must demand skill

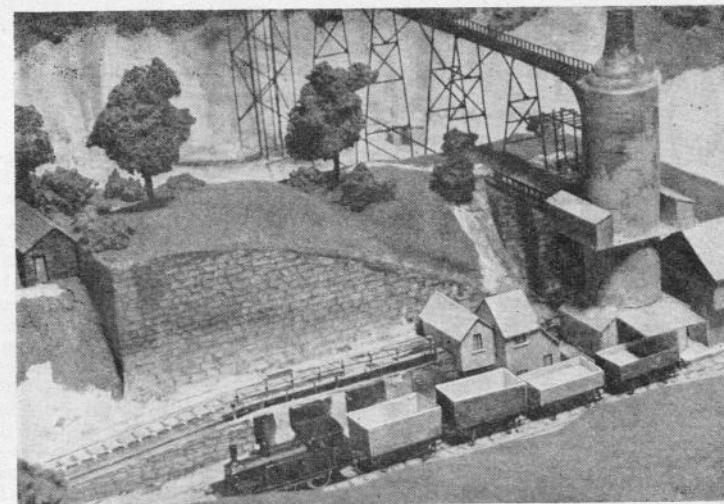


and patience rather over the average. Lots of people don't mind admitting that they find even "00" rather too small for their taste; how much more so will this be with "TT" or "000."

Therefore, I think that the relative advantages of these two scales should be considered solely on their merits, without reference to the present position of commercial supplies. It is a matter of personal taste; I do not wish to lay down the law but simply to offer some considerations. In front of me as I write there are three locomotives, 0-6-OT, 4 mm. scale 9.5 mm. gauge, "Rokal" 2-4-2T, and 0-6-4T, 2 mm. scale, 9.5 mm. gauge. Of the three, the Rokal tank is by far the largest; it is altogether much bulkier than the 4 mm. scale narrow-gauge job, and it completely dwarfs the 2 mm. engine, though the latter is by no means a model of a small prototype (the Highland Railway Blair Atholl banker). The same is true of wagons; my 2 mm. scale wagons live comfortably in matchboxes when not in use, and one of them will stand comfortably inside a "Rokal" wagon. Agreed, the latter is a model of the large Continental type of wagon, and is wider than scale to accommodate the over-size wheels and consequently widened underframe. Even so, the difference in size is infinitely greater than one would expect from the difference of half a millimetre to the foot, in scale. In fact, it has to be seen to be believed!

The point is, that in spite of this mere half millimetre, "TT" and "000" are two completely different scales, and the practical difference between them, when it comes to designing a layout, is not much less than the difference between "00" and "0" gauge. If "TT" scale be adopted in order to allow of easier curves than would be possible in 4 mm. scale, then clearly the amount of space required for a given layout will not be appreciably different in either scale. The man who wants to build a layout in a folding tray, to go under his bed, and who knows jolly well that he cannot make an interesting "00" layout in this space, will find that he won't be able to do so very much better in "TT." He will gain something, but not so very much, by denying himself the use of the multitude of commercial components available in the larger scale. With "000," however, he would gain a good deal. Bear in mind that to cut down the scale by half means dividing the space required by four, and the bulk by eight. This is a substantial difference, and for those with limited space may mean all the difference between having a complete layout and a col-

BY
R. W. G.
"MATCHBOX"
BRYANT
UNDOUBTEDLY
ONE OF THE
FINEST
000 MODELLERS IN
THE WORLD



The illustrations are from Captain Provo and H. B. Whall's 000 layout shown at this year's Model Railway Exhibition, and an excellent example of super-detail in this small size

lection of models that cannot be run at home.

I have a little terminus station in 2 mm. scale; it lives in an old guitar case and is just three feet long and not more than six inches wide, except at the bulge which accommodates the control panel. What could be more portable than that? The same station in "TT" scale would be three feet nine inches long, and correspondingly bulkier. It would still be portable, but the full extent of the difference in space requirements does not become apparent until one thinks in terms of the space required by a circle of track. In "000" curves of 18 ft. radius have been found satisfactory in operation. A circle of this radius will therefore require a space just over three feet square (nine square feet). In "TT" a corresponding circle requires three feet nine inches square, that is, fourteen square feet, which is a considerable difference. And it is increased in proportion as the simple circle of track is elaborated into an oval, with stations and all the other features of a complete layout.

I am not trying to make invidious comparisons between one scale and the other. I myself have been working 2 mm. scale for several years now. Undoubtedly, it demands extreme attention to accuracy if satisfactory operation is to be achieved. I am satisfied, however, that it is a practicable proposition. Such troubles as I have had in my own working have been associated with the fact that my layout has had to be portable, and are not inherent in the scale. In fact, I have never been able to operate my layout as a whole,

except at exhibitions. This is by no means a fair test; the dust and dirt of exhibition halls are guaranteed to make every available gremlin pop up! I feel that I must mention this. A good many people will have seen my layout, together with that of Mr. Langridge, in operation at the Central Hall, Westminster, at Easter, 1951, but few can have had any conception of the difficulties of running it in such conditions. The same may be said of the wonderful "000" layout shown by Mr. Whall and Capt. Provo at the same show last Easter. I would agree with any critic who may deem "000" too small, generally speaking, for exhibition running. This fact is inherent in the scale, because dirt cannot be scaled down to suit wheel treads, commutators, and pick-ups. What I do hold is, that "000" is a very excellent scale for the man who has no fixed abode, or no possibility of having a separate "railway room." And it affords more scope than any other for truly compact layouts designed to fit into cabinets in a living room, for example.

I do not decry "TT" by saying this. The American manufacturers advertise "TT" as allowing of a layout on the kitchen table. But it wouldn't be a very elaborate sort of layout, whereas a "000" layout might be developed in such a space, in an interesting way. If I had more space and more spare time, I might well start building a "TT" layout using some Continental prototype, with existing commercial rolling stock dodged up. But I haven't, so I had better not let myself be tempted to start.

HIPPOTAS

A NEW 'A' CLASS
YACHT by J. A. LEWIS

THE A Class rule is perhaps the most interesting one under which to design a boat. It may be thought at first glance that there is not much scope for a designer to develop his ideas, but although the rule is framed to prevent freak boats being produced, there is plenty of opportunity for variations in design.

Basically the rule is as follows:

$$\frac{L \times \sqrt{S}}{4} \times \frac{L \sqrt{S}}{12 \sqrt[3]{D}} = 39.37$$

Where L = Load water line in inches plus half any excess in quarter beam measurement.

\sqrt{S} = the square root of the total sail area in square inches measured in accordance with I.Y.R.U. regulations.

$\sqrt[3]{D}$ = the cube root of the displacement

in cubic inches in full racing trim.

The quarter beam length is measured in a line parallel with the middle fore and aft vertical plane at a distance from it equal to one quarter of the load water line beam and one tenth of this breadth above LWL. The excess of QB measurement is the amount by which the QBL exceeds the length allowed without penalty. This length is equal to a percentage of the LWL length found by subtracting the square root of half the LWL length in inches from 100 (Percentage = $100 - \sqrt{\frac{1}{2} \text{LWL}}$).

There are displacement limits, draught limits and freeboard limits, but the above states the salient features of the rule. Anyone becoming interested in A boats for the first time should obtain a full copy of the rules from the publications secretary of the M.Y.A.

It will be seen that the main controlling in-

fluences are the reduction of sail area with increasing LWL and the increase of sail area with increase in displacement. The control of the quarter beam length is a good device to prevent extreme overhangs and to keep the hull of fairly normal shape.

The fact that the LWL length is the main governing factor with regard to speed makes it necessary to decide this dimension first and a study of some of the best recent A Class boats shows a variation between 49 in. and 56 in. For the new design, we show 55 in. but during the development of the drawing the waterlines have been snubbed back to give a length of 54.4 in. on the water. In order to do this, the profile has had to be flattened where it crosses the LWL. This looks a little unfair but is worth while in the interests of extra sail area obtained. This snubbing also improves the form resistance of the hull and is to be found in many first class designs in the J Class 12 metre and 6 metre classes.

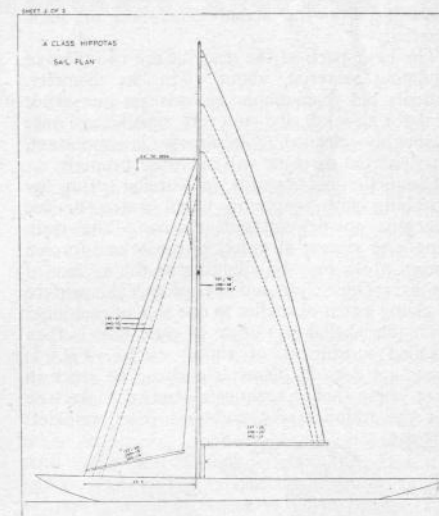
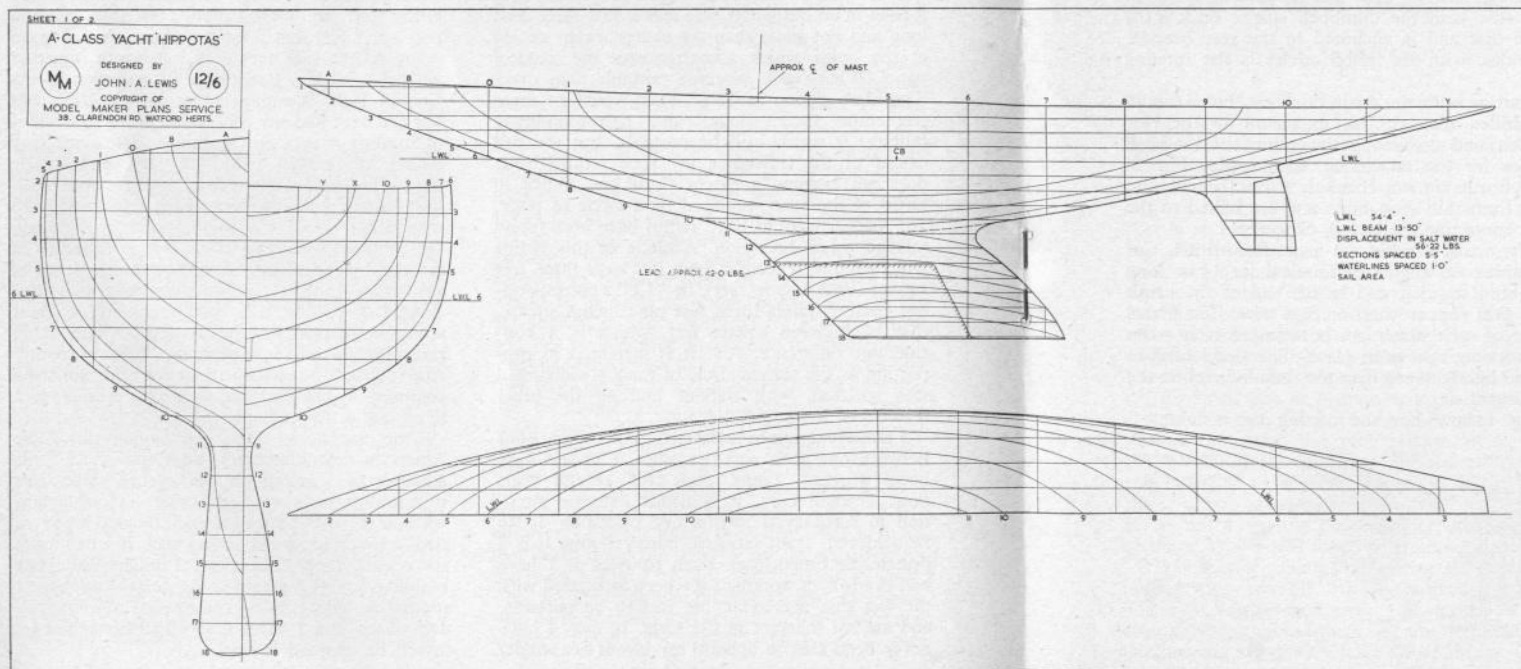
The displacement chosen for the new design is 56 lb. which lies nicely between the limits set out in the rules. Although there is no actual limit regarding the maximum displacement, only the figures used in the formula are restricted,

and though I usually favour as heavy a displacement as practicable I do not feel that a displacement of over 60 lb. to be justified in any model yacht. Herein lies the big snag in the A Class rule for, generally speaking, the big boats have the advantage when racing under the average conditions in this country, but they become too big and unwieldy to handle for any length of time and what should be a pleasant sport becomes hard labour.

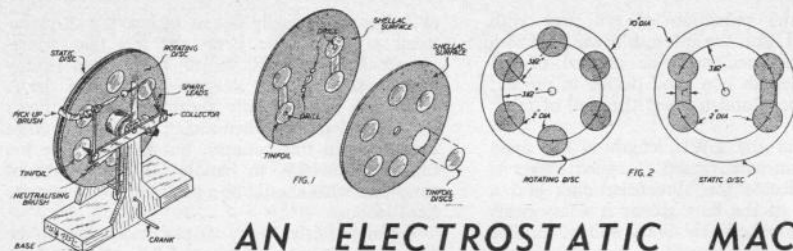
When a fairly heavy displacement has to be accommodated on a restricted LWL, the trend has always been towards the narrow boat. In the 6 metre class it was necessary to impose a minimum beam. The new boat follows this trend with a LWL beam of 13.5 in., which I feel is as narrow as one can go and still maintain reasonably easy buttock lines and a flat run aft which contributes so much towards a fast craft.

