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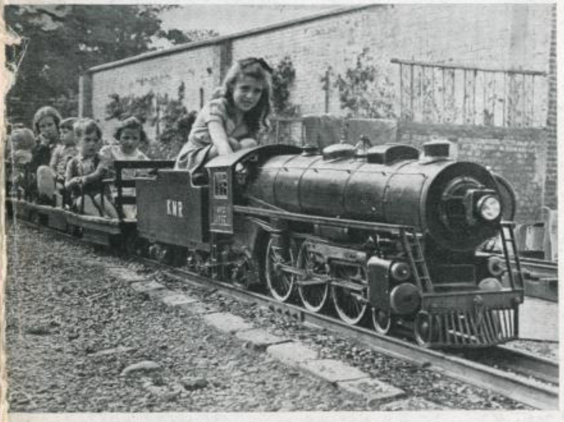

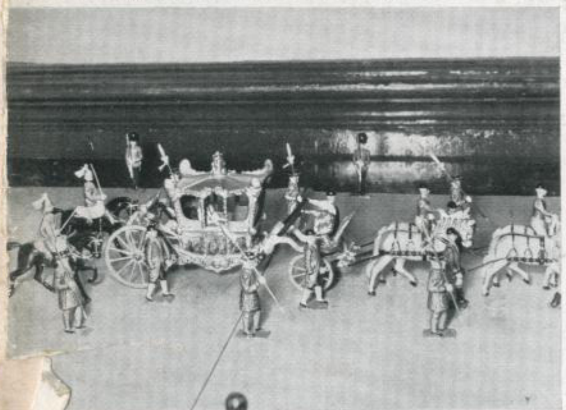

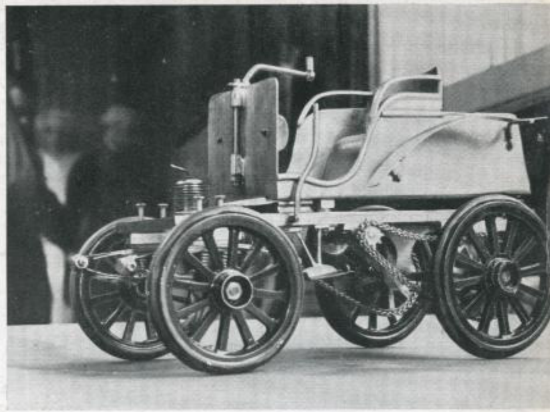

VOLUME 1 NUMBER 9 (New Series) AUGUST 1951

IN THIS ISSUE : Radio Control Features on Model Boats and Cars : All About Kites
The D.B. Hillclimb Special : Making a Model Tower Mill : A Kitchen Table B.R.M.
Another Instalment of Marblehead "Festive" : Making Model Buildings : Improving
the Miniature Railway Layout : '0' Gauge Feature : On the Right Track '00' Feature
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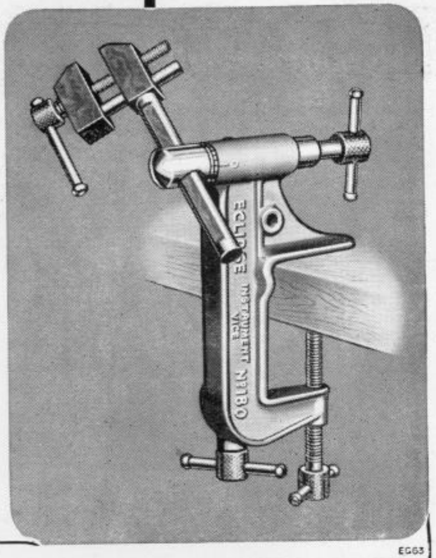

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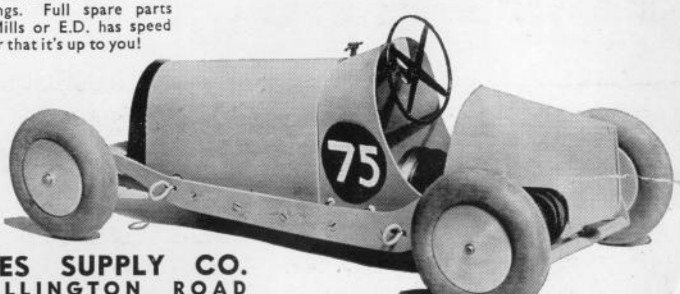

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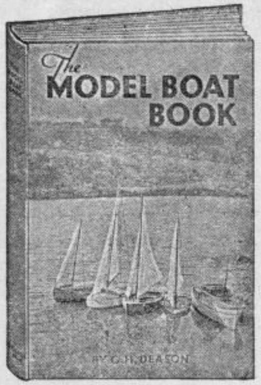

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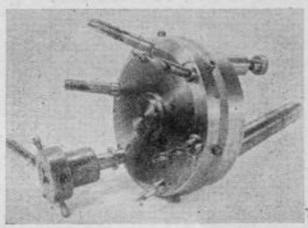

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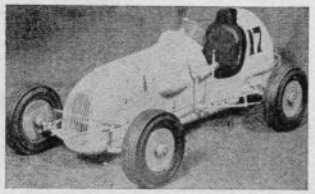

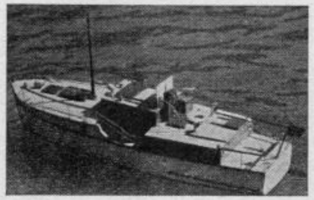

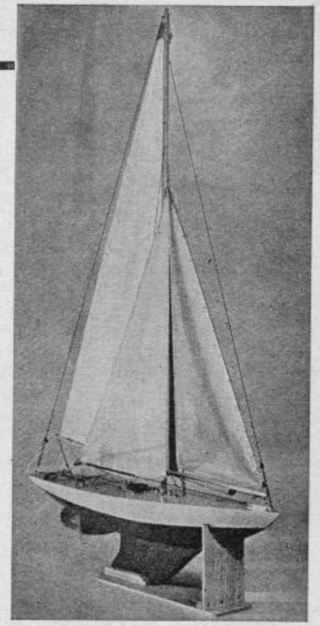

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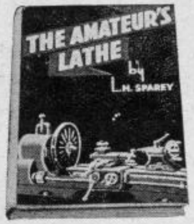

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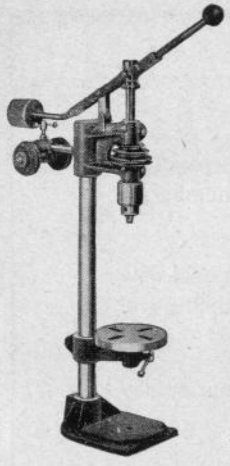

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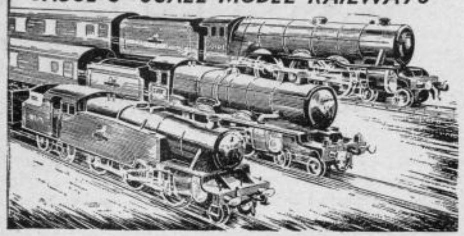

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Contents

VOLUME I No. 9 (New Series) AUGUST 1951

WHAT OUR MODEL CAR FANS WANT

WITH the ninth issue of *Model Maker* in readers' hands we and they should by now be able to judge how the combination of interests is working out, and we hope that the verdict will be one of fair dealing all round. It is, however, particularly to the model car fraternity that this editorial is addressed, since before the amalgamation they were separately catered for and formed, as they still do, a not inconsiderable proportion of our readership.

As might be expected, devotees of the other branches of model building who share our pages do, from time to time, ask why so much space is given to the youngest hobby. This is usually countered by a militant model car man declaring that 00 gauge locomotives get in his hair every time he opens his *Model Maker*!

Within the model car movement itself there are divided views which need equally careful consideration. The club enthusiast wants competition results in full every month, and derides the suggestion that they make very dry reading to those not immediately concerned. It is, he maintains, of absorbing interest to him to know that so and so's car was one and a half miles an hour slower at Wigan than on its last outing at Moreton-in-the-Marsh!

The scale model builder wants more and better prototype drawings, fully detailed to the last rivet, and preferably showing intimate details of the transmission as well. The less skilled workers don't want designs involving lathe work or metal bashing, and haven't the space to run their models at over 30 m.p.h. anyway, and the aspiring speedmen want more and more tuning hints, and have no time for "kid stuff"!

We can sympathise with all these viewpoints, and do our utmost to see that the articles readers want are included. The fields in which we receive the fewest contributions are the building and tuning of the larger capacity high-speed models, and, not unnaturally, the new developments of radio control.

Whilst we welcome contributions on all aspects we shall be particularly pleased to consider articles on these subjects for inclusion within the next few months. Meanwhile we commend for your special attention this month the really "down to brass tacks" article on building a contest-winning 2.5 c.c. model, by Ken Proctor, and the radio-controlled model produced by Trevor Owen, which strikes a new note and has wide possibilities.

ON THE COVER . . .

Top right : E.D.'s prospective cross channel model launch on test at Richmond. Centre left : Youth at the controls on the former Kenton (Middx) Miniature Railway, now at Cleethorpes. Centre right : G. H. Deason tries out his hillclimb special on a chalky gradient. Bottom left : Captain Lightbody's model of the Royal Coach, and authentic escort. Bottom right : S. C. Palmer's 1894 Panhard now under construction. Powered by a .5 c.c. Allbon it is the first "old timer" of a number to be run on the 8-Club's circuit.

(Kenton Railway : Norman Dyer—Others Model Maker photos.)

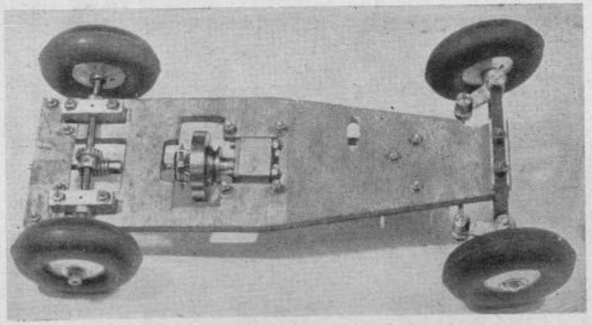
THE D.B. HILLCLIMB SPECIAL

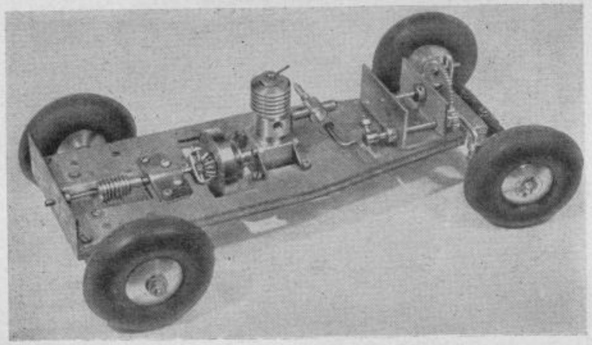
COMMENTARY BY G. H. DEASON

AT the outset I should make it clear that, although I have long schemed to build a model car with mechanical remote steering, no claim is made as to the originality of the idea. It was done in pre-war days with clockwork models by Schuco, for instance, and latterly with electric propulsion by the "Ever Ready" people, and I have read of the doings of a bunch of enterprising enthusiasts in the Channel Islands who went a step further, and fitted c.i. engines, and used their own trials circuit.

However, the idea of trying the thing myself kept recurring, and only a press of other projects delayed the start until a month or two ago. Time was still a scarce commodity, but having craftily enlisted the sympathy of Maurice Brett, I outlined my conception of a "hill-climb special" on the backs of sundry envelopes, presented him with an engine, a handful of assorted gears and four Z.N. airwheels from Kitten I, and stepped back to await results. Not however, without a brief struggle to subdue the conscience of the said Maurice Brett, whose *metier* is the building of those superb scale models which evoke gasps of admiration when exhibited in glass cases, and who was frankly horrified by the *very* experimental nature of the job as I planned it.

This little matter settled, by the repeated plea that "I only want to see it *work*", the car took shape rapidly. Briefly, its specification is as follows. A plywood base carries the sturdy little .85 c.c. Wilsco diesel engine with flywheel, driving a short propeller shaft through a pin and fork universal. A Juneero worm gear is secured to the rear of the shaft, which runs in a plain bearing and has an out-rigger bearing behind the worm. The axle shaft is set below the base, running in brass bearing blocks, to ensure ample ground clearance for trials sections, and the wheels are low pressure Z.N. air-wheels of $2\frac{3}{4}$ in. dia., secured by their standard cone fixings.





Front suspension is "independent", by means of two transverse springs (Eclipse saw blades), the steering pivots being standard "Prestacon" units. These were used as a time saver, although no difficulty would be encountered in making them up. The track rod is formed from Juneero rod, and has a vertical loop formed in it, as shown in the illustrations, to take the steering pin.

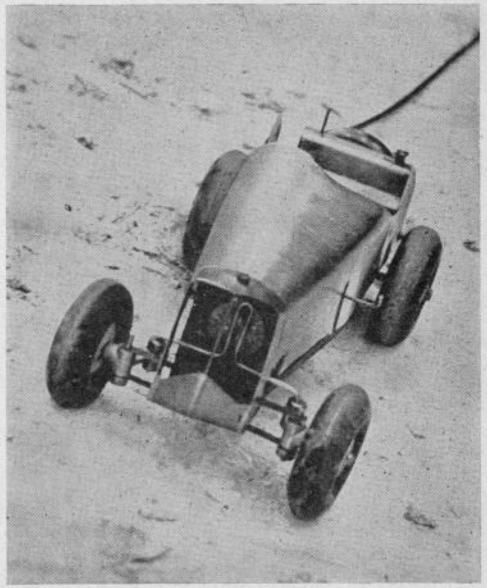
Behind the front axle a length of channel section brass is bolted to the base, and through the upright portions are passed the spindles of the steering reduction gears, again Juneero products, giving a 3:1 ratio. The spindles are located by standard collars and grub screws, and the large gear has a steering pin fitted to it, passing through the loop in the track rod.

Steering is controlled by a heavy duty Bowden clutch cable, having screwed adjusting sleeves at each end, these being obtainable from motor cycle dealers. The outer casing passes through the angle bracket at the back of the base-board (which also serves as the bearing for the prop. shaft and the mounting for the tank) and is locked to a small angle bracket by a nut. The inner cable is continued forward and coupled to the extended spindle of the steering pinion by means of a solder-less nipple and a couple of stout grub screws.

The cable is 4 ft. in length, and at its other end a plywood handle or "dashboard" is fitted over the screwed adjusting sleeve, and a Juneero steering wheel fitted on to the protruding inner cable. Thus, by holding the handle in the left hand, the steering is operated *via* the inner cable and the gearing by means of the wheel.

A slab tank of tinplate is fitted to the rear angle plate, and a spare wheel attached to the back of this by a bolt soldered into the rear tank panel. A cycle oiler acts as a filler cap, and a breather pipe projects upwards on the other side.

At this point, since Maurice was due to depart for foreign lands on holiday, it was deemed essential to stage a trial run to test the controls. I was to take the wheel for the first attempt, and I was exremely flattered by the number of co-toilers who turned out to spectate. It transpired, however, that this was due not so much to admiration of my brain child as to the morbid hope that I had miscalculated the gear ratio, and would be towed to Leighton Buzzard in something under four minutes, the helpless victim of the monster I had let loose. Happily, they were disappointed, for with the engine at full blast the speed on the level proved to be something under 5 m.p.h., or a brisk walking pace. Steering proved



Above : Close-up view of the D.B. Special with its temporary "trials" bodywork. Note the authentic Chiltern chalk.

Top left and bottom right : The writer going well on a one-in-three section, until an unseen boulder causes him to take to the rough !

Left : "Stopped in Observed Section". A momentary loss of control due to lack of adhesion !

Opposite page : Underside and general view of the simple chassis. The pinion was integral with the flywheel used, and has no significance in the scheme of things.

quite accurate, and the car was driven round the staff car park and various obstacles, including well meaning spectators, with confidence and control. The very low gearing made it possible to place the model on the ground to start the run with no sign of stalling, and by cornering on full lock a most satisfactory cloud of dust and flurry of wheel spin could be produced.

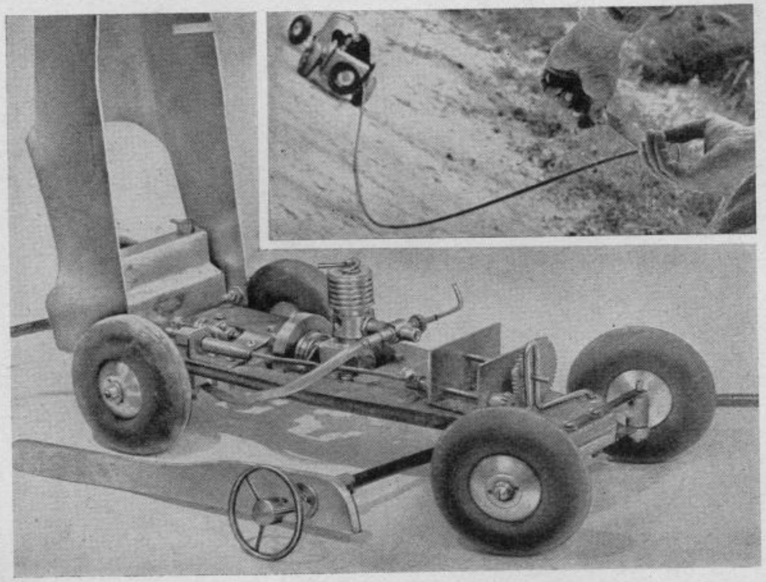
So far so good. My collaborator then departed for his tour, leaving me to make the car look rather more like a car for its first public appearance. Now a trials car is rarely a thing of beauty, but I clothed the D.B. Special in some semblance of a body, arranged to hinge upwards from the back to leave the works unobstructed, and fabricated a rather tasty brass radiator shell, from which I omitted the gauze front for two reasons, to assist the cooling of a rather overstressed motor, and because I couldn't find any anyway!

All was now set for some real hill storming. From my office window I can see in the middle distance an eminence known as Totternhoe Knoll, clothed round its lower slopes with picturesque greenery (more of this anon), and having a series of chalk gulleys climbing steeply to its summit. This looked just the thing, so enlisting the support of my Co-Editor and an *Aeromodeller* colleague who combines skill with small engines and the art of photography with a remarkable personal agility, we set out hopefully, reaching the base of our objective without incident, apart from the ruin of a nice pair of gaberdine trousers because I had omitted to empty the tank before starting. However, they weren't my trousers, and pioneering must always take its toll.

By a fortunate coincidence the alleged path to the summit started at the Cross Keys Inn, so morale was high as we breasted the foothills. It was considerably lower by the time we emerged on hands and knees from the picturesque belt of greenery, which proved to consist of a vast bed of nettles in a jungle of thorn trees. However, we still had the car, equipment and camera, and were unbitten by adders, although I was bitten by my Co-Editor for picking such a fool place on a hot day.

We were rewarded with a magnificent view of Beds. and Herts., and a wonderful selection of miniature trials hills to test my skill. This proved pretty mediocre at first, for despite the accuracy of the steering, the miniature chalk boulders behaved just as they do when scaled up to full size, and we made repeated excursions into the undergrowth. Moreover the car was more fitted to tackle a one-in-two gradient than I was, but goaded on by my heartless colleagues, I succeeded in achieving some reasonable climbs, and found that real skill is necessary to pick a course and combat wheelspin whilst maintaining personal forward motion and equilibrium. This miniature trials stuff certainly has something.

The car itself is now being tidied up, and drawings will be produced for publication in a future issue, for those who feel like trying this entertaining form of model motoring for themselves. I will also, on receipt of a stamped envelope, tell readers where the path starts which would have taken us effortlessly and unscathed to the summit of that blistering hill. We found it on the way down.



Left, inset : A close-up view of the steering control, showing the hand "dashboard", wheel and Bowden cable.

The complete car as test-run, showing the steering arrangement and hinged one-piece body.

A Model Driver for Your Car

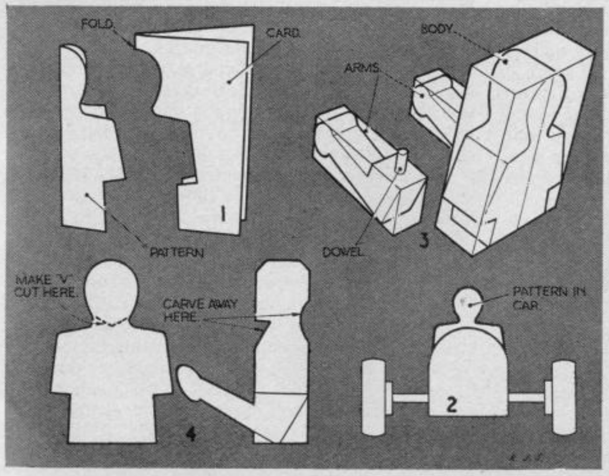
BY S. J. FOOTE

HAVING read the article "Circuit Racing Review" let me say how much I agree with the remarks concerning miniature drivers, which in my opinion put the finishing touch to any model car and which I would say should definitely be compulsory for circuit racers. Having just arrived back in Plymouth after a visit to Silverstone, I shudder to imagine just what Farina's Alfa would have looked like, breaking the lap record with an empty cockpit, or with a massive cylinder taking the place of the driver, so let's get as near as possible to the right atmosphere with miniature circuit races and make drivers a "must"!

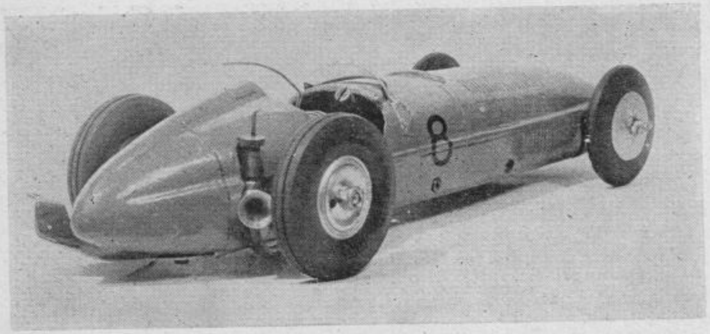
As I have made drivers for all my model race cars I thought a description of how I made them might be of some interest, although I would point out that my methods are rather crude, but the results have been quite satisfactory.

To start with, in order to get a pretty good idea of the size of the driver required for near-scale effect, cut it out of a piece of cardboard in the manner illustrated (Fig. 1). Then place this "pattern" driver in the cockpit (Fig. 2) of the car and take a rear view and front view of the car and cardboard driver. If the effect is satisfactory place the cardboard pattern on a piece of balsa 3 in. x ½ in. about 8 in. long, and mark off two outlines. Cut these out with a fretsaw (rather on the full side of the outline) and cement and dowel the two pieces together (Fig. 3). In this rough state the balsa driver is placed in the car in order to get an idea of the angle it will be necessary to make the arms, so that the hands will fall correctly on the wheel; the arms and hands are then cut out in cardboard and pinned in place on the driver. If the length and angles of the pattern arm is satisfactory two outlines are made on the balsa and these are then cut out and dowelled and cemented in place on the driver (Fig. 4).

The "body" is now ready for carving, and although I find this hard to explain I have never found it difficult to do, and the only tools I use are a sharp pocket knife and razor blade, but roughly my method is as follows. First bevel off the square edges of the body and arms; next make a broad V-shaped cut on the lower part of the head to form the chin; then cut away the top of the shoulders and neck towards the chin so that the driver now appears as in sketch (Fig. 4). Carve away the back of the head and neck as shown by dotted lines in sketch (4). The head, neck, shoulders and arms, etc., can now be finished off by a little more rounding with sandpaper, and the nose made from a small piece of balsa and cemented in place. Cut two small hollows for the eyes and one for the mouth. Next a thin strip of card is cemented around the back of the neck and brought to a V on the chest to form the collar. The man can now be painted, and when dry a small piece of celluloid cut oval shape and cemented over each eye to form the goggles. The driver is now ready to take the wheel, and can be clipped or dowelled into the cockpit of the car.

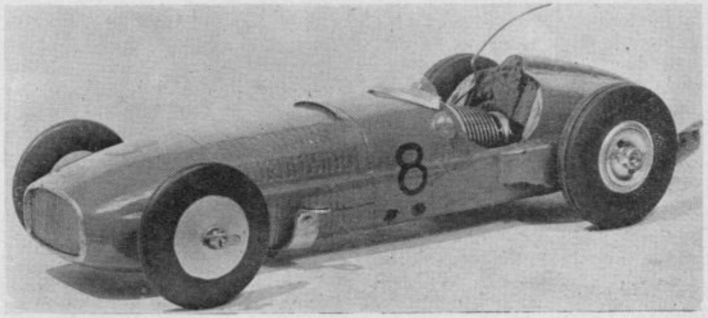


The completed driver shown at the wheel of a Healey "Silverstone". His somewhat anxious expression is due to his unfamiliarity with this car, and his preference for an almost vertical steering wheel!



KITCHEN TABLE B.R.M.

PART I OF A DETAILED STEP-BY-STEP ARTICLE BY KEN PROCTER
THIS MODEL IS DESIGNED FOR THE INSTALLATION OF ONE OF THE POPULAR TWIN SHAFT ENGINES



THE recently published "Prototype Parade" featuring the B.R.M. was of particular interest to me, since it afforded me the first opportunity of checking the accuracy of my own model against drawings prepared with the sanction of the B.R.M. Trust, which presumably can be regarded as being authentic.

Towards the end of 1949 reading accounts of the performance of "Busy", particularly during the visit to Sweden, made it apparent to me that if I intended to retain my position as North East Region $2\frac{1}{2}$ c.c. Champion I would require a speedier car than my Jaguar powered "Oliver Demonstrator" for the 1950 season.

In view of the fact that my "Oliver Demonstrator" has never failed to complete its runs in any Open Competition, it was obvious that my choice of engine would be an Oliver, and I therefore purchased an Oliver "Tiger" unit as soon as these were marketed.

In case of confusion, the unit concerned is of the plain bearing type, the faster ballrace unit being produced during the 1950 season.

During the course of many Open meetings attended in the 1949 season, I had all too often heard obviously interested would-be participants state that if only they had access to workshop facilities and/or more spare time, they too would join in the sport.

Now, whilst workshops are undoubtedly a great asset, they are not, in my opinion, an absolute essential, and furthermore, whilst a dearth of spare time is obviously no great help, lack of it can only slow up the actual construction or development of a model racing car.

In view of my position as Honorary Car Secretary of the Sunderland Model Engineering Society, I am naturally very keen to encourage as many individuals as possible to the movement, and whilst I can assure all would-be participants that every effort will be made to remove any obstacles which come their way, I decided that perhaps a little concrete evidence would be more assuring, and therefore, determined to make my new car a "Kitchen Table Special". Obviously, a car made on the kitchen table, using only generally available hand tools and which performed with moderate success at Open Meetings, would serve as an excellent incentive to the "not so fortunate" fraternity.

Being of the opinion that where possible a model racing car should depict an actual prototype it was perhaps natural, particularly in view of the fact that my engine was British made, to choose the B.R.M. which, fortunately at this time was being subjected to the first press release at Bourne. However, it was, and is, appreciated that many readers will have their own particular fancies regarding a suitable prototype and this was borne in mind so that the actual construction methods could be equally applicable to all types.

Preliminary work took the form of the extraction of all photographs of the B.R.M. from both the daily press and current illustrated weeklies, from which basic data my working drawings were prepared.

The method of producing detailed outline drawings from photographs necessitates the use of several dodges, and a full description would take several pages, however, in view of the fact that it has now been rendered almost unnecessary by the wide variety of drawings published under "Prototype Parade", only a brief outline will be given.

The basic principle is, of course, that of proportion, but, since foreshortening is always present to a certain degree in any photograph care must be taken to give full consideration to the view point of the camera. Obviously the degree of accuracy achieved is a function of the photographic evidence available, and in my own instance the tail views presented the greatest weakness and were in fact misleading initially.

Cardboard cut-outs of "guesstimated" views are utilised and viewed from a similar position to that of the camera, and modified accordingly if necessary. For wheels two discs spaced the appropriate distance apart are pinned to the central elevation cut-out and by suitable juggling the wheelbase and track deduced. Cross sections are also deduced in a similar manner and are fixed "egg box" fashion to the central member for the final "tidying up".

The final result of my "guesstimations" is reproduced overleaf, the actual drawings being drawn full-size for the model, based on the $2\frac{1}{4}$ in. dia. "Raylite" rear wheels.

The next stage was to decide on the layout, and to facilitate this, the actual engine unit was drawn in position on another sheet of paper, again in four views, the body outline being shown in dotted line. This procedure was then held up until a decision was reached regarding the construction of the bodywork itself.

