THE MODEL WORLD AT YOUR FINGERTIPS

MECCANO MAGAZINE

THE MODEL WORLD AT YOUR FINGERTIPS

PILOT BOAT SCALE PLAN

REMOTE CONTROL WORKING TANK

ROBOT TRAINS

HAWKER DEMON CONVERSION

AUGUST 1966 TWO SHILLINGS

AVIATION PLASTIC MODELLING AEROMODELLING BOATS RAILWAYS RACEWAYS SCIENCE CYCLING PUZZLES COMPETITIONS

SCALEXTRIC

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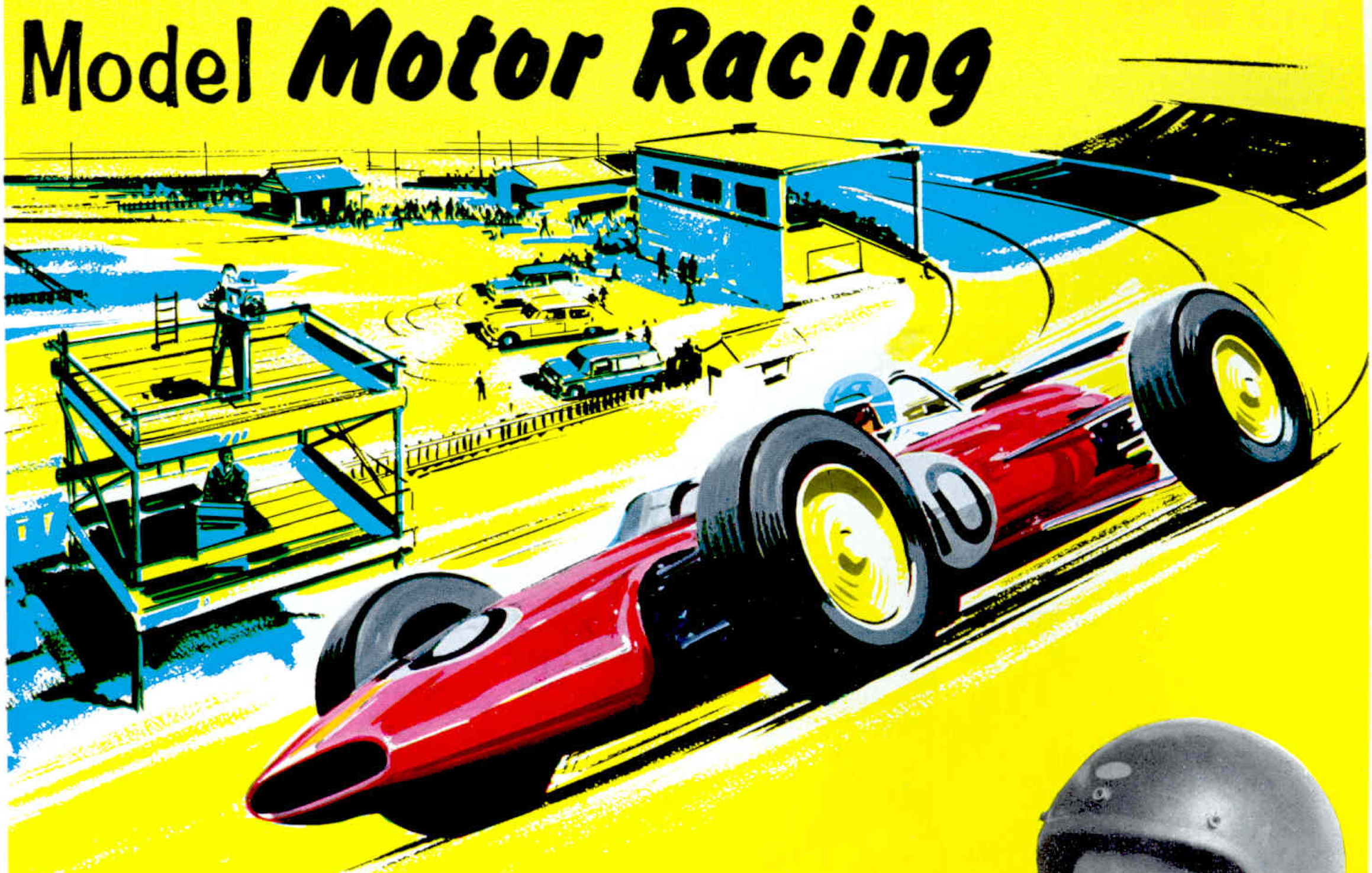

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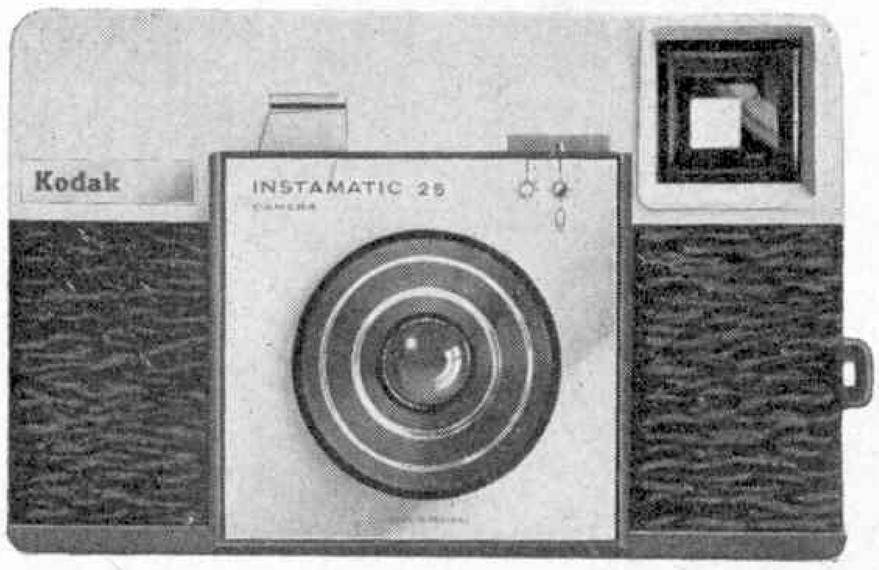

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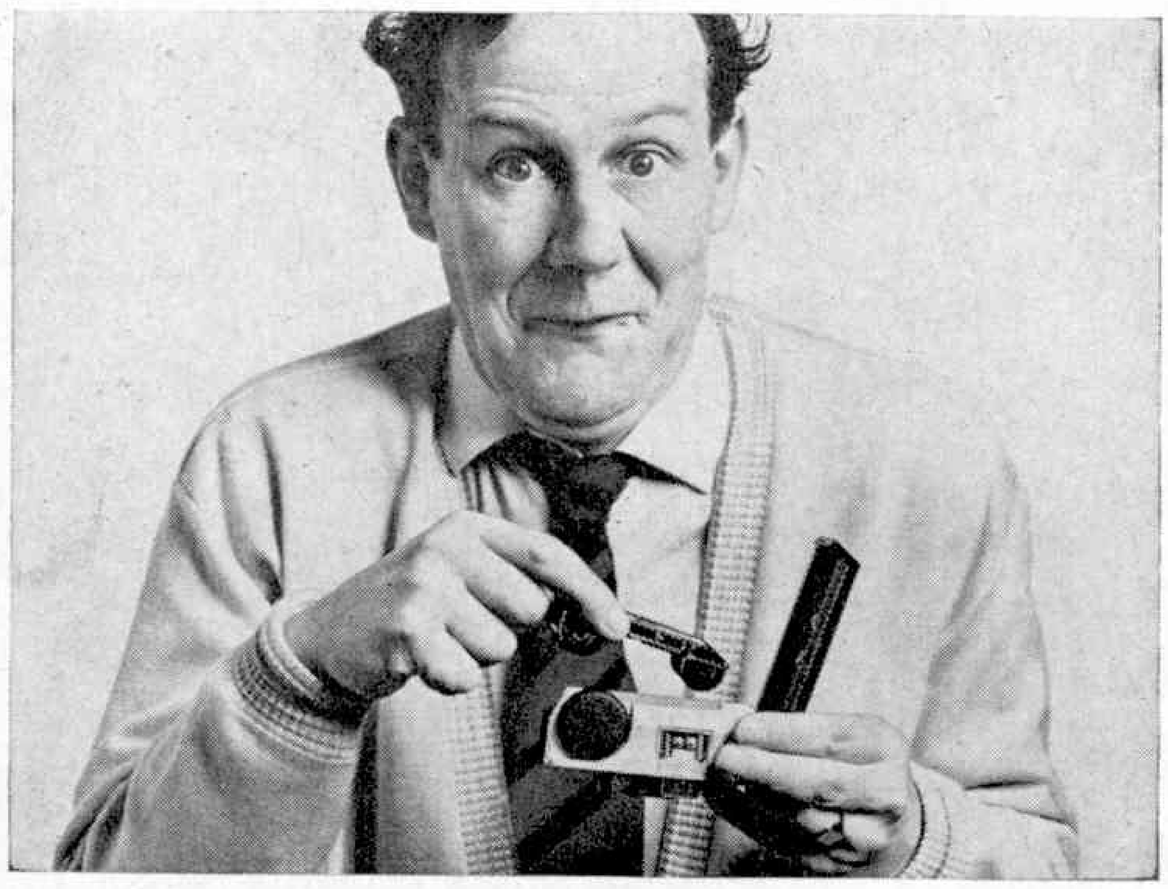

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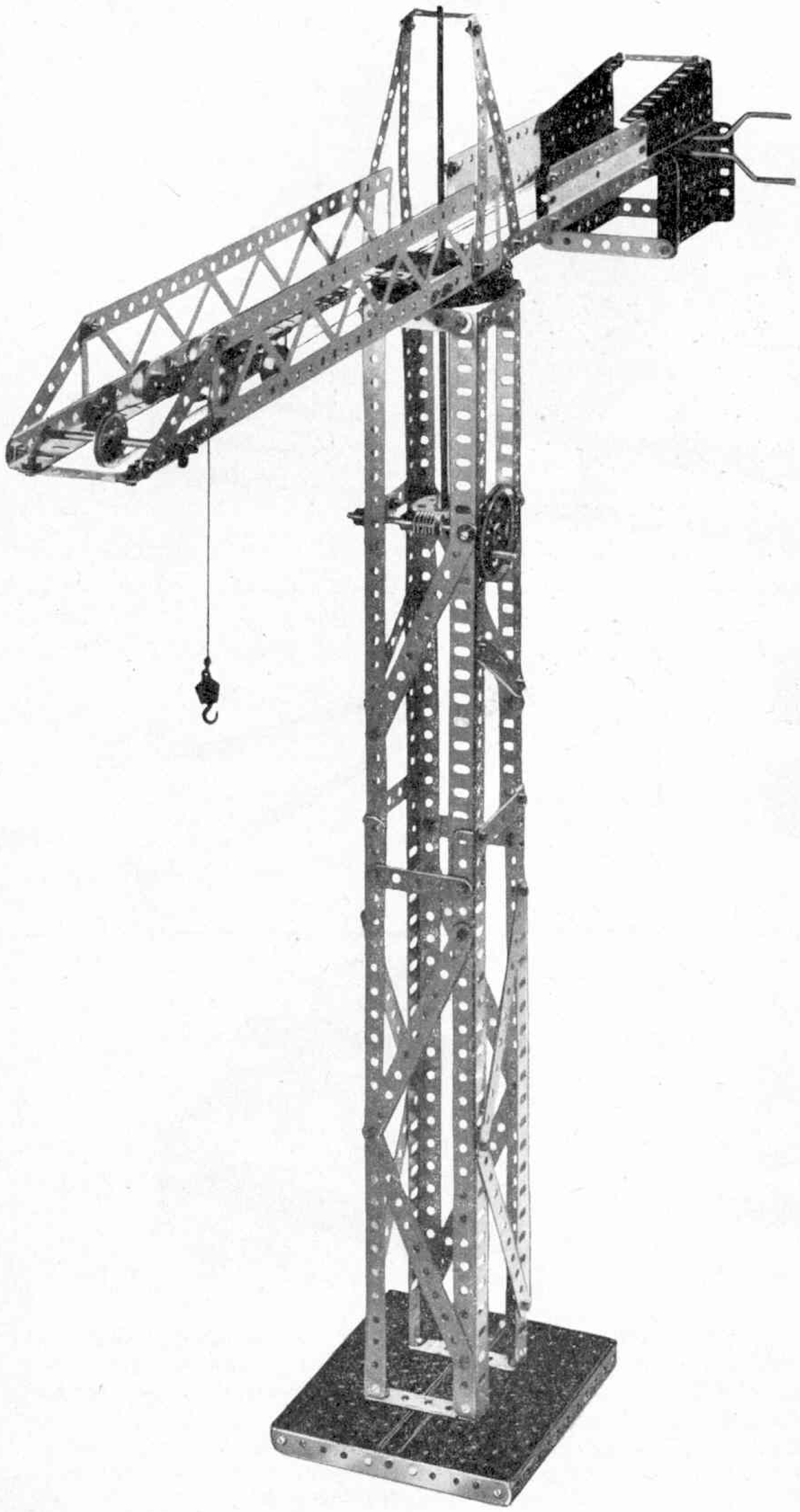


From Hampstead to Hong Kong the Sky-line Changer

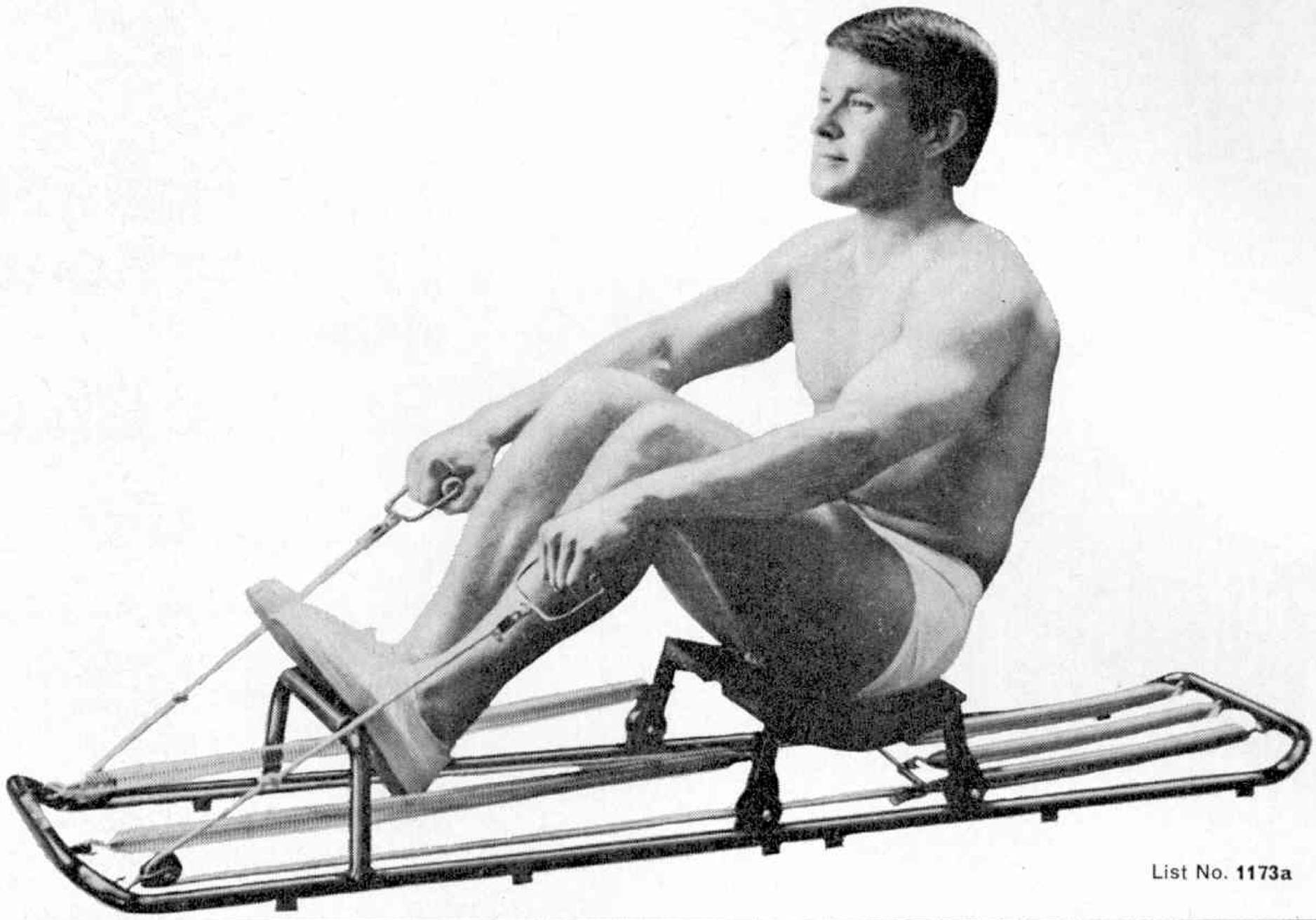
Wherever you go in the world, wherever they're building high, you'll find Tower Cranes . . . and Meccano.

Enthusiasts everywhere have devised their own Meccano Tower Cranes. This splendid model is yet another of the original, ingenious, simply clever or cunningly detailed; practical, entertaining and educational working models that you can make with Meccano.

If you are already a Meccano enthusiast, you'll know what we're talking about, and how to extend your Meccano with the Conversion sets. But, if you have yet to discover the thrills of building with Meccano, there are ten fabulous sets that you should know about . . . from 19/11. (If dad's a Stockbroker, we have one set at £55!). These are complete with instructions for making hundreds of models that really work.

We should like you to write about any models you've made which you think would be of interest to other Meccano enthusiasts round the world. Please send photographs and descriptions to, Meccano Ltd., Binns Road, Liverpool 13.

THE WORLDS GREATEST CONSTRUCTIONAL TOY



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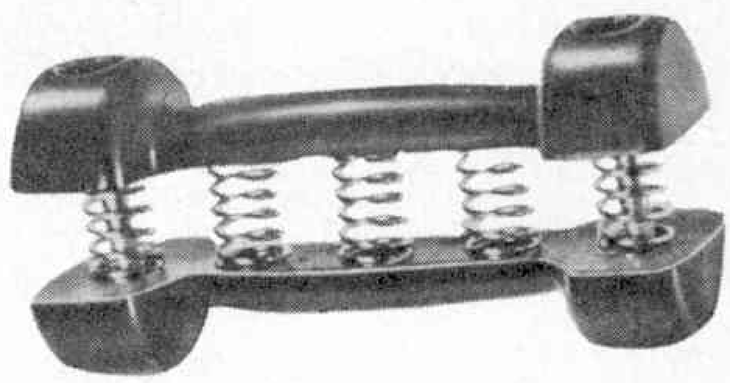

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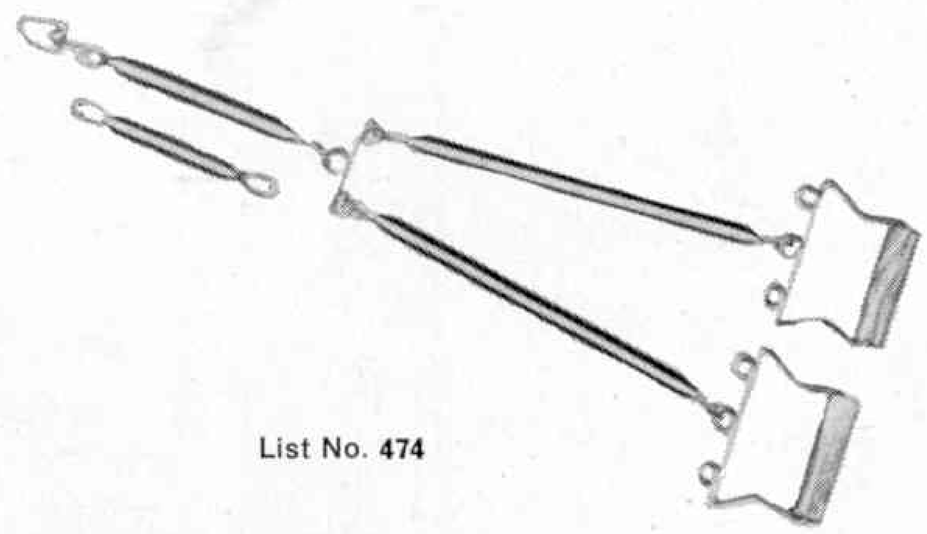

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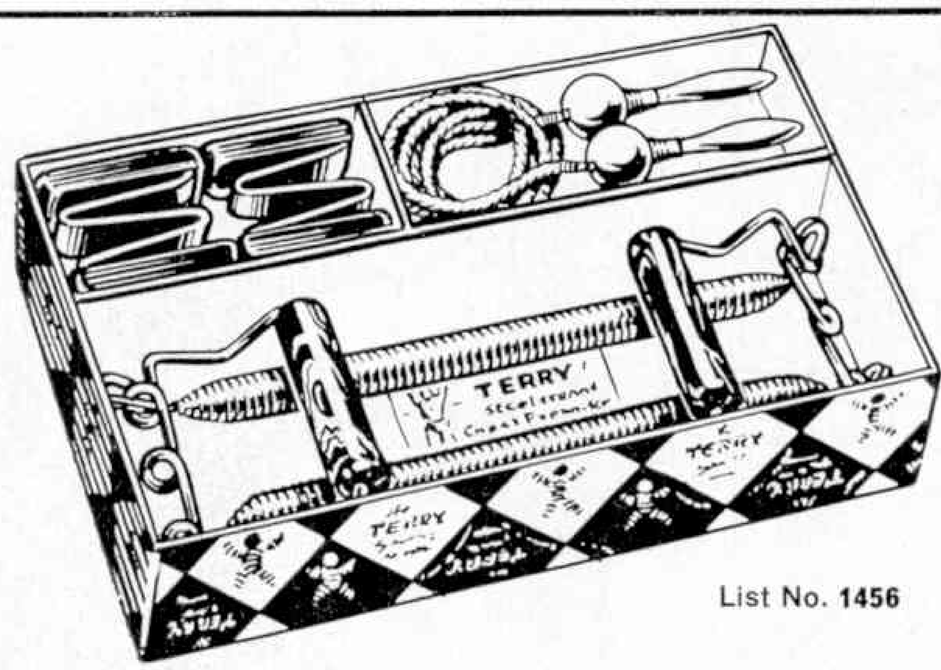

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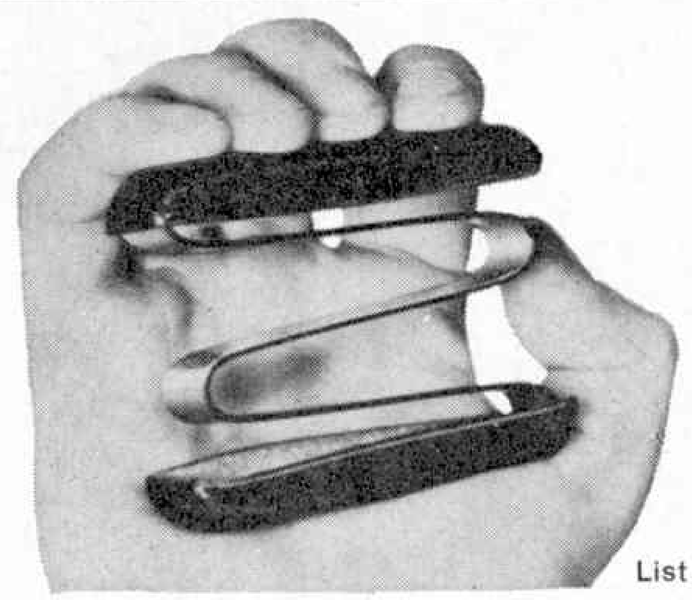

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meccano magazine

the model world at your fingertips

August 1966
Volume 51 · No. 8 · Monthly

On the cover: Readers who build the Liverpool Pilot Boat 'Puffin', featured on the next page will find our fine cover picture of great value in enabling them to capture the real atmosphere of this impressive craft. Some colour notes appear at the foot of this page.

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Next month: An exciting full size plan for an easy-to-build, all-sheet Jetex-powered flying model and how to make a real slide-rule for only a shilling!

For aeromodellers everywhere, this Summer, all eyes will be turned towards the Royal Air Force Station at Swinderby, midway between Lincoln and Newark, on the A46, when over the August Bank Holiday from Saturday, 27th August to Monday, 29th August the cream of Control Line fliers from 20 nations will be competing in the first ever F.A.I. World Control Line Championships to be organised in Great Britain.

Staged by the Society of Model Aeronautical Engineers, every opportunity will be available on the airfield, for members of the public and especially aeromodelling enthusiasts, to enjoy this once-in-a-lifetime spectacle.

As a preview to the Championships, an interesting exhibition called 'Model Aviation 66' will open on Tuesday, 26th July at 10 a.m. in the Exhibition Hall, City Library, Free School Lane, Lincoln; and will run until Saturday, 6th August, opening hours being Monday to Friday 10 a.m. to 7 p.m.; Saturdays 10 a.m. to 6 p.m.; Sunday 10 a.m. to 5 p.m.

In addition to model aircraft of all types on show, visitors will be able to see sections showing all the different aspects of designing and building. There will be, for instance, a completely fitted-out aeromodellers' work den; a comprehensive show of balsa wood with samples depicting all the different stages of cutting before it reaches the model shop; how to build a simple glider, stage by stage in pictures; and of special interest to our readers, Meccano Magazine's own 'Flight Plan 66', with plans, pictures and models, as featured in the June and July issues. Another section will show aeromodelling in the Royal Air Force today, both at home stations and overseas.

During the exhibition, the S.M.A.E.'s own Assistant Public Relations Officer, Mrs. Freda Shirt will be in attendance to tell visitors all about the many exciting things on show, as well as to answer questions on joining the S.M.A.E., where your nearest model aircraft club can be located, and advice on forming a club yourself.

So if you live in or near Lincoln, and are an aeromodelling enthusiast, be sure and visit the Model Aviation 66 exhibition in July, and the World Control Line Championships in August. Why not organise a party from your school or college?

As we promised when we increased the number of pages in Meccano Magazine, more space is being devoted to Meccano Model Building features. Our correspondence indicates that this move will be well received, and older readers will be especially pleased to see this month, the return of 'Among the Model Builders'. The continuance of this feature depends upon the support of all Meccano fans and it will appear for just as long as *you* continue to send us details of your interesting models.

The Editor

Colour notes for 'Puffin' builders:

Hull—Black. **Deck**—Scrubbed wood—light colour. **Superstructure**—White. **Lettering on transom**—White. **Lettering on superstructure**—Black. **Windlass**—Yellow ochre. **Windlass barrel, port side**—Black. **Lifebelts**—Red and White. **Life Rafts**—Light brown timber. **Mooring bollards and posts**—Black. **Steps**—Black. **Inside ventilators**—Black. **Radar scanner, loud hailer and searchlight**—Blue-grey. **Small door in wheelhouse**—Light brown timber.

Skyline Merseyside...
Big ships, small ships...

chugging away day in, day out
a small, busy pilot boat...

This is the story of The 'Puffin' and

THE 'PUFFIN' PILOTS

by Mike Rickett

LIVERPOOL, now famous for one of the longest under-river road tunnels in the world, its cup winning football teams, and its two Cathedrals, was renowned long before any of these, for its great docks and shipyards. Since the time of King John, in 1207 to be exact, when the Borough of Liverpool was created from a tiny hamlet within the Parish of Walton, the city has made a name for itself as a port. Although originally created solely to help King John in his war with Ireland, the Port of Liverpool is now one of the most important in the country, with a dock system that extends for over seven miles on the Liverpool side of the River Mersey.

The never-ending activity in a port has always fascinated me and the sight of ships—from majestic liners with their flotilla of fussing tugs, to busy tramps—is one that I cannot resist. The apparent ease with which ships glide along the river and into dock is deceptive and one tends to forget the enormous amount of work done behind the scenes, as it were, by a host of highly trained people.

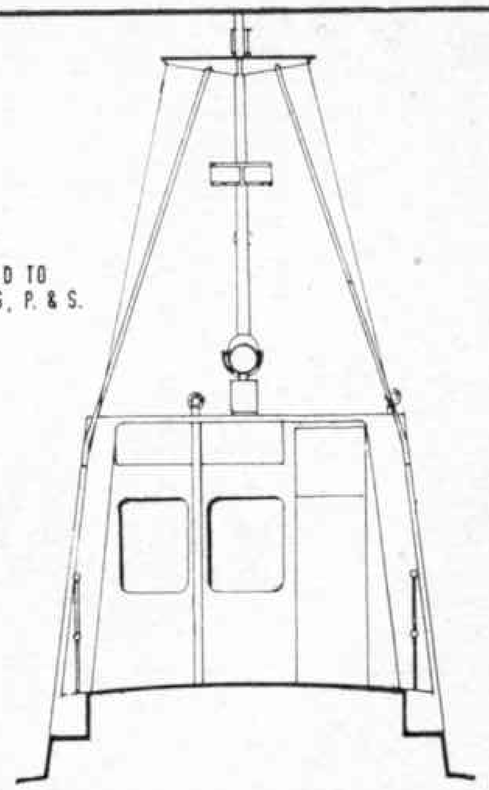
Running a port the size of Liverpool, handling the 60 million tons of shipping that use it annually, can be unbelievably complex, especially where a river like the Mersey is concerned. In common with other rivers of

LIVERPOOL PILOT VESSELS "PUFFIN" & "PETREL."

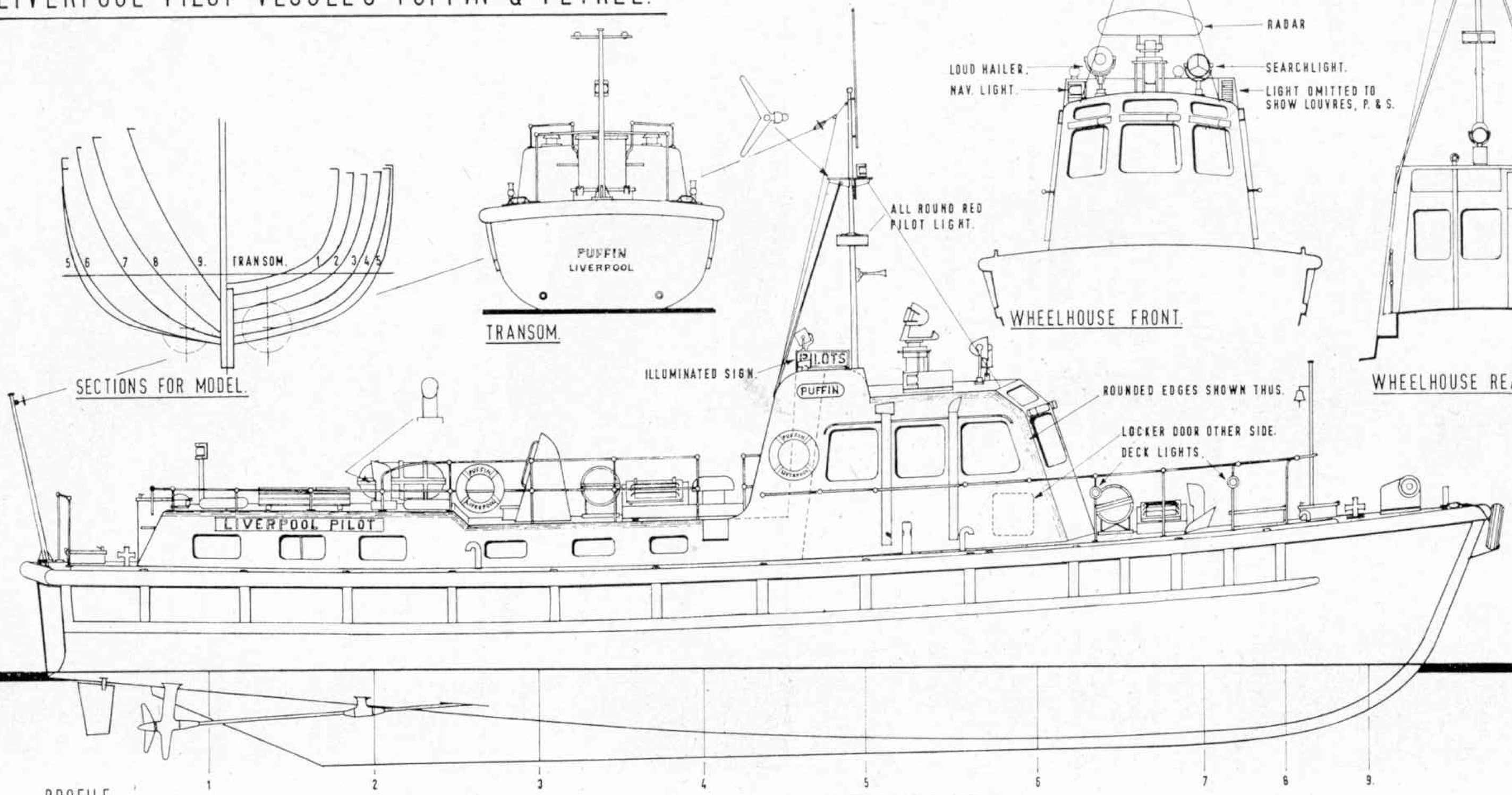
SECTIONS FOR MODEL.

TRANSOM.

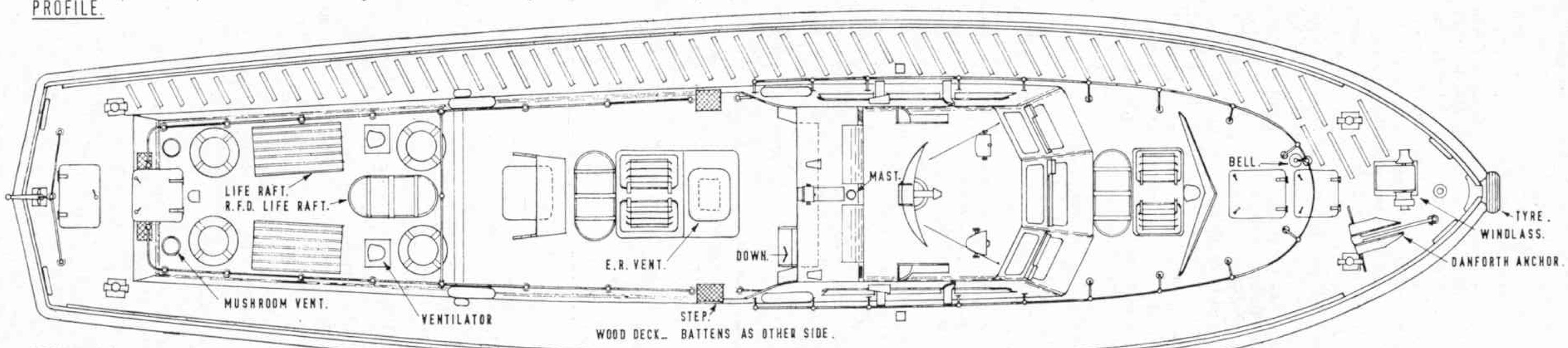
WHEELHOUSE FRONT.



WHEELHOUSE REAR.



PROFILE.



DECK PLAN.

Drawn by. Ian R. Stair. Based on information kindly supplied by the designers. Graham & Woolnough, Naval Architects, Liverpool.

SCALE 12" 0 5' 10'

its type, silt is constantly building up and it is necessary for shipping to navigate down deep channels specially dredged at the approaches to the river. Currents in the Mersey are also extremely strong and together with the 30 ft. tide, navigation could be a hazardous matter for any captain attempting to enter the port without a comprehensive knowledge of local tides, channels and weather conditions. Obviously, captains foreign to the River Mersey cannot be expected to have this knowledge and it was made compulsory, as early as 1765, for all ships entering or leaving the port, to have on board ship, pilots specially trained and familiar with local conditions on the river. Before this, pilotage was done by local men, often unqualified and untrained with no central authority to regulate their activities. Pilots, in those days, competed for the work and it is not difficult to imagine the hard, tough life that these men must have led in those far-off days of sail. There is evidence in fact that many of the early pilots engaged in smuggling activities and remains of tunnels used for this purpose can be seen to this day in Egremont on the south bank of the river.

200th ANNIVERSARY

As a result of this lack of organisation a series of serious accidents occurred in 1764, which involved a disastrous loss of lives, crews, pilots and ships. Public opinion was outraged by these events and it was this that resulted in the regularisation of the Pilot Service. The Liverpool Pilot Service celebrates this year, the 200th anniversary of organised pilotage in the port, now done through the Mersey Docks and Harbour Board—the Pilotage Authority for the port who administer the service through the Pilotage Committee. Since the first Acts of Parliament in 1766, pilots have been thoroughly trained in local conditions and are required to sit comprehensive examinations.

The launch illustrated on our front cover and Ian Stair's drawing on page 7, is one of two used by pilots for boarding or leaving ships approaching the river. Named 'Puffin' and 'Petrel', these are manned by four crews working in 12 hour shifts and consisting of a master, engineer, and two A.B.'s. Capable of carrying up to 16 pilots in after accommodation, they are powered by Rolls-Royce engines giving a speed of 16 knots. The launches have the astonishing fuel consumption of 26 gallons of high quality fuel oil per engine hour —upwards of one ton per day! In the field of electronic equipment they carry radar, radio telephones, V.H.F. radio and an echo sounder. The V.H.F. equipment is used for port operations and also for contacting the Pilot Office, other ships and dock entrances, and the radio telephone for distress calls and for contacting the G.P.O. shore stations and other ships. All controls are duplicated in the wheel house and the launches are equipped with a galley, master's cabin and crew quarters. In the Pilot Service for 3½ years, the launches weigh 46 tons and were designed by Graham & Woolnough of Liverpool and built by Phillips and Son, Dartmouth, Devon.

Basically, the duty of the 178 pilots, trained from boyhood for the service, is to meet incoming ships at the outer approaches of the port, and to guide them to their destinations in the river—usually the docks. A clearing office is maintained by a Shoremaster who allocates pilots to individual ships and who makes certain that a pilot is awaiting a ship on its arrival at the Western Station (Point Lynas), the Bar Station, or alternatively, if a ship is leaving the port, at the place where she lies.

The majority of pilots in the service hold First Class Licences. Apart from 46 appropriated to various shipping companies, they work on a rota system, taking it in turn to pilot ships inwards or outwards as they are required.

In addition to the two launches, 'Puffin' and 'Petrel', the Pilot Service has three diesel electric Station Keeping Pilot Boats for taking pilots on and off ships. The two stations are maintained at Point Lynas, Anglesey, where the majority of ships receive their pilots and at an inner station near the Bar Lightship, 15 miles from Liverpool where the main buoyed channel into the Mersey starts.

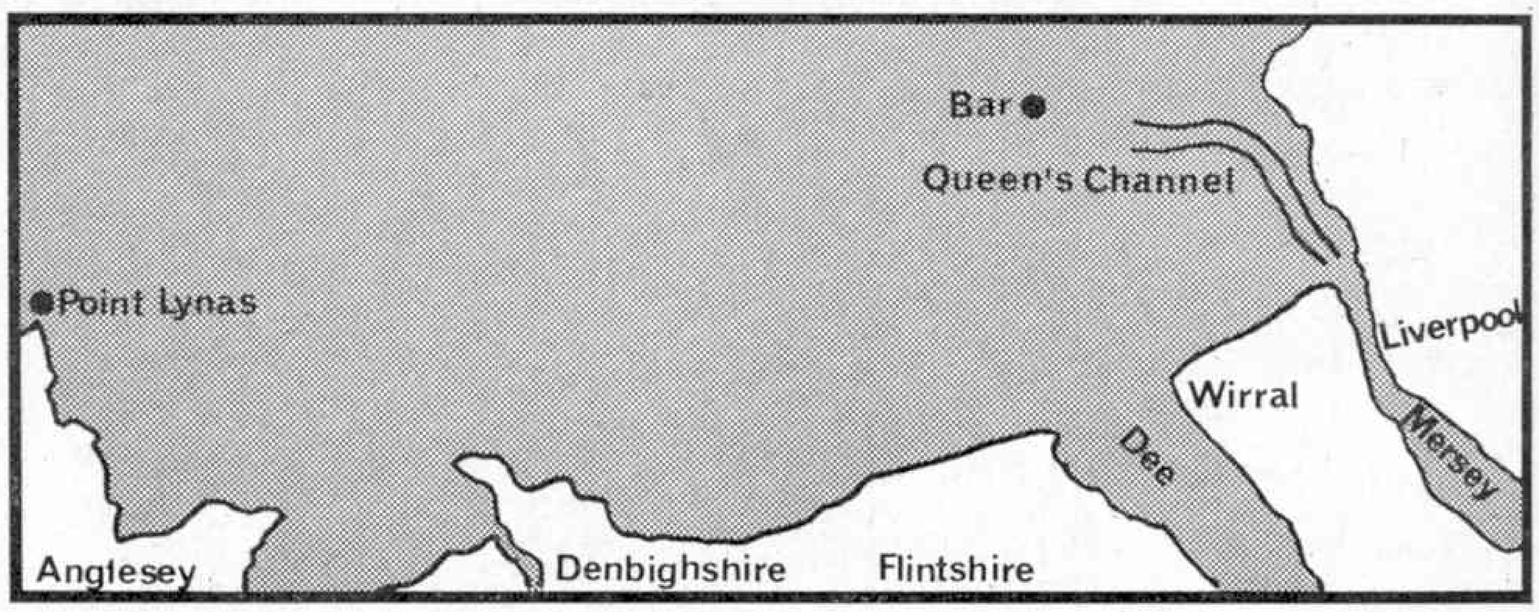
Each of three pilot boats in turn does seven days duty at the Bar Station, followed by a similar turn at the Lynas Station, and then six days for maintenance. The boats, which are fitted with all modern aids for navigation, are manned by a crew of 22, which includes 10 boathands, and are each capable of accommodating 12 pilots. In addition to the two launches and the Pilot Station boats, the service also has a small river launch used for general duties in the river itself and particularly for conveying pilots to and from ships anchored in the Mersey.

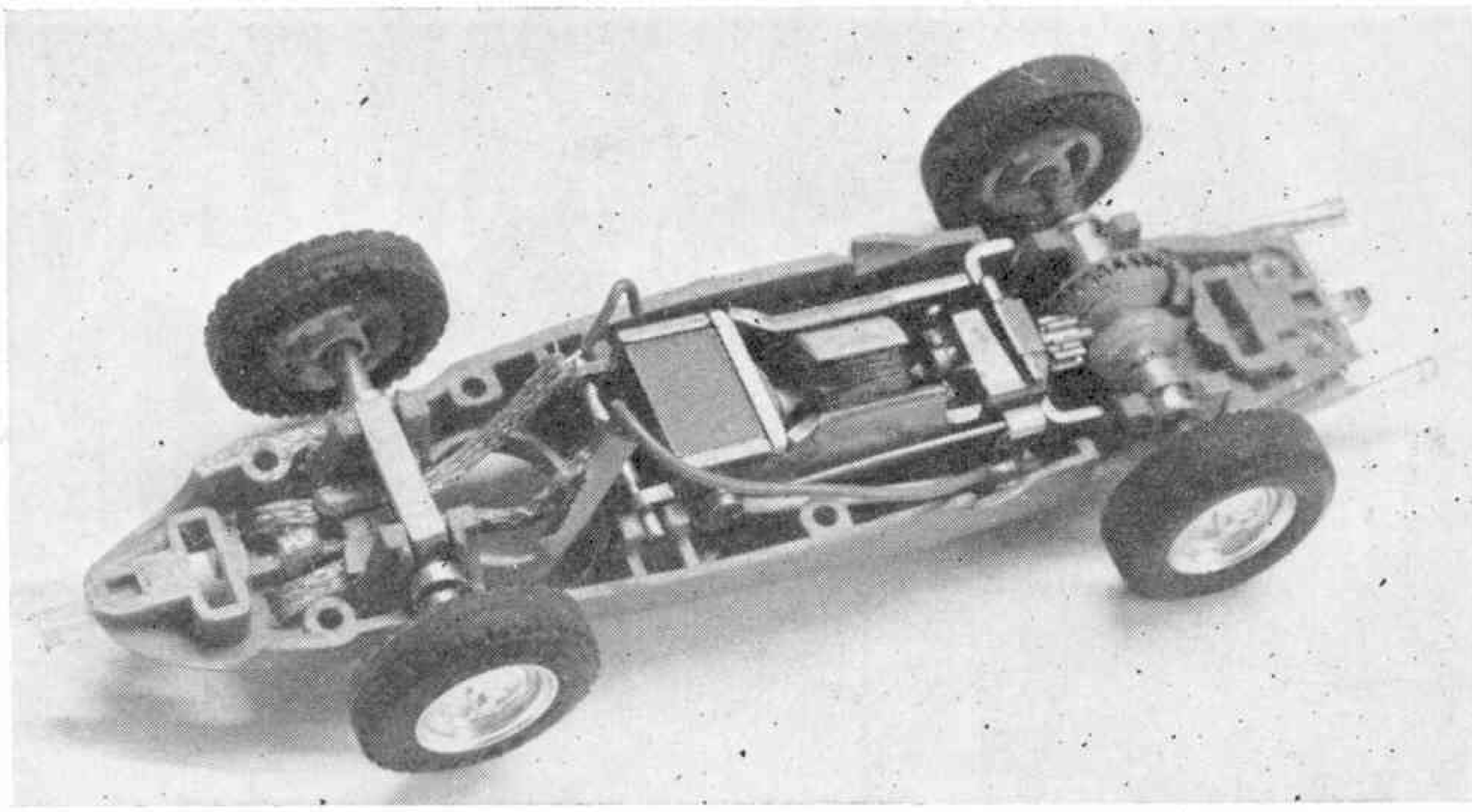
An interesting and exciting career, entry into the service is usually by application on reaching the age of 16. The applicant must hold four 'O' level G.C.E. passes and the names are placed on a preliminary waiting list. As vacancies occur, applicants are called before an examination committee which, if he is suitable, transfers him to the official register of applicants. When selected, the applicant is placed with a shipping company for a period of usually 6-12 months, or until a vacancy arises in the service. The apprenticeship is a long one, generally lasting 5½-6½ years, necessary to familiarise the potential pilot with the moods of the weather, tides, lights, depths, signals and the seamanship required over the Liverpool Pilotage District, which encloses an area from St. Bee's Head in Cumberland, east coast of the Isle of Man, to Anglesey and as far up the River Mersey as Eastham Locks or Garston.

During his apprenticeship, a boathand will progress through the duties of Junior Boathand, Junior Boathand on Deck, Puntsman, Boatswain, Second Boathand, and Senior Boathand. Towards the end of his apprenticeship he is required to obtain a Ministry of Transport Certificate of Competency. When a vacancy occurs, the Senior Boathand in the service is called before the Examination Committee for licensing as a Third Class Pilot, which allows him to pilot ships not exceeding 600 tons net. After two years he is called for a further examination, resulting in a Second Class Licence allowing him to pilot ships of up to 3,000 tons net and, after a further two years, a final examination for a First Class Licence, which allows him to pilot ships of any tonnage.

Like the Royal Navy, the Pilot Service is full of tradition, to be seen even in the painting of the two launches which, in addition to the white superstructure and black hull, have a white line on the water line, an inheritance of the days of competition, when this was painted on to make speed assessment more difficult.

The map below shows the complex coastline of the Liverpool Pilotage District. Most ships are met by the pilot launch at Point Lynas. Bottom: Pilot boat 'Puffin' on the Mersey. One of the two high speed river launches, she is used by pilots for boarding ships approaching the river





SOUPING UP COMMERCIAL SLOT RACERS

BY GODFREY ARNOLD

ORIGINALLY this article was going to be entitled 'Modifying Commercial Cars' but, as it is difficult to know where to draw the line between modifying and scratch building (the subject of the next article in this series), I felt that the new title was more appropriate.

There is no point in carrying out any modification unless one or more of the following aspects of performance is improved and none of the others suffers to any marked extent:
Acceleration,
Top Speed,
Road Holding,
Reliability.

There are two basic ways to improve acceleration, assuming that the supply voltage remains the same, either to make better use of the existing motor or to substitute a more powerful one.

The gear ratios chosen by manufacturers are usually a compromise and can often be bettered for a particular circuit, although a bit of experimenting is often needed before the right one is found. Even if you select the best ratio for your circumstances this is no use unless the power can be got onto the track and this gives rise to the paradox that adding weight to a car can improve the acceleration, by reducing wheelspin. Weight added for this purpose should always be mounted just forward of the rear wheels. Tyres, of course, play an important part in getting the power onto the road and, generally speaking, the softer the tyre, the better the grip but choice of tyres for maximum acceleration should take second place to choice of tyres for optimum roadholding. About the only other way of improving acceleration with the existing motor is to tune it, but this is a subject in itself, which I hope to cover at a later stage.

We are now left with the other way of improving 'getaway' and that is to install a more powerful motor which may be very easy but very often involves a major conversion. Should you decide to do this, take care, if you are racing on a small track, as the increase in power may make the car rather a handful to drive; also make sure that you have a suitable hand controller for the motor used.

Top speed is affected, largely, by the same factors as acceleration, especially gear ratios, but whereas a higher numerical ratio is best for acceleration a lower one is best for top speed. However, unless you are fortunate enough to race on a track with fairly long straights of twenty feet or so, acceleration is the more important.

Races are won or lost on roadholding and it is here that commercial cars, in general, offer the most scope for improvement. Because a large proportion of such cars are played with, rather than raced seriously, they have to be made as tough, and yet as easy to service, as possible. In addition, so that the price can be kept within reason, ease of production often takes precedence over sophisticated design and both these factors account for home-built cars winning many more races than commercial ones.

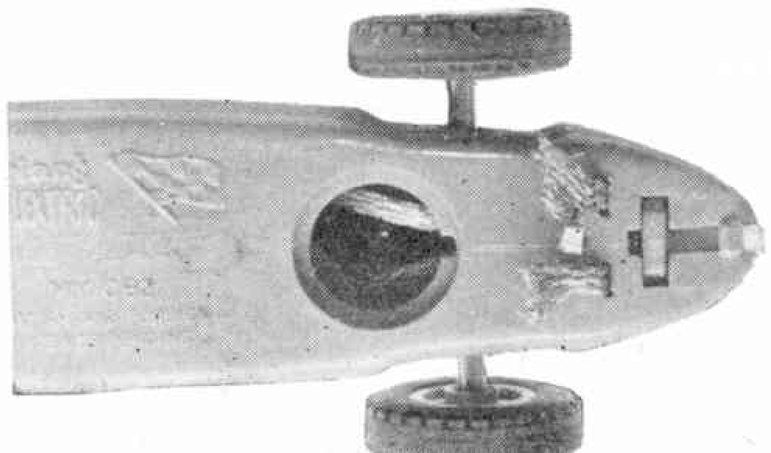
Improvement of roadholding can be tackled in many different ways. While theoretical considerations seem to play little part in slot racing there are certain principles of design that always hold true. Probably the more important of these is that the pivot centre of the slot guide, or the guide pin if a single pin is favoured, should be on or in front of the axis of the front wheels, never behind. Therefore, if a car has a guide pin behind the front wheels, this should be moved to the front and a worthwhile improvement in roadholding will result.

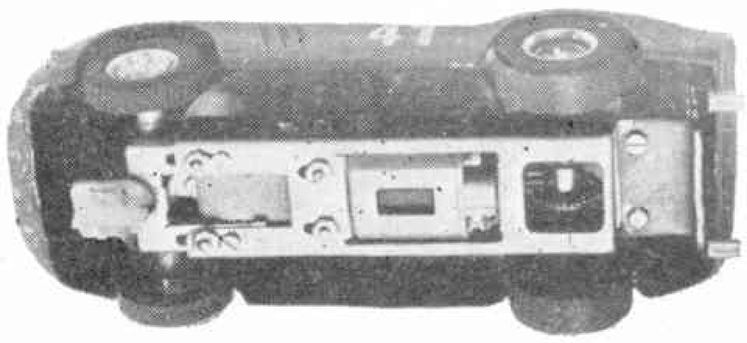
Another basic design principle is that the weight of the car should be carried on its four wheels. Whilst this may sound obvious many commercial cars have the front end supported, in fact, by the pick-up braids and will perform just as well with the front axle removed! If this is due to a 'floating' front axle then the first thing to do is to fix this so that it carries the weight of the car. The other reason for the braids carrying the weight of the car is that very often, especially in those cars produced by American manufacturers, the braids are far too stiff. Ideally a braid should be springy enough to make good contact with the track conductors and yet not so strong as to have a tendency to lift the car.