The keel has been made rather thicker than usual and this eases the burden of carrying the displacement in the canoe body proper.

It is hoped that this design may prove itself to be a fast and weatherly craft under all conditions and that it will bring much pleasure to those who may build to it.



WORKING DRAWINGS OF THIS INTERESTING NEW BOAT ON CLASSIC LINES BY THE DESIGNER OF THE SUCCESSFUL 10-1/2" RATER "HALCEYON" ARE AVAILABLE AT 12/6 THE SET OF TWO FR. M MODEL MAKER PLANS SERVICE, 38 CLARENDON ROAD, WATFORD, HERTS. LINES ARE HALF FULL SIZE, BUT BODY PLAN IS GIVEN FULL SIZE AND SAIL PLAN FOR THREE SUITS TO QUARTER FULL SIZE.



AN ELECTROSTATIC MACHINE

THIS is a machine of the type popular in school laboratories for generating static electricity for demonstrations and experiments. As a model project it is a novelty—and quite a lot of fun to make and then “play” with. It has, of course, definite instructional value and could be used as such. Its main attraction, however, is simply that it is a model which is different and as such is a worthy project for those of us who like “making things work.”

The description of this machine does not give complete details of the stand. Construction of this should be quite obvious and there are a number of alternative methods which could be employed. Our description is concerned mainly with the working parts—the actual generation of static electricity.

The basic parts of the machine are two discs of insulating material, about 10 in. in diameter. Actually old gramophone records are just about ideal for this job and are very satisfactory once thoroughly cleaned. Cleanliness is important, otherwise the machine will not work properly.

Clean the old records, or similar discs, by scrubbing with soap and warm water—or use detergent powder instead of soap. The main thing is to remove all traces of grease and foreign matter which may be adhering to the surface of the discs. Once clean and dry, protect this surface by giving a coat of shellac to one side of each disc.

To this shellaced surface of each disc is then attached a number of tinfoil circles, Fig. 1. These are 2 in. in diameter and can be stuck in place, using shellac again as a cement. Make sure that the tinfoil is flat and free from wrinkles.

About the best way to flatten tinfoil is to lay it over a sheet of glass and then rub lightly.

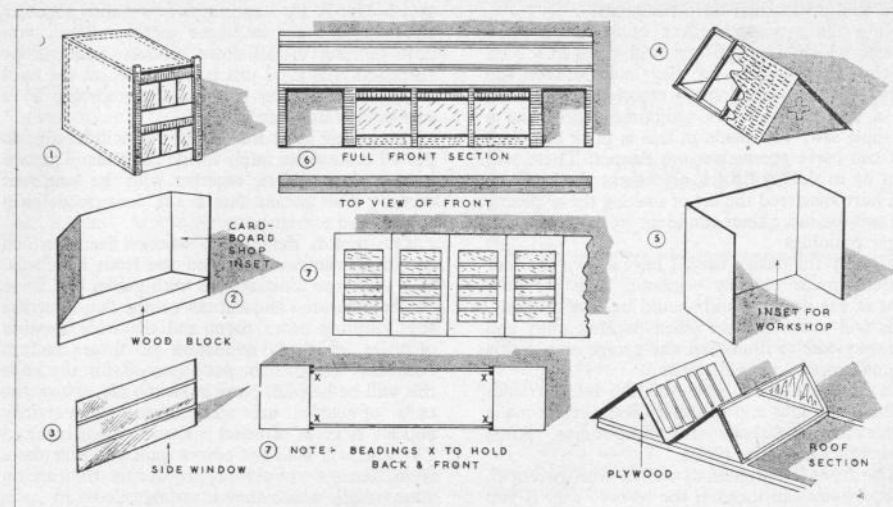
One disc has six circles of tinfoil attached to it, cemented at equal intervals around the disc. The centres of these discs lie on a circle $\frac{3}{4}$ in. radius, as shown in Fig. 2. An easy way to mark the position of these centres is to draw on this $\frac{3}{4}$ in. radius circle with compasses and then, with the same radius, mark off equal arcs around the circumference. This method will divide the circumference exactly into six equal parts.

The second disc has only four tinfoil circles cemented to it, and adjacent pairs are joined with a further strip of tinfoil, 1 in. wide, to form two dumbbell shapes. This will be clear from Fig. 2. The disc with the dumbbell shapes on it is the static disc and is anchored to the rear bracket. The disc with six tinfoil circles is the rotating disc.

Starting with the static disc first, holes should be drilled through this to mount to the rear bracket, and also in opposite ends of the dumbbell shapes for the attachment of brushes, Fig. 3. The brush corners themselves can be cut and bent from thin strip brass and are bolted to the disc, contacting the tinfoil, of course.

The actual brushes are made from tinsel. Cut a number of lengths of tinsel about $1\frac{1}{2}$ in. long and bind together and to the end of the brush with thin copper wire, or fuse wire. The actual shape of each brush can be adjusted later when the rotating disc is in place. The tinsel brushes should lightly sweep over the tinfoil circles on the rotating disc.

Fig. 4 shows how the rotating disc is mounted.

PART
ONE

Building a Model Garage

VICTOR SUTTON'S REGULAR ARCHITECTURAL FEATURE

MANY model-makers are confident in making small buildings but not quite so sure of themselves when it comes to making something a little more ambitious. The first thing to do is to make sure that your model is not going to be too large to transport when you may consider taking part in an exhibition. Secondly, building in units you will find that you get far less damage and can paint much more of the intricate work before assembly. I have chosen a well-balanced garage for the purpose of this article, because I have been asked for this many times in the last few years.

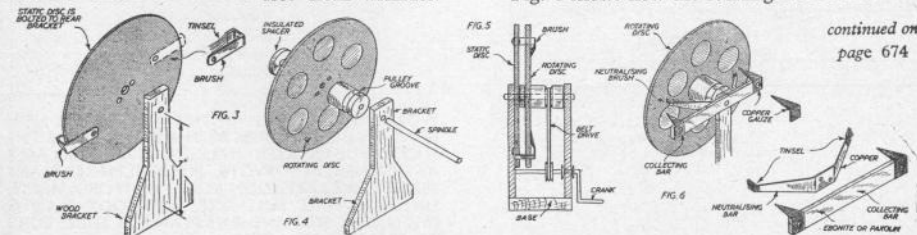
Although designed as a general service garage, I see no reason why it should not be made up as a toy for small cars or operate as a bus station on a scenic lay-out. By its design, the enthusiastic worker can raise the roof section, make the centre span longer or shorter and the garage will still look just as effective by reason of the two-storey design at each end. However you change it do not bring the centre higher than the end sections. This would make it disproportionate.

I saved much time in building the ends by finding two suitable strong cardboard boxes. These I strengthened with $\frac{1}{4}$ in. square wood, after having unpicked them flat and designed and cut out my windows. Being of a display type,

these were cut out and lined with heavy transparent material. This I well lined with Cellotape, because should these panels come out you have no chance of getting them back again. The light uprights I made from obechi wood and stained before fixing in light oak. You will save yourself no end of blobs on the windows if you will adopt this idea of painting these parts first. Each bar was secured behind with another bar to prevent sagging in the window material. Study sketch for this.

The floor I reinforced with plywood, otherwise it may break away. In sketch No. 2 you will see the neat little interior which I have suggested you use and put in before fixing up. Odd tyres from cars, petrol tins from blocks of wood and other little items can be conjured up and set in with some imagination. You may also realise that garage windows are not all dull and some gay painted strips, representing crepe paper will not be out of place.

The two outer sides and the back may not have windows if you think this part will be covered up, but if you do add them design them with sweeping lines as shown in No. 3. Perhaps you can borrow a book from the local garage manager to get some ideas. Petrol companies often show



continued on
page 674

some designs in their advertisements.

Note the attractive effect of the two main pillars, which I suggest should be $\frac{1}{2}$ in. \times $\frac{1}{4}$ in. obechi. Cut the slots as they look between the brick sections with a small tenon saw and then get a pad saw or it is sometimes known as a key-hole saw. The blade in this is thick and then you can carve these slots out deeper. These will then be in dull red brick or cement shade. Once you have mastered the art of making these effects, you will be more than confident to go ahead with larger buildings.

To keep the design easy, I have shown the roof sections made entirely separate. This is quite clear in the drawing and should be easy to make. This will avoid damage when packing away and you may care to illuminate the garage and in this you can conceal your batteries.

In the next sketch is shown the interior sides of the outer ends and this gives you a ready-made alcove for workshops and store-rooms. Some work benches can be added.

The front is designed as shown with two open ends, or you can increase the bays to four if you like. This can all be rearranged by leaving out some of the large windows and supports, which are only a repetition of the two ends. See the end view in sketch No. 0 to show how this is made up in one frame. Beadings, cardboard and supports all make up into one flat framework. The part under the name panel could be made with cardboard frame and coloured perspex, which is often seen in this type of building. Actually, it is sometimes very ornamental.

Readers may study such journals as *Ideal Home* or *Country Life*, as so often these garages are used as backgrounds for good-class advertising. A trip round the North Circular Road might also give you some ambitious ideas in this way.

Design the back to be more simple, but the same size and style as the front. Reduce the window surface a little and line in with cardboard.

Now that you have the two ends and the front and back, note the slats of thin wood shown in

sketch No. 7. By standing the two ends together square and the two larger sections fitted, you have nothing to fall down, in fact, you will be surprised how rigid this is. I only learnt the hard way, after showing my model aerodrome in a tent on a windy day.

In packing away this model you will be able to put all accessories safely inside the ends. The two long sections will tie together with the long roof section. This means that a 3 ft. long model will not be hard to transport.

The roof is made on a wooden frame which fits in on the two ends and the front and back. It is split into four sections with gables and these can be measured and cut out on the flat. Note the slats running down them and the wide expanse of glass which is a feature of these modern buildings. If you can use plywood for the ends this will be helpful. Note in sketch No. 0 how the ends of gables are strengthened with sticky paper. A piece of wood is shaped to an inverted "V" and will hold the points rigid and save them from damage should people decide to lean on your model, which they invariably do.

Green pantile might be used for the roof and would tone in well with light oak woodwork and cream walls.

Interior girder work could be added and painted in pale green. A study of a garage would show this and it can make it very realistic if added.

I find it a good plan to make a separate flat floor and this is a handy guide when setting the model up. Paint this a dull cream or distemper shade. I have made this type of model with shutter doors made on parchment paper with strips of obechi wood glued on. If space permits, these can run up between two slipways of wood and adjusted by weights. With this design it would disappear behind the name panel and lower section.

The design is enhanced by the two ends protruding out farther than the centre part. An island can then be provided with the usual pumps and, we hope, pointed trees in tubs.

drive, coupled up to the rotating disc with a simple belt. Turning the crank now revolves the rotating disc whilst the static disc, being anchored to the rear bracket, remains still. The brushes attached to the dumb bell shapes on the static disc lightly sweep the surface of the rotating disc, contacting the centre of each tinfoil circle.

More brush gear is now required. This consists of a bar of conducting material, such as thin copper, with tinsel brushes bound to each end. This, and the collecting bar, can be attached at the same time to the front bracket—Fig. 6.

TEST Check.—Now is the time to test (1) the fairness of your work and (2) to see if you are going to get a hull which sails true at all angles of keel.

You check (1) by drawing a test bilge diagonal. This is shown at "D1" on "Polaris" body plan and half breadth plan. Strike in similar lines on your body plan and using a slip of paper or a pair of dividers, measure from point "0" to where the diagonal crosses each section line and transfer that distance to the appropriate station line on the opposite side of your half breadth plan. When all the stations are thus marked and you have also marked the fore and aft ends, use your spline and weights and strike in a line through all the spots. This line must be a fair continuous convex curve and no hollows in it can be tolerated. If it is not up to standard, redraw it to a fair curve, but alter it as little as possible. Transfer your amended distances back to your body plan, redraw the offending sections and re-fair the sheer plan and half a breadth plan.

We must now digress into a little bit of theory. For many years the reason why some yachts sailed sweetly at all angles of heel, while others developed vices as soon as they heeled, remained a mystery, but about 20 years ago Admiral Turner made an intensive study of this subject and produced his "Metacentric Shelf Theory." He therein stated that the main reason for vice in a hull was a condition of unbalance between the forward part of the hull and the after part. When a boat heels she puts more hull into the water than she takes out of it. The heeling action causes a shift of the centre of buoyancy down to leeward and produces a "couple" between the heeled centre of buoyancy and the centre of gravity. This enables the boat to carry her sail. If the quarters are full in relation to the shoulders, she tries to put more of her after end into the water than she does forward. This being manifestly impossible, she drops by the bows until the two immersed volumes balance, the centre of lateral resistance moves violently forward and she grips up into the wind, requiring much helm to hold her on her course. Similarly, if the shoulders are full in relation to the quarters, the stern drops to restore the balance, the centre of lateral resistance moves after and the boat runs off the wind.

Admiral Turner's system of analysis was designed to show these faults at the drawing board stage, a much less expensive proceeding than finding them in the finished yacht.

I do not propose in this series to go fully into this method of analysis, but to test our drawing at this stage, we will adopt the first part of it and for this purpose we must find the heeled centre of

FIRST STEPS IN MODEL YACHT DESIGN

PART III

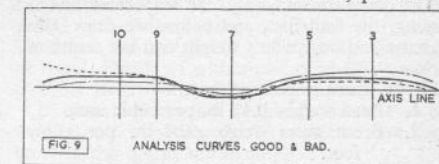
By H. E. ANDREWS

buoyancy for each of the trial sections we have so far drawn.