I considered that panel beating to produce double curvatures would be a little too ambitious for the kitchen table worker, and therefore somewhat reluctantly chose balsa wood as being, under the circumstances, the best alternative. My reluctance was due to previous experiences with soft balsa in prewar days, but let me assure readers that all my fears have now been dispelled. I am now very satisfied with both the degree of finish and strength which can be achieved; in fact, it could be said that I am now a "hardened" balsa fan!

Now the best type of bodywork is that which permits all normal operations to be completed without its removal, so I considered the manner in which this could best be achieved, and also how the bodywork could be affixed to the chassis without exposing ugly clips. I decided that the body would in elevation and plan overlap the chassis since I disliked the idea of making an underpan chassis to tally with the top, which would thus have exposed a horizontal joint not visible in the actual car, and also, unless complicated fabrication was resorted to, introduce panel beating which we have already made taboo.

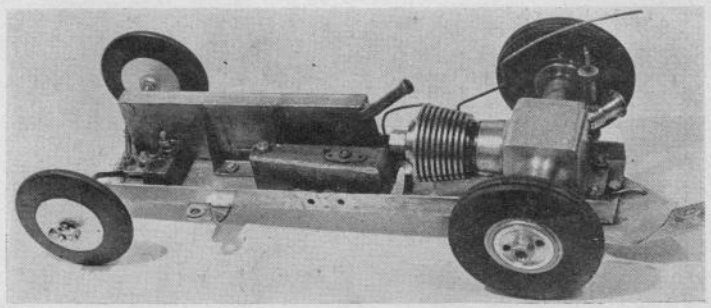
From the plan and elevation it was apparent that the best and simplest form of chassis would be a channel section of $1\frac{1}{2}$ in. width and $8\frac{7}{8}$ in. long, and furthermore, if the sides were $\frac{5}{8}$ in. high, neat Allen headed 6 B.A. fixing screws could be used, passing through the bodywork at points coinciding with the panel fixings on the actual prototype car.

Regarding the layout finally adopted, the drawing developed into the form reproduced in Fig. 2 as the size, shape and situation of the various components were deduced, bearing in mind the ideal bodywork as defined.

The fuel tank was designed in cross section by a similar graphical method to that described in some detail by "Professor" in the April issue of *Model Maker*. The length of the tank extends from just beneath the scuttle to just aft of the front axle, since due to the low build of the car and outrigged carburetter jet, the cross sectional area is small, leaving only length to gain the necessary capacity.

The filler pipe is arranged to fill the tank from the bottom to avoid air locks, and communicates with the cockpit of the car by means of a flexible extension which is sealed during runs by means of a cheese-headed screw. The overflow pipe, which also

Above : Two views of the Oliver powered 2.5 c.c. B.R.M. described in these pages by Ken Proctor, which show that a simple model may combine performance with good looks.



Right : A view of the chassis, of which further detail pictures will appear next month.

Full sized constructional plan of the B.R.M. model is available from this office, price 3/6d. post free.

leaves the tank at the rear end, runs internally in the tank along the inner edge at the top to the front, being bent at the rear from the back of the tank and extending just through a hole in the chassis and suitably scarfed, facing forward. The final tube is the fuel line, which is taken as usual from the rear of the tank at the bottom outermost corner.

The ordinary "on off" type Oliver fuel valve is in line with the fuel supply pipe, and connected to it by means of flexible tube, the actual fixing of the valve being by means of a hole drilled in the chassis. A further length of flexible tube connects the other end of the valve to the bottom of the carburetter jet, via an elongated hole in the chassis.

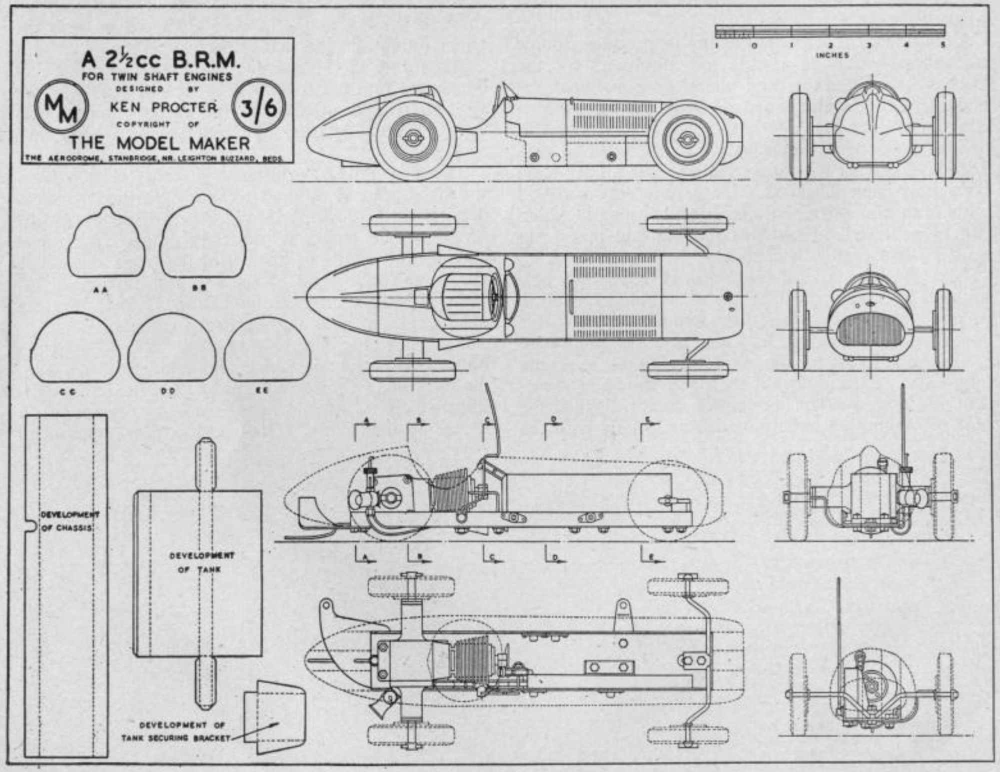
In view of certain limitations I decided that whereas I had initially toyed with the idea of fitting near scale front axle members this idea would have to be discarded and a single bent wire system substituted. (Not very Porsche!)

With the general layout in mind, we can now proceed to the actual construction, the first part of which in my instance was the body, since I had to satisfy myself that balsa wood was a suitable medium. Since the width of the chassis was to be 1½ in., and the overall width of the body 2½ in. I decided to use bread-and-butter construction, using five vertical ½ in. thicknesses of balsa wood. Bread-and-butter construction is an excellent time and labour saving method, since, by careful initial thought the majority of surplus material, both internal and external, can be removed prior to the carving operation.

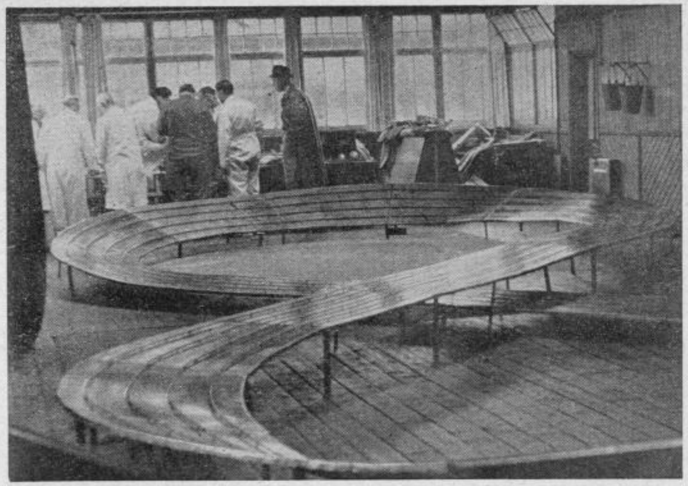
The general layout and outline drawings were therefore studied, and the five vertical members shown in dotted line on the plan view by lines drawn parallel to the centre line at the appropriate positions distant ½ in. apart. From this view the overall length of each member could be found, and, in a similar manner by drawing the vertical sections on the end views, the respective widths at each of the reference cross sections could be determined. Thus, having lengths from the plan view and heights from the end views, by referring these to the appropriate points on the elevation the actual elevation or sheer view of each member could be constructed.

The weight of balsa is such that one can afford to be generous with the actual body thickness, and I therefore made the tail almost solid except where the

(Continued on page 574)



THE 8 MODEL CAR CLUB'S FIRST MEETING



THE idea behind the formation of the Eight Model Car Club was the provision of a portable track with a high safety factor, which could readily be erected for exhibitions and demonstrations, and incorporating a fly-over crossing to increase both the interest of running and the length of the run, without increasing the floor space required.

The club was formed in December, 1950, and the first public demonstration of the new track took place on June 9th at St. John's Hall, Friern Barnet Lane, Whetstone. It was originally intended to use a Z-section rail, but this was unobtainable, so the designer-builder S. Kedgeley, who was responsible for the "Nordromo" track described last year, adopted a flat mild steel strip, ½ in. x 3/16 in., supported by ⅜ in. spacers set 8 in. apart. The track gives a run of 110 ft. per lap, each rail being, of course, of equal length due to the figure-eight plan.

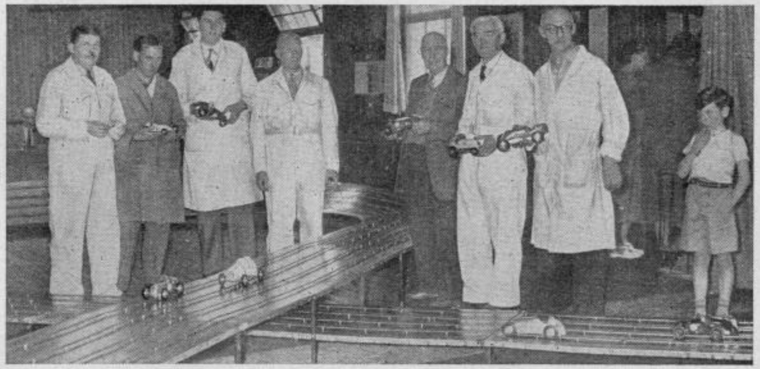
Banking of 25 deg. maximum was used at each end, based on a calculated speed of 30 m.p.h. It is interesting to record that the whole track, in 28 sections, was constructed in a small private garage, and the material, galvanised steel sheet, cut with hand shears and flanged by hand tools also!

The cars are held on the track by m/s rollers in pairs, fore and aft, the rollers having an integral flange or head at their lower ends, which prevent them from lifting off the rails, the usual grooves being cut in the rails at the starting point. Engines are of 1 c.c., although 1.5 c.c. is permissible, and clutches are compulsory. The majority of the engines used at the opening meeting were of A. F. Weaver's design, though several E.D. Bees were also in evidence, and speeds were sufficiently well matched as to provide some really spectacular racing.

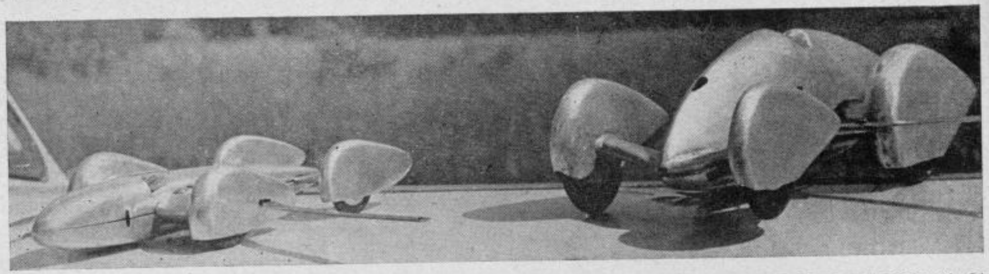
It is intended to include a class for veteran car models in the future, and one member, S. C. Palmer, had a fine part-finished model of an early Panhard on view, an illustration of which appears on our cover this month.

Interested visitors will be welcomed at future meetings, particulars of which can be obtained from the club's Hon. Secretary, L. C. Strong, of 70 Raleigh Drive, Whetstone, N.20.

Above : This view of the track shows the comparatively limited floor space required to provide a lap distance of 110 ft.



Right : Members of the Eight Model Car Club and their models, designer-builder S. Kedgley being fourth from the left, and Hon. Sec., L. C. Strong second from the right.



ROUND THE MODEL CAR MEETINGS

THERE has been so much Club activity in recent weeks that there is not sufficient space in which to publish as full reports as we should like, particularly in view of the fact that a number of Competition and Press Secretaries have sent excellent accounts of their meetings. However, as we are frequently assured by keen club-men, the results are the things which matter most, so on this page will be found a number of contest results in full, accompanied by representative pictures where possible. We had hoped to include the Blackpool Open meeting in this issue also, but this has not been possible in the time available.

Scottish Speed Championships
Dundee

Place	NAME	CLUB	CAR	TIME 1st Run	TIME 2nd Run	Av. m.p.h.
1	K. Procter	Sunderland	Dooling/Railton	9.00	8.85	100.93
2	J. C. Cook	Sunderland	Dooling/Arrow	9.45	8.65	99.63
3	F. W. Thwaites	Sunderland	Hornet/Special	9.07	9.05	99.33
4	J. Soutar	Dundee	Rowel/Sabre	10.2	10.04	88.94
5	K. Smith	Dundee	McCoy/Rapier	11.00	10.40	84.17
6	J. C. Cook	Sunderland	Dooling 5c.c.	12.38	10.23	80.33
7	A. Fyffe	Dundee	McCoy/Special	8.15	N/R	55.21
8	F. C. Petrie	Sunderland	Dooling/Special	8.81	N/R	51.07
9	W. Armstrong	Dundee	Dooling/Arrow	10.00	N/R	45.00
10	S. Chorley	Motherwell	Rowell/Special	N/R	N/R	—
11	J. Moonie	Motherwell	Rowell/Special	N/R	N/R	—

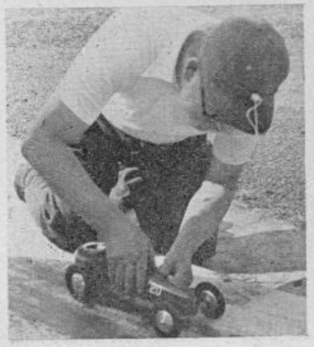
SURREY MODEL CAR CLUB
"Rogers Cup"

No.	NAME	CLASS	CLUB	TIME	SPEED	TIME	SPEED	ERROR
1	B. Stocker	5	P'mouth	13.2	68.18	14.05	64.05	4.13
2	F. Jeffery	5	P'mouth	12.22	73.64		N/R	
3	F. Smith	10	Surrey	10.64	84.58	10.42	86.37	1.79
4	K. Davis	2.5	Chiltern	19.77	45.54	20.88	43.10	2.44
5	L. R. Gawley	10	Chiltern	9.01	99.88	8.75	102.85	2.97
6	A. Poyser	10	Surrey	9.57	94.04	9.53	94.43	.39
7	L. S. Light	2	M'head	N/R			N/R	
8	J. F. Herbert	5	M'head	17.57	51.22		N/R	
9	F. A. Jones	2.5	M'head	24.84	36.23		N/R	
10	J. T. Adams	5	P'mouth	17.94	50.16		Scratched	
11	J. Wilson	5	P'mouth.	N/R			N/R	
12	P. Bailey	10	P'mouth	13.00	69.23	13.22	68.07	1.16
13	E. Boddie	5	P'mouth	20.06	44.86	18.81	47.87	3.01
14	K. Palmer	10	Chiltern	26.19	34.37	12.14	74.13	39.76
15	J. Emmerton	1	Chiltern	N/R			N/R	
16	R. Hinks	1.5	Chiltern	N/R			N/R	
17	L. Kays	2.5	Medway	12.99	69.28	14.37	62.63	6.65
18	K. Robinson	2.5	Medway	15.11	59.56	15.41	58.40	1.16
19	D. Garrod	10	Surrey	8.11	110.97	8.05	111.80	.83
20	E. Rogers	10	Surrey	8.69	103.56		N/R	

"BASIC SPEED COMPETITION" 2 Runs of ¼ mile.
"ROGERS CUP" won by G. Thornton, .05 error
2nd Pewter Pot, F. Cottrell, .28 error
3rd Ash Tray, A. Poyser, .39 error
4th Ash Tray, C. Catchpole, .41 error

E. Bridgman disqualified from 2nd place through infringement of Racing Rules

The following Clubs took part in this event :
Maidenhead, Medway, Chiltern, Portsmouth, and Surrey



Above : Seen at the Surrey Track "and little fleas have lesser fleas . . . " Alec Snelling's new 10 c.c. Streamliner with his Oliver record breaker. Left : E. E. U. Rogers with his Ball engined model at Surrey's Open, and D. James of Worcester pushing off in the Lady Mary Grosvenor Trophy race at Hooton.

Opposite page : Ken Proctor receives the Scottish Trophy from Mrs. Rowell, and (centre) two more Dundee competitors, S. Chorley with his 5 c.c. Connaught and the unlucky Allen Fyffe, and (below) a group of Grimsby visitors at the Derby Open.

DERBY OPEN MEETING
Rolls Royce Silver Trophy

10 c.c. RACE

Position	NAME	CLUB	CAR	ENGINE	SPEED 1st Run	SPEED 2nd Run
GRADE A						
1	J. A. Shelton	Surrey	Arrow Mod.	Dooling	127.47	125.87
2	I. W. Moore	Derby	Own	Dooling	125.17	121.62
3	C. M. Catchpole	Surrey	Arrow	Dooling	118.57	119.20
GRADE B						
1	A. Poyser	Edmonton	Own	Dooling	—	111.24*
2	J. C. Cook	Sunderland	Arrow	Dooling	107.27	104.04
3	C. W. Jepson	Guiseley	Arrow	Dooling	104.28	—
GRADE C						
1	F. Thwaites	Sunderland	Invader	Hornet	98.68	100.44*
2	B. Harris	Bath	Own	McCoy	—	96.25
3	W. Hurn	Bath	Invader	McCoy	95.33	95.54
GRADE D						
1	J. G. Robinson	Meteor	Own	Own	77.92	—
2	J. Emmerton	Chiltern	Own	Lapwing	63.15	—
3	F. Lee	Bath	Conquest	Conqueror	60.76	—

*Denotes that car exceeded Grade limit, and is therefore upgraded in next race.

TOTAL : 25 entries

The Walker Trophy

5 c.c. RACE

Position	NAME	CLUB	CAR	ENGINE	SPEED 1st Run	SPEED 2nd Run
GRADE A						
1	J. C. Cook	Sunderland	Own	Dooling	87.29	93.55
2	E. Armstrong	Sunderland	Arrow Mite	Dooling	89.46	90.09
3	Mrs. I. W. Moore	Derby	M.D.S.	Dooling	—	89.02
GRADE B						
1	J. R. Parker	Meteor	Own	Eta	83.64	84.03
2	J. Broadbent	Grimsby	Own	Eta	—	81.52
3	W. Hurn	Bath	Own	Dooling	80.50	79.15
GRADE C						
1	S. H. Seville	Leicester	Own	Eta	63.11	59.68
2	S. R. Robinson	Meteor	Own	Own	61.64	—
3	C. A. Bunn	Lincoln	E.R.A.	Eta	48.49	—

TOTAL : 32 entries

Chaddesden Shield

2.5 c.c. RACE

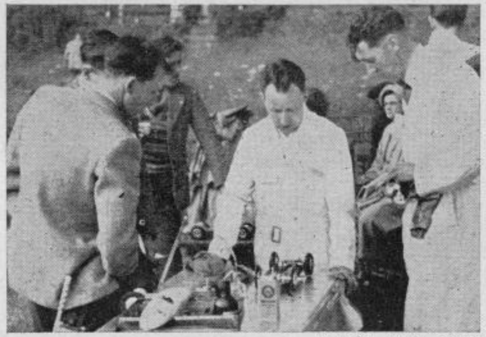
Position	NAME	CLUB	CAR	ENGINE	SPEED 1st Run	SPEED 2nd Run
GRADE A						
1	E. Armstrong	Sunderland	Own	E.D.246	76.27	76.01
2	A. F. Snelling	Edmonton	Own	Oliver	67.61	69.39
3	W. K. Crow	Nottingham	Own	Oliver	68.02	66.12
GRADE B						
1	R. Jackson	Derby	Oliver	Oliver	61.68	59.64*
2	J. R. Parker	Meteor	B.R.M.	Elfin	56.07	59.17
3	O. Lead	Meteor	Oliver	Oliver	57.43	57.91
GRADE C						
1	S. H. Seville	Leicester		E.D. 25	41.39	41.28
1½ c.c. RACE						
1	E. Bishop	Bath	Own	Elfin	40.94	45.68
2	E. R. F. Ridsdale	Chiltern	Own	Mills 1.3	42.25	38.36
3	J. Emmerton	Chiltern	Own	E.D. Bee	—	—

*Exceeded Grade limit and is therefore upgraded in next race.

CONCOURS d'ELEGANCE
1. H. C. Wainwright
2. H. S. Howlett
3. S. H. Saville

Total : 3 entries

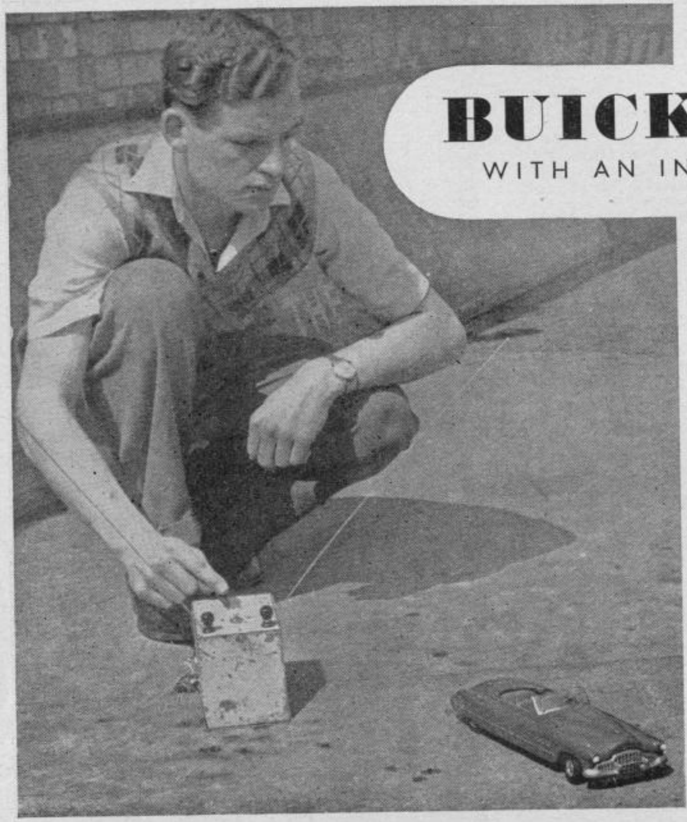
Photo : P. Lane



Photos : W. E. Rowell

Hooton Model Car Club

NAME	CLUB	ENGINE	SPEED
2.5 c.c.			
F. B. Stephenson	Hooton	Elfin	55.9
B. Etherington	Hooton	E.D.	38.3
B. Etherington	Hooton	Oliver	59.6
5 c.c.			
D. M. Eaves	Blackpool	ETA	67.7
B. Etherington	Hooton	ETA	73.0
N. Haslam	Bolton	ETA	77.0
10 c.c.			
Mr. Dowe	Worcester	Conqueror	68.7
D. James	Worcester	Rowell	73.5
J. Hart	Liverpool	Rowell	73.2



T. OWEN APPLIES RADIO CONTROL TO A

BUICK CONVERTIBLE

WITH AN INTRODUCTION BY G. HONNEST-REDLICH

I have often been asked if Radio Control was at all applicable to small model cars. My answer has usually been in the negative, possibly due to my total inability to achieve really miniature working models! Mr. Trevor Owen, who possesses that quality, has with his first effort really achieved results which are as convincing as they are reliable.

The main difficulty of stowing batteries for both propulsion and the radio, has, as can be seen in the photographs, been solved without the usual attendant fault of inaccessability.

I think that the constructional answer, when contemplating a radio-controlled model car, is to lay out your components and batteries and let that determine the size of the model. But make sure that your propulsion power is correct. Unless you have a large smooth surface at your disposal, you will find it nearly impossible to control it at more than walking speed. In fact a slow speed is more to scale, and great fun can be had on a pavement trying steering contests with the help of bottles (empty) as obstacles.

The future of small radio controlled model cars has a few pros and cons. In favour are the low expense and constructional time factor, also a low powered light and small transmitter. (Ranges of only yards are required.) Again the little space these models occupy makes it easy to have quite a fleet.

Against these advantages are the drawbacks of requiring a smooth level surface to operate upon, and also due to the fitting of components here and there, an easily removable or plug-in radio receiver is hardly possible. By building just a little larger, the receiver could be made in a unit, to be changed from one car to another.

I am always pleased to see "Firsts", and let us hope that other modellers will take up this new field.

THE advent of radio control applied to a model car is, we feel, somewhat overdue, and although in reply to an appeal we made in the pages of *Model Cars* some time ago we received word of scattered projects in their early stages, and have seen demonstrations by the Radio Control Society's model on the television screen, we ourselves were reluctantly beginning to subscribe to the earlier views of G. Honnest Redlich, the r.c. expert who wrote the foreword above, i.e. that the practical difficulties were going to prove too great for the amateur builder.

We were very interested, therefore, to receive details of the successful little model built and operated by Trevor Owen, as it will immediately be seen from the illustrations that his model is both compact and realistic, and even though the speed is low and the range comparatively short, it immediately places the radio control of car models within the bounds of practical politics, and opens up wide prospects for the future.

The car, as will be seen, is modelled on the 1949 Buick Convertible, and the dimensions are as follows:—

O/all length 13 in.; Height $2\frac{1}{2}$ in.; Width $4\frac{1}{2}$ in.; Wheels $1\frac{3}{4}$ in. dia.; Track, front $3\frac{7}{8}$ in.; rear $3\frac{1}{2}$ in.; Turning circle 4 ft. 6 in.; Speed 4 m.p.h. approx.

The body and base are built up of $\frac{1}{4}$ in. and $\frac{1}{2}$ in. sheet balsa, the front grille outline and louvres being cut from $\frac{1}{8}$ in. sheet; $\frac{1}{2}$ in. stock is used for the bumpers, and all beading is made of half-round and tapered $\frac{1}{16}$ in. dowel. The ventilating holes in the body sides are made from $\frac{1}{4}$ in. metal grommets, and the headlights are ex-Government panel lights. Seats are of $\frac{3}{16}$ in. sheet balsa, the steering wheel is of $\frac{1}{4}$ in. dowel and 16 s.w.g. wire, and the windscreen of $\frac{1}{32}$ in. celluloid. An excellent finish has been obtained, the bodywork being painted red, the interior grey, with silver bumpers, radiator and beading. So much for the car's outward appearance.

A careful examination of the chassis will show the driving arrangement, which consists of a "Victory" five-poled armature motor driving by spur gears on to the rear axle, providing a gear reduction of 6:1, which with the small diameter wheels gives ample power. The motive power and gearing are under the boot. This unit runs on 9 volts, made up by two complete pen-cells and two half-cells.

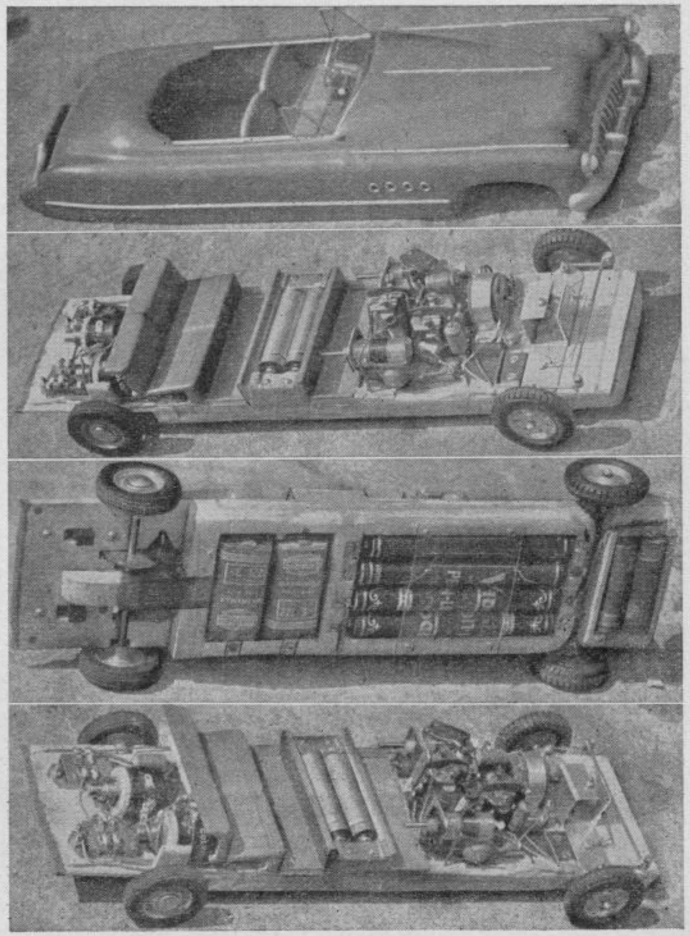
The steering is operated by an Electrotor, driven by two complete pen cells, giving three volts each way. As originally built, two E.D. receivers were used, run from common batteries, two B.122's and two half pen-cells in parallel. Thus the complete battery equipment carried on the car consists of four complete and four half pen-cells and the two B.122 h.t. batteries. All are fitted beneath the car except the l.t., which is located beneath the front seat. All batteries are fitted with spring connections to assist easy replacement.