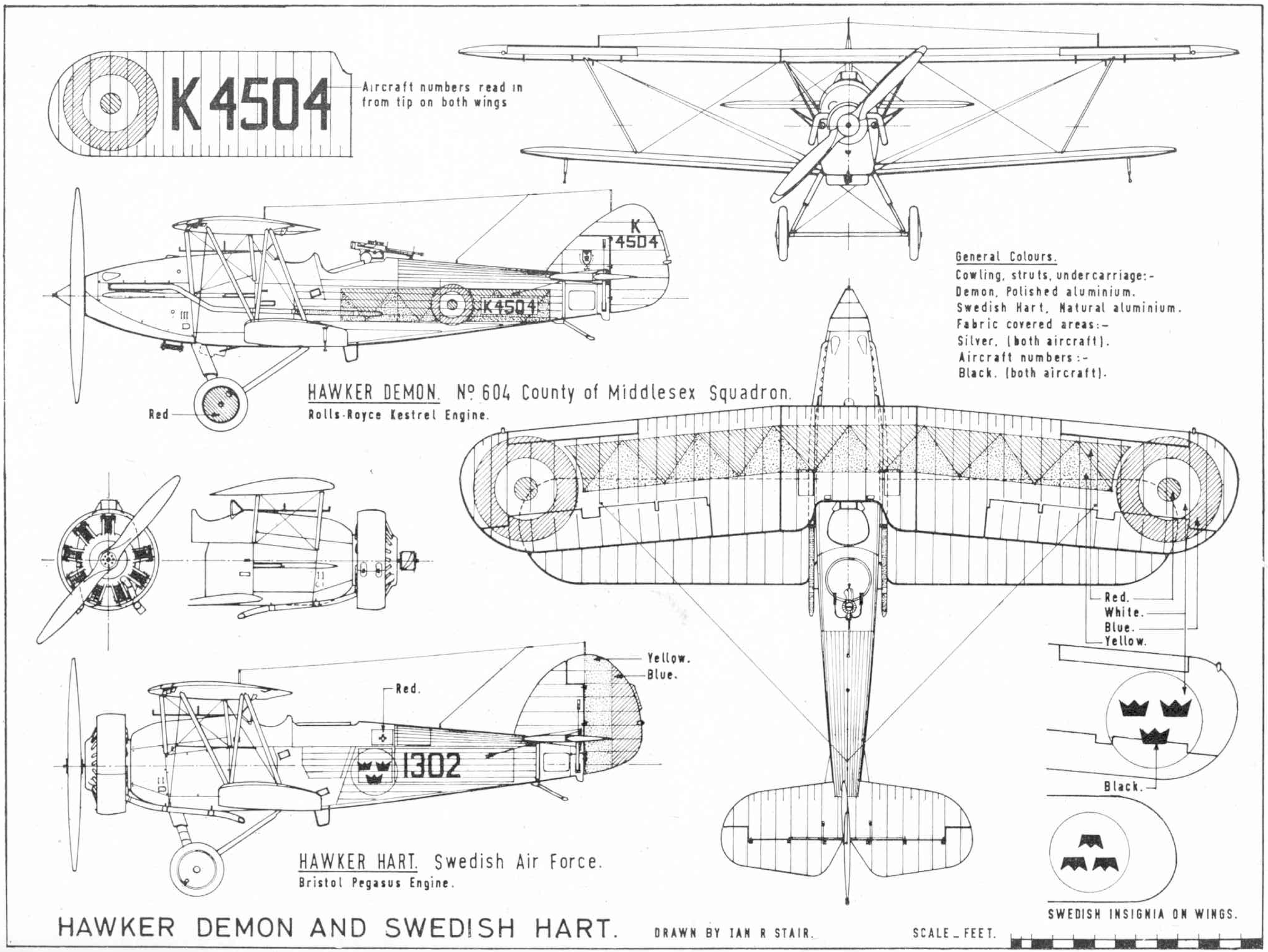
Tyres, obviously, play a large part in roadholding and a choice, from the wide range now available, is governed largely by the track surface. Slicks (treadless tyres) seem to be the best and, as a general rule, for the gritty type of club track hard ones are the best but, for smoother surfaces, such as commercial or plain hardboard tracks, soft ones are preferable. Personal preference also comes into it and if it means fitting different wheels in order to get a better choice of tyres—then fit different wheels. Remember that tyres must be absolutely concentric with the axles, care taken in fitting will be amply repaid.

Much controversy exists on the subject of ballast and many hours are spent discussing the relative merits of lightweights and heavyweights, but almost any car will benefit from a little 'added roadholding'. Plasticine is very useful for this purpose, as it can be 'stuck' inside a car and its qualities are enhanced if lead shot is mixed in with it to make it 'heavier'. It is very difficult to generalise on this subject but all weight should be put within the wheelbase of the car and as low as possible. As a rough guide, if the tail slides around, ballast should be put near the back wheels and if the car tends to go straight on at corners then the ballast should be put towards the front. Do not, however, add ballast just for the sake of it, and if a car performs to your satisfaction without added weight leave it alone. Before adding any ballast make sure that you have exactly $\frac{3}{16}$ in. slot guide depth. Too little and the guide will jump out of the slot, too much and it will foul the bottom. If the guide is too deep merely shave some off and, if it is not deep enough, either lower it or use smaller front tyres. The substitution of machined gears for plastic ones is an advantage, but only if motors and rear axles are well located. As mentioned earlier, commercial cars are usually very tough and, consequently, reliable. The main point to watch is that any modifications do not impair reliability.

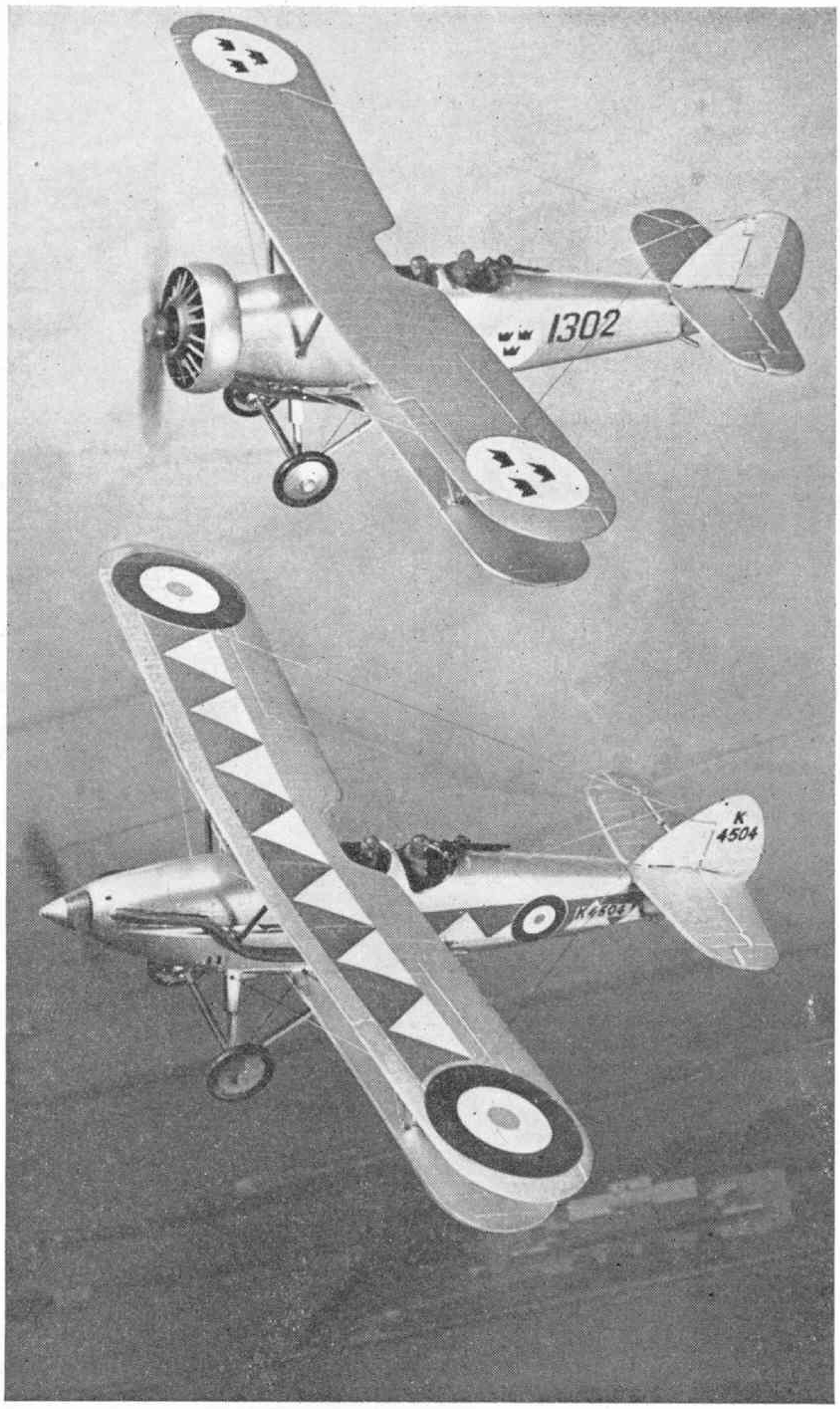
Heading picture and below left: this Scalextric Ferrari has had the guide pin (actually a body locating pin) moved forward of the front wheels, softer braids used, and the front axle positively located by using the axle spacers as bearings and some brass tubing as spacers. All this reduced lap times from about 13 secs. to under 10 secs. Below right: how not to add weight! The large piece of lead was added to the tail of this 1/24th Revell Ferrari to improve tail adhesion, but its location tended to lift the front of the car on acceleration. Had it been mounted lower, and ahead of the rear wheels, the front piece (which is too high anyway) would not have been needed.






K4504
Aircraft numbers read in from tip on both wings
K 4504
K4504
Red
HAWKER DEMON. Nº 604 County of Middlesex Squadron.
Rolls-Royce Kestrel Engine.
General Colours.
Cowling, struts, undercarriage:-
Demon, Polished aluminium.
Swedish Hart, Natural aluminium.
Fabric covered areas:-
Silver. (both aircraft).
Aircraft numbers:-
Black. (both aircraft).
Red.
White.
Blue.
Yellow.
Yellow.
Blue.
Red.
1302
Black.
HAWKER HART. Swedish Air Force.
Bristol Pegasus Engine.
SWEDISH INSIGNIA ON WINGS.
HAWKER DEMON AND SWEDISH HART.
DRAWN BY IAN R STAIR.
SCALE _ FEET.

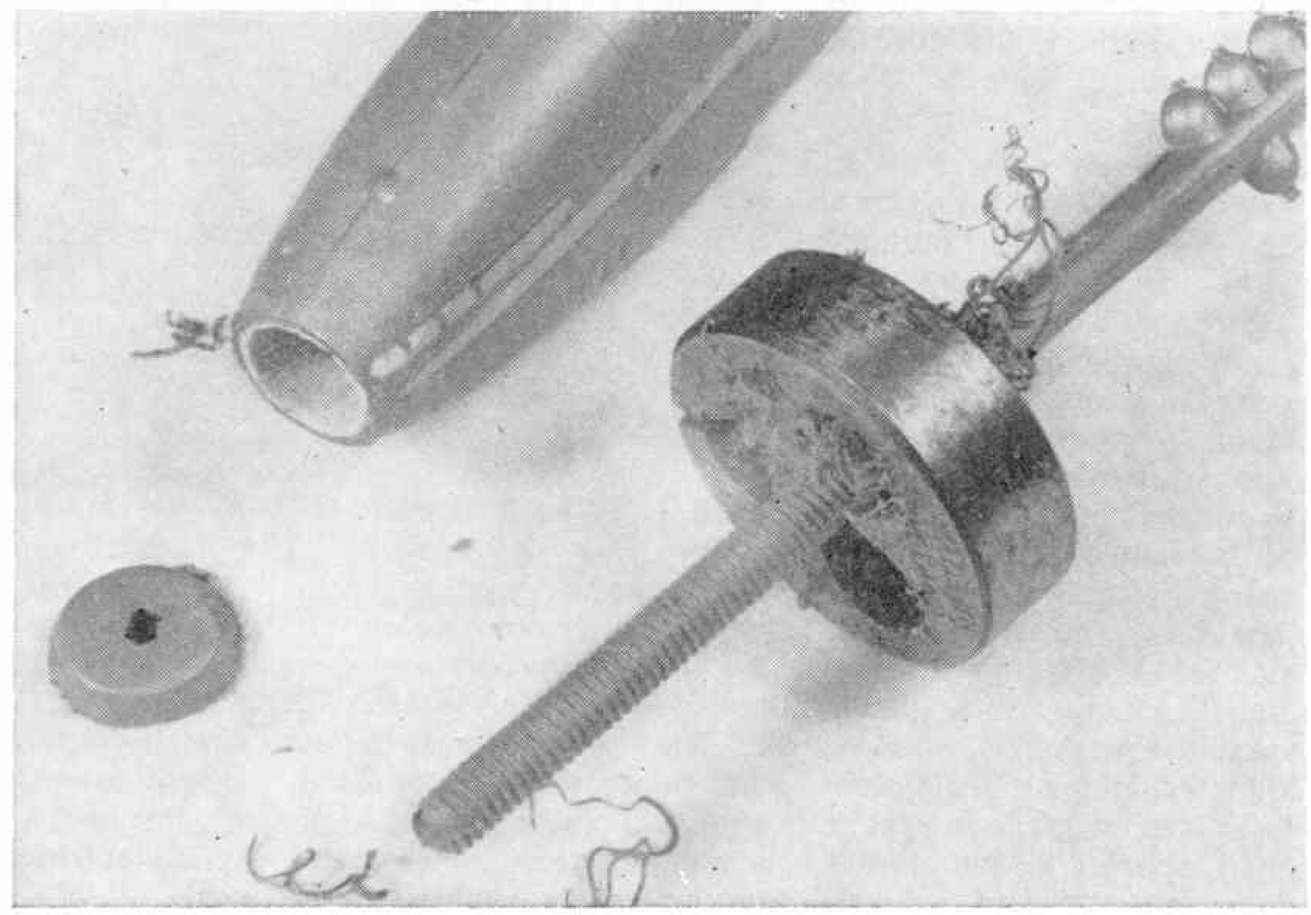
DEMONIC HARTS



The Airfix Hawker 'Hart' kit is not a new one, but when it appeared some years ago it set new standards for low priced plastics with its finely engraved rib lines and thin-section wings. It still compares quite favourably with many of the current releases and makes fine raw material for the kit converter.

Ian Stair's drawing provides all the data required for Doug McHard's two projects this month—the Hawker 'Demon' and the more complicated Swedish 'Hart' with its built-up radial engine.

When, in the May issue we adapted the Westland 'Wallace' to make a 'Wapiti', we were left with an unused radial engine cowl ring. Also, the brief mention in the June, Fokker FVIIa feature, of a suggested method of building up radial engines from threaded plastic sprues, inspired a number of requests for further details. The Swedish 'Hart' project this month not only provides an ideal opportunity to use that cowling, but it also enables us to enlarge on the business of dummy radial engine building.



THE SWEDISH 'HART'

To be really accurate, you should cut off the whole front end of the Airfix 'Hart' fuselage and rebuild it to the outline shown on our drawing. You *could* then use a *complete* 'Wallace' engine and cowling to complete the job, but it seems a bit wasteful to go about it in this way, so a more economical, though rather less accurate method is here described. The finished product is, nevertheless, quite effective as our 'flying' photo amply testifies.

1 Make a start by sawing off the front $\frac{1}{8}$ in. of the fuselage and re-cement the cut-off piece *inside* the fuselage about $\frac{1}{4}$ in. back from the new front face. Fill in the gun trough on the fuselage side and also the exhaust ports with Humbrol Body Putty (see May issue) .When quite dry—it will take several hours—sand it flush with fine abrasive paper, finally finishing off with No. 400 Wet-or-Dry paper.

Continued overleaf —▶

Slice the knobs off the plastic moulding sprue to make a smooth rod, and down it run a $\frac{1}{8}$ in. Whitworth die to produce a threaded rod which will eventually be used to represent engine cylinders.

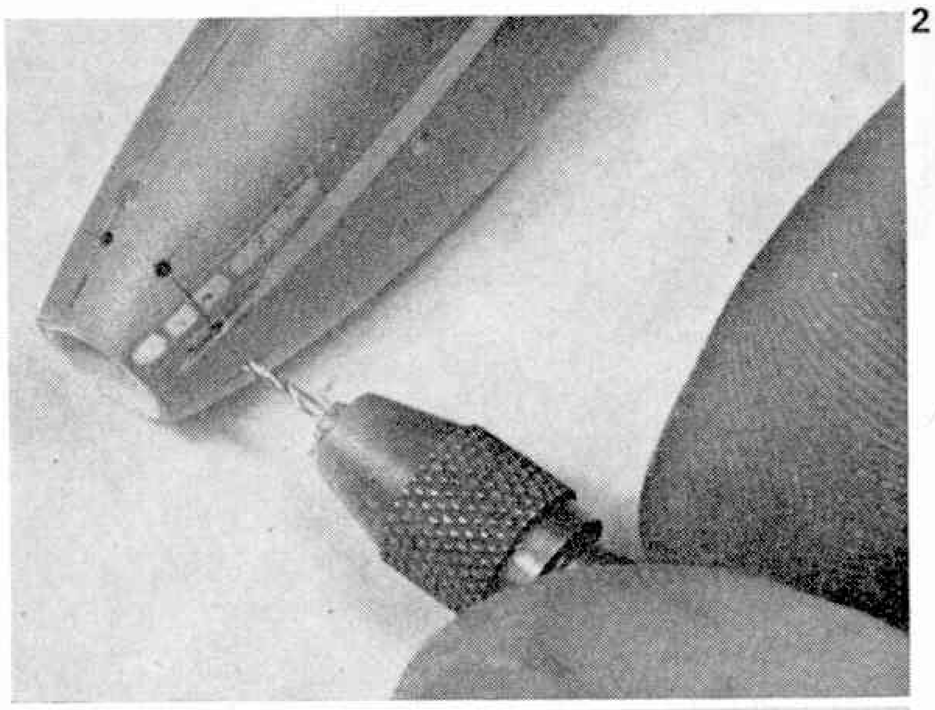
2 Carefully mark out and drill nine equally spaced $\frac{1}{16}$ in. diameter holes around the nose, as shown, using the drill in a small pin chuck. Start with the top cylinder hole which must be on the exact centre line.

3 Open out the holes with a larger drill or gimlet, adjusting the spacing of the holes if necessary. Cut the threaded sprue into nine pieces—rather longer than needed—and cement them in position to represent the engine cylinders. If you're really keen, you can thread the holes with a $\frac{1}{8}$ in. Whitworth tap and screw the cylinders in!
Other details revealed in this photograph: the underside radiator and the little oil cooler have both been cut off and the inside of the nose is slightly built-up with Body Putty. When dry, the front rim is rounded off.

4 When the cement has thoroughly set, the cylinders are sanded to length and the previously mentioned 'spare' Wallace cowl ring is cemented on. Alternatively you can make up a cowl ring from 60 thou. thick Plastikard wrapped round a suitable former. Short lengths of thinly stretched sprue (see May issue) are then cemented in place to represent exhaust pipes. Longer and thicker pieces are used for the main exhausts—the drawing gives you the size and shape of these (see also photo 7).

5 The enlarged fin and rudder are cut from 60 thou. thick Plastikard sanded to correct section and the rib lines scored with a sharp knife.

6 Here's an easy way to make 'Swedish' transfers. Take a piece of 'Yeoman' white transfer sheet, and using a pair of dividers (one point sharpened to a knife-edge with an oilstone), cut suitably sized white discs, supporting the pivot point on a piece of card or celluloid to prevent too deep a hole being pierced.
The black 'crowns' can be painted on using a small brush or they can be drawn on with a mapping pen, using thin enamel or *waterproof* ink. The finished transfer is then applied in the normal manner.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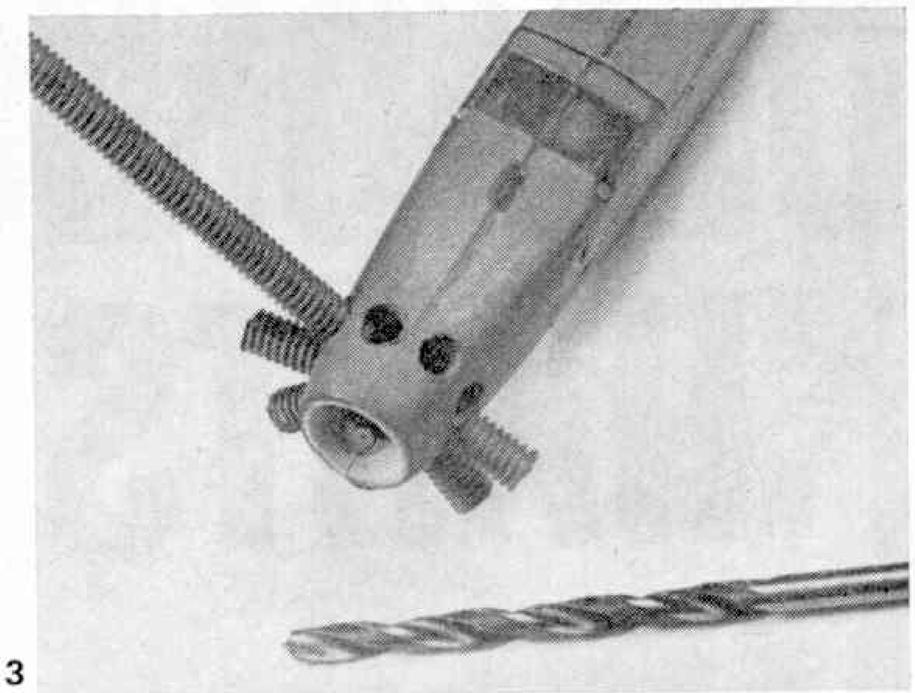
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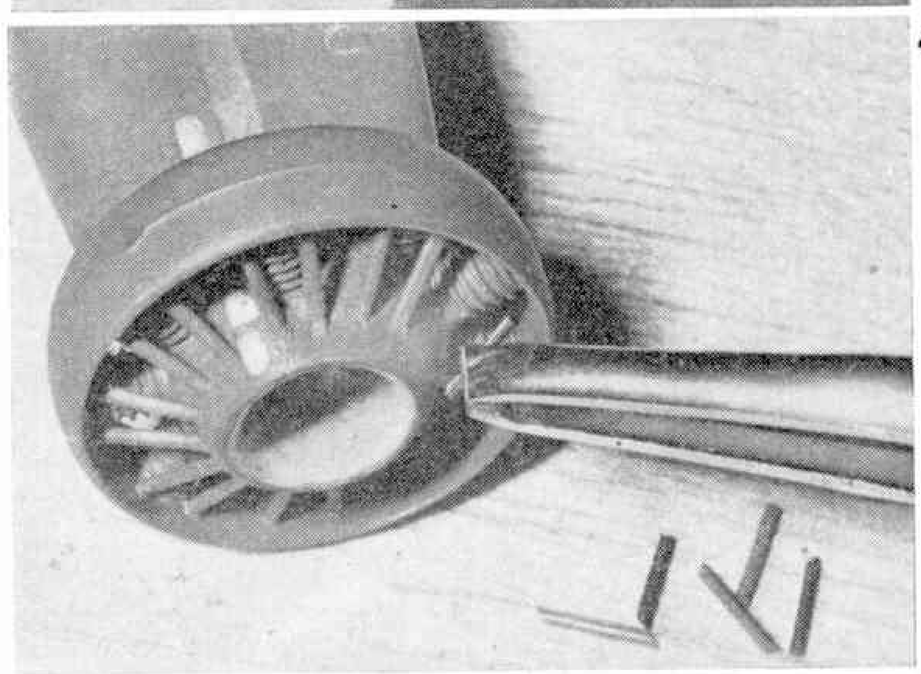
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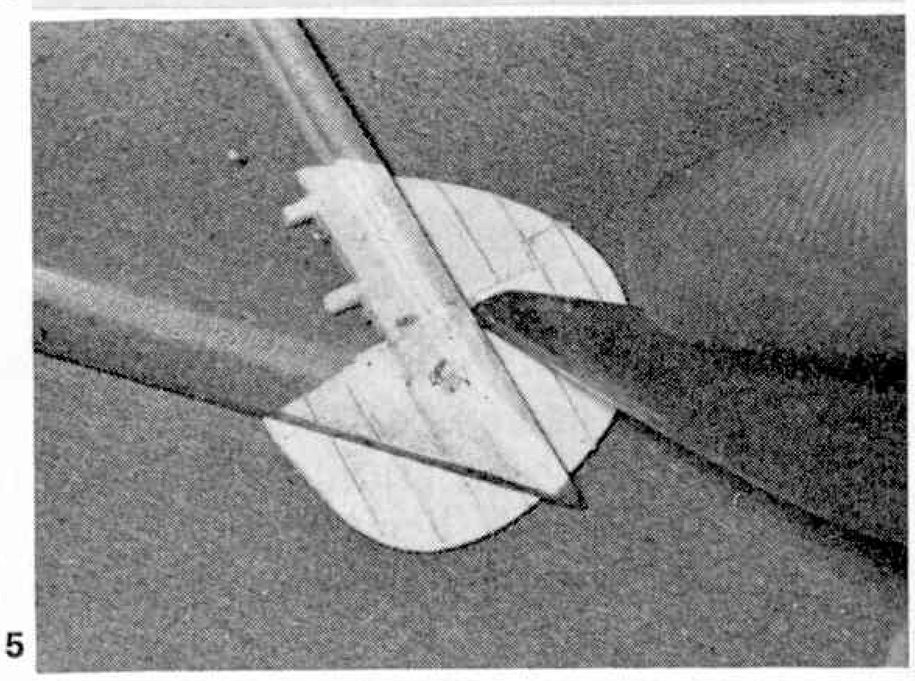
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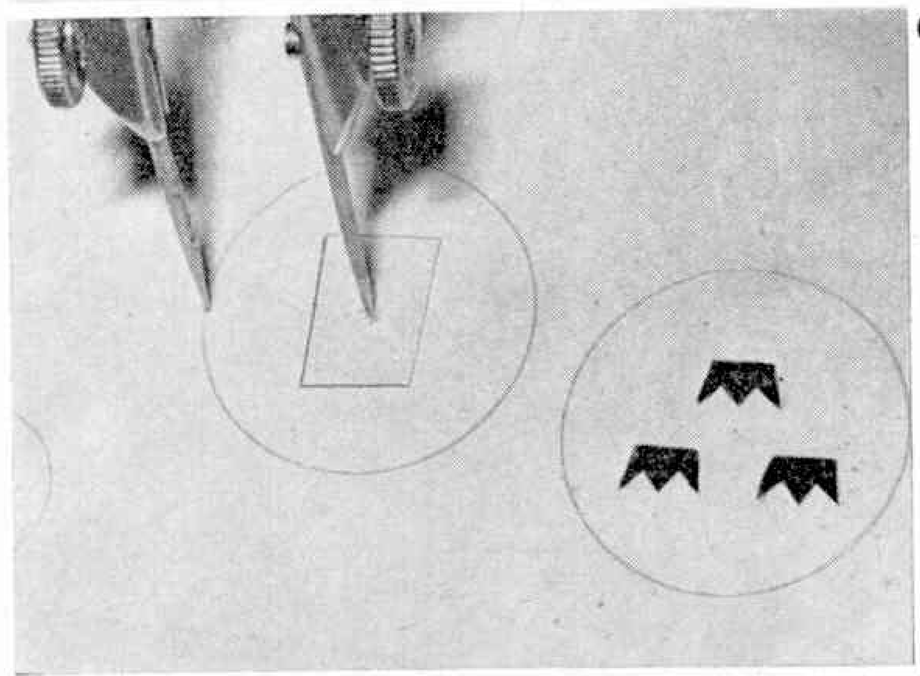
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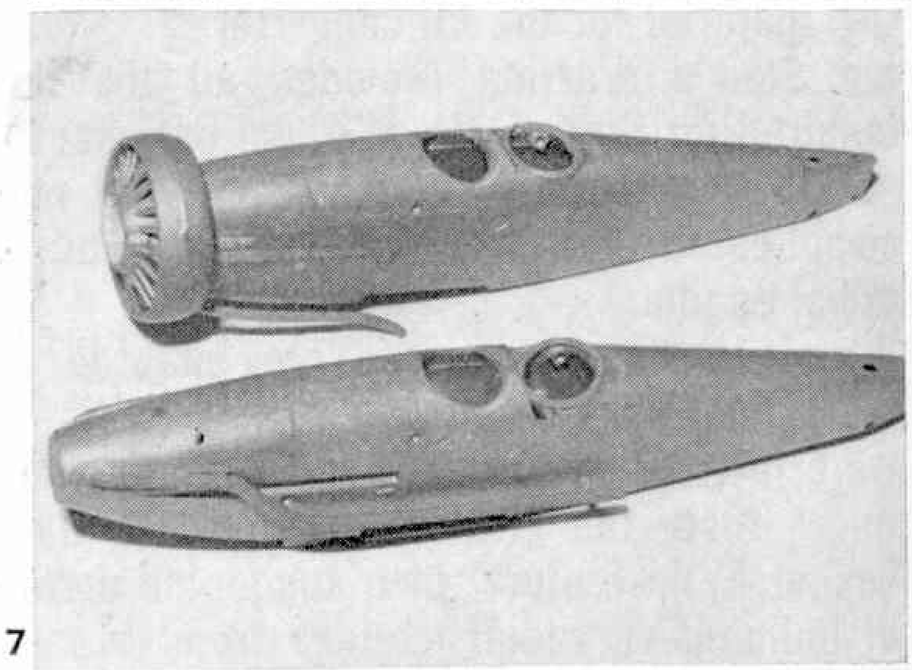
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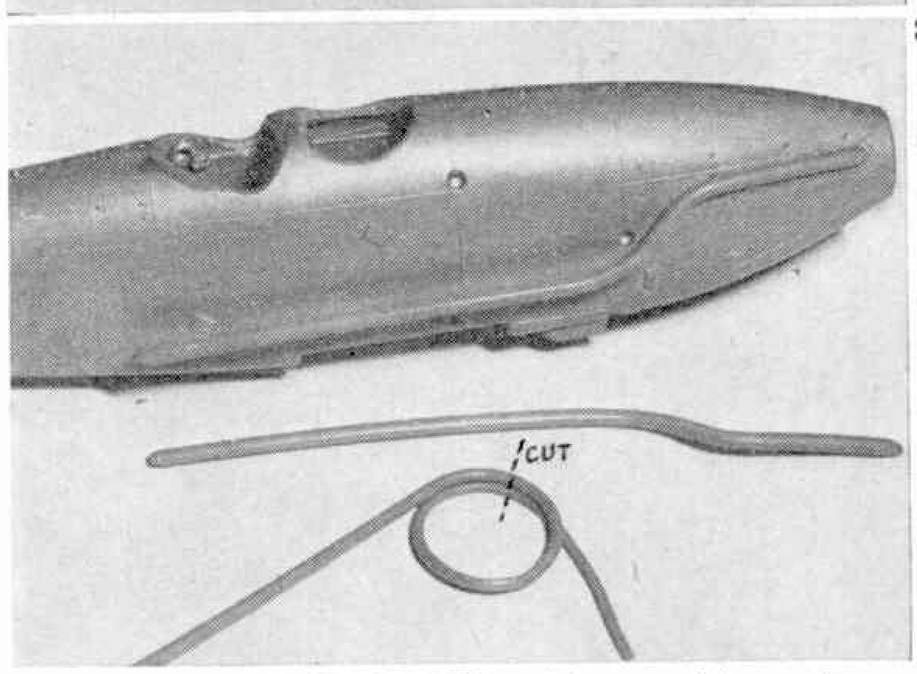

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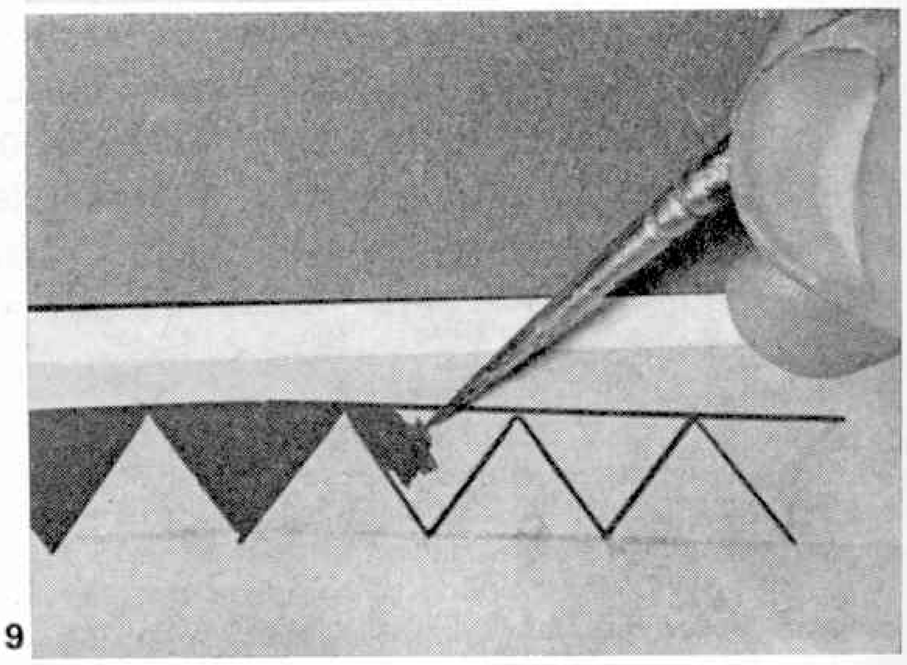

9

THE HAWKER 'DEMON'

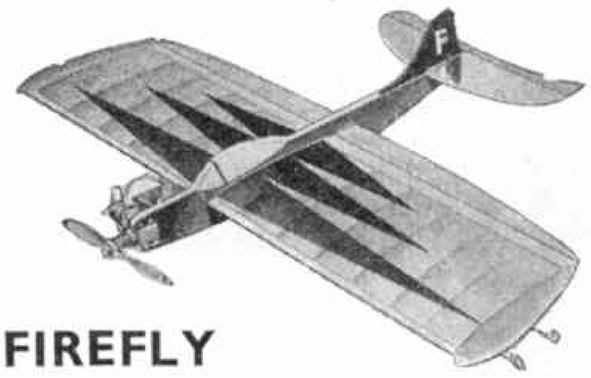
This is a simpler job to tackle and is rather more colourful.

7 The two finished fuselages are seen here side by side.

8 The long exhaust pipes are bent from heated and stretched plastic sprues. After heating, stretch slowly to produce a fairly thick rod. A thinner rod is used to produce the gun-mounting ring for the re-shaped rear cockpit. The ring is bent as shown in the foreground and cut where indicated to form a perfect circle. If the rod is first curled around a small paintbrush or similar handle, it will then spring out to about the right size.

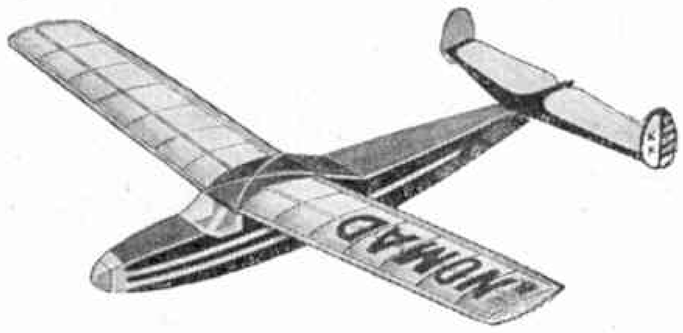
9 The colourful squadron markings are quite easy to make using yellow 'Yeoman' transfer sheet on which the design is traced from the full size plan. The red outline is marked using an enamel-charged ruling pen and then filled-in with a small brush. Cut out the dry transfer, and apply in the usual way.

START OFF RIGHT with a KEILKRAFT model aircraft kit!



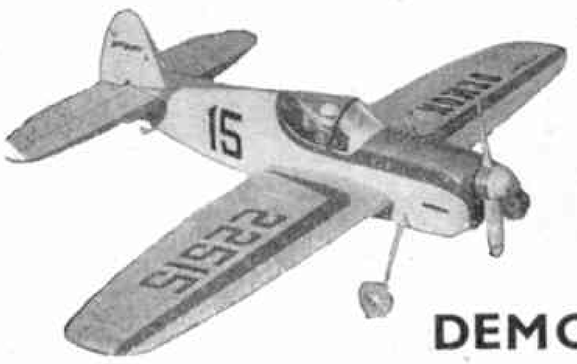
FIREFLY

Stunt model with "profile" type fuselage, specially designed for engines under 1 c.c. Kit contains die-cut parts. Wingspan 20 in. **19/9**



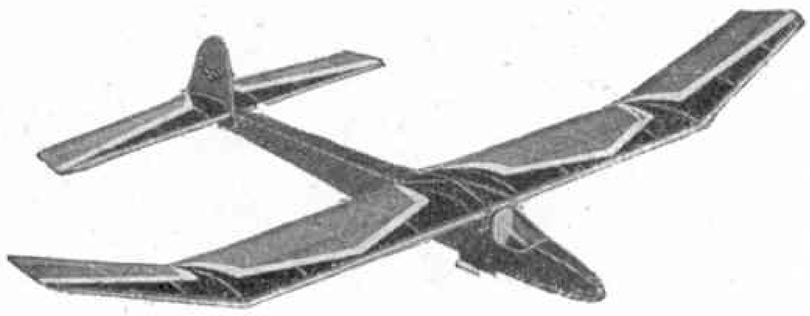
NOMAD

Beginner's model with fuselage parts, tailplane and fins in pre-cut, decorated sheet balsa. 20 in. span. **5/11**



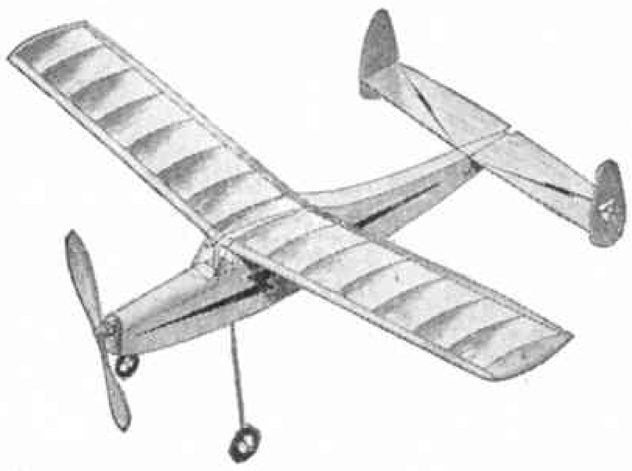
DEMON

Class A team racer to the new S.M.A.E. specification. Kit contains die-cut parts. For engines up to 2·5 c.c. Wingspan 30 in **36/3**



CONQUEST

Towline glider for beginners, with a very good performance. Kit contains die-cut parts. Wingspan 30 in. **9/4**



GEMINI

Duration model with all fuselage parts, tailplane, and fins in pre-cut, pre-decorated sheet balsa. Wingspan 22 in. **10/-**

and when it comes to radio control

MINI SUPER

Keilkraft's popular radio control model. A real pleasure to build and fly. Kit contents include—all parts pre-cut, metal clunk tank, preformed undercarriage, three sponge rubber wheels, pre-shaped leading edge section, full size plan and building and flying instructions. For 1·5 to 2·5 c.c. engines. Single channel or intermediate R/C. Wingspan 48 in. **£4. 18. 0**

you can't do better than start off with a Mini Super!

All these Keilkraft kits contain die-cut parts for speedy, accurate assembly, and full size plans plus building and flying instructions.

KEILKRAFT

RIGHT from the start!

See this famous range at the local model shop

Mr. Howson has had at least two unusual experiences in his life. One was to travel at 138 m.p.h. on the fastest railway on earth—during a recent test run on the New Tokaido Line in Japan—and the other was to have been born when steam trains were still bellowing their sooty way round the Inner Circle's tunnels on London's Underground. This makes him incredibly old; but a railway fan never really grows old, and only last year he was journeying round the world by train studying exciting new developments on railways.

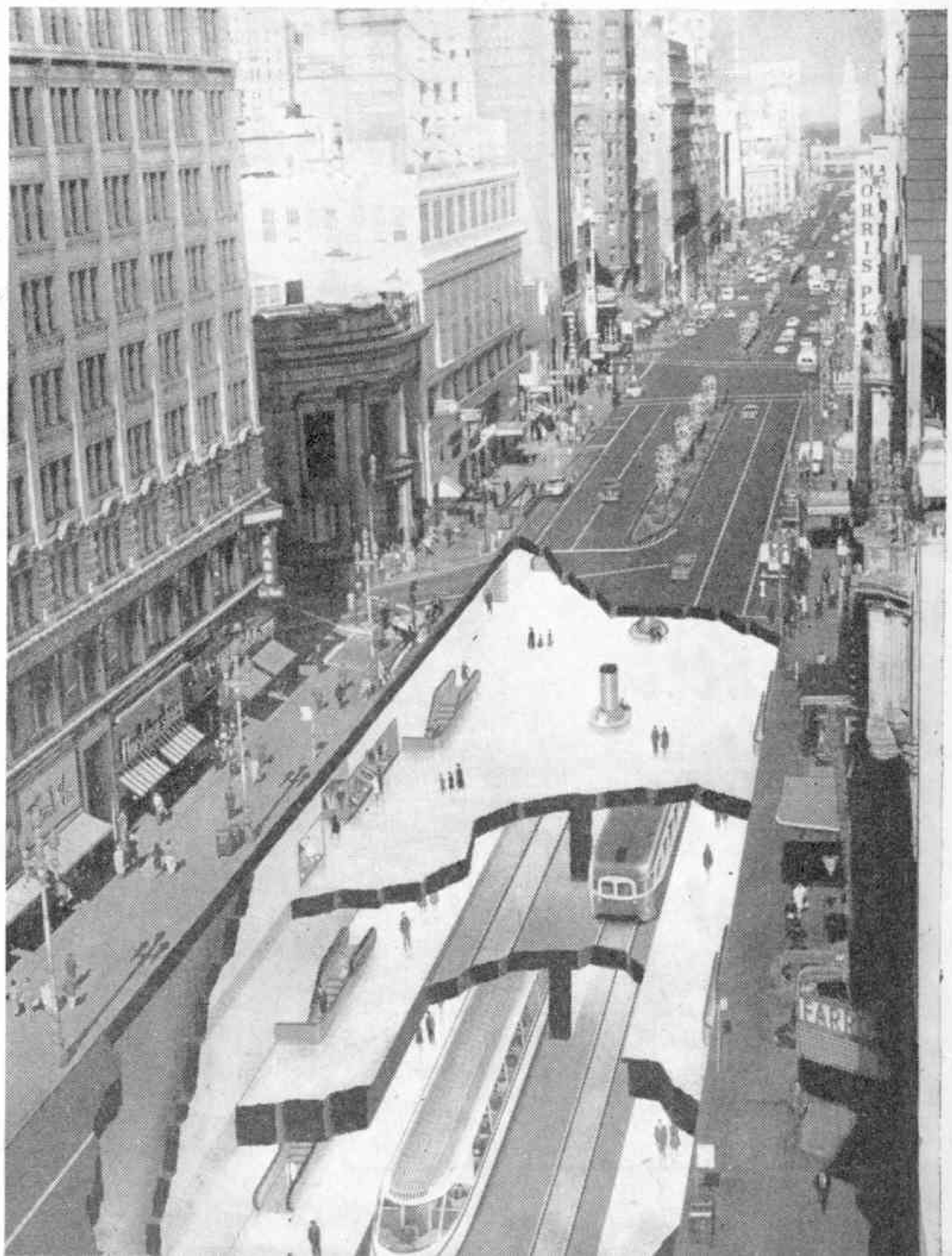
ROBOT TRAINS OF THE FUTURE

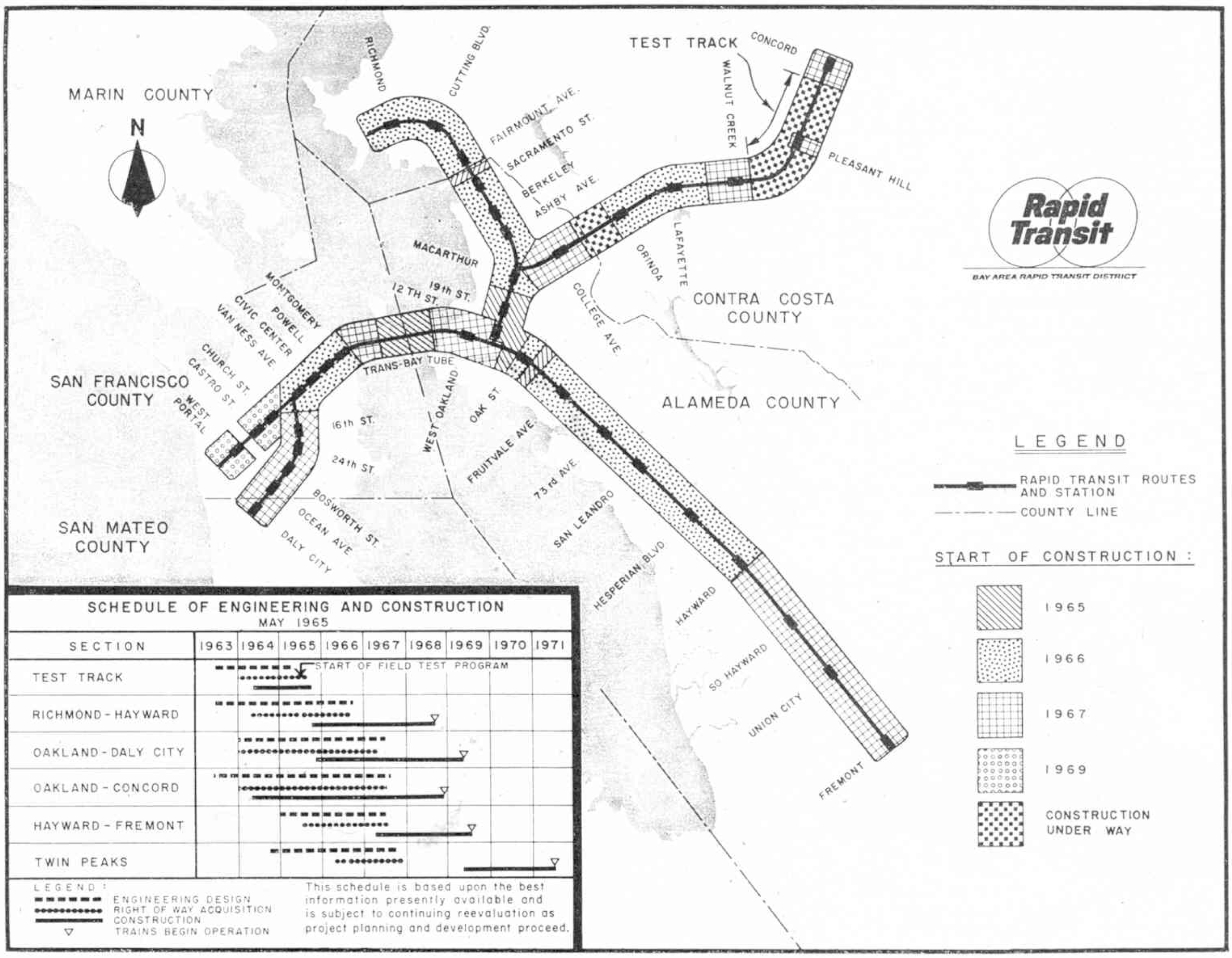
PRIMARILY the journey was undertaken to study new ideas in mass transportation. In railway parlance this usually means carrying large numbers of people from their suburban homes to work in cities, and carrying them home at night. It is a tremendous job which experts agree can best be done by rail, and the large increase throughout the world in new railway systems similar to London's Underground, bears witness to the fact that this type of railway is indispensable, and will be needed for growing cities more and more in the future. Certainly no one, including the writer, could describe the 'Tube' as exciting—but the Channel Tunnel will conceivably be in tube, as will the Japanese super railway already referred to, when it links Japan's islands by undersea tunnel. It is this and other developments which make for stimulating reading.

In America, for instance, schemes are being discussed and money reserved for research into feasibility of building a super railway between Washington, Philadelphia, New York and Boston. This is the famous 400 mile long 'North East Corridor' where growing townships link with cities like a string of beads, and the whole area demands more transportation than the saturated motorways can ever provide. So a tube railway, with trains running at up to 300 m.p.h., possibly riding on a cushion of compressed air and being sucked along 'atmospherically', is a distinct possibility. It would not be an entirely new idea, for in 1866 such a tube railway was actually built and ran to carry parcels beneath London, in trains that were blown along by huge fans at one end of the tunnel, and sucked back into a vacuum created by reversing the fans' motion. It failed only because the tube gradually leaked air at the joints and no satisfactory sealing method had been devised at that time. The line ran roughly south-east from Euston to the G.P.O. in the City.

Automatic control

But returning to earth, so to speak (or rather into it), we can get a pretty good idea of the future form of short, high-





density railways serving cities or groups of cities by observing new projects now being built or planned. Perhaps the most revolutionary feature of this type is automatic control, permitting for the first time in railway history, the operation of driverless, passenger-carrying trains. Here, again, the idea is not entirely new—only the controlling techniques are. The writer, way back in 1926, was associated with the first successful driverless 'Tube', the Post Office Railway, again in London, that runs on the principle of relay-operated track energizing and de-energizing. Basically, when the track is being fed with traction current the train moves: when the current is cut off the train's motors stop; the brakes snap on and it stops. At the present time there are three major 'Underground' or Rapid Transit systems in the world running driverless trains. The writer's experience in 'driving' one of these trains beneath Tokyo, and the operational technique itself, will be the subject of a future article.

Last summer the writer was in San Francisco studying plans and progress on an absolutely new 75 mile super 'commuter' railway system. It is actually the first railway system of its kind to be built in the world, and many foreign technicians are carefully watching construction progress and testing, as this railway will be the model for similar projects in other parts of the world. The City of San Francisco, beautiful and romantic, occupies all the tip of a peninsular, with the Pacific on one side and the United States mainland across San Francisco Bay on the other. It is thus almost surrounded by water. The famous Golden Gate and Oakland Bay bridges link it tenuously to the mainland, but these are jammed with motor traffic most days and there is no rail crossing. A string of busy, growing townships line the mainland shores and the volume of traffic crossing into San Francisco is now too much for any bridge to cope with efficiently.

The works starts

A little beyond the mountains to the east, on the mainland, in hot, arid country that was once desert, engineers therefore, decided to build the testing ground of a railway designed to relieve the Bay Area and San Francisco of much of its congesting motor traffic. The writer floundered across sandy hillocks and dry creeks in shimmering heat, and watched the roadbed being levelled by huge bulldozers. Since then, tracks have been laid and specially built test cars are being run up and down a four-mile stretch. The line will start a little further to the east and will be part aerial (elevated on concrete pylons) part land tunnel and part undersea tunnel. It will dive into the mountains and emerge on the Bay shore. Then it will plunge beneath the water in deep 'tube'; and because this area is subject to earth tremors the tube will be earthquake-proof. Under the City of San Francisco it will run at deep level, beneath the city street cars (trams) and a huge concourse for passengers, which itself will extend below the length of famous Market Street. Then it will surface and run in its own right of way down the middle of a motor Expressway. Sometime in the future it will be extended to circle the huge Bay and rejoin the 'main' line, and a spur will run north through Berkeley, famous for its University, to Richmond. Like a necklace, many townships will be connected by the fastest commuter railway on earth.