Across your body plan draw heeled water lines at "rail down" level. Using a separate piece of tracing paper for each section, trace the full section lying underneath the heeled water line. (Remember your body plan only shows half sections.) On each piece of tracing paper draw the Welch axis as shown in Fig. 6(A). Now cut out and balance each of these sections like you did your trial mid-section. Draw the line of balance on each section parallel to the Welch axis and measure the distance along the upright LWL from the centre line to where the line of balance crosses the upright LWL. Using the line of your half breadth plan as the axis line for this analysis, transfer to each section line the distance you have obtained from your tracings. Some will be on one side of the axis line and some (in way of the fin) will be on the other, or negative, side.

Having obtained all these spots, join them in as fair a curve as possible. The sort of line which should result if your hull is balanced is shown in full line at Fig. 9. You will see that except in way of the fin this line is straight and parallel to the axis line.

If the line is like any of the dotted ones in Fig. 9, your hull is unbalanced and you must then choose whether to alter the after end or the forward end. This depends upon which end of the hull you think best. If, for example, the analysis line forward is reasonably straight and parallel, but the line after tends to bear away from the axis, it obviously means that the after end is bad and needs alteration. In this example, the after end is too full and must be fined down, particularly



above the LWL. Do not, however, do it violently. Probably a small change on each section will achieve the desired result. When you have made these alterations, repair your drawings and again test for balance.

The design "Polaris" is not absolutely balanced on this system because I thought it desirable to sacrifice a small degree of balance in order to obtain qualities which should enable her to plane down wind more easily.

Before continuing, I may as well explain the meaning of the curved dotted line running across the sheet plan. This is the "line of rake of the midship section." You will notice that each buttock line has its point of greatest depth on this line, the inner ones being farther forward than the outer ones. Similarly on the half breadth plan the lower water lines have their points of greatest width farther forward than the upper ones (except on the fin). The purpose of this is to achieve a long flat "run" to the boat which is conducive to fast planing down wind.

You will notice that the forward sections are somewhat sharper than the after ones. This causes the slight degree of unbalance.

We must now return to your drawing. When the balance line is to your satisfaction you can continue to fill your remaining sections, buttock lines and water lines and diagonals. Continue the process as already explained, taking care to make all your intersections accurate and fairing each line. You should not now be able to go far wrong, and each line should fall sweetly into place. Continue until all the hull lines are drawn and satisfactory.

The fin now requires attention. You will notice that the fin water lines are drawn on the sheer plan and not on the half breadth plan.

To draw these, first mark on the relevant water line the half breadth of the fin on the mid-section. This is obtained from your body plan. Then using your spline, strike in a fair streamlined curve from forward to aft along this water line and passing through the spot of greatest width.

Now do the same for all the other fin water lines, taking care to make all the curves of similar type. Having done this, transfer all the fin water line widths on to your body plan and draw in the section lines for the fin.

Calculations.—The drawing of the hull is now almost complete and only one important line is missing, the lead line, and before we draw this we must find our yacht's weight and her centre of buoyancy.

Firstly, three important facts:—

1. Lead weighs 0.42 lb. per cubic inch.
2. Fresh water weighs 62.4 lb. per cubic foot.

3. Salt water weighs 64 lb. per cubic foot.

To find how much our boat weighs, we have to find how much water she displaces when she floats on her designed L.W.L. We achieve this by constructing a "curve of areas." This not only gives us our displacement and centre of buoyancy, but also gives an idea of "rate of change of form" along the hull.

To make and use a curve of areas, proceed as follows: line up a page of a notebook, thus—but at this stage you can only complete column 1.

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5
Section No.	$\frac{1}{2}$ Hull areas	$\frac{1}{2}$ Fin areas	c/a areas	Totals
1	.02		.01	15.512
2	.42		.406	
3	1.15		1.56	
4	1.90		3.32	
5	2.52		4.436	
6	2.92	.45	5.78	
(MS) 7	2.95	1.16	7.81	7.81
8	2.53	.43	7.45	18.2
9	1.96		4.845	
10	1.23		3.125	
11	.66		1.845	
12	.19		.81	
T	NIL		.125	
				41.522

Now return to your body plan, and counting the squares find the area enclosed by the centre line, the LWL and the section line. Do this for each section and write the answer down in Col. 2 of your notebook as shown (we are using "Polaris" as an example). You should take care to obtain separate figures for the hull and the fin. (Co. 3 shows the fin areas.)

Having obtained the figures for all the sections, you are now in a position to draw two curves of areas, one for the hull and one for the fin. Take your second sheet of graph paper and draw on it a line equal in length to your LWL. Erect on it section lines corresponding to the section lines on your sheer plan and number them the same. Now mark on this line the forward and after ends of the water line joining the fin and the hull.

Using the figures in Col. 2 of your notebook, mark up on each section line the number of inches corresponding to the figure you have (only remembering all the time that your column of figures is square inches). When you have marked all your sections thus, use your spline and weights and draw a fair curve through all the spots, starting and finishing the line on the LWL ends.

Cast Your Own NAME PLATES

BY R. G. ILSTON

THIS process enables the amateur to produce aluminium nameplates, badges, etc., for models with a finish equal to that of a professional job.

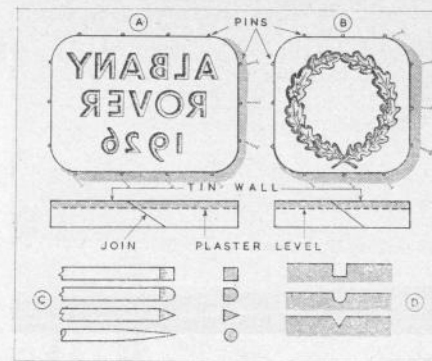
Tools

The first step is to make a few simple tools by shaping the ends of small files on a grindstone to the forms shown at (C), and which will produce cuts of varying contours as at (D).

Casting Block

A sketch is made of the plate required, and a frame of tin about $\frac{1}{4}$ in. wide is bent to the shape and size of the plate and held in position on a board by several pins. The casting block or mould is then produced by pouring plaster-of-Paris into the frame to a depth of $\frac{3}{8}$ in. and allowing it to set.

The block is then removed and the design is marked out on the face in pencil. Letters and/or design are next channelled out by use of the tools, and the plaster is brushed over with molten tallow or wax, so as to leave a thin film on the face and in the contours.



Casting

The block is replaced in the tin frame, and pieces of scrap aluminium are melted in an iron ladle over a clear fire, or by use of a blowlamp; this must be done with care for the metal must not be allowed to "boil" or it will deteriorate and will not give a good finish.

When the metal has liquefied, it is carefully poured into the mould until the plaster face is completely covered to the depth needed.

After the casting has cooled, all that remains is to remove it from the frame, drill fixing holes, burnish the face with a soft wire brush and apply paint as and where desired, and the job is finished.

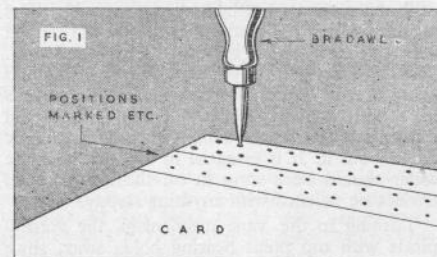
00 STRAPPING AND RIVET HEADS . . . By J. R. WOOD

THERE is no doubt that many who have constructed a 00 gauge wagon, have found difficulty in reproducing scale rivets and strapping, some modellers are content to leave out this detail. To my mind they put the finishing touch to any wagon and present little difficulty. There are on the market stamped brass strappings, but there is no need to buy these, because they can

be made quite simply at home, rivets and all.

First take a sheet of thin cardboard or cartridge paper, micromodel card is ideal, lay it on a piece of wood and mark out the required size of strappings, but do not cut them out yet. Mark on your drawing the position of rivets with pencil, the next stage is to push a small sharp bradawl into the marked positions as shown in the sketch; Just a light impression is all that is needed, so do not push too hard. Now the strappings can be cut out. You will see that on the opposite side you have a realistic rivet head. If you have accidentally pushed the bradawl too far and in consequence pierced the card, these small holes can be sealed with Balsa cement and rubber over with the finger, this will give the effect of a perfect row of rivets. Finish off with a coat of shellac varnish in order to give a good painting surface.

If corner pieces are required, use the same method, but this time mark out the correct size, score in the centre and bend.



A. WILCOCK ON

centre-pop soldering iron, minor metal saw and files.

As mentioned in the previous article, freedom of the rudder is the first requirement of efficient vane steering. This is most readily achieved by "swinging" it on pivot points at both the top and bottom. Fig. 1 clearly shows the top and bottom mountings. Where the rudder post is solid the conical cavities top and bottom can be drilled straight out using a spear point or carefully sharpened twist drill, following a carefully placed "centre pop." To do this perfectly, a lathe is the answer but a quite satisfactory job can be done by the eye and the hand drill. If a hollow tube post is used suitable plugs soldered in provide the necessary solid ends.

The accuracy required is that necessary to avoid the post making contact with the trunk during any part of its movement.

For those having suitable tape and dies the arrangement of Fig. 2 is good even if a little unorthodox and gives a slightly clearer deck. It cannot be recommended where a quadrant is fitted to the rudder post having strong pulls applied. This same arrangement can be applied to the pintles of the vane mechanism.

The fitting for the top of the rudder post is shown in Fig. 3 and in general arrangement probably cannot be beaten. It is simple, light, and gives a clear indication of the position of the rudder below when making adjustments or watching the boat in action—providing it is securely fixed to the rudder post—and enables both a centring line and counterweight for balancing to be neatly fixed. Three methods of securing the tiller to the rudder post are shown in Fig. 3 (a), (b), (c). The first (a) using two grub screws through the collar are in the author's opinion the best as this arrangement can be very secure but can be dismantled easily. The necessary drill and tap may not however be available. The second method (b) is again good and the tapped hole can be avoided by using a nut and bolt. The third method (c) is that using solder should be secure, it is not so convenient and occasions have been known for the soldered joint to fail during the course of racing, when little can be done about it. It is essential in any case that the collar should be a snug fit on the rudder post. Do not be satisfied with anything sloppy.

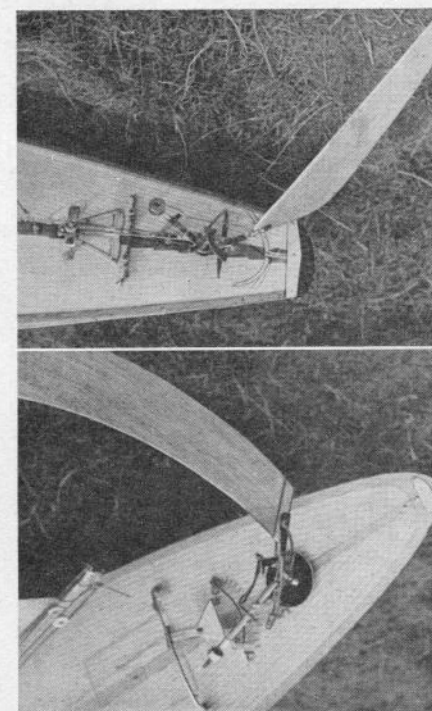
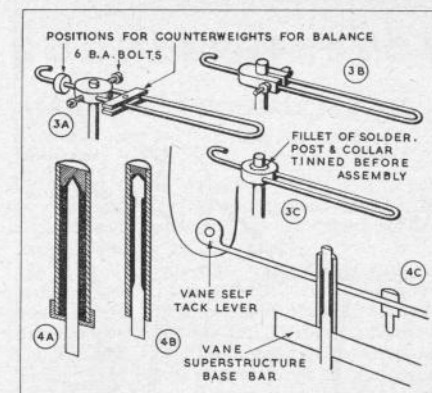
Turning to the vane mechanism, the vertical pintle with top point bearing holds sway, since if the mechanism is balanced in the locked

Mechanics of the Vane Gear

position, i.e. non-self tack position, it is balancing on the point and there is little side thrust at the base, nevertheless it is worth while reducing friction as far as possible by one of the arrangements shown in Fig. 4 (a) or (b). To reduce the pintle diameter as shown in Fig. 4 (b) is really a job for a lathe, since the reduced section is for clearance only it can be quite satisfactorily filed away. A similar clearance is desirable on the self tack pintles where these are as shown in Fig. 4(c).

The linkage between the tiller and the vane may now be considered. This connection probably gives rise to as many mechanical and operational difficulties as any part of vane steering. The arrangement and proportions most frequently seen are shown in Fig. 5 in simplified form. The length of the tiller arm is limited in length by requiring to clear the vane pintle and in order to obtain as large a rudder movement as possible, the connection pin is placed to be well forward in the tiller arm with the rudder in the "rudder neutral position." This gives rise to two faults, (1) the leverage that the vane can exert on the rudder is too small and (2) when for any reason the vane has swung through a large angle the water pressure on the rudder exerts a binding action between the tiller slot and connection pin. Experience suggests the following: A tiller arm to just clear the vane pintle as mentioned above and the pin fixed in the vane base to be between $\frac{1}{3}$ and $\frac{1}{2}$ the distance between the vane pintle and rudder post from the vane pintle. This gives appreciable leverage on the tiller arm, for small angles of movement, so that the limited power in the vane is capable of moving the rudder early. It limits the maximum rudder movement to some 20° to 30°, but this is adequate if the sail plan is correctly placed over the hull and the boat is not being sailed overcanvased. The limited tiller arm movement avoids jamming or binding which is a great advantage.