The steering motor with its gearing, together with both receivers are built in under the bonnet, and apart from the driving motor, the boot houses two potentiometers and two double pole single-throw switches. The Electrotor operating the steering is geared down 50 to 1 to the steering shaft, round which a thread is taken in four turns, the extremities of the thread then going to the two steering arms.

With two receivers in use, one is employed to control the driving motor, on and off, and the second operates the progressive steering, by means of the

(*Continued on page 574*)

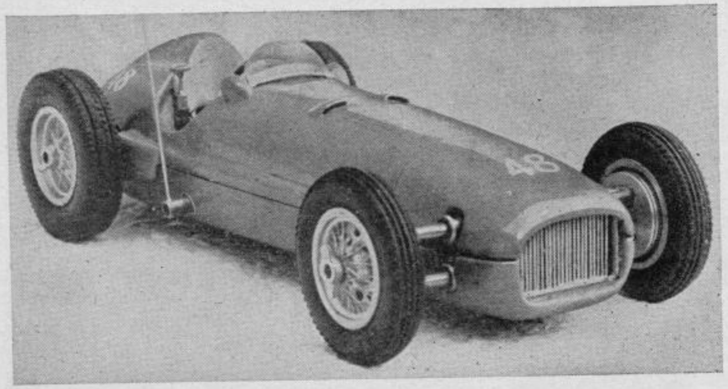
Left : Trevor Owen operates the transmitter of his radio-controlled model Buick. Below : These views show the careful planning required to accommodate the control gear and batteries in a 13 inch model, without sacrifice of accessibility.



L. C. MILLS PRESENTS ANOTHER

$^1/_{12}$th scale B . R . M.

A MORE ELABORATE VERSION FOR THE BETTER EQUIPPED WORKSHOP



PHOTOGRAPHS of the excellent 1 in. to 1 ft. scale models from the Baigent stable which appear from time to time in *Model Maker* were responsible for my deciding to have a go at a model of this type.

I was fortunate in being able to have a chat with the worthy H.C.B. in person, who supplied me with a set of his scale tyres and much "gen" on spoked wheels. However, having had a look at the finished wheel on an actual Baigent model, and bearing in mind my very limited skill, I decided that front row spoking would be enough for a first attempt!

The drawings were prepared from a set of *Model Maker* B.R.M. plans scaled down to the appropriate dimensions. As the model was to be "functional", the whole was based on the principle of a balsa body built around a rectangular aluminium pan.

Motive power was to be supplied by a long stroke Oliver Jaguar engine, which by reason of its very adaptable type of engine mounting would fit into the scheme of things very well.

The most difficult job, wheel building, was tackled first and owing to the difficulty of getting hold of scrap brass of the right size, the rims were turned from dural. These rims were turned with back plates, the rear ones having the brake drums also turned in one piece, the front rims having plain plates to facilitate fitting to the front axle assembly.

Construction of the wheels followed closely on the articles published on the subject in this magazine, the only problem having to be overcome was the fixing of the spoke ends to the rim. This was done by turning a groove in the rim to coincide with the spoke holes, and running a length of 26 gauge wire round it, the spoke ends being soldered to this wire. I forgot to mention that the hubs were turned in brass and it was found that the spokes held them in position quite firmly, no other fixing being used. "Knock-on" hub caps were made from dural, the rear ones being tapped 1 B.A. to hold the wheels on to the driving pins supplied with the engine. Front caps were threaded ¼ B.S.F. to screw into the hubs, which had been tapped accordingly.

Next came the pan, a plain piece of aluminium 9¼ in. long, having the sides turned up for ¼ in. to give rigidity and having a total width of 2⅛ in.

The engine was bolted to this, using the existing bearers and U-bolts, as also were the dural mountings to carry the front suspension arms.

These suspension arms were produced from mild steel, and had to be made over scale size as true-to-scale arms would have been too fragile. They were bent to the correct angle and the outer ends faced off and drilled for 6 B.A. bolts. The two upper arms were made longer in order to carry the coil springs. Several types of springs were tried without much success, so the suspension arms were fitted with brass arms carrying coil springs soldered to them, the other ends of these springs being soldered to a piece of brass bent at right angles and bolted to the pan. Front brake drums were turned in dural and carefully drilled and tapped to carry 6 B.A. studs, the outer ends of the suspension arms being held to these by 6 B.A. Simmonds nuts. Each pair of suspension arms operates in brass bushes fitted into the dural brackets. These brackets were tapped 4 B.A. to take the bolts holding them to the pan, and were joined by a slotted piece of dural to allow for correct wheel alignment. Shouldered stub axles hold the front wheels to the drums by means of "shake proof" washers and 4 B.A. nuts, the wheels running on plain bearings.

The balsa body was built "bread and butter" fashion by pinning three lengths of 3 in. x ⅝ in. balsa and one length of 3 in. x ¼ in. balsa, together with household pins. The whole body was then carved to shape, being taken to pieces on completion so that it could be hollowed out easily. Using the ¼ in. piece as base, the pan was let in and cemented into place, the next piece being cemented into place forming the bottom half of the car. The two top pieces were cemented together to form the top half of the body and both halves then had tissue doped over them to strengthen, followed by the usual procedure with filler, cellulose and fuel proofer.

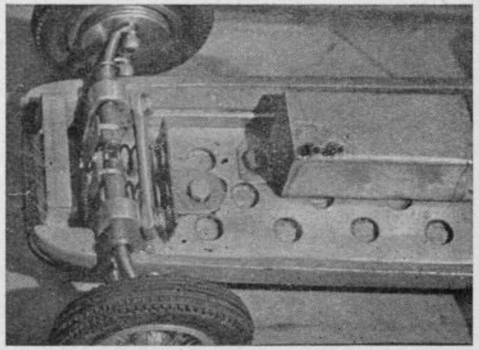
Radiator block was produced from $\frac{1}{32}$ in. brass rod soldered into a copper frame and pinned and cemented to the bottom half of the body. Fuel tank and knock-off switch were then added, all bolt holes being recessed through the balsa to the underside of the pan. The two halves of the body are held together by means of two small Terry spring clips in front and a pin type spring clip in the rear.

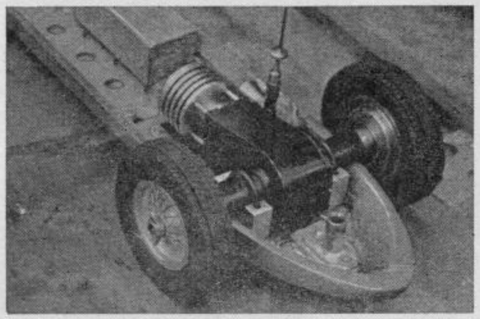
Windscreen, mirrors made from chromium drawing pins turned down to size and a facia panel were now added, followed by a three-spoked steering wheel, the latter having part of the rim cut away to clear the cylinder head.

Finish is the pale green of the early E.R.A.s, with with silver wheels, numbers being applied by means of transfers.

A quickly detachable pan handle is fitted for track use.

So far the model has only had one outing and achieved 40 m.p.h. Although not built as a "speed" model this figure should be improved on as things loosen up.





Above : With bodywork removed the mounting of the Oliver Jaguar engine and the working Porche-type front suspension can be seen. The lower portion of the balsa body is permanently attached to the chassis tray.

This southern version of Britain's most talked-of racing car provides an interesting comparison with Ken Proctor's "Kitchen Table" model described on page 526. Both are eminently practical competition models, but L. C. Mills has produced a more ambitiously detailed replica.

Right : Another view of the B.R.M. Jaguar, on which an excellent finish has been achieved. The wire wheels carry front spokes only, and the tyres were made by H. C. Baigent.

Readers' Letters . . .

Streamlining & Model Car Performance

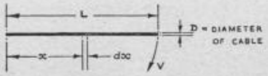
Dear Sir,

I am writing with regard to an article by A. M. Colbridge entitled "Streamlining and Model Car Performance" in the May issue of *Model Maker*.

In this article Mr. Colbridge states that there is no simple solution for the drag of the cable and the b.h.p. that this absorbs. I have set down a reasonably simple solution to this problem and finally have presented a complete formula for the engine b.h.p. which includes cable resistance.

Let dx be an elemental length of the cable, distance x from the centre.

Then:—



Frontal area of element = D × dx

Velocity of element $= \frac{V}{L} \times x$

Air drag of any body = KAV^2

(K = drag coefficient
A = frontal area)

$\therefore$ Air drag of element $= K.D.dx.\left(\frac{V}{L}x\right)^2$

$\therefore$ Drag of total length $L = KD\int_0^L\left(\frac{V}{L}\ x\right)^2 dx = R^1$

Integrating $R^1 = KD\left(\frac{V^2}{L^2}\times\frac{x^3}{3}\right)_0^L$

$\therefore R^1 = \frac{KD.V^2\ L}{3}$.. lbs.

Now D.L. = frontal area of cable which can be called constant as was done for the cars.

Let the cable "streamline coefficient" = C^1 = K.D.L. (i.e. KA. as before)

We now get $R^1 = \frac{C^1V^2}{3}$ lbs.

$\therefore$ B.H.P. absorbed by cable $= \frac{C^1V^2}{3} \times \frac{V}{550} = \frac{C^1V^3}{1{,}650}$

V in ft./sec.

or B.H.P. $= \frac{1{\cdot}47C^1V^3}{1{,}650}$

V in m.p.h.

From this we can get values of C^1 if we know the B.H.P. absorbed by the cable.

i.e. $C^1 \quad \frac{1{,}650\ B.H.P.}{1{\cdot}47\ V^3}$

The B.H.P. absorbed by the cables is set down on page 382 of May *Model Maker*, therefore:—

m.p.h.	B.H.P.	C^1
70	.15	.00049
80	.20	.00044
90	.30	.00047
100	.40	.00045
110	.50	.00043
120	.65	.00042
130	.80	.00041
140	1.0	.00041
	Average =	.00044

The reasons for the variation in these values is that the B.H.P. figures are "rounded off".

$\therefore$ the B.H.P. absorbed by the cable $= \frac{1{\cdot}47 \times {\cdot}00044\ V^3}{1{,}650}$

(This is for the "Standard Cable" in the article.)

Finally:—

$\therefore$ B.H.P. of engine $= \frac{1{\cdot}47\ VR}{550} + \frac{1{\cdot}47 \times {\cdot}00044V^3}{1{,}650}$

where $R = Q + CV^2$ = total car resistance.
Q = rolling resistance.
C = Car streamline coefficient.
V = Speed in m.p.h.

bridge and have found a "Streamline Coefficient" for the cable.

For the benefit of any modeller who wants to do some calculations but has a car of greater or less than 10 sq. in. frontal area, it should be mentioned that he can find an individual value of "C" for his own car by dividing Mr. Colbridge's values by 10 and multiplying by his own frontal area.

Finally, congratulations to *Model Maker* and A. M. Colbridge for such an enlightening article on streamlining which, for out and out speed models, cannot be carried too far, especially when one remembers that

1. Power varies as speed cubed, i.e. to double the speed we require eight times the power.
2. There is nothing we can do about cable drag.

Manchester 12. R. G. Boor, A.M.C.T.

Suggestions for the Future

Dear Sir,

I am a regular reader of your excellent magazine, the *Model Maker*, and find the news of other people's hobbies most interesting. My interest in the magazine is Model Cars and when my son is older, Model Railways, Gauge 00. I am therefore, taking care of my copies as a reference library. I have a few criticisms to make, however, and give them below, as I know you always welcome them and accept them in the friendly spirit in which they are given.

Next, as I am a novice in model cars, I find that although your articles on other people's models are interesting, they are not as useful to me as the articles such as the "Skirrow" or "Offenhauser". If these high speed models were presented in the same way, with accompanying plan, I should find them more to my liking.

I should also like to see the *Aeromodeller* article "Gadget Review" in the *Model Maker* only then for model cars. With the high cost of accessories today, I am sure this would be a great saving to all the many novices. The "great white chiefs of the race game" must have a fund of "gadgets" and adaptations of wireless parts, etc., that we novices would find very helpful.

I am hoping to find, or create, enough enthusiasts in Corby to form a model club, and to that end would appreciate it very much if you would tell me who are my nearest clubs so that I could visit them, and pick up a bit of gen.

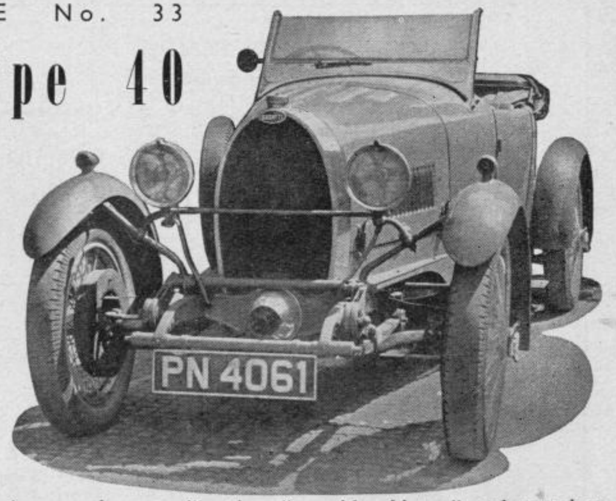
Good luck to you and your staff.

Corby, Northants. K. N. Gregory.

PROTOTYPE PARADE No. 33

BUGATTI Type 40

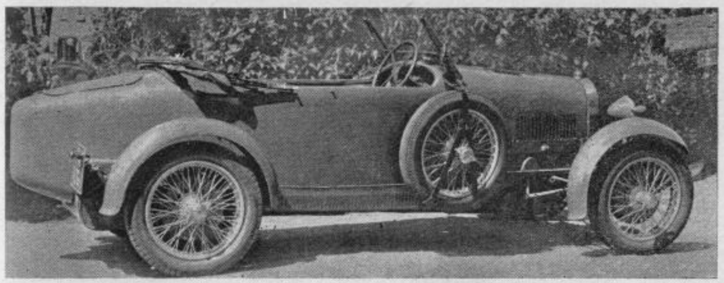
BY G. H. DEASON

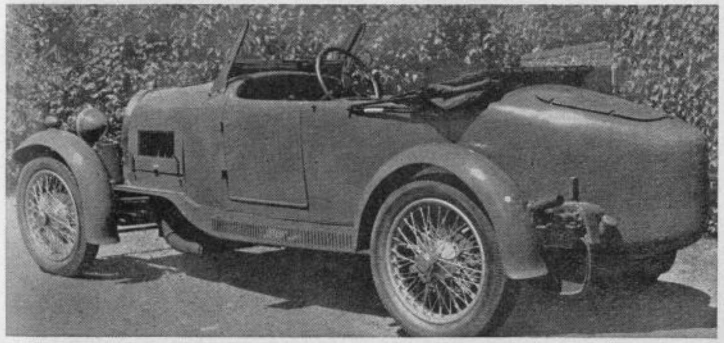


EVEN allowing for my weakness for Bugattis generally, and the fact that we haven't had one in the series since the Type 35B in 1947, I must own that this one happened completely by chance. You should have been having a quite different car this month, and in fact everything was laid on for us to go to work on it, once more through the courtesy of Chiltern Cars of Leighton Buzzard. However, in the process of bringing our intended subject into the light of day it was necessary to push PN 4061 out into the sunshine, and I became aware of signs of ill-suppressed excitement in my drafting colleague Maurice Brett, who was dancing up and down and pointing with mute appeal to the old Type 40. The old lady looked so brave in her new coat of Danube blue (and that's the nearest approach you'll get in a paint maker's sample book to Le Patron's chosen colour) that then and there we abandoned the more illustrious "car with a history", and started on the Bugatti with growing enthusiasm.

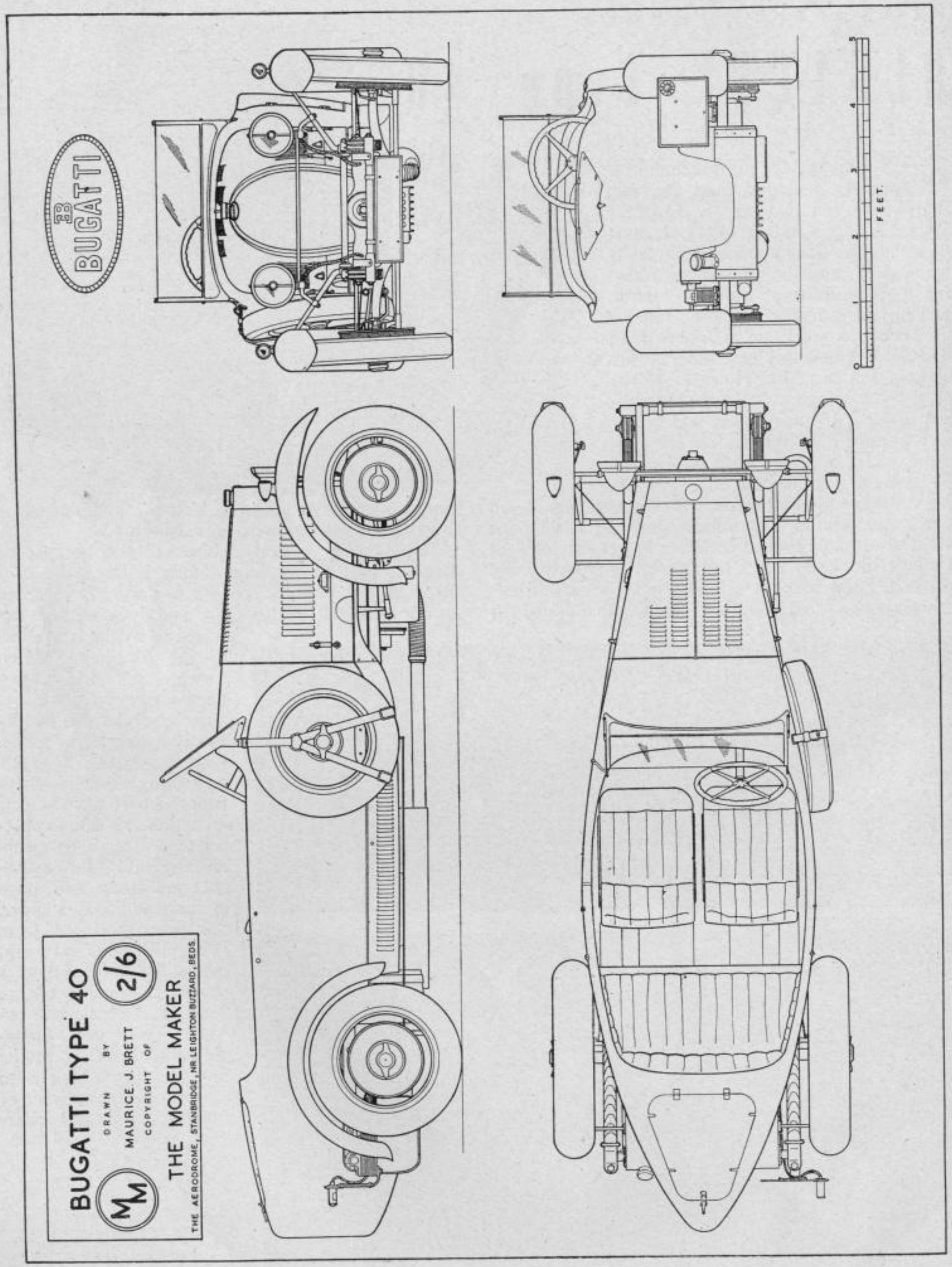
This apology is not really called for, because no member of the Molsheim family is unworthy of a place in P.P. The Type 40, however, is regarded as the humblest of the clan, and is sometimes referred to by the irreverend as the Molsheim Morris Cowley, but this is perhaps a thought unkind to a car which left the factory nearly a quarter of a century ago with 75 m.p.h. available in full touring trim. Apart from which, it makes all the appropriate noises, both mechanically and "exhaustively", and steers and stops in the traditional manner.

It was produced from 1927 until 1930, and might almost be described as a pedestrian version of the Type 37, the little four cylinder G.P. car, distinguishable instantly by its tiny radiator, which is to most people the epitome of Bugatti grace and char-





Three aspects of the Type 40, which show that what the old car lacks in grace she makes up in character. This particular specimen left the factory in 1929.



acter. The Type 40 is considerably heavier, and carries very distinctive touring bodywork and a larger radiator, but the engine is the same four cylinder 69 x 100 mm. unit, with one exhaust and two inlet valves per cylinder, operated by a single o.h. camshaft, plain bearings and the same clean, almost box-like external appearance.

Unlike the Type 37 and its supercharged version the 37A, however, the four-speed gearbox has a central gear lever with a central ratchet release affair, looking rather like a bicycle pump sitting up vertically in the driving compartment, flanked by a handbrake which is plainly intended for parking rather than for grasping purposefully in elaborate moments at high speed. However, the cable-operated brakes are more than sufficient to deal with the car's performance, and operate in large ribbed drums. The chassis has not quite the same air of fragility at the front end as have the G.P. cars, although the front axle looks similar externally, and has the same curious arrangement of the half-elliptic springs passing through special lugs in the beam. The axle in this case is solid, however, and not bored out as in the case of the racing jobs. The well known reversed quarter elliptic springs are, of course, a feature of the rear end. Hartford type shock absorbers are fitted, with double friction members.

A hefty looking tubular member ties the front dumb irons, and the lamps and close-fitting helmet wings are braced by a formidable array of tubular supports. The dynamo protrudes from the crankcase below the radiator, and the headlamps are the typical Marchal products of the period, with aluminium shells.

The bodywork of the Type 40 is quite unmistakable, and in this car is entirely original, except possibly for the iron step plate which protrudes rather unexpectedly below the only door. This particular body was, I believe, known as the Type Grand Sport, and was similar to that fitted to the eight-cylinder Type 43. You either like it or you don't, according to temperament. It is a robust affair in steel, looks rather high and cumbersome, and then when the passenger carrying part finishes, it suddenly goes *very* Grand Sport and grows a rather comic racing tail, topped by a sort of manhole cover. This oubilette is *not* intended to house your mother-in-law, but gives access to a capacious compartment for luggage and tools.

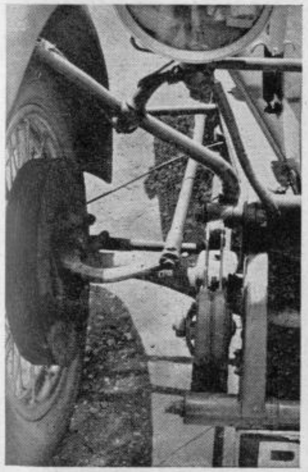
The one and only door is just a square door, and the seats are definitely designed to discourage sleep, but a rather natty valance below the body simply bristles with louvres. The bonnet is rather more conservative in this direction, and boasts only a central hinge, so you keep it propped open with your head whilst you're changing plugs. The fixed windscreen has stout metal side frames, and is raked very steeply backwards.

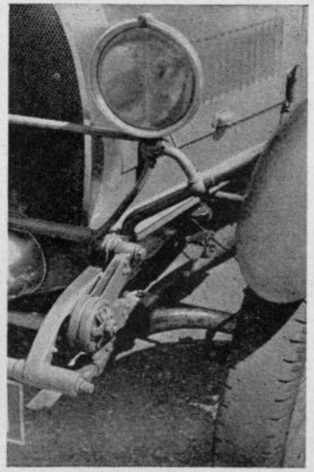
In the driving compartment the great Ettorre's contempt for frivolity is most apparent, as it is in all his cars, and there is no nonsense whatsoever about the instrument panel. A speedometer and rev. counter you were given, also a small ammeter and oil pressure gauge, and for the rest you put your trust in Molsheim.

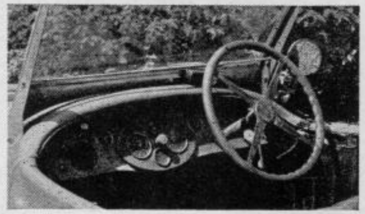
The steering wheel is wholly and delightfully Bugatti, with the typical unpolished wooden rim with carved fingergrips surrounding four flexible spokes which should be polished steel, but I'm afraid were painted in this case. Below the wheel a utilitarian device for ignition control looks rather like one of

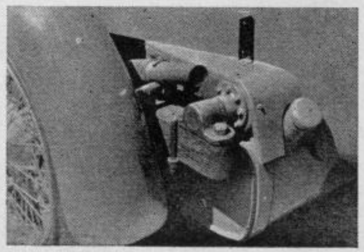
(*Continued on page* 574)

Detail close-ups which show the front suspension, brake gear and steering connections, the driving compartment and traditional rear spring anchorage.









LITTLE DATA IS AVAILABLE ON THIS SUBJECT SO A. M. COLBRIDGE TELLS YOU

All About Kites

KITE flying, once a most popular hobby, has largely fallen into disuse. No longer does one find a group of kite-flying enthusiasts gathered together on a Sunday morning on a suitable ground, trying their skill against one another, or even indulging in the sport of "string cutting". This, we might emphasise, was not as unscrupulous as might appear. Fairly to cut one's opponent's kite string the line had to be sawn through with one's own kite string, each manoeuvring for the most favourable position. The highly aerobatic types of kites generally used for "fighting" were, in fact, usually termed fighting kites. Some of the stunts achieved with a fighting or aerobatic kite were, as a point of interest, comparable with the manoeuvres which are nowadays accomplished with a control line model aeroplane.

There are still kit flying experts, but they are few and far between. Present date kite fliers are usually of two types—youngsters who have acquired or built a kite of their own and fly for the fun of it; or parents trying, with varying degrees of success, to fly a commercial kite for the benefit of their offsprings.

Yet the art of kite design and flying still has much to interest the man with a flair for modelling — and provides an excellent excuse for a pleasant, leisurely afternoon out in the open air. Unlike model aircraft, kites revel in wind and what may be "impossible" conditions for flying model aircraft provide just the occasion for trying out a new kite design. We know of at least one occasion where a group of model fliers, grounded by adverse conditions, knocked up a number of simple box kites on the spot and, flying on reels of cotton, proceeded to run an impromptu contest to see who could get the greatest height. A really miniature version, not much more than about 8 in. long, eventually disappeared from view upwards on the extreme end of a full spool of cotton and, apparently, stayed there for the rest of the afternoon.

There are all sorts of different shapes and sizes for kites, but basically these can be grouped into a number of distinct types.

The simplest, and at one time the most popular type is the old *bow* kite (Fig. 1). General proportions are shown in the diagram, applicable to all sizes. The framework consists of a straight central member to which is bound and tied a bow of similar material (but smaller cross section). Strong thread then completes the outline, which is then covered with light cloth, light paper or tissue, depending on the size.

The bridle is a simple "V" type attached to the central member, and the kite string itself is attached so that the normal attitude of the kite is some 10 to 15 deg. nose-up. There are no further lines to support the kite laterally, and it is imperative to *balance* the kite in this plane. If one side of the kite is heavier than the other then the lighter side must have weight added to it to compensate, such as pins pushed into the end of the bow.

For stability, the bow kite requires a tail at least ten times the length of the kite. This, of course, is tied to the extreme end of the central member. There ar various forms of tail which could be used, about the simplest being to tie strips of tissue or light cloth into a length of thread or string, as shown in Fig. 2. The second sketch of Fig. 2 shows a more "powerful" form of tail which was popular about fifty years ago. A number of small cloth or paper drogues are tied to the tailstring at intervals, the diameter of each drogue being about one-tenth the length of the kite for which the tail is intended.

Bow kites, in various modified forms, are still to be seen, but a far more efficient type of similar form is the *eddy kite* of Fig. 3. This is built around two straight members with thread or cord outline and requires no tail. There are one or two detail design points which must be observed to make a successful flier of a kite of this type.

General design proportions are summarised in the drawing. Both wood members are of equal length and lashed together at right angles exactly 18 per cent of the length of the central member from the front. The cross member is then bent upwards to a curved dihedral by means of a straining cord from tip to tip. Tip dihedral should be L/10 and the curve should be maintained uniformly throughout the length.