90 sec. intervals

Air conditioned trains will speed at up to 80 m.p.h. with only a 90 second 'headway' between trains at peak hours. Although there will be a one-man 'crew' to each train, his duties will be to supervise only. Trains will be driverless. Fail-safe apparatus will control speeds, acceleration and deceleration, distance between trains and stops. Even the doors will open and close automatically. Thousands will leave their autos at stations near their country homes, or come in by bus, and travel at speed and in safety on this extra wide railway (gauge 5 ft. 6 in.) whose cars have been designed aerodynamic in silhouette, to be stable in extreme cross-wind pressures, and to be virtually noiseless.

Q With new and old Hand Controllers is it possible to plug in both of them at the same time on the same lane so as to save plugging them in and out all the time? David Stack, Glamorgan.

A Unfortunately it is not possible to plug both Hand Controllers into the track at the same time due to the fact that when the trigger of the new A 262 Hand Controller is fully released, the dynamic braking system comes into operation and if this Controller were left permanently plugged in, a short circuit would occur when the standard Hand Throttle A256 was in operation.

Q Is it possible to adapt an existing car into a race-tuned one by putting in a new engine, or by any other method? Also, is it possible to adapt an existing Hand Controller into a race-tuned one by putting in a new rheostat with less resistance? Michael Austerberry, Basildon.

A The Race-Tuned Scalextric Cars are not yet in production and the question of converting the older type models has not yet arisen. In any case, it will be some considerable time before spares become freely available. However, at the present time it does appear that it may be possible to fit Race-Tuned Motors into some of the older type cars but whether or not they will operate with complete satisfaction, we are unable to say at the present time. Certain Race-Tuned Motors will be identical in size and shape to the existing RX motor (as in c/68, c/75, c/54, etc). *But* on new or redesigned cars such as c/87, c/88 the design and position of the guide pin is modified for better cornering. Old models may not prove to be good road holders with the additional power delivered by the new motors.

Q I would be grateful if you would confirm that a normal 12 volt 2 amp. Transformer Rectifier would be suitable for use with Scalextric Equipment operating on 230 volt 60 cycle per sec. supplies. If not, would you advise what alternatives are available? Flying Officer, F. Felton, Pickering.

A Scalextric Equipment requires a Transformer with an output of 12 volt D.C. at not less than 2 amps., it is essential that the equipment is *never* operated from an A.C. output of the Transformer, since this would damage the Permanent Magnet. The Mains voltage of the Transformer must of course be suitable for your local Mains Supply. The input does not effect the output providing the Power Unit is correct for local supply.

Q Recently I made a new layout with my plexy track most of which is 2½ years old. But unfortunately the cars will not negotiate the inner curves and some of the straights. This seems to be because of bad electrical contacts at the joints. Could you please tell me what I can do about it? Also could you please tell me where I can obtain one of your catalogues as I am having a job to get one? M. Spooner, Hatfield.

A 1. During the past 2½ years a small amount of grease and dirt may have become pushed in between the connections of the two Track Sections. Such dirt should be removed with a small brush (possibly a stiff toothbrush soaked in methylated spirits).

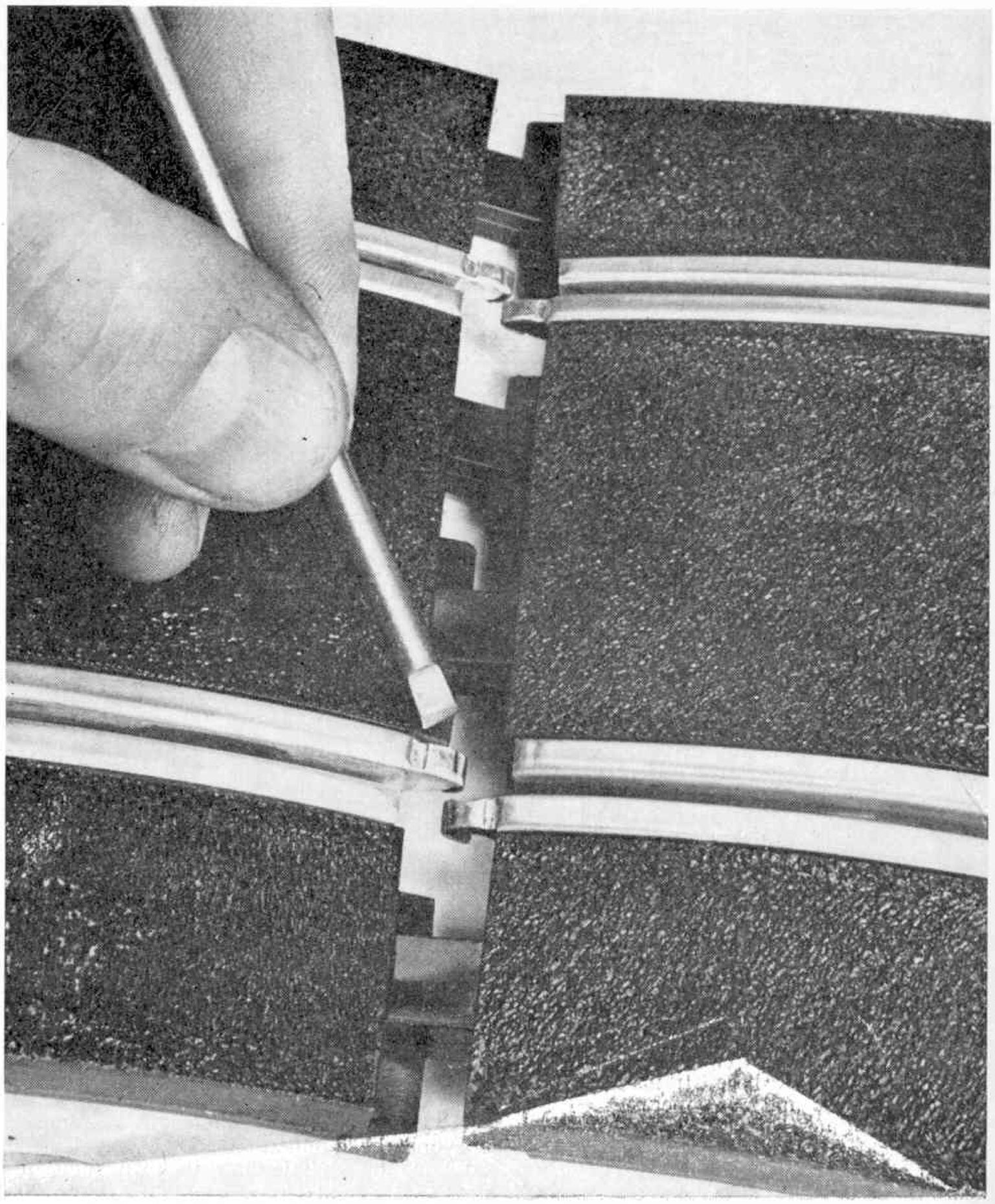
2. The projecting ends of the Metal Contact Rails may have become slightly bent and may not be making good contact with the next Track Section. These ends should be carefully adjusted (bent slightly upwards) with a pair of pliers. It should also be noted that if any sections are 'dead' there must be *two* breaks in the circuit, one at each end of the dead section.

Remember if any Track Section becomes 'dead' it is only because it is not making good electrical contact with the next section. Catalogues cannot be supplied direct from the factory—they must be obtained from authorized Scalextric dealers.

Q Could you tell me why it is not possible to run a Race-Tuned Car on a normal 33 ohm hand throttle? Is it possible to buy a Race-Tuned Car and put the other kind of engine in it, because at the moment I've got three cars and I like the Ford Grand Touring car which is Race-Tuned. Nicholas Lampard, Sheffield.

A A car fitted with high powered motor such as the Scalextric Race-Tuned series requires a resistance of not more than 25 ohm. A 33 ohm resistance will overheat and very quickly burn out.

We regret that it is not possible to fit a standard motor into the forthcoming Ford G.T. Car. This new model will have an entirely different type of motor and will not accept the old type Scalextric Engines. c/77, c/78, c/79, c/80, will be fitted with Mabuchi type motors, other Race-Tuned Models have a Scalextric Motor similar, but more powerful, than the RX.



Here is a selection of recent readers' queries, the answers to which we consider to be of general interest to all Scalextric enthusiasts.

MINI MAGIC

BACK in 1959, when the first Austin and Morris Minis took to the road, they were hailed generally as a revolution in small car design. The famous transversely mounted four-cylinder engine of only 848 c.c. capacity provided an extremely lively performance, which was well matched by outstanding road-holding and cornering ability—and all in a vehicle only 10 ft. long from nose to tail!

With such a specification it is not surprising that the Mini soon became the most tuned, modified and 'souped-up' car on the road.

The Mini-Cooper itself was born in 1961 as a result of consultation with John Cooper, who had done a great deal of work in developing the very successful Formula Junior BMC engine. Since then the Cooper has become almost a legend both on the race track in saloon car events and in gruelling road rallies all over the world, putting up fantastic performances against very much larger and more powerful cars. Top names in rally driving are associated with the Mini—Paddy Hopkirk won the Monte Carlo Rally in 1964 driving a 1071 c.c. Cooper and his success was followed in 1965 by Timo Makinen winning in a 1275 c.c. car. Makinen also 'won' the Monte this year in a Mini-Cooper, although he was disqualified for contravening the lighting regulations. Such 'David and Goliath' feats against much bigger and more expensive vehicles have endeared the little cars to the public and the standard Minis are now well on the way to their second million.

The Scalextric 1/32nd scale Mini-Cooper represents the Austin variety, and is available in either bright red or British Racing Green. The body is moulded in polystyrene, with full detail, and radiator grille and wheel-trims are bright 'chrome'. Windows are fitted, with the driver's window in the open position, and the interior is complete with the driver himself, sensibly wearing a crash helmet! Racing numbers are fitted, and a distinctive black and white racing strip runs along bonnet and roof. A sheet of extra transfers is supplied with every car if extra decoration is required; these are of the usual 'water slide' type.

On the track the Mini-Cooper drives very well indeed, with an excellent turn of speed, but it must be remembered that it will not hold the road on bends quite as well as the racing cars in the Scalextric range—after all, the design is basically a small family saloon, and consequently the centre of gravity is much higher than that of a purely racing machine, and the 'track' or distance between the wheels is smaller. However, the driver can use his skill to the utmost in 'coaxing' the Mini through bends and chicanes and 'opening up' along the straights to gain upon his opponents. In many respects this sort of driving is much more fun than driving a car which can be put into corners at full throttle. To be authentic, of course, the Mini should not be raced against pure racing cars, and the best plan is to run a 'Saloon Cars' only event.

Before racing a Scalextric Mini-Cooper it is as well to check the position of the pick-up braids; the front wheel drive makes the braid position more critical than on conventional slot racers. If they are bent too far down towards the track, the bonnet — and front wheels—of the car tend to lift slightly, and this can result in complete loss of adhesion on a gradient, with the front wheels spinning madly—embarrassing in an important race!

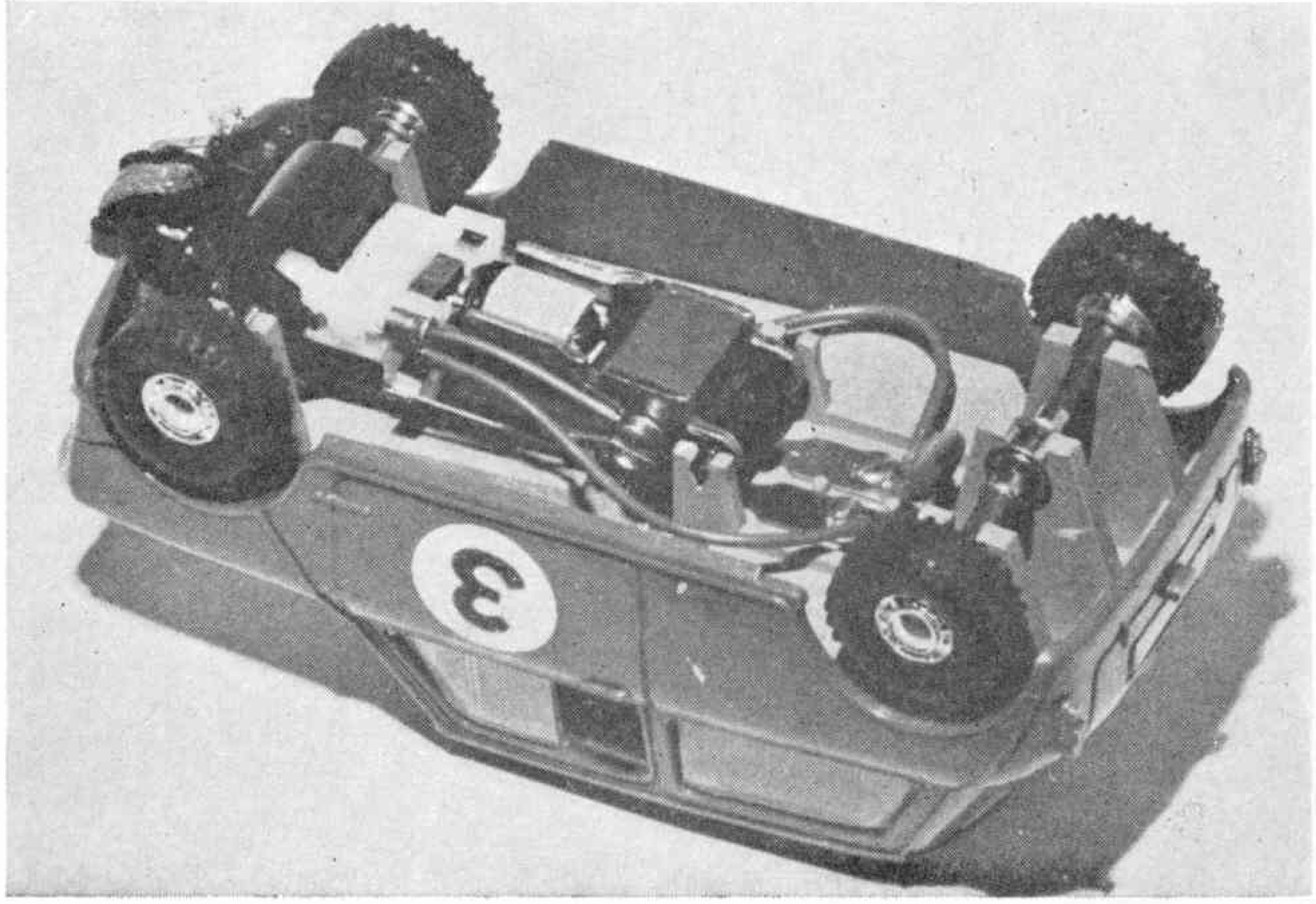
Regular maintenance is just as important for a model car as it is for its full size counterpart, and there is no excuse for badly maintained Scalextric cars, as a very comprehensive sheet of maintenance instructions is included with every model. This gives full details for performing a 'general overhaul', including removal of the motor and enclosed gearbox. When oiling, it is most important to avoid getting oil on the commutator; an oily or dirty commutator is the main cause of overheating and generally bad running of small electric motors. One more point—remember that with a new car, as with a real vehicle, it is wise to give it a 'running-in' period at moderate speeds before using full throttle.

Anyone who drives a Scalextric Mini will soon succumb to the thrill of Saloon car racing in miniature, and it is certain that many people will soon be adding 'Mini Magic' to their own circuits.

John Brewer

All the thrills of the 'Monte' are emphasised in this 'Autocar' photo of a snowy night scene and right out of the picture onto your own track, come two gleaming Scalextric Minis!

Below: front wheel drive—just like the real ones—is a feature of these exciting new cars



Progress in the air

THE discovery and development of new raw materials has always been a spur to progress. Undoubtedly, the finest modern example of this is the introduction of plastics. The almost infinite variety of mechanical characteristics possessed by today's plastics family means that many industries are using this material to replace many long-established 'traditional' materials like wood, metal and fabric. Even in our model world we use several different types. Tough nylon gears in race cars; nylon model plane propellers; rubbery plastic for tyres; incredibly tough plastic covering films for planes; plastic adhesive tapes; and of course (need we say it) plastic kits! But perhaps one of the most interesting types of plastic is expanded polystyrene foam. Widely used in various forms, for heat insulation and specialized packing jobs, its extreme lightness and adequate rigidity makes it an ideal basic constructional material for model aircraft.

This is just one of many examples of materials being produced for one purpose that prove to be adaptable to other quite different ones.

To investigate and take advantage of all these new and exciting materials that continue to appear in bewildering variety, a research and development team must be constantly alert and ready to experiment with

often unlikely substances. It was just such a team that produced the models shown on these two pages.

Let's take a look first of all, at the little 'Tadpole'—a simple rubber powered high wing cabin model of most attractive design—moulded in expanded polystyrene. Such a realistic model produced in any other material would either be too heavy to fly well, or too delicate for any but an expert to handle. 'Tadpole' is neither!

It measures a full 15½ in. wingspan, yet weighs a mere one ounce. The combination of large size, low weight and sound design guarantees long flights, yet despite its feather weight, 'Tadpole' is tough enough to resist crashes that would completely demolish more conventionally built models.

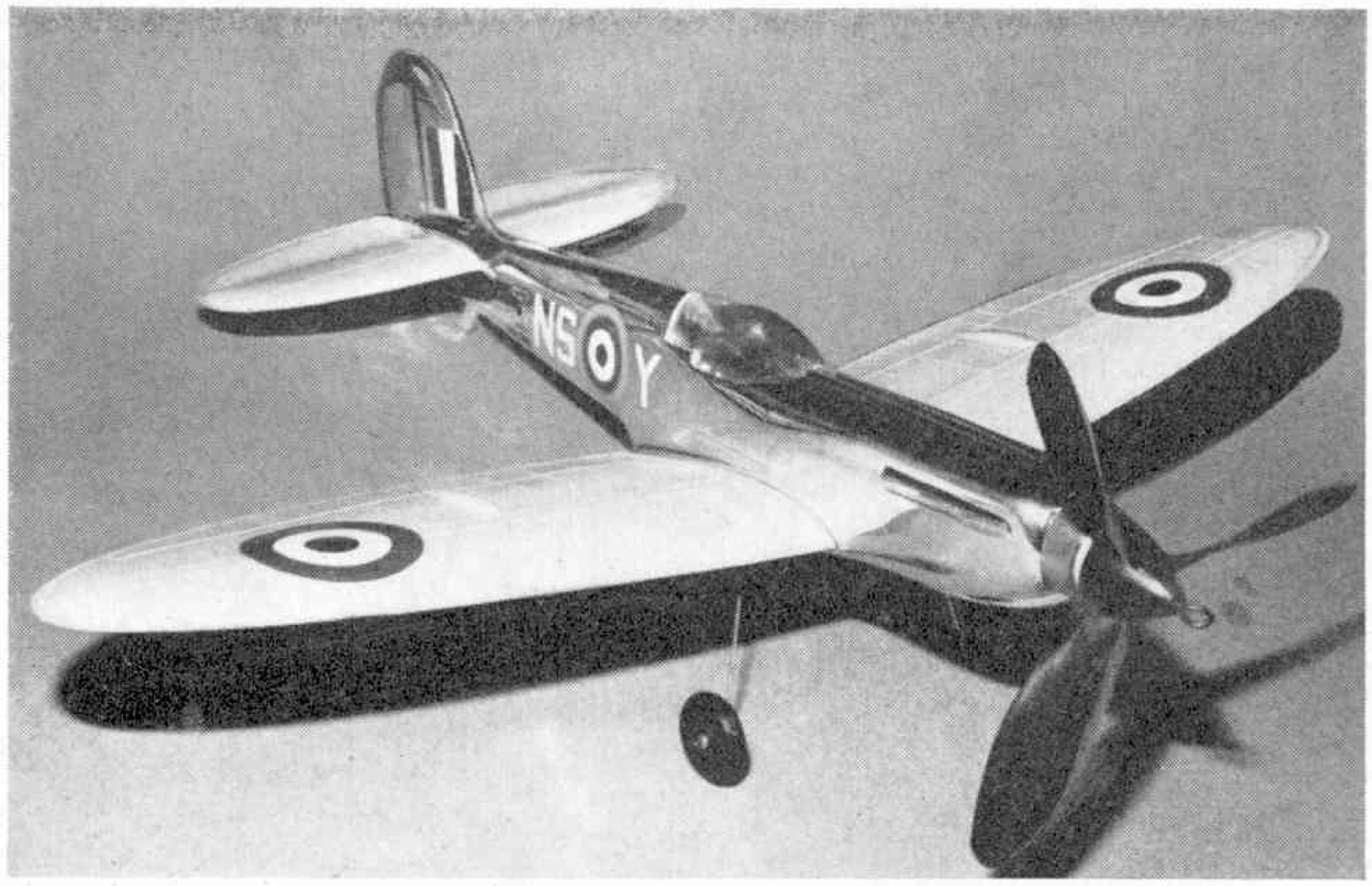
The model comes to you completely finished but for the application of the colourful pressure sensitive 'dry' transfers. Our test 'Tadpole' flew extremely well and required no flight adjustments at all. Nevertheless, it is as well to understand how and why your model flies, in order to be able to get the very best from it, so we recommend another look at the article in last month's issue which dealt very fully with the subject of trimming a model for flight. A tip! If you fly in an area where 'Tadpole' is likely to crash into sharp cornered obstacles such as goal posts or gates, stick a strip of adhesive tape along the leading edge of the wing. This will add very little weight but at the same time it will greatly increase the 'nick-resistance' of the wing.

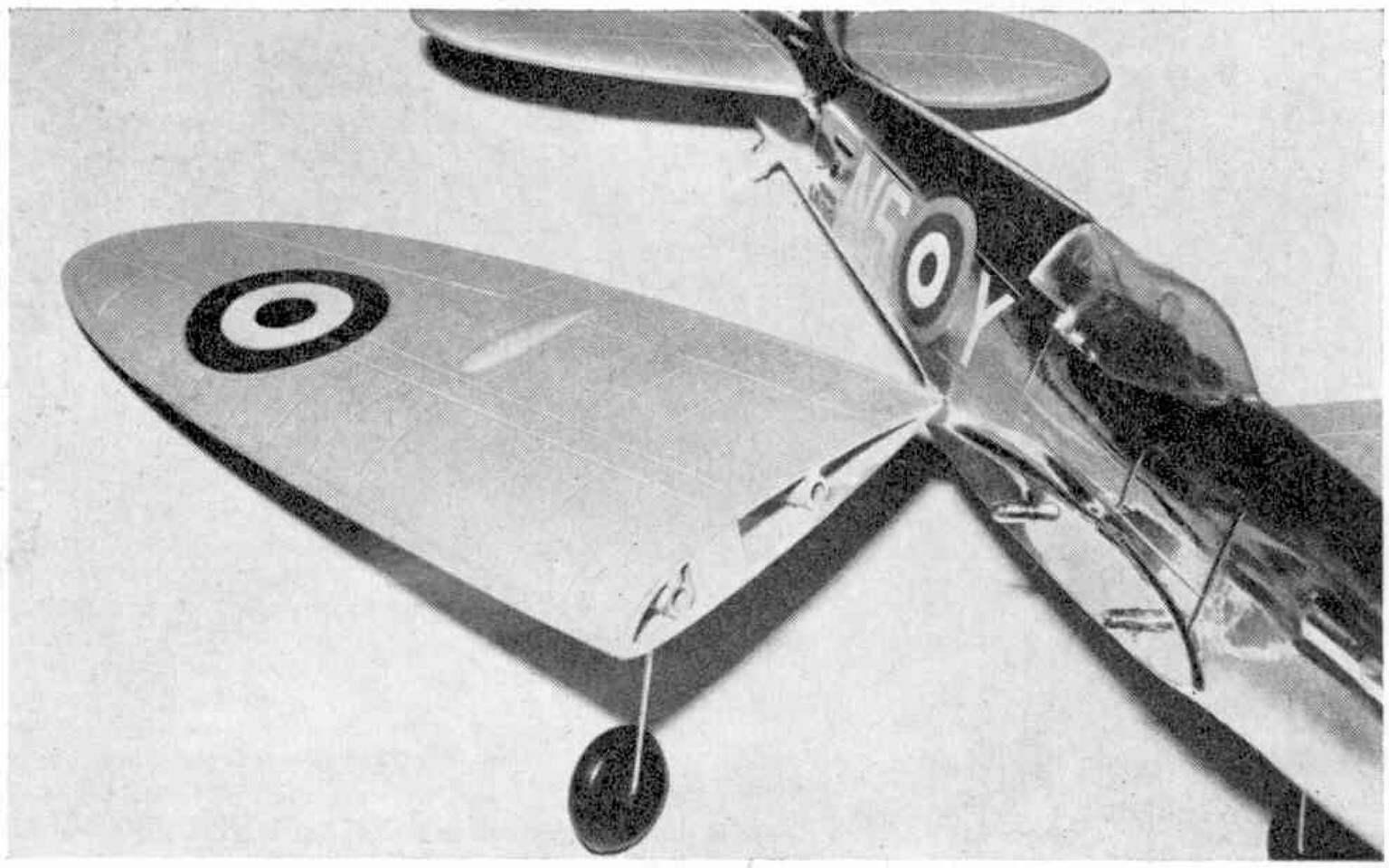
Please don't be tempted to paint 'Tadpole'. Quite apart from the surprising amount of performance-destroying weight that paint adds to such a model, there is a much more serious consideration. Many paints and dopes sold for model use contain cellulose, and this attacks the material of which 'Tadpole' is made—dopes will, in fact, completely dissolve the model!

The Spitfire

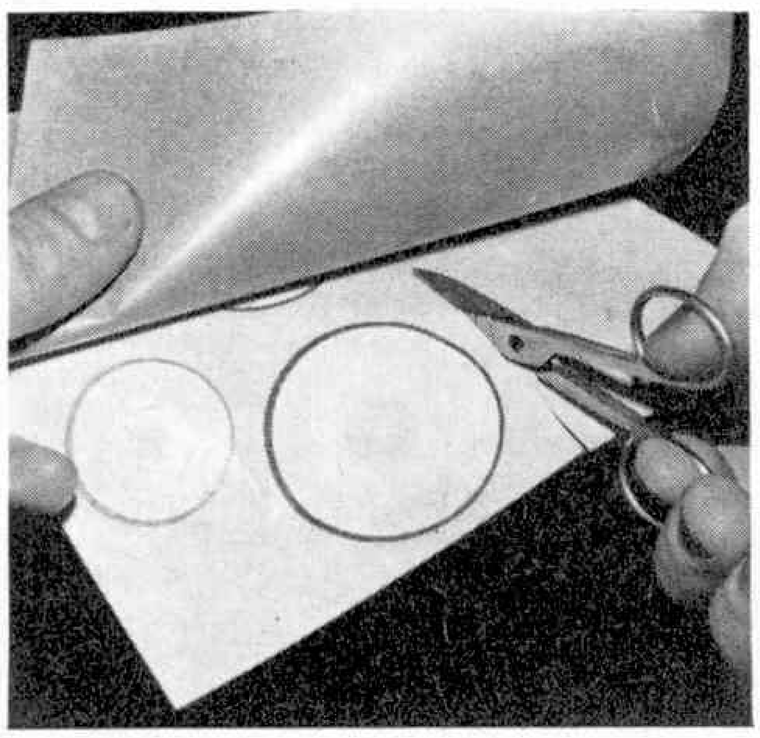
Another Frog Ready-to-Fly model which makes extensive use of plastic, is the rubber-powered 19 in. span 'Spitfire 6'. In construction this one is a little reminiscent of some of the very first ready-to-fly models of thirty years ago and appropriately enough, these were also made by Frog. But whereas the old models used cardboard and aluminium, and acetate plastic—the new 'Spitfire' uses vacuum and injection moulded styrene plastic in a most ingenious manner. Wings knock off on a bad landing to prevent damage, and the three bladed propeller has a built-in free wheel device to extend the glide after the power runs out.

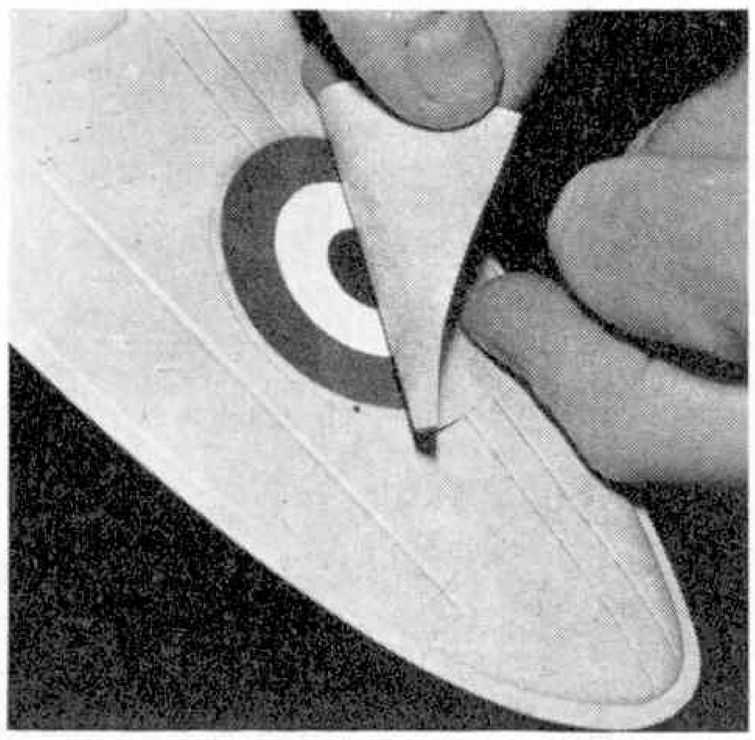
The 'Spitfire' is available in two versions—the 'standard' model, with blue fuselage and yellow wings and tail; or 'Metalised' fuselage with light grey wings and tail in the 'de luxe' version.





Top: the realism of the Spitfire is emphasised in this view. Above: the metallic fuselage, transparent canopy and knock-off wing fixing are features worth noting. Below left: cutting out the transfer sheet. Below right: rubbing the decal in place with the thumbnail and peeling off the backing paper. Facing page: applying adhesive tape to the wing leading edge of the 'Tadpole'





Both the 'Tadpole' and 'Spitfire' include a set of very effective 'dry transfers' and the method of application of these may be new to many of you. Once in place, these transfers stick instantly and refuse to come off—even under extreme provocation.

Main points to remember are 1. separate only *one* decal at a time from the protective paper. 2. position the transfer very carefully before applying any pressure to the backing paper. 3. rub over the whole area of the transfer with the fingertip. 4. apply very firm pressure to one edge of the transfer backing paper with the thumbnail to stick the transfer securely to the surface. 5. finally, slowly peel away the backing paper, to leave the design in place, and then gently, but firmly, smooth the transfer down with a clean handkerchief.

There are other equally exciting Ready-to-Fly models in the new Frog range. They are all illustrated in full colour in the latest Frog catalogue which you can get from your local dealer for 9d.

DOUG MITCHELL

GREAT GUNS

Here's a tale of the Wild West when men were men and guns were 'Western Forty-Fours'

1

THE 'Western Forty-Four' was one of the great guns of the Frontier. It was also the gun which set the seal of success on the career of Sam Colt. One of these revolvers is a genuine, mid-eighteen-sixty pistol owned by photographer Chris Cederberg, who took the pictures on this page, the other is a full-sized replica made from a plastic kit by the author. You'll have to look pretty closely to tell the difference between them.

When it comes to hand guns, you can't beat a Colt. Yet Sam was only 16 when he started designing the original 'Paterson' Colt—so called because of the new Jersey town where production started up in 1836.

Sam was 23 by then and reckoned that the frontiersmen needed a reliable, hard-hitting revolver of simple and robust construction. He was dead right, but just the same, he couldn't get the American Government to buy his gun in any quantity and he was forced to close his factory seven years later through lack of money. In fact, if it hadn't been for the Texas Rangers, the name Colt might have been unknown today.

It happened like this.

Three years after the Paterson factory was closed down, the Mexican War broke out and the Rangers were drafted into the U.S. Army as a unit.

One-handed

The Rangers were a tough, hard-riding bunch who needed a weapon which could be fired one-handed from a galloping horse, and would knock an enemy flat at 50 yards. They didn't reckon the official Army equipment, much preferring the Colts which they had used before the war with Mexico. They demanded more Colts and a certain Captain Samuel H. Walker was sent north to find Sam and persuade him to start making revolvers again.

Captain Walker had little trouble in persuading Sam Colt to start up again, and the two of them working together completely redesigned the revolver. The result was what became known as the Walker Colt, a great improvement on the earlier gun and one which paved the way for the success of the Colt's Patent Firearms Manufacturing Company, as well as bringing fame to the man whose name is still synonymous with 'revolver'.

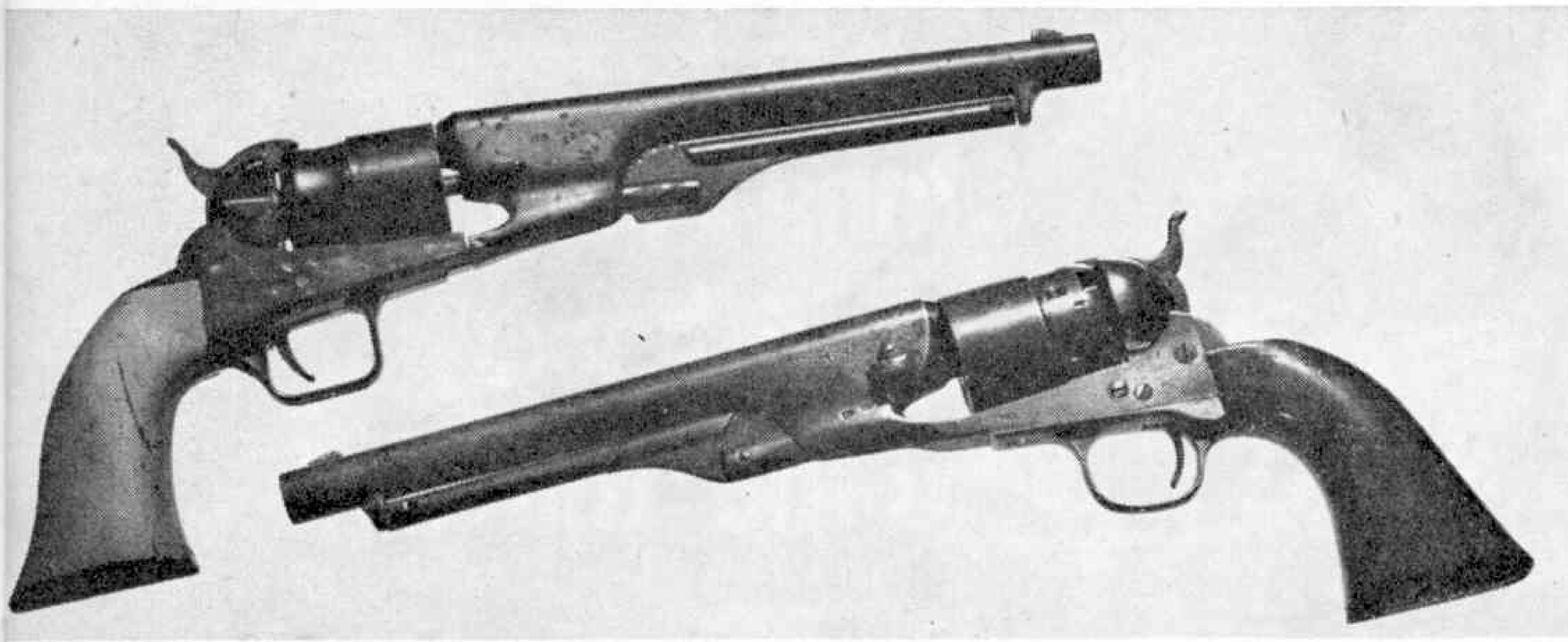
Simple design

Although the Walker Colt was big and heavy—it weighed over four pounds—the working parts were simple in design, few in number and interchangeable between weapons. Even if you couldn't get a spare part, it wasn't all that difficult for a skilled blacksmith to beat one out on the anvil and file it to shape.

Sam didn't stop there and, although all the subsequent models of the cap and ball type were basically the same, he kept on improving the weapon all the time. The Walker Colt was followed by the 'Dragoon' in 1848, the Navy .36 in 1851 and then the .44 calibre Army model in 1860.

This last, a much lighter and easier handling gun was also known as the Western Forty-Four and was the best and most popular percussion pistol ever made. More than 200,000 were produced and it was used on both sides during the Civil War. It was also a great favourite with cowboys, outlaws, frontiersmen and even Indians — when they could capture them or buy them from an unscrupulous trader.

The Forty-Four was still a muzzle-loader, firing a conical bullet, but the long barrel was rifled, that is to say it had spiral grooves running its length which spun the bullet, giving it remarkable accuracy at long range.



The photographs show exactly how the gun was loaded and though it may look a slow and rather complicated business, an expert could do it quite quickly —especially if there were Indians about!

Even quicker loading was possible using a paper cartridge. In this case, the powder charge was held in a very thin paper cylinder and could be loaded, with the bullet, by means of a tapering metal tube. The ram-rod was used to finish the job. The snag here was that the paper had to be thin enough for the flame of the percussion cap to penetrate. This made it so fragile that many would break open in the ammunition pouch.

To buy one of these splendid guns today would cost you a great deal of money, especially one which was in full firing order, but Pyro Plastics Corporation, of New Jersey, make the amazingly accurate plastic copy shown here. Naturally, it hasn't the same sort of weight but the hammer cocks, the trigger pulls, the cylinder revolves, and the built-in ram-rod works like the real one. And if your local shop hasn't one in stock, they can get one for you from A. A. Hales Ltd., 26 Station Close, Potters Bar, Herts.

Above: Before you read any further, try to decide which of the two guns shown in this photo is the real one. One of them is a real Colt, the other a full size plastic replica. The lower one is the genuine article — did you spot it?

1 To charge the chambers with powder, the gun must be held more or less upright. The forefinger is put over the nozzle of the powder flask and a catch pressed across. This fills the tube with powder, the correct measure for the charge. You then release the catch cutting off delivery of powder, take your finger off the nozzle, and allow the powder to pour into the chamber. With the hammer at half-cock, you can turn the cylinder and so fill each chamber in turn.

2 The next step is to load the bullet. As you can see here, it is pointed and has two grooves around the base. These carried grease to help prevent fouling when the black powder was fired. The bullet expands a little on firing so that its sides bite into the grooves of the rifling as it travels up the barrel. This is what gives the bullet its spinning motion and, of course, its accuracy. The bullet is pressed into the chamber base with the fingers.

3 The cylinder is now turned to bring the chamber holding the bullet opposite the ram-rod, still keeping the gun upright to avoid spilling powder. The ram-rod is then used as shown to press the bullet fully home. On no account may the tip of the bullet protrude or it will foul the barrel when the cylinder turns. The whole gun would then have to be dismantled to clear it, since the cylinder will only rotate in one direction. By the way, did you notice that it was the plastic gun in this picture?

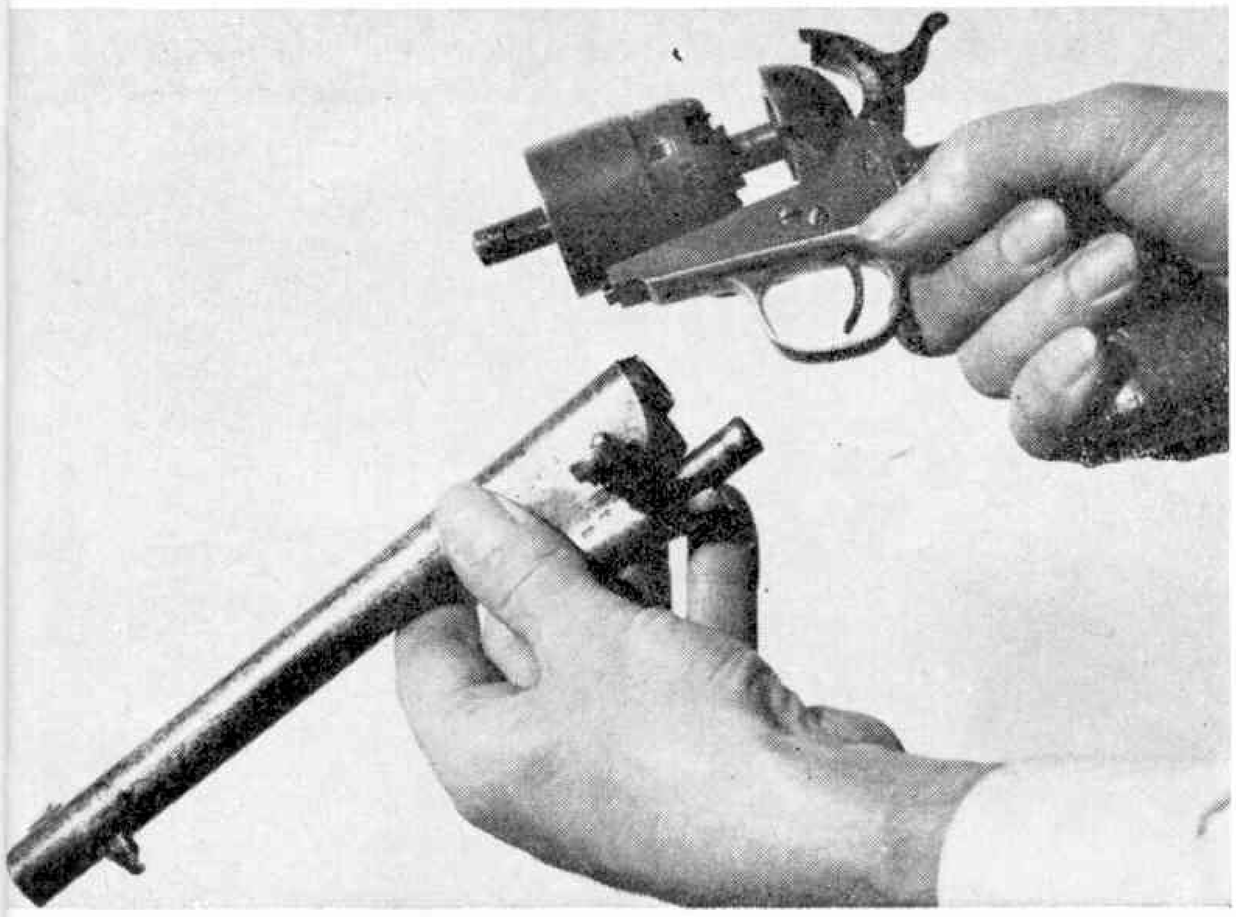
4 The final act to make the gun ready for firing is to fit the percussion caps. These are small copper cylinders which contain a powder which detonates when it is struck by the hammer. The flame from the cap passes through a hole in the nipple, thus setting off the main charge. The caps are simply slipped over each nipple on the cylinder and pressed home gently with the fingers.

5 This picture well illustrates the simplicity of the Western Forty-Four. To clean it, the gun has to be taken apart, but all you have to do is to knock out a tapered peg. This peg passes through the barrel section and through the spindle which carries the cylinder. You can then pull the barrel section away from the body of the gun, and there you are.

2

3

5



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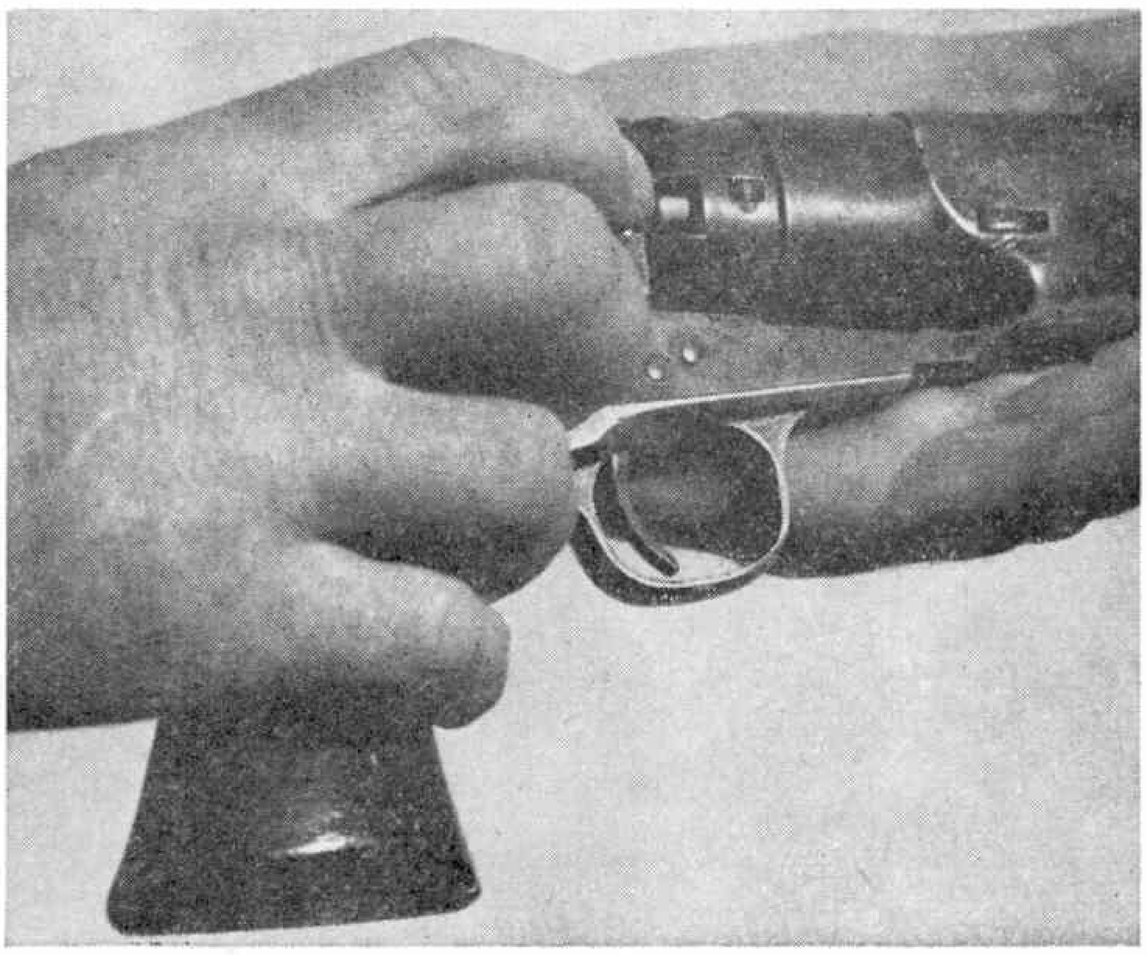


John W R Taylor looks back to the 'thirties' when

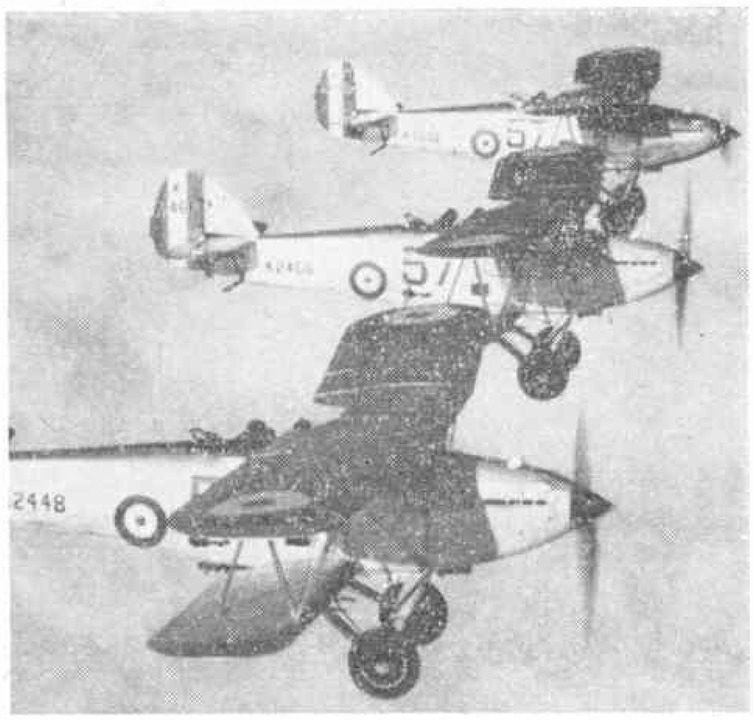
HARTS WERE TRUMPS

SIR SYDNEY CAMM, greatest of all British aircraft designers, who died a few months ago, is remembered mainly for his series of world-beating fighters. Yet, back in the early 1930s, it was a bomber that first demonstrated his ability as a creator of sleek, high-speed combat aircraft. That bomber was the Hawker Hart.

We are so accustomed to seeing streamlined, jet-powered monoplanes nowadays that the Hart, an open-cockpit two-seat biplane, must appear thoroughly antiquated to the average youngster. But it is not difficult to convey the effect that the arrival of the Hart had on military flying. First R.A.F. Squadron to equip with it, in January 1930, was No. 33, based at Eastchurch. Within three months its crews had mastered their new machines well enough to take second place in the annual Bomber Command proficiency contest.

Shortly afterwards, in an air exercise, they completely outflew the Siskin single-seat fighters of the defending forces. This so worried the Air Ministry that they re-equipped one flight of No. 23 Fighter Squadron with Harts, specially equipped as two-seat fighters. During the 1931 air exercises, this flight was the only unit in the Royal Air Force that could intercept Bomber Command's Harts. No. 33 Squadron demonstrated its invulnerability on one famous occasion by crossing the South Coast near Bognor Regis and flying at 8,000 feet to Northolt aerodrome, which it attacked with a shower of tennis balls, each labelled 'bomb'.

To discover how Sydney Camm was able to gain such a lead over other designers, we need only study the single-seat fighters of 1930. Best of those in R.A.F. service were the Siskin IIIA, Gamecock and Bulldog. All were fine manoeuvrable aircraft, but their big uncowled radial engines created so much drag that they



had a top speed of only 156 m.p.h., 155 m.p.h. and 174 m.p.h. respectively. The Hart, with its closely cowled Rolls-Royce Kestrel in-line engine, was 10 m.p.h. faster than even the Bulldog and highly manoeuvrable as well.

Another clue to its high performance lay in its method of construction, which combined strength with light weight to a remarkable degree. Fully loaded with pilot, observer, 83 gallons of fuel, two machine-guns and 520 lb. of bombs, it weighed a mere 4,554 lb. Thus, a whole squadron of Harts weighed little more than one of the modern R.A.F.'s Lightning single-seat fighters.

BATTLE OF BRITAIN

The Hart's fuselage was built up as a 'box' of round-section steel and duralumin struts, each rolled to a square section at the ends. This meant that joints could consist merely of two flat side plates between which any number of struts could be bolted or riveted, even though the struts were of different diameters. This not only saved money and weight compared with the usual welded structure, but made it much easier to replace any strut that became damaged in service—a factor that helped to win the Battle of Britain in 1940, as the same method of construction was used in the Hurricane, making it easy to repair and get back into action.

Hawker's patented metal fuselage structure had been used first in the prototype Heron fighter of 1925. Camm devised a new method of wing construction specially for the Hart. Each spar consisted of top and bottom booms of rolled steel strip, joined by a light-gauge plate web. No other company could build wings combining such great structural strength with such light weight.

Even with the advantages offered by these new techniques, Hawker had known that they were tackling an almost impossible task when they set out to meet the demands of official Specification 12/26, issued in May 1926. As a start, the Specification called for a top speed of around 160 m.p.h. at a time when the average bomber had its work cut out to reach 115-125 m.p.h.