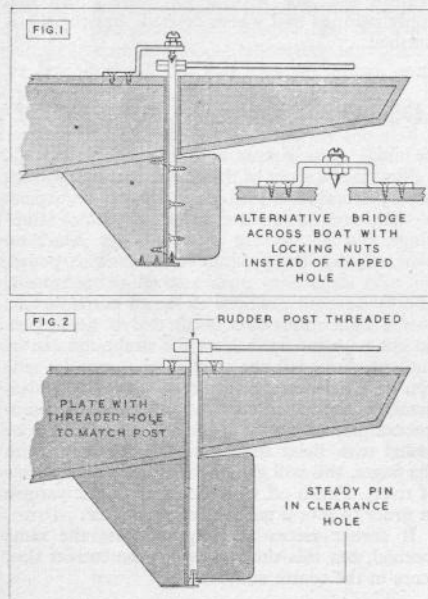
Turning to the self tack mechanism of the vane. The self tack feature is used when sailing against the wind and as close as possible with speed on both port and starboard tacks. The angle required lies between 40° and 45° and when once found can be almost fixed. It is essential that there should be no tendency to "lock" up to that

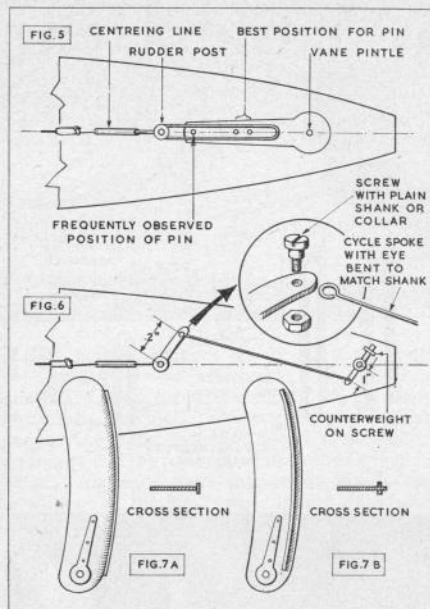


Typical vanes seen at "A" Class Nationals at Gosport this summer. Heading on left depicts Kai Ipsen's delightfully simple yet efficient design. On the right, upper picture, shows winner J. H. Priest's vane as fitted to "Yeoman"; and below, that fitted on second boat "Scamp"

THE author happens to be a professional engineer; he was before that, and still is, a handy man. He is aware that while there are many very capable engineers, amateur and professional, amongst the model yachting fraternity they are in a minority and the real requirement of information for the majority and suggestion within the capabilities of the handy man having only hand tools. These notes then are directed to him.

So far as possible operations will be limited to the following tools, although reference will be made to others for more advanced metal workers: Screwdrivers, pliers, hand-drill and twist drills,





angle and to meet this condition where a pin and slot arrangement is used it is essential that the pin be on the vane lever and the slot on the counter weight lever. The length of the slot, as for the tiller arm, should be such as to clear the other pintle and the pin should be positioned so that for a 45° movement of the vane, the counter-weight moves through an equal angle. Thus over the small range of adjustment (40°-45°) required the angular movements of vane and counter-weight will be comparable and the gear can be balanced. With the pin and slot mechanism it will be found that the angular movement of the vane and counter-weight arms differ considerably and the above adjustments are necessary for good operation. The use of gears enables the angular movements to be always equal and when properly engaged gives a movement less liable to bending.

Consideration must be given to the length of the arm carrying the vane. The vane is normally flying in the wind and moves, or should move for slight deviations of the boat or wind. The area presented to the wind is very small and the power is similarly small. To make the most of a small power it requires applying at the end of a long lever. The length this lever can be of a vane gear is obviously limited by the position occupied in the running position. Suggested lengths are,

from the central vane pintle to the centreline of the vane a minimum of 4 in. for a Marblehead and 5 in. for a 10 Rater—very much shorter distances are observed to be the rule with the uninitiated. If such distances cannot be tolerated even by moving the vane pintle to the stern of the boat then at least approach as far as one can. Since the counter-weight arm and weight must equal in weight and centre of gravity it must of necessity be similar in length.

The proposal to possibly move the vane pintle to the stern of the boat may raise the problem of distance between the rudder post and the vane pintle. Fig. 6 shows a very efficient method of overcoming the difficulty. It is efficient because, unlike the pin and slot linkage, over the movement range used, it will maintain a reasonably constant ratio of angular movement between the vane and rudder. A two to one ratio as shown will be found to be satisfactory. The disadvantage of the scheme is trouble of balancing. This it will be found can be effected by a small counter-weight in the position shown and should be adjusted with the yacht keeled in the water with the vane superstructure removed.

Finally, mention must be made of the vane feather. This must be as light as possible while being strong enough. Since a counter-weight equal to it has also to be carried, the weight of the whole must be kept as low as possible. Balsa or Obeche are most appropriate materials. To enable the size to be reduced while improving the power and also strengthening the feather, the fitting of a stabilising fin or fins as shown in Fig. 7 (a) or (b) is recommended. This will in most cases enable the area to be reduced by up to 50%; the reduction being made in the width, it is important to maintain height. An advantage of getting the vane well astern is that it moves the feather into an area less disturbed by eddies from the mainsail.

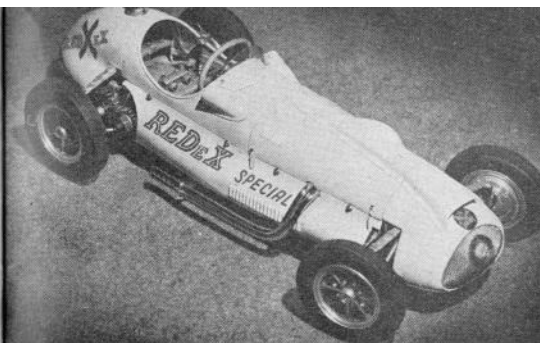
OTHER RECENT ARTICLES ON VANE GEARS IN "MODEL MAKER"

VANE SELF-TACKLING GEAR
By K. P. MORRIS March, 1951

A NEW VANE STEERING GEAR
By S. ELPHEE June, 1951
(Available through MODEL MAKER Plans Service at 1/6)

VANE GEAR COMMENTARY
By A. WILCOCK April, 1952

A LIGHT VANE GEAR
By J. H. CUNNINGHAM, M.I.Mech.E. September, 1952
(Available through MODEL MAKER Plans Service at 2/6)



RED_EX SPECIAL COOPER-BRISTOL 5 CC ETA ENGINED MODEL

THE photographs on this page show a replica of the Formula II Cooper Bristol, recently built for the Wayne V. Myers Co. Ltd. of Chiswick High Road, London, by Mr. H. C. Baigent, to provide a model test bed for their researches into the possibilities of the application of their product RED_EX to the miniature petrol and compression ignition engines. This model was chosen because the prototype in the hands of Mike Hawthorn is a fully RED_EXed car and has achieved considerable success since its inception, much of which is attributed to the use of RED_EX in the lubricating oils of the engine, gearbox and axle.

Recent tests carried out on miniature engines show remarkable improvements in starting, reliability and performance, together with increases in b.h.p. and r.p.m. Moreover, excessive overheating, once a major problem, has been hand-somely reduced and the fuels blended by the Wayne V. Myers Co. Ltd. in conjunction with Mr. J. Dean, have in consequence made possible a "hotter" mix than heretofore.

The model painted in the Company's colours and called the "RED_EX Special," is powered with the well-known E.T.A. 29 5 cc. glow plug unit, and tests are now in process at the Edmonton Car Club track at Picketts Lock Lane, where the model is a frequent visitor. Messrs. RED_EX have recently carried out many improvements on the track, notably in the painting and renovating of the surrounds, timing huts and pits area, the track now assuming quite a competitive and international atmosphere. Whilst high speeds are not expected from the model in view of its weight and scale proportions, it is

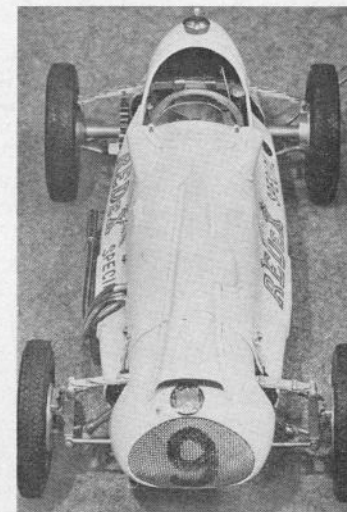
hoped that it will encourage enthusiasts to pay more attention to scale appearance (now sadly lacking) and also serve as an exhibit on the Company's stand at exhibitions.

It is well known that leading exponents of model car racing have used RED_EX as a lubricant and bore soak for some time, notably, Mr. and Mrs. C. M. Catchpole, Jim Dean, Joe Shelton, Alec Snelling, Roy Flower and others, whilst on Sunday, July 6, the fastest times of the day in both 5 and 10 cc. Classes were obtained on RED_EX fuel at 92.97 and 126.40 m.p.h. respectively. Mrs. Joan Catchpole's famous 90 m.p.h. 2.5 cc. car regularly uses RED_EX for bore soaking and general lubrication, where it is found that it eliminates corrosion and leaves a very desirable oil film on the internal parts of the engine, entirely preventing any gumminess of piston rings, rotary valves and contra pistons, and entirely eliminates pick up or seizure.

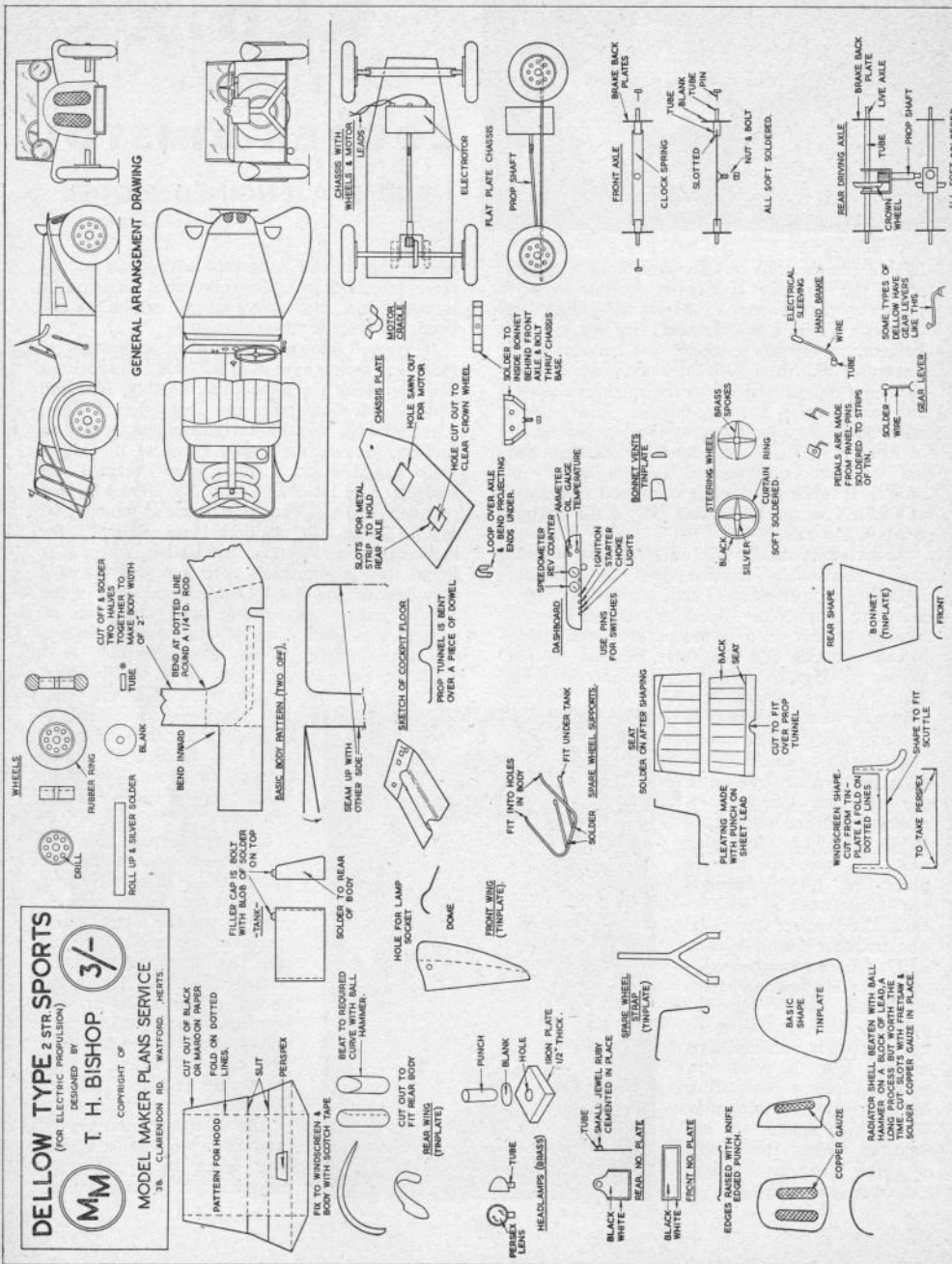
Recent tests carried out on a small diesel engine with RED_EX fuel and using the same settings as employed with other fuels, show an increase in b.h.p. from .31 to .34 and 400 r.p.m. with very much cooler running.