The second important point is to attach the covering loosely, but again with uniform looseness in each of the four panels (Fig. 4). If one panel "bags" more than another when filled with air it will have different lift and upset the lateral balance of the kite, which again in flown simply on a single (central) bridle.

The method of bridling is shown in Fig. 5. The main line attaches directly to the junction of the two spar members. The other line attaches to the extreme end of the central member and the main line, the length of this line being 9/10th of the length and attached to the main line at a point such that the main line is exactly at right angles to the longitudinal frame member.

It is also necessary to balance the kite both laterally and longitudinally. Lateral balance is achieved as with the bow kite. Longitudinal balance must be adjusted so that the kite will balance horizontal when supported at 35 per cent of its length from the nose.

Variants of both the bow and eddy kite have been produced with vertical keel surfaces, as in Fig. 6. Strictly speaking keel area is not necessary and, in fact, especially in the case of the eddy kite, possibly undesirable. The tendency in such cases is often to ignore one of the most important features of the eddy kite design in that the main line should be at right

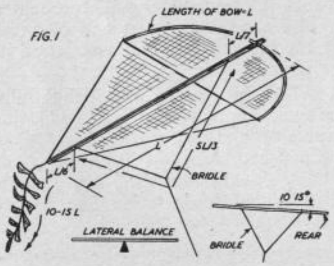


Fig. 1 : The Bow Kite — simplest and onetime most popular type.

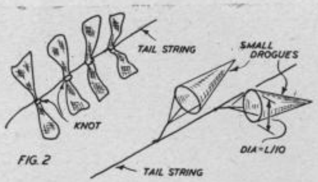


Fig. 2 : Tails for the Bow Kite. The usual bow and the drogue type—which has quite a modern air for a fifty year old notion.

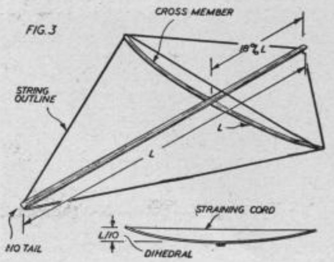


Fig. 3 : The Eddy Kite, which is tailless, and provides a more efficient design variant on the Bow Kite.

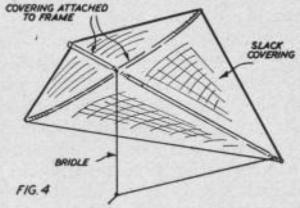


Fig. 4 : Attaching the covering to a typical kite. It should be loose with uniform "bagginess".

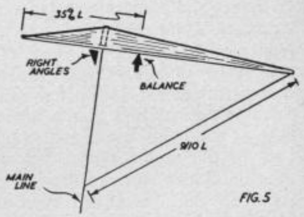


Fig. 5 : Method of bridling—which is an important consideration.

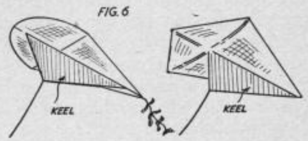


Fig. 6 : Further variants of the Bow and Eddy Kite made by the addition of vertical keel surfaces.

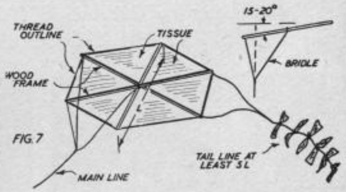
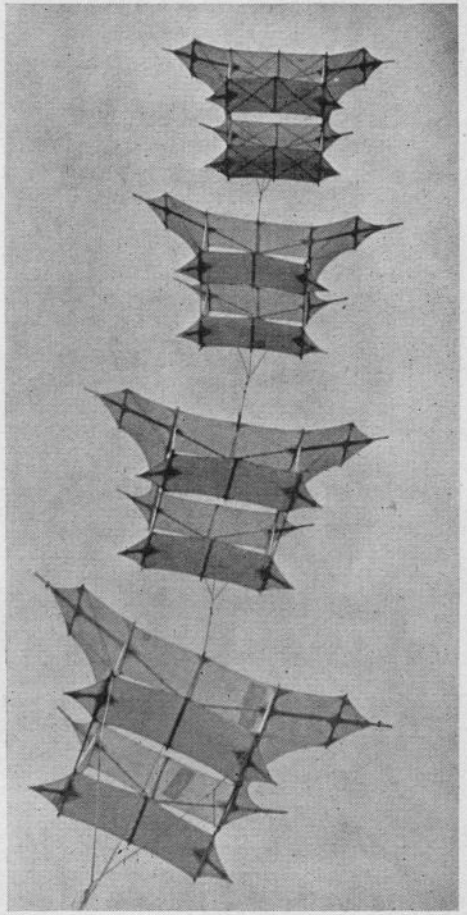


Fig. 7 : A Hexagonal Kite — which is perhaps in the more modern manner while being simple to make.



These fantastic manlifting Cody kites were brought back to enliven a recent Royal Aeronautical Society Garden Party this year.

Photo by courtesy of "Flight".

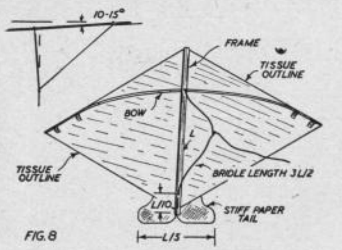


Fig. 8 : Indian Kite—though of square plan form there is a rudimentary "bird" appearance.

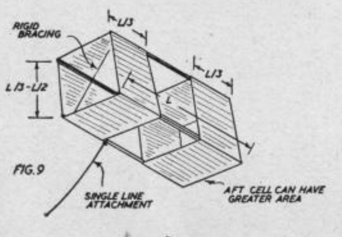


Fig. 9 : The Box Kite—always a popular type, and reputedly of twentieth century invention.

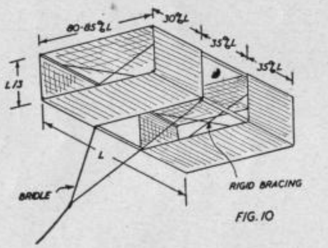


Fig. 10 : Rectangular Box Kite—a variant on the common box kite developed on scientific lines.

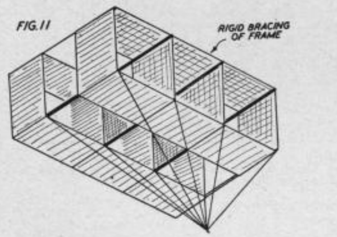


Fig. 11 : Multi-cellular Box Kite—the ultimate in box kite development.

angles to the longitudinal axis of the kite. The most common failing with kites of these types is that the makers have ignored the question of balance. A properly balanced eddy kite is probably the most efficient of the lot. A light eddy kite will fly in the gentlest of breezes, whilst a large, strong eddy kite will successfully ride out a gale and remain airborne almost indefinitely, as long as the wind is blowing.

A more modern kite in the popular class, however, is the *hexagonal*-shaped *kite* of Fig. 7. Here there are few details on which the constructor can go wrong. Balance is relatively unimportant for a three-string bridle is used and lateral balance is simply achieved by making the two "legs" of the front "V" of equal length. Under wind pressure the kite cannot do anything but ride level. The third string is attached to the centre of the framework and adjusted to give a flying attitude of some 15 to 20 degrees, as shown. This angle will actually depend to a certain extent on the longitudinal balance and length and weight of the tail, but can readily be adjusted when trimming. A tail length of at least five times the ((diagonal) length of the kite is desirable. Otherwise none of the dimensions is particularly critical. This is the type of kite, incidentally, which is strongly recommended for a first attempt at kite design.

More tricky to handle, but much more exciting to fly, are the *Indian kites* of Fig. 8. These are of square plan form with what is virtually a bow kite frame with the bow located farther aft than usual. The outline of the square is formed by the tissue covering, strained taut by the bow. The covering is glued to the central stick members and "bound" to the tips of the bow.

Only a small tail is used, cut usually from stout paper and glued to the covering. The approximate size of the tail, and other relevant dimensions, are summarised in Fig. 8.

Once again lateral balance is very important on a kite of this type. With only a single "V" bridle, unless the weight of the kite is balanced about the centre stick it will tend to tip over and slide off to one side. Longitudinal balance is not so important as in the case of the eddy kite, and any diving tendencies can usually be cured by adjusting the point of attachment of the flying line.

All of the kites so far described have been of the "flat" type. The other main type is the *box kite*, either in its simplest form or multi-cellular "box". The box kite, incidentally, was the invention of a Mr. Lawrence Hargrave of New South Wales at about the beginning of this century. The rectangular-box type was derived from it by Professor Rotch of the Blue Hill Observatory at Massachussets, U.S.A. All these types are characterised by the fact that they are capable of taking up a more overhead flying position than most of the "flat" types.

Basic proportions of the simple box kite are summarised in Fig. 9. The four longitudinal members are braced apart in the form of a rigid box skeleton with covering strips applied around the two ends. Properly made, a kite of this type will fly on a single line with no bridle attachment, the line being tied to one of the frame members immediately aft of the front covered portion, or front "cell".

Another interesting form of this type of kite is the *rectangular box* (Fig. 10), which is somewhat more efficinet than the square box. This design was developed along scientific lines and it will be noticed that the rear lifting "cell" has greater area than the front "cell". This is because the rear cell is operating in the downwash of the front cell and is, there-lift, more area is given to the rear cell. Such kites

fore, slightly less efficient. In order to equalise the have greater lifting power on account of the greater area of horizontal surface employed.

Incidentally, although all square box kites of this type should fly quite well on a single line attachment, this fact appears to have been ignored by many modern kite fliers who persist in using a bridle. A bridle, admittedly, gives more positive stability and perhaps is preferred for this reason. There is, of course, one noticeable difference between the flight attitude of the square box kite and the rectangular box. The former flies "diamond fashion" whilst the rectangular box flies "flat". Hence the need in the latter case for a twin line attachment.

For greater lifting power, multi-cellular box kites have been developed, a typical example being shown in Fig. 11. These are rather like three or more square box kites joined together, or a rectangular box kite with additional vertical panels. In actual fact the rectangular box of similar overall dimensions should have a similar lifting power to that of the multi-cellular kite, which in any case flies "flat" like the rectangular kite. On the same basis the multi-cellular kite should have increased rear cell area like the rectangular kite, although it is more common to see equal "box kite" cell areas employed. Two further differences are that the multi-cellular kite usually has added vertical surfaces between the two cells and often a rather complicated bridle system.

As regards the range of sizes applicable to these various types of kites, the simple square box kite, as mentioned previously, can be built right down to a length of 6 in. or even less and still operate successfully. In such small sizes, of course, very light material would have to be used for the sticks, such as $\frac{1}{16}$ in. square balsa, with lightweight tissue covering. Balsa wood in fact, is an ideal frame material for the smaller sizes of kites of almost every type. Once the spar member length exceeds about 15 in., however, hardwood such as spruce is to be recommended.

Similarly with covering. Lightweight tissue paper as used for model aircraft covering is ideal for the smaller kites. A grained tissue such as Japanese tissue is to be preferred as possessing greater strength. Lightweight cloth material or nylon is better for the larger sizes. Lightweight silk is seldom satisfactory since it is too porous.

A good size for a *bow kite* is a length of 36 in., which then uses stock sizes of wood. The main member could then be 1 or $\frac{3}{4}$ in. x $\frac{1}{4}$ in. spruce or birch and the bow about $\frac{3}{8}$ in .square of the same material. Bamboo or cane could also be used for the bow.

Eddy kites can be made larger with advantage. A minimum length of, say, 3 ft., and an optimum length of 6 ft. In the latter case the two members could be $1\frac{1}{4}$ in. x $\frac{1}{2}$ in. straight-grained spruce.

Hexagonal kites are successful from a length of about 10 in. upwards, with a possible top limit of about 30 in. Structure weight is rather high with kites of this type and both a very small and very large frame suffer on this account. Balsa spars could be used for the small sizes, spruce for the larger frames.

A good size fo an *Indian kite* is about 15 in. square with a $\frac{1}{4}$ in. x $\frac{1}{8}$ in. hardwood or bamboo backbone and a bamboo bow of roughly $\frac{1}{8}$ in. dia. To be successful, the frames of such kites should be made as light as possible. Covering would then be standard model aeroplane tissue with the tail cut from brown paper or stiff writing paper.

Finally, a few brief details on two of the more popular variations on "straight" kite flying—kite fighting and "team flying". "Fighting" is carried out simply by manoeuvring one's kite so that the line passes across the opponent's kite line and then cutting through his line with a sawing action. Generally part of the kite line is made abrasive by coating with emery powder or powdered glass. Such a line can be a most effective "cutter"—and not only to other kite strings! — and so care is needed in handling such a line, especially when paying out or reeling in.

A favourite "formula" for "cutting powder" is to pound and grind up fragments of glass in a bowl or mortar and then sieve through fine muslin. The powdered glass collected is mixed with thin glue and then "painted" on to a length of the line. The line is strung up between two posts and the "paint" applied with a cloth and allowed to dry. Fine emery powder is also as good a cutting medium as powdered glass and is sometimes preferred.

In "team flying", two or more kites are flown on the same line. The most usual way to do this is to fly each on a short individual line attached to the main line (Fig. 12). The main line must, of course, be of double or treble strength to take the increased pull. Another method is to attach each kite to the one below it (Fig. 13). This needs care, otherwise the whole balance of the team may be upset. In the case of eddy kites, for example, each succeeding line is attached to the balance point of the kite below it, and so on, forming a most effective team with considerable lifting power. Box kites do not react so well to this treatment.

All told, in fact, there is still a lot of fun to be had in designing and flying model kites!

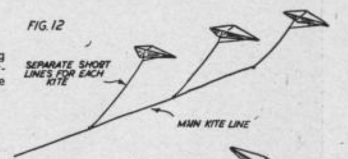


Fig. 12 : Team flying of kites, with kites attached to a main kite line.

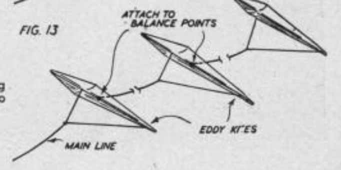
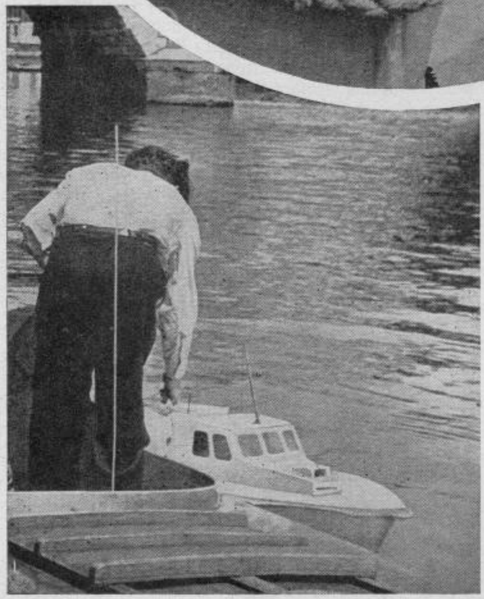


Fig. 13 : Team flying with kites attached to each other.

A RADIO CONTROLLED BOAT

MODEL MAKER ATTENDS THE FINAL TRIALS OF A POTENTIAL CROSS CHANNEL MODEL VENTURE

Circle left : George Honnest-Redlich at the transmitter with Jack Ballard watching critically in the background as the boat is brought close alongside at speed.



Lower left : Starting the engine with a cord from the boat — a manoeuvre which also requires some practice !

Top right : Tuned reed receiver — the prototype of that installed in the boat, and described in G.H-R's. book "Radio Control for Models."

Centre right : Checking over the radio equipment on the landing stage before setting off on the trials.

Bottom right : A searching test of the boat as it is made to circle the transmitting launch in tidal waters just disturbed by the passage of a Thames pleasure boat.

The Project

EVER since his first experimental radio control set was mocked up George Honnest-Redeich has hankered after long distance voyages with the model constantly under radio control. Like so many others he has enjoyed to the full the various maneouvres possible with model craft of all shapes and sizes in the sheltered waters of the usual boating lake. But the requirements of a model intended for use in open water, amongst full-size shipping, and even at sea, were found to be very different from those normally available. Early attempts with scale and near-scale models served to confirm that such boats became waterlogged and were unsuitable for the full-size waves of even quite a moderate sea. What was wanted was considerably more beam, reasonable draught, and quite a bit of tumblehome.

The Model

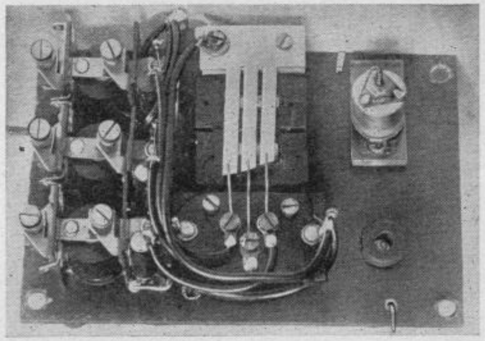
A model that pretended to no exact scale was therefore designed with these objects in view. For an overall length of approx. 5 ft., a beam amidships of nearly 2 ft. was provided. Adequate weathering was provided by nearly 9 in. of hull above water, with tumblehome to the upper part. The proportions generally follow something between a yacht tender and a pram dinghy. To give some "scale" appearance a simple cabin and deck structure was provided with a ship's boat—much undersize! — duly installed. Non-essential detail was omitted as with a working boat it is inevitably knocked off during its first trials.

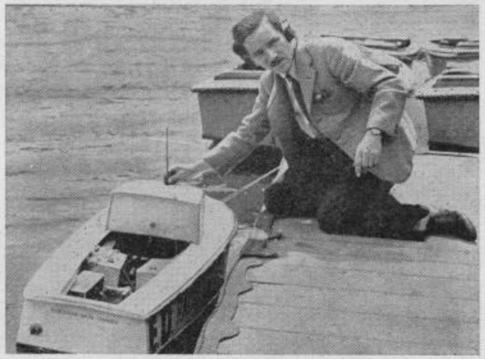
Hard chine construction was followed, using $\frac{1}{8}$ in. resin bonded ply of sufficient strength to take care of any unnoticed driftwood and the like encountered in open water. All up weight with batteries, fuel and radio equipment was approx. 60 lb.

As this was and is essentially a commercial project undertaken on behalf of Electronic Developments (Surrey) Ltd., for whom he has developed their range of radio control apparatus, no attempt was made to design special equipment for the boat, but only to adapt items already marketed by them. In this the Works Engineer Bernard Miles gave valued assistance in the installation of power plant and with necessary mechanical advice outside the realm of electronics. A standard E.D. Mk. IV 3.46 c.c. diesel engine was installed, with the addition of water-jacketting, fed by thermo-siphon from a header tank placed forward, with cooling fins, and appropriate air ducts for cooling. In lengthy trials this has shown no signs of boiling, but for really long distance voyages will be increased to the maximum capacity consonant with weight and area available.

The engine is fed by two "grand piano" shaped tanks containing $1\frac{3}{4}$ gallons of fuel in all, gravity fed through a float chamber to the engine. Standard E.D. silencer equipment is also in use. Apart from the tanks which are simple soldering jobs, all the items mentioned are stock equipment available from E.D.s.

The two fuel tanks are so placed over the centre of gravity of the boat that as they empty no disturbance of trim will be involved. Apart from their piano shape—chosen to give easy starting access to the engine, they are also of





greater depth aft than forward.

Propeller is of about $2\frac{1}{2}$ in. dia., $1\frac{1}{2}$ in. pitch, and was the result of several experiments. At the moment the engine is revving at about 7,000 r.p.m., but it is intended to reduce this rate to a figure somewhat nearer full-size practice by suitable gearing down. The screws were made up from a turned boss and two silver soldered blades, assembled in the rough and carefully filed up to shape and balance.

Steering is by two rudders placed out of the screw wash to enable "inching" movements to be achieved with a reasonably large amount of movement, without sacrificing the ability to execute a "crash turn" in emergency by a hard-over lock.

The mechanics of the steering system have been kept simple, and comprise a threaded rod running across the full beam, and connected to the rudders by a link motion. An electric motor drives a threaded bush back and forth along this rod thus giving unlimited movement so long as contact is held in the "on" position.

While any standard receiver would operate the mechanism, George has installed his own favourite tuned reed receiver, a variant of which will ultimately be on the commercial market. This can be regarded as a personal choice of the expert and is not by any means essential for a reliable operation.

River Trials

We were invited to attend the final trials before the experimental boat proceeds under radio control from Richmond Bridge to the South Bank site—a voyage which has now been accomplished—followed by Festival demonstrations. After this there remains their ambitious cross-Channel trip to be attempted when the waters between Cap Griz Nez and Dover are comparatively free of would-be swimmers.

On this occasion the engine started from cold with three flicks of the cord, and after warming up at the boating stage was taken aboard the control launch and started equally speedily from the boatside. Thanks to the silencing system it was remarkably quiet for a diesel of this size, though even so was louder than the marine engine installed in the launch!

Control was perfect on the river, it being possible to take the model in circles round the launch while proceeding up or down stream, bring it close in and shave the boat by less than a foot, or allow it to proceed fifty yards away. The arrival of an inquisitive Thames Police launch demonstrated its stability even with fairly large craft setting up wakes. Finally a public pleasure cruiser set up a bank to bank wake that rocked the landing stage but did not disturb the model.

After exhaustive tests the model was brought in to dock and examined. The water header tank could still be touched with the back of the hand. No water had been shipped. The only moisture in the bilges came from a leak in the exhaust system where the bolts had not been tightened up.

We see no reason why this boat should not be the first to cross the Channel under radio control, and would wish Jack Ballard, enterprising Managing Director of E.D.s, and his team every success in their venture.

HOW ACCURATE IS YOUR LATHE? ASKS J. W. G. BROOKER

THE other day, praising my E.W. lathe for its precision, I was challenged by my friend to demonstrate its accuracy simply and quickly. He knew that as an alternative to elaborate straight edges and rods and gauges one would just close together the two "centres" to show that the tips would exactly meee point to point.

To my mind this is inconclusive apart from the fact that the test lacks any magnification of any imperfection in the alignment, so necessary when assessing minute errors. The test too, is invalidated by even the slightest damage to either or both the points.

Momentarily puzzled, I hit on the idea of removing the tailstock barrel from its housing and fitting it in the Burnerd 3-jaw self-centring chuck mounted on the nose of the mandrel. The jaws of this chuck absorb a length of $\frac{5}{8}$ in. of the barrel, leaving about $3\frac{1}{2}$ in. in the open air. It is hardly necessary to emphasise that the slightest error in the alignment of the headstock bearings and mandrel and/or of the seating and setting of the Burnerd chuck would on rotation cause the outer end of the barrel to describe a circle having a diameter greater than the actual diameter of the barrel itself.

Next I slid the tailstock body along the lathe bed towards the headstock noting that the barrel firmly held at one end in the chuck smoothly entered its other end into its housing in the tailstock—a perfect mating. Finally locking the tailstock to the lathe bed it was noted that the mandrel carrying chuck and barrel could be rotated with a touch and without a suspicion of friction or binding in the tailstock.

It should be stressed that neither the mandrel in its bearings nor the barrel normally in the tailstock exhibit the slightest shake even when warmed up by a period of working, yet they turn freely.

This test was acceptable as showing the perfect alignment of headstock bearings with tailstock, and the accuracy of the lathe bed. Should my readers fail to get a like result he should not necessarily blame the manufacturer of his lathe. A little heart searching is called for as inconsiderate treatment either when installing or in use can be the explanation.

PHOTOGRAPHING LAUNCHES

A PRACTICAL ARTICLE ON AN EVENT WHICH MANY HOLIDAYING MODEL MAKERS MAY ENCOUNTER

WHEN the question of attempting to photograph a launch is raised the instinctive idea is to try and get right into the shipyard and close up to the vessel.

This is a great mistake from the amateur's point of view, as from crowd level there is very little chance of obtaining any comprehensive pictures of the proceedings—if indeed any pictures at all. At a spot close to the slipway little more than a few square feet of the ship's side can be got into the finder, while further back amongst the crowd the people themselves get in the way, to say nothing of sheds, cranes and other yard equipment. The nice pictures of launches one sees in the press are usualy taken from the launching platform set at the bows or from special press daises if the event is of considerable importance.

Actually the best positions for the amateur are generally found completely away from the yard, at some location where the vessel, stocks and slipway can be seen nearly broadside on. Here the vessel can be snapped at any desired position during its slide into the water — before she begins to move halfway down, or finally afloat. Indeed, from such a viewpoint a complete series of pictures in sequence, which fully record the launch can readily be obtained if one is fairly quick in winding on and re-sighting.

With a lens round about 5 in. focal length (see the "f number" on the front of the lens of your own camera—this is the focal length), anything up to 1,000 yards away will give an image of quite a good size, and if the pictures are reasonably sharp—which they should be as the camera will be working on its infinity setting—they will make very satisfactory enlargements if so desired.

Taking at this range, and in the strongly actinic light found generally over water, the ship must be regarded as a "distant scene" for reckoning any exposure from a chart. With distant scenes the exposure necessary is less than for near-in subjects in the same light. If the same exposure was given the vessel would come out hazy and over-exposed. Should you be accustomed to working always with, say, 1/25 second, then this exposure can still be used if the lens is stopped down. Thus if for any particular light you have invariably got good pictures with the 1/25 second exposure — the lens opening being f8, then carry on the same, but put an f11 stop before the lens. This will do all that is necessary. The smaller stop will also help to give extra good definition.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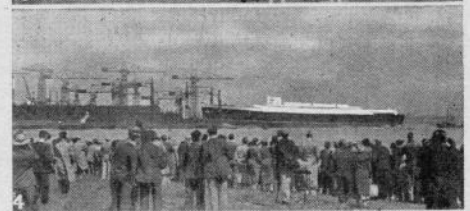
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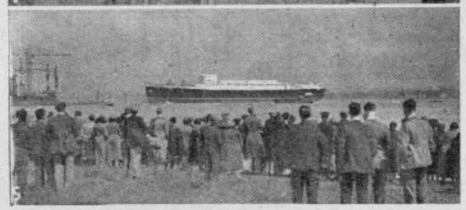
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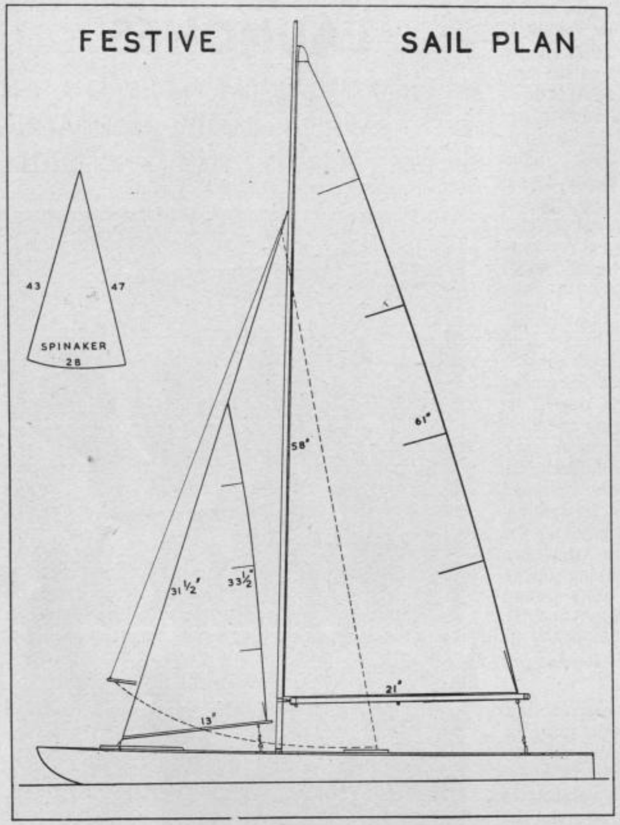
Figs. 1 and 2 show the vessel on the "slips". The bow cradle can just be seen.

Fig. 3. The ship enters the water. Note that the launch is made stern first.

Figs. 4 and 5. The great moment has arrived and the vessel is afloat out in the river.

(*Continued on page* 564)

W. J. DANIELS' NEW MARBLEHEAD DESIGN



FESTIVE

Part IV deals with casting of the lead keel, and making the necessary moulding boxes; Spars and Sail-making; finishing of the Deck.

Earlier instalments have appeared in *Model Maker* as follows:

Part I (May): Building board, moulds, backbone, reduced size lines, and progress to "in frame" stage.

Part II (June): Planking the hull, building up the fin, deck beams, fixing the deck.

Part III (July): A photofeature illustrating points in planking, fin, backbone and ribs.

Back numbers of any or all of these issues can be obtained from these offices, price 2/- per copy, plus 2d. postage.