The best engine available for the new aircraft appeared to be the 450 h.p. Rolls-Royce Falcon, and the original design for the Hart was based on use of this power plant. Then Rolls produced their revolutionary F.XIB engine, in which some 60 lb. of weight were saved by having the cylinder blocks cast in one piece instead of using a separate casting for each 'pot'. Camm redesigned the Hart prototype around the F.XIB, which became the 525 h.p. Kestrel, and the rest of the story is history.

From the Hart sprang a family of military biplanes that, at one period in the early 'thirties, not only outnumbered all other aircraft in the R.A.F. but served also with 20 other air forces. Those first Hart fighters of No. 23 Squadron were followed by a genuine two-seat fighter derivative named the Demon.

The performance of the Hart had wiped out with a single blow a whole new generation of radial-engined fighters designed to Specification F.20/27. To fill the gap, Camm designed a Kestrel-engined single-seat fighter named the Hornet, which went into production as the Fury, and its naval counterpart, the Nimrod.

There followed a succession of army co-operation and general-purpose biplanes based on the Hart—first the Audax and then the Hardy, Hartbees for South Africa, naval Osprey and Hector. In this last type, Camm had to switch to a Napier Dagger air-cooled in-line engine, as all available Kestrels were needed for the R.A.F.'s new Hind day bomber which was, unashamedly, an up-dated Hart.

Meanwhile, the Hart itself had gone through more transformation scenes than the cast of a pantomime. Quite apart from acting as a flying test-bed for most of the ideas incorporated in other members of the family, it had sprouted at various times floats, gun turrets and an evaporative cooling system that necessitated a primitive semi-enclosed cabin to protect the crew from a hail of super-cooled water droplets.

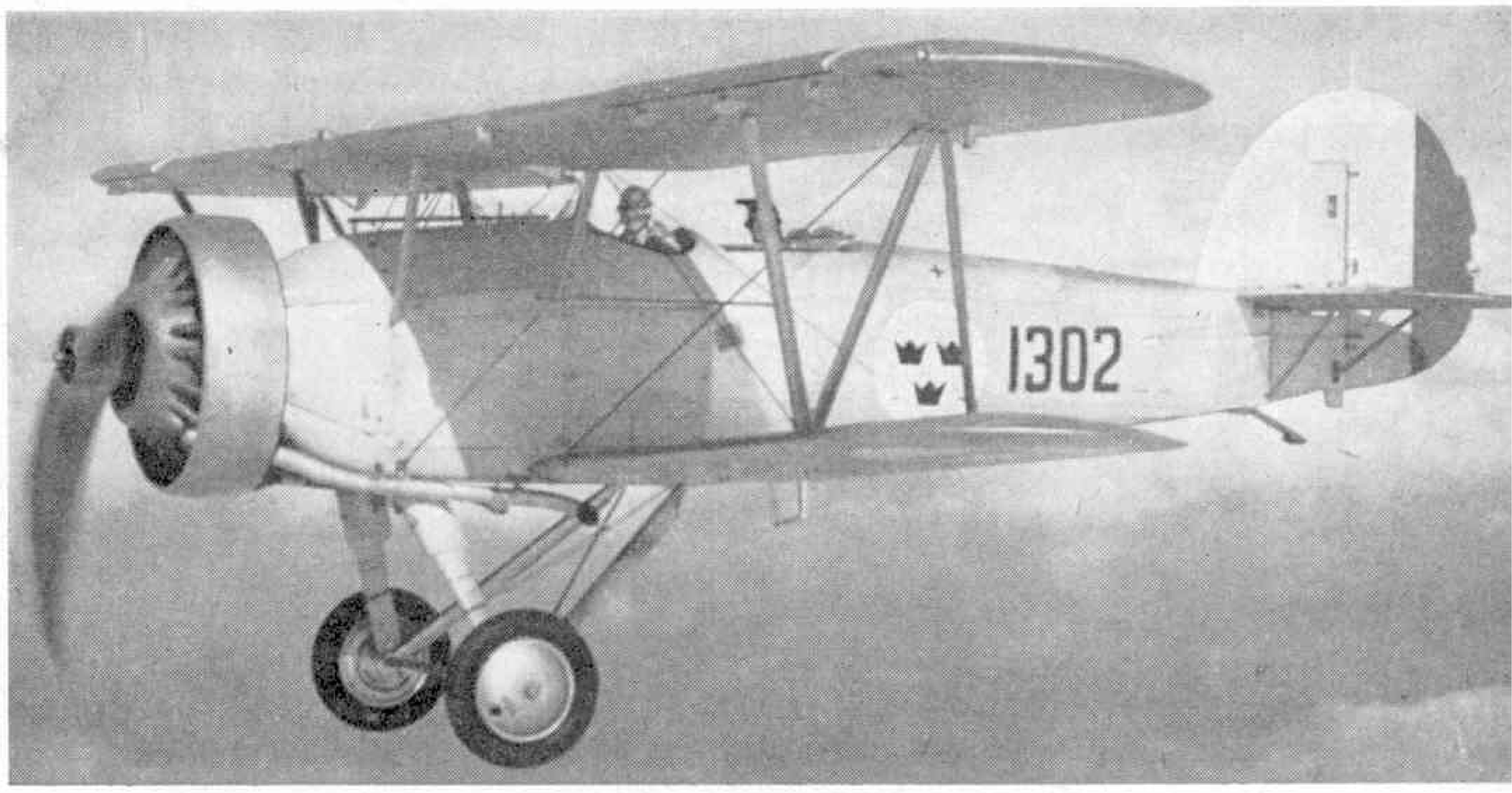
Some foreign customers still preferred radial engines, so Harts flew experimentally or in service with the Bristol Jupiter, Pegasus, Perseus and Mercury and Armstrong Siddeley Panther, to which must be added the foreign-built Lorraine Petrel and Hispano-Suiza 12X in-line engines, the Dagger, the Rolls-Royce P.V.12, prototype of the famous Merlin, and even the Merlin itself!

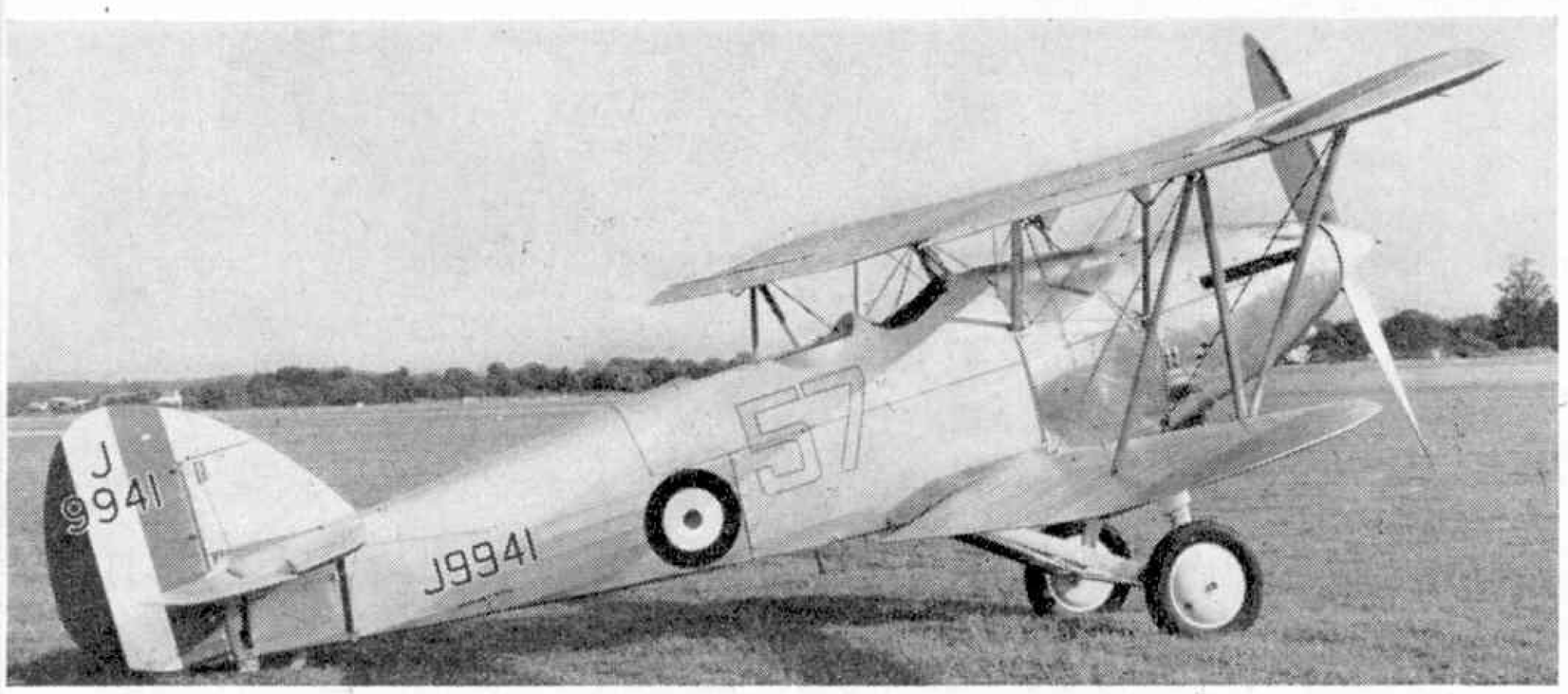
Altogether, 1,042 Harts were built, including 507 Hart Trainers, which remained in service until 1939. Total production of the whole family of Hart/Fury variants was 3,341 —more than 15 times the total of all aircraft built by Hawkers in the 10 years before the Hart entered production.

One Hart remains airworthy today, known affectionately as 'Gab-Emma' as it carried the civil registration G-ABMR for most of its life. First flown in 1930, it was fitted at various times with every conceivable mark of Kestrel and sported wheel spats temporarily in 1932. Other items fitted experimentally included the type of message pick-up hook used on the Audax, the modified tail unit developed for the Osprey, the low-pressure tyres specified for the Hardy and the tail-wheel introduced on the Hind. It was a favourite mount of air photographers and donned a coat of camouflage as a ferry pilot transport in World War II. Post-war, it acquired a blue and gold paint-scheme and took part in several air races.

IMMACULATE

Twenty-six years of faithful service ended miserably when it was damaged in a forced landing; but months of care and effort, plus a determined search for spares, restored G-ABMR to immaculate condition, and it is flying today in the insignia of No. 57 Squadron, with the military serial J9941. Few aircraft could tell such a story.





Opposite page: three Hawker Hart I's flying in formation, and a Demon of 604 squadron. This 'Flight' photo emphasises the clean lines of the machine and the heading picture shows another variation of the top wing markings. Ten Demons would weigh about the same as ONE B.A.C. Lightning, its present day RAF equivalent!

This page above: a Swedish Hart with Bristol Pegasus 1M2 radial engine (see our plastic kit conversion on page 10).

Left: 'Gab Emma', the only surviving airworthy Hart, as she is today, restored to original condition and carrying the insignia of 57 squadron.

Above: A large Tri-ang Hornby system that incorporates reverse loops. Below: A 'Britannia' refuelling while waiting for points to be changed

MIKE RICKETT RESOLVES A PERENNIAL RAILWAY PROBLEM

REVERSE LOOP WIRING

OF the many letters we receive from readers on the subject of model railways, by far the greatest number are concerned with the wiring of some complicated track formation usually, in fact almost invariably, involving some form of reverse loop which the reader has tried to wire in the normal way. Although Tri-ang Super 4 track was designed, for simplicity, to use only the minimum of track feeds or Power Connecting Clips (R487), the special wiring necessary where a reverse loop is involved does tend to puzzle most people. A reverse loop can, of course, be a very useful formation and this, no doubt, is why so many enthusiasts try to incorporate it into their layouts. It does, however, have a number of disadvantages and unless special precautions are taken, a permanent short circuit will result, making operation quite impossible. Unlike some track formations, reverse loops require correct positioning of Power Connecting Clips, and Isolating Tracks must also be fitted to prevent the short circuit mentioned above from occurring.

Where points with dead or isolated 'frogs' (the V-section on a point) like those in the Tri-ang Super 4 range are concerned, the wiring is not too complicated, but systems like the old Hornby-Dublo, which had points with a completely live 'frog', involve more extensive wiring and also isolating gaps in both rails, instead of the single gap that is necessary for Tri-ang Super 4. Generally speaking, reverse loops are not really recommended for the beginner to the hobby, partly because of the more complicated wiring and also because of the more involved train operation that results. For anyone prepared to suffer these disadvantages however, reverse loops can be useful in bringing added interest to a layout, as well as providing an unusual means of turning or reversing a train, rather than a single locomotive which can be turned quite efficiently by a turntable.

Basically, reverse loops can be divided into the three different types shown in Figs. 1 to 4. Each has its own particular use and all, with the exception of the plan in Fig. 3, can be incorporated into a larger layout. Figs. 1 and 2 are normally used with the out-and-back type of layout, where trains are run from a terminal station to the reverse loop, which can, incidentally, consist of any number of sidings, as shown in Fig. 5. These can, of course, be used for storage purposes so that a timetable or sequence of different trains can be run to and from the station. An alternative, where space permits, is to position a set of reverse loop sidings at both ends of a through station, each set of sidings being used as a 'magazine' to dispatch and receive trains.

The wiring shown on all the drawings is intended for the Tri-ang Super 4 track system and, as shown in the key, requires Isolating Tracks (R497) Lever Frames (RT47) and Power Connecting Clips (R487). Figs. 1 and 2 both show the same type of reversing loop, but with different ways of wiring the formation. The difference between them is that in Fig. 1 trains cannot run continuously from B round the loop and back on to the main line, whereas in Fig. 2 they can. Fig. 1 is the cheapest of the two systems to wire and requires only two Isolating Tracks, positioned on each side of the loop, two RT47 lever frames, wired to Isolating Tracks A and C, and a Power Connecting Clip at B for supplying current to the track.

With a train running round the loop in an anti-clockwise direction from B and with the point therefore set to the straight, the lever frame A is set to the 'on' position and the train run into the loop between the track enclosed by the Isolating Rails. The train must then be stopped and the control knob turned to the 'off' position. You will see that it is important for the length of track between the two isolating Rails to be long enough to accommodate the longest train you are likely to run over the layout. Once the train has stopped, lever frame A can be switched 'off', the points changed, lever frame B switched 'on' and the control knob turned in the reverse position to allow the train to move in the same direction as before.

The loop shown in Fig. 2 differs in that trains can run continuously round it without stopping. No lever frame sections are needed, but it does involve the use of an additional Power Controller, such as the Tri-ang RP3 described in last month's magazine. This is not really an expensive way of operating a reverse loop because if it is used to store trains as in Fig. 5 a separate controller is, in any case, desirable. The RP3 costs only 32s. 6d. and the one output is all that is needed for the purpose. An additional Power Connecting Clip will also be needed at A for connecting to the secondary Power Controller.

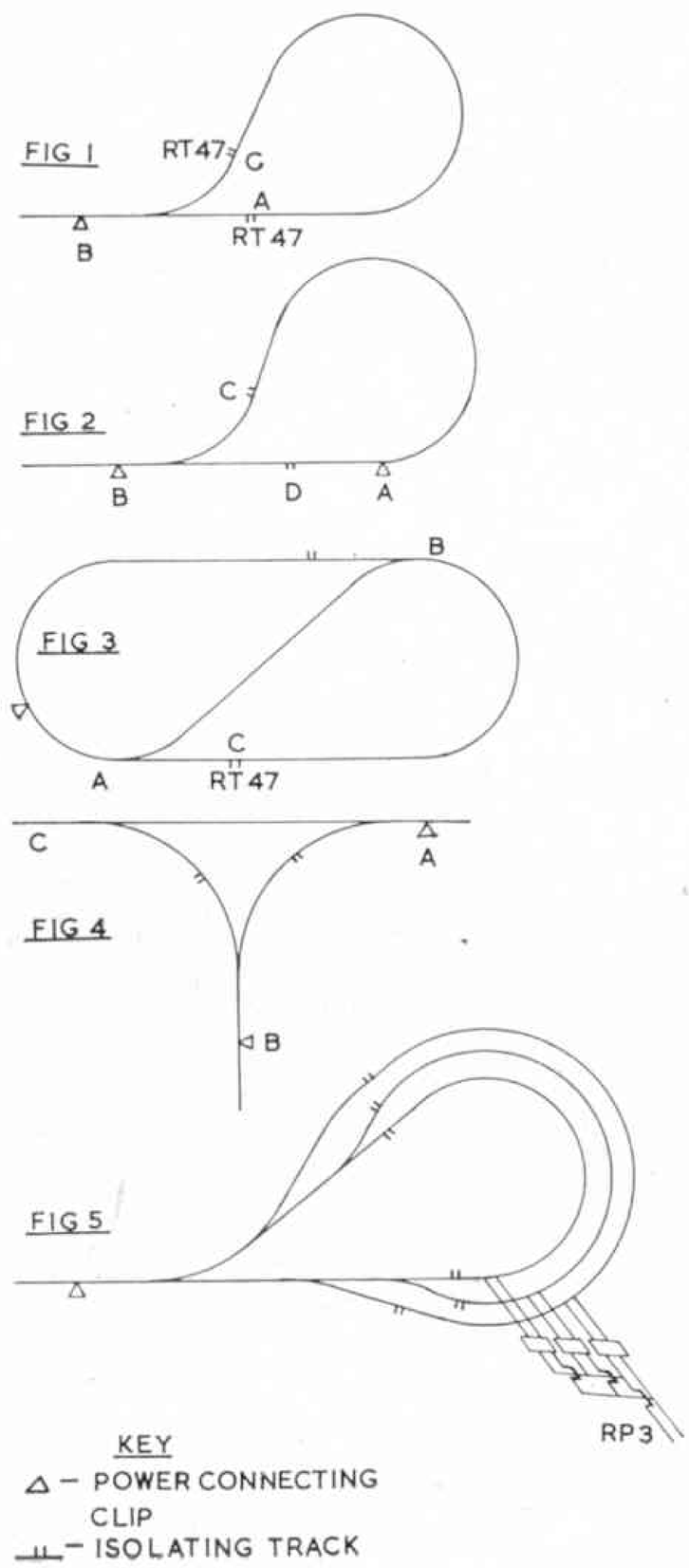
Change in speed

With the points set to the straight position once again, both control knobs are set in the forward position to allow the train to travel in a clockwise direction round the loop. When the train reaches the section between Isolating Tracks C and D the knob of controller A is turned off and the point switched to the curved position. Controller A knob must be reversed before the train passes Isolating Track C and it is important to turn the two knobs approximately the same amount to avoid the locomotive undergoing a sudden change in speed.

Either of these wiring systems can be used for the plan in Fig. 5, although the one in Fig. 2 is possibly the better. The controller must, in this case, be connected to each loop by a lever frame. If the wiring system shown in Fig. 1 is used, two lever frames will be needed for each loop.

The plan in Fig. 3 is, in fact, two complete reverse loops and is probably the most complicated of all the designs. Its operation too, has its difficulties and of all the designs, this is one I would recommend least of all. It is necessary, when a train is travelling in an anti-clockwise direction round the oval for it to stop at point A if it is to change direction round the reverse loop. Points A and B should then be changed and the lever frame switched to the 'off' position. The controller knob can then be turned for forward travel and the train run round the loop until it reaches Isolating Track C where it must be stopped. The lever frame is then switched 'on', points A and B changed and the control knob set in the reverse position to allow the train to continue travelling in an anti-clockwise direction past point A.

The final type of reverse loop I intend talking about is one occasionally seen on the prototype railways and is also one quite popular with those enthusiasts having sufficient space at their disposal. A useful formation for the larger layout, it is usually seen at the approaches to a terminal station, and like the loop in Fig. 2, requires two Power Connecting Clips and a secondary controller. Because this formation is usually at the approaches of a terminal, the second controller is no extravagance, since one would probably be needed anyway. Two Isolating Rails are also necessary, as shown in the drawing, and a locomotive travelling from A to B could be run continuously through the oval without any adjustment to the two controllers. If, however, the locomotive were to travel between B and C as well, the points should be changed, the direction of the control knob at B reversed and the locomotive run to point C. To change direction back to A, simply reverse control knob A.



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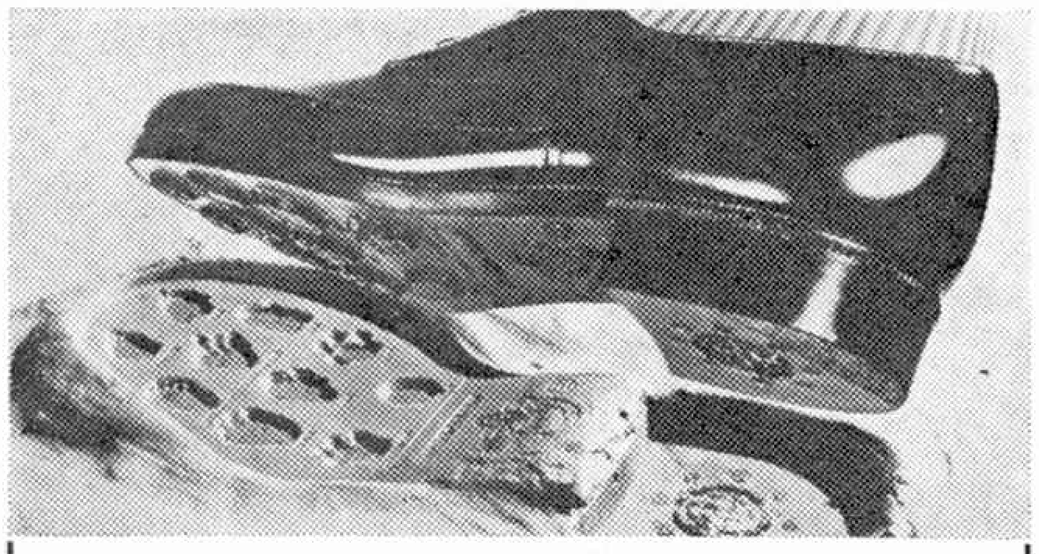

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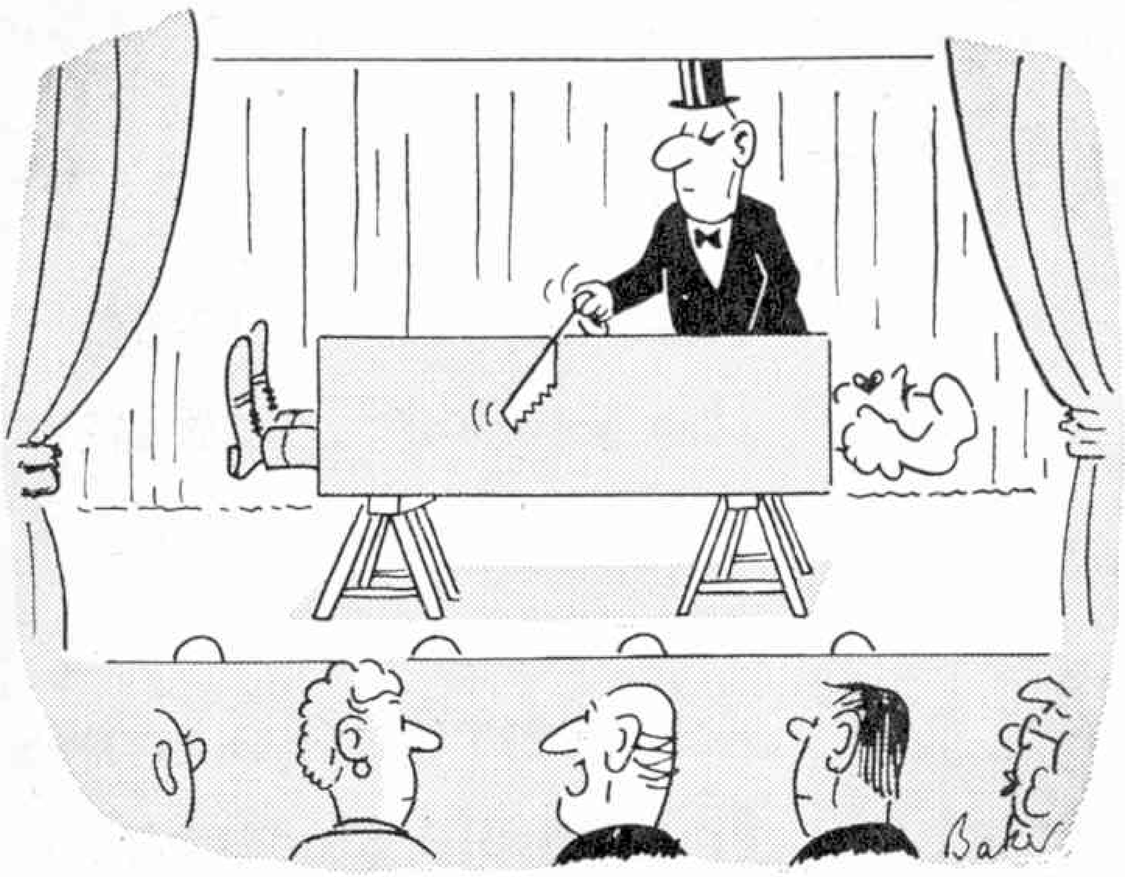


"If you ask me, this act is phoney!"

FUN & GAMES

For answers to puzzles please see page 50

A. You all know that a cent is an American coin but here are eight *different* cents awaiting solution. Each is a word ending in CENT, in answer to a given clue. (To help you, the answer to No. 1 is DesCENT.)

1. The CENT that is a drop.
2. The CENT that is respectable.
3. The CENT that effects the voice.
4. The CENT that is new.
5. The CENT that is a curved row of buildings.
6. The CENT that is nearby.
7. The CENT that is pleased.
8. The CENT that is tranquil.

B. Under an old contract, a farmer hired a labourer for £8 a year plus a suit of clothes. The man left after seven months and received £2 13s. 4d. and the clothes. What was the value of the suit?

C. Read this if you can! It is just an ordinary piece of writing, put in puzzle style.

B yyy, do not your B CONFIDENT self, nor estimate FLyUoEuNrCE 4 good with others, but HONsESTeYANDeTRkUTH 2 make the best of what tUheCm.

HANDY TRANCE

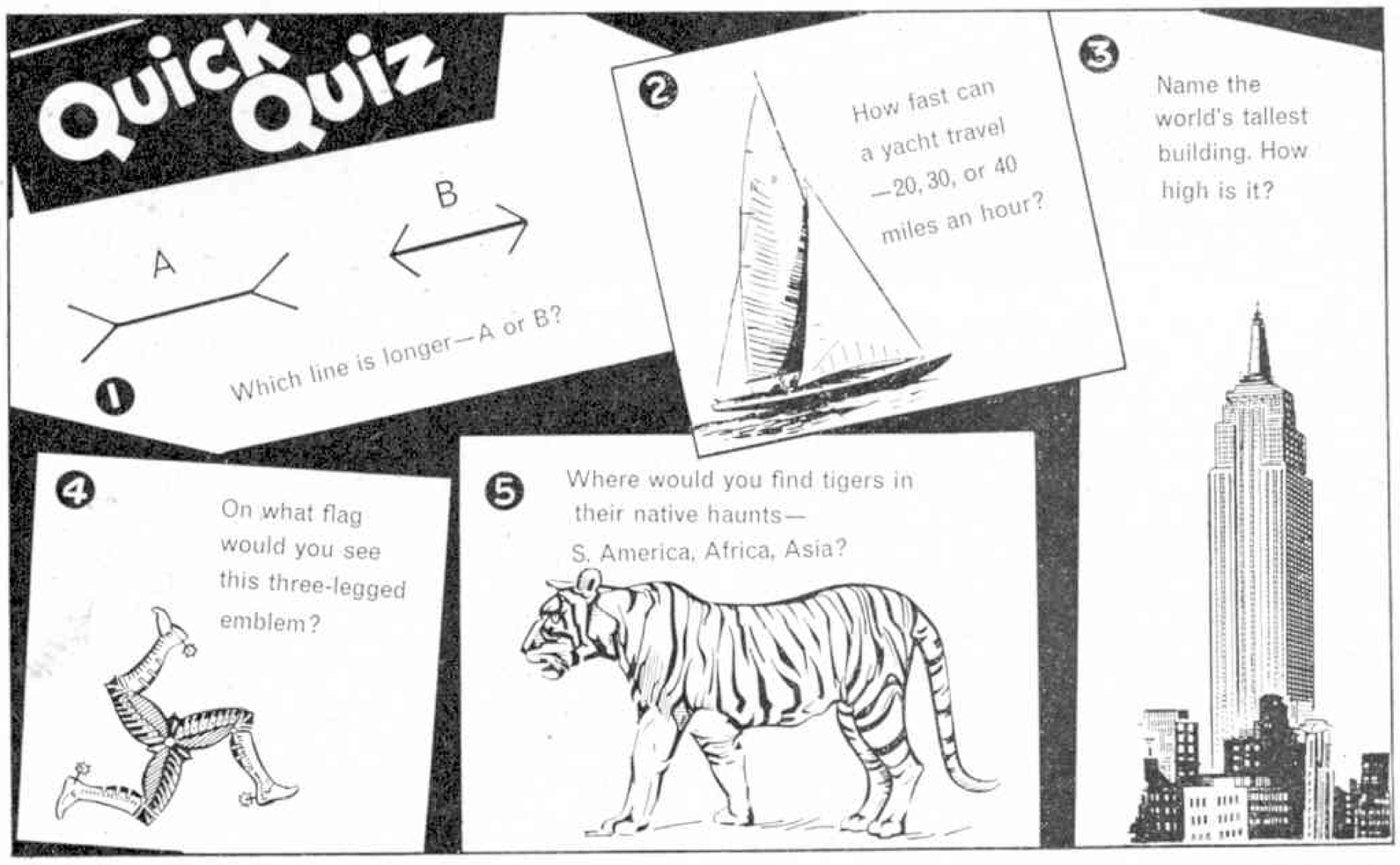
Ask someone to extend an arm straight to the side, palm up. Tell him you're going to make him raise his hand in spite of himself by invoking the use of hypnotism. Then, as you recite some meaningless patter, stroke the palm of his hand several times and stop suddenly. To his great surprise, his hand will involuntarily shoot upward!

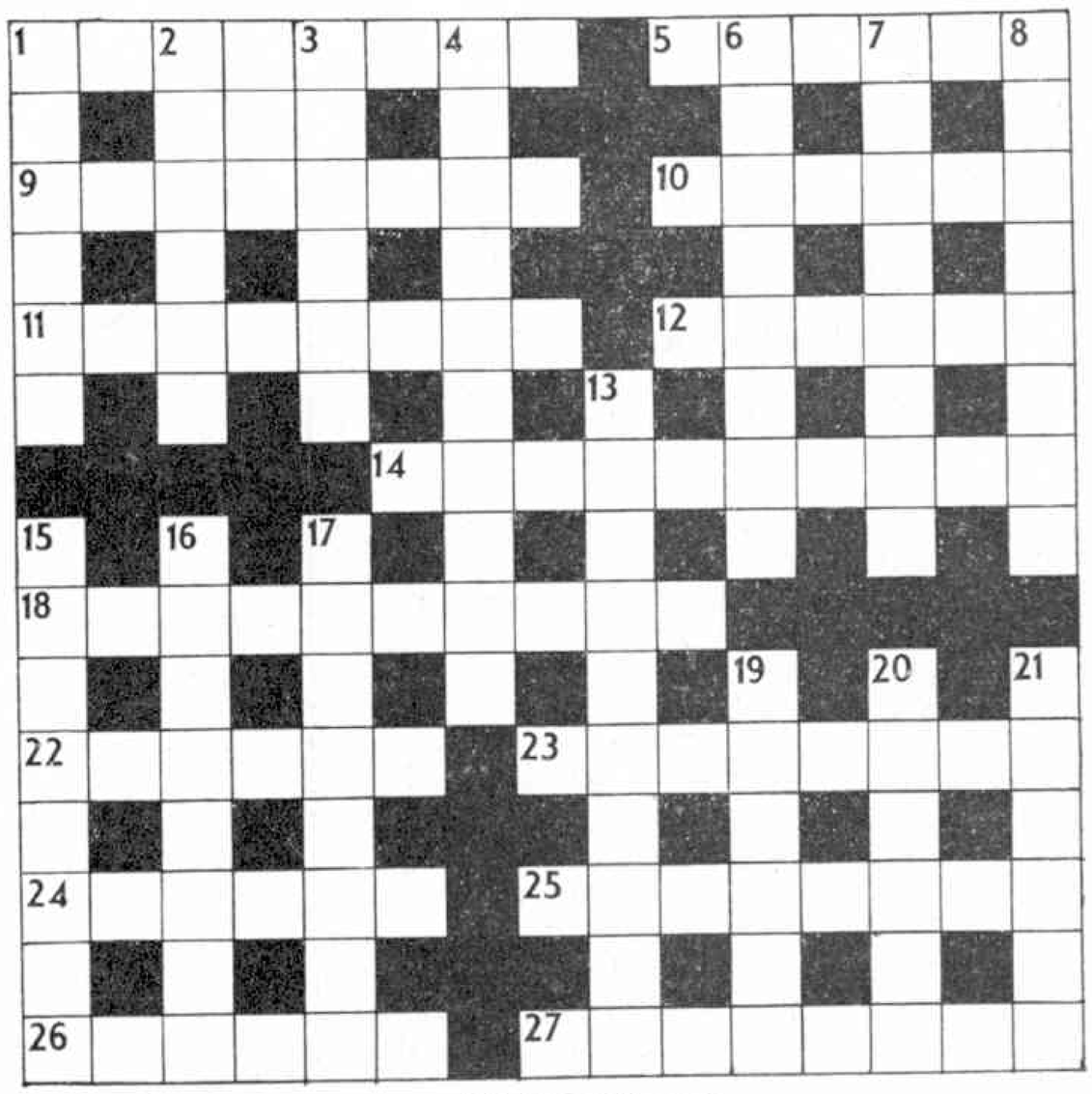
WHEN ON A HIKE

What would you do if: 1. You were hiking through an unknown deserted part of the country to a distant town. 2. Your only guides were the successive signposts you encountered on the way. 3. Coming presently to your crossroads, you found that the signpost there had been upset by the wind and had fallen into a ditch face downwards. 4. You wanted to continue on your way?

Answer: Replace the post in its hole, so that the proper arm with its lettering points the way you came. Of necessity, the directions of the other arms will be correct.

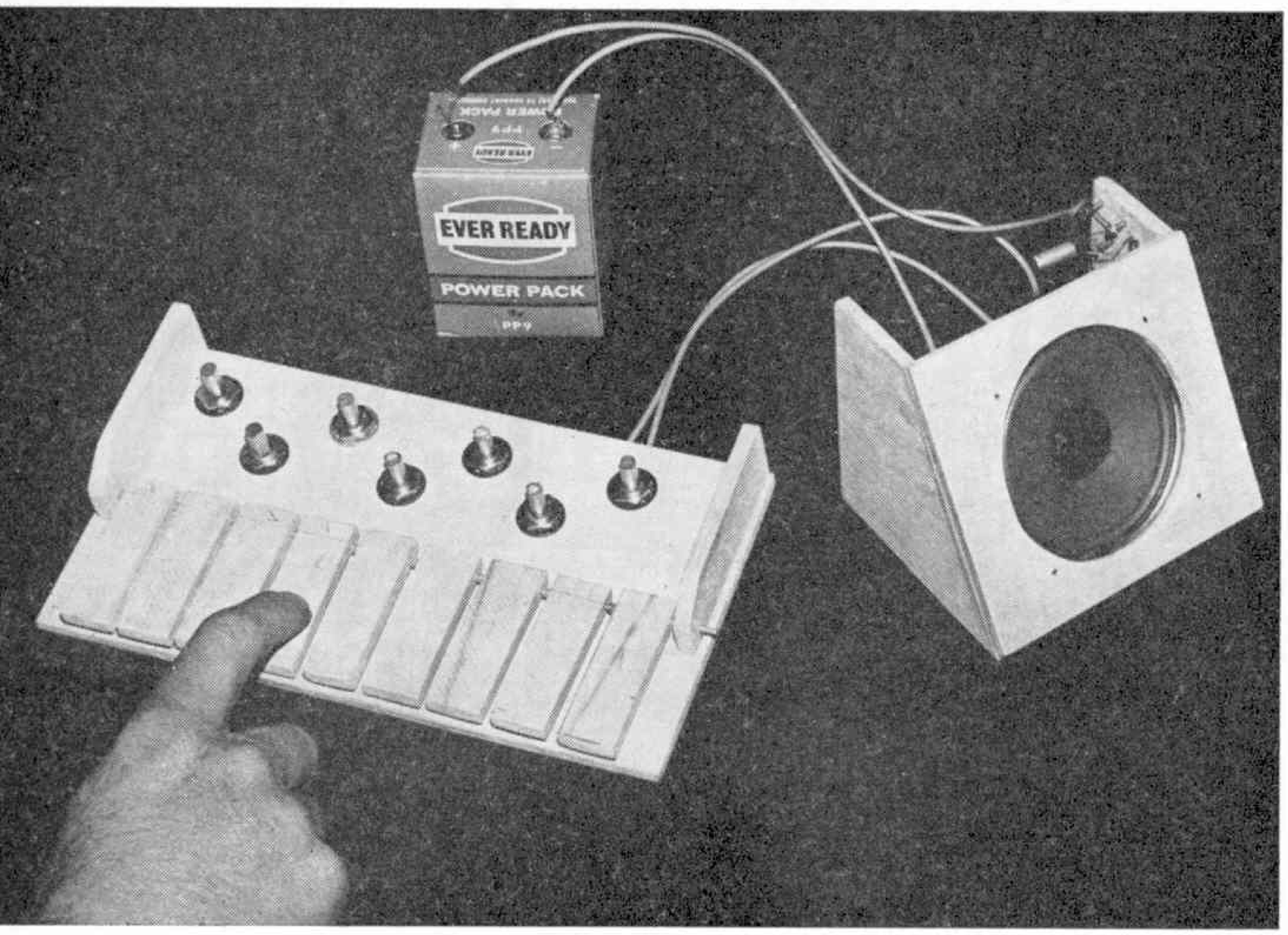
Quick Quiz





ACROSS
1 A very special male
5 To be able to bear the cost
9 To cut off a limb
10 A good companion
11 What achievements could bring you
12 Middle East language
14 A keen type
18 The future forecast
22 To decline
23 A primitive weapon
24 Top surface
25 A respite
26 For climbing
27 To congregate

DOWN
1 Rascals
2 You can have one on a piece of string!
3 To turn
4 To contend against
6 A place of defence
7 To overcome
8 You do it when you devote something to special purpose
13 Footwear specialists
15 Agreement
16 Kept within limits
17 A poisonous gas
19 Olde English fairy
20 Magnificent
21 Native of Greek capital



Last month we built the keyboard and now we tackle the really exciting part as Ron Warring describes the simple electronics involved in constructing our

M.M. ELECTRONIC ORGAN

Part 2. The Note Generator & Amplifier

AT this stage we are concerned with the 'electronics' side of the organ and the circuitry involved has been simplified to a degree. The tone generator circuit uses two transistors in a typical multi-vibrator circuit. Amplification is then provided by a third transistor working on the 'half supply voltage' principle to reduce the number of amplifier components to an absolute minimum. Feeding an 80 ohm 2 in. or 3 in. diameter permanent magnet loudspeaker this will give an output of approximately 50 milliwatts, which is sufficient volume for an average size room.

As explained in Part 1, treble and bass notes are accommodated on separate keyboards, and each keyboard requires its own separate note generator/amplifier circuit feeding its own loudspeaker. If, however, you are only building a single keyboard organ then only one note generator/amplifier circuit need be built —i.e. you can follow the plans given but only assemble one circuit and fit one speaker, cutting down the length of the panel to 4½ in. instead of 8 in. We would recommend making the panel the full 8 in. length, however, as even if you start with a single keyboard organ we are sure you will want to extend it to a treble and base organ later on.

The circuit diagram is shown in Fig. 1 and a complete list of components required are given in the panel on the right. The circuit diagram should be used to check connections, but the actual making and wiring up can be done by following the physical layout diagrams.

Dimensions for marking and cutting out the main panel are given in Fig. 2. This panel is cut from ¼ in. ply and the speakers mounted on the back of the panel behind the circular holes. Two end pieces are required, also cut from ¼ in ply. The exact size of these is given in Fig. 3. The black circles refer to positions where copper or brass nails are driven into the ply to act as connecting points for wiring up the circuit components for the *treble* note generator/amplifier or *left hand* end. The pattern must be *reversed* for marking out the right hand end (base note generator/amplifier)—i.e. making a tracing, turning the tracing paper over and transferring to the right hand ply end.

The complete construction is shown in detail in Fig. 4, which you can also follow for wiring the various components into position. The straight lines on the layout pattern (Fig. 3) are lengths of fuse wire wrapped around the nails and soldered in place. Each component is then fitted in turn to its correct connecting points, soldering each joint. Simply follow the diagrams in Fig. 4, first mounting all the resistors, then the capacitors and finally the three transistors.

Three additional lengths of *insulated* wire must also be soldered to the circuit at the points shown, two of these forming the connections to the speaker and the third the lead to the positive terminal of the battery. Leads A and B are the two leads connecting the keyboard to the note generator/amplifier circuit. It should look something like Fig. 5.

Capacitor C4 is soldered in place directly across the two terminals of the loudspeaker.

Continued on page 30

Circuit components required

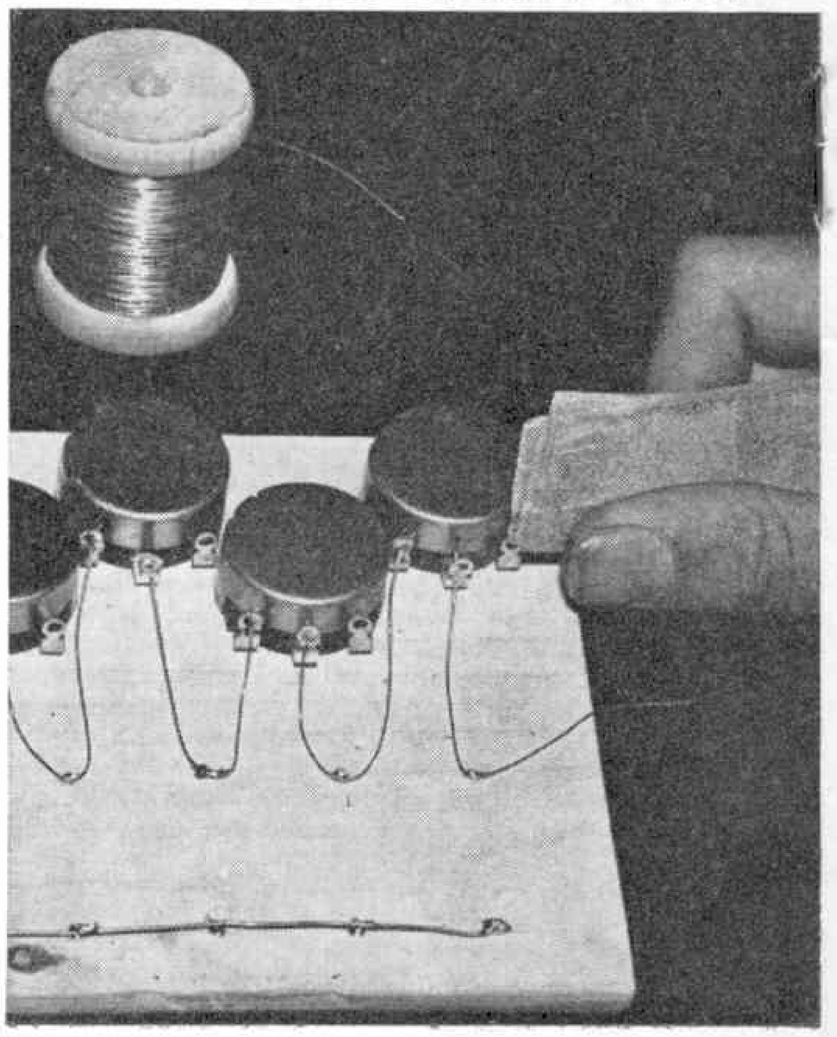
Components are identical for both the treble and base circuits except for the values of the capacitors C1 and C2. The following lists one full set. *Two* sets are required for making both the treble and base note generator/amplifier circuits.

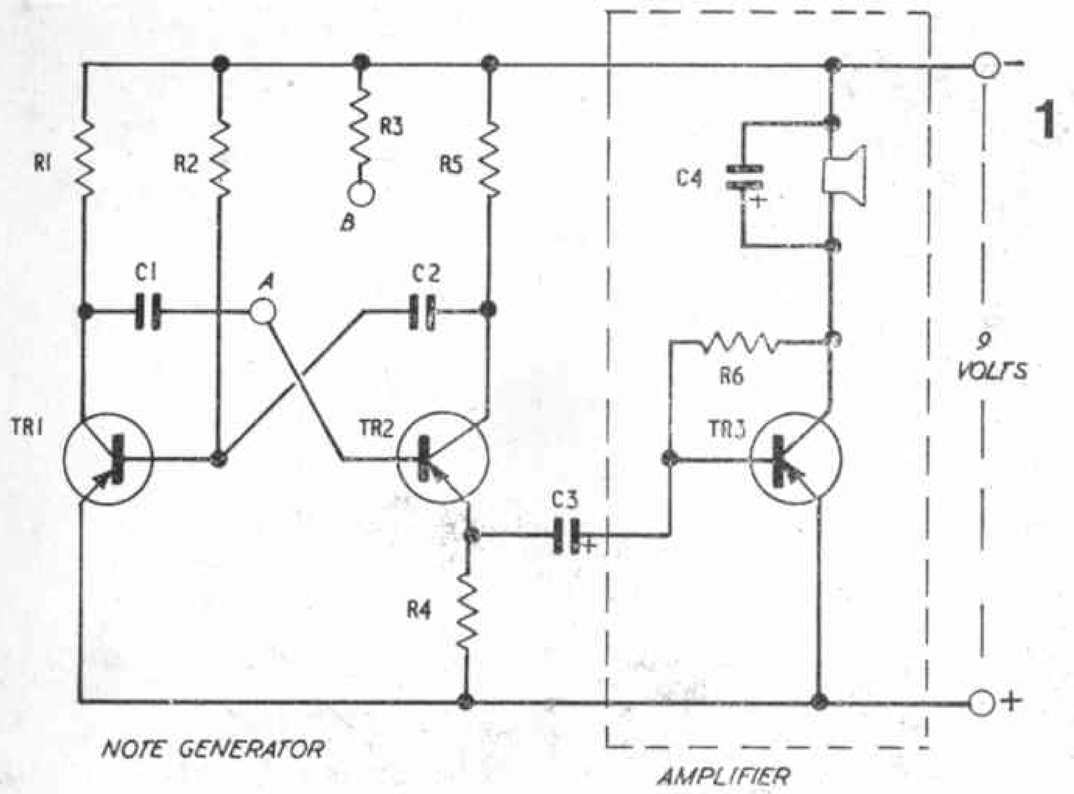
Resistors
R1 –2·2 kilohm
R2 12 kilohm
R3 10 kilohm
R4 100 ohm
R5 2·2 kilohm
R6 39 kilohm
} miniature type ¼ watt

Capacitors
C1 ·1 mF for treble
·25 mF for base
C2 ·1 mF for treble
·25 mF for base
C3 2 mF (electrolytic)
C4 2 mF (electrolytic)
} all 12 volt working

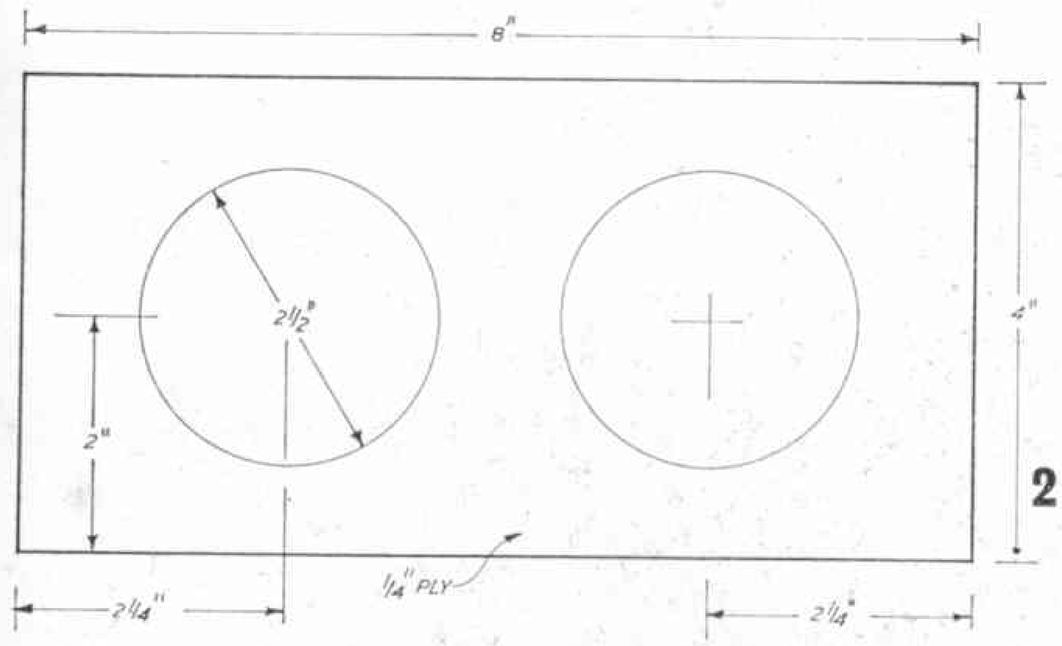
Transistors
TR1 Mullard OC71 (or equivalent)
TR2 Mullard OC71 (or equivalent)
TR3 Mullard OC72 (or equivalent)
Loudspeaker—80 ohm permanent magnet type (2 in. or 3 in. diameter).
Battery—9 volts.