It would appear that the widely used and eminently successful RED_EX System for prototype cars and engines can be applied with some success to the miniature field, and the Company's Sales Manager, Mr. W. J. Holloway, himself a keen modeller, will be pleased to afford information or advice to any modeller who cares to write to him (Miniature Engines Division) on cars, boats or planes.

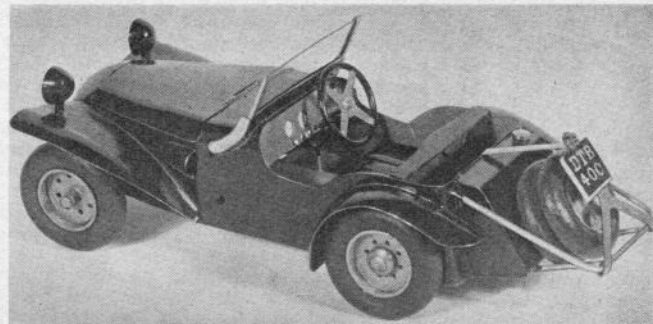
The Company intends to produce a brochure at a later date, when the British team using RED_EX in Italy return.



MODEL
MAKER



A FULLY DETAILED
ELECTRIC MODEL
OF ONE OF THE
MORE POPULAR
TRIALS CARS
BY T. H. BISHOP



Electrically Driven DELLOW

I CALL this model a Dellow "type" because it is not an exact replica of a "Dellow," but owing to difficulty in obtaining information on the car, I know considerably more about Dellow's now that it is finished than when I started the model!

I first made drawings from what pictures I could get in the motoring press and wanted to make the model as attractive looking as possible, with good performance, but no frills, which are unseen and only add to weight, so there is no springing on this model and no chassis proper.

Construction

WHEELS.—These I made up by hand without the use of a lathe. They consist of a $\frac{1}{4}$ in. strip of brass, whatever gauge you have handy, turned up into a ring. The joint is very hard soldered. (All other work is soft solder with a common soldering iron.) The rim is hammered perfectly round on any piece of steel rod or mandrell. Then blanks of brass are cut to size to be a firm fit inside the ring, drilled for hub centre and lightening holes and sweated in place. The tube used for the hubs is a nice firm fit, to hold steady while soldering in place. Then cut off to size and

the entire wheel rubbed flat on both faces on a 16 in. smooth file. Tyres, in my case, were rubber rings, and the finished wheel comes out at $1\frac{1}{4}$ in. dia.

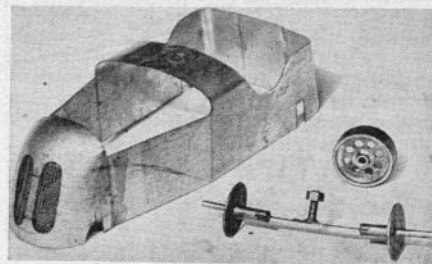
FRONT AXLE.—The drawings explain this very simply. I have not quoted sizes of tube because the modeller can use what he has by him; if the tube has to be purchased, get a tube that will with a bit of filing go into the bore of the larger of the two sizes.

The clock spring in the front axle is as far as I've gone towards any suspension. The brake back plates are simple brass blanks again, and the wheel retaining pins are woodworkers' french pins with a tiny slice of brass rod sweated on their heads.

REAR AXLE.—The rear axle is a rather more complicated piece of work. The tube in which the live axle runs must be soldered in position in one straight length, then the space for the crown wheel cut out with a saw. The brake back-plates are round blanks again. Care is needed in lining up this part of the work if the gears are to run true. I obtain the gears by buying "Frog" plastic rubber driven cars, the crown wheels of which are pressed on to an alloy bush (which won't solder), so I knock that out and solder in a tube to fit.

The rear axle is secured to the base plate by means of tinplate strips, U-shaped, which pass through saw-cuts in the base and are bent over underneath. By this means it can be removed at any time without damage.

The chassis or base plate on which the two axles are mounted is a plate of thin sheet steel, though brass or alloy would do just as well. A



hole is sawn in it to let the crown wheel project through and a second hole for the motor, which is prevented from passing right through by a cradle of tinplate, two lugs of which rest on the sides of the hole. The motor is held in position by a length of "Scotch Tape," simple to remove or renew. Motor leads pass through the base plate at a convenient point. Connection between motor spindle and propeller shaft is a small length of lighter spring.

BODY WORK.—The metal used was all obtained from cutting open old tin cans and straightening out the resulting sheets. The basic pattern for the body which I worked out first in brown paper, is given in the drawings accompanying this article. Maybe someone cleverer than I could allow for the amount needed to go across the scuttle and cut the body out all in one piece, but my method allows small size tin sheets to be used.

A useful tip when fretsawing thin tin sheet is to cut with a bit of scrap plywood under the metal. Cut ply together with metal and no jarring or snags will result. When smooth filing an edge, always have metal against a wooden block or hold in vice between two strips of ply if possible.

When the two body sides are cut out, bend carefully with the thumbs and fingers over a length of suitable bar or pipe. Soft solder pieces in tip of scuttle and rear of body. If the dash is now prepared by cutting instrument holes and steering column hole, it can be soldered in place and will considerably stiffen up body structure; don't forget the switches; pins soldered in and nipped off at the back.

The radiator shell is the next obvious item to prepare, and don't give up hope, it comes right in the end! Cut out a piece of tin larger than required, and if a sheet or block of lead is not handy, two thicknesses of good cardboard or a block of softwood will be needed to beat upon. Use a ball-headed hammer, the end of a ball-peine hammer will do; keep on beating in the centre of the plate, at first keeping all the blows overlapping, as near as skill with hammer will allow. From time to time thumb up the sides as they are almost flat, and pay most attention to getting a good curve on the topmost part of the shell. The bumps left by hammering can be smoothed out with a hammer or mallet on a suitably shaped stake, or if one is not available one could be made in hardwood or filed up in soft iron. When satisfied with the shape, trim to size a little at a time with tin snips, and mark on and fretsaw out the two long slots for air. Back these with copper gauze and solder the whole to the bonnet sides, taking care that the top of the radiator shell coincides with the shape and angle of the scuttle.

The body is now fitted to the chassis. The rear slots fit over the rear axle and the body sides should be a snug fit between rear brake back plates. The front end is secured by a box-member made in tinplate and bolted to the chassis plate forward of the motor position.

At this stage depth and position of cockpit floor can be found. The floor runs from a line dropped from rear edge of the bonnet to just short of the crown wheel and pinion assembly.

Then run a small shelf-like piece soldered in the rear of the body to cover and yet clear the crown wheel. The seat back butts up against this. The prop shaft tunnel is put in the floor before fitting. Just bend this over a bar, then grip bar and tin in the vice jaws and bend smartly back.

Fit pedals to front sloping portion of floor. My pedals are made by soldering french panel pins on to a strip of tin, then cutting off three sections and holding by the pins in a handvice or pinchuck, file some shape into pedal tops; oval is a reasonable shape. Three pedals are required, clutch, brake and accelerator.

The gear lever, which is short and rigid, is made by tinning the end of a length of wire, then pick up a blob of solder on the end and when cold file and emery paper to shape, and solder into the top of the prop shaft tunnel and nip off surplus below.

The seat itself is a very simple yet effective job. Cut a length of tin the exact width of the body inside. First make a bend deep enough to reach the floor and cut out prop tunnel position. Now make another bend at seat back distance, raked back slightly. Now make a thin punch knife edge style, but not too sharp, and punch in the pleating on seat and back. Thumb the back into the two back rests and solder a shaped strip of tin across the top, with about $\frac{1}{8}$ in. projecting each side to rest on body topsides. My seat is not fixed in any way, but is a tight push fit in the body and can be removed at any time for oiling rear axle gears.

The rear wings are another exercise in panel beating, again all done with a ball hammer on lead sheet, and cut and filed to shape after beating up.

The front wings are cut to shape shown in drawings, curved and a dome put in where the wheel comes. The wing valance slopes downward to meet the bonnet sides. The headlamps are made of brass sheet. Two circles are cut out and beaten through a hole drilled in a block of iron, with a punch filed to shape out of a soft iron rod. Several annealings in a gas ring or fire are needed to prevent cracking of the metal, after which they are cut round to size, and mounted on a small

(Continued on page 698)

5cc. SPEED MODEL CAR

PART 3: ENGINE BRACKET AND FLY WHEEL

By IAN W. MOORE

IT will have been noticed that one item shown on the drawing last month has not yet been described—the collet. I propose to leave this for a moment until we get to the modifications required on the small gear, and pass on to the next item on the list, which is one of the most important.

The Engine Bracket

This is an aluminium casting, which you can, of course, make up your own pattern and get them cast locally. The pattern is extremely simple, and consists basically of two similar-shaped endpieces joined across with top and bottom pieces. In order to make the casting applicable to any one of the engines, the front corners of the casting are not cut away on the pattern but carried straight across (the diagram should make this clear). The bottom, front and ends of the pattern should also have about .025 extra left on above the drawing dimensions to allow for machining.

I am not an expert machinist and my methods of doing the job with my somewhat limited facilities probably do not bear close examination, but the experienced machinist will find the job straightforward enough.

The first operation on the casting is to machine the bottom face flat, and this may be done by clamping the front face on to an angle plate, bolted to the faceplate of the lathe and taking just sufficient metal off the base to remove the .025 allowance and clean up the casting nicely. The casting should now be removed and replaced with this newly machined face clamped to the angle plate so that the front (engine) face may be similarly cleaned up and the casting is then removed.

Paint the ends with marking out blue, white-wash or whatever your pet concoction may be and then mark on line 1.000 in. up from the bottom face, and another 1.075 in. back from the front face and centre pop, their intersection, which is the centre line of the rear axle. The next operation is to bore the ballrace housings. If you have a vertical slide for the lathe, this should be used, if not then the casting can be bolted down to the cross-slide with suitable packing pieces to bring the centre-pops up to lathe centre height. Put both centres in the lathe and use them to help in locating the casting accurately. Both front and bottom machined faces must be parallel to the centre line of the lathe. There are

several fairly obvious ways of checking this and no doubt everyone will have their own particular favourite.

Assuming that you are satisfied with the alignment, remove the headstock centre and replace with a chuck, and drill a hole through both ballrace housings, using a drill as short and stiff as possible. If you are going to use a $\frac{3}{16}$ in. dia. boring bar, the hole should be about $\frac{1}{16}$ in. bigger to clear it. Remove the drill and substitute the boring bar, and open up the hole to its final diameter of .650 in., and then bore for the ballraces themselves, to the depth shown. These should be a fairly tight push fit, but not a force fit. If you should have the misfortune to make one slightly oversize (probably due to the aluminium building up on the point of the cutter) don't scrap the casting but bore out about .080 in. oversize and fit a separate liner for the race later—some may prefer to do it this way in any case. As a final operation whilst still set up, the outer face can be skimmed up.

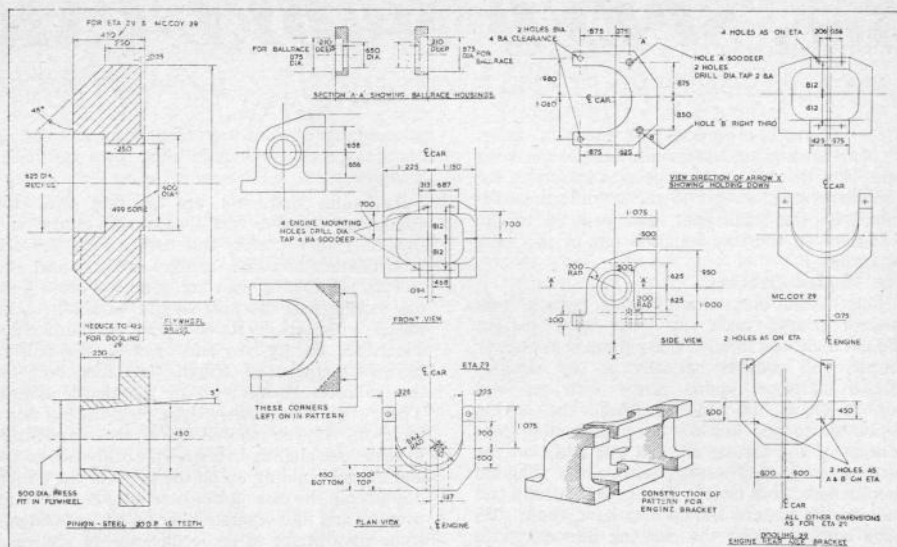
This somewhat sketchy description of the machining may help a little—I have not gone into great detail since so much depends on the facilities and experience available.

As mentioned earlier, the casting can be "machined" even if you have no lathe, and a quite satisfactory job made if care is taken. In this case, the front and bottom faces should first be filed up flat and square to one another, and the casting marked out as before. Holes are now drilled as accurately as possible through the ends and gradually increased in size until finally they are reamed $\frac{3}{16}$ in. right through both sides. These holes now form a bearing in which the boring bar can run, whilst being rotated with a hand-drill, the casting being lightly held in a vice for this operation.

Before the engine can be fitted to the bracket, it is necessary to make the flywheel and pinion assembly, to ensure correct alignment, so we will deal next with the

Collet

Strictly speaking, the type of collet drawn is only necessary for use with the Dooling 29, which has a plain unthreaded $\frac{1}{4}$ in. dia. crankshaft, whereas the Eta and McCoy 29's both have threaded shafts and an ordinary collet could be used. However, my personal preference is for a method which does not involve pulling up against



the front engine ballrace, and I think it is better to use this type for any of the engines. There is a dimension missing from the drawing—the length, which is .715 in. and the angle of taper, which is 10° included.