Full-size lines are available through *Model Maker* Plans Service, price 7/6 post free, or 9/- if required to be despatched rolled in stout card tube.

BEFORE varnishing the inside of the hull it should be thoroughly cleaned up removing all surplus glue, etc. Before the deck is permanently fixed the mast step and stern tube for rudder must be made and fitted in position.

Lead Keel

While the deck is being prepared the lead keel and fin appendages have to be given consideration. You must at this point make up your mind if you intend to steer by vane or quadrant.

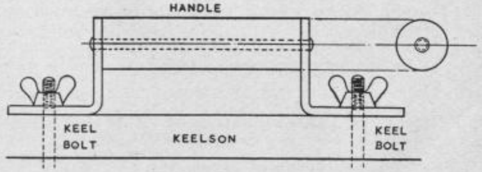
If the former is to be selected you must attach layers to bring the depth down to 4½ in. or 5 in. in the case of quadrant steering.

The remainder of the fin can be glued up and shaped.

It will be obvious that if the pattern for the lead keel is cut exactly at the lead line shown on the drawing the wood removed by the saw will leave a gap. The procedure is to draw another line ¼ in. away parallel to the lead line and cut so as to leave both lines showing.

The piece that is for the lead pattern can then be planed to the lead line leaving it slightly full to allow for shrinkage. The joints of the layers will make it apparent if you have this face truly square.

The piece that will form the deadwood of the fin can also be planed to the line and a ¼ in. piece glued



on to fill the gap. After the keel is cast and finished up it can be placed in position.

The keel bolts are now passed through it and given a tap to mark their position. The holes can then be drilled right through the backbone. Make the bolts of $\frac{3}{16}$ in. drawn brass rod. Brass wing nuts can be obtained and these should be arranged as illustrated with a handle for carrying.

The keel pattern should be given a coat of turps and varnish and papered very smooth.

The smoother the surface the less finishing will be required for the lead casting. The simplest way to obtain the lead keel is to get it cast from your pattern at the foundry, but as we are building the model for the purpose of instruction and the satisfaction of having done it all the following is the procedure.

Casting Box

It is necessary to make a casting box. This really is two half boxes each with no lid or bottom. Each has a fillet of about ⅜ in. square beading around the inside of the upper and lower edges. These are to prevent the moulding sand from falling out. The half boxes should be fitted with locating lugs so that they go together exactly when assembled. One side should have three holes along the joint about 1 in. dia.

One half box should be laid on a flat surface and filled with moulding sand, the latter being packed as hard as possible. The pattern is now offered to the box and the outline marked. Sand is now dug out to enable the pattern to be fitted in half-way. By continually putting the pattern in and noting where it is touching you will set it to a dead fit. Now sprinkle either brick dust or parting sand over the surface of sand and pattern.

The other half box is now placed in position and filled with sand, the latter being packed tight and then levelled off flush with the top edge of box.

The top box is now lifted off when you will have half of the impressing of the pattern in each box. It is much simpler to cast the bolt holes than to drill them, so in order to do this it is the practice to have short lengths of rod protruding top and bottom of the pattern at the bolt positions.

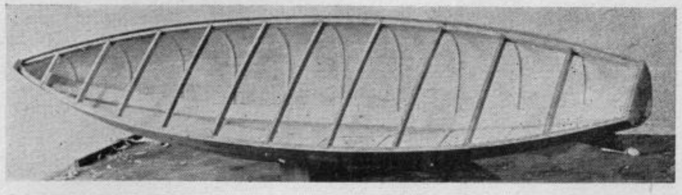
These are known as core prints and they will make the impressions in the sand where the cores will be placed. The cores consist of rods the same length as from top to bottom of the core prints. These are blacked over a candle flame to prevent them from welding to the lead, and placed in their respective positions. It is the practice before removing the pattern from the box to pierce holes right through the sand to the pattern with a long hat pin. This will enable air to escape and avoid the possibility of blow holes. After removing the pattern three channels are cut from recess left by the pattern to the holes in the point of casting box.

The boxes are now carefully placed together, securely held, and stood with the pouring holes uppermost. You will require about 25 per cent more lead than the finished casting. This must be melted in an iron pot. If the lead is old and inclined to be dirty the dross can be brought to the top and the lead cleaned by the application of a small quantity of sal ammoniac. The dross can be removed with a strip of flat wood. It is important that the lead should be at the right heat and this can be tested with an off-cut of your decking. It should start to char the wood in ten seconds.

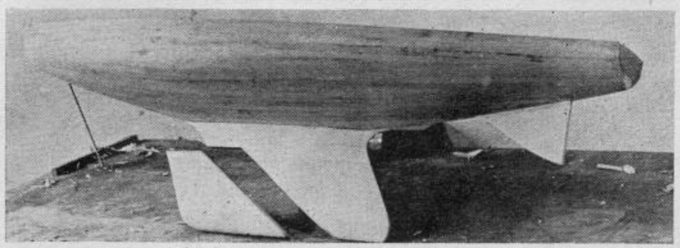
Now pour the lead through the centre hole until you see it rise in the other two holes. After leaving for a sufficient time to cool the boxes can be separated and the cores and runners removed and the lead keel given a finish with file and fine glasspaper.

Deck

Having carried out all the operations described the deck can be fixed. In cutting it to shape about ⅛ in. of fullness should be allowed as the curvature

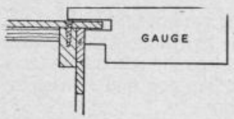


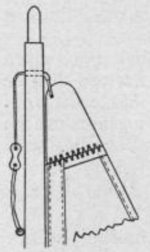
Right: The planked hull with deck beams fitted. The inside has been varnished or under coated to ensure a watertight finish, and prevent any rotting of the wood through water shipped through the hatch when sailing.



Right (lower picture): The planked hull with fin fitted, the pattern for keel (for use with Vane steering) has been cut away, and the edges faced as instructed.

Left: Diagram showing use of keel bolts to fix the carrying handle—a necessary fitting where weight begins to mount up, which avoids any undue strains on the hull.





Left : Use of a gauge to mark the pin line on the deck and thus ensure even alignment : dividers will take care of spacing.
Right : Mast head details, showing metal head board, mainsail halliard. Note reduced taper where burgee will be flown.

of the deck will tend to make it narrower.

First, tack it on temporarily, and making gauge as illustrated, mark a line around the top face. This will enable you to get all the pins regularly over the rail. Go round this line with your dividers set at $1\frac{1}{4}$ in., and mark the position of the pins, so that they will be evenly spaced. A pencil line drawn round the topside will give the deck line, and it can be trimmed to this line. The deck can now be fixed permanently varnish being used to seal it.

The deck can now be lined to represent planking. This can either be to the old fashioned straight lines or lines parallel to the deck edge as the modern fashion. The deck coamings and transom piece can now be fitted. These should have had a previous coat of varnish and after fixing the whole can be given a finishing coat.

Spars

The spars for *Festive's* first suit will be mast, main boom, jib boom and spinnaker boom. The diameter of the mast should be $\frac{1}{2}$ in. at the keel, $\frac{5}{8}$ in. in the centre tapering to $\frac{7}{16}$ in. at head. The wood for this can also be obechi, or aircraft spruce. First plane it square to $\frac{5}{8}$ in. and, choosing which side will be aft, the latter should be kept straight. Using this side as the base, mark off the points stated and with a spline draw the curve of the taper on the two sides and plane down to the lines keeping the spar in the square.

The spar can now be made octagonal after which it is easy to glasspaper the spar round. When putting the ferrule on the heel of mast care should be taken to arrange the slot that fits over the mast step so that the straight side of the mast comes aft.

The other spars can be produced in similar manner. Jib boom and spinnaker boom $\frac{3}{8}$ in. parallel, the main boom should be $\frac{1}{2}$ in. if a box-footed sail is used but need only be $\frac{7}{16}$ in. if the sail is laced on the foot.

Sails

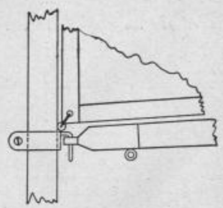
Perhaps of equal importance to a correctly designed and built hull is the cut and set of the sails. The most perfect airfoil is a flat triangular piece of cloth with the base held dead straight by a wire stay. It stands to reason that if a sheet is attached to the free corner, the cloth will, when held to the wind, assume a shape that will equalize the pressure over the whole surface. In the case of the mainsail however, it is necessary to reinforce the foot of the sail as well as the luff, and this necessitates cutting the cloth so that when the luff and foot of the sail is straight sufficient cloth is slack to allow the sail to take an efficient shape. The writer has found that by making the luff of the mainsail dead straight and cutting the foot convex, the form of which must be a parabolic curve with its deepest point nearest the luff of the sail.

The cloth should be pinned down to a flat surface. Mark the lead of the sail allowing enough for the hem. All sails should be hemmed at the leach. The jib should be true to plan.

Having marked out and cut the cloth to pattern the leach of mainsail and leach and foot of jib should be first hemmed. This is best done on a sewing machine, in fact all should be machined as it is very difficult not to stretch the raw edges of the cloth. After hemming the binding must be applied. First fold the tape by creasing it over an edge and then fold in about an inch. Start at the clew of the mainsail, place the cloth in the folded tape and bring tne foot of the sewing machine down so that the needle pierces the inner edge. Then lift the foot and place the cloth in the fold for about 6 in., whilst giving a pull to the tape. Lower the foot of the sewing machine and sew along the inner edge of tape until the tack is reached, then cut the tape. Start again from the tack of sail with a 1 in. fold, and proceed as before pulling the tape tight and feeding the cloth into the fold without stretching or creasing. Fold in an inch of tape at the finish. The jib should have a narrow strip of tape sewn on the flat from tack to clew to take the strain, the luff being taped as per mainsail. A second row of stitching should be run down the tape to keep it flat. The beginner will find that a flat spinnaker will give less complication than an attempt at a parachute one, the luff only being taped, the foot and leach being hemmed.

The mainsail can either be laced to mast and boom or provided with hooks. In the case of the latter method a jackstay must be fitted. This consists of a wire passed through small screw-eyes placed at suitable intervals along the spars and fixed at the ends, the hooks on the sail being arranged to come intermediate between the screw-eyes. A head board of aluminium or other suitable material is sewn at head of mainsail.

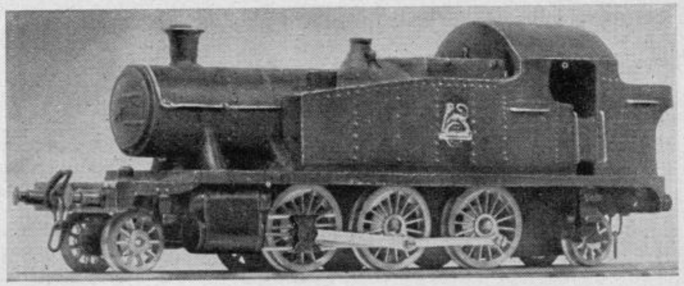
When sewing on the sleeves for the battens the opposite procedure to taping the sails must be adopted inasmuch as you must give a slight pull to the cloth and let the tape be as slack as possible. Do not use too small a stitch, and do not have the tension of the sewing too tight.



Goose neck and mast band showing attachment of mainsail.

MODEL MAKER BUILDS AN ACRO LOCO

Described by MAURICE BRETT



ONE of the latest additions to the Acro range of model railway kits and accessories, is this 00 gauge G.W.R. 4500 Class tanker kit. This kit makes up into a convincing little scale model of one of the less glamorous, but nevertheless very necessary, types of loco which in various forms are to be found doing the donkey work on lines and at depots all over the country. This type of loco is just as important on a model layout as in full-size practice, a fact which a lot of modellers seem to overlook. After all, you won't find three main line locos for every tank loco on a full-size railway, so why do it on the model layout? Fortunately these tanker types of model are usually cheaper than the larger express locos, this one in particular being quite reasonable. The cost of the complete kit is £2/0/4, wheels and motor, etc., extra.

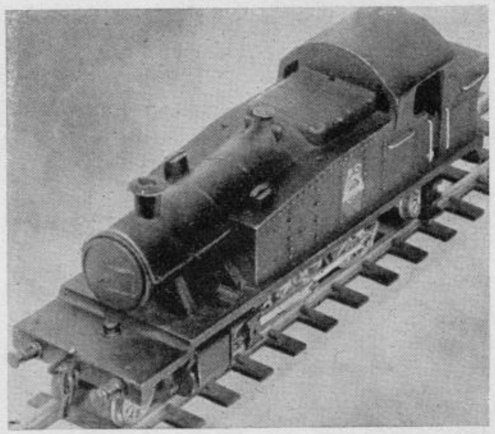
You will note from the photographs that our model is painted a very dull sooty black. This is the finish on the parts as received in kit form and as it rather befits the appearance of the hard worked full-size loco we decided to leave it. We must apologise for the inaccuracy of the wheel colouring, but they were left natural metal for photographic purposes. The model is, of course, shown in British Railway colours and crest, but it would look just as well in the familiar G.W.R. green (some there are who would say very much better!).

Now, about the kit itself. The main items are the cast body and cast mainframes. Both these are heavy lead base casting with a low melting point, so if there is any soldering to be done extreme care must be taken to ensure that you don't melt a large area of casting. The body casting which includes boiler, water tanks, cab, and footplate, etc., is quite clean, and includes a lot of detail, such as rivets and small fittings. Steam pipes, footplate steps, funnel, safety valve, are also cast integral with the body.

The two cylinders and the pony truck are cut in the same material as are some of the smaller detail pieces such as the tank filler caps, smokebox door, crosshead slides. Other fittings included in the kit are buffers, vacuum pipes, coupling hooks and chains, wheel coupling rods, and wire for the handrails. All necessary nuts and bolts are supplied in 10 B.A. size though in some cases the screws are cast into the fittings. Wheels, motor, and pickup, are not included in the kit, as many modellers prefer to fit the motor of their own choice. Another factor in this matter of not supplying wheels and motor with the kit is the question of two- or three-rail running, and, of course, 16.5 mm. or 18 mm. gauge. Detailed building instructions are supplied, and if a super detail model is desired scale drawings are obtainable.

Assembly is perfectly straightforward, and very few tools are required, mainly a pair of pliers for bending wire, and a screwdriver. The mounting of the motor is left to the individual, though the mainframes appear to be shaped for fitting of the Zenith Mk. IV, but most other makes of motor may be installed by filing the motor seating to fit.

Although we have not had opportunity of testing our model under rigorous conditions (we still haven't got space cleared for our layout), good adhesion should result from the weight of the model. Apart from this, providing a good motor is used, the low gearing of the small diameter (18 mm.) driving wheels should give good initial pulling power.



Improving the Miniature Railway Layout

H. A. ROBINSON MAKES SUGGESTIONS ON GENTLER CURVES

A MODEL layout can be said to be as good (or as bad) as its curves. Straight track may or may not be well laid, but it is when the line swings away that faults really show themselves, and the biggest numbers of departures from real practice can creep in. This being the case, it is quite worth while giving curves and their characteristics a very close study with the view either of improving the running on existing track, or laying new track to the best advantage.

The first thing to realise is that in ninety-nine out of one hundred indoor layouts the curves have to be a compromise as far as radius is concerned. In actual practice the minimum non-check-railed radius on main lines is 10 chains or 220 yds., which in gauge 0 would be reduced to 15 ft., or 9 ft. in 00. In the average home both these figures, or even the reduced radii possible with heavy check-railing, are quite impracticable, and most workers are lucky if they can put in anything greater than a 3 ft. 6 in. maximum, this representing an actual 51 yds. radius. Many quite efficient lines, however, have to operate on a maximum 2 ft. curvature. But as will be seen, comparing with true-scale curves these figures are ridiculously small.

Thus, modellers must realise to start with that they are working with curves that are much underscaled, and this despite the fact that most items on the track perhaps are to true-scale dimensions. This anomaly in itself will explain away quite a lot of strange happenings. The comparison too, shows why curves should always be made as large as possible, for there is a long way to go before even nearing correct scale proportions.

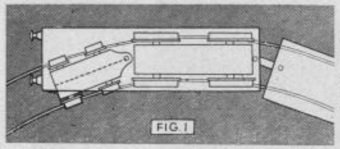


Fig. 1. The unfortunate position taken up by a bogey locomotive on a curve of too small a radius.

Small radius curves introduce the danger of derailment at speed, but the main trouble is that scale or near-scale stock just cannot accommodate itself to tight turns. This is perhaps most noticeable at the front end of the bogey locomotive. In actual practice, when looking end-on to an engine standing on a curve, the leading bogey wheels can certainly be seen to be pressed right over to one side or the other, but the buffers still retain their approximate position of right over the rails, and they would always engage with any other vehicle that happened to be before them. Not so with our model bogey engines on a small-radius curve, for here the buffers are well out to one side of the track as Fig. 1, as the frame, controlled alone by its driving wheels, has become a beautiful tangent to the curve. This is unrealistic, but also it quite prevents correct mechanical functioning of the front end of the engine in respect to other vehicles.

With scale coaches, etc., the under-scale curve has the effect of causing vehicle ends to present a too sharp angle one to another, which in turn gives a wrong angle to the pull of the couplings, and it also can cause buffer locking when the curve suddenly gives way to straight track (Fig. 2).

If very small radius turns are imperative, the troubles mentioned can be minimised by using short vehicles and tank engines in place of the bogey variety, and if one makes one's own stock, seeing to it that in every vehicle there is very little overhang from the leading wheels to the end of the frame. Building or obtaining stock to agree with the minimum curvature on a line is quite correct railway practice, so no one need have any scruples on this score.

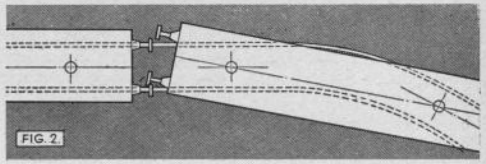


Fig. 2. Showing how long stock buffer locks when coming out on to the straight from a sharp curve. The danger of this trouble can be reduced by the introduction of transition curves.

There is an interesting rule which connects four-wheeled vehicles and curvature stating that the minimum curve over which they should work is equal in radius to ten times their wheelbase. Thus, gauge 0 stock of about 3½ in. wheelbase can operate over 3 ft. curves. For four-wheeled engines the coefficient given is 12. It is clear, then, that for a gauge 0 layout using 3½ in. four-wheeled vehicles only, a 3 ft. curve would give good running. With longer four-wheeled vehicles the radius would have to be increased.

There is a good deal of relativity about this curve business, but a number of authorities give as standards to be aimed at for gauge 0 — 6 ft. as main line minimum for fast running, and 3 ft. 6 in. for slow running; but in very confined space we are afraid this will amount to a counsel of perfection.

However, having struck our compromises let us consider some ways in which even the most underscaled curves can be improved. A few of the troubles of sharp curvature have been mentioned, buffer-locking on leaving for the straight being one. This trouble can be greatly avoided and much better running given by putting in "transition curves". This rather high-sounding name simply means that instead of swinging the track from the straight to the full curve suddenly, the minimum radius is approached by a steadily-increasing curvature. This means that the change of direction is more gradual (see Fig. 3). While the decrease of radius from the straight should have almost calculus precision, in practice a transition curve can be obtained by building the curve at first to a rather greater radius than finally required and then moving the track inwards at (A) in the figure. Only a slight sideways adjustment is necessary, but this has the effect of giving an increasing curvature lead-in and brings the middle of the curve to the allowed minimum. To carry out this, the whole stretch of track must, of course, be temporarily loose on the baseboard. This procedure shortens the straights at either side and increases the area taken by the curve, but so great is the improved running that adjustment of this nature is quite worth while.

Apart from preventing buffer-locking at the point of exit, transition curves mean that the whole change of direction can be made at speed with greater safety. When entering a curve a vehicle gets a sideways velocity in addition to its forward motion. This is supplied through the flanges of the outer wheel. If the new velocity is imparted too suddenly the vehicle cannot respond quickly enough, and trying to move in the same straight line topples over sideways. A transition curve imparts the new sideways motion gradually, and thus greatly reduces the danger of this kind of derailment.

If used for fast, or even medium running, curves can and should be improved by super-elevating—that is, setting of the outer rail higher than the inner. This can be effected by either raising the outer rail or dropping the inner, but a little of both is the ideal. Super-elevation, by bringing the centre of gravity of each vehicle inward a little tends to reduce the danger of toppling over at speed. In sidings, loco depots, etc., curves can be left flat.

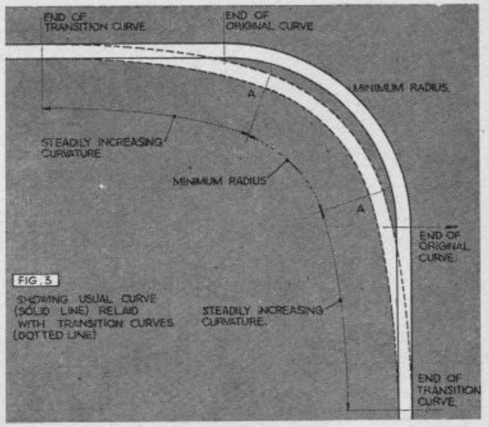
Super-elevation is not just a haphazard tilting of the track but is a precise angle, and this is given for gauge 0 by the formula

$$\text{Super-elevation in inches} = \frac{1}{\text{Radius in feet} \times 4}$$

This is for slow running. For fast running the figure obtained should be doubled, and for a 4 ft. radius curve it works out to about ⅛ in.

In 00 the super-elevation in inches is given by $\frac{1}{\text{Radius in feet} \times 7}$ for slow running, and the figure for fast running is obtained by increasing by 25 per cent.

If you would like a very accurate figure worked out against the speed of your trains, etc., there is a formula that will give this, but the above is sufficiently accurate for small model work.



A fault which often occurs on track made up with scale lengths is that the joints tend to take up an angle as Fig. 4 instead of being a smooth curve, and this even though the track is supplied with stiff slip-on fishplates. The only cure here is to give the end of each rail a definite turn inwards. Curvature elsewhere can generally be secured by making use of the springiness in the metal without having to introduce any bend beyond its "elastic limit", that is, beyond the point where if the pressure of the chairs was released it would spring back to the original straight. But the last inch of rail-end invariably stands out as a stiff tangent, hence the need for the deliberate bending here. The trouble is most noticeable in small radii curves.

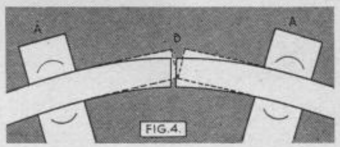


Fig. 4. Showing how joints on curves sometimes take up an angle. This trouble can only be cured by definitely bending the rail between A and B.

Loss of locomotive power on curves is due to several things, and again much can be done to help. In straight running the flanges never truly rub against the rail, the action being a gentle sliding of one surface over the other. Also the amount of flange below the rail level does not enter into the picture. On a curve, however, the outer flange is pressed hard against the outer rail. Moreover, it takes up an entirely different angle to the rail than in straight running. This new position can cause binding, for the distance now wanted between the rails is as (a) — (b) in Fig. 5 instead of (c) — (d), the former being obviously the greater distance. The point (a) is where the flange first contacts the rail head.

This danger of binding is eliminated by widening the gauge a little over the whole length of the curva-

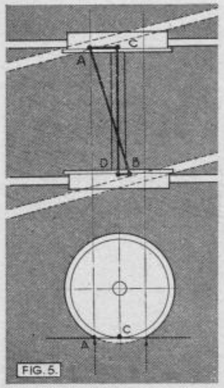


Fig. 5 explains why the gauge should be widened on a curve. The dotted lines in the upper figure show how the rails meet the wheels on a curve. To give clarity the angle has been exaggerated.

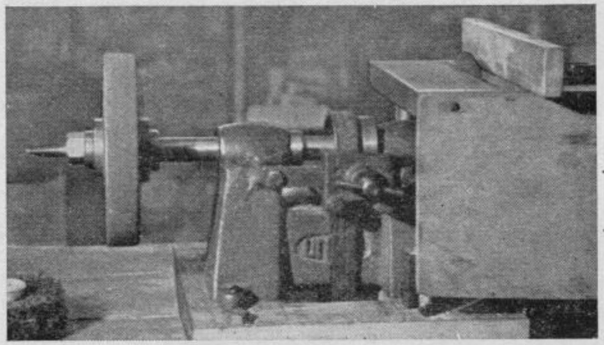
ture — the sharper the curve the greater the widening needed.

Another factor that causes drag on a curve is that the path taken by the outside rail is longer than that of the inner. Locomotives and other scale wheels are locked solid to their axles, however, which means that both wheels must give exactly the same number of revolutions despite the fact that one has to travel further than the other. This means that one has of necessity to slip, thus wasting energy. Invariably it seems to be that it is the outside wheel that does the sliding, not turning as much as really necessary for the distance traversed.

The oiling of this one rail only can greatly ease running without causing any spin of the drivers. The outside rail of curves therefore should be given an occasional wipe with an oily rag, the inside one being left dry.

Avoid check-rails if possible, as these absorb power on sharp curves, but better have them than continual derailments, and they certainly at critical speeds can prevent these unfortunate occurrences. If using a check-rail, continue it round and a little way on to the straight so that all wheels enter the channel between it and the running rail before the actual curve is reached.

Finally, if you find reverse curves are necessary, that is when a curve in one direction immediately gives way to one in the other, never have the two curves coming exactly together, but work a little straight track in between. This keep buffers in better alignment, and so prevents the danger of locking. It also stops that violent change of direction which, as pointed out, can be a cause of disaster.



Better Work from a Multi-Purpose Tool

BY E. E. GILBERT

ALTHOUGH multi-purpose tools are a boon and economy for the home mechanic, it may sometimes be found that the changing over of the various fitments required for different jobs absorbs a regrettable amount of the precious time that can be spent in the workshop.

That was one point which struck me when I acquired a small circular saw-cum-grinder-cum-polisher-cum-drill, with which it was necessary to dismantle the table and saw to put on the grinding wheel, and vice versa.

Another thing I noted was the good length of unoccupied spindle extending from the body of the machine to the coarse-threaded tapered tip for holding mops and brushes. If only the grinding wheel were sitting in that space, I reckoned, every function of the machine would be available at any moment.

I could see that the projecting piece of spindle would have to be reduced a little in diameter, to allow the grinding wheel hub to slip over. Also, a portion would have to be threaded left-hand, and replicas made of the pair of clamping plates supplied with the machine. These alterations, being rather beyond my limited experience, I had made at a local works.

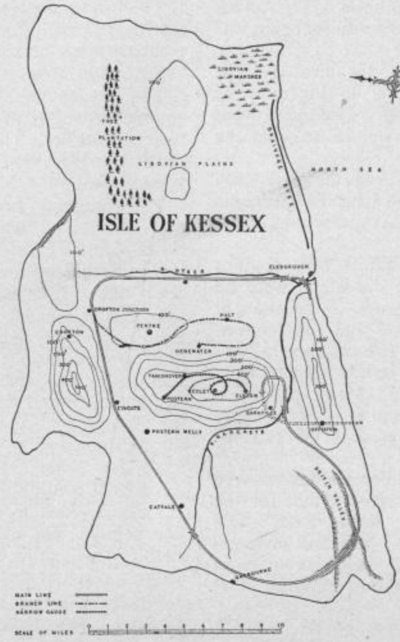
The result has been eminently satisfactory. Every fitment on the machine is always ready for use. Only for rare outsize jobs is it necessary to unship either grinder or saw. That the grinder has been moved out of reach of the fitted tool rest is a minor disadvantage which can easily be overcome either by a temporary or permanent rig-up.

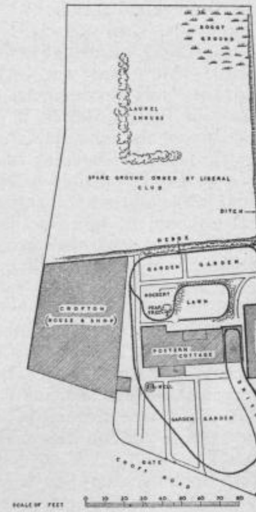
A fear that trouble might develop through having moved the grinding wheel from its position between the bearings to one outside, proved groundless. Otherwise, an extra bearing, for which there is plenty of room, would have been made and fixed in a support built up from the bench.

The fifty shillings the factory charged for the work has never been begrudged. A more skilled owner of one of these machines and a lathe, of course, could save himself even that.

The Kessex Railways

IN THIS INSTALMENT E. L. KILLICK GIVES THE FICTIONAL BACKGROUND OF HIS GARDEN LAYOUT





THE story which provides the background and location of these railways, starts with the original plans for a railway on a different site to that now being used.