Below: cleanliness is really essential when soldering. Here, a potentiometer 'tag' is being rubbed with fine sandpaper to remove dirt and grease (see 'Soldering Hints' on page 30)





1



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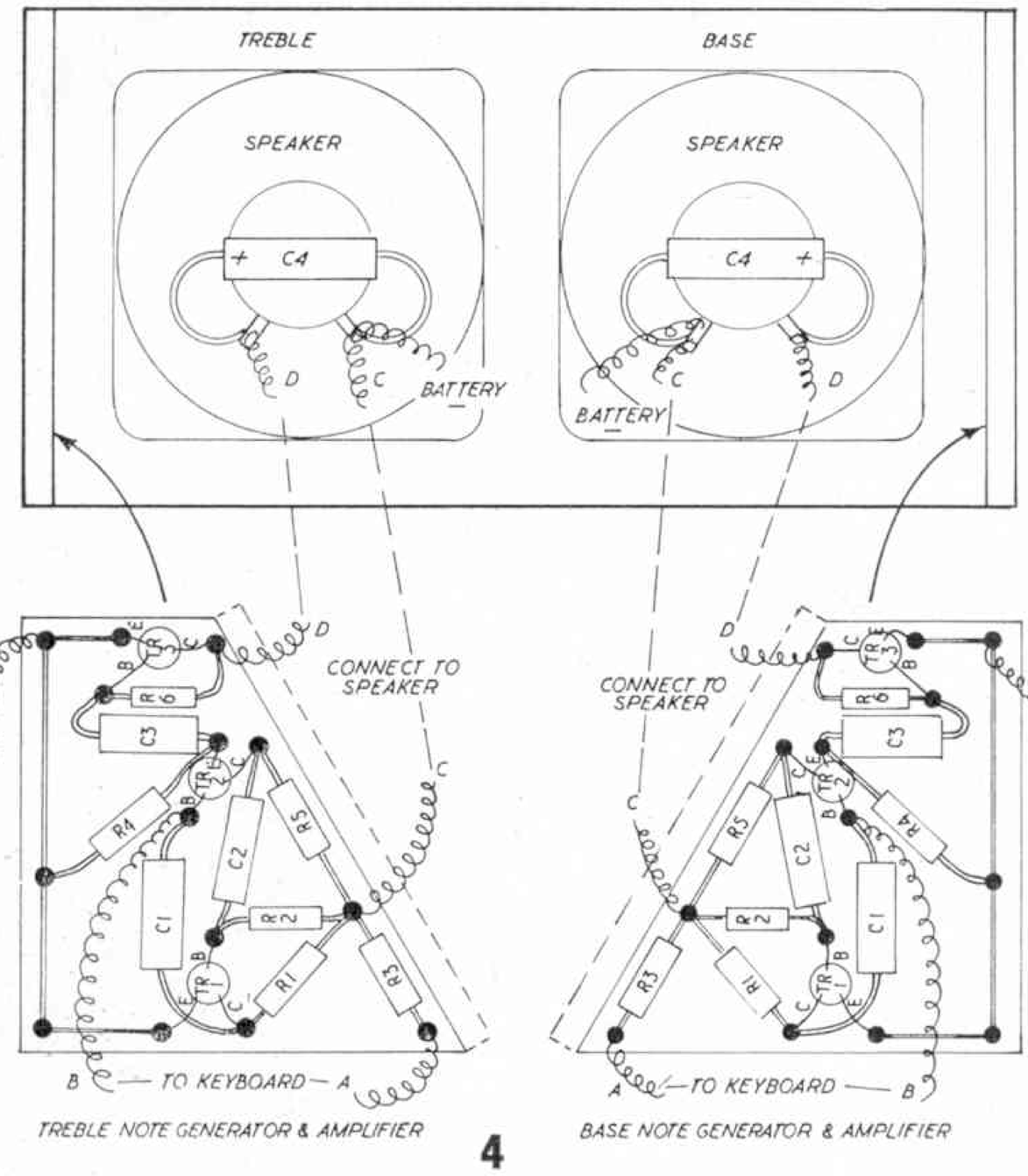

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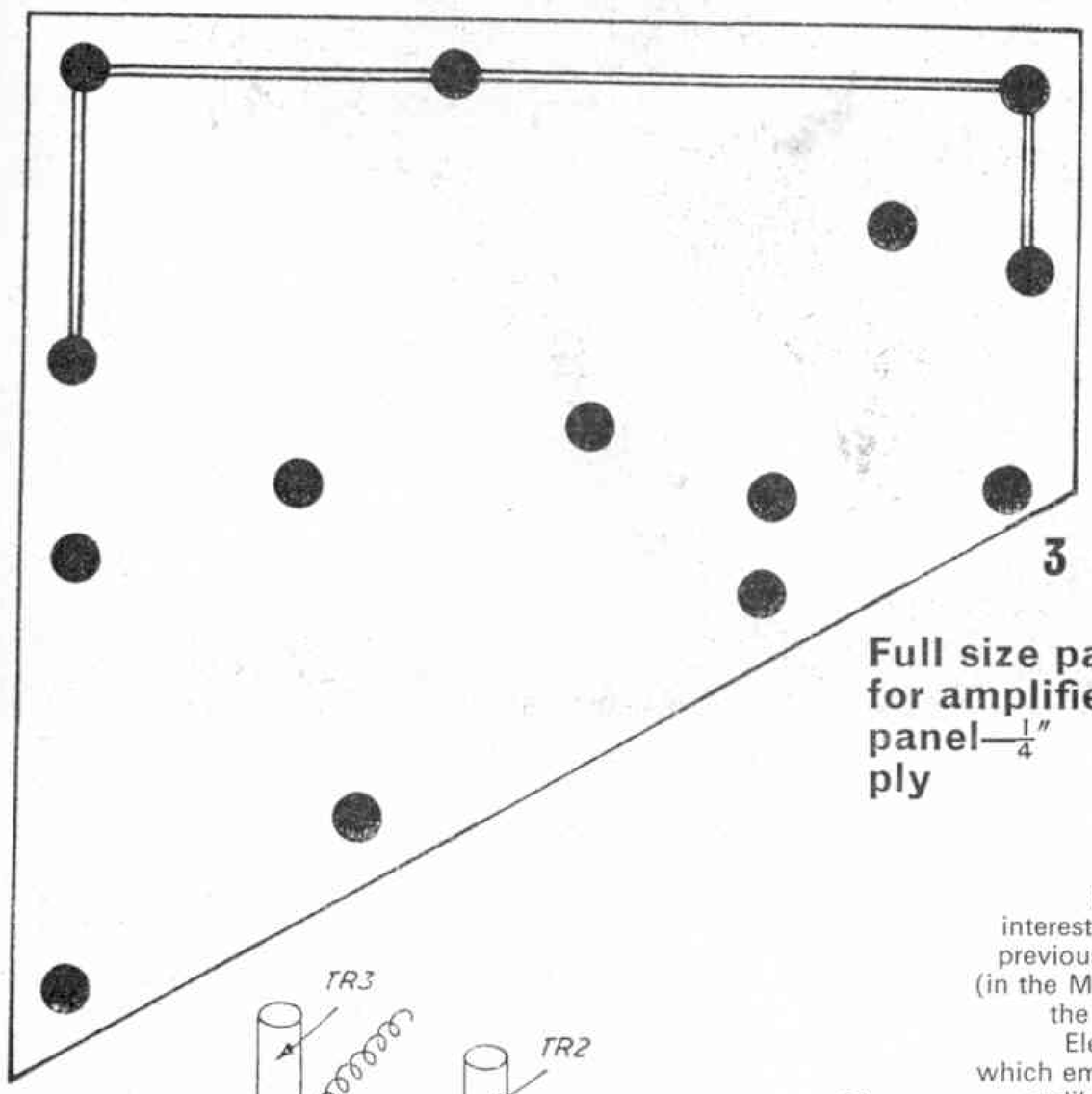
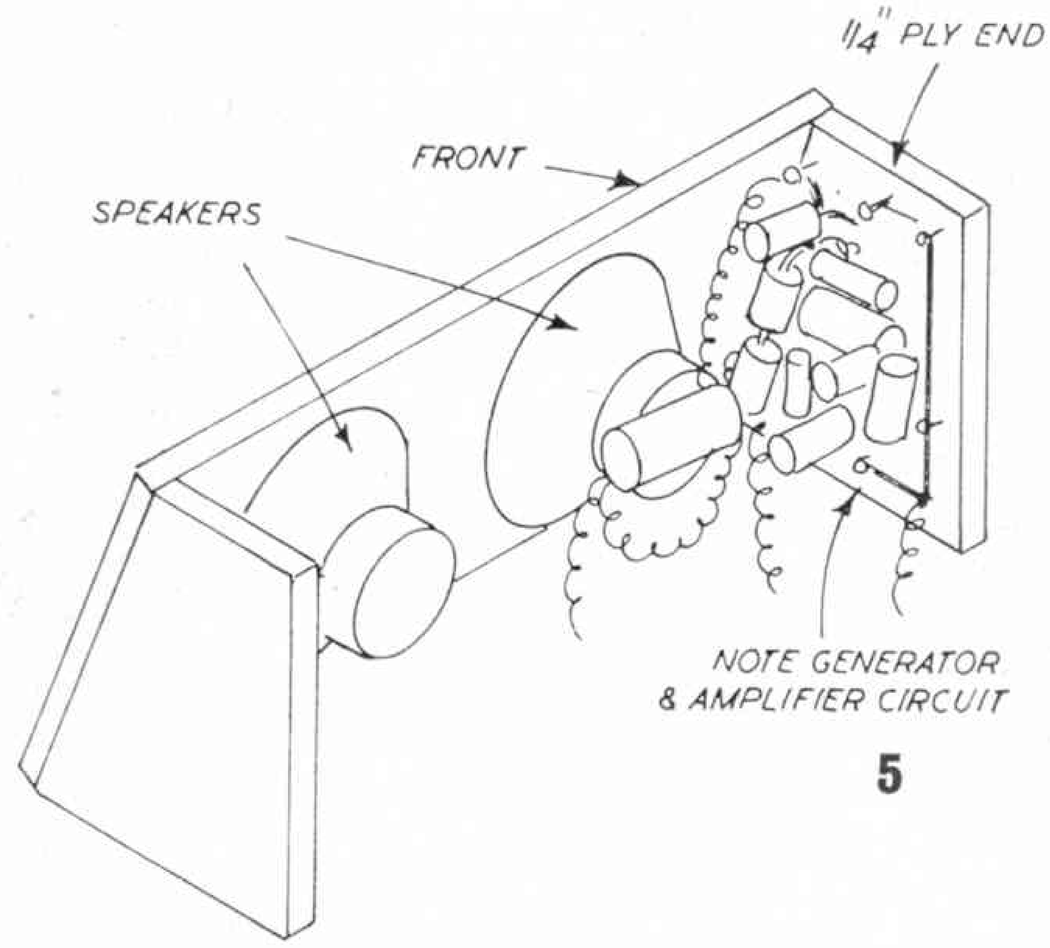


3

Full size pattern for amplifier panel—¼" ply



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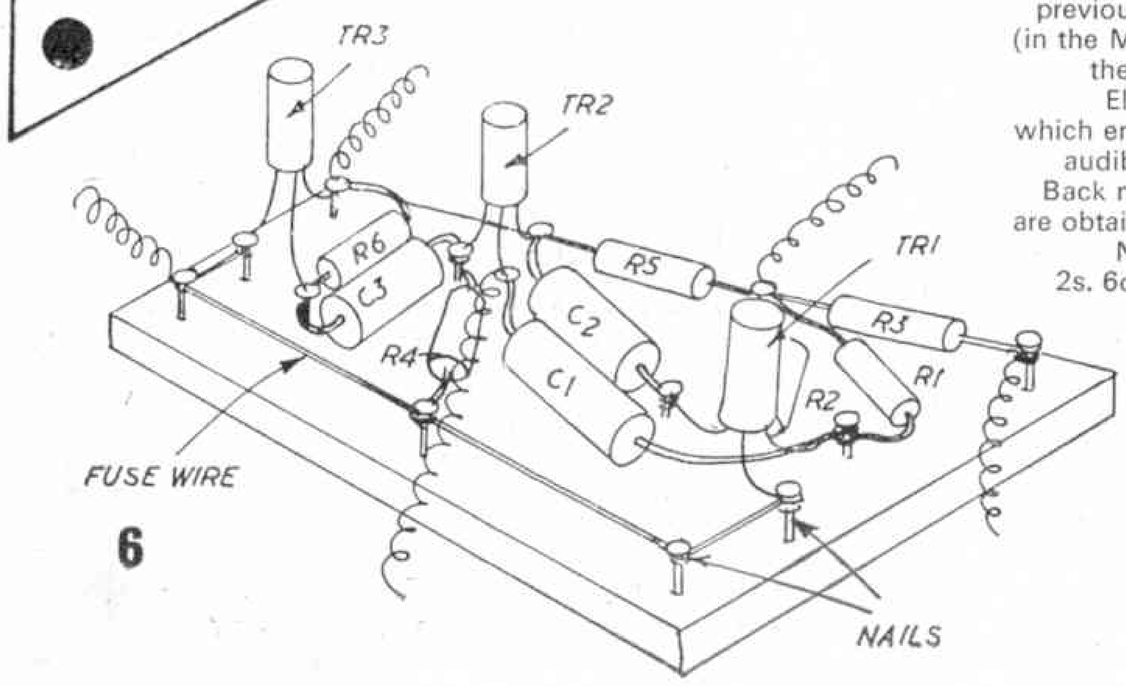
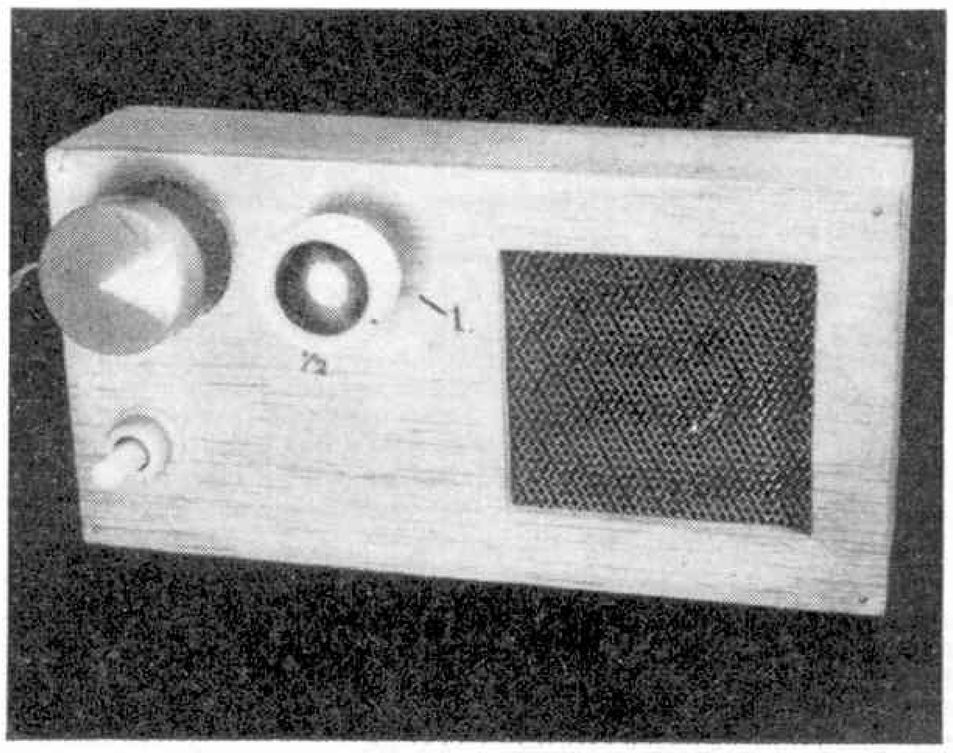


6

New readers will be interested to know that the previous electronics project (in the May issue) dealt with the construction of this Electronic Metronome which emits a variable-space audible and visual signal. Back numbers of this issue are obtainable from our Back Numbers Dept., price 2s. 6d. including postage.



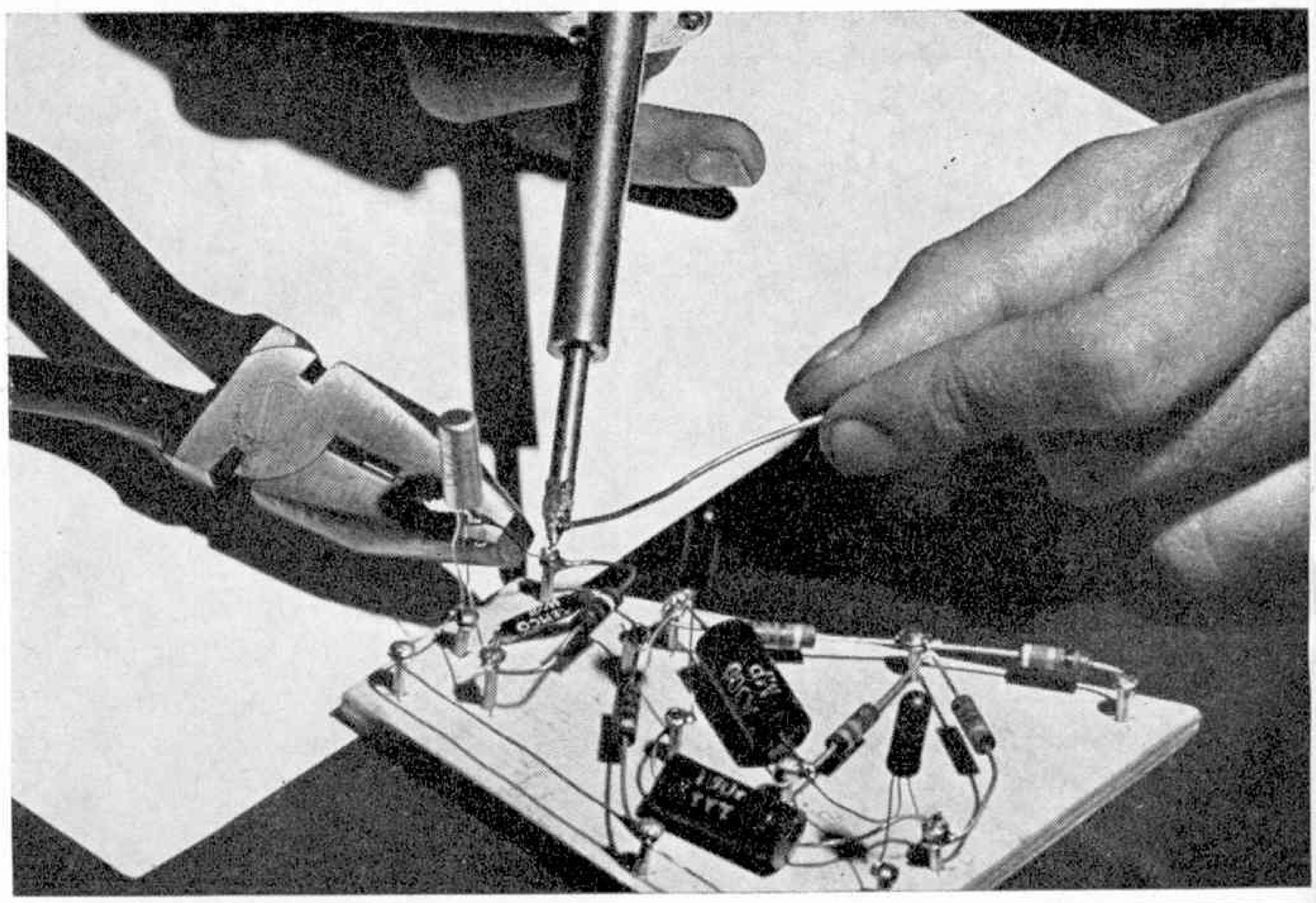
The end panels are pinned and glued to the front panel, as shown in Fig. 6, and the connections to the loudspeaker completed. Note that the positive battery lead also goes to one side of the speaker. Make sure that this is taken to the *correct* side, identified by the negative end of the electrolytic capacitor C4.

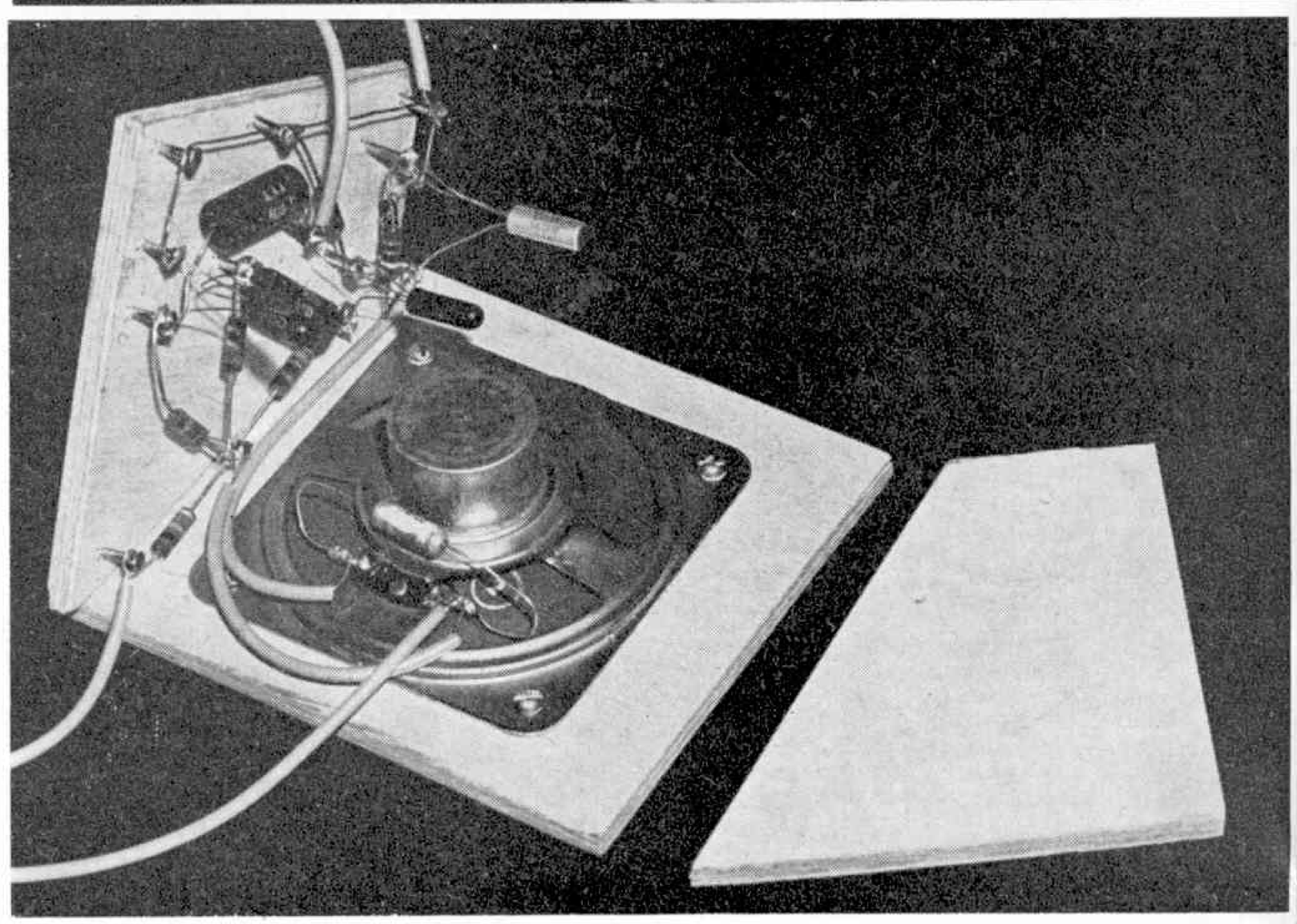
All that remains to do is to check that the circuit connections conform to Fig. 1 *before* connecting up the battery. Check also that the electrolytic capacitors are connected the right way round—and be sure also to connect the battery the right way round. Your electronic organ should then be ready for tuning, dealing with each keyboard in turn.

Start with the treble keyboard and depress the highest note key (i.e. the eighth key from the left). This should produce a clear 'organ' note in the treble loudspeaker. Now depress the next key, when a lower note will be heard. The frequency of this note can then be adjusted by altering the setting of the potentiometer immediately behind that key (i.e. the potentiometer switched by that key). The same applies to all the other notes in turn. They are adjusted by depressing the appropriate key and adjusting the corresponding potentiometer to produce the required note. You can only sound one note at a time, and so you can only adjust one note at a time. If you start from the highest note first and work down the scale, adjustment of the lower notes will not affect adjustment of the previous notes. If you work the other way round—low notes up—you will upset the previous note every time you adjust a higher note.

You can adjust the range of notes and each individual note 'by ear', but the best way is to adjust against some other musical instrument, such as the piano. If you are not satisfied with the range obtained you may have to adjust the value of R3 (i.e. try a slightly higher or lower value) to reset the frequency of the first note, but if you do this all the other notes will be altered and require readjustment.

Having tuned all the treble keyboard notes in this way you can carry out exactly the same procedure with the base keyboard—aiming obviously this time for much deeper notes. Treble and base notes can be played simultaneously since they work through separate note generator/amplifier circuits, so you can tune one against the other, if necessary. Take as much time as necessary to get the sound 'right'. It can be quite fascinating if you have a good ear for music, and if you can play a piano you will find it quite simple to adjust individual notes very accurately. You then have a full, miniature working electronic organ in proper tune.





Top: using a pair of pliers as a 'heat shunt' while soldering the connections of a transistor. Above: the almost completed note generator and amplifier unit

Soldering Hints

Readers who are building our Meccano Magazine Electronic Organ will probably be familiar with the art of soldering, but for those who are not, the following hints may prove useful.

Soldering, like most crafts, cannot be carried out properly unless the correct tools are used. Use a suitable *small* electric soldering iron, with a good long lead to allow freedom of movement. The Weller 'Marksman' pencil soldering iron illustrated is just the right size and extremely easy to use.

Many different solders and types of flux are available, but for electronic work it is convenient to use a resin-cored solder, which has the flux 'built-in'. Not only is this kind of solder much simpler and cleaner to use, but the flux contained in it is non-corrosive, and does not harm the soldering iron bit or the various electronic components. On no account must acid flux ever be used.

For all the wiring use tinned copper wire of about 24 s.w.g. gauge. This is easily obtained from radio hobby shops, and being pre-tinned, takes solder beautifully. When buying the wire, don't forget a couple of yards of PVC sleeving. This simply pushes over the bare wire, converting it to 'insulated'. Now to work!

Although the 'tags' on the potentiometers and the wires on the capacitors, resistors and transistors are pre-tinned for easy soldering, they must also be *clean*. If they look discoloured (brown or black) scrape gently with fine sandpaper or emery to remove the dirt, until the silvered surface shines nicely. This may sound like 'bull' but it is very important indeed—solder will never form a proper joint on a dirty or greasy surface.

One more important point before we solder our first connection. The copper wire conducts heat very rapidly, and the hot soldering iron bit will come very close to the various delicate and expensive electronic components—it could quite easily ruin them. To guard against such an event, a 'heat-shunt' or 'heat-sink' is used. This can be simply a pair of pliers clamped to the wire between the bit of the soldering iron and the component itself, but if you are working single-handed and find it difficult to cope with the iron, the solder *and* the pliers, then you can buy special auto-clamping heat shunts quite cheaply. The heat from the iron is diverted along the shunt and the capacitor or transistor remains cool. Even so, you should *never* keep the iron on the joint longer than is absolutely necessary. Two second at the most.

Before switching on the iron, prop it up on a bent wire stand to keep the bit clear of the bench. It will only take a couple of minutes to heat up, and while you are waiting, prepare the first connection. Always try to make the joint a good 'mechanical' fit to the tag or nail to which you are soldering—just a twist will do. Apply the hot iron to the connection and feed in the solder with the other hand (see photo). As the solder melts, it will run into the joint. Don't apply too much solder—this usually results in a 'blob'. Upon removal of the iron, the solder sets immediately, and should present a fairly bright, smooth and silvery appearance. If the joint has a matt crystalline look, it is probably 'dry', and a sharp tug will break it. In this case it should be re-heated and a little new clean solder applied. If this does not do the trick, then it must be laboriously scraped clean and a second attempt made. As 'dry' joints are usually caused by dirt or grease, it really does pay to clean all joints before soldering. Such dry joints are responsible for many of the electrical faults that develop in electronic circuits built up by beginners.

So off you go! Work slowly and methodically, with the circuit diagram propped up in front of you and a really hot iron. Don't forget the heat-shunt to protect your valuable components. The neatness of your joints will improve as the job progresses. Easy, isn't it?

NEXT MONTH—ADDING A TREMULO CIRCUIT TO THE ORGAN

HAVE YOU SEEN ?

THE MIDLAND RAILWAY
by C. Hamilton Ellis
Published by Malaga Books, of 9 Woodthorpe Road, Ashford, Middlesex. **Price 10s. 6d.**
192 p.p. plus 32 p.p. photo-lithographed half tone illustrations. Paper-back edition 8½ in. by 5½ in.

It has been remarked many times that the Midland Railway was a very individual line and that in many ways, as the author of the book under revue remarks in his opening sentence, 'the Midland Railway was a magnificent railway'. Two very distinguishing features of the line however, were the large number of ancient engines used on both passenger and goods trains, and secondly the splendour of its coaches. It would indeed be true to say that Midland Railway coaching stock was second to none. Even third class coaches were reasonably comfortable for the standards of the time, when, it must be remembered, most other railways barely tolerated third class passengers. The Midland Railway was by no means one of the many impoverished lines, and while many antique locomotives were used, there were no antique coaches. In terms of route mileage, the Midland was the third largest railway in Britain, and among its many main lines was that famous route from Settle to Carlisle, often nicknamed the 'long Drag'. Its Company Officers included many famous names, such as Chairmen like George (railway King) Hudson, and John Ellis, and locomotive superintendents such as Mathew Kirtley and S. W. Johnson. The story of the Midland is a fascinating one and the author has an intimate knowledge of his subject, which he writes about in an entertaining and instructive way in this, a paper-back edition of the original book. Reproduced by photo-lithography, the illustrations do leave a little to be desired, but at the price, the book makes a very worthwhile addition to any library.

RAILWAY CARRIAGE ALBUM
by G. M. Kichenside
Published by: Ian Allan Limited, Terminal House, Shepperton, Middlesex. **Price 50s.**
228 p.p. One colour plate. Profusely illustrated. 9¾ in. by 7½ in.

During the past century, coaching stock has differed in design, construction and the standard of comfort offered to passengers. The lot of the third class passenger, in particular, has improved, and he no longer has to endure the somewhat spartan comfort of 'Parliamentaries', or the cramped bare wooden seats, meagre lighting and non-existant heating that were usual before the turn of the century. Indeed, the changing social conditions of the past 100 years is reflected in the design of Coaches during that period, and the subject makes a fascinating study. Although far more numerous and greater in variety than locomotives, coaches have been somewhat ignored by railway historians, and Mr. Kichenside, Editor of 'Railway World' portrays in this book a representative selection of coaches from about the 1880's to the present day with over 400 excellent photographs, each accompanied by a fairly lengthy explanatory caption. The photographs are arranged in order of the pre-nationalisation companies, and the book includes at the front, a 42 page historical survey outlining the development o ithe coach from its stagecoach ancestry.

Printed on glossy art paper, the book is extremely good value and will be of interest to both railway enthusiasts and railway modellers alike.

REVELL SHERMAN M-4 TANK

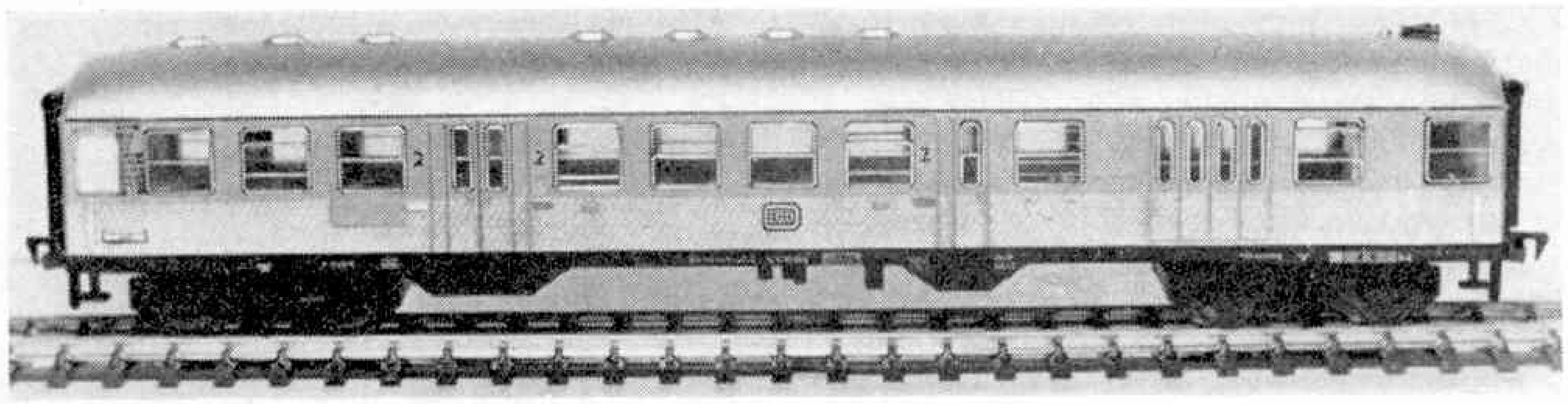
The 400 horsepower M4 medium tank, nicknamed the 'General Sherman', was the most widely used American tank during World War II, and saw action in North Africa, Italy, France and Germany.

Revell's kit is to 1/40th scale and incorporates all the fine detail and working features for which Revell are well-known. The suspension, wheels and tracks actually move, the turret revolves and the guns revolve and elevate. The parts are moulded in the correct 'drab' brown colour and there is little painting to do. Some of the more fascinating details include opening hatch-covers, spare track 'shoes' carried on the hull for emergency repairs and a spade, hatchet and other implements for 'digging out' a bogged down tank are all moulded into the hull itself. Three figures are included in the kit; the tank commander and two riflemen.

Construction is straightforward, and all the parts fit together in a most satisfying manner; there is little 'flash'. However, it is advisable to work strictly to the comprehensive building instructions supplied with the kit, and resist the temptation to detach all the parts from their sprues before commencing construction, as numbers moulded on the sprues identify the various parts. This is an excellent idea, especially as, in this kit, a great many wheels are included, all looking very similar, but with different functions!

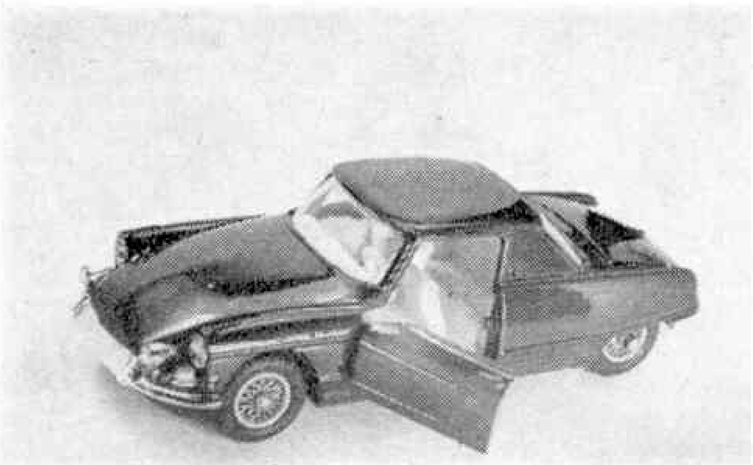
It occurred to us, whilst building the 'Sherman', that a model of this size could be motorized. Steel axles would have to be fitted, however, and extra care taken in assembling the bogies and running gear generally. A job for the experts only!

The 'Sherman' retails at 10s. 6d. and would make a useful addition to any collection of military vehicles. Being built to 1/40th scale, it makes a big, 'chunky' model, with a great deal of fascinating detail.

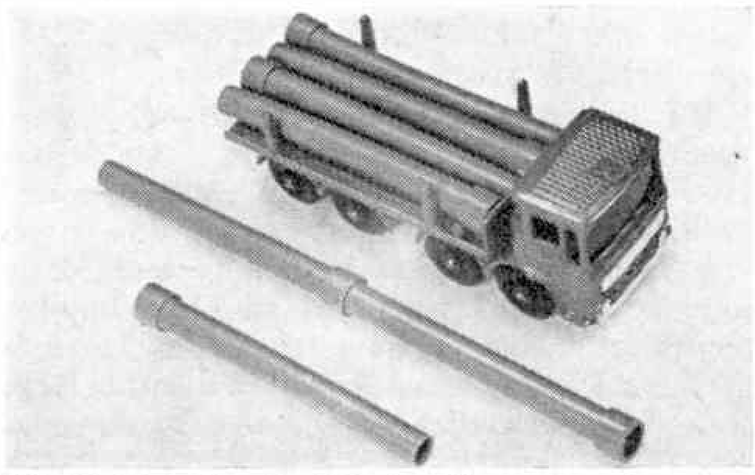


NEW COACH FROM FLEISCHMANN

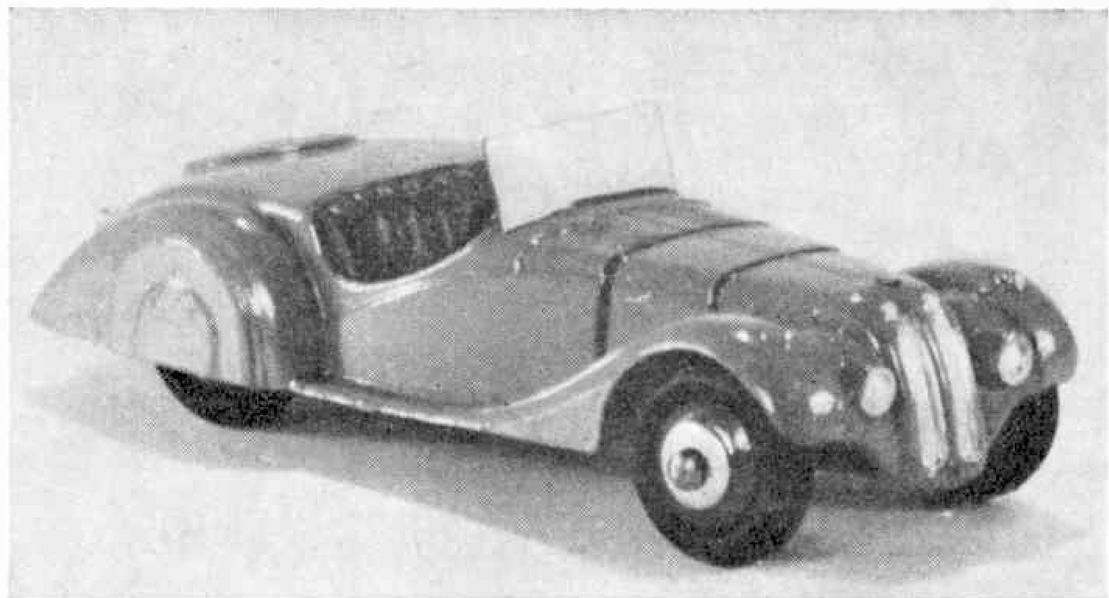
HO enthusiasts will be interested in the latest addition to the Fleischmann range, a baggage/2nd coach of the Deuschen Bundesbahn used in push-pull trains. This is a real beauty and well up to the standard that we have come to expect from this old established name. Imported and supplied by M. & R. (Model Railways) Ltd., of Vassalli Showrooms, 23 Central Road, Leeds, 1., the coach is 9½ in. long and superbly detailed. Working rear lights collecting current from the track supply are also fitted, and in addition provision is made for extra lights in the body interior of the coach, which is remarkably free running. The livery is very attractive and the coach has a silver roof, grey and silver waist and grey upper panels, with gold window frames, some of which are half open. The coach has orange interior seats, full door, underframe and underside detail and very fine lettering on both the body and the underframe.



A recent Corgi is the Citroen 'Le Dandy' coupé with Henri Chaperon body. Complete with wire wheels, and beautifully finished in dark red, it costs **7s. 3d.**



This 'Matchbox' Leyland 8 wheel flat truck carries a load of seven pipes, which can be removed and fitted together to form a pipeline over 14½ inches long! **2s.**



Above: this sleek classic was Dinky Toys No. 38A Frasher Nash-B.M.W.
Below: show off your collection! This showcase shows just how effective your models can look if properly displayed

THIS series of articles is designed to further the cause of collecting miniature models of all types in scales varying from 1/32 to 1/80, completely leaving slot racing to the slot racers, who in any case are better qualified to cover this side of the hobby. How long it all lasts, depends on you and your support, plus a deal of tolerance from your long suffering editor!

I aim to brainwash all the would-be collectors from five to fifty into becoming full blown addicts, with gen on some of the models made in various parts of the world, before and after World War II plus a few ideas on what to collect, what to search for, chopping, repainting and generally improving the appearance of the models, etc.

I suppose in the main, I'll be chatting about model cars—having a weakness in this direction—but I'm open to suggestions on what you'd like to read about and hope you'll drop me a line c/o Meccano Magazine with your ideas, queries, hopes, etc.

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To begin with, I'd like to describe why I started collecting models or toys, instead of, say, stamps or soldiers, because many people have given me old fashioned glances when my wife mentions my hobby (though I think she and they are by now immune to my odd ways and my small son of two is an ardent fan).

Ever since those far off school days, I've been a vague model maker with beginnings in the wooden aircraft field of the war years and progressing? to plastics in the 1950s with the early American Revell Miniature Masterpieces and Gowland Highway Pioneer kits.

But the die-cast side of my life didn't begin until 1963 when I walked into a toy shop—which sold model kits—in Tamworth, Staffs., and gazed upon *six* brand new Dinky Toy Frazer Nash-B.M.W.'s for a minute or two (see illustration above). I gave a smart impression of a skate out of water. My eyes bulged and my mouth stayed open, for it must be remembered that these Frazer Nash's had been obsolete for a good many years and are not to be found in shops of this kind any more. Consequently, they're quite rare in the condition described above.

It's difficult to say what my thoughts were when I first saw these Dinkies. There has always been a soft spot in my heart for metal models, especially cars (after all, I was spoon fed from an early age on Dinky and Minic toys by a father who had an obsession for models of any kind, shape or size) and many's the time I've regretted throwing away a large collection of pre-war Dinkies and Tootsietoys. The F.N.s were priced at a half a crown each and much to my wife's consternation, I blushed a little and purchased all six!

Over a period before buying the above, I'd gathered together and 'touched up' with paint where necessary the excellent Matchbox 'Yesteryear' models by Lesney, and these, along with my own wood and plastic productions represented my full collection, having no idea then of the vast range of models now produced by manufacturers all over the world.

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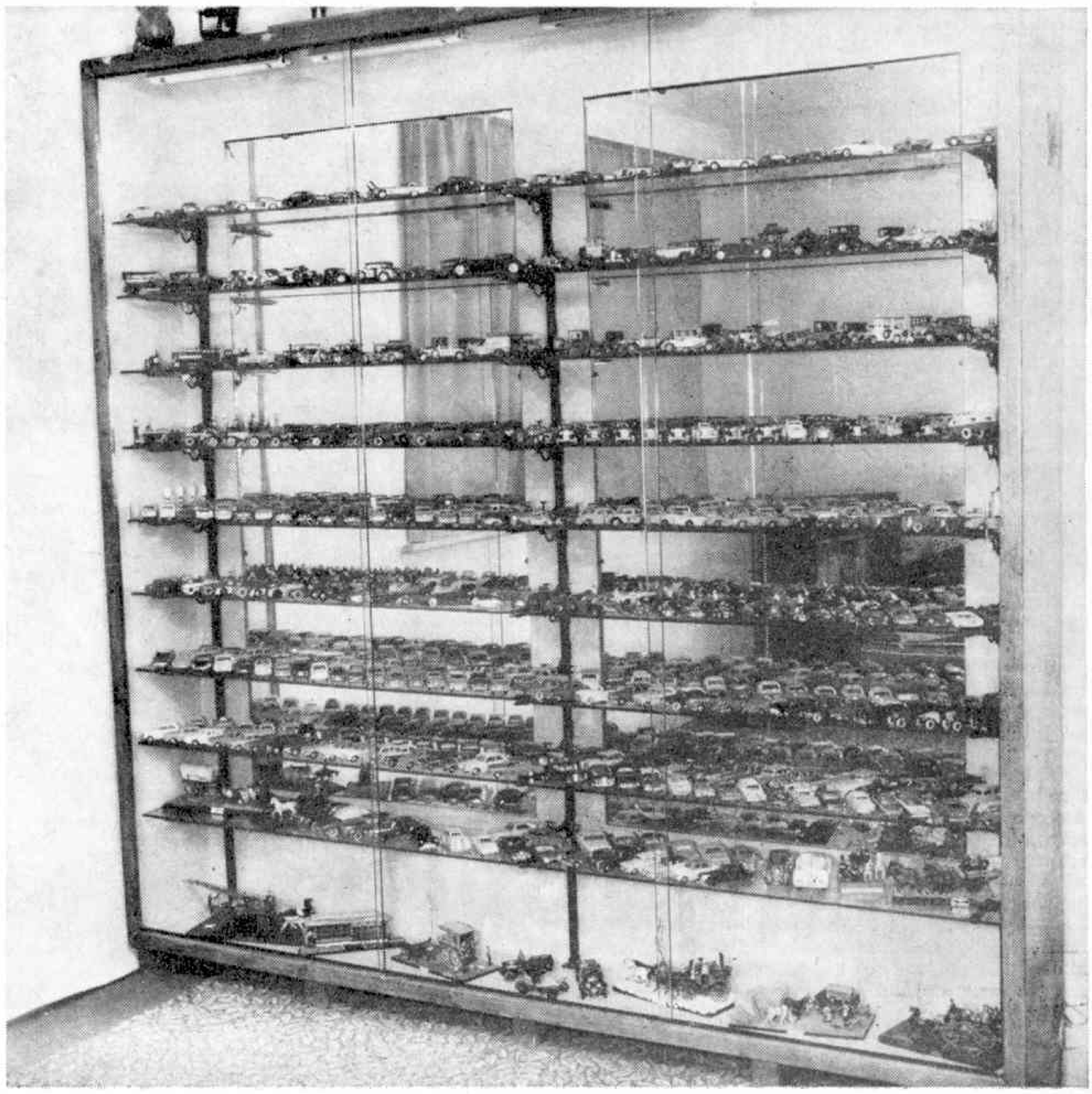
This earlier part of my hobby—my attempts in plastic, etc.—occupied a great deal of space and has only recently been sacrificed to make room for the 1/42nd stuff. We had almost 1,500 models taking all the available cupboard space plus, but now it's pruned a little to something around one thousand. This consists of several hundred cars, both ancient and modern, added to which are numerous light and heavy lorries or trucks, military vehicles, a fleet of buses and a range of racing cars. Ninety-nine per cent of all these are metal with the odd plastic thrown in, and a fair number of the former date back to the 1920s and 1930s.

This all leads up to, as I've said before, why collect model cars, how do you go about building a collection and, most important, how much does it cost?

Well, I've told you how my adult car collecting began with the toy shop visit. Mixed with this was, I suppose, a certain portion of nostalgia for those old toys which had given me so much pleasure and had cost so little (one could buy some Dinky Toys for the huge sum of 3d. each, but when you come to think about it, 3d. in those days was worth 2s. 6d. of today's money. It makes you wonder how much a half-crown model car will fetch in 20 years time!).

Add a portion of love for authentic scaled down detail, and Bob's your uncle—you're hooked! We older boys don't play with



'em now, rheumatism won't allow us to crawl around the floor any more, we just sit and admire. Anyway, why *not* model cars? Many people collect queer items such as beer mats, matchbox and cheese labels, butterflies, and now even Victoriana, etc., but I prefer cars, and I've long since ceased to blush when a young saleslady raises an eyebrow at my query: 'Any old Dinky Toys, please?'

Many moons ago I also gave up my pipe-dream of collecting the 'real thing'. Most of us, I think, envy Lord Montague with his fine collection of classic, vintage and veteran vehicles at Beaulieu, but it's rather nice to be able to see a Rolls-Royce maybe, in a showroom, costing something like £7,000 and then being able to pop around the corner and purchase a replica at, say, seven shillings. You'll probably never own the real thing, but at least you can have its baby brother!

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As to going about building a collection, it's really best to decide first, what or where your main interest lies—whether it be old-timers, G.T. cars, racing cars, commercials such as buses, etc., or perhaps 'war games' with a collection of army vehicles and soldiers. Let's suppose you decide on old-timers, what better to start a collection than the reasonably priced Matchbox 'Models of Yesteryear'. You'll get that collecting feeling right away when you find you've really got to search hard for the early issues which can only be found nowadays in the small back street shop. The bigger stores, having a large turnover of stock, naturally have only the current up-to-date models on their shelves. Depending on how many 'back street' shops there are around, and how much time and money (which I'll discuss in a minute) you're going to allocate to the hobby, you can then put a small advert. in a model magazine such as the Meccano Magazine (this really brings results—I know!). —on these lines: 'Wanted, pre-war and post-war Dinky Toys by collector, will purchase or swop. Would be pleased to hear from collectors abroad. Write John Smith', etc. In no time at all, believe me, you'll have friends all over the place! You can also scrounge round friends and relations who may have some old toys in the loft and who'll be glad of a nut like you to take them away. Don't worry if they're in a terrible condition, half the fun is restoring 'em to their original state, which in itself is not difficult. All that you require are a few cheap tools (which I'll describe at a later date), patience and a fairly steady hand.

All this is within anybody's pocket. Of course, you can go mad and purchase everything within sight and be broke in the process, but this isn't the collecting spirit. A true collector gets a thrill out of searching and waiting, writing to and helping others and particularly restoring. As I say, it needn't cost a lot, and while you're buying up all those 'Yesteryear' Bullnose Morris's, the people you write to will be sending various manufacturers' catalogues to whet your appetite. From these, one can decide which models one would like to have. Most foreign collectors are willing to supply new models, which are impossible to buy in Britain, for old Dinkies, etc.

One *very* important point to remember is: *always* be absolutely fair in your dealings through the post. Always describe in full detail the model you have for exchange. If, for example, the car has a headlamp missing and is perhaps devoid of paint, *say so*, for collectors have long memories, and it's easy to become blacklisted, and that's certainly no way to increase your collection!

Another important point (and the reason for the illustration of a showcase opposite) *do* try and display your collection, however small. I don't advocate buying expensive showcases—though the one shown was quite cheap. But do get them *out* of their boxes and on to shelves for viewing. If you don't have a cupboard, take one over, your mother or wife will probably raise Cain about the lack of clothes space, etc. Well, if it's a wife, trot out the old one about it being better than drinking every night, etc., and if it's a mother —use your imagination!

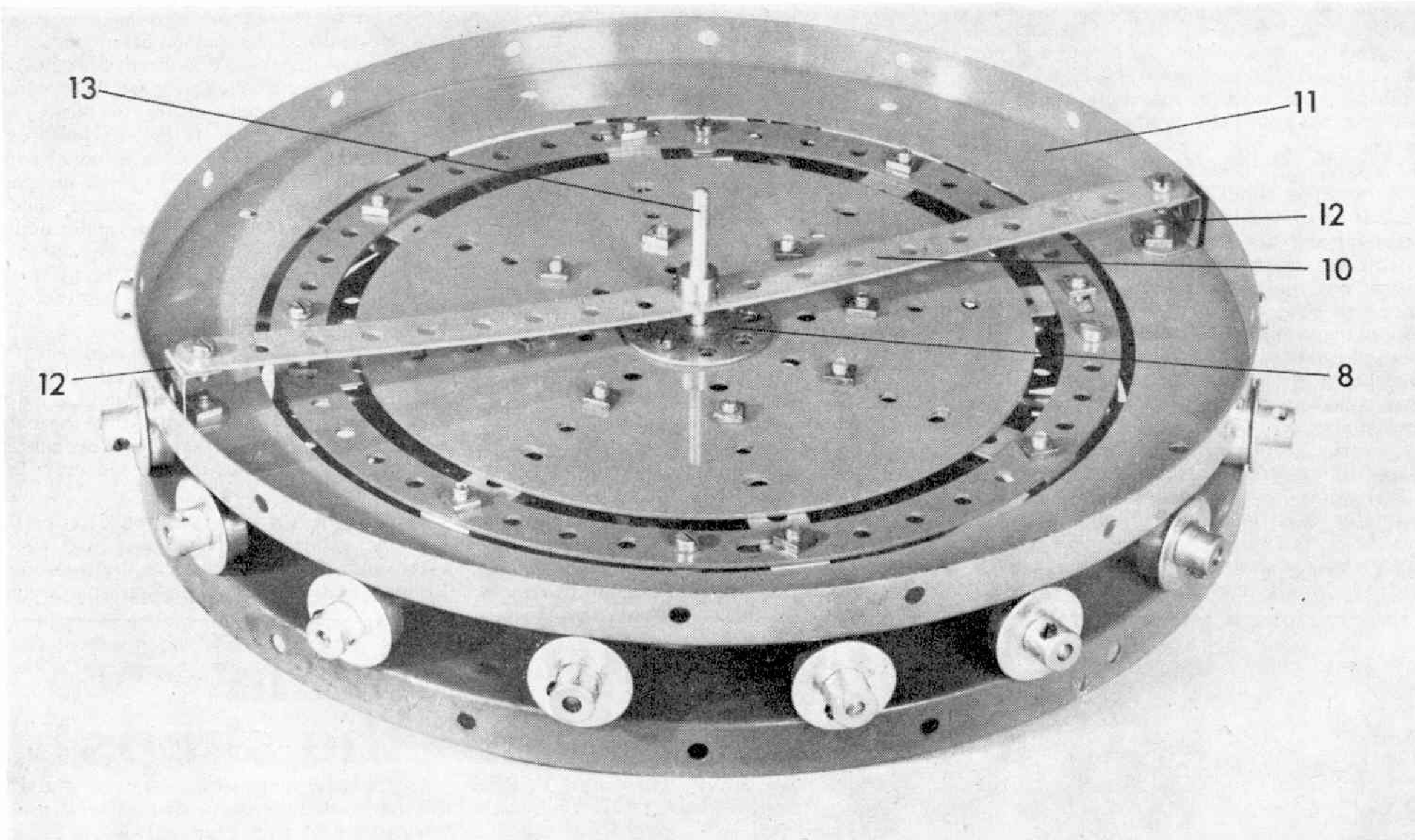
There are various points of interest in a collection of this type. For instance, in the car section alone, one can clearly see the progress which has come about during the history of the automobile. There are the 'horseless carriages' where the owner sat in a closed compartment at the rear of the car, and the poor driver was exposed to all weathers. There are cars with huge mudguards and running boards and cars without, some with masses of chrome and some with super streamlining; cars like boxes costing hundreds and cars like buses costing thousands.