Put a piece of $\frac{1}{2}$ in. dia. mild steel in the chuck, with about 1 in. out, and drill and ream $\frac{1}{2}$ in. dia. Reduce the outside diameter to .450 right along, face the outer end and turn to .375 in. dia. for $\frac{1}{4}$ in. Set the top slide to 5° and turn the taper from where the .375 dia. ends until it runs off. The .375 dia. portion should now be threaded $\frac{3}{8}$ in. \times 40 t.p.i. and the collet parted off to .715 in. length, and slit down (from the large end) for a distance of .425 in. with as fine a saw as possible. Since you will have to make a matching taper in the pinion, it is advisable to make a D-bit whilst the lathe is set, so chuck a piece of $\frac{1}{2}$ in. silver steel and turn the taper now. Remove from chuck, file to shape and harden and temper. The nut for the collet should be made from a $\frac{1}{2}$ in. nut, opened up and threaded $\frac{3}{8}$ in. \times 40 t.p.i. to match.

Pinion

This should first be put on a $\frac{1}{4}$ in. dia. mandrel, boss outwards, and the boss reduced to the dimensions shown. Remove the mandrel and chuck the pinion by the boss, checking concentricity from the teeth as before, and open up the centre hole, finishing with the taper D-bit until the larger diameter is just .450. Remove the

gear and clean up any burrs. Both gears are now ready for cyanide hardening, which should be .005 to .007 in. deep all over.

The Flywheel

This is of brass, 1.500 in. dia. and .450 in. thick for the Eta and McCoy 29's, but is reduced to .425 in. for the Dooling. If possible get a piece of material which will clean up to 1.500 in., but if the available bar is exactly to size already, the skin necessary to true it up will not matter. Cut off a length of about $\frac{1}{2}$ in. and put it in the chuck and clean up the face. Drill and bore right through to a diameter .001 in. less than the actual diameter of the pinion (nominally, this will be .499 in.). Remove a further .025 in. from the face, from the outer edge inwards to a diameter of .600 in., so as to leave a shoulder round the hole, which keeps the pinion clear of the flywheel so that the large gear does not foul when in line with the pinion. The flywheel is now taken out of the chuck and the pinion pressed in, using the vice as a press and making sure it goes in straight. I always do this cold, and so far have not had one come loose, so do not consider it necessary to shrink it in. A spare piece of $\frac{1}{2}$ in. bar should now be turned to fit the 10° included taper in the gear and used as a mandrel whilst turning the outside and outer face of the flywheel. The .625 in. dia. recess for the nut is taken down to the level of the gear boss in either thickness of flywheel.

We are now in a position to do a trial assembly

and finish the engine bracket. The flywheel-gear combination should first be fitted to the engine. This is best done with the crankshaft housing and crankshaft removed from the engine. Put the collet into the gear and screw the nut on finger-tight and push on to the crankshaft. Grip the flywheel in the vice tightly, with a piece of wood each side to avoid bruising it, and position the collet so that there is a faint suspicion of clearance between it and the crankshaft ballrace, and then pull up the nut *tight*. Make sure that the crankshaft revolves freely and that the ballraces are not under end load, then reassemble the engine.

Take the rear axle and gear, assemble and fit the taper pin, riveting over the end into the countersink in the gearboss, and clean of both ends of the pin flush with the boss. Make sure when doing this job that the pin is in really tight, as the slightest looseness of the gear on the axle will soon play havoc with the hole in the axle.

Assemble the rear axle and ballraces into the bracket temporarily, and position the engine, using packing pieces approximately .050 in. thick under the engine feet to mesh the gears (we'll deal with the amount of backlash, etc., later). Check that the engine crankshaft is in line with the rear axle in front view, and that the gears are in line, and then mark the position of the engine holding down screws. Remove the

engine and rear axle, and drill and tap these holes, and also those needed for holding the bracket into the car. The corners of the casting can also be cut off at this stage, as shown on the drawing. If you trust your machining sufficiently you can, of course, do all these holes to drawing positions, but I have yet to reach that happy state.

The whole assembly is now ready for final erection, proceeding as described before. The rear axle is located sideways by the gear on one side and the collar on the other and should be set with about .002 in. side float. The engine is screwed down and the correct thickness of packing arrived at by trial and error. The amount of backlash required in the gears is rather difficult to define, but from experience, seems to be considerably in excess of the theoretical amount. As a guide, on one car a piece of paper .004 in. thick fed between the gears comes out neatly crimped, but not cut!

If you are satisfied that everything is in line and free, the rear wheels can be fitted and pulled tight on to their tapers. Don't do this until you are satisfied that all is well, because you will have to make an extractor to remove the hubs if you have to strip the axle down again. Normally this will not be necessary during a season's racing since tyres may be changed without taking the inner half of the hub off the axle.

FULLSIZE WORKING DRAWINGS ON TWO SHEETS SIZE 34 \times 23 IN. AND 38 \times 20 IN. ARE AVAILABLE FROM THE PUBLISHERS — PRICE 8/6 POST FREE.

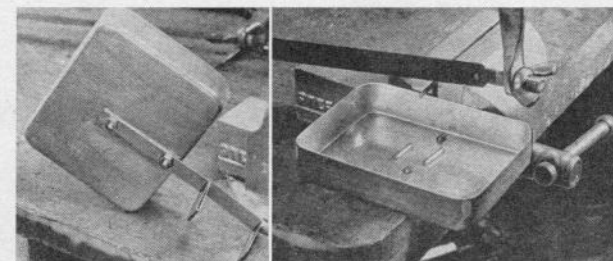
VICE TRAY TO CATCH SMALL SAWN PARTS

By C. T. BOWER

WHEN sawing off small bits of rod from a length of material held in the vice, it is inevitable that the saw will sever the piece without warning with the result that it is lost on the workshop floor.

I have avoided this petty irritation by fixing a small tray to the vice, and it has proved to be a very useful gadget.

The method of construction is shown above where the tray will be seen to comprise a shallow metal container with a strip metal clip bent from one continuous piece bolted to holes punched



through the bottom surface.

The actual tray once contained Promicrol photographic developer and the clip is bent up from Juneero strip. Juneero bolts secure clip and tray together. The clip slips over the square ram of the vice, which can be opened and closed with the tray mounted in place, the clip sliding along the ram, if necessary.



(1) All the Winners. A happy snap of competitors and silverware at Cleethorpes. (2) D. Robson of the Meteor Club with his scale E.R.A. still wearing rail guides. (3) Fancy fuelling device in use by F. Petrie of Sunderland. (5) Line-up at Nottingham for the Percival Marshall Trophy. Winner was the cigar-like device in centre, built by B. W. Harris. (7) John Oliver and G. H. Deason judge the Oliver Scale Trophy at Nottingham, watched by C. B. Maycock.

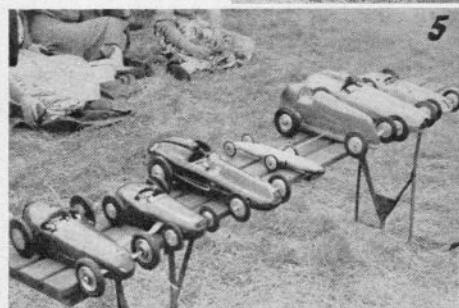


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ROUND CLEETHORPES, BLACK CAMERAPORTS BY MESSRS. CATCH



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(4) A view of the battle ground at the Cleethorpes M.C.A. Speed Championship, with timing hut in centre. (6) Taking it easy at Nottingham are a group of the Meteor Club boys, John Parker is nearest camera.



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THE CLUBS POOL AND NOTTINGHAM POLE, BELLAMY, PROCTER AND DEASON



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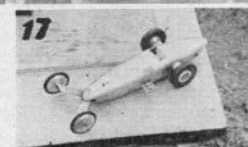
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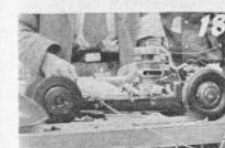
(9) Ken Crowe, Nottingham's Hon. Sec., watches his 2.5 cc. E.D. Spl. hooked up. (12) F. Petrie and Ted Armstrong discuss form at Blackpool. (15) Ken Proctor with his fast 2.5 cc. job at Nottingham.

(13) Alec Snelling all set for off at Nottingham with his 1.5 cc. speed model. (14) S. F. Drayson, winner of the Oliver Speed Trophy at Nottingham, takes some advice from Cyril Catchpole. (16) B. W. Harris, winner of the P.M. Trophy, with an array of Tiddlers. (18) J. Foster's Rowell after its expensive blow-up at Blackpool.

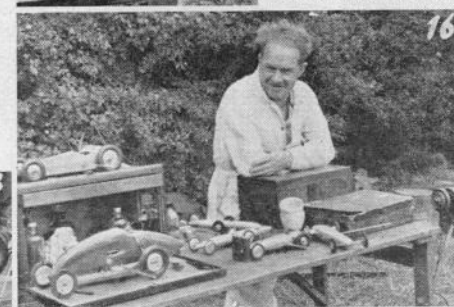


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(17) Which way does it go, Mister? A Tiger Bomb seen at Blackpool modified to run 't'other way round.



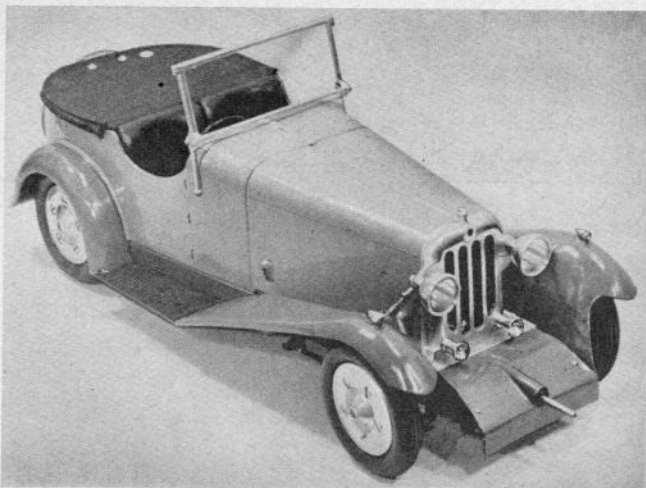
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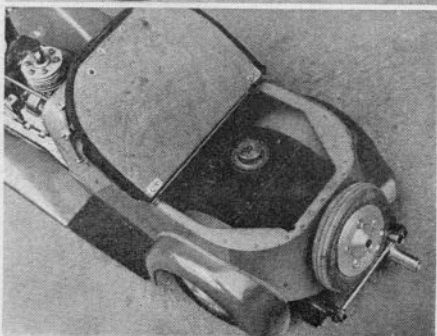
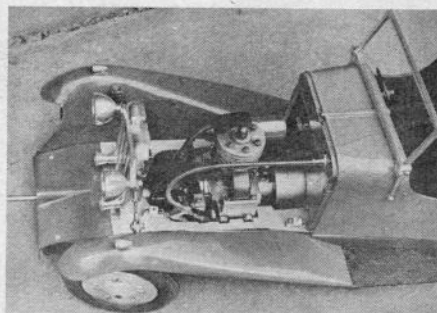


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WHILST the clubs continue to promote healthily supported and fiercely contested speed competitions for out - and - out speed models, our office post-bag makes it abundantly clear that there is another side of the coin, represented by a considerable body of enthusiastic folk who quietly build themselves model cars for their own pleasure and because of the interest they take in motoring affairs. Most of these builders quite frankly couldn't care less if their masterpieces never exceed 30 m.p.h., and (low

MODEL CAR MISCELLANY



be it spoken) don't care very much if their cars don't exactly comply with such things as weight regulations and dimensions. We confess to a considerable sympathy with their point of view, and are always pleased to hear of their efforts.

A typical example of this approach to the hobby was brought to our notice recently by a Farnborough reader, Mr. R. Maxwell, who has been working for a considerable time on a sports model in the vintage tradition, of freelance design and to a larger than usual scale. In fact, the weight of the finished model comes out at a little over 12 lb., which may well make the M.C.A. officials raise their eyebrows. The power unit is a home-built job of sturdy proportions, of 5 ccs. and having the unusual feature of an external transfer passage. Built more for reliability than speed, it has done many hours of trouble-free running.

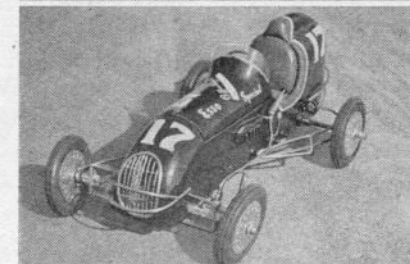
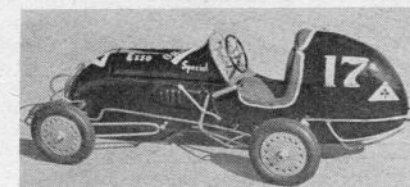
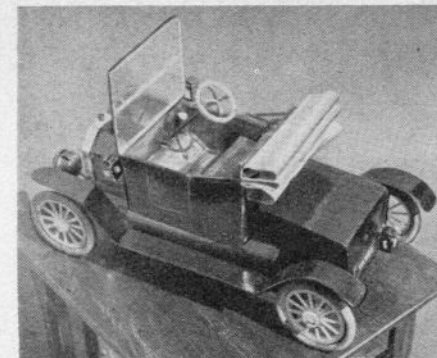
The chassis follows big-car practice wherever possible, and has as its basis a nicely constructed channel-section frame with a pronounced upsweep over the rear axle. Springing is by reversed quarter-elliptic springs, inspired by the builder's ownership of a type 40 Bugatti in days gone by. Special wheels have been turned up to accommodate 1066 tyres.