The present site, which is "an island, privately owned", is to be served with a double track main line, a single track branch line, and an independent "highland" railway. The former are of standard 4 ft. 8½ in. gauge, and the latter 4 ft. narrow gauge.

The "island" derives its origin from the actual plot of ground on which the model lines will be built. Various districts such as coal mines, highlands, marshes, and towns, all have their origin in something appropriate in reality and in a similar position on the actual site used.

The lines have been planned to give both interesting running operation and at the same time to serve a "useful" purpose in their particular localities.

The original plans for these layouts were for a plot of ground in Kent, but owing to business, war, and finally personal matters, this site was abandoned last year. The present site is in Sussex, and so a combination of Kent and Sussex gave birth to "Kessex" and the "Isle of Kessex" came into being. Many town and village names bear some relationship to actual surroundings, as will be seen from the maps in Figs. 1 and 2.

Although the construction of the Kessex lines has only recently been started, and much of it is yet only to be seen in blueprint form, the story opens in 1936.

In that year a privately owned island off the south coast of England, was to have been developed into a small self-governing community within the United Kingdom. It was felt desirable not only to build railways for internal transport, but to link them to the S.R. on the mainland. Three internal railways were projected, between them serving all parts of the island, and two of them were to be directly connected to the mainland.

Plans were prepared, surveys taken, agreement reached with the S.R. for the mainland link-up, and orders were placed for much of the material required. Then in 1938 came misfortune number one — the collapse of the business in which the chief sponsor of the railway undertakings had invested his entire finances.

For over 12 months the project lay dormant, but in August, 1939, at a meeting held by those persons still anxious to proceed with the scheme, considerably modified plans were discussed. It was decided to adopt these new plans and orders were given to commence work without delay. It was expected that the first constructive work would commence in October of that year, but in September came misfortune

number two—war. With the outbreak of hostilities the complete abandonment of the second scheme was inevitable.

Throughout the war, however, the idea of these railways becoming a reality never faded from the minds of its sponsors, and in 1946 a third, and what was to prove final attempt was made to bring the project into actual fact.

During the two years 1947-1949 materials and equipment were purchased as and when they became available. Most was war surplus or second hand from other railway companies.

Early in 1950, however, it became very obvious that many of the inhabitants of the island were no longer in favour of building railways. Some thought it was no longer possible to build and run them at a profit, while others felt that the two previous failures to start should be taken as an indication that only failure could attend the project. Many people in fact showed very open hostility, and each day brought more and more difficulties to prevent the start of work.

By the middle of 1950, to the complete dismay of all concerned, it became very apparent that for the third and last time the scheme would have to be abandoned. A final meeting was held and arrangements were made to remove all the stock in hand to a storage site on the mainland, pending final disposal.

Two months after this meeting of the original company the former managing director received an invitation to visit a small island off the east coast of Britain—the Isle of Kessex. This island is also privately owned, with its own local government, but is within the United Kingdom. The outcome of this visit was the acceptance of an offer to investigate the possibilities of building railways to serve the island.

Without loss of time the first surveys were taken, and it was agreed that Kessex could best be served by building a main line round three sides of the western half of the island, with a branch line to serve the lowland part of the western interior. The highlands of the west were to be provided with a narrow gauge line having no direct connection with the other railways. The possibilities of direct connection to the mainland by bridge or tunnel were given a great deal of consideration, and it was decided to tunnel.

These first surveys were taken in July, 1950, and the first company formed to build the main line commenced operations the following month, with the construction of the tunnel from both ends.

The branch line, which is to be single line was commenced early in 1951, and is a privately owned independent line. The Highland line was commenced in March, 1951, and already a short section of track is under test.

The foregoing story shows how the existence of the need for railways to suit the site chosen for a model can be created. It also gives an idea of how one can build up the background story to justify the many and various features desired in the model.

In this instance I have been able to justify a fair size double main line and a short single track branch line. On the branch the simplest of running operation will be available, whereas on the main line there will be no limitations to size of train or locos due to the through connections with British Railways. This through connection will also permit the running of locos and rolling stock in B.R. colours as well as having our own individual colours.

I also wanted to have one part of the "0" gauge line portable for exhibition work, and in the next chapter I will show how this has been achieved while at the same time keeping to the original story.

Finally, the Highland line, which as you will remember is narrow gauge, gives me a portable "00" line. The reason for making it narrow gauge is because it is 16.5 mm., which works out at 4 ft. 1½ in., and so is much nearer 4 ft. than 4 ft. 8½ in. At first I thought of having it 2 ft. 6 in., giving a half-size (approx.) railway in comparison with the other lines, but that would have meant all personnel and scenery would have been to 7 mm. scale, and the layout would have been unsuitable for exhibition on its own. To overcome the differences in sizes for supposedly similar size railways the highland lines were created as existing with no direct communication with the other lines.

This month has shown how to create the story behind a railway, and is equally applicable to a small or large layout. Next month will show how the actual surroundings of the model are used and adapted to fit the background story.

A DRILLING TIP

IT is a guiding principle of machinery that "overhang" be kept down to the very least possible dimensions. In other words, that the tailstock or toolpost carrying the drill chuck or tool bit as the case may be, be brought as closely to the work pace as can be contrived. A toolpost, whether on a slide or mounted separately, can generally be worked into a position to eliminate overhang, but with the drill in a chuck fitted in the tailstock barrel the case is not so good.

In recent months I have discovered the value of stub drills in this connection. In the case of the ¼ in. stub drill its use cuts down the overhang by nearly 2 in. — a material difference, you will agree. The Dormer concern (The Sheffield Twist Drill & Steel Co.), specialise in a range of stub drills in high speed steel and they are very useful. Besides cutting down overhang the stub drill gives more working room at the faceplate or headstock chuck—a welcome benefit in the case of small lathes with modest length between centres.

Converting Hornby Locos to Two-Rail Track

BY A. J. EDWARDS

HORNBY locos although not super scale models offer unlimited possibilities to the man whose main interest is in operating a model railway. The scale fiends will call this "playing trains", but it has its fascination. In addition, the types of Hornby locos available are sufficiently like the real thing to give very pleasing effects.

It follows then that many operators may wish to convert Hornby products to share the work on a two-rail layout.

This conversion is easier than may appear at first sight. Hornby main axles are the same size as Romford or Hambling, so that standard wheels by these makers can be used.

First withdraw the pins holding connecting rods, then carefully punch the Hornby axles out of the wheels. Your care should be directed at protecting the main frame—the wheels will probably break anyway. Now you will realise, as I did, that you should have removed the magnet and motor armature before commencing work. Anyway, do it now before you do any more damage, and put the parts away safely, and be very careful not to lose the two tiny balls out of the bearing caps. Now proceed with removing the wheels and axles. The gear wheel on the driving axle is fixed by two grub screws.

The 0-6-2 tank loco is fitted as standard with 20 mm. wheels, but 21 mm. Romford type can be substituted with a little care, and a certain sacrifice of conscience. First of all the centre pair must either be flangeless, or you must file away the projecting lip on the frame that prevents them going on. I removed the wheel flanges, it's easier, having an elastic conscience. However, the alternative is not too difficult, and the righteous feeling is very nice, when all the wheels have flanges. Of course you may then find that the completed loco will not negotiate your curves in which case rectitude is wasted, but it's good while it lasts.

To return to the job: when fitting the wheels put thin washers behind the insulated ones to make sure that their rims cannot touch the frame. The rear pair may be found to come too close to the armature windings, if so it may be possible to squeeze the windings in a little, nothing harder than fingers for this job! If the windings will not give, even when assisted by ardent prayers, the solution is a little tricky. My method was to insert a tiny distance piece under the thrust ball in the bottom armature bearing and so raise the whole armature. The amount required is small, 0.035 in. in my case. It will be noted that this trick reduces the effective bearing length, but no ill effects have resulted in many hours of running.

Having made sure that all three pairs of wheels will run freely, we now come to the fitting of connecting rods. If Hambling wheels are used the pins are already in position. If Romfords are your choice then either drill holes suitable for force-fitting the original Hornby pins or drill No. 60 Morse tap 12 B.A. and use screws. In drilling and tapping the alloy used for these wheels, the application of a little paraffin will ease the job considerably. I prefer the screw method on grounds of ease of dismantling and replacement. The connecting rod holes need opening out with a No. 54 Morse drill to clear 12 B.A. screws.

Now if your drilling and tapping has been reasonably accurate you should have the main wheels running smoothly without tight spots. If not—but perhaps we should ignore such horrible thoughts.

The pony truck is easily dealt with, using 12 mm. wheels and a Peco Insulaxle. The pony casting really requires bushing to the correct size as the original axle is larger than the Peco. But it will run quite happily without this if you do not fancy the prospect. Do not forget to put fibre washers behind the wheels. (Peco again.)

That should complete the mechanical work, which brings us to the electrical side. An important point to remember is that the whole structure of a Hornby loco is electrically connected to one side of the circuit, and in case you should wish to do some double-heading it is essential that this shall be the same side on all locos. It is also desirable that all locos shall go in the same direction for a given track polarity. Elementary and obvious no doubt, but better thought of at the beginning of the job than the end.

There are many alternatives in types of pickups, but a good rule is to use the type that you have found satisfactory on your track.

The existing Hornby pickup can have transverse arms screwed or sweated to its shoes, extending outwards on the insulated side of the loco and terminating in small spoon-shape ends to bear on the railhead. These extensions should be rigid otherwise they will play Moussorgsky or other horrible noises when running.

If the wheel rim type of pickup is used it will be found helpful if the loco is weighted to improve contact between rail and wheel. In any case Hornby

locos are rather too light for their power.

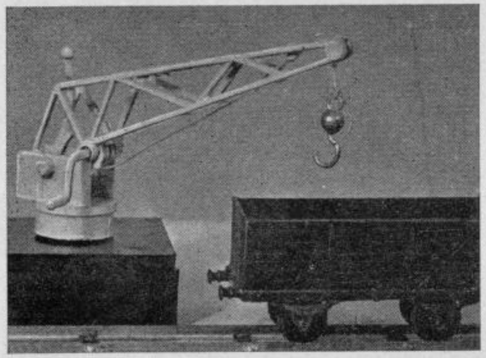
Most of the foregoing applies only to the 0-6-2 tank loco which is the most common type of Hornby in use and which makes such an excellent "maid of all work" on the average layout, but the basic principles apply equally well to the Gresley and Duchess types.

On the Gresley the required wheel sizes are, drivers 24 mm., bogie 12 mm., tender 12 mm.; for the pony truck I found ERG Masterpiece wagon wheels ideal. I know they have an incorrect number of spokes, but if anyone can see past those dummy axle boxes to count them, then he is welcome to criticise.

Reverting to the 0-6-2 tank, quite a lot of improvement can be brought about in its appearance if you feel inclined, and after modifying it to run on more realistic track it would be quite logical to add detail to the body casting in the interests of realism. A better shaped chimney can easily be fitted, and such small items as tank vents and fillers make a big difference. Of course, if you feel like a major rebuild the Hornby can be converted into a very fair imitation of an L.N.E.R. N.7.

Two-rail operation can get you to undertake all sorts of jobs that are just not worth while when that centre rail blots the landscape. Once started on the rocky road to realism one must take care not to become obsessed by a passion for detail, which can easily lead to all detail and no railway unless unlimited spare time is available.

It must not be thought that I am decrying the wonderful work done by people who go in for fully detailed accurate scale models. On the contrary I consider that their efforts are beyond verbal praise, but I have seen several enthusiastic but less skilled modellers sadly discouraged by some of these experts. Indeed I have suffered myself until I realised that only under very close inspection did the difference between the expert's model and mine become obvious. In any case there is room for all types in any hobby, except perhaps that awful chap who botches a job and then is too lazy to throw it away so he tries to camouflage it with an extra coat of paint. To put it in a nutshell: what you decide to do, do properly. A simple model, soundly made, is infinitely better than an elaborate one poorly made.



A USEFUL CRANE

BUILT BY W. S. HOPPER

BECAUSE on many model railways one sees a few crane models only one is liable to think that these are sufficient, and that they must all be of a pattern decided on by the goods department. Further, in a large number of yards today there are at least two cranes. The first and smaller is the old type with trusses strengthening a single spar rigid jib, the other, which has replaced it being mounted on a circular pedestal and having its jib built up out of riveted sections. These types are of standard design for any given railway and are likely to remain unless some other type is designed by British Railways.

For a large number of purposes, however, other cranes are to be seen in every industrial area. These belong to private firms and public utility undertakings which have to provide their own.

If one wants realistic models of these cranes, and they are just as necessary as the first two types, there are several commercial models on the market from which they can be adapted. The one in the photograph shown here was taken off a model road vehicle.

It was made of a soft alloy, and inside the circular base is a socket to fit the pillar on the chassis. Into this socket was fixed a short length of steel rod, in this case from a Meccano set. The rod, for permanence, can be cold soldered into the socket. But great care must be taken or the paint on the crane will be damaged and usually they have been well enamelled.

Next a wooden platform was cut out of three-ply and built up for experimental purposes. The dimensions can be obtained from almost any model railway handbook. A wooden stage of this type is used for leading purposes by any firm employing a railway.

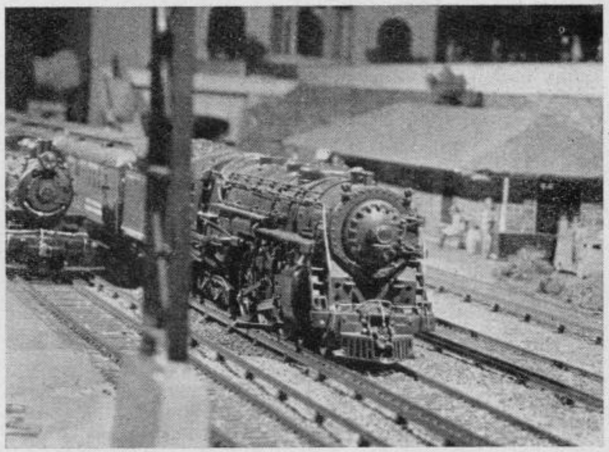
At one end of the platform about an inch from one edge a hole was bored to take the rod. This was then thrust through and secured under the platform by a brass collar. For stability a flat pulley would be better.

Cranes are rotated about their base either by a cog moving over a large circular rack in the base of the crane, where the base is circular as shown in the photograph, or in the older types they rotate by turning a vertical cog which engages a large toothed circle. As all the ones which are really adaptable would not show the mechanism there is no need to attempt to model it.

On the Right Track

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

WRITING THIS MONTH ON REALISM THE AIM



An American Club layout based on their popular Lionel Components, where no effort has been spared to achieve the maximum realism—in fact it might well be a fullsize picture.

THERE are three directions in which we can attempt to achieve realism in a model railway. We can make or buy models of locos and rolling stock that are "showcase exhibits", or we can model a "railway picture" in which the chief attraction lies in the convincing surroundings and scenic effects in which our railway is laid, or we can put down a layout whose chief virtue lies in the realistic operations and time-table running that can be performed.

It is a sad fact that these three ideals are mutually exclusive. In the one human life that is allotted to us we can never hope to excel in them all.

But need we spend sleepless nights on this account? After all the necessity for choosing whether we shall be a crack specialist in one direction, or a tolerably good "all rounder" faces us in any and every human undertaking—professional or otherwise. And since—believe it or not—railway modelling *is* a hobby, the one thing that matters above all else is that we shall, each of us, find in it an opportunity to fling defiance at the "musts" and "must nots" of life and, for once in a way, follow the devices and desires of our own hearts.

There is probably no hobby that offers a wider scope for self expression—for exercising our native wit and ingenuity and for getting away from vexations into a little world of our own devising. Wherefore let us shun like the plague anything that tends to turn into a calculated business the grandest hobby the world has ever seen. And, at the same time, let us remember that the pleasure we derive from our hobby is likely to be in direct proportion to the effort we have made to secure realism.

A re-cap of the situation along the lines of the foregoing soliloquy is desirable from time to time even for the advanced worker. For the beginner it is indispensable. Unless we have some agreed plan of action, some chart on which to lay out our course, we shall merely drift.

We should at least know, for example, whether we intend to specialise on making models of locos and rolling stock, whether we are going to make time-table running the main object, or whether, indeed, we shall attempt to combine all three in roughly equal proportions and be content not to excel in any one of them. The reason why we need to come to some sort of decision on this matter at an early stage is that it necessarily determines our whole approach to the subject. For example, if you set out to build exquisite miniatures of locomotives or coaches or wagons, you could probably manage very comfortably with a roll-top desk for a workshop. A short "test track" might be all you would need, and this could be laid down on two 3 ft. laths of ply or Weyroc hinged at the middle (or jointed by dowels) so that a 6 ft. run could be put down on occasion and wired up to a simple power-pack and controller. This could be used to test out locos under "steam" and, when not in use, it could stow away inside the desk.

In short, the space requirements in this case would be no greater than a corner of the lounge or sitting room. Writing of this brings to mind one very complete installation in which the roll top desk houses a small watchmaker's lathe and sensitive drill. When not needed the lathe and drill on their platform, together with the small motor and switch, fold up and disappear into a well-recess in the desk originally intended to accommodate a typewriter. The pigeon holes in the desk house the pots of paint, brushes and small tools, while sheets of metal, plywood and cardboard are stored neatly in the pedestal drawers intended for stationery and correspondence files.

The particular constructor we have in mind is a

keen club member and he regularly takes his models (in varying stages of completion) down to the club for discussion and criticism, and for running on the extensive layout which the club maintains for its members. But the idea of building locomotives and rolling stock may appeal to you not at all. You may argue that, particularly in 00 gauge, many of the finer details over which the modeller has laboured anxiously and long will, in any case, be invisible when the train is moving. What you need is locos and rolling stock items that are reasonably true to type and that can be bought ready made from the many excellent models listed by manufacturers.

To you it is the pictorial aspect of railways that makes the strongest appeal. You wish to capture the spirit of some railway scene that has taken your fancy; maybe amid mountains and lakes, or a lazy little branch line in Devon, or an industrial scene with blast furnaces, pit heads, or shipbuilding yards. In such a case, you will need not only more space than our friend with the roll top desk, but you will have to give some thought to the location and, particularly, to the lighting, whether natural or artificial, which plays so important a part in the viewing of pictures of all kinds.

Or again it may be that you are content with only a modicum of realism in locos, rolling stock and pictorial setting, provided that you can run a time-table schedule with some pretensions to accuracy.

Two of us operated the Norchester and South Leigh Railway. Although together in the same small room, we communicated only by bell strokes and morse buzzer (to take the place of a needle telegraph). Scale time was indicated on a large clock dial, suitably calibrated to read four-times time and run off the mains. The twenty-four hours of the day thus occupied six hours. The clock was on the main switch, so that when this was cut both clock and trains stopped together and thus preserved relative positions. In this way the 24-hour schedule could be suspended whenever the operators were constrained by domestic calls or fatigue to seek a break.

Only on two occasions were we able to work six hours non-stop and since the average number of arrivals, departures and light-loco movements at the terminal stations was 105 per hour, in addition to point setting, signalling and bell punching, it will be seen that there was not much time to stand and stare. The Editor being willing, this time-table working will be more fully described at some future date. But the point is that this railway, although by no means devoid of scenic effects or lacking in realism, was essentially an exercise in time-table operation.

There were newspaper, milk and fish trains in the early morning and late evening, workmen's specials, business rush and through express trains at appropriate times, coal and heavy mineral trains in the "wee small hours", race specials, ocean liner specials, and even a fog special—the latter being provided by the laying on the metals of caps from Junior's Wild West pistol and suggested by the dense accumulation of smoke from our pipes!

Naturally, the layout had to be subjected to many searching tests and revisions before it could cope with high pressure traffic of this kind, and no small amount of time was put in on maintaining the 14 locos (and the track wiring!) in efficient conditions. Also the strenuous mental exercse of operating, akin to playing six games of chess simultaneously, is not everyone's idea of amusement. But it is doubtful whether there were to be found anywhere happier souls than those two operators in their smoky den.

In very broad terms then, we can say that the hobby is divided into those who make and those who operate miniature railways and, unless indeed, circumstances of purse, time and space are decisive factors, it is often a matter of considerable difficulty for the beginner to determine which will be the most pleasurable line for him to follow.

Does our choice lie in the direction of the exquisite miniature made at the roll top desk, the superb railway picture wherein trains run amid convincing and lifelike surroundings, or the busy train room where, in imagination, teeming crowds and costly merchandise are conveyed upon their lawful occasions? This choice, like that of marrying a wife, or buying a yacht, is one that can be decided only by the principal himself. The advice of friends and of those who have "been through the mill" may be useful in so far as it applies to one's particular circumstances. But there are two bits of advice whose wisdom will not be challenged by anyone of experience.

The first, in the words of "our Wilf" is, "Have a go". Make a start and you will find your bearings. It's great fun. The second, whether you build show-case models, create railway pictures or run time-table schedules, or compromise on all three is "Make it convincing." Ideas and ideals always lose in the presentation and you cannot convey in your finished work a greater conviction than you yourself feel.

CONTRIBUTORS are welcome! You need not have a famous name, you need not have a fully equipped workshop—just as long as you have something of interest to our readers we shall be pleased to hear from you. Good photographs are our lifeblood, but your diagrams can be mere sketches—we will re-draw them for publication. Not more than 1200 words for a first article. We will acknowledge all articles submitted—and be pleased to give advice on likely articles, even if not suitable as at first submitted.

Cutting Oils in the Home Workshop

BY A. SMITH

THE use of cutting oils in the home workshop is usually the exception rather than the rule. In general, machine oil is made to serve where hand work predominates. For such operations as sawing, screwcutting with taps and dies, and drilling, it is reasonably successful. The increase, however, in the number of power driven machines now available, plus the opportunity of obtaining the fluids in small quantities, e.g., one gallon cans, may result in a desire to use a lubricant more suitable to the job in hand.

The reasons for employing lubricants when working metal may be enumerated as follows:—

1. To cool the workpiece and the cutting tool. During the performance of any machining operation heat is generated by the shearing and distortion of the metal and by the friction between the tool point and the work. This heat may become so excessive that the cutting edge of the tool breaks down. In precision work cooling may be essential to prevent expansion of the work.

2. To lubricate the bearing formed between the tool point and the work.

This has been referred in in (1), but lubrication at this point also reduces the possibility of swarf building up on the tool point.

3. Washing away chips from the cutting area.

4. Assists the cutting edge to produce a good finish.

5. Protects both machine and work from rusting, an important point where time for workshop maintenance is at a premium, or where the machines are only used occasionally.

6. Reduces power consumption due to the machine working at a higher degree of efficiency.

The types of cutting lubricants are many and varied, but those in the following groups are in general use:—

(a) Alkaline solutions, e.g. soda water. This consists of water containing a small proportion of mild alkali. They have little lubricating value and are mainly used where cooling properties only are required as in grinding. Unless thorough cleaning of the machine is done after use, rapid rusting will result.

(b) Soluble oils, which are known throughout the engineering industry as "suds". These are not actually soluble, but form a milky white emulsion when mixed with water. They serve primarily as cooling agents, the oil content providing some lubrication and corrosion protection at the same time. These oils consist of a mixture of mineral oil, a fatty oil and an emulsifying agent such as soap. The fatty oil can be vegetable or animal type, such as lard. Other things are then included to produce special effects. These oils are proprietary or patented compounds, and resemble lubricating oils in general appearance, before being mixed with water.

When mixing, always add the oil to the water, gently stirring. The water should be of normal temperature. The richness of the mixture will depend on the severity of the machining operation and the hardness of the metal. For general use proportions of 20 parts of water to 1 part of oil will be found satisfactory.

If the water is especially hard, it must be heated before use, or a water softener such as soda ash added to ensure a stable emulsion. Some oils contain an agent which makes this unnecessary.

Where the mixture is being used over and over again it should be tested to ensure that water evaporation is not causing a change of too great a degree in the water-oil ratio. This may easily be performed by placing a quantity of "suds" in a glass bottle or jar and adding a few drops of hydrochloric acid (HCl). Shake the bottle and then allow the mixture to settle when the oil and water will separate. With a ruler held vertically against the side of the bottle the ratio of water to oil can then be measured off.

This form of cutting fluid is the most useful in the home workshop for general sawing, drilling, screwcutting, and turning of steel.

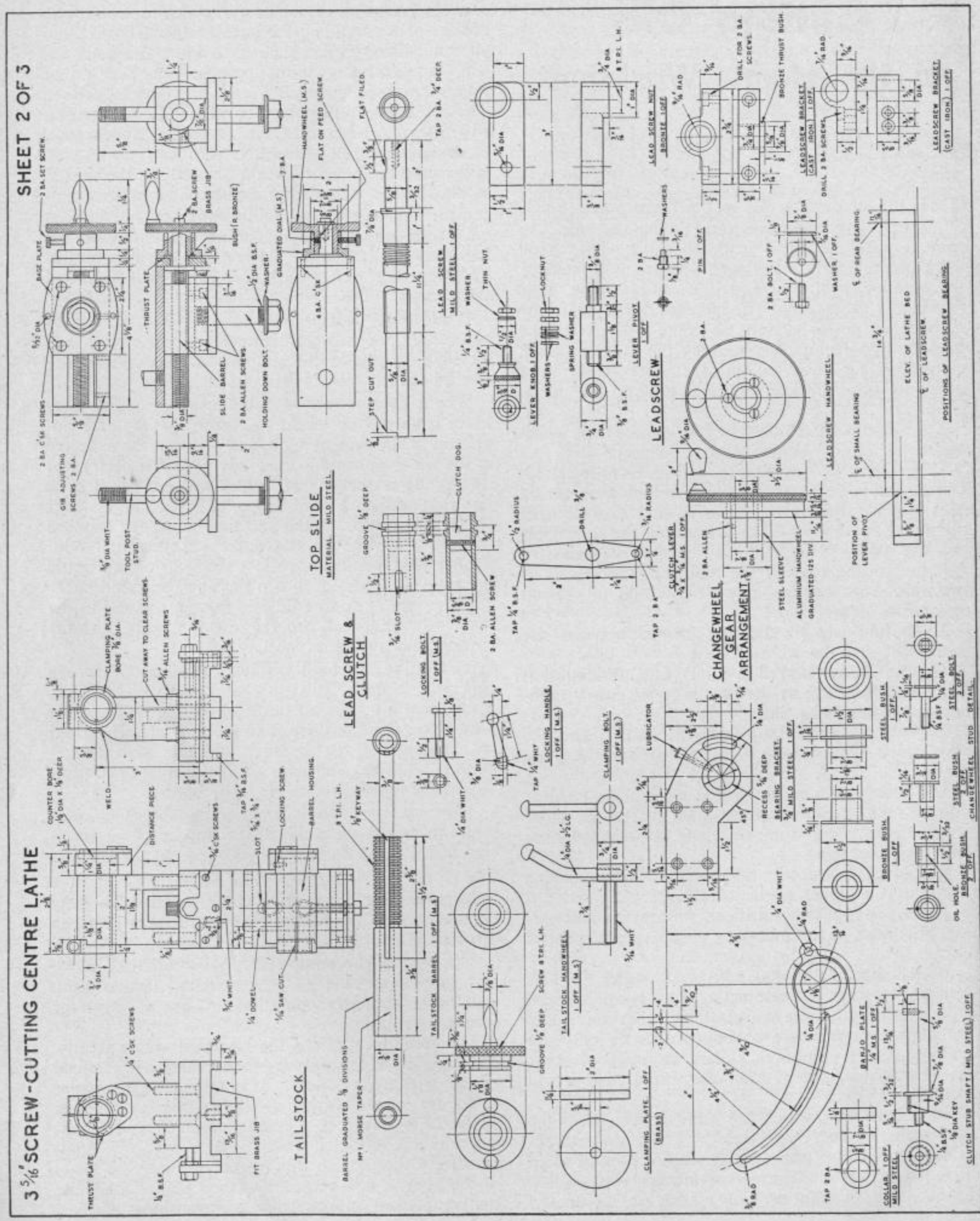
(c) Cutting oils used without previous mixing are generally termed "straight" or "neat" oils. They comprise a most varied range of cutting fluids, some pure fatty oil, others are combinations of sulpherised fat, mineral oil or a small amount of chlorine-bearing additive, whilst for certain cutting operations vaporising hydrocarbons are introduced.

They are particularly used in industry on automatic machines upon which the impact of an emulsion might cause damage by washing out the lubricating oil from the many working parts.

In machining brass or bronze, the use of a fatty oil may lead to the formation of dark spots or green discolouration.

This in no way completes the list of fluids used, and lubricants such as grease, tallow, white lead, sour milk, turpentine, paraffin, etc., are of value for certain operations.