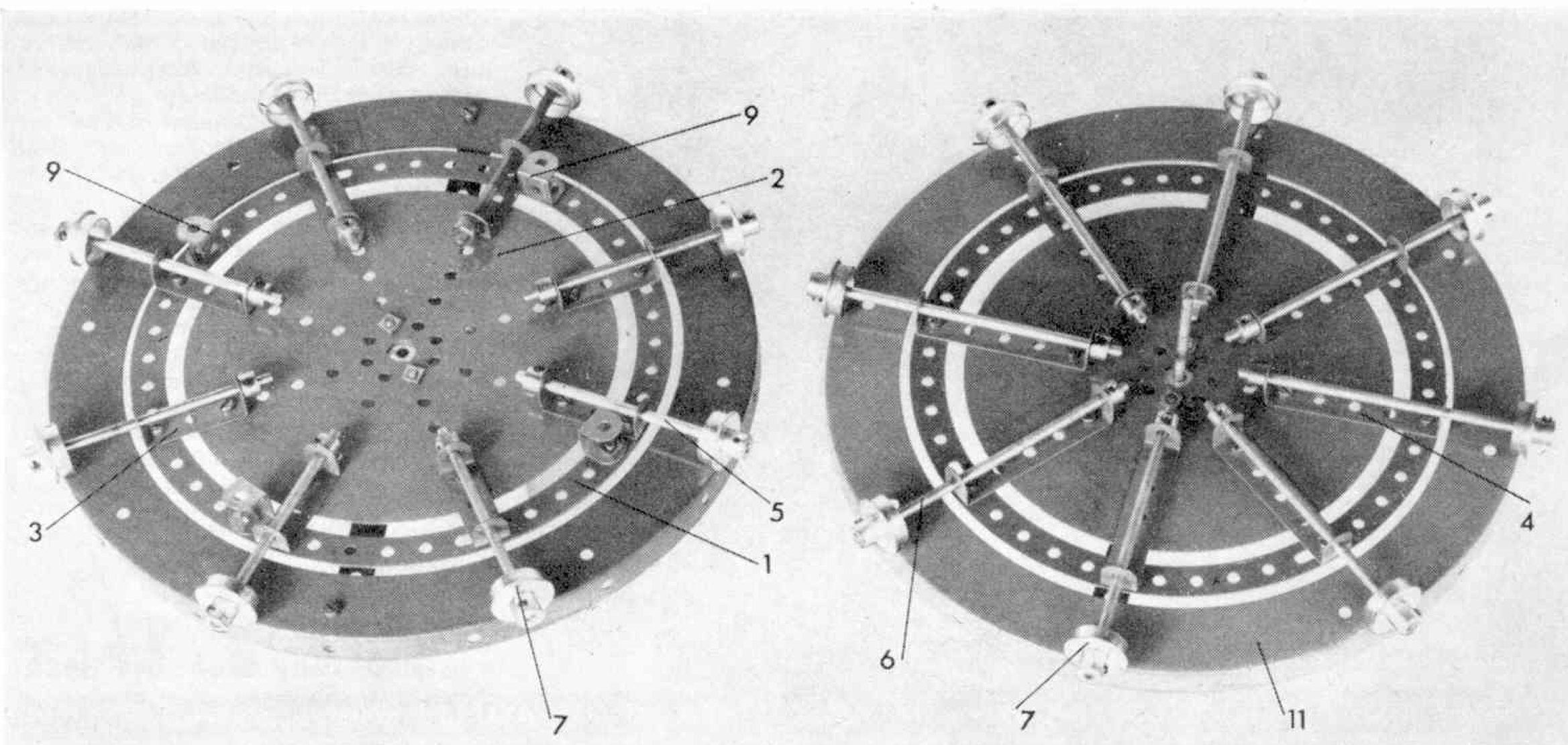
To those of us already inoculated with the collecting bug, this will seem all 'old hat', and they'll know I've left a lot unsaid. But, as I stated in the beginning, this rambling epistle is designed to further model car collecting, in other words, catch 'em and draw 'em into the fold.

Next month I'll show you and describe the five other models with the Frazer Nash which make up a set of six and, in the meantime, I hope you *do* 'catch the bug'—it's up to you!

* BACK AGAIN AMONG THE MODEL BUILDERS

Designed by Mr. Len Hearn of Horley, Surrey, this built-up Roller Bearing is excellent for use in large models incorporating a swivelling movement. Below: the two halves of the Roller Bearing showing the layout of the rollers





IN 1964 shortage of space forced us to discontinue a monthly section which had been running under the above heading for a great number of years. As announced recently, however, the extra pages introduced in May have left us with space to spare and, thanks to your response to my request for material, I am now able to re-start the section. It will, I hope, continue indefinitely, but I must remind you that its life depends almost entirely upon your contributions. If you have anything Meccano that you think would be of interest to other enthusiasts, therefore, do not hesitate to send me details. Write to: Among the Model-Builders, Meccano Magazine, Binns Rd., Liverpool 13.

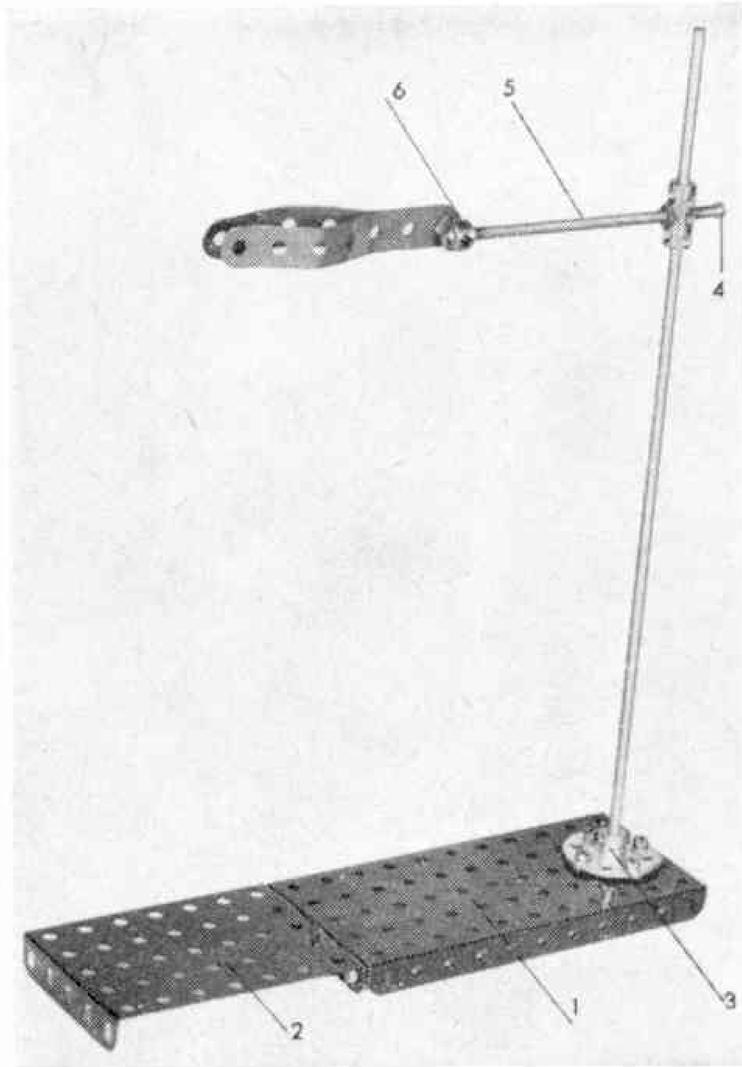
We promise that everything submitted for publication will be carefully considered, including photographs of self-designed models, although building instructions for such models cannot be included. Useful mechanisms are particularly acceptable. In fact, the item I have chosen to begin the series is an example of a mechanism essential in large, swivelling cranes and excavators, etc. It is, of course, a built-up Roller Bearing, which has been designed by Mr. Len Hearn, of Horley, Surrey.

Roller bearing

For instructional purposes the Bearing has been split into two halves. Each half is obtained by joining a 7½ in. diameter Circular Strip 1 to a 6 in. diameter Circular Plate 2 with Double Angle Strips. In one case, eight 1½ in. by ½ in. Double Angle Strips 3 are used while, in the other, eight 2½ in. by ½ in. Double Angle Strips 4 are used. Journalled in the lugs of Angle Brackets 3 are eight 3½ in. Rods 5, whereas eight 4½ in. Rods 6 are journalled in Double Angle Strips 4. Each Rod carries a Collar on the inside end and a ¾ in. Flanged Wheel 7, with its boss pointing outwards, on the outside end.

An eight-hole Wheel Disc 8 is bolted to the opposite side of Circular Plate 2, then the two arrangements are connected together by four Double Brackets 9, making quite sure that one set of rollers lies mid-way between the other set. A 9½ in. Strip 10 is now fixed diametrically across the inside of a 9⅞ in. diameter Flanged Ring 11 by Double Brackets 12, as shown. A second Flanged Ring is similarly prepared and, finally, the completed roller arrangement is 'sandwiched' between the two Flanged Rings. Note that Flanged Wheels 7 revolve on the horizontal flanges of the Flanged Rings, the vertical flanges of which point outwards in each case. The completed bearing is held together by a 3 in. Rod 13, passed through the centre and secured by Collars at each side. Assuming that the bearing is incorporated in, say, a crane, the base or stationary section would be fixed to the lower Flanged Ring, while the revolving section would be secured to the upper Flanged Ring. If the swivelling movement of the crane was powered, the drive would be taken to the upper section of the bearing only.

Two drive methods spring to mind. An extra 9½ in. Strip could be added at right angles to existing Strip 10, and a suitable Gear Wheel fixed to this and Strip 10, but spaced a sufficient distance from them to allow a driven Pinion to mesh with the Gear Wheel without catching on the Strips. Alternatively, Rod 13 could be replaced by a drive Rod. In this case, however, the Rod must be attached to the upper half of the Bearing whilst being free to turn in the lower half. An anchoring point could be provided by replacing upper Wheel Disc 8 with a Bush Wheel.



This effective Clampstand is another of Mr. Wright's useful pieces of chemical apparatus.

Besides its modelling ability, Meccano has many practical uses, as Mr. S. W. Wright, of Northchurch, Berkhamsted, Hertfordshire, has discovered. Apart from his interest in Meccano, Mr. Wright has several other hobbies, among which is chemistry. During an experiment some time ago, he discovered that he needed a tripod and clampstand, neither of which he possessed. He did, however, have some spare Meccano parts, so he used them to produce a couple of pieces of simple, but very serviceable apparatus which he is still using. These are described below.

Tripod

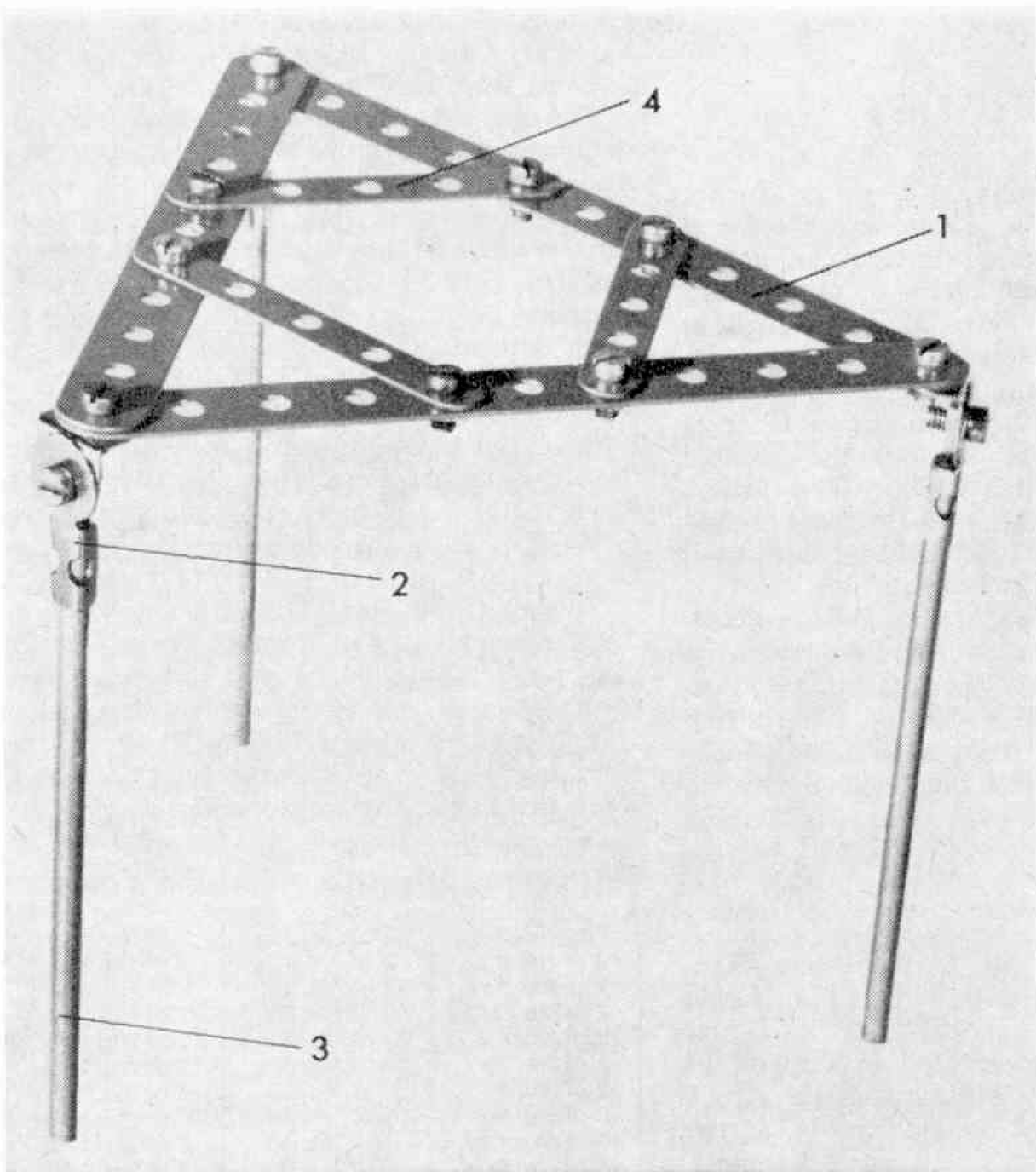
Three 5½ in. Strips 1 are bolted together to form a triangle, at the same time fixing an Angle Bracket in position in each corner. A Rod and Strip Connector 2 on the end of a 4 in. Rod 3 is, in turn, bolted to each Angle Bracket, then three 2½ in. Narrow Strips 4 are secured between Strips 1 to support a beaker or other apparatus. As Mr. Wright points out, 'The Rods could be altered to adjust the height'.

Clampstand

Equally as simple as the Tripod is the Clampstand, although it does take slightly longer to build. A 5½ in. by 2½ in. Flanged Plate 1 is extended by a 3½ in. by 2½ in. Flanged Plate 2. Bolted to Plate 1 at the end furthest from Plate 2 is an eight-hole Bush Wheel 3, in which an 11½ in. Rod is fixed. A Coupling, carrying a ½ in. Bolt 4 in one centre transverse tapped bore, is mounted on the Rod, while a 3½ in. Screwed Rod 5 is tightly fixed by a Nut in its diametrically opposite tapped bore. This Screwed Rod must not grip the 11½ in. Rod. The Coupling can, of course, be set in any position on the Rod by Bolt 4.

To build the actual clamp, a Collar 6 is secured on the free end of Screwed Rod 5. Two 3½ in. Strips are now fixed together at one end by a Nut and Bolt, which is then screwed into the Collar. Finally, the other ends of the Strips are bent outwards so as to hold a test-tube or similar piece of equipment.

Below: a simple Tripod built by Mr. S. W. Wright of Berkhamsted, Herts. to assist him in his chemistry experiments.

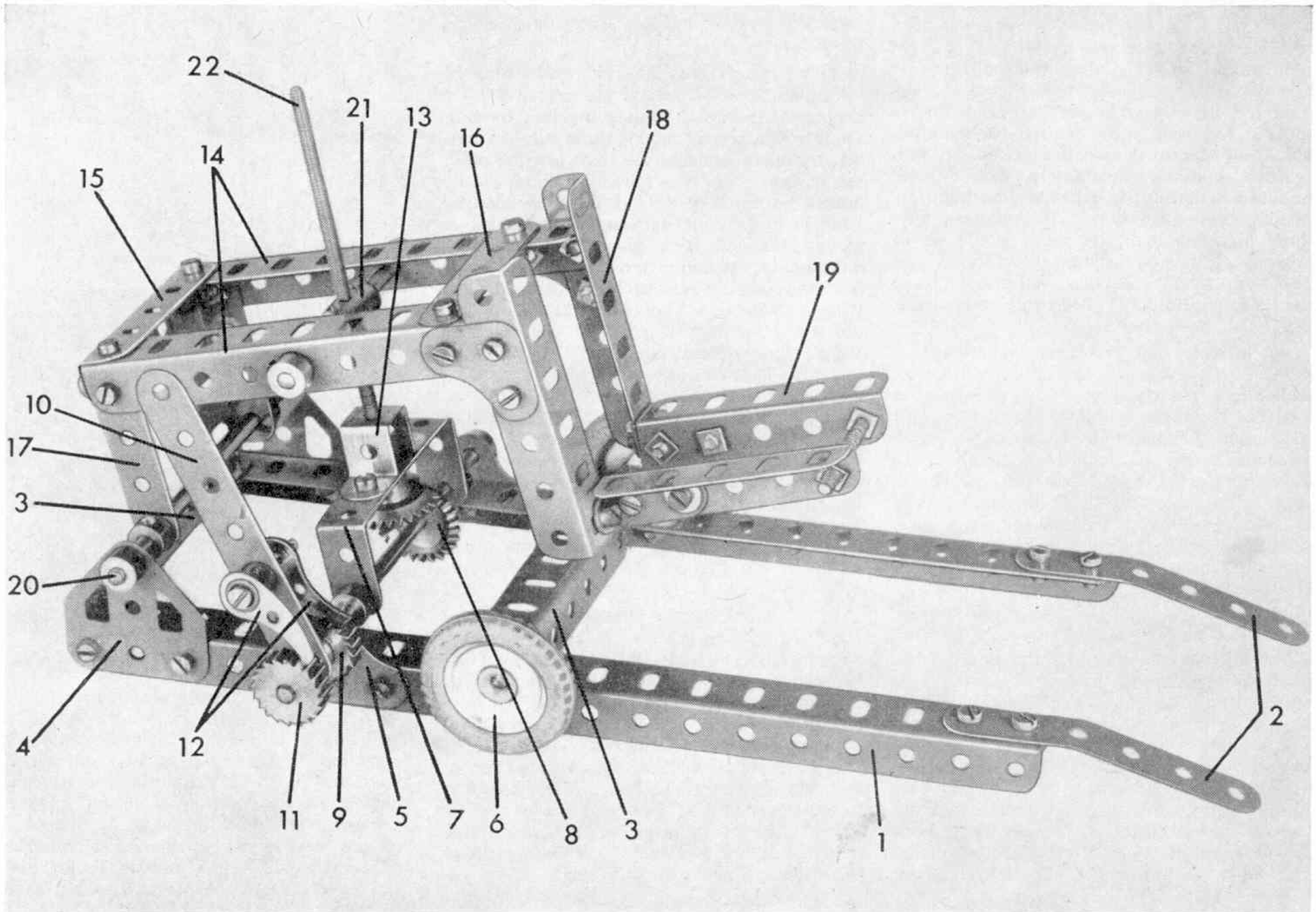


Parts required

Roller Bearing
2 of No. 1a
8 of No. 11
8 of No. 15a
8 of No. 16
1 of No. 16a
16 of No. 20b
2 of No. 24a
48 of No. 37a
48 of No. 37b
8 of No. 38
8 of No. 48
8 of No. 48a
18 of No. 59
2 of No. 145
2 of No. 146
2 of No. 167b

Tripod
3 of No. 2
3 of No. 12
3 of No. 15b
12 of No. 37a
12 of No. 37b
3 of No. 212
3 of No. 235

Clampstand
2 of No. 3
1 of No. 13
1 of No. 24
7 of No. 37a
7 of No. 37b
1 of No. 52
1 of No. 53
1 of No. 59
1 of No. 63
1 of No. 80a
1 of No. 111a



EASY LOADING by Spanner

HAVE you ever watched barrels being unloaded from a brewery wagon outside an hotel? It's a fascinating sight to see the huge, tremendously heavy casks being carefully guided down a sloping plank from the load platform of the lorry, but have you ever wondered how they were loaded in the first place? There are, of course, special machines to do the job, and the model described in this article is a reproduction of just such a machine.

Because of the duty performed by the original, I have called the model a Mechanical Lorry Loader. When using it, the idea is to roll a 'barrel' up the protruding forks at the front and on to the lift-platform. Once in place, the handle at the side is 'worked' backwards and forwards, causing the centrally-mounted Screwed Rod to revolve. This, in turn, raises the platform until it is level with the bed of a lorry when the barrel is rolled off. On the original, incidentally, the lifting operation is hydraulically controlled.

Construction

To build the model, two 9½ in. Angle Girders 1, each extended by a bent 3 in. Strip 2, are connected by two 3½ in. Angle Girders 3. Bolted to each Girder 1. in the positions shown, are a Flat Trunnion 4, a 1 in. Corner Bracket 5, and a 1 in. Triangular Plate. A 4½ in. Rod is journalled in the Triangular Plates, being held in place by 1 in. fixed Pulleys with Motor Tyres 6. Journalled in the Corner Brackets is a 5½ in. Rod carrying, between the Brackets, a Collar, 2½ in. by 1 in. Double Angle Strip 7, a ⅞ in. Bevel Gear 8, mounted between the lugs of the Double Angle Strip, and another Collar. The Collars prevent the Double Angle Strip from sliding on the Rod, which is itself held in place by a third Collar and a Ratchet Wheel 9.

A 3½ in. Strip 10 is added to the Rod, followed by a second Ratchet Wheel 11 with its teeth pointing in the opposite direction to Wheel 9. Two Pawls with boss 12 are then loosely fixed to Strip 10 by a 1⅛ in. Bolt locknutted through its third hole, and a Double Bent Strip 13 is bolted to the centre of Double Angle Strip 7.

Lifting section

A framework is built up from two 4½ in. Angle Girders 14, joined by a 2½ in. Angle Girder 15 and a 2½ in. Strip 16. Two 2 in. Angle Girders 17 are secured to Girders 14 and 15 at the back, while two 3 in. Angle Girders 18 are bolted to Girders 14 at the front, being braced by 1 in. Corner Brackets. Fixed to the lower end of each Girder 18 by a 1 in. Angle Bracket is a 2½ in. Angle Girder 19, then Girders 19 are joined by a 2 in. Screwed Rod, held in place by Nuts.

The complete framework is now pivotally connected to Flat Trunnions 4 by a 4½ in. Rod 20, secured by Collars in Girders 17, which is held in place, also by Collars. Two 1½ in. Rods are passed, one each, through the centre holes of Girders 14 and into each end of a Coupling 21, where they are fixed in place by Grub Screws. Collars are added outside the Girders, then a 4½ in. Screwed Rod 22 is screwed through the centre transverse tapped bore of the Coupling until its end protrudes through Double Bent Strip 13 and Double Angle Strip 7. Finally, another ⅞ in. Bevel Gear is fixed on the end to mesh with Bevel Gear 8.

Note that both Pawls 12 must always be on the same sides of the Ratchet Wheels at the same time. This means that only one Pawl can engage at any one time so that, when Handle 10 is worked with the Pawls on one side, the platform will lift, while it will lower when the Pawls are on the other side.

Parts required

1 of No. 3	2 of No. 15a	1 of No. 63
2 of No. 4	2 of No. 18a	2 of No. 77
1 of No. 5	2 of No. 22	1 of No. 80b
2 of No. 8a	2 of No. 30	1 of No. 81
2 of No. 9a	44 of No. 37a	1 of No. 111d
2 of No. 9b	42 of No. 37b	2 of No. 126a
2 of No. 9c	6 of No. 38	4 of No. 133a
3 of No. 9d	1 of No. 45	2 of No. 142c
2 of No. 12b	1 of No. 46	2 of No. 147a
1 of No. 14a	9 of No. 59	2 of No. 148

THE TRIUMPHANT DINKY

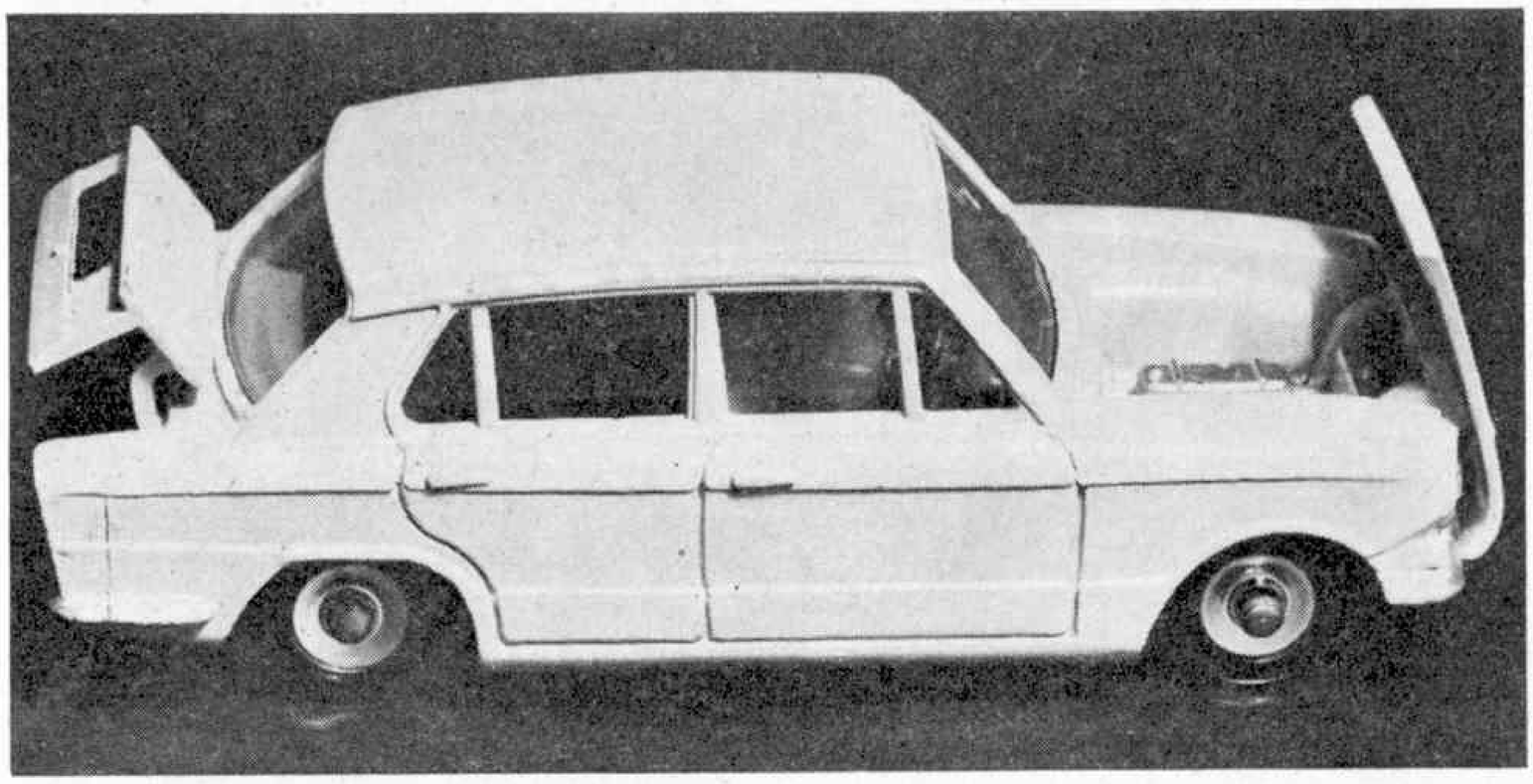
by Chris Jelley

IT'S been said — jokingly, of course — that Dinky Toys are a subsidiary of Standard-Triumph Ltd., motor manufacturers of Coventry, Warwickshire. Naturally, there's no truth whatsoever in this but, looking at the Dinky Toy range, you can see the reason for the joke. In the past few years alone, Meccano Limited have produced models of the Triumph Herald, Triumph Vitesse, Triumph Spitfire and Triumph 2000, all of which have proved tremendously successful. These models, however, are not the result of any secret deal between Standard-Triumph and Meccano Ltd. The original cars were simply highly distinctive, popular vehicles that were perfect subjects for reproduction in miniature form.

All Triumph cars, in my opinion, are distinctive, including the revolutionary new Triumph 1300, latest saloon car to roll off Triumph's production lines. As soon as the 1300 appeared it was obvious that it should join its predecessors in the Dinky Toy range, and this has now happened. In fact, Dinky Toy No. 162 Triumph 1300 should be in the shops even as you read this article.

Intended as a reasonably priced model, the 1300 might be expected to lack somewhat in quality, but nothing could be further from the truth. To begin with it consists of a minutely detailed body on a strong die-cast base, nor is the body detail restricted to the general shape of the car. So accurately has the original been reproduced that the guttering, door handles, petrol-filler cap and even the boot-lock can be seen, besides the name 'Triumph' across the bonnet! The bonnet, itself, opens to reveal an 'engine' which is also well detailed, and which appears to be a fairly accurate representation of the main features of the full-size power unit.

Other features present include opening boot, Prestomatic steering, 4-wheel suspension, jewelled headlamps, windows and number plates. Fitted inside are seats and a steering wheel with a rear-view mirror indicated on the windscreen moulding. On the outside of the windscreen moulding, windscreen wipers are represented. Overall finish is in pale blue with red interior and black base.



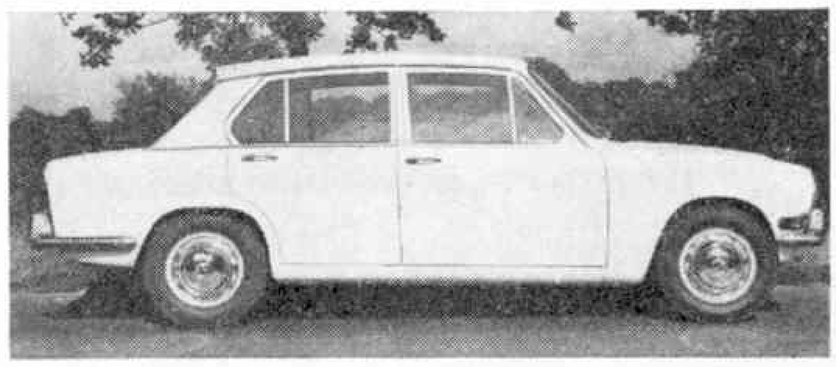
Looking at the actual car you might almost say that the 1300 is the younger brother of the Triumph 2000. The two vehicles are certainly similar in general external appearance, although, of course, the 1300 is considerably smaller than the 2000 both in size and engine capacity. Whereas the 2000 is powered by a 6-cylinder, 1,998 c.c. capacity engine, the 1300 carries a 4-cylinder power plant with a capacity of 1,296 c.c. that develops a maximum power output of 61 b.h.p. at 5,200 r.p.m., to give the car a top speed of 85 m.p.h.

Perhaps the most interesting difference between the two cars, however, is the drive. On the 2000 the rear wheels are driven in the usual way, but the 1300 has front-wheel drive. I had no idea of this fact until I came to write this article, and I must say that I was greatly surprised. Unlike the transversely-mounted engines fitted to the B.M.C. front-wheel drive cars, however, the Triumph engine lies in a north/south direction, or longitudinally, the drive passing through a 4-speed and reverse gear box to the wheels.

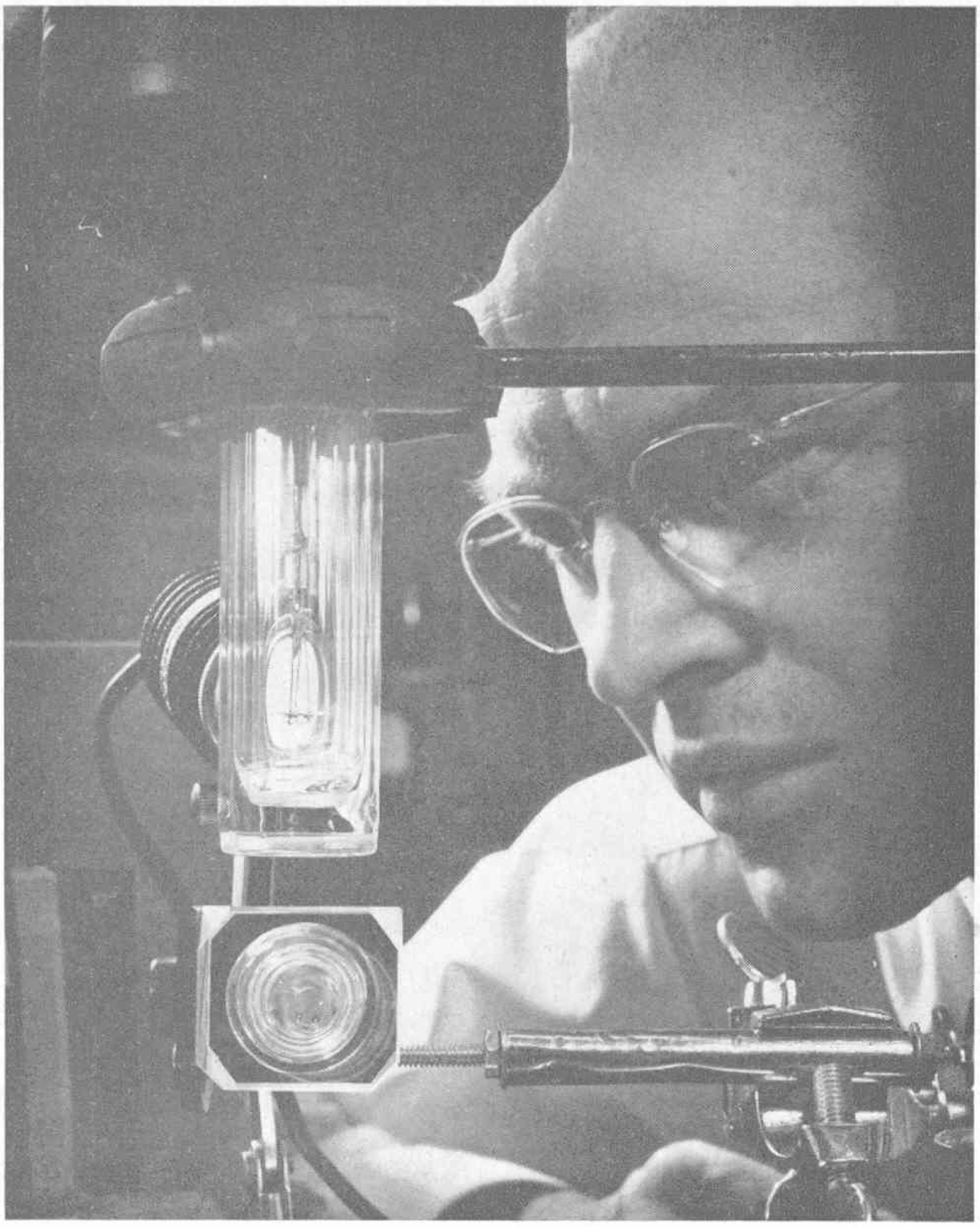
Standard-Triumph claim the 1300 to be 'Britain's best equipped car next to the big ones' and this is no idle boast. No less than 46 carefully planned features included in the car are listed in the manufacturer's literature. Many of these, such as speedometer, interior bonnet lock, courtesy lights, etc., are common to most cars these days, but several are unusual, particularly in a car of this size. Most interesting items are fold-away window winders and what is described as an 'all-systems-go' dial. The window winder is hinged and folds away into a special recess to fit flush with the inside of the door. Being pulled out to operate, the winders retract automatically when not in use.

The dial with the space-age name consists of a circular instrument split into eight sections, each section carrying a warning light that performs a particular duty: ignition, low fuel, direction indicator (right-hand), hand brake, choke, direction indicator (left-hand), oil and headlamp main beam The hand brake and choke warning lights, although tremendously useful, are not often incorporated in other types of cars. I, personally, think that the idea of having all the warning lights together in a group is an excellent idea, as it does away with the need to search all over the instrument panel to make quite certain that everything is in order. The low fuel light, incidentally, is in addition to a proper fuel gauge.

From the safety angle, safety-belt anchoring points are included inside the car while disc brakes are fitted to the front wheels with drum brakes at the rear. Childproof locks are fitted which is a great asset if young children travel in the car.



The clean lines of this 'real' 1300 are faithfully reproduced in the latest Dinky model



By JOHN BREWER

HAVE you ever wondered what it would be like to live in a world without electricity? Do you take it for granted when you switch on the light, play a record or listen to the radio? Most people do, although nearly all the scientific aids we enjoy today are comparatively recent inventions. Our grandparents can remember a world without electric light, radio or motor cars. It is incredible that so many inventions and important scientific 'breakthroughs' have occurred over the last 50 or 60 years, completely altering the lives of people the world over.

It would be a mistake to think that all important scientific discoveries were the results of years of research in shiny laboratories—many came about almost by accident, often in little back rooms in private houses, by people who refused to take at face-value the information provided by the text-books of the time. True scientists believe in practical experiments—things don't always work in real life quite as they do on paper!

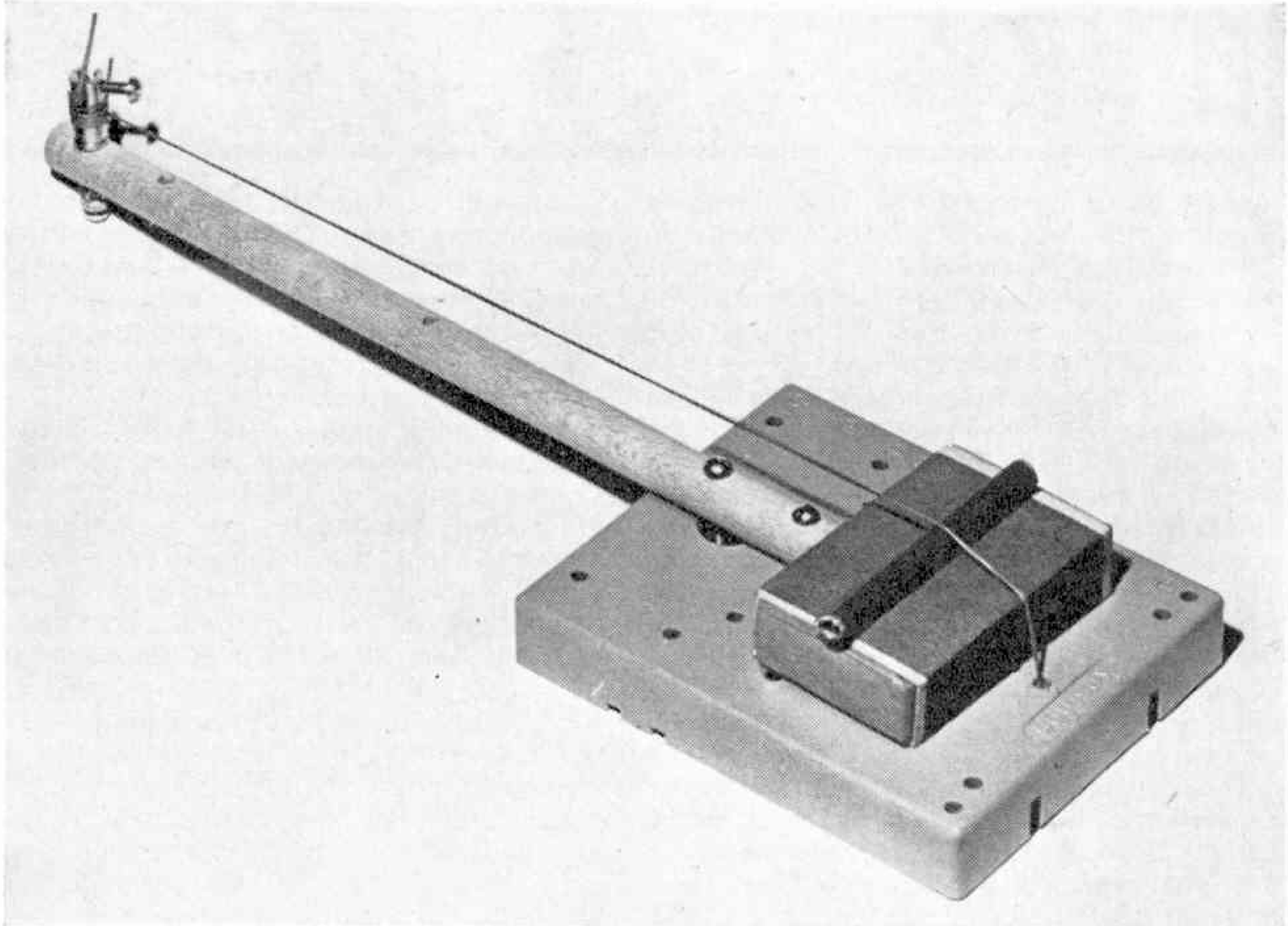
No scientific subject can be learned by reading books alone, and until quite recently it has been impractical for young people to carry out experiments at home. The introduction of the Tri-ang science sets however has solved this problem nicely. Each set contains apparatus and materials sufficient to conduct some 90 different experiments with the aid of the fascinating, yet simply written instruction book. All the experiments are designed for young people between the ages of 8 and 11, an age group which has been sadly neglected until recently in the field of science, as facilities for practical experiments are unusual in junior schools.

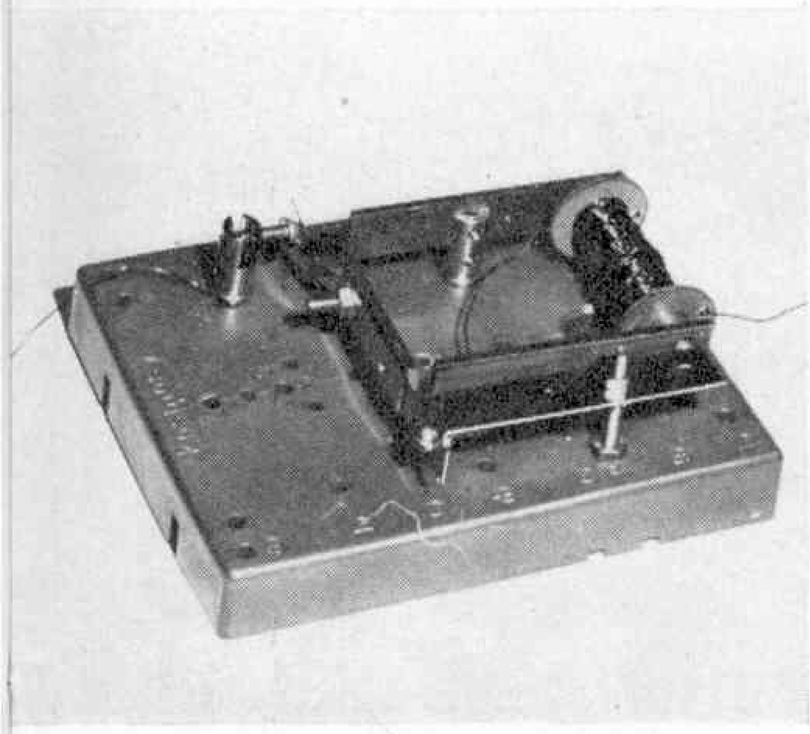
'The Young Electrician' set not only describes simple experiments to show the flow of electric current, but also includes an interesting selection about the behaviour of light and magnetism. Most fascinating of all, however, are the instructions for building several practical 'gadgets', including a buzzer and an

TABLE TOP SCIENCE

Hardly a day goes past without news of new developments in Science. Now, with these science sets, young aspiring scientists can perform fascinating experiments on a table top!

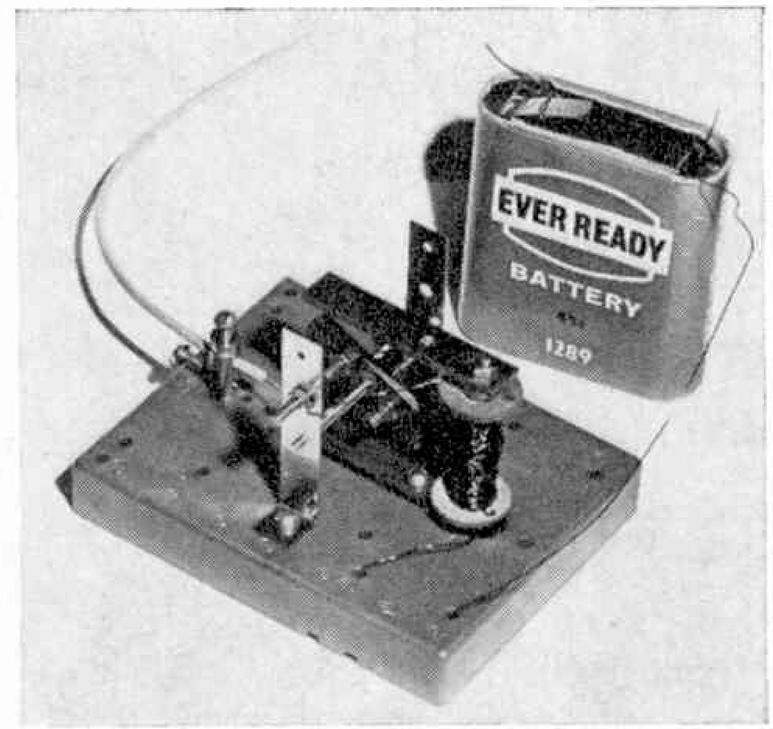
A matchbox is used as a soundbox on this miniature guitar, built from the 'Young Technician' Science Set





The electro-magnet coil can be clearly seen in this picture of the Buzzer, described in this article

The 'Young Electrician' set, showing the neat method of boxing the various parts



Most exciting feature of the 'Young Electrician', the electric motor uses electro-magnet coil and pole pieces together with a revolving armature. It works well

electric motor, and *all* the parts (except the battery) are included in the set. As every experiment uses only a 4½ volt battery, mums and dads can rest assured that there is no danger of electrocution!

Electro-Magnet

The electro-magnet plays a large part in the operation of both the buzzer and the electric motor, and is made up by putting 200 turns of the wire supplied, on to the iron core. This is not quite so laborious as it sounds, but it is worth taking a little care to make sure the windings are neatly laid on. The construction of the buzzer can be seen in the photograph, with the two pole pieces lying alongside the coil, and the armature, attached to the spring, forming the fourth side of the 'box'. When the battery is connected, the armature swings back and forth, and the contact screw 'makes and breaks' the current. The spring buzzes very noisily!

Having used the electro-magnet in conjunction with the armature, the next logical step is to build a working electric motor, and this is perhaps the most exciting feature of the 'Young Electrician' set. Building it is also a valuable experience, for electric motors are met in all sorts of modern appliances, from electric trains and motor car starter motors to such everyday articles as washing machines. What better way to understand electric motors than to build one! Once again, all the necessary parts are included in the set, and a 4½ volt battery supplies the power.

Construction is very simple, as can be seen from the photograph. The armature runs in two metal brackets, which are bolted to the base plate, with the two pole pieces above and below it connected by the electro-magnet coil. A wire from the positive side of the battery is fixed in a clamp and arranged so that, when the armature is spun, it lightly brushes the two bolts fixed through the armature itself, thus making contact twice per revolution of the armature shaft. The wire from the bottom end of the coil goes to the negative battery terminal, and the wire from the top end of the coil is 'earthed' on to one of the metal brackets supporting the armature shaft. With the battery connected, and the armature given a spin to start it, the motor will run very smoothly and quietly. As the wire from the battery makes contact with the bolts on the spinning armature, small blue sparks emit, adding an interesting spectacle to an already fascinating working model. In practice, we found that if the battery was moved slightly in relation to the motor, the contact wire varied slightly in the pressure that it exerted upon the armature contact bolts, and the motor could thus be varied in speed over a quite considerable range, from just ticking over, to full speed. Also, if the armature was in a certain position (best found by trial and error) the motor would start without assistance when the battery was connected. A pulley is fitted to the armature shaft, and the motor could easily drive a small Meccano model.

Turbine Wheel

None of the experiments in the 'Young Electrician' set, including the building of the electric motor, requires the use of solder.

The 'Young Technician' is a companion set to the 'Young Electrician' and is similar in presentation, but it deals with experiments in physics and chemistry suitable for young people of the same age group. Again, many interesting and practical aspects of simple science are investigated, including ball-bearings, which are found in almost all modern machinery, the principles of gearing and the behaviour of air and water under pressure. A turbine wheel is included, together with a length of plastic tube, from which a most effective water operated turbine can be built (out of doors, of course!).

One section of the instruction book deals with Sound, and a small but effective guitar can be made, using a matchbox as a soundbox —a certain favourite with very young scientists!

Blue Litmus

The chemical side of science is not neglected, and the set includes two test tubes and even a piece of blue litmus paper which, of course, is turned red by acids like vinegar, and back to blue by 'Alkalis' like bicarbonate of soda.

Did you know that a piece of litmus paper can tell you if your milk is sour? Fresh milk behaves like an alkali, but after it's been standing around it turns acid and will turn blue litmus paper red—a useful experiment!

Carbon-Dioxide

Most people have seen a fire extinguisher being used, but many don't realise that it is not water that is used to put out the fire, but carbon-dioxide gas. The 'Young Technician' handbook describes a simple but very vivid experiment to show just how effective carbon-dioxide is as a fire extinguisher. Put a large spoonful of sodium bicarbonate (not included in the set, but can be obtained quite cheaply) into the bottom of a glass. Borrow a candle and stick it on to a coin by warming the bottom end, then place it in the glass. The candle flame should be about one inch below the edge of the glass. Now add a little vinegar (which is an acid, of course). This works on the sodium bicarbonate and carbon dioxide gas is produced. You cannot see it, because like most gases, it is invisible. But watch the candle flame. It will start flickering, and when the carbon dioxide reaches it, will go out altogether. Light a match and dip it into the glass—the match also goes out immediately. Real fire extinguishers also contain sodium bicarbonate and an acid, and when you do this experiment you can really appreciate how effective carbon dioxide is in putting out a big fire.

Water Level

Talking of fires, whenever anything burns, a part of the surrounding air is used up by the flame. This can be easily proved by another experiment using the glass and candle. Stand the lighted candle in a shallow dish of water, and place a jam jar upside down over the candle. The water inside the jar will go down a bit, because the air inside the jar is taking up some of the space. The candle very quickly goes out as the air is used up, and the water inside the jar starts to rise, and goes even higher than the water level outside on the plate. The water has, in fact, risen to fill the space previously occupied by the air, before it was used up by the candle flame.