The engine is mounted well forward in the frame, so as to come under the bonnet, and a forward extension of the crankshaft carries the rotor of the unit magneto, which fits very neatly

into the scheme of things. Forward again of the magneto is another shaft which engages with the front of the mainshaft through dogs, to enable the motor to be started by handle or other device from the proper end.

The front stub-axes are carried on trailing arms, the wheels steering on the Ackermann principle and a lockable drag-link is incorporated. A large exhaust manifold leads to a flexible pipe extending to the tail of the car. The centrifugal clutch is of the "reversed action" type, with shoes on the driven side.

The bodywork of this impressive model is beautifully carried out and looks most effective. Somewhat reminiscent of the H.R.G. two seater, the commodious tail is enclosed by a tonneau-cover, and contains a very large fuel tank capable of holding 150 ccs. of fuel. The spare wheel is carried on the back, and other details include graceful sweeping wings and a fold-flat screen. The radiator is carved from solid aluminium and has a very vintage air, and the front end is com-

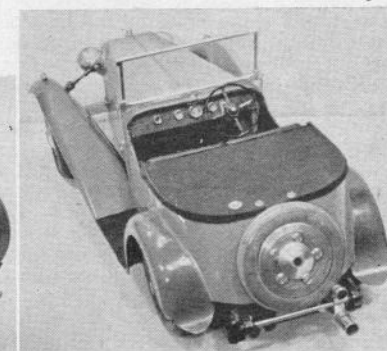
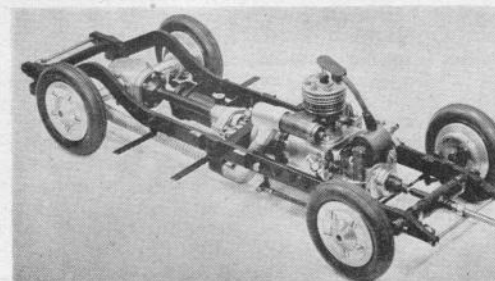


pleted by a dumb-iron apron. The colour-scheme is in light grey and dark grey.

The builder is anxious, when the car is tuned to his satisfaction, to undertake an endurance run over a considerable distance if he can find a suitable venue for his activities, so if any reader has a suggestion for this we shall be pleased to forward letters to Mr. Maxwell.

Model cars in the Canal Zone is the subject of an interesting letter received from Dane F. Farthing, which we reproduce herewith without further preamble, together with pictures of his attractive model "Offenhauser" speedway car.

I am enclosing two snaps of my model, "Offenhauser" speedway car, made from your MODEL MAKER drawings, with the hope that perhaps someone might be interested in what's



going on in the way of racing in the canal zone here.

The car was made as near the drawings as possible, but one or two alterations such as independent front suspension friction drive, and spring leather covered seating. The body was constructed in spruce, balsa being just about unobtainable out here. Wheels are by Messrs. Wrefords, with a ring of small holes chiselled concentric to the hubs. Power unit is a Frog 150 compression ignition engine, driving a compensating friction type drive via a four-shoe parallel moving type centrifugal clutch.

The car is finished in gloss black, some six coats being used for the desired finish. Numbers and lettering, etc., in white, names being lined with red. Bumpers, swinging arms, spring details, steering wheel, etc., are all made from brass brazing rod silver soldered and then nickel plated.

The speed is a very modest 35 m.p.h., this not being due alone to the car's performance, but to the complete lack of a suitable track surface. Part of the perimeter track is used at the moment, where some of the more large ruts are filled in with sand, a medium of which we have a great abundance here.

A scale 2.3 "Bugatti" is now under way, in which I hope to fit my new three-quarter finished 10 cc. ohv. petrol engine, working steering, and suspension system, and by the time this is finished we will, I hope, have completed a track of somewhat better condition than our present one.

Your magazine is read and re-read, until the

TEST BENCH (Continued from page 696)

Next comes the attractive Miniplane, illustrated on page 696. A hand in the picture gives some idea of its small size, but for all that it is built exactly like a fullsize plane, complete with wedge and highly tempered blade. Like its larger brother this blade should be touched up on the oilstone to get good results. Treated as a real tool in a small size it will give that sort of service. The two shavings shown in the picture are from hard beech, and were produced without any preliminary whetting of the blade. With such treatment it is an ideal smoother, small enough to get into all kinds of awkward corners normally inaccessible. Price is 4s. 6d. and makers are the Multicraft people whose modelling knives, and modellers' boxed toolsets are already so well known.

Then comes John Buck's useful little Mileage Recorder, which helps in checking route distances

next issue arrives, and on behalf of my fellow model car friends, as we are called here, and myself, we thank you for our only means of keeping in touch with what's going on.

Yet another pleasant project, this time a non-working job, was sent to us recently by Mr. W. Boddy, Editor of *Motor Sport*, under the title, "A Kitchen-table Model T Ford."

Lieut. Peter Fenny, R.A., found himself possessed of a growing desire to own a model T Ford car, but the acquisition of a wife rendered the dream impractical. So he decided to build a replica instead, for, as he has observed, marriage does at least provide the kitchen table!

The completed model, which aroused much favourable comment at a recent meeting of the Vintage Sports Car Club, is to a generous scale for the length is no less than 13 in. The actual scale was determined by the wheel-size after these had been made from steam rings. The construction is of wood but upholstery, hood material and similar details are of authentic materials, many of which were Army odds and ends, and the tall windscreen is of celluloid.

Most of the work was done on a treadle fret-saw and the model was completed in about six weeks, working most evenings. A run in a real model T of the same age provided a boost to inspiration.

The model is non-working, but faithfully conveys the air of the original in this rather unusually large scale—a fascinating change from 1/24th! Lieut. Fenny intends to embark on a similar model of a 1913 Morris-Oxford.

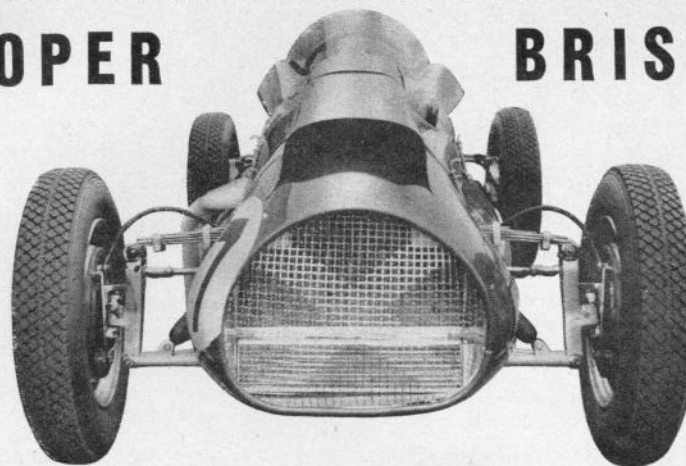
for work or play. It comprises a small plastic box, with a window through which a revolving dial records mileage. At its base is a small geared wheel connected with the dial. In use it is just rolled along the route chosen, and will show up to 50 miles in the window. Only thing to remember is to reset to zero at the start. Scale is 1 in. to the mile, but a simple arithmetical calculation enables it to be equally useful for any other scale.

Manufacturers are reminded that we are always pleased to see samples of their products for review in these columns. We do not accept their sponsors' unqualified praise without practical test of our own, so that our comments can be valued accordingly. In the same way, we shall always be happy to give readers our unbiased advice on any model materials they may be thinking of buying, or give them our suggestions for goods that would satisfy their needs as set out.

PROTOTYPE PARADE NO. 43 DESCRIBED BY G. H. DEASON

COOPER

BRISTOL



RARELY does a racing car "hit the headlines" straight from the drawing-board with such gusto as did the Cooper Bristol, the Formula II contender from the famous Surbiton factory, which has such an amazing record of successes with their products in all the smaller capacity classes. Coupled with the new car, of course, was the name of a driver, new to big-time racing, that of gifted Mike Hawthorn of Farnham, a born conductor of racing cars if ever there was one, whose father carries out the tuning of his particular car at the Tourist Trophy Garage at Farnham.

Mike Hawthorn's meteoric career has rather tended to overshadow the fact that there are more Cooper Bristols than one; there are in fact a number of these cars in existence, the first of which was completed early this year and underwent initial tests in the hands of John Cooper himself.

The new car was obviously going to be a potent factor in Formula II events, for although the engine chosen for the project is basically a sports unit, of a design which dates back to the B.M.W. of pre-war days, its comparatively modest output would undoubtedly be used to its maximum advantage in a Cooper-built chassis, provided that the Cooper road-holding and weight-paring were "the mixture as before." The firm had already had considerable experience with fast road cars with engines in the conventional position, in addition to the knowledge gained with the rear-engined 500s and 1,000s, so the betting was on the sum working out right first

time. The Easter Goodwood meeting dispelled any doubts about the matter, and was the occasion of Hawthorn's sensational debut into the bargain. Having only received his new car a few days before the event, he won the Lavant Cup and the Chichester Cup races, the former, a Cooper-Bristol one-two-three victory with Alan Brown and Eric Brandon second and third, and rounded off his day by saucily finishing second to Gonzalez and the big Ferrari in the Richmond Trophy! Fangio also tried his hand with one of the cars in the Chichester Cup Race, and Alan Brown set the seal on the Cooper reputation by winning the second Easter Handicap. From then onwards the new car has been making headline news all through the season, and although not always enjoying trouble-free motoring, has proved without doubt that Surbiton has produced yet another masterpiece.

When seen in comparison with other Formula II cars, the Cooper Bristol immediately creates the impression of being a much smaller machine, and a featherweight at that. In point of fact the wheelbase is some five inches longer than the Connaught, described last month, and the track is also wider. There are minor variations between the various cars built so far, the principal external difference being the pronounced "schnozzle" of an air intake which figures on Mike Hawthorn's car, and also on that of David Murray of Ecurie Ecosse, the Scottish stable, by contrast to the more normally profiled versions driven by Eric Brandon and Alan Brown of Ecurie Richmond. This duct covers a secondary internal

COOPER BRISTOL

BY PERMISSION OF COOPER CAR CO. LTD.

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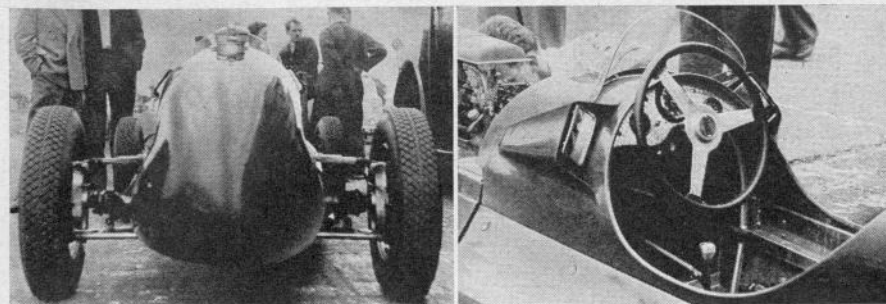
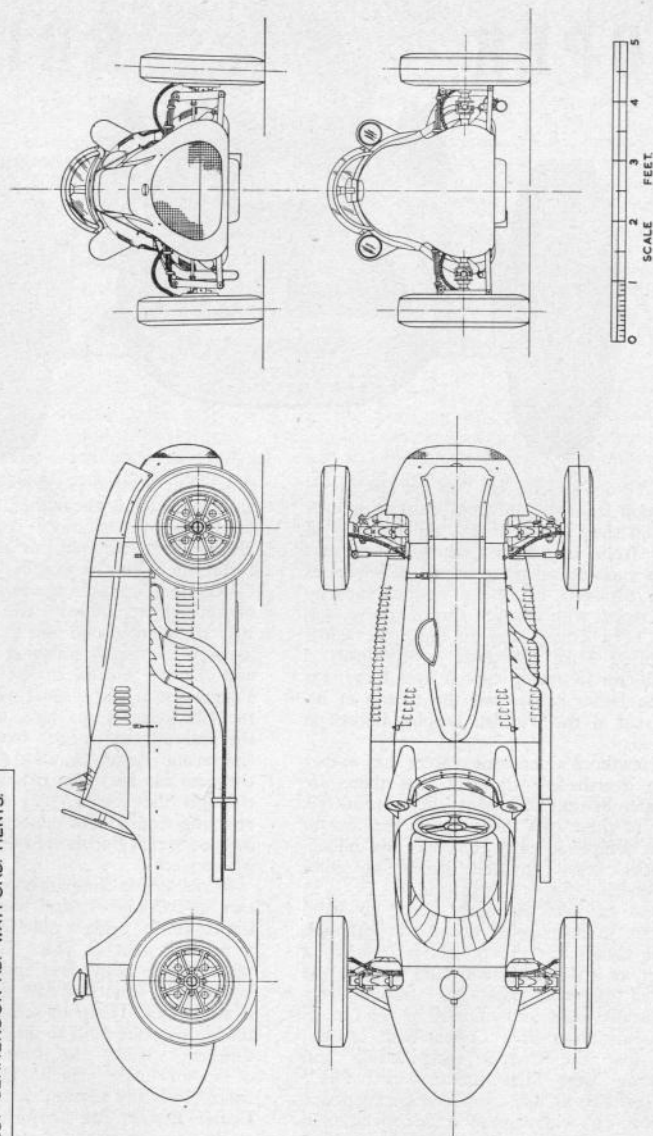
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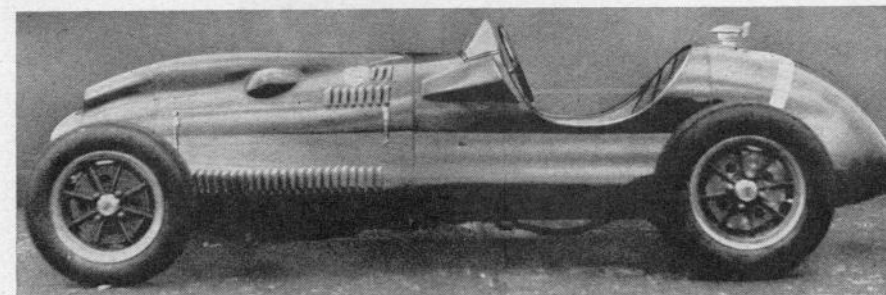


tunnel, housing the intakes of the three down-draught carburetters.