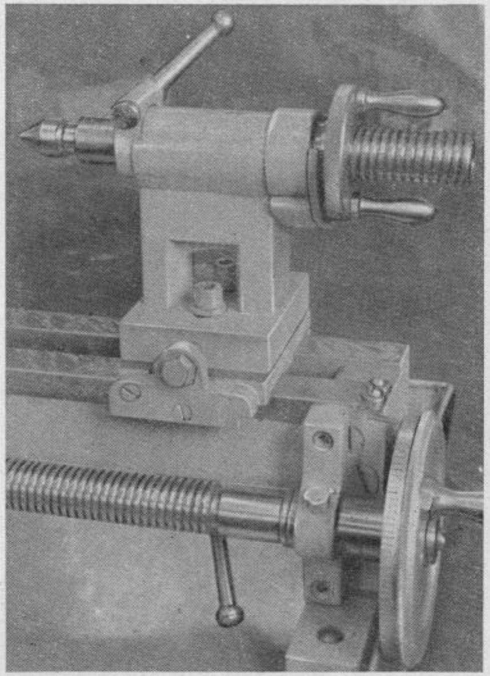
The mode of applying the lubricant varies greatly. The simplest is to apply by hand, using a force-feed oil can with a long spout. It is often an easy matter to fix up a small dripcan, particularly on a lathe, while the building of a small force-feed system circulating the lubricant from a lathe sump is comparatively simple. In this respect use may be made of the many small geared or vaned pumps available from numerous suppliers of ex-Government surplus.



Building a Lathe

PART II. THE TOP SLIDE & TAILSTOCK

BY J. A. MURRELL



The Top Slide

IT was decided to make a combined cross and top-slide in order to give a greater swing over the saddle. It will be noticed that the construction is rather unusual, but this design was preferred to the usual amateur method of making a V-slide, i.e. in three parts. Furthermore, the job can be carried out in the lathe.

The first job to be done was to cut out two pieces of M.S. plate, one 1 in. thick and one piece $\frac{5}{8}$ in. thick. These two pieces were machined all over—4-jaw chuck work—resulting in one piece $4\frac{1}{8}$ in. x $1\frac{5}{8}$ in. x $\frac{15}{16}$ in. and the other $4\frac{1}{8}$ in. x $1\frac{5}{8}$ in. x $\frac{9}{16}$ in. One face of each was scraped flat.

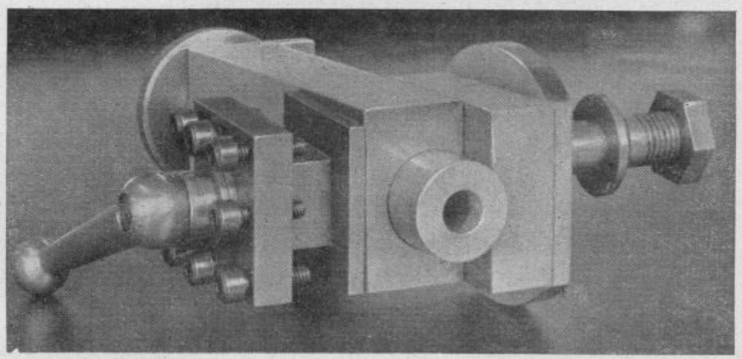
The next job was to cut the slot in the top piece for the brass gib strip. Firstly, a slot $\frac{1}{8}$ in. wide x $\frac{1}{4}$ in. deep was cut, the job being held by three jaws of the 4-jaw chuck, and the tool held sideways in the toolpost, the saddle being traversed by hand.

The chuck was then turned through 30 deg. and a tool ground to a 60 deg. angle. The slot was then opened up so that it finished up $\frac{1}{4}$ in. wide at the bottom and $\frac{1}{8}$ in. wide at the top, with one side at 90 deg. and the other at 60 deg. A piece of $\frac{1}{4}$ in. square brass $4\frac{1}{8}$ in. long was filed to fit this slot and fixed in position by sweating at each end.

The top and bottom pieces were now clamped together and set up in the 4-jaw chuck, the joint being set $\frac{1}{4}$ in. below centre. The two pieces were now bored $\frac{7}{8}$ in. dia. to a good finish. The gib strip of course, had been half cut away and was now the correct shape. The two pieces were parted and the bottom piece cut off to correct length of $2\frac{1}{4}$ in. A piece of M.S. was turned to $\frac{7}{8}$ in. dia. x $2\frac{1}{16}$ in., and drilled and tapped $\frac{3}{8}$ in. Whit., this being the slide barrel.

The barrel was then bolted to the bottom piece by 2 B.A. Allen screws as shown.

The illustrations show the entirely "professional" appearance of the parts described in this instalment.



A set of three (not four as stated in our July issue) full size drawings of J. A. Murrell's Screwcutting Centre Lathe can be obtained price 10/- post free from Model Maker Plans Service, The Aerodrome, Billington Road, Stanbridge, Nr. Leighton Buzzard.

Next the baseplate was cut from $\frac{1}{4}$ in. M.S. plate and screwed to the bottom piece as shown by four 2 B.A. csk. screws. The holding-down bolt was then turned up and fitted as shown.

The feedscrew was made next, then the bush, handwheel and index dial, the dial being graduated with 60 divisions. The trust plate was made from $\frac{1}{4}$ in. M.S. plate, and is fitted to the top piece with two 4 B.A. screws. The top piece was drilled and tapped for the 2 B.A. gib screws, and the toolpost stud was turned and fitted.

The parts were assembled, gib screws adjusted, and the slide was found to move more freely with a very smooth action.

Two holes were drilled in the baseplate to be used later as positioning holes for setting the topslide for facing operations.

The Tailstock

This again was built up from bits and pieces, screwed together. The first part to be tackled was the barrel housing. This was made from a short end of $1\frac{1}{4}$ in. dia. M.S., $2\frac{7}{8}$ in. long, turned down to $1\frac{1}{8}$ in. dia. for $2\frac{1}{4}$ in. of its length.

The block on which the housing is mounted was made from a piece of M.S. 2 in. x $2\frac{1}{2}$ in. $1\frac{1}{4}$ in. The top of this was bored off centre as shown to take the housing, and the bottom was cut away as shown to allow access to the $\frac{5}{16}$ in. Allen screws. This gap was cut out with the 1 in. end mill.

How to fix the housing to the block was a problem, as I wanted all the work to be done in the workshop. However, the only answer was welding, so the job was sent to the local garage.

In the meantime the baseplates were made, once again two more bits being chopped off the stove bedplate. The lower piece was slotted in the same manner as the saddle, and the slots scraped flat. The holes drilled for gib screws, a brass gib fitted, and the adjusting bolt plates fitted as shown, the clamping bolt hole was also drilled and tapped.

The sliding base was machined up and the $\frac{5}{16}$ in. slots cut out. The block and housing were back by now and were bolted to the sliding base by four $\frac{1}{4}$ in. csk. screws. The job was then marked out and set up in the lathe and bored $\frac{3}{4}$ in. dia. counter bored at the back $1\frac{1}{8}$ in. dia x $\frac{1}{8}$ in. deep.

If any reader uses this design, the front portion should be turned down to $\frac{7}{8}$ in. dia. for the clamping plate. I did this job later as a modification, for at first I had had a clamping bar welded on. This bar broke off after the job was completed, and thus the clamping plate was fitted.

To resume. The tailstock barrel was tackled next and turned and screw-cut to the dimensions given. The barrel was graduated in $\frac{1}{8}$ in. divisions at the same time. The slot was cut using the lathe as a shaping machine. The handwheel locking bolt, handle and clamping plate and bolt were turned next.

The thrust plate was made from $\frac{1}{8}$ in. M.S. plate and is bolted to the body by $\frac{3}{16}$ in. screws, with a $\frac{5}{8}$ in. thick distance piece in between. The position of the screws is determined by the handle holes in the handwheel. A $\frac{3}{16}$ in. screw with the end turned down to $\frac{1}{8}$ in. is screwed into the barrel housing as shown to prevent the barrel rotating.

The assembly was now bolted to the baseplate with one $\frac{5}{16}$ in. B.S.F. Allen screw. The other screw and the $\frac{1}{4}$ in. dowel pin were fitted later when the tailstock was "lined up".

PHOTOGRAPHING LAUNCHES (*Continued from page* 547)

At the range mentioned and the comparatively slow rate that a vessel moves down the ways, the 1/25 second will "arrest motion" and give a clear-cut picture, except perhaps at the last moment of entering the water when the hull is moving at its fastest, and then to step the shutter speed up to 1/100 second and open the lens a little might be well. If attempting a series, however, keep to the one speed and lens setting.

Panchromatic films are on the whole the best to use, as they differentiate strongly between the black of the top part of the hull and the red of the lower, which are the colours in which most ships are painted, bar naval. Chrome films do not show this distinction quite so well, but nevertheless they give quite good pictures and are satisfactorily fast to lights of all kind.

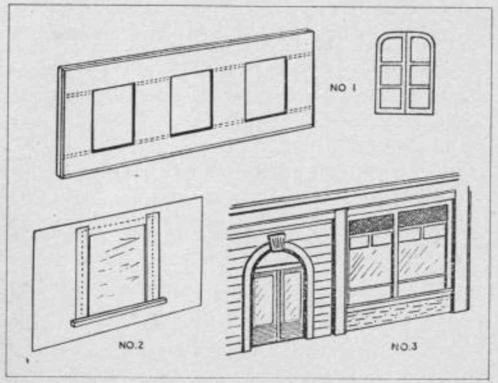
Should it not be desired to make a big number of shots, the three mentioned above always fully describe a launch, i.e. before starting, halfway down with the hull just striking the water, and finally afloat. The first of these can be taken at leisure well before the proceedings start. This gives plenty of time to wind the film on to the next number and reset the shutter if it is desired to snap when the vessel is moving at its fastest.

Once in the water all speed will disappear and there will be plenty of time to go back to the slower shutter setting.

If more than the three snaps are attempted, then keep to the one shutter speed. Finally, when snapping, hold the camera very steady—better still have it pressed against something solid. This will take away any danger of "camera shake" which comes about if the trigger is jabbed and the camera jerked slightly the very split second that the lens is open. This slight shake, although it may not be noticeable when a contact print is viewed in the hand, will show up if a fairly big enlargement is made. The secret of a good enlargement from a diminutive image is that the tiny image shall be pin-sharp.

Making Model Buildings

VICTOR SUTTON DESCRIBES SOME TYPES OF WINDOWS



MANY models are spoiled by the rough and badly shaped windows upon which too little time has been spent. All your windows must be proportionate, the correct style and also firm in construction. You can only achieve this by careful study and paying plenty of attention to the structural part around the windows.

Any arched effects should always be made with three thicknesses of cardboard. These should be glued firmly together and pressed. I have an old-fashioned iron which I keep for this.

Models cater for many periods and to get these correct one should try and borrow a book from the library which deals with buildings only. A few sketches can then be taken and kept for reference.

First, and most important is the scale. Like the doors, you can get this correct by measuring a building and then working out the correct size for the windows. There are many hundreds of types, and I got over this difficulty by seeing a local builder who is in a large way and he lent me some catalogues of these from the leading stock window manufacturers. Messrs. Crittalls alone have some hundreds of different sizes.

I find, that generally speaking, it is better to take out the whole space to be taken up by the window. I can then paint the cardboard edges without damaging the transparent material. As shown in the sketch you can then work on the actual frames and crossbars in comfort and in the flat position. Further than this, if you are using a good thick cardboard as used for photographic mounts you get a deep $\frac{1}{16}$ in. bevel, and this makes all the difference in the appearance.

In most cases you will have sills, and these invariably get knocked off in time. As shown in my sketch I provide for this by running a thin beading along at this level and then any projection is fitted through with a pin.

Note the overlaps of pasted paper on the sides of the transparent sheeting.

Transparent sheeting is now available at model shops, and here again you must be certain that it will not buckle out of the frame or crumple when fitted. To completely overcome this I suggest that you paste around all windows as shown with some thin paper, not thick as this will tend to pull the cardboard into a buckle also.

If you are working on a two-colour painting scheme then you will see that you can paint the frame first in one shade and the second framework, and fit this on the transparent material. The whole lot is then ready to fix and is not overrun with paint.

Should you decide to make the window frames in thin wood then go very carefully with the glue (Croid I prefer for this) otherwise it will run badly, and once on the material you cannot scratch it off. Cellophane wrappings off some kippers will always do for a small window. Wet it before fixing.

Oddments of lampshade parchment can also be used for those windows where you do not want to look right through. Waxed paper from packets of fancy biscuits is also handy for roof windows in arcades and such buildings as garages, stations and similar buildings where this form of lighting would be used. Double sheets of greaseproof paper is also another suggestion. I have also used a good class tracing paper which is again most effective.

In making what is to represent a plate glass window you must combine both the cardboard and the wooden framework idea as I have shown in my sketch. In this particular design you would have probably a tiled base, stained cardboard surround, and woodwork with a grille along the top of perforated zinc.

Windows to open, however large or small, should be backed with stripwood in obechi to keep them in shape. One cannot expect them to keep rigid in cardboard only.

I prefer poster colour for painting small cardboard parts in preference to ordinary paint. I do some-

(*Continued on page* 569)

Windmills - Tower Mill

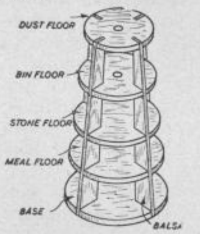
In Part III of this Windmill Series Ron Warring describes the construction of a typical model Tower Mill with Roller Reefing Sails, shown in the rolled position.

Part I (in our June issue) dealt with modelling of general types of mill. Part II (in July issue) covered the building of a typical Post Mill. Future parts will deal with Smock and Composite Mills with Spring and Patent Sails.

THE tower mill has a tapering body of circular section built of stone or brick on which is mounted a cap or cupola carrying the windshaft. This cap can be turned so that the sails face the wind, either by hand means or automatically by using a fantail. Most tower mills are similar in appearance, the greatest point of difference being in the shape of the cap and its external winching or winding gear. For our model we have chosen a typical type with a hemispherical cap with hand winding gear which can be made to work or not as desired.

Another point of difference between tower mills is the type (and number) of sails. Whereas four sails are by far the most common, the sails themselves may be common, roller reefing, patent or spring type. We are describing each of these sail types in turn on the various models. The post mill model, for example, had common sails. Spring and patent sails will be described on subsequent models. The tower mill is shown with roller reefing sails—sails which roll up rather like a series of roller blinds, and can be opened to the degree required by the striking gear. It is impossible to model roller blind sails of this type in the small size of the model and so these are only of dummy form, representing the sails fully closed.

FIG. 1



For a working mill, of course, there is no objection to filling in the gaps between the rolled sails with small slats—or using other types of sails. In this case the modeller would probably also prefer to power the windshaft with a small electric motor. This induces a few complications as the small cap with the said assembly must be free to rotate. A suitable arrangement for this will be described in the next model of the smock mill.

Mixed balsa and hardwood are the chief materials of construction. Start by making the tower. Four circular floors and a circular base are first cut from the material as specified and then assembled with the four tapering vertical members cut from 1 in. x $\frac{1}{4}$ in. balsa, as shown in Fig. 1. The assembly will be quite stable when set and it is a good plan to complete the whole of the rest of the assembly before planking in the walls of the tower.

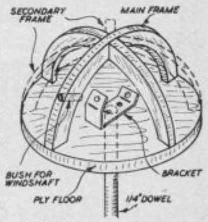


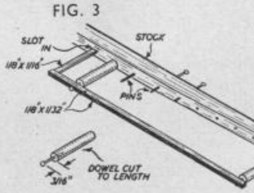
FIG. 2

The cap is built on a circular disc of $\frac{1}{4}$ in. ply with the main roof members cut from $\frac{1}{4}$ in. sheet balsa, as shown in Fig. 2. The centre of the ply disc is drilled to take a $2\frac{1}{2}$ in. length of $\frac{1}{4}$ in. dia. dowel which is glued in place. A metal bracket also screws to this disc to take the windshaft at the appropriate angle of 15 degrees. This windshaft is a $2\frac{1}{2}$ in. length of $\frac{1}{8}$ in. dia. brass tube which must run freely in the metal bracket and is located with suitable washers soldered in place. This prevents excessive fore and aft movement. The sail assembly should be mounted on the windshaft before mounting the windshaft permanently on the bracket.

Sail construction is detailed in Fig. 3. Two stocks are required, each cut from an 18 in. length of $\frac{1}{2}$ in. x $\frac{1}{4}$ in. birch or similar wood. Note that these taper down to $\frac{1}{4}$ in. square at the tips. Cut 13 lengths of $\frac{1}{16}$ in. dia. dowel for each sail to the exact lengths given by the plan. These will vary because of the taper cut on the stock. In one end of each piece of dowel push in a pin so that exactly $\frac{1}{16}$ in. protrudes between the end of the dowel and the lower side of the head. Drill through the stock to take pins as shown and mount all the roller sails in place. Complete the frame by glueing two pieces of $\frac{1}{8}$ in. x $\frac{1}{32}$ in. birch along the trailing edge and add the $\frac{1}{8}$ in. x $\frac{1}{16}$ in. frame piece at the root.

Use a slow drying glue for this and whilst the glue is still drying, pin out the sails over two templates as shown in Fig. 4. Make sure that the sails contact each template fully and leave to set. This will give the right degree of twist or weather to the sails, varying from 25 deg. at the root to 10 deg. at the tip.

FIG. 3



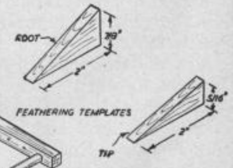
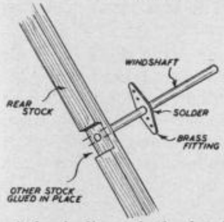


FIG. 4

FIG. 5



Join the two sails together as shown in Fig. 5, and then mount on the windshaft. A small metal fitting is made and soldered to the windshaft and pinned to the back of the rear sail stock. The front of the hollow shaft should just protrude through the front stock. The sail assembly can then be mounted on the cap, adding a spacer as necessary to give full clearance between the sails and the tower for rotation. The dummy striking gear is bent from thin wire glued along the back of the sails and cranked and pushed into the hollow windshaft.

You can now complete the cap by planking in between the roof members with strips of $\frac{1}{4}$ in. x $\frac{1}{16}$ in. balsa. Tackle one segment at a time; trim down with a razor blade. When the roof has been completely covered, sand down smooth and round off the joints. The small decorative (wood) sphere can then be added, mounted on a short length of $\frac{1}{16}$ in. dowel. Cover the whole of the roof with tissue, fairing this into the pillar supporting the small sphere.

The cap is located by the dowel running in holes in the top (dust) and next (bin) floors and then secured by means of a collar of $\frac{1}{4}$ in. ply 1 in. dia., glued in place. For easy movement, however, a number of rollers are mounted on the top of the tower dust floor. These are made by cutting eight $\frac{1}{2}$ in. lengths of 18 s.q.g. brass tubing and mounting with small pieces of 18 or 20 s.w.g. wire, bent as shown in Fig. 7, and pushed into the ply floor. The winding gear is also secured to the top of the dust floor.

FIG. 6

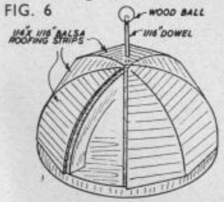
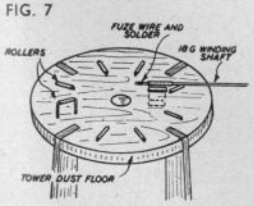


FIG. 7



The winding shaft consists of a length of 18 s.w.g. wire, as shown, which runs in thin walled 18 s.w.g. tubing cemented to a distance piece of $\frac{1}{8}$ in. x $\frac{1}{32}$ in. Coat this shaft with rubber solution and allow to dry. The winching wheel is a sandwich of two discs of 1 mm. ply and one smaller disc of $\frac{1}{16}$ in. balsa. The

Above : The completed Tower Mill posed in a natural setting. Below : The main constructional work is well displayed in this progress picture.

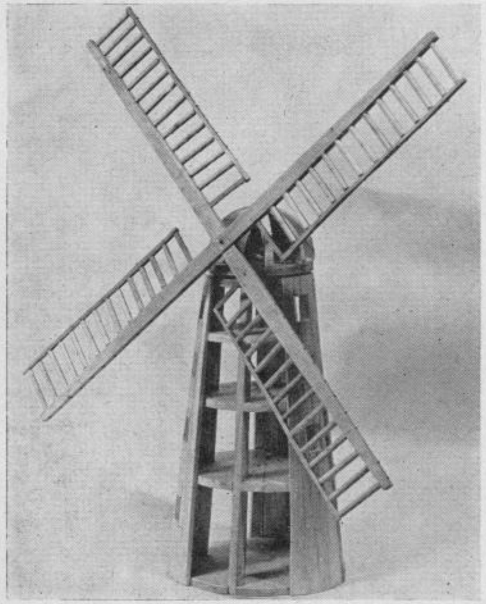
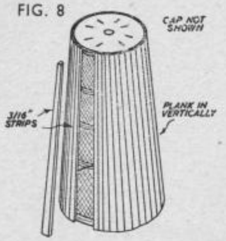


FIG. 8



spokes may be cut out of the ply discs before assembly and then filed and cut out of the balsa disc when cemented together, or merely painted on. This wheel is attached to the end of the winding shaft.

The cap can now be mounted in place and secured with the ply collar under the bin floor. It should rotate fairly freely by hand on the rollers. The winding shaft, when turned by hand, should have sufficient friction grip to rotate the cap slowly on its own.

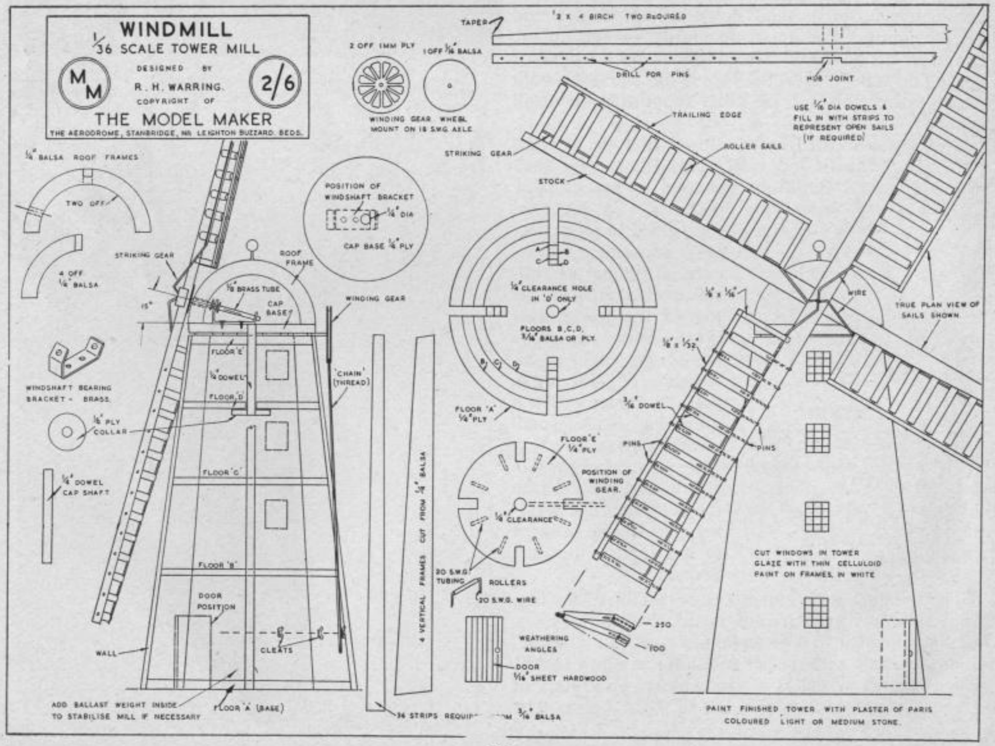
Normally this wheel is turned by an endless chain—in this case a loop of thread or twine, reaching to ground level. When not in use the end of this loop is fixed around a small cleat $1\frac{1}{2}$ in. from the base of the tower. A row of these cleats should be fitted around the walls of the tower at this height, when completed.

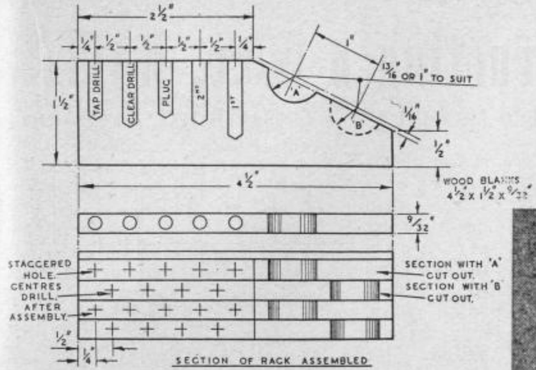
The tower walls are built up by planking in with strips of $\frac{3}{16}$ in. balsa, as shown in Fig. 8. Cut 36 strips each 10 in. long from $\frac{3}{16}$ in. sheet balsa, tapering as shown on the plan. These strips are slightly longer than necessary so that they can be trimmed off flush top and bottom when planking is completed. Work around the whole tower, one plank at a time, trimming each slightly as necessary to get a good fit against its neighbour. The last plank will need to be cut to fit the space left.

When dry, sand the tower walls down to a circular section. Then cut out rectangles for the ten windows and door, as indicated on the plan. Simply fill the window spaces with sheet celluloid on which has been painted or ruled the frames, preferably in white. The door may be made from $\frac{1}{16}$ in. or $\frac{3}{32}$ in. hardwood, scored as shown and hinged in place. The door should open inwards.

To finish the tower we recommend painting with a thin paste of plaster of Paris, either in natural white or coloured light or dark stone, or grey. The slightly roughish surface resulting will be most realistic. In many mills the brick or stonework is actually tarred, but a black finish is not particularly attractive.

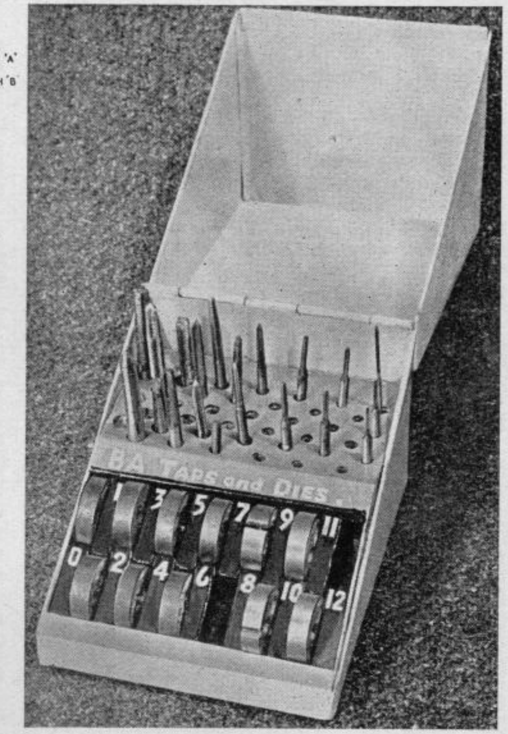
The cap and the stock and frame of the sails should be painted matt white. The rolled sails (the $\frac{3}{16}$ in. dowels) can be coloured brown. The wires representing the striking gear should be black.





A Practical Box for TAPS & DIES

BY S. NICOLL



SOME time ago the growing accumulation of assorted taps and dies, acquired from all kinds of sources, and not bought expensively in a neat container, began to present increasing difficulty in sorting out the right ones from their untidy jumble.

The box illustrated was evolved to provide a cheaply made, but neat home for them that could be extended in the future as required. Basically, it is formed from a surplus metal box bought for a few pence from a Government surplus store. This was filled with slotted strips, cut out to hold the dies in the front part, and drilled to take the taps at the back.

According to the size of box in use and the stock of small tools to be housed, the number of strips prepared can be varied. Should no suitable box be available it is quite a simple task to bend one up from sheet metal, solder the joints, bend over a wire hinge, and finish with a coat of paint. There are so many boxes in all shapes and sizes about, however, that only the purist will insist in making it all himself to this extent.

MAKING MODEL BUILDINGS

(Continued from page 565)

times use flat paint, but this I keep very thick. Too much moisture in the paint will mean a buckle up later on. Poster colour I use quite thick; in fact straight from the pot. Windows are always improved by lining in Indian ink and a mapping pen. Indian ink can be had in colours, including white.

I would suggest that those readers who want to make really good buildings would do well to get a copy of "How to Draw Houses" by Sydney R. Jones. It is a Studio publication, costing 3/-, and can be got through any newsagents. It is very well illustrated, and the various treatments of various facia bricks, cornices and other parts is well worth study. Here too is the ideal book to give you correct proportions for the windows.