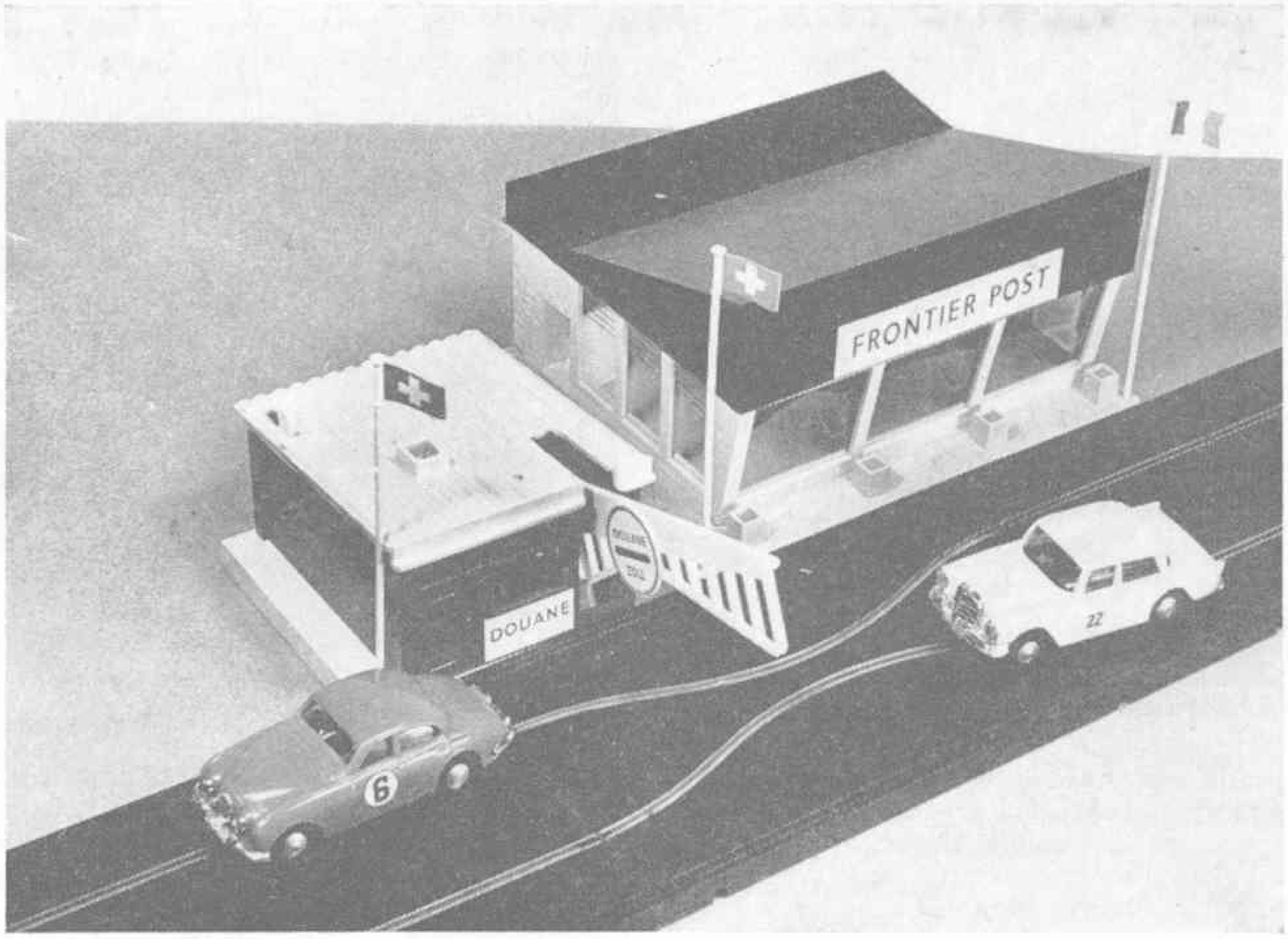
These are just a few of the enormous number of experiments covered by these two sets. Both sets are specially interesting, we feel, as they are designed entirely with young people in mind (although many older folk will find them instructive!) and any aspiring young scientist who has the good fortune to own one will feel quite at home when he arrives in his first laboratory.

Older science enthusiasts, who would like to 'get their teeth into' some more advanced experiments will be pleased to learn that a bigger set, the 'Senior Technician' will be available in the near future, together with the 'Senior Photographer.' The latter will deal with the science of optics as well as photography in general and will include apparatus and instructions for building a telescope and projector.

Science is one of the broadest fields imaginable, and a great deal can be learned from even the simplest experiments, so have a go —you may not discover anything new, but you never know!

MINIATURE MOTOR RALLIES

BY WALKDEN FISHER



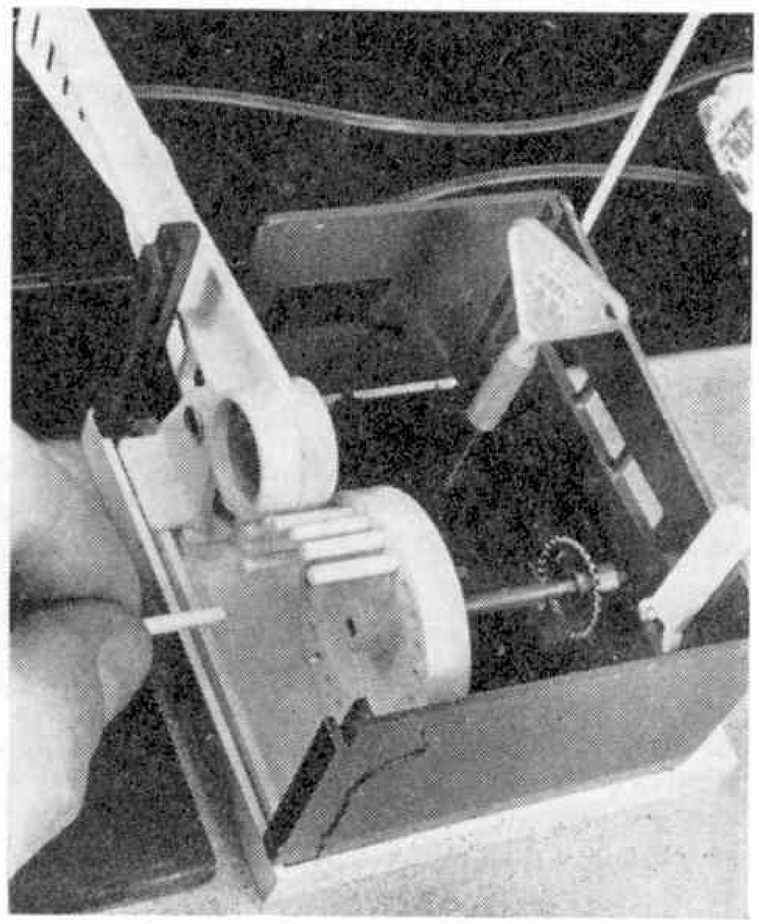
THERE are many aspects of motoring sport, each with a technique of its own, and in the realm of full scale one of the most popular types of event is the Motor Rally—the classic example being the world-famous Monte Carlo Rally, in which entrants start from various points all over the Continent and finally converge on the renowned Mediterranean resort in the tiny principality of Monaco.

A motor rally is entirely different from a race. In the latter, high speed is the chief quality; the first car to cross the finish line, having covered the distance, being the winner. In a rally it is the competitor's average speed that matters. By driving too fast or too slow, arriving too early or too late at checkpoints along the route he, or she, can be penalised by a loss of points. Rallies, especially the notoriously gruelling ones, are therefore a tremendous test for drivers and cars.

The model car hobbyist has, up to now, been more occupied with racing, but with the recent introduction of the new Minic Rally sets the scope of model motoring is widened considerably.

In size, the Minic model range fits in perfectly with Triang-Hornby model railways, and for those enthusiasts with limited space at their disposal it could well be the answer in providing a tabletop-full of thrills.

The range offers a fascinating variety of layouts and the two latest exciting additions will doubtless be of tremendous interest. These are: The Frontier Post Motor Rally set and The Checkpoint Bravo Rally set. The former is the larger of the two and track sections supplied with it make up into no less than seven different layouts. Two top rally cars, a Mercedes-Benz 220 and a 3·8 Jaguar, plus a Frontier Post and a barrier that goes up and down across the track automatically are included. The latter is ingeniously devised so that the clockwork timer incorporated within it can be preset to raise and lower the barrier at varying intervals. Cars have to avoid this hazard, and a suggested method of organising a rally is first to decide upon the number of laps it will have, then multiply the figure by 10. This is the number of points drivers start with. Five points are then subtracted each time a car is stopped by the barrier, and a further 10 for skidding off the track. Should a car actually strike the barrier an even heavier penalty could be introduced to act as a deterrent against careless driving! If a second automatic barrier is fitted in a layout the competition will be intensified considerably, developing into a test for extra-quick reactions. Twenty points can be added for finishing first, but it does not necessarily mean that the first over the line will be the winner. This will be the competitor who completes the distance with the most points in hand.



The smaller Checkpoint Bravo Motor Rally set offers a choice of two compact track layouts which have been given the descriptive titles of 'The Flying Chicane Eight' and 'The Lazy Guitar'. Also included are two cars—a Mercedes-Benz 300 SL and an E-type Jaguar, plus a Rally Control Point and Filling Station. Similar to the Frontier Post set, this also features an automatically operated barrier.

There are many different methods of organising a miniature rally using the automatic barriers, and a great deal of fun is to be experienced in devising regulations and hazards to provide a thorough test.

If a stopwatch is available further interest will be added to the contests, and a development of the previously described scheme could be organised in the following manner—first, it will be necessary to designate someone as the 'official' who will be responsible for keeping score and timing. If there are several people in the group this job can be taken in turn. The scorekeeper positions himself at the starting line and then each contestant runs his car for three laps, during which he is timed to the nearest second. His time is multiplied by 10 and the resulting figure will be known as his individual 'Required Time'. The automatic barrier can be in operation during the timed three laps for all competitors or, alternatively, these preliminary trials can be made on a clear course without this hazard in operation —this would most certainly increase the competitive interest of the actual rally.

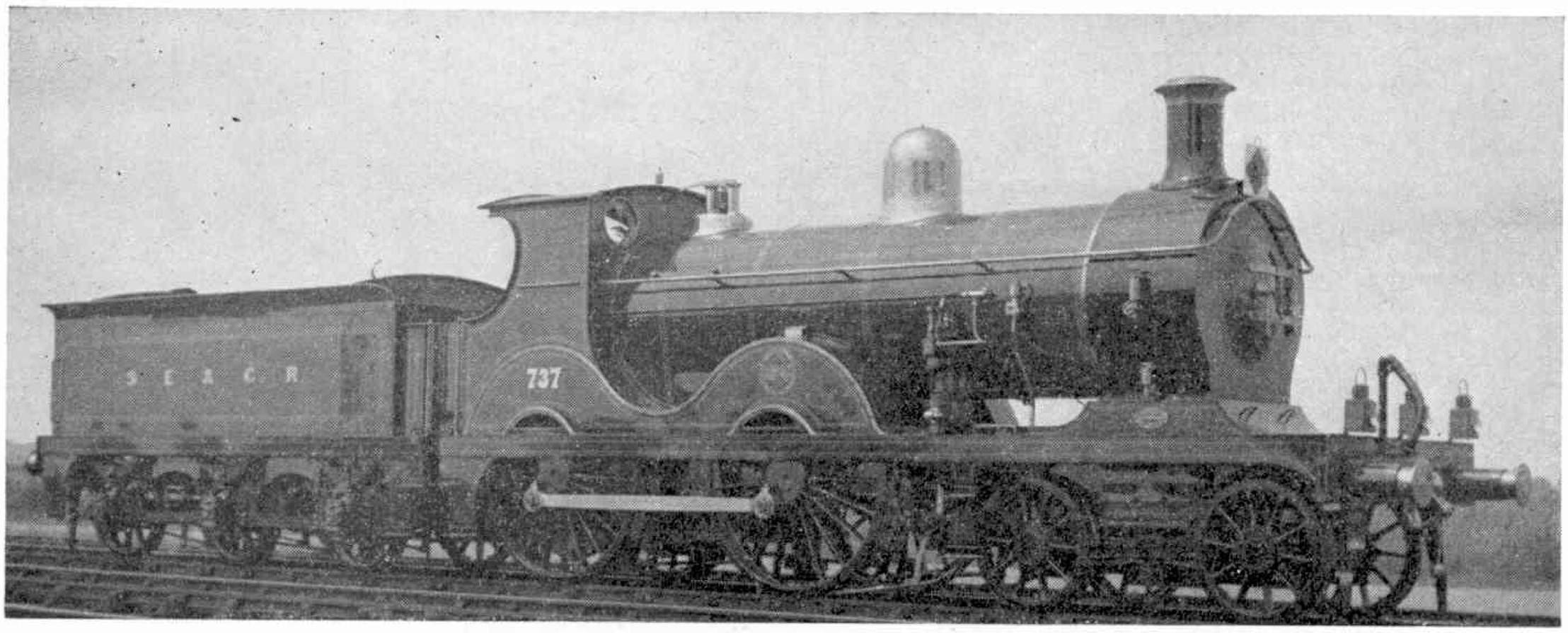
After all the contestants have been given their 'Required Times' the rally can commence with the running of two cars at a time. The scorekeeper gives the signal and simultaneously starts the stop watch. Each car is required to cover 30 laps, during the course of which the automatic barrier will be operating, and if a car strikes this after failing to pull up when it bars the road, a 10 second penalty is awarded. At the completion of the 30 laps the time is noted and the difference between the elapsed time and the 'Required Time' for each competitor is marked down—the driver with the least difference being the winner.

Concentration

Regularity and reliability are more important than speed in a contest of this nature, and during the qualifying runs a well-controlled steady pace is of great advantage. A low 'Required Time' on the other hand could well provide a competitor with difficulty in maintaining it during the rally. It is by no means easy to drive at a certain speed and then lap again at exactly the same speed. Added to which there is the interesting situation of the two contestants on the track probably having entirely different 'Required Times'. Consequently their speeds will not be the same and this will mean that each driver must restrain himself and drive at a steady pace. Both will have to disregard racing and concentrate on their actions in order to avoid the possibility of finishing the winner by *position* but the overall *loser* due to an accumulation of penalty points.

The excellent range of Minic GT Racing and Rally Cars present the enthusiast with a splendid choice, and all the models are now fitted with the new three-pole Jet-Speed Six electric motor which is remarkably efficient and robust considering its size. Independently sprung phosphor bronze pick-up contacts are also incorporated in these tiny cars and their design ensures constant contact with the track power slot even when the model bounces or crosses irregular track joints.

On trial a unit was tested for a total of 624½ hours. Averaging 10 hours a day non-stop the car notched up a total of 1,852 actual miles! This proved without doubt that under normal play conditions the Jet-Speed Six would have given trouble-free performance for at least two years.



Transport Museum

Travel back in time! The Museum of British Transport contains relics of public transport over five generations: Historic locomotives—Royal coaches—trams—horse-drawn and other buses. You can also see *Mallard,* the fastest steam locomotive ever built—126 mph reached on 3 July 1938.

Visit also: **The Railway Museum, York**
The Great Western Railway Museum, Swindon

Museum of British Transport
Clapham High Street, London SW4

It's open:
10.00—17.30 Mondays to Saturdays (including Bank Holiday Monday).

It costs:
1s 6d for boys and girls under 15 years; 2s 6d for adults. Reductions for school parties.

It's easy to get to:
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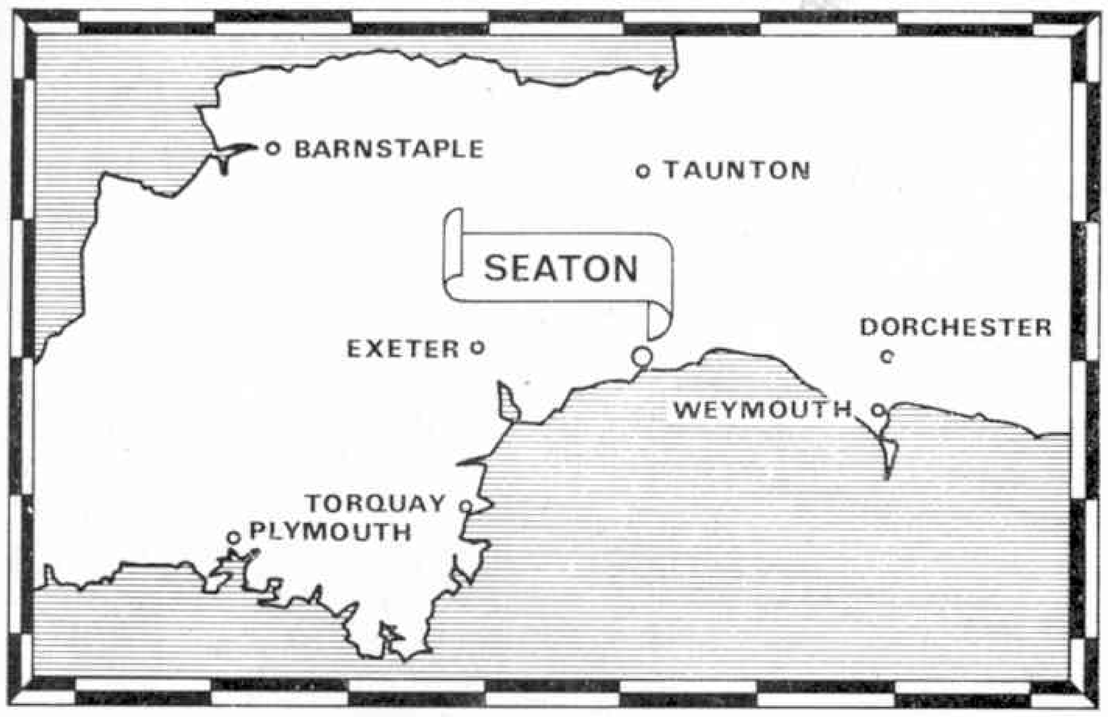

WELCOME!

If your holiday journeyings bring you within reach of Devon, don't miss the chance of looking in at Seaton. To model railway enthusiasts at home and from overseas this is the West-country headquarters of railway modelling. For Seaton is the home of "PECO" products. From this pleasant little town on the Devon coast, Peco Streamline track, points and a host of accessories leave for all part of Britain . . . are exported too, in a constant flow to serve railway modellers all over the world. Here at Pecoway House in Seaton you can see for yourself just what Peco means to the modeller; see the comprehensive range of Peco products in full; get up-to-date information on latest developments and, if you wish, discuss any special problem you may have, with an expert on the subject. There's such a lot you could see. Do pay us a visit. We think you'd enjoy it. You're welcome!

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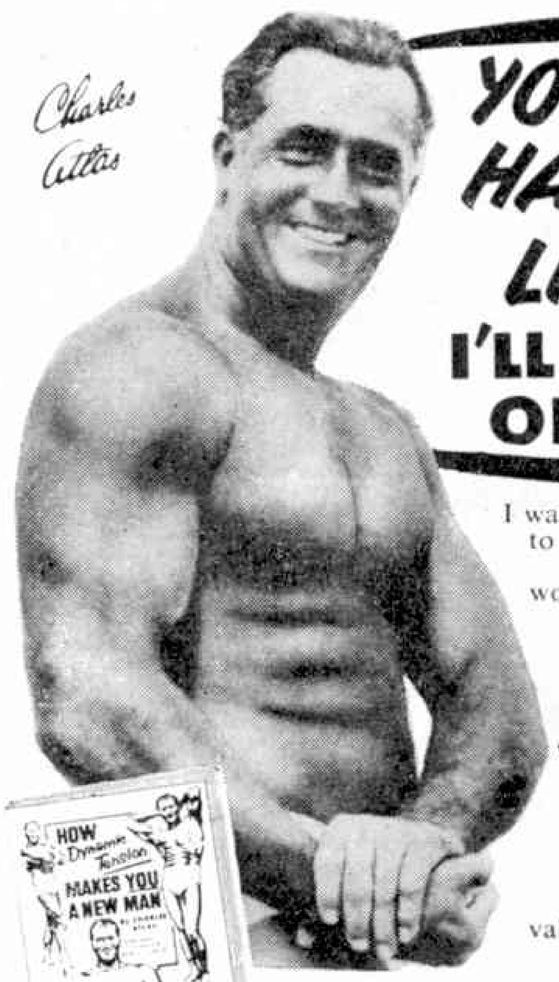

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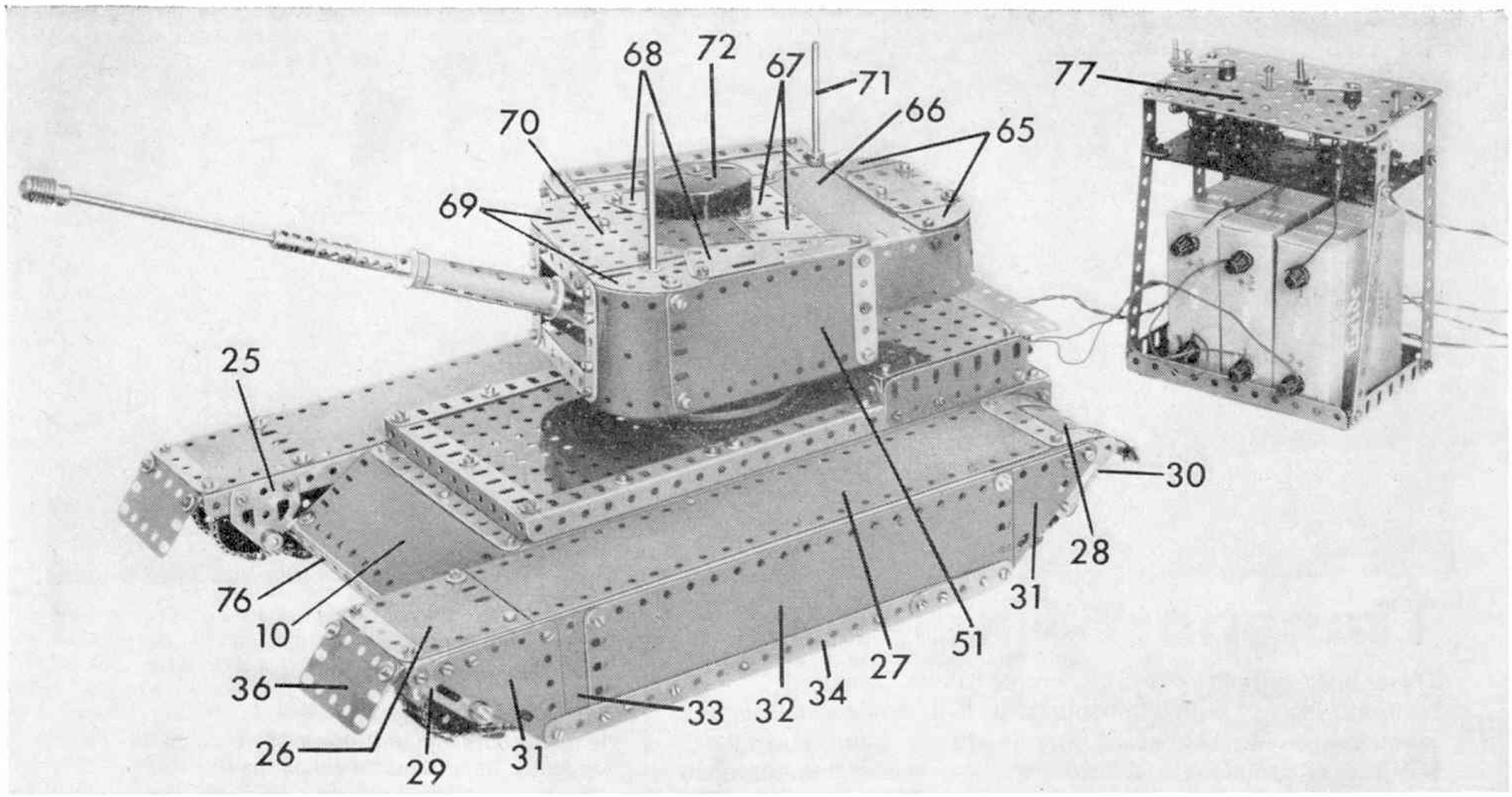
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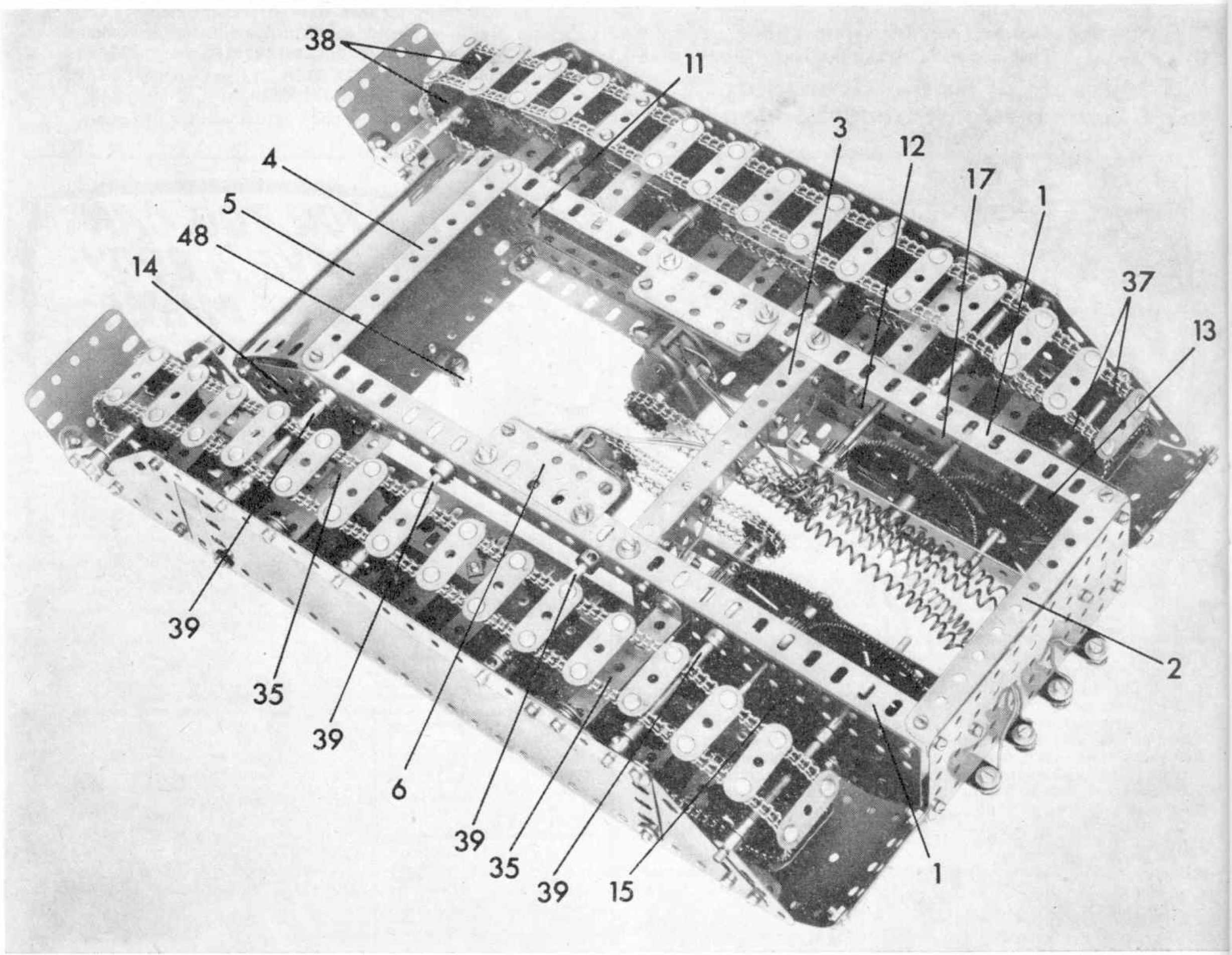
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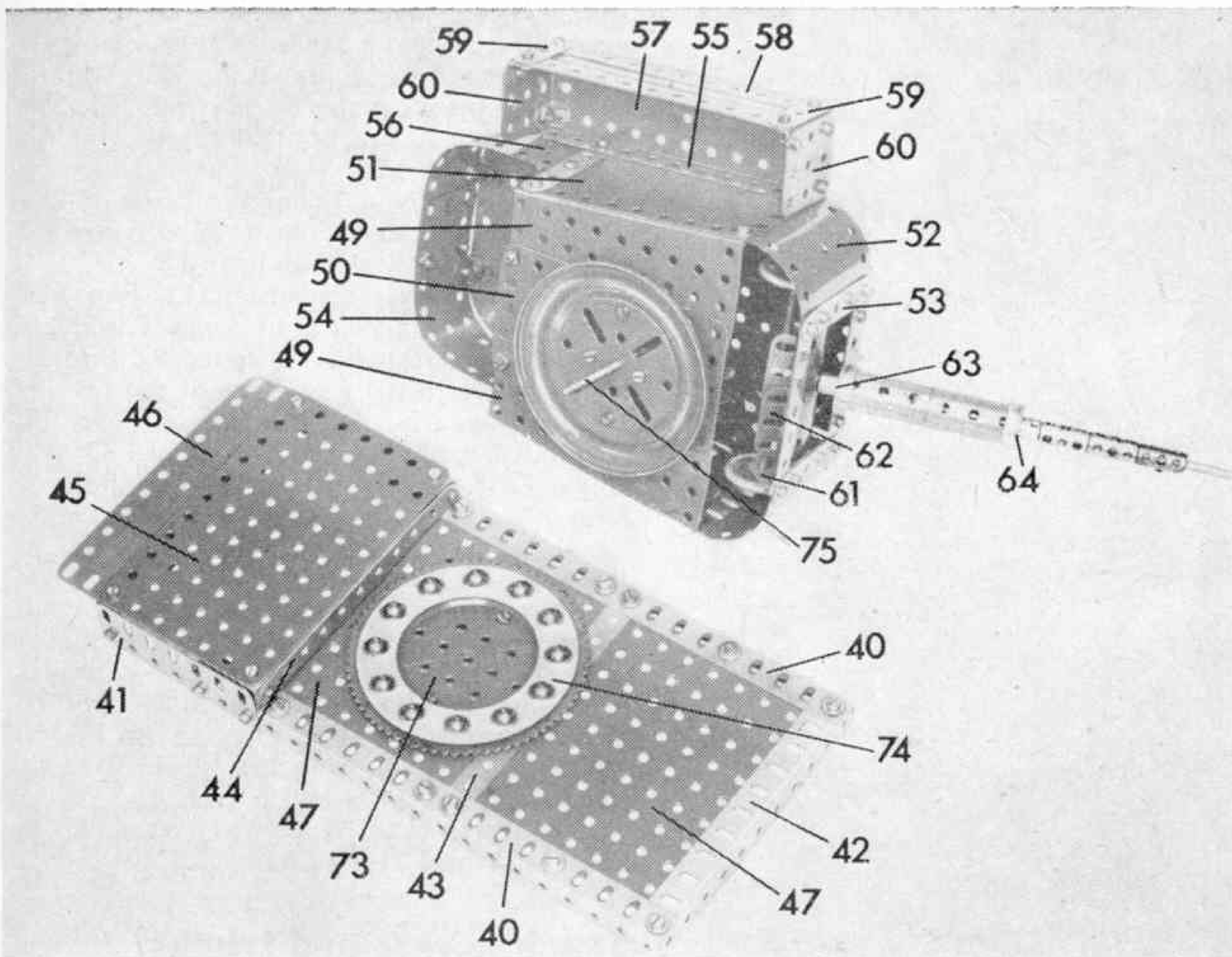


BUILD OUR M.M. REMOTE-CONTROLLED TANK

It works and steers just like the real thing—the only snag is that once you've built it, you won't want to dismantle it again! In operation it is uncannily realistic

MODELS that can be controlled from some distance away by a hand-held control box seem to be all the rage these days, and I must admit that the fun you can have with such 'remote control' models is enormous. I was particularly fascinated by a small tank, built from a plastic kit, which I saw at an exhibition in London at the beginning of the year, and on one occasion described it to our chief model-builder. A few weeks later, he presented me with an absolutely fabulous Meccano Tank, working on the same principle as the little model, and I just couldn't resist featuring it in these pages. I hope you like it as much as I do!

The only problem connected with the model lies in its authenticity. As you probably know, a full-size tank is powered by two engines, each driving one of the tracks. In the same way the model is powered by two Emebo Motors, so it does prove rather expensive but, if you do have the Motors and parts available, it's really worth building.

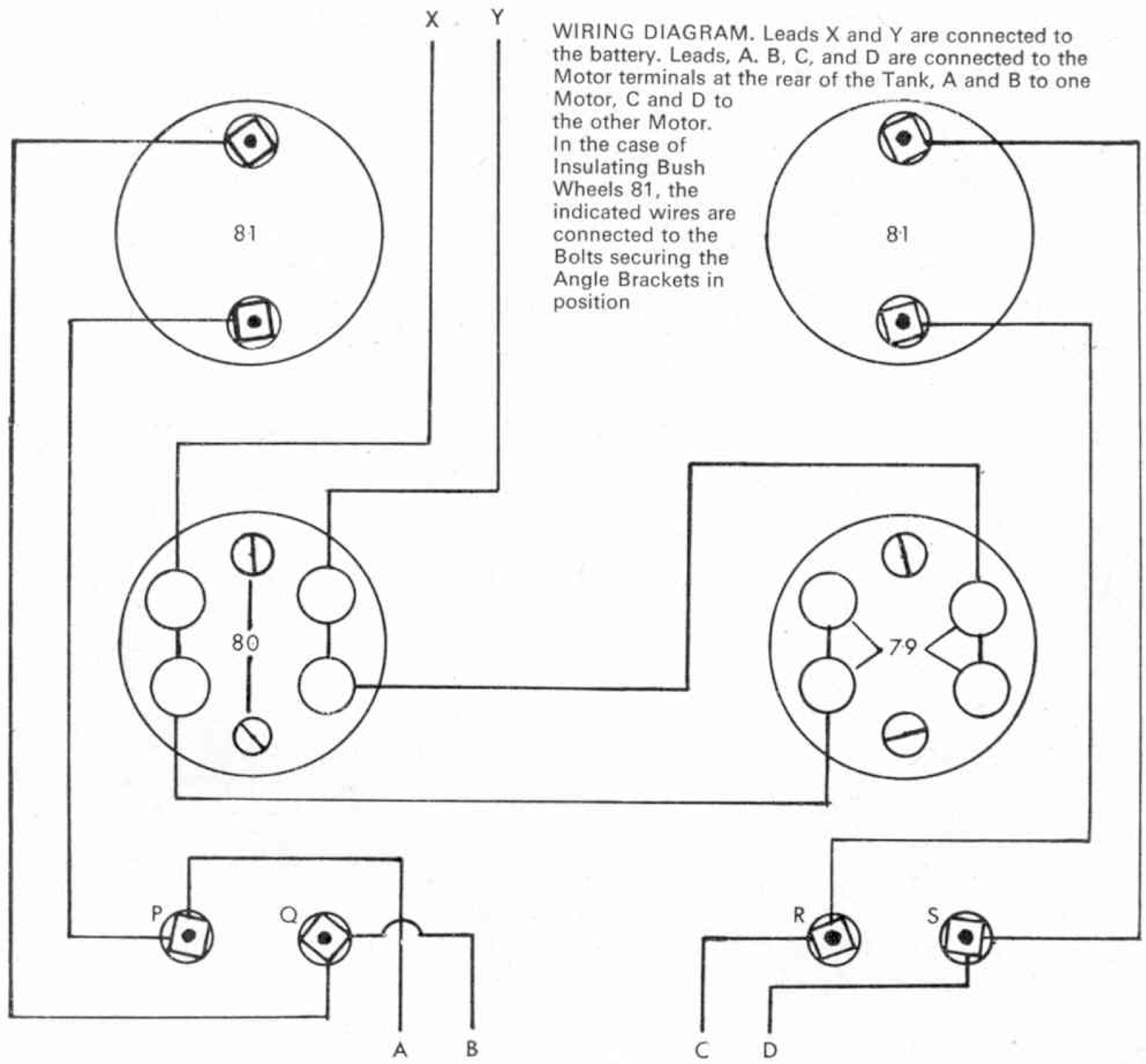
Because of the two Motors, each driving through its own gear box, the tank can be made to perform all the travelling manoeuvres of its real-life counterpart. With both Motors running together, it can be made to move in a straight line forwards or backwards. By operating only one Motor, it can be turned, and by running one Motor forward and the other backwards at the same time, it can be made to turn in its own length. Alternatively, if both Motors are run together in the same direction, with one being stopped intermittently for very short periods, the tank will make gentle turns while travelling forwards or backwards.

For instructional purposes, I have split the model into separate parts for easy identification, as follows:

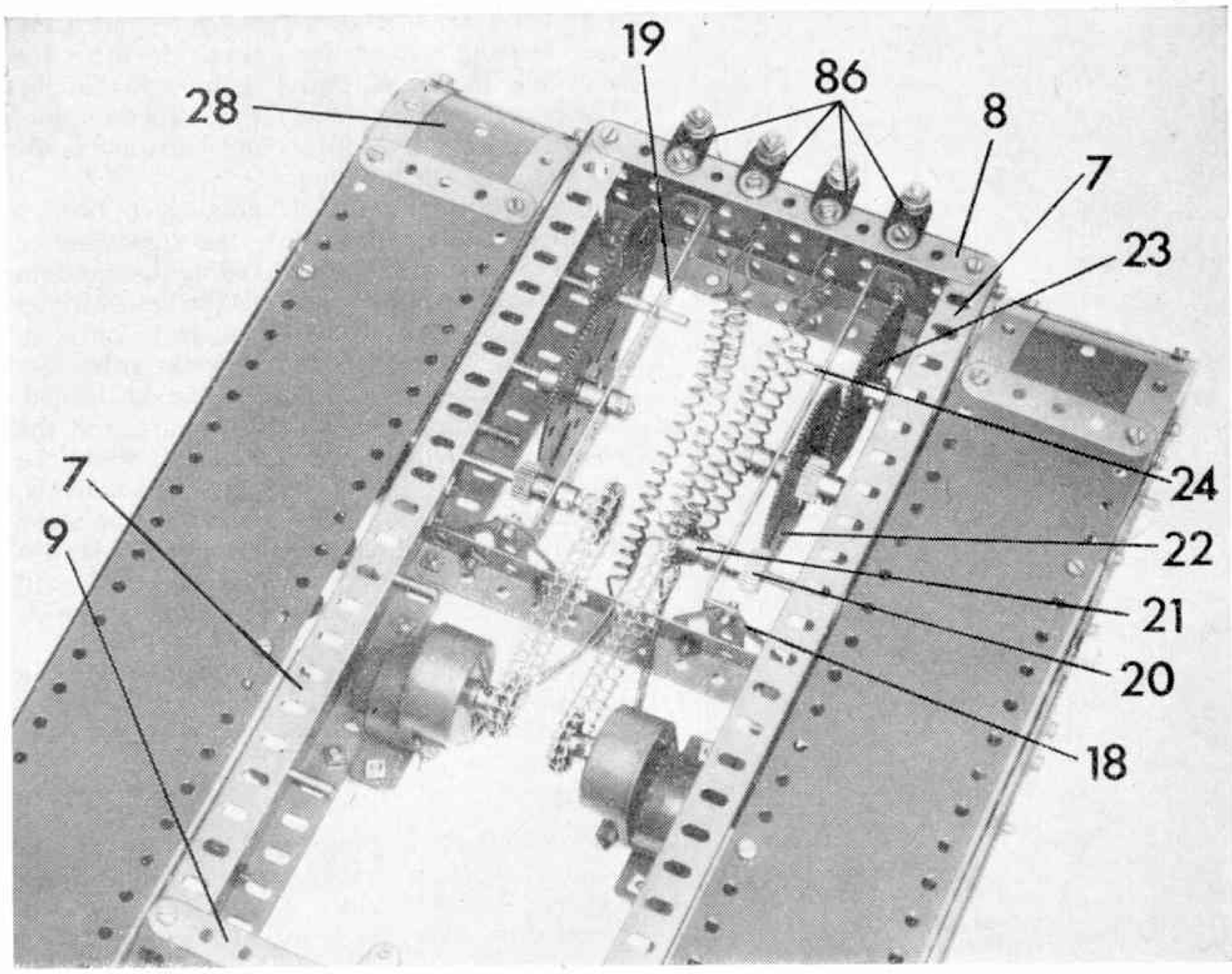
Body

A rectangle is built up from two 12½ in. Angle Girders 1, joined by two 5½ in. Angle Girders 2 and 3 and a 5½ in. Strip 4, at the same time fixing a 5½ in. by 2½ in. Flexible Plate 5 in position. Note that Angle Girder 3 is positioned 11 holes from Angle Girder 2. A 2½ in. Flat Girder 6 is bolted to each Girder 1, as shown.

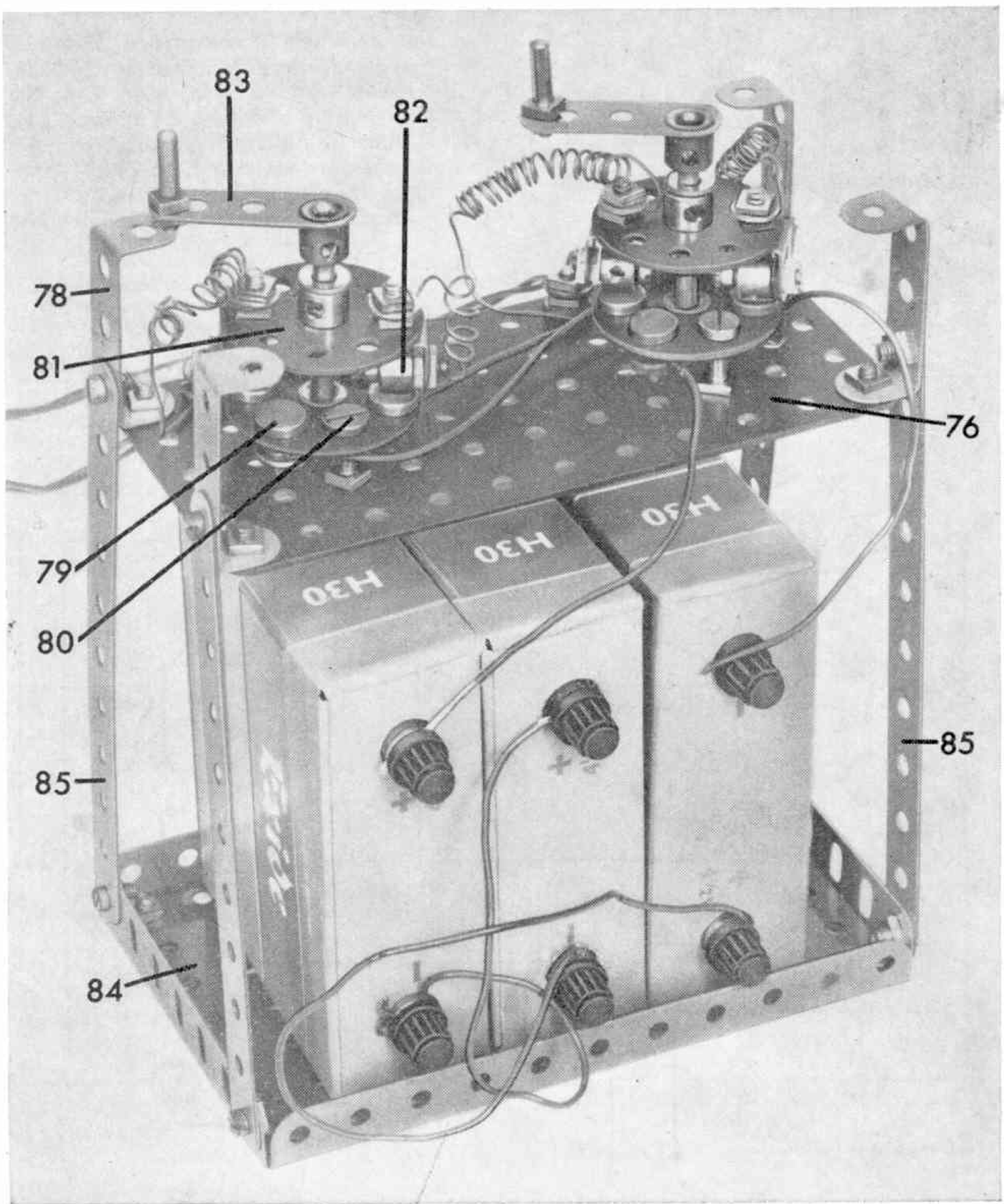
Another rectangle is constructed from two 12½ in. Angle Girders 7, joined by a 5½ in. Angle Girder 8 and a 5½ in. Strip 9, at the same time bolting a second 5½ in. by 2½ in. Flexible Plate 10 in place. The two rectangles are now joined at one side, by a 2½ in. Triangular Plate 11, a 2½ in. Strip 12, and a 2½ in. by 2½ in. Flat Plate 13. At the other side, the



WIRING DIAGRAM. Leads X and Y are connected to the battery. Leads, A, B, C, and D are connected to the Motor terminals at the rear of the Tank, A and B to one Motor, C and D to the other Motor. In the case of Insulating Bush Wheels 81, the indicated wires are connected to the Bolts securing the Angle Brackets in position



Above: a close-up view of the motors and gearboxes. Below: the control box, from which the 5½ in. by 3½ in. Flat Plate has been removed for clarity. An alternative 'push-button' control box will be described next month



rectangles are joined by another 2½ in. Triangular Plate 14 and a 5½ in. by 2½ in. Flat Plate 15. A second 5½ in. by 2½ in. Flat Plate is bolted in place at the back, while Flexible Plates 5 and 10 are brought together at the front and fixed to a 5½ in. Angle Girder 16, which is attached to Triangular Plates 11 and 14 by Angle Brackets. Strip 12 is connected to Flat Plate 13 by a 3½ in. Strip 17.

Both gear boxes are identical. Two Flat Trunnions 18 are bolted to Angle Girders 3, then each Flat Trunnion is connected through its apex hole to the Flat Plate at the rear by a 5½ in. by ½ in. Double Angle Strip 19. Journalled in the second hole of the Double Angle Strip and the corresponding hole of Strip 17 is a 3 in. Rod carrying a ½ in. Pinion 20, a Collar, and a ¾ in. Sprocket Wheel 21. In mesh with Pinion 20 is a 2½ in. Gear Wheel 22, on a 2½ in. Rod, held in place by a Collar. Also fixed on the Rod is a second ½ in. Pinion in mesh with a second 2½ in. Gear Wheel 23 on a 5 in. Rod 24, which protrudes approximately 3 in. through Flat Plate 13. An Emebo Motor, with a ¾ in. Sprocket Wheel fixed on its output shaft, is bolted to each Flat Girder 6. The Sprocket Wheel is connected to Sprocket Wheel 21 by Chain.

Track covers and tracks

As in the case of the gear boxes, both sets of track covers and tracks are similarly built, therefore it is necessary to describe only one of them. Angle Girder 7 is extended seven holes by a 7½ in. Angle Girder, to the side flange of which a Flat Trunnion 25 is bolted. A compound 16½ in. by 2½ in. strip plate is now built up from a 2½ in. by 2½ in. Flexible Plate 26, a 12½ in. by 2½ in. Strip Plate 27 and a 2½ in. by 2½ in. Curved Plate 28, edged by two 2½ in. Strips and two Formed Slotted Strips. When complete, it is bolted to the upper flange of the 7½ in. Angle Girder, being attached to Flat Plate 15 at the rear by an Angle Bracket.

A compound 15 in. angle girder is obtained from a 12½ in. and a 3 in. Angle Girder and is bolted to the outside edge of the compound strip plate. Bolted, in turn, to the vertical flange of this compound girder are two 1½ in. Corner Brackets 29 and 30, two 2½ in. by 2½ in. Triangular Flexible Plates 31, a 9½ in. by 2½ in. Strip Plate 32 and a 2½ in. by 1½ in. Flexible Plate 33. Parts numbered 31, 32 and 33 are edged by a 9½ in. Strip 34, extended by a 2½ in. Strip. Plate 32 is connected to the body by two 2½ in. by ½ in. Double Angle Strips 35, the outside lugs of which are spaced from the Plate by three Washers on the shanks of ⅜ in. Bolts. At the front a 2½ in. by 1½ in. Flexible Plate 36 is connected to Plate 26 by Obtuse Angle Brackets, at the same time fixing a 2½ in. Strip in position.

If the model has been correctly built up to this stage, Rod 24 should protrude through one of the holes in Corner Bracket 30. Before securing the Corner Bracket, therefore, two 1½ in. Sprocket Wheels 37 and two Collars must be fixed on the Rod, the Collars serving to hold the Rod in place. Also held in place by Collars is a 3½ in. Rod, journalled in Corner Bracket 29 and Flat Trunnion 25, and carrying another two 1½ in. Sprocket Wheels 38. Another four 3½ in. Rods 39, each carrying two 1 in. Sprocket Wheels, are journalled in Girder 1 and Strip 34, Collars holding them in place.

The creeper tracks themselves are now built up. Two lengths of Sprocket Chain, each with 185 links are arranged side by side on a

flat surface with approximately 1 in. separating them. A 1½ in. Strip is attached to the third link of each chain by passing a small paper fastener through both the Strip and the link and then by bending each lug of the paper fastener over the side of the link. The lugs must be bent tightly around the link, otherwise they might catch on the Sprocket Wheel in the tank itself. In fact, it is a good idea to cut the lugs of the paper fasteners until they are only about ⅜ in. long.

With the first 1½ in. Strip fixed to the third links of the Chains, another 1½ in. Strip is fixed to the ninth links, another to the fifteenth, another to the twenty-first, and so on until 30 1½ in. Strips have been attached. When completed, the tracks are passed round Sprocket Wheels 37 and 38, the Chains engaging with these Sprocket Wheels and also with the 1 in. Sprocket Wheels on Rods 39. It is essential that, with the track in place, the 1½ in. Strips are parallel to each other and at right angles to the body.

The top of the body is removable and is built up from two 9½ in. Angle Girders 40, each extended by a 3½ in. Flat Girder 41 overlapped three holes. Girders 40 are connected by a 5½ in. Angle Girder 42 and a 5½ in. Strip 43, another 5½ in. Strip 44 is attached by Double Brackets, while Flat Girders 41 are joined at the back by a 5½ in. Flat Girder attached by Angle Brackets. A 5½ in. Angle Girder is bolted to the upper edge of this Flat Girder. Fixed to this and to the Double Brackets to which Strip 44 is bolted, is a 5½ in. by 3½ in. Flat Plate 45, at the same time securing a 5½ in. by 1½ in. Flexible Plate 46 in position. Two 5½ in. by 3½ in. Flat Plates 47 are also bolted between Girders 40.

Two Angle Brackets are bolted to the lower edge of Flat Girder 45 with their lugs pointing rearwards. The completed construction can then be locked in position on the body by inserting these Angle Brackets beneath Angle Girder 8 and by screwing a ⅜ in. Bolt through the centre hole of Angle Girder 42 into a Threaded Boss 48, fixed to a Fishplate bolted to the underside of Plate 10.

Turret

Turning to the turret, two Flanged Sector Plates 49 are connected by a 4½ in. by 2½ in. Flat Plate 50, to the underside of which two Threaded Bosses are fixed. Attached to the other side of these Threaded Bosses is a Ball Thrust Race Flanged Disc, to which a Double Arm Crank is bolted so that its boss lies over the centre hole of the Disc. A 4½ in. by 2½ in. Flexible Plate 51, edged at the rear by a 2½ in. Strip, is then bolted to the outside flange of each Sector Plate, at the same time fixing a 2½ in. by 2½ in. Curved Plate 52 in position. A 2½ in. Strip 53 is bolted to each Curved Plate, at the same time bolting two 3½ in. Strips between the ends of Strips 53.