The chassis frame is very typically Cooper, having box section side members as its basis, with an additional tubular structure above it upon which the light tubular body framing is carried, in similar manner to the Half Litre Mark V. Suspension is again a tried and trusted arrangement familiar in the smaller rear-engined racers, using transverse leaf springs and wish-bones, damping being by hydraulic struts. The special radiator element, which incorporates both water and oil cooling sections, is carried forward of the front spring. The fuel tank is carried in the tail, with a large external filler cap.

Wheels are similar to those fitted to the half-litre jobs, of light alloy with ribbed spokes, brake-drums are 10 in. in dia., tyres are 5.50 x 5.00 x 15, and braking is hydraulic on the two leading shoe principle. Steering is by rack and pinion.

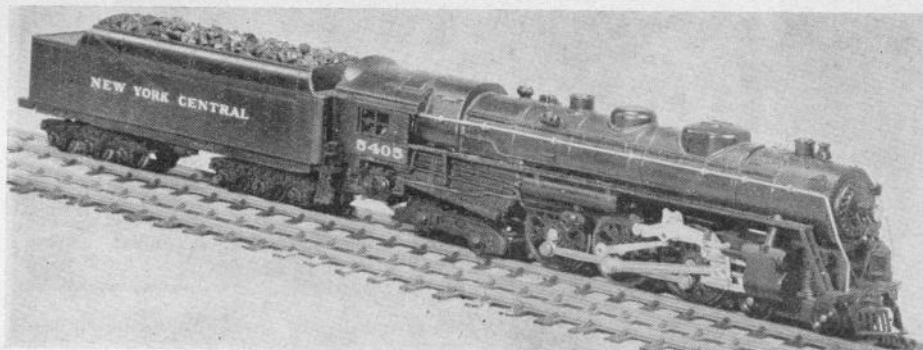
(Below) This side aspect gives an impression of the distinctive bodywork with its large air-duct on the bonnet-top, short downswept tail with large external filler, and the neat light alloy wheels with incorporated brakedrums. The "bulge" on the side of the engine cover provides clearance for the vertical magneto.



((Left) Rear view of the Cooper Bristol, showing similarity of suspension with the well-known 500s. (Right) Cockpit shot, in which the lightweight chassis superstructure carrying the bodywork can be seen, together with the simple linkage from gearbox to lever, mirror fairings, and neat functional appearance of the instrument panel.

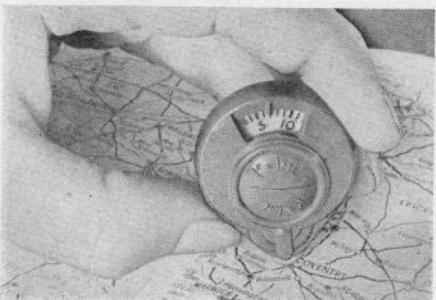
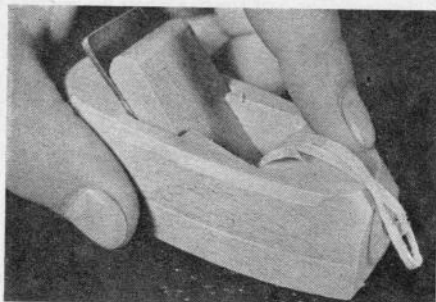
The Bristol 4-speed gearbox is controlled by a simple remote lever placed centrally between the driver's legs, and the instrument panel is simple in the extreme, a 4 in. rev. counter in the centre of the engine-turned panel being flanked by two small dials giving water temperature and oil-pressure. The neat steering wheel has engine-turned spokes and a leather-bound rim. The twin rear-view mirrors are enclosed in fairings integral with the scuttle. Two separate three-branch manifolds on the off side lead to short twin tail pipes.

Various colour schemes have been seen, from Mike Hawthorn's original unpainted bodywork, now dark green, to the lighter green of Ecurie Richmond, with contrasting colour band round the radiator opening, while the car I have illustrated is the mid-green Ecurie Ecosse car with the blue cross of St. Andrew on the mesh of the radiator grille.



TEST BENCH

A REGULAR TRADE REVIEW



THIS month's items include a first announcement of some exciting new Graham Farish locomotive and rolling stock items, a delightful little modeller's plane, and—for those lucky people yet to holidaymake—a map measurer.

First to reveal the Graham Farish stop press releases—which came along too late for inclusion in their advertisement—in fact too late for any but one enterprising agent to include them this month. In consequence of the development of American sales, they have dared to enter right into competition with U.S. locomotive manufacturers with the grand model New York Central depicted above. This is far superior to anything the Americans have attempted and should establish a new standard of values. Just to give one instance of what has gone to it, no less than thirty special form tools had to be made for the valve gear alone! Other details are comprehensive; the loco looks and is a big fellow, but to a far more exact true-scale size and outline than any competitor. Incidentally, although of good overall length it will tackle curves like a shunter—or should we say “switcher” for American readers. A limited number will be on the British market selling at £9 5s. 0d. inc. P.T., together with N.Y. Central Coaches to match, and a Chesapeake and Ohio coach to make up the train; these cost 25s. in silver and brown colour schemes.

British railway fans have not been neglected for the long-awaited passenger coaches, 1st and 3rd, and 3rd Composite are now available in appropriate colours, selling at 25s. each. Pullman fans will be pleased to know that their Pullman range is now completed with a composite at 32s. 6d. Goods enthusiasts have a new matched set of Bolster Wagon (4s. 6d.), three-planker (4s. 3d.), and one-planker (4s.) available singly or as a set. These should all be in the shops by October 1.

(Continued on page 692)

DOPE & CASTOR

By JERRY CANN

THE little notice which appeared in last month's issue, stating in suitably funereal type that Cann was on holiday and would resume his fulminations on his return, both gratified and surprised me. Gratifying that I should be treated to a bulletin of my own, and surprising because I had laboured on the monthly masterpiece before my departure, only to have it lost by some careless Editorial type, jealous, no doubt, of my elegant literary style! (*Steady, Cann! Ed. Type.*) Anyway, as a canny North-countryman I hate to waste last month's effort, although I fear that I owe an apology to several club secretaries whose meetings in September I had promised to publicise. It's too late for that now, so I hope you went along without being told, as I expect you would have done anyway.

One item that mustn't be overlooked is a rousing cheer for the British team which so handsomely upheld British prestige in Italy in the International competition at Monza. The small classes, in particular, put up a wonderful show, in which all-British machines amassed more than twice the number of points totalled by the other competing nations.

The only fly in the Monza ointment seems to have been the rather rudimentary ideas of the organising club as to what constitutes a safe and reliable tether for high speed machinery, there being several break-aways, with resultant damage to cars, though happily not involving spectators, until the visitors took the matter in hand and made up fresh tethers which more clearly met M.C.A. requirements. The track surfaces were not beyond criticism, which may explain the rather lower than normal speeds obtaining. The tiddlers ran on a smaller-than-usual radius, the tens on a larger one, but competitors seem to have had little difficulty in coping with the new conditions.

By contrast with the blazing sunshine of Milan, coupled with a temperature of over 90 degrees, the British Speed Championships at Cleethorpes were plagued with a typical sample of English weather, heavy rain falling intermittently. This made things a bit patchy for competitors, in more senses than one, but is just one of those problems which have to be accepted as part of the natural hazard in all forms of outdoor sport in this country. Those fortunate mortals who got in a run on the dry track are just as likely to hit a sticky patch next time.

October 1952

There was a rare get-together of the clans at the combined Derby and Nottingham Clubs' affair on August 31, when the Derby boys were guests of Nottingham and joint hosts to visiting clubs. Of these there was a wonderful gathering, no less than 14 clubs being represented on the scoreboard, from all parts of the country. Entries in all four classes totalled ninety-one, there being 12 1.5s, 34 2.5s, 33 fives and 23 10s. Add to this the fact that the Percival Marshall and Oliver Scale Trophies were down on the bill, plus the operation of the Grading system in the racing events, and you will realise that Ken Crow had his hands full. That the organisation was excellent need hardly be emphasised. If it hadn't been, the meeting would never have finished at all. In point of fact, it went off like clockwork, and Bassingfield will be chalked up as another of those good spots to visit for a day's racing in the country.

There just isn't room for full results of the meeting, so here are the highlights.

1.5 cc. Class—MARSHALL SHIELD

		m.p.h.	Grade
C. M. Catchpole	Oliver Special	65.69	A
D. M. Eaves	Oliver Tiger Cub	56.35	B

2.5 cc. Class—CHADDESSEN SHIELD

E. Armstrong	E.D. Special	78.80	A
F. C. Petrie	E.D. Special	77.78	B
O. Bellamy	Oliver Special	66.76	C

J. S. OLIVER SPEED TROPHY

S. F. Drayson	Oliver Special	74.62	
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5 cc. Class—WALKER TROPHY

J. Yates	Dooling Special	87.54	A
J. C. Cook	Dooling Special	86.95	B
J. Parker	ETA Special	71.20	C

10 cc. Class—ROLLS ROYCE TROPHY

J. Shelton	Dooling Arrow	121.45	A
W. Hamilton	Dooling Special	111.24	B
F. G. Buck	Topsy	99.22	C
D. Tartellin	McCoy Special	84.11	D

That energetic Bristo'ian, B. W. Harris, fresh from Shelsley Walsh, won the Percival Marshall Trophy with a device closely resembling a Churchillian cigar on wheels, which was nevertheless a thoroughly good piece of workmanship and design, which clocked 65.38 m.p.h. in the 2.5 cc. class to boot. Co-judges of this event and the Oliver Scale Trophy for cars based on Oliver parts or castings were C. B. Maycock and MODEL MAKER'S G. H. Deason, who wore out their trouser knees industriously creeping round the entries, notebooks in hand. Harry Howlett's fine "Prototype" Alfa Romeo won the Oliver Scale award, hotly pursued by W. K. Crow's similar car, both most handsome models with performances to match.

Electrically Driven DELLOW

(Continued from page 684)

piece of tube, which in turn is soldered into a hole drilled in each wing. A perspex lens completes the lamps and then paint the insides silver.

The windscreen shape can be seen in the drawings, and explains itself better than I can; it is just a bit of cutting, fitting and folding, no adhesive is needed to secure the perspex to the frame—just close in U-shaped frame sides with pliers or a light hammer tap.

The rear slab tank consists of three pieces of tin with a bolt for a filler cap. It is open ended at the front and soldered on the body back. The attractive spare wheel carrier is made from wire all soft soldered together, after bending to shape. The two top arms are soldered into drilled holes in the body, and filed flush inside. The two bottom tubes are flattened at these ends and soldered to the bottom of the tank. When the inverted Y-shaped strapping is fitted to the spare wheel carrier, the natural spring in the metal itself will hold the wheels firm, the single straight end just clips over the body edge, but can be raised to remove spare wheels.

The rear number plate is made of tin to shape shown. A small tube is soldered in for the rear lamp, complete with a tiny ruby jewel (paste) which looks most effective. The edges of front and rear number plates are raised all round with the knife-edged punch, and the numbers themselves are $\frac{1}{8}$ in. figure and letter punches. It is unlikely that the modeller would possess these, but a friend may have access to some at his work. After painting the number plates matt black, I outlined the raised edges with white, and spread Chinese white water colour into the figures with a knife blade, wiping off the surplus with a damp cloth.

To revert to the body work for a moment, the bonnet top is hinged from the rear edge to open crocodile fashion, but I now find this is not correct; on an actual "Dellow" the bonnet is free to lift right off, and is held down by four spring-loaded clips.

The motive power I use is the famous "Electro-tor" which gives ample power for a car of this size, and 6 m.p.h. is obtained with ease. I run the car with the batteries carried in the hand with leads about a yard long from the motor.

This is no "showcase only model." It has plenty of running on all sorts of surfaces, board floors, concrete, hard courts and lino.

There is ample room in the bonnet for a larger power unit to be fitted if desired. I am now trying out the power unit of an electric train, and with its original gear ratio of 40 to 1 reduction, the car will climb hills of 1 in 6 grade with ease, but speed on the flat suffers of course. Hill climbing is not possible with the Electrotor and present gearing.

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