Whilst the window is an important part of the model, do not colour it so that it will look as though you have concentrated on the windows and left the rest of the building as an afterthough. Do not line the windows in solid white lines, or if they are not cut out colour in with deep blue. Balance the colouring so that it still looks a part of the building.

Plywood windows are always strong, but you have the danger of ragged edges, and these cannot be corrected without cutting away too much wood or causing a rough split edge which will not paint well. If you have a plywood window, then line the rough edges with a strip of thin obechi.

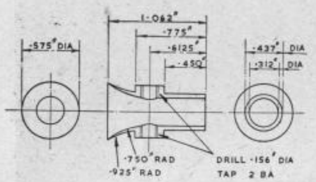
model maker IN THE WORKSHOP

Constructing a 5 c.c. RACING ENGINE Part V

CONTINUED FROM LAST MONTH BY G. M. BARRY

Gudgeon Pin End Pads

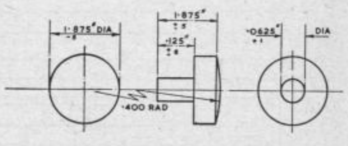
THESE may be made from dural, brass or bronze. Chuck a piece of .250 in. or .1875 in. dia. bar in 3-jaw, leaving about .375 in. out. Face end of bar, turn .1875 in. dia. full length then turn to .062 in. dia. for .125 in. long. Now part off—leaving piece .1875 in. long overall. Pull bar through chuck, and repeat operation as before. Now chuck by small diameter, and radius end as per drawing. This second operation can be dispensed with if the parting tool is ground to give the required radius. In fact, the whole piece may be machined with one tool, if ground to correct shape, i.e. knife-edge for turning towards headstock, a square end for parting off and the back edge to correct radius. If tool is kept narrow no chatter will occur. This completes end pads.



CARBURETTOR BODY
ALUM OR DURAL. 1 OFF

Carburetter

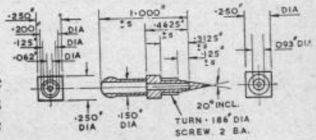
This may be made from a casting, or from bar stock, using either aluminium or dural. I prefer bar stock myself, again in preference to a sand casting. A die casting, however, would eliminate a lot of machining, and would be preferable if obtainable. However, as making from solid covers the operations required over a casting as well, let's consider that. Chuck a piece of hexagon bar .575 in. (approx.) across flats, in 3-jaw, leaving 1.500 in. or so out. Using a knife tool, turn a .925 in. radius for .287 in. long, and making small diameter .437 in. This radius is, of course, not critical, as its main function is to make the carburetter look something like a carburetter! It is best done by traversing carriage, while gradually feeding tool in. Now, using a left-hand knife tool, measure 1.062 in. along piece, and starting from that point reduce diameter to .437 in. for .450 in. long. Bring up tailstock chuck, and drill .3125 in. dia. for 1.125 in. deep. Using boring tool, open up mouth of this hole to a .750 in. (approx.) radius, in the same way as for outside. Finish by polishing bore with emery paper, and then part off piece 1.062 in. long. Mark off length .625 in. from small end, on flat of hexagon, and find centre point of flat. This can be done by eye, or by measurement. Centre pop and drill .156 in. dia. through both sides of carb., and tap 2 B.A. Remove any burrs and give bore a final polish. This completes carb. Incidentally, I've just noticed that the hexagon shown on my drawing is smaller than the diameter of carb. mouth. This is another "drop off" on my part and should be ignored!



GUDGEON PIN END PAD
DURAL. 2 OFF

Carburetter Jet

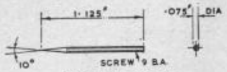
This should be turned from brass or dural of square section, approx. .250 in. across flats and 1.00 in. long. Chuck truly in 4-jaw, leaving about .500 in. out. Drill from tailstock .062 in. dia. x .500 in. deep. Turn .186 in. dia. for .3125 in. long, set over topslide 10 deg., and turn a taper .125 in. long. If you have a tailstock die holder, thread this piece 2 B.A. If not, reverse in chuck and set to run truly, drill .125 in. dia. x .537 in. deep. Turn to .200 in. dia. for length .237 in. and starting cut .200 in. in from end, thus leaving sufficient metal to form ball end. Ball end, .250 in. dia., can now be formed on end, and is best done by working cross and topslide together to rough out ball, and then finish with a file or a form tool. This ball end may be omitted if desired, as it is not essential. If screwing of 2 B.A. thread was not done from tailstock, it can now be done by hand. This completes jet.



CARBURETTOR JET
DURAL. 1 OFF

Carburetter Needle

This, as will be seen from assembly drawing is made up from several parts, and is perhaps over-elaborate. Most modern engines use a bent wire, and split taper friction screw. Do not make the one to be described if you prefer something else!

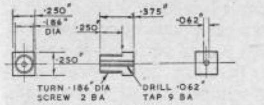


CARB. NEEDLE
STAINLESS OR SILVER STEEL. 1 OFF

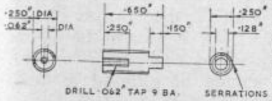
The needle is made from a piece of .075 in. dia. silver steel or stainless steel. A bicycle spoke makes a good needle. Screw a piece of suitable stock 9 B.A. for about 1.125 in. long. Hold in 3-jaw chuck (not too tightly or threads will be damaged), and turn and file a taper of 10 deg. included angle and about .275 in. long. Obtain as smooth a finish as possible on this taper, as any steps or undue roughness cause rapid wear on the jet and makes control difficult and running erratic.

Needle Carrier

Make this from square dural or brass of .250 in. cross section and .500 in. long. Chuck truly in 4-jaw leaving .250 in. out, and drill through .062 in. dia. Put a 9 B.A. tap in tailstock chuck and tap through. If chuck is not over-tightened on tap, and tailstock is not clamped to bed, this can quite easily be done, without breaking any taps, as any "jamming" will tend to rotate tap in drill chuck. The headstock should be turned by hand, and you will be able to "feel" the thread being cut. However, if you prefer it, this thread may be tapped by hand after machining of piece. Turn .186 in. dia. x .250 in. long, and screw 2 B.A. either from tailstock or by hand. Reverse in chuck and face off, making overall length .375 in.



NEEDLE CARRIER.
BRASS OR DURAL. 1 OFF



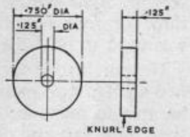
SERRATED STEM.
BRASS OR DURAL. 1 OFF

Serrated Stem

Chuck a piece of .250 in. dia. brass or dural in 3-jaw, leaving .750 in. out. Drill .062 in. dia. x .250 in. deep. Tap 9 B.A. from tailstock, or leave until later. Put an outside threading tool on its side in toolholder, set point to centre height and, using a 15 or 16 tooth change wheel for indexing, cut grooves in piece by moving tool along, using racking wheel. Make grooves about .025 in. deep. When grooves are complete, change tool for parting tool, and reduce piece to .128 in. dia., starting cut .500 in. from end of piece and taking it up to chuck. Then part off to .650 in. long.

Knurled Disc

Chuck a piece of .250 in. dia. brass or dural in 3-jaw, leaving 1.00 in. or so out. Take a light skim cut over this length to ensure true running, and put a knurling tool in tool post. Feed tool in about .025 in. and move along length of piece and back to start. Feed in another .025 in. and repeat. Do this until you are satisfied with the pattern. Now drill piece .125 in. dia. x 1.00 in. deep and then part off disc .125 in. thick. Thus you will have several and though you only require one, it is not wasteful to make five or so, as there are many uses to which they can be put.



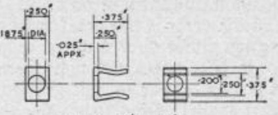
KNURLED DISC
BRASS OR DURAL. 1 OFF.

Spring

This is best made from hard brass shimstock. Cut a strip 1.00 in. long x .250 in. wide. Mark off and drill centre hole first; turn off corners and bend as per drawing.

Assembly

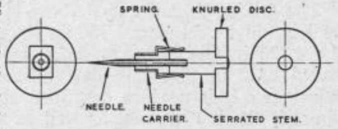
Screw needle into serrated piece, taking care to make as tight as possible, after serrated piece has been forced and riveted into knurled disc. Place spring on needle carrier, and screw the latter into carb. body. Screw jet into other side, insert needle, and carb. is made. It may be necessary to make some adjustments before a perfectly satisfactory job is obtained, but it should be pretty near the mark exactly as made.



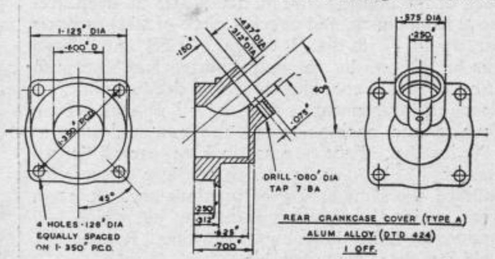
SPRING (CARB)
BRASS OR STEEL. 1 OFF.

Rear Housing

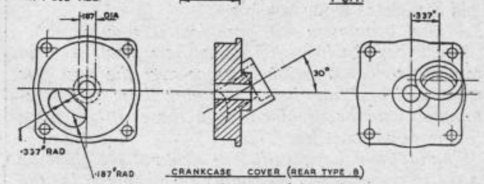
An aluminium casting is used for this component. Chuck in 4-jaw, with face out and set to run fairly true. Face off very carefully, and turn spigot to 1.125 in. dia. —1 for .250 in. long. Bore .600 in. dia. x .625 in. deep, if using a bush for rotary valve, or to .500 in. dia. x .625 in. deep, if valve is to run direct in housing. Take another very light finishing cut across face, to ensure squareness with bore, and remove from chuck. If bush is being used for valve, this should now be pressed into position in vice, using pads on jaws, and spacer to prevent marking face. Place valve in housing in full open position (that is with port at bottom), clamp in machine vice or with toolmaker's clamp, and using valve as a drilling jig, drill through housing or through bush and housing .312 in. dia. or to suit port size. If all machining has been correctly done, and reasonable care is taken, the hole will break through in correct



ASSEMBLY CARB. NEEDLE.



REAR CRANKCASE COVER (TYPE A)
ALUM ALLOY (DTD 424)
1 OFF



CRANKCASE COVER (REAR TYPE B)
ALUM ALLOY (DTD 428)
1 OFF

position, in centre of boss. If the hole is not correct, and the error is too great to be ignored, something is wrong, either your fault or mine, and the only thing to do is to check through operations and find where it occurs, swear to suit gravity of the occasion and start again! Obviously a few thous. either way won't matter, so don't be *too* critical. Chuck a piece of .437 in. dia. bar, brass or steel, and turn to .313 in. dia. or until housing is a good push fit, through port. Place housing on this mandrel, face to the chuck, and counterbore the port hole .437 in. dia. x .150 in. deep. Remove from mandrel and drill and tap hole for grubscrew (though this is not strictly necessary). Using drilling jig, drill holes for fastening screws, remove all burrs, etc., and housing is completed.

The drilling jig mentioned above is merely a piece of $\frac{1}{4}$ in. mild steel plate 1.250 in. square, marked out for 4.128 in. dia. holes on 1.350 in. P.C. dia., and bored 1.125 in. plus 1 in. dia. to fit over spigots on housings. It is used as described above, and does simplify the job no end, as well as saving a lot of tedious marking off.

Front Housing

This is made from an aluminium casting. Obviously it could be machined from square bar, if the ribs were omitted, but I prefer a casting. No chucking pieces are necessary, and the casting should not be coned. Hold casting by small end in 4-jaw and set to run as truly as possible. Drill right through from tailstock .312 in. dia., and open out to .381 in. dia., getting as good a finish as possible. It is better to bore to final size, if a small enough boring tool is to hand. Face end, and turn spigot 1.125 in. dia. —1 x .125 in. deep. Bore .875 in. dia. plus $\frac{1}{2}$ in. x .225 in. deep. This is, of course, the ballrace housing, so, while boring, and when nearing finished size, try the ballrace and keep on trying it, until it just won't go in, and leave it at that. Bore another recess in the back of the housing .750 in. dia. x .025 in. deep. Remove from chuck, and chuck a piece of steel or brass bar, about $\frac{7}{16}$ in. dia., leaving 1.600 dia .out. Turn this to .381 in. dia., or until housing is a nice push fit on to bar. Taper slightly with a dead smooth file, clean off, and smear a drop of oil on bar. Push housing into position, small end out, and turn to 1.00 in. dia. Face across, making overall length approx. 1.250 in., as per drawing. Bore a recess for ballrace, the same as for the previous one. Remove from mandrel, and using a dummy jig, which will be described, drill holes as per drawing. Remove jig. This completes front housing.

A final instalment will complete this series.

The 5 c.c. Racing Engine has been dealt with in step-by-step constructional stages over the past five issues, and back numbers containing these earlier instalments can be obtained from these offices price 2/- per copy, post free 2/2d.

Should there be a sufficient demand we shall be happy to consider the possibility of arranging for the production of a set of castings.

Model Maker Goes Camping

A TOPICAL HOLIDAY ARTICLE BY TREVOR HOLLOWAY

IT is often those little "home comforts" that make a camping holiday all the more enjoyable, so here are a few suggestions on gadgets the writer has proved extremely useful during many camping holidays in the past. They can be made before setting off, or on the site, as may be most convenient.

A Camp Refrigerator

The problem of keeping perishable foods fresh in camp during warm weather is particularly important in these days of rationing. Obviously you can't take the domestic 'frig with you, but you can rig up a very efficient substitute for little or no cost, which operates on the water cooled system.

The diagram gives you a good idea of construction. A wooden box (a tea chest would be ideal) is mounted on legs, or some sort of stand, and erected conveniently near the camp kitchen. The box is then draped over the top and around the four sides with sacking or some other absorbent material.

A bucket or bowl of water is then placed on top of the box and trailing from it should be about eight strips of cloth or sacking each 2 in. or 3 in. in width. Two strips should be allowed to hang down each side of the box.

These strips soon become saturated and so conduct water into the material draping the box. The process can be speeded up in the initial stages if the draping material is soaked beforehand.

Strangely enough, the warmer the day the cooler is the interior of the refrigerator. Actually it operates most efficiently when exposed to the sun. All you have to do is occasionally top up the water reservoir. The writer found this only necessary every three or four hours when a medium sized bucket was used to hold the water.

If your box is large enough you may be able to fit a shelf and so increase storage capacity. You won't be able to make ice cream in the gadget, but it will keep milk, fats and other perishables at a temperature sufficiently low to prevent them spoiling.

A Camp Oven

Lack of an oven cramps any camp cook's style—it rules out roast beef (if any!), Yorkshire pudding, tarts, cakes and a host of other desirable fare. Don't despair though, for given a biscuit tin or one of those containers of the putty drum type, a very serviceable oven can be easily erected on the spot.

First, dig a fire trench about 9 in. deep and 3 ft. long in the path of the prevailing wind. Place two bars across the trench, stand the tin or drum on them and then consider how to add the chimney. The most convenient way is to use a length of drainpipe as seen in the sketch, but a flue could be built up of stones.

Well pack the oven and flue around with soil and turf with the exception of the oven door end, of course. If you use a biscuit tin, it is a good plan to fit a couple of wire hinges so that the lid will lift upwards. A wooden knob screwed near the centre of the lid is also an advantage.

To maintain an even heat, stoking is best done little and often. One word of warning. Resist the temptation to open the oven door frequently or the baking process will be ruined completely.

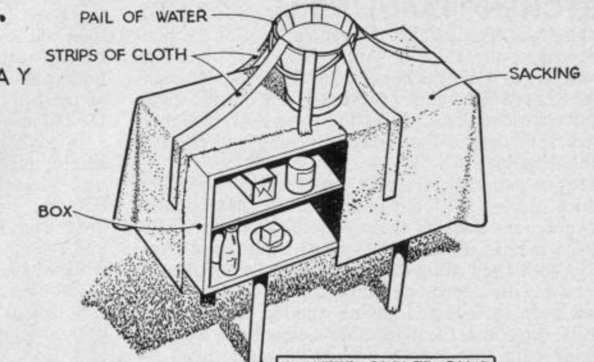
A Roll-Up Table Top

In the writer's opinion a camp without a table on which to prepare or serve meals is lacking a major necessity. No matter how well cooked a meal, if you have to squat on the ground to eat it with your plate balanced precariously in your lap, your appetite and your digestion will suffer.

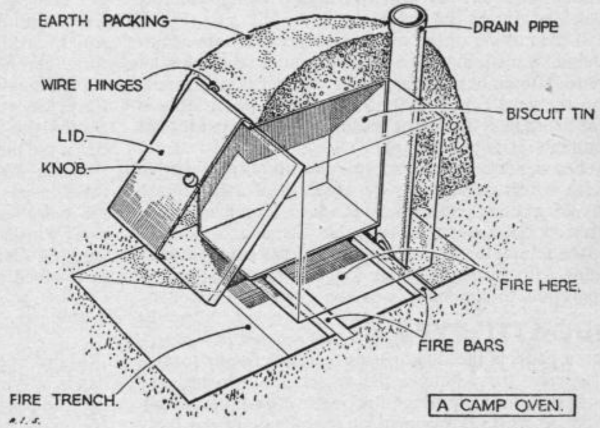
A table, even of the folding type, is something of a nuisance to cart around as many readers have probably discovered. A roll up table top however, is much more compact and easy to transport. The framework support should not prove difficult to build from materials found on the site—four stakes about 3 0in. long for the legs and two poles, say 4 ft. long, for the cross struts. You could, of course, fix up these details at home if that seems most convenient to you.

Now for the table top itself. About two dozen plaster laths, say 3 ft. in length would be ideal. Failing this you may follow the writer's example and take an old piece of trellis work apart. Lay the strips on a flat surface, spacing them $\frac{1}{2}$ in. to 1 in. apart. About 6 in. in from the ends of the strips lay a length of upholsterer's webbing obtainable at any furnishing stores.

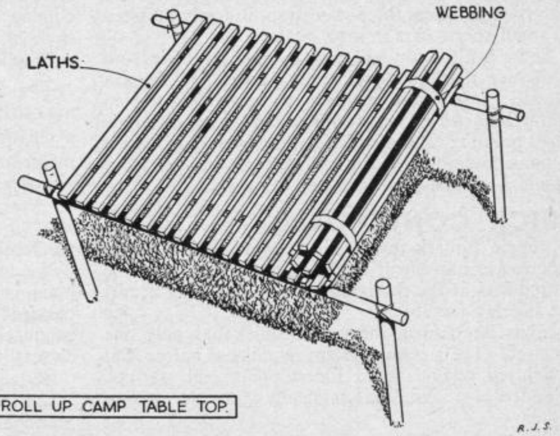
The webbing is secured to the strips by small tacks, care being taken to see that all strips are parallel before driving home the tacks. Your table top is now capable of being rolled up in a compact bundle which is both light and convenient to transport.



A WATER COOLED CAMP REFRIGERATOR.



A CAMP OVEN.



A ROLL UP CAMP TABLE TOP.

KITCHEN TABLE B.R.M. (Continued from page 528)

engine was fitted, whilst the general roof of the bonnet was of the order of ½ in. The sides, of course, were left at ½ in. thickness excepting encroachments due to outside carving. Obviously the outside members were one piece, whilst the three inner members were split due to the cockpit opening and radiator grille opening.

Paper patterns were than made of each member, which also showed the outline of the next smaller member, and each of these patterns was then transferred to ½ in. thick balsa wood of the "hard" variety, with even grain running lengthwise. Using a fretsaw with a medium cutting blade, all five members were cut out and having roughly cleaned these up, I cemented them together using balsa cement, taking care that they were correctly registered by utilising the inner outlines previously mentioned. The whole was left to set overnight, being suitably weighted during the process.

If the cutting of the centre member has been accurately executed, as well as the two outer pairs of symmetrical members as far as the cockpit is concerned, the body will be correct in elevation, but if this is not the case, it should be trued up, utilising cardboard templates and glass paper.

The next stage is to correct the body from a plan view, which necessitates the removal of a fair quantity of material, for which purpose I used a Swann Morton balsa cutter with a No. 2 blade. A cardboard template was again used and the sides actually being left vertical at this stage. The final major operation to the body was the correction at cross-sectional level, templates in this instance being made for half sections at panel joints just aft of the radiator grille and approx. half-way along the tail, and also at the front and rear of the driver's cockpit. Both the tail sections, of course, embody the head fairing.

In my instance it is emphasised that due to the careful planning of the patterns no interior cutting was necessary, and also the slots coinciding with both the front and rear axles to provide a vertical draw from the chassis were embodied in the patterns and therefore did not require further cutting. Detail work was left until a later stage, and in the meantime the body was put to one side.

Sufficient mention has already been made of the general layout of the "works" to enable the description of the construction to be dealt with more briefly than that for the bodywork.

I first cut the developed channel chassis out of 16 s.w.g. aluminium sheet and then, by clamping a ½ in. square steel bar on each side of the "bend" lines in turn, carefully bent the edges up at right angles, using a hammer, and thus formed the channel section. Care was taken to see that the final width did not exceed the 1½ in., and when bent this was tried for entry on the underside of the body.

When satisfied, the engine unit was temporarily fitted in position, and having retrieved the body and the balsa cutter, the side of the bodywork was cut away "little by little" so as to clear the carburetter, venturis and needle valve control, when lifted from or lowered on to the chassis.

(Part II will appear in the September issue)

BUGATTI TYPE 40 (Continued from page 539)

those gadgets the doctor uses to inspect your tonsils. The view from behind the wheel is surprising, the bonnet being, or rather looking, very short indeed. A spare wheel is strapped on the offside of the body with the traditional three-way strap, so freely imitated by small sports cars in after years.

There is also, you will note, a hood, but if it is no more use than the one which graced my Brescia Bugatti of hallowed memory it would be best to follow Maurice Brett's example and take it off! One small point worth noting is the exhaust system, which is non-standard as to its tail pipe on this car, and should be, I believe, as in our drawing.

Many specimens survive in enthusiastic owner's hands, a typical example of which I met a few weeks ago, competing in a high speed trial at Silverstone. Its owner told me that he had obtained 40 m.p.g. coming from Devonshire to the meeting, and his average speed in the "Hour Blind" was high enough to shame many modern sports cars.

The Type 40 Bugatti, whilst neither a racing car nor, strictly speaking, a sports car, is without doubt a classic example of its time, and will long be remembered with affection when many of its contemporaries are forgotten.

BUICK CONVERTIBLE (Continued from page 533)

"Knupple"* mark-space ratio system. This allows a progressive movement at the transmitting end to be reproduced at the receiving end, thus making accurate steering possible.

In its latest form the model Buick has only one receiver. The steering system remains as before, but a delayed relay is used for stopping and starting. Absence of a signal automatically stops the driving motor.

The aerials run down either side of the car, and the receivers are standard E.D. Mk. III units.

We look forward to seeing considerable development in radio control for model cars and shall be pleased to hear from any other readers who have produced satisfactory working models such as the clever little example described.

* *A full description of the workings of the "Knupple" control mechanism is contained in* Radio Control for Models *by G. Honnest-Redlich, 9/3 post free from these offices*

DOPE & CASTOR

By JERRY CANN

THERE has been so much activity among the clubs in the merry months of June and July that it's difficult to know where to begin. Perhaps for a start it might be a good opportunity to say "Thank you" to the hard working hon. secretaries and press secretaries who have gone to the trouble of sending in reports, results and often pictures of their events. Believe me, they are most welcome, and if any of them should feel that they haven't been given the space they deserve, I can only say on behalf of *Model Maker* that we have done our best to give the main meetings a look in before they are too much a matter of history.

Four challengers for the Scottish Speed Championship Trophy crossed the Border on 17th June, and got away again unscathed with that handsome piece of silverware safely in the bag. Congratulations to Ken Proctor, and the same to the promoting club, who staged a good meeting in, to quote Press Sec., Andy Hutton, "met. conditions generally associated with Manchester". Of the Scottish defenders, my condolences go to Allen Fyffe, who made fastest time at 110.42 m.p.h. after a "no run" due to a timing fault, only to be eliminated on his third attempt by ignition troubles. The Glasgow contingent, accustomed to a small track, were pestered with fuel feed bothers, and Jack Cook of Sunderland suffered record wheel spin in the wet with his Dooling Arrow.

Derby Open Day was a tremendous affair, 76 entries coming from 14 clubs, as widely spaced as Sunderland, Edmonton and Bath, the latter starting at 6 a.m.! The grading system ensured that the prizes circulated freely, and the cars appear to have circulated even more so. In the Chaddesden Shield event for 2.5 c.c. jobs, E. Armstrong's new E.D. 246 model put up a new class record for the quarter at 76.27 m.p.h. to win. It should be explained to any mystified customer that Alec Snelling, running his Oliver powered super-streamliner at Surrey recently was only able to claim half and mile records at 76.84 m.p.h, the quarter being ruled out due to the odd part of a lap needed to complete that distance on the Chertsey Track.

In the 5 c.c. section 32 models competed, including Ted Armstrong's Connaught and John Oliver's "purely for amusement" twin. Best time was recorded by the Connaught's less sightly stable mate, "Arrow Mite", Mrs. Moore's Dooling breaking a sparking plug, and her husband's Fox engined car retiring. The big stuff was competing for the Rolls Royce Trophy, and here the Open 10 c.c. record fell to Joe Shelton at 127.47 m.p.h. Bill Moore's M.D.S. ran him close, and altogether 11 cars exceeded the "ton". H. C. Wainwright won the Concours D'Elegance. Results on page 530.

The "Lady Mary Grosvenor" Trophy, an annual fixture of the Hooton M.C.C., being run off even nearer to Manchester than Dundee, wasn't blessed with good weather, but speeds were creditable under the circumstances. Brett Etherington won the Trophy which is for cars up to 5 c.c., with a Dooling powered job, also putting up fastest 2.5 c.c. time with an E.D. Special.

There was some doubt as to whether the Guiseley Open meeting on June 10th could be arranged, but determination on the part of Bill Hamilton, Bill Winterburn and the boys said it could, and by a lot of hard work by everybody, it was. The Hon. Sec. was instructed to "get 'em all here" and he certainly got most of 'em, including Sunderland, Altrincham, Bolton, Bradford, Harrogate, Osset and Derby, plus a thousand spectators! Bill Moore did his stuff for Derby with 124.13 m.p.h., Bill Jepson getting 105 m.p.h., Jack Cook took the 5 c.c. class at 90.45 m.p.h., the home side getting Grade B at 84.9 m.p.h. by Frank Teak's C.T.A. engined car, fastest British 5 c.c. Ted Armstrong scored in the 2.5 c.c. class at 70.31 m.p.h., and Ken Proctor took Grade B at 59.1 m.p.h. A notable feature of the afternoon was the number of young club recruits, who took their motoring seriously, T. Burton of Sunderland collecting the 1.5 c.c. class with an Elfin job of his own construction at 35.5 m.p.h. Do we see the good work of Ken Proctor behind this?

It would have been hard to find a pleasanter spot for model car racing than Chertsey Mead on the occasion of the Surrey Club's recent meeting. The weather was warm and sunny, and excellent sport was provided against the pleasant background of trees and river. Speaking of the river, *Model Maker's* camera man was all set for the scoop of a lifetime as E. P. Zere walked steadily backwards paying out a cable . . . happily for E.P. the cable finished about two feet short of the river!

Some good looking models were among the entries, notably George Thornton's Lago Talbot and L. C. Mills' B.R.M., and Alec Snelling produced the grand-pa of all streamliners, pictured elsewhere in this issue, a scaled-up version of his 2.5 c.c. record holder. An interested visitor was E. H. Row, Feature Editor of *The Motor*, who was thoroughly initiated into the mysteries of the hobby, and was greatly impressed by what he saw. The whole event was marked by a refreshing air of informality despite the efficient organisation of Cyril Catchpole, George Thornton and his enthusiastic helpers, which makes any Surrey Club affair a pleasant date.

D. James, Hon. Sec. of the Worcester M.R.C.C. writes to say that the Worcester Open Meeting has been cancelled, but there is a possibility of a re-arranged date which will be announced in these columns if time permits.

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CROSSWORD SOLUTION

We give below the solution of the Crossword Puzzle which appeared in our July issue:

Across:
1 Cylinderhead
7 Craftsmen
10 Awash
11 Shafting
12 Flag
14 Nail
16 Sets
19 Epic
21 Hindered
22 Ennui
23 Twentysix
25 Petrolmotors

Down:
2 Yucatan
3 Inch
4 Hesitate
5 Ale
6 Swarf
8 Flats
9 Nags
13 Gardener
15 Lorry
17 Spanner
18 Shot
20 Chips
22 Exit
24 Wee

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We thank those who have sent in copies already. They have provided us with enough December, 1950 issues to meet immediate demands. Issue No. 1 is therefore no longer required.

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