At the left-hand side a 5½ in. by 1½ in. Flexible Plate 54 is bolted to Plate 51, while, at the right-hand side, a 5½ in. Angle Girder 55 and a 5½ in. by 1½ in. Flexible Plate 56, are bolted to Plate 51. Plates 54 and 56 are curved round, to be overlapped three holes and bolted to each other. Two 1½ in. Strips are fixed one to each end of Angle Girder 55, the same bolts also securing a 5½ in. by 1½ in. Flexible Plate 57 and two Angle Brackets in position. Bolted to the other ends of these 1½ in. Strips is a 5½ in. Angle Girder 58, the fixing Bolts also securing two Angle Brackets. Another two 1½ in. Strips 59 are bolted, along with another 5½ in. by 1½ in. Flexible Plate, to this Angle Girder. The 1½ in. Strips are connected at their lower ends by a 5½ in. Strip, the holding Bolts again securing Angle Brackets. Attached to the three Angle Brackets at each end is a 1½ in. by 1½ in. Flat Plate 60.

Gun mounting and gun

Fixed to the inside of each Curved Plate 52 is a Trunnion 61, the holding Bolts passing through Strips 53. A 4½ in. Rod carrying a Coupling, fixed in its centre, is journalled in the apex hole of these Trunnions, being held in place by 1 in. fixed Pulleys with Rubber Rings. Note that the Rod passes through the end transverse smooth bore of the Coupling. Fixed in the longitudinal bore of the Coupling is an 11½ in. Rod.

A compound 2½ in. by 2½ in. Curved Plate 62 is built up from two 2½ in. by 1½ in. Flexible Plates bent to shape. The curved plate is now mounted on the 11½ in. Rod, which passes through its centre hole, and is held tight against the Coupling by a ¾ in. Flanged Wheel 63. Next, two Sleeve Pieces connected by a Chimney Adaptor are slid over the Rod and wedged tightly in the Flanged Wheel. Another ¾ in. Flanged Wheel 64 is added, followed by three Couplings. Finally a Worm is mounted on the end of the Rod.

The top of the turret is covered by two Semi-Circular Plates 65, connected by a 2½ in. by 1½ in. Flexible Plate, a 4½ in. by 2½ in. Flexible Plate 66, two 2½ in. by 1½ in. Flexible Plates 67, two 3½ in. by 1½ in. Triangular Flexible Plates 68, two Face Plates 69 and a 3½ in. by 2½ in. Flanged Plate 70. Generally speaking, the roof of the turret is attached to the sides by suitably placed Angle Brackets except in the case of Flanged Plate 70, which is bolted direct to the upper 3½ in. Strip joining Strips 53. A Rod Socket carrying a 2½ in. Rod 71 is fixed in Flexible Plate 56, while a 3½ in. Rod is held in the boss of left-hand Face Plate 69. These Rods represent radio aerials, while the hatch cover is represented by a Boiler End 72, fixed to Flanged Plate 70 by a 1⅛ in. Bolt.

Returning to the removable top of the body a Ball Thrust Race Toothed Disc 73 is bolted to the centre 5½ in. by 3½ in. Flat Plate. A complete Ball Cage 74 is placed in the Disc as shown, then a 2 in. Rod 75 is secured in the boss of the Double Arm Crank, bolted to the Ball Thrust Race Flanged Disc attached to the underside of the turret. Finally, the turret is placed in position, with Rod 75 being passed through the centre hole of Toothed Disc 73 and held in place beneath the 5½ in. by 3½ in. Flat Plate by a 1 in. fixed Pulley with Motor Tyre.

Control box

With the model complete, the only section left to build is the control box, but this is perhaps the most complex part of the operation. A 5½ in. by 2½ in. Insulating Flat Plate 76 is connected to a 5½ in. by 3½ in. Flat Plate 77 (this has been removed in the close-up illustration of the control box to help description) by four 1½ in. by ½ in. Double Angle Strips 78. Two forward/stop/reverse switches, one for each Motor, are now built up but, as both are similar, only one is described here.

Four Contact Studs 79 (Elektrikit Part No. 544) are mounted in a six-hole Insulating Bush Wheel, leaving two diametrically opposite holes free, then the Bush Wheel is attached to Insulating Plate 76 by two Pivot Bolts 80, passed through these holes.

Two Angle Brackets are attached to an eight-hole Insulating Bush Wheel 81 through diametrically opposite holes. A ½ in. Bolt, carrying a loose Collar 82 on its shank is locknutted in the free lug of each of these Angle Brackets, then the Bush Wheel is fixed, beneath Plate 77, on a 2½ in. Rod passed through the boss of the six-hole Insulating Bush and journalled in Plates 76 and 77, being held in place by a Crank 83 above Plate 77. A Threaded Pin is fixed in the Crank for a handle.

Two washers are placed on the Rod between the six-hole Bush Wheel and Plate 76 so as to keep the Bush Wheel against the heads of the Pivot Bolts. Beneath Plate 76, a Tension Spring is placed on the Rod, followed by a Collar. This tends to pull the Rod downwards, thus holding Collars 82 against Contact Studs 79. Note that the eight-hole Insulating Bush Wheel 81 must be fixed on the Rod, but the Rod must be free to turn in the six-hole Insulating Bush Wheel. When finished, a second identical arrangement is constructed.

A box for holding the batteries is obtained from a 5½ in. by 3½ in. Flat Plate 84, edged by two 5½ in. and two 3½ in. Angle Girders. The 3½ in. Girders are connected to Double Angle Strips 78 by 5½ in. Strips 85. Incidentally, four ½ in. Bolts are fixed by Nuts in Flat Plate 77 to provide 'stops' for the handles.

Wiring

Great care must be taken with the wiring of the control box, but, before starting on this job, take each of the four leads from the two Emebo Motors in the Tank to special terminals at the back of the Tank. These terminals are obtained by bolting four Insulating Fishplates 86 to Angle Girder 8, and by using Nuts and Washers on ½ in. Bolts for the contact screws. Returning to the control box, four terminals, P, Q, R and S (see wiring diagram), are provided, in two sets of two, by Nuts and Washers on ⅜ in. Bolts fixed in Insulating Plate 76.

Wiring of the control box can now begin. Rather than describe it, however, which might prove confusing, I have included a wiring diagram. This, as I think you will agree, is far easier to follow than written text. With the wiring completed, you will find that the 'off' position results when Collars 82 are in contact with Pivot Bolts 80.

Parts required

2 of No. 1a	2 of No. 48d	1 of No. 142c
8 of No. 2	5 of No. 52a	1 of No. 147b
3 of No. 3	1 of No. 53	2 of No. 155
13 of No. 5	1 of No. 53a	1 of No. 162a
64 of No. 6a	2 of No. 54	2 of No. 163
6 of No. 8	34 of No. 59	1 of No. 164
2 of No. 8a	2 of No. 62	1 of No. 168
2 of No. 8b	1 of No. 62b	1 of No. 179
10 of No. 9	4 of No. 63	9 of No. 188
2 of No. 9b	3 of No. 64	5 of No. 189
2 of No. 9c	2 of No. 70	2 of No. 190
2 of No. 10	2 of No. 72	3 of No. 191
2 of No. 11	2 of No. 74	2 of No. 192
28 of No. 12	2 of No. 76	2 of No. 196
4 of No. 12c	4 of No. 94	2 of No. 197
1 of No. 13	8 of No. 95a	4 of No. 200
2 of No. 15	16 of No. 96	2 of No. 214
11 of No. 16	4 of No. 96a	4 of No. 215
4 of No. 16a	1 of No. 103	4 of No. 223
4 of No. 16b	2 of No. 103d	2 of No. 224
2 of No. 20b	2 of No. 103f	1 of No. 510
3 of No. 22	2 of No. 109	4 of No. 513
4 of No. 26	12 of No. 111a	2 of No. 514
4 of No. 27c	8 of No. 111c	2 of No. 516
1 of No. 32	1 of No. 111d	8 of No. 544
301 of No. 37a	2 of No. 115	2 of Emebo
272 of No. 37b	2 of No. 120b	Motors
94 of No. 38	2 of No. 126	120 Paper
4 of No. 48	4 of No. 126a	Fasteners
4 of No. 48a	4 of No. 133	

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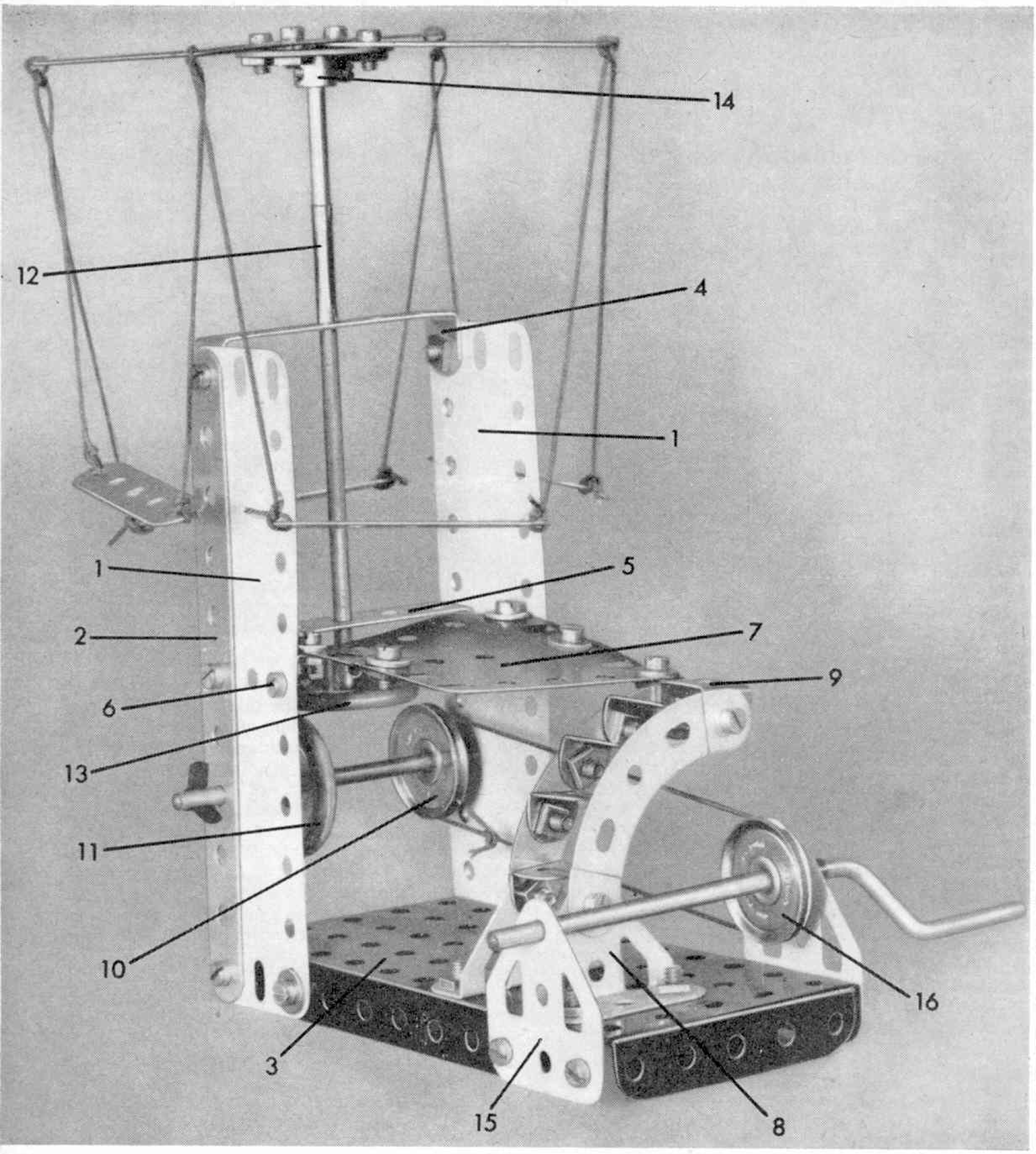

Parts required

4 of No. 2	5 of No. 38
4 of No. 5	1 of No. 40
1 of No. 11	2 of No. 48a
7 of No. 12	1 of No. 52
2 of No. 16	2 of No. 90a
1 of No. 17	2 of No. 126
1 of No. 19s	2 of No. 126a
4 of No. 22	2 of No. 155
1 of No. 24	2 of No. 189
3 of No. 35	2 of No. 194
34 of No. 37a	1 of No. 213
34 of No. 37b	

"DON'T forget the youngsters" is a rule that every regular hobby magazine contributor should always keep in mind and this applies particularly to members of Meccano Magazine staff. When looking through recent issues of the 'M.M.', however, I suddenly realised that I had not featured a model built from one of the smaller Meccano Outfits for some considerable time. In other words I had forgotten the rule, as most of the smaller Outfits are owned by young readers. To redeem myself, therefore, I describe below an easy-to-build, working model of an Aeroplane Roundabout, constructed with a Meccano No. 1 Junior Kit. Everybody who owns a Meccano main Outfit must have all the parts used in the model, therefore, it can be built by virtually every 'Meccano Magazine' reader.

Just how easy the model is to build is evident from the accompanying photograph. Two 5½ in. by 1½ in. Flexible Plates 1, edged by a 5½ in. Strip 2, are bolted one to each side of a 5½ in. by 2½ in. Flanged Plate 3. At the top, Plates 1 are connected by a 2½ in. by ½ in. Double Angle Strip 4, while a similar Double Angle Strip 5 is fixed half-way down the Plates, the holding Bolts passing through the centre holes of Strips 2. Also fixed to each Plate 1 is a ½ in. by ½ in. Angle Bracket, held by Bolt 6, to which a compound 2½ in. by 2½ in. Plastic Plate 7, obtained from two 2½ in. by 1½ in. Plastic Plates, is bolted. This plate represents the platform used by passengers climbing into the 'aeroplanes'.

A staircase is provided by securing two Trunnions 8 to Flanged Plate 3. Bolted through the apex holes of these Trunnions are two 2½ in. Stepped Curved Strips, joined at the top by a Double Bracket 9, the Bolt fixing the inside Curved Strip to this Double Bracket also holding a ½ in. by ½ in. Angle Bracket in place. The other lug of the Angle Bracket is bolted to compound Plastic Plate 7. A further four Angle Brackets are bolted to the inside Curved Strip as steps.

Revolving section

Held in Strips 2 by Spring Clips is a 3½ in. Rod that carries a 1 in. fixed Pulley 10 and a 1 in. fixed Pulley with Rubber Ring 11. A compound 5½ in. Rod, obtained from a 3½ in. and a 2 in. Rod joined by a Rod Connector 12, is then journalled in Double Angle Strips 4 and 5, being prevented from dropping through by the Rod Connector. A second 1 in. fixed Pulley with Rubber Ring 13 is attached to the lower end of the compound rod and is brought into constant mesh with Pulley 11. Two 5½ in. Strips are now crossed at right-angles and bolted to an eight-hole Bush Wheel 14, fixed to the upper end of the compound rod, as shown. The aeroplanes are represented by 2½ in. Strips attached to the ends of the 5½ in. Strips by Cord.

Drive

All that now remains to be built is the driving system for the aeroplanes. Fixed to Flanged Plate 3 are two Flat Trunnions 15, in the apex holes of which a 3½ in. Crank Handle is journalled, being held in position by an Angle Bracket and a 1 in. fixed Pulley 16. This Pulley is then connected to Pulley 10 by a Cord driving band.

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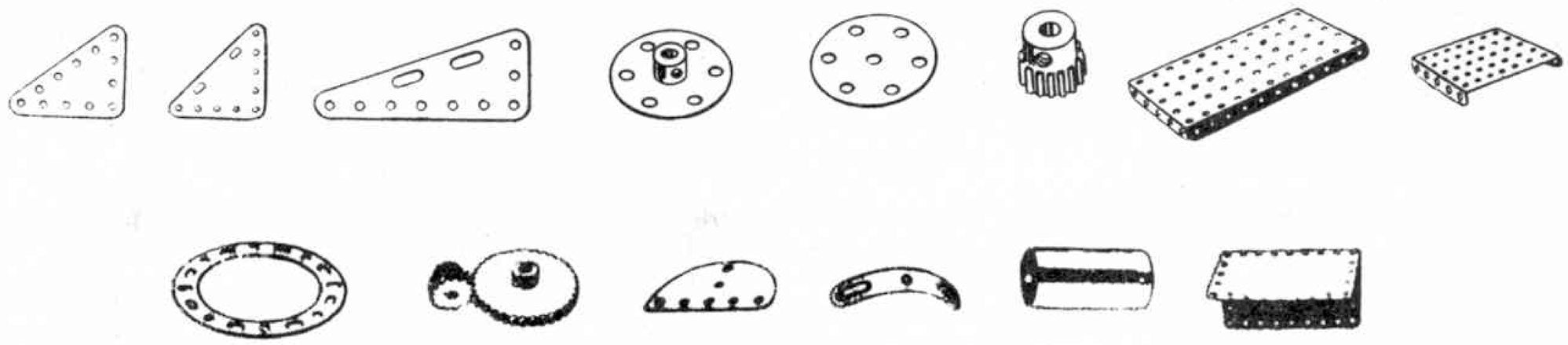

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Ask Tom Sheridan and he will do his best to answer it. Questions should be sent on postcards bearing your full name and address, but these will not be published if you put them in brackets and just add your initials. Address them to Tom Sheridan, Meccano Magazine, Thomas Skinner and Co. (Publishers) Ltd., St. Alphage House, Fore Street, London, E.C.2.

Can William Tell?

Q. Can you possibly tell me where I can obtain plans for making a crossbow?—Thomas Scott, Cockenzie, East Lothian.

A. I have drawn a blank. Can another reader help, please?

Brightest star

Q. Which is the brightest star in the night sky?—P. S., Norwich.

A. When Venus is at its brightest as the 'Evening Star', it outshines any other planet or star. But, like the moon, it goes through phases, and becomes practically invisible when it is between the earth and the sun. Then Jupiter is the brightest object; but when it is on the other side of its orbit it also becomes faint and the permanent star Sirius is the brightest object in our sky.

Dust problem

Q. I have trouble keeping my Scalextric layout free from dust. Have you any tips?—N. B., Huddersfield.

A. If the layout is on a permanent base board it should, of course, be covered with a dust-sheet when not in use. But the makers say that a clean 1½ in. or 2 in. paint brush is useful for removing dust, the smaller size being handier if accessory buildings are incorporated in the circuit. A track-cleaning brush, for removing dirt which may fall between the conductor rails of the track sections, is now supplied with all sets and is available as an additional accessory (Catalogue No. A 214.)

Pirate stations

Q. Would you tell me the wavelengths of all the pirate radio stations, including those about to start?—Mark Spencer, Edinburgh.

A. At the latest count, round the dial, they are: Radio Caroline (North), 201 metres; Radio Essex, 222 m.; Radio Tower, 236 m.; Radio Scotland, 242 m.; Radio Caroline (South), 259 m.; Radio London, 266 m.; Radio 270, 270 m.; Radio City, 290 m.; Radio England, 355 m.; and Radio 390, 390 m. Radio Channel and Britain Radio are also scheduled to start operations, but their wavelengths have not yet been announced. *(Britain Radio 355 m., Ed.)*

Busy fingers

Q. What is the endurance record for typewriting—if any?—'Sister Sue', Harlesden, Middlesex.

A. In a contest in Adelaide last September, Miss Lois Meeuwissen, a 19-year-old typist, typed continuously for 62 hrs., 1 min., beating the previous record by nine hours.

How steep?

Q. Please tell me how the steepness of a hill is measured?—Richard Taylor, Lincoln.

A. Hill gradients can be calculated from contour lines on a map, which are produced by joining up points of equal height above sea-level. On one-inch Ordnance Survey maps the 'vertical interval' between the contour lines is 50 ft. Using the scale of the map, the horizontal equivalent between the lines at any point may be measured; and dividing the vertical interval by the horizontal equivalent will give the gradient at that point expressed as, for example, one in three—a 1 ft. rise or fall every 3 ft.

A good car driven with care can manage a gradient of one in seven, but few cyclists can cope with more than about one in 15.

Car output

Q. How many cars were produced in Britain in 1965?—Nicholas Thorn, Slough.

A. Complete figures are not, at the moment, available. In the first half of the year production amounted to 948,458 cars and taxis, 238,278 goods vehicles, and 9,474 bus coaches and trolleybuses.

Big readers

Q. How many newspapers and magazines are in current circulation, and how much is spent on them?—Neville Baker, Garsington, Oxon.

A. For every 100 people in Britain about 50 copies of daily newspapers are sold every day—a higher proportion than anywhere else in the world. In 1964 £179 million was spent on newspapers, and £62 million on magazines. Some 140 daily and Sunday papers and about 1,200 weekly papers are now being published throughout the United Kingdom. In addition there are about 4,500 weekly, monthly and quarterly periodicals of all kinds.

Some years ago UNESCO estimated that more than 7,500 daily newspapers were being published throughout the world. Of these, some 2,300 were printed in English, to the extent of 96 million copies daily.

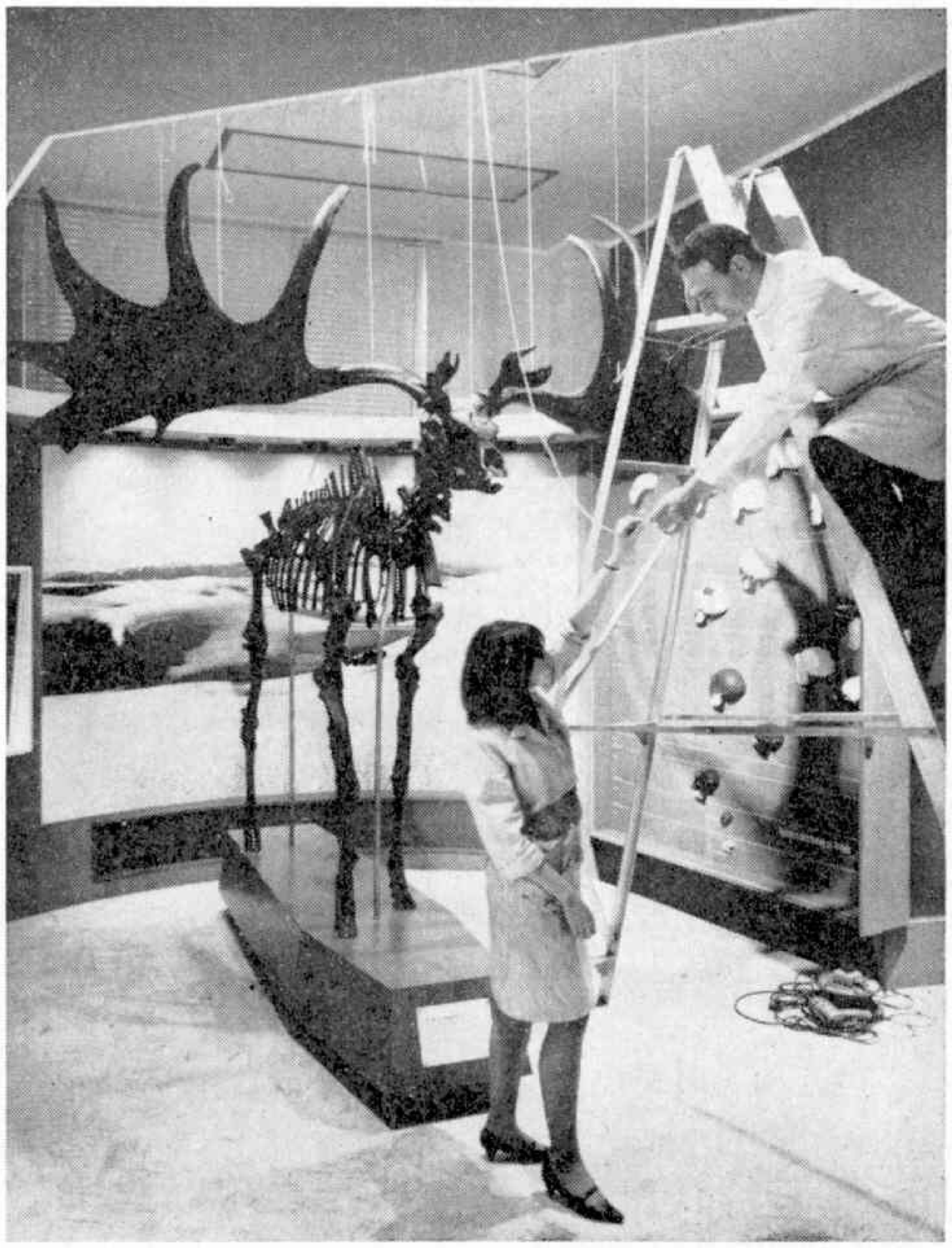
Historic museum

Q. Where is— or was—the oldest museum?—G. L. D., Sheffield.

A. The famous temple of learning founded by the Egyptian kings at Alexandria housed collections of various objects used in teaching, and instruments for the study of astronomy and anatomy. It was destroyed by Moslem invaders in 640 A.D.

The term 'museum' was first applied in this country, in the early 18th century, to the building erected at Oxford to house the collection of the antiquarian Elias Ashmole. London's British Museum, founded in 1753 as a repository for the natural history collection of Sir Hans Sloane, was the first to be opened to the public.

In the 'Earth before Man' gallery of Liverpool's modern museum, members of the staff put the finishing touches to an exhibit featuring the 10,000-year-old skeleton of an Irish elk



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• Flying Review Magazine from the issues of 1963 to the issues of 1965. Apply to: Gabriel McGovern, 36 Landscape Ave., Churchtown, Dublin 14, Ireland.
• Stamp collection in lots, send 6d. for approvals. J. Stewart, Sunnyside, Cornhill, Biggar, Lanarkshire.
• "M.M.'s", Jan. 1952-Dec. 1963, reasonable condition, 50s. or offers. C. Gray, 8 Damdale, Peebles, Peebleshire, Scotland.
• For sale: Stamps, 1s. for 100; stocks limited. Send s.a.e. P. Robinson, 36 Coronation Ave., Seaton, Workington, Cumberland.
• "M.M.s", October, December 1922, July, November, December 1923; several 1905 "Mechanics Made Easy" parts. Apply: Snowdon, 6 Armstrong St., Blackfyne, Consett, Co. Durham.
• Corgi Toys, good condition. Send s.a.e. for details. Jay, 1 Orchard Drive, Hazlemere, High Wycombe, Bucks.
• Large selection, good condition, Hornby-Dublo three-rail track, locomotives, rolling stock accessories for sale. Send s.a.e. for list to: J. Spencer, The Spinney, New Yatt, Witney, Oxon.
• Geared Roller Bearing, Meccano part No. 167; pre-1914 book "The Story of Meccano"; pre-1914 No. 3 outfit. Separate offers to: 72 Elizabeth Road, Henley, Oxon.
• Private collection of 8 mm. films; variety of subjects, horror, sport, Western, comedy, etc.; no reasonable offers refused. Stamp for list. 78 Cox Street, Coventry.
• Stamp collection, 2,000 different, including Commonwealth, 35s. J. Barefoot, 12 Storth Ave., Sheffield 10.
• Meccano Magazines, November 1955 to December 1965, August 1959 missing; Aero Modeller and Model Maker, both November 1960 to August 1964. All above 1s. each post free. Mr. Lancaster, 22 North Lonsdale Rd., Ulverston, Lancs.
• Obsolete Dinkies, pre-war and post-war. Overseas enquiries welcome. State requirements. D. Pinnock, 1a Hereford Rd., Southsea, Hants.
• Cigarette and trade cards, clean mixture, 1900-65, 100—6s. 6d.; schoolboy mixture, 100—3s. 9d. Wimblett, Lyndhurst, Thurlestone Sands, S. Devon.
• 1 cc. Diesel engine, as new. £2 o.n.o. North, 41 Nursery Rd., Norwood Lane, Meopham, Kent.
"M.M.'s", April 1942-Sept. 1949; buyer pays postage. Westney, 51 Roman Way, Caister-on-Sea, Norfolk.

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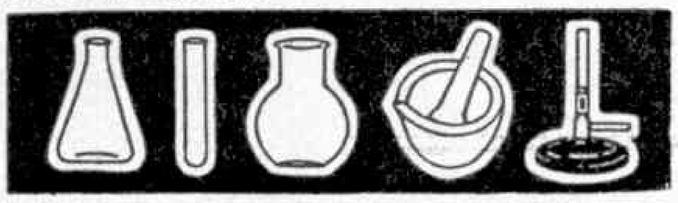

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Solutions to puzzles on page 27

S	U	P	E	R	M	A	N	■	A	F	F	O	R	D
C	■	U	■	O	■	N	■	■	O	■	V	■	E	
A	M	P	U	T	A	T	E	■	F	R	I	E	N	D
M	■	P	■	A	■	A	■	■	T	■	R	■	I	
P	R	E	S	T	I	G	E	■	A	R	A	B	I	C
S	■	T	■	E	■	O	■	S	■	E	■	E	■	A
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A	■	C	■	P	■	I	■	O	■	S	■	R	■	E
P	R	O	P	H	E	S	I	E	D	■	■	■	■	■
P	■	N	■	O	■	E	■	M	■	F	■	S	■	A
R	E	F	U	S	E	■	C	A	T	A	P	U	L	T
O	■	I	■	G	■	■	■	K	■	E	■	P	■	H
V	E	N	E	E	R	■	R	E	P	R	I	E	V	E
A	■	E	■	N	■	■	■	R	■	I	■	R	■	N
L	A	D	D	E	R	■	A	S	S	E	M	B	L	E

Quick Quiz

1. They are both the same length.
2. 25·9 miles-an-hour (22½ knots) was achieved by the catamaran *Endeavour* at Cowes in 1955.
3. The Empire State Building, New York. 1472 feet, to the top of the television tower.
4. The Isle of Man.
5. Asia.

Tricky Teasers

A. 1, Descent. 2, Decent. 3, Accent. 4, Recent. 5, Crescent. 6, Adjacent. 7, Complacent. 8, Quiescent.
B. £4 16s.
C. Be wise, do not be over-confident in yourself, nor over-estimate your influence for good with others, but seek in honesty and truth to make the best of what you see in them.

Last Month's Dinky Toy Winners

BELOW is a list of fifty names of readers whose entries for last month's 'Silhouette' competition were the first correct answers to be selected by the Editor. If your name appears in this list, then write on a postcard to: *Silhouette Prize, Meccano Magazine, Thomas Skinner & Co. Ltd., St. Alphage House, Fore Street, London E.C.2,* and claim your FREE Dinky Model Mercedes-Benz 230 SL. If your name does not appear in this list, even though you entered for the competition don't be disappointed—try again!

C. Baker, Cold Blow Crescent, Bexley, Kent. *D. Baker*, Clitherow Ave., Hanwell, London, W.7. *I. Barclay*, Oaklynn, Maidstone, Kent. *R. Brebner*, Farnham Pk. Drive, Upper Hale, Farnham, Surrey. *S. Clarke*, Magdalen, Kings Lynn, Norfolk. *David Clements*, Plantation Way, Amersham, Bucks. *N. Coleman*, Windmill Road, Polegate, Sussex. *D. Cook*, Trodds Lane, Merrow, Guildford, Surrey. *G. Coy*, Cranbrook Road, Bristol, 6. *R. Crook*, Marlborough Road, Goring-by-Sea, Worthing, Sussex. *R. Cross*, Priory Road, Fishtoft, Boston, Lincs. *C. Crotty*, Wroxham Gdns. Potters Bar, Herts. *D. L. Curson*, Heslop Road, Balham, London, S.W.12. *D. Dawson*, Fernlea, Linlithgow, Scotland. *A. J. Drake*, Kinnaird Way, Cambridge, *D. Eastwood*, Gipsy Lane, Kettering, Northants. *A. Egner*, Victoria Terrace, Jarrow, Co. Durham. *R. Emery*, Vicarage Drive, East Sheen, S.W.14. *D. Fox*, Bridle Road, Shirley, Croydon, Surrey.

Continued on page 52

STAMPS NEWS

BY F. E. METCALFE

1st day covers

Envelopes with a set of stamps postmarked first day of issue have, for a long time now, been fairly popular, particularly in the U.S.A. where the enterprising Post Office has been at pains to service covers with nice cancellations when a new set, or generally a single special stamp is issued, and that is pretty often. With no corresponding service in Great Britain, or even stamps until recently, not many collectors bothered to go in for such things, even when very occasionally there was a new set of stamps suitable for the purpose. Now all that has changed. We not only get a special issue of stamps every couple of months or so, but the Post Office even offers specially printed envelopes from time to time. But these envelopes have been up to now so unattractive, that collectors have usually preferred to buy envelopes produced by private firms. Our Post Office is learning, however, and now at the G.P.O. in a number of large cities (the list is lengthening all the time, so later on even the smaller towns may be similarly favoured; at least I believe that is the plan) special posting boxes are placed, so that envelopes, with the new stamps, can receive first day cancellations. Such is the growing popularity of these British first day covers that they have been listed in the Commonwealth QEII Catalogue and if you feel like going in for this attractive philatelic sideline, now is the time to start, for prices of already existing covers are going up, and I think the upward trend will increase rapidly, such is the mounting interest.

Kindness to animals

We rather pride ourselves on our love for animals (a Frenchman once remarked to me that it was at the expense of humans) but of course in the U.S.A. they also feel proud of a similar liking and even the Post Office does it's best to foster the spirit and they have even issued a stamp to further the good work. It is amazing what objects are considered suitable for yet another stamp (and another first day cover) but the nett result is that collectors of the U.S.A. stamps are able to form most interesting collections at very little cost, and the P.O. doesn't lose either. Good business for everybody.

Satellite "DI"

France is taking its 'space' programme very seriously and to mark the success of the launching of its satellite 'DI' it issued, on February 18, a most handsome stamp, as can be seen from the illustration. I am sure it will interest many Meccano readers. There is no doubt about it, our neighbours across the Channel do release some attractively designed stamps; it is equally true that such stamps more than pay their way, for there are thousands of collectors, all over the world, who go in for French stamps simply because they are so beautiful. For some time, stamps illustrating famous paintings have been regularly issued, and although they sold well to start with, they are now rising quickly in price, for even those who would normally not collect stamps are wanting copies, as miniature works of art.

Our own stamps

And what about the designs of our own stamps? Are they drawing non-collectors, through the beauty of their designs? The short and plain answer is that they are not. Are we giving our designers a chance? Well, there is one thing to be said in favour of our issues, the designs are original, whereas the French 'Famous Paintings' issues, are merely copies. Nevertheless, we are making the job more difficult than it need be. Take, for instance, the four stamps issued in May, depicting British beauty spots. No doubt the idea (apart from a nice little profit from sales to collectors) was to show would-be tourists how beautiful Great Britain is in places. That being the case, why the side panels blocking out so much that could have been shown? These four stamps would have been quite nice if the whole stamp had been devoted to what is was intended to illustrate.

The tip of the month

As collectors know, there are the famous Stanley Gibbons stamp catalogues, which in various volumes cover the whole world, and the Commonwealth catalogues which deal with British Commonwealth issues of the KGVI-QEII reigns. Collectors who make do with out-of-date editions are often being very short sighted, that is if they spend more than coppers on their collections, for in these days with stamp collecting so popular, prices are changing all the time, and even the current catalogues may be a bit out. For instance, take the stamps of those now very popular Australian Dependencies (there was a time when they were anything but sought after) Nauru and Norfolk Is. and Papua. In a recent number of Gibbons Stamps Monthly giving a resume of price changes it stated that all Norfolk Is. issues were nearly double, the same with Papua and New Guinea to 1963, Nauru, one issue (1937-47) and Pitcairn Is. all 2 to 3 times catalogue. The point I wish to make is this. You never know how much demand will change.

The unwanted stamps of today may just be the ones which, like the countries I have quoted, collectors will want tomorrow. Don't make do with an old catalogue and even then, watch for what is going on in the stamp world.

Top left: the USA "Kindness to Animals" 5 cent stamp

Right: Nauru threepenny, now much in demand by collectors

Bottom left: handsome French issue to mark the successful launching of the "D1" satellite

Right: issued in May, one of the series of stamps depicting British beauty spots

CAR OUTLINE COMPETITION

50 DINKY MODELS MUST BE WON!

Fill out the form and send it to us. The names of the senders of the first 50 correct answers will be published in the next issue of Meccano Magazine. The winners will then be expected to write to us to claim their prize. The competition will be judged by the Editor of Meccano Magazine. His decision will be final and no correspondence can be entered into.

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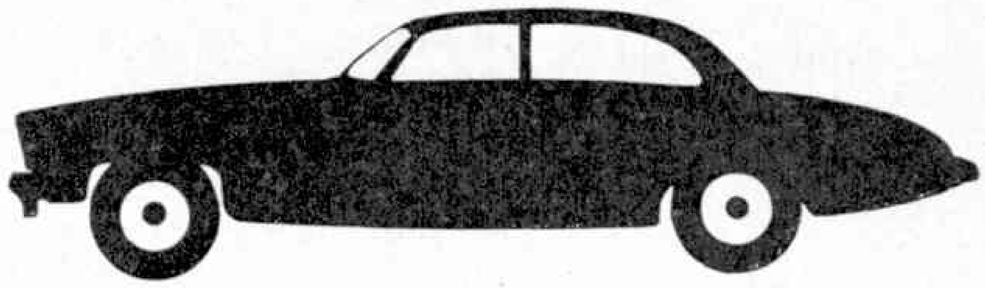

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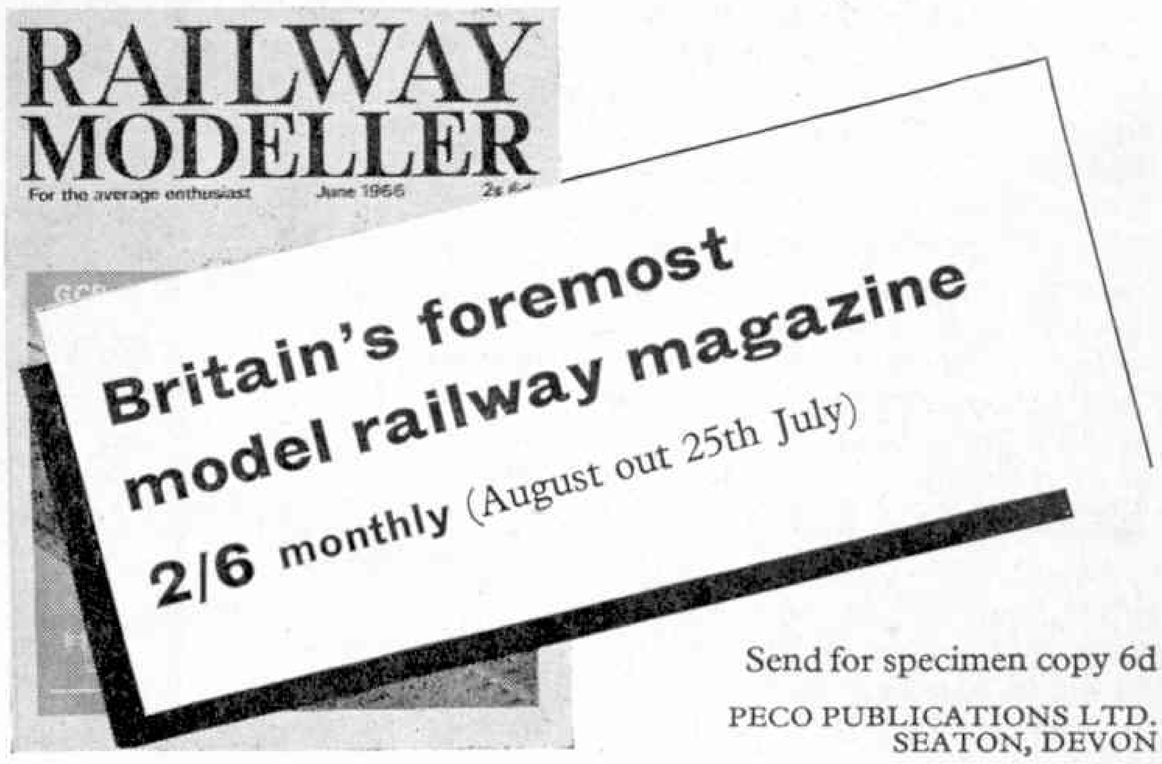
OVERSEAS WINNERS OF COMPETITION 'M'—DAIMLER

X. Fleuriot, Rue Ollier, Paris XVe, France. *L. Raffc*, Viale Lexert 2, Aosta, Italy. *R. Stuart*, Delongpre, Hollywood, California, U.S.A. *M. Blitz*, Rusthoflaan 13, Rotterdam, Holland. *R. Theisen*, rue Marechal Foch, Virton, (province de Luxembourg) Belgium.



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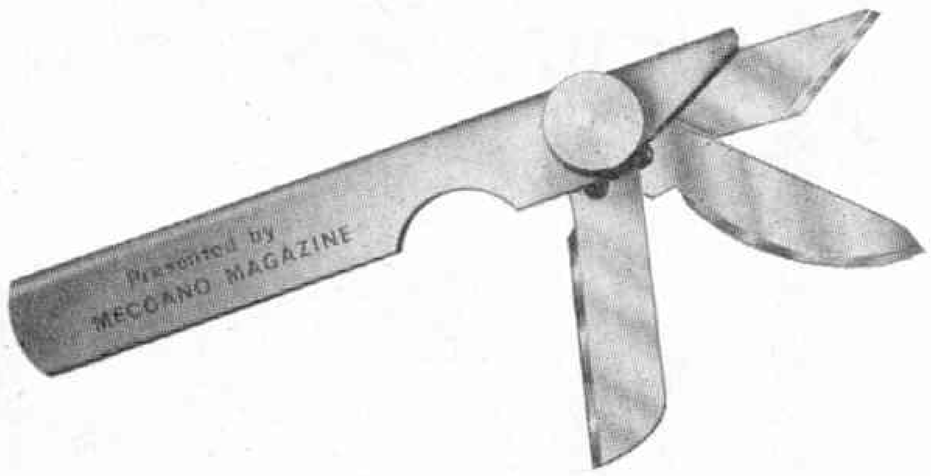

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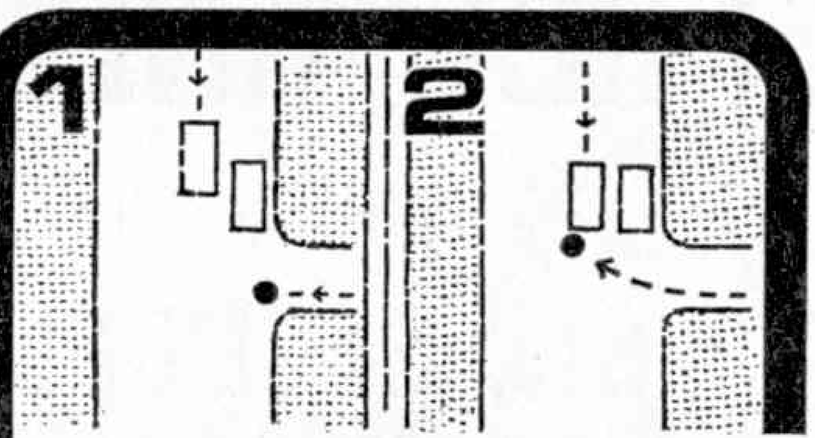

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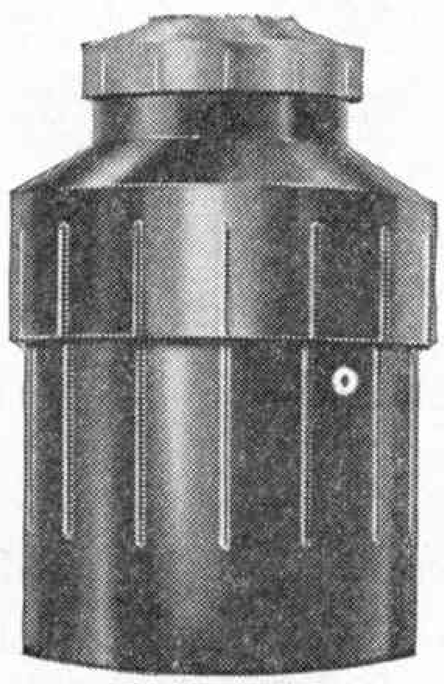

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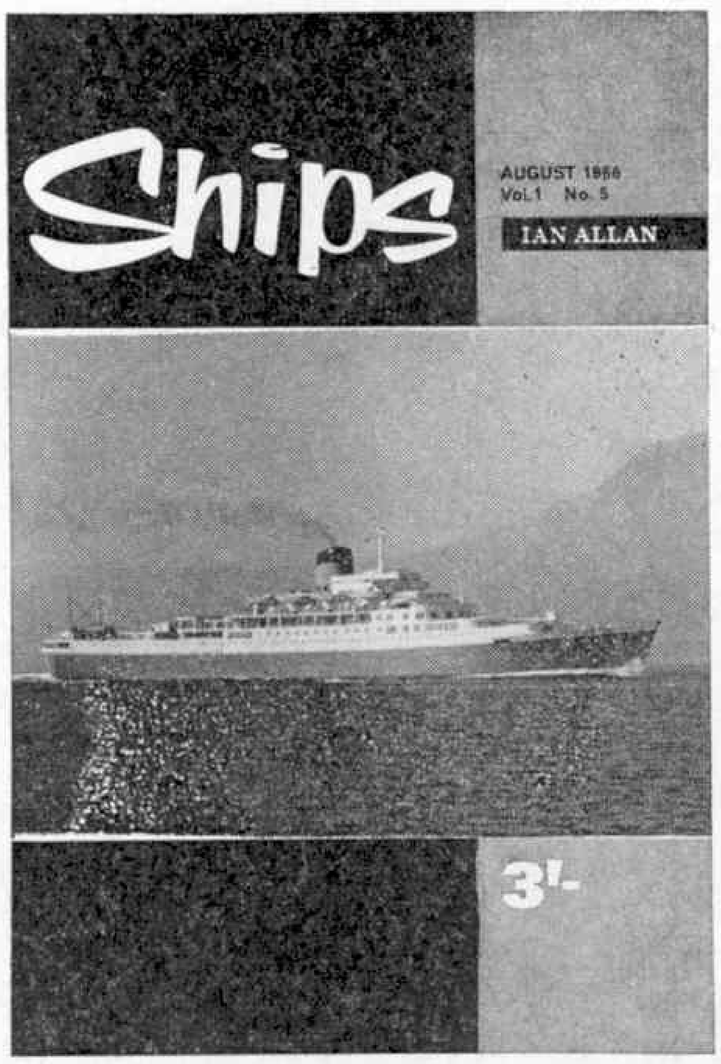

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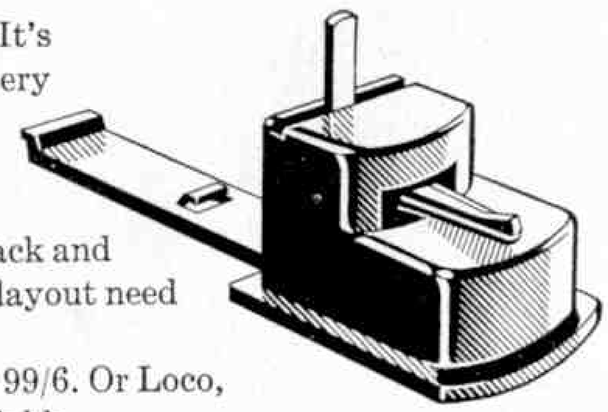

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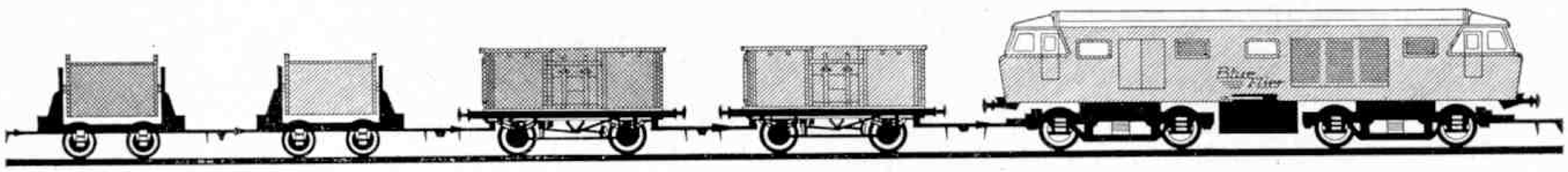

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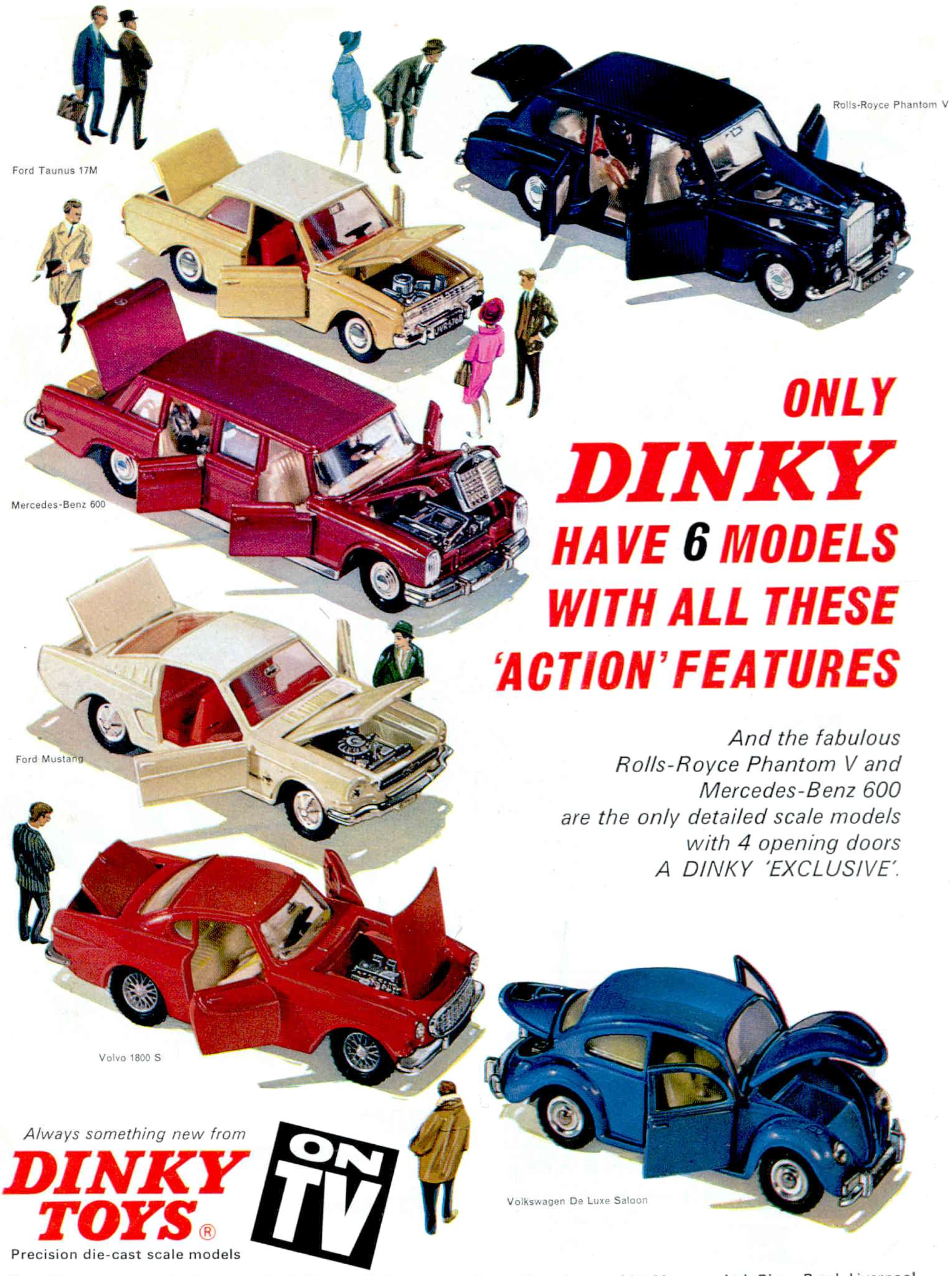

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