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MECCANO MAGAZINE

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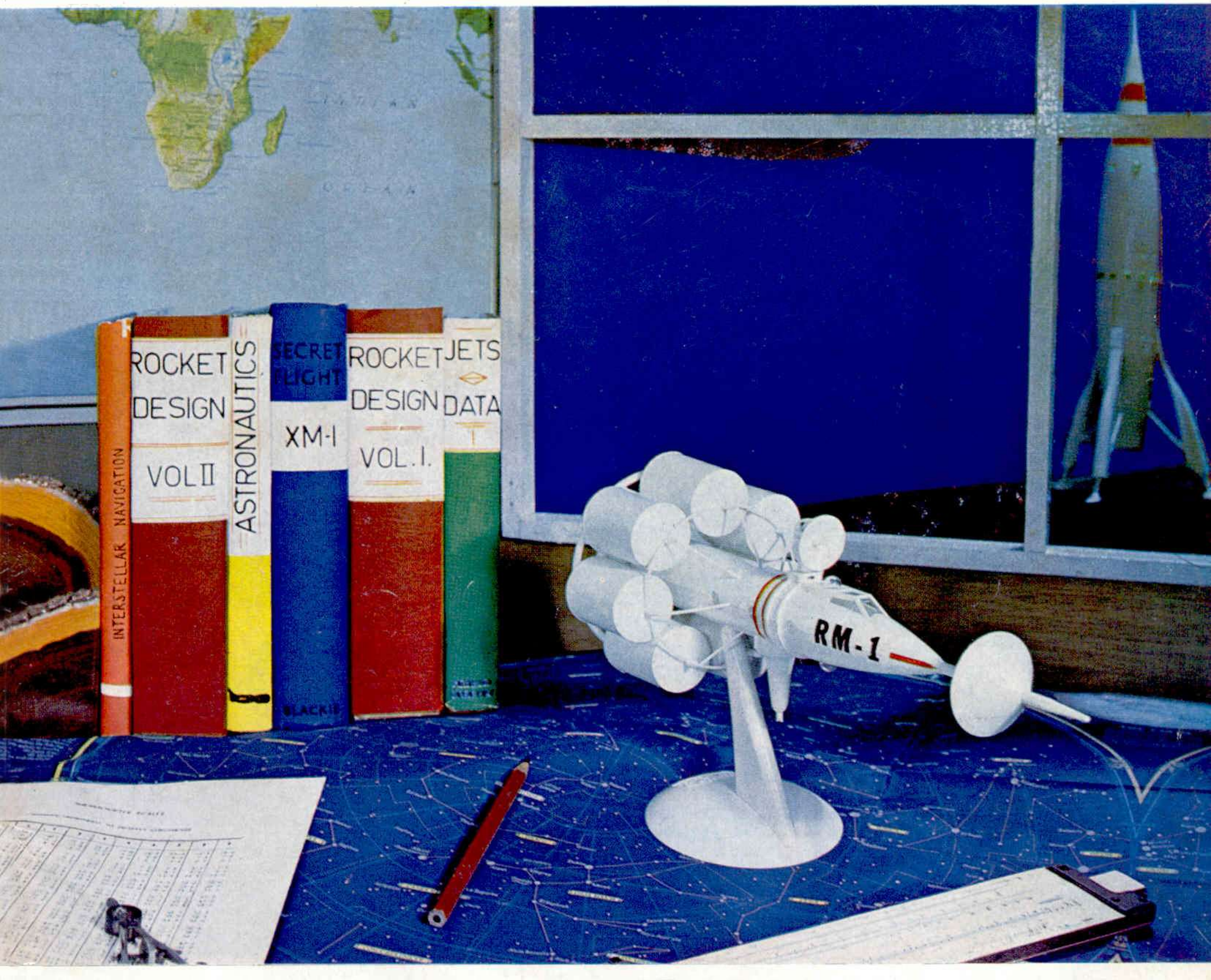

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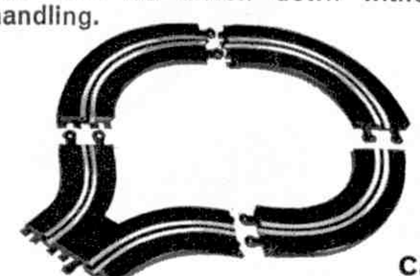

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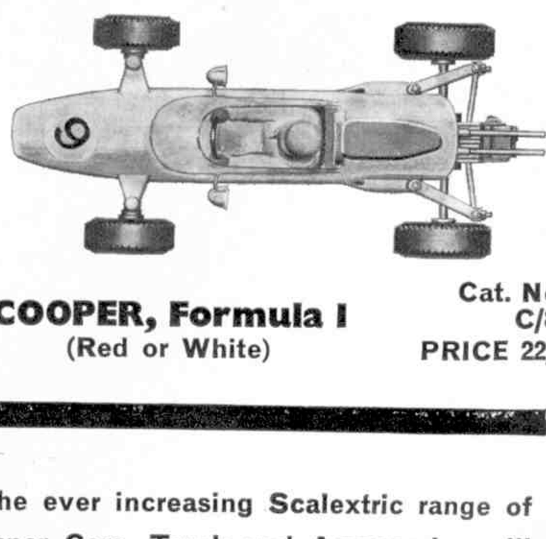

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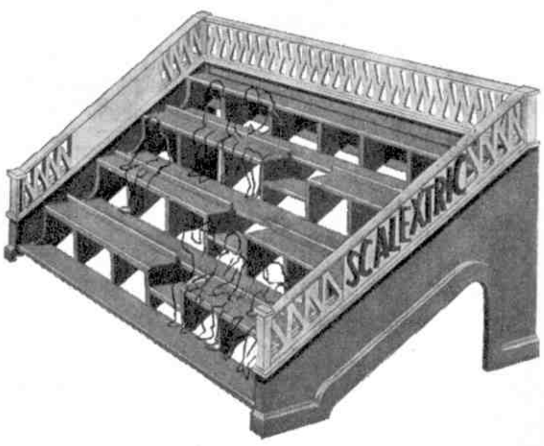

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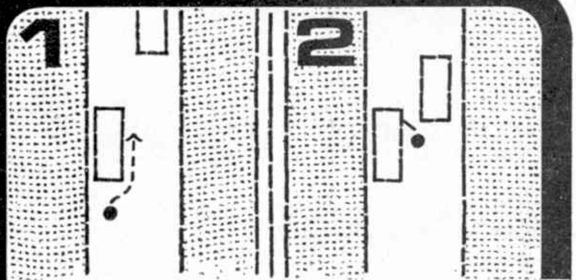

1 Overtaking a stationary vehicle in a narrow street deserves extra care, especially if there is another vehicle approaching you from the opposite direction, preventing you from making a wide, safe circuit. Remember, the driver of the stationary vehicle may well fail to see you in his rear mirror.

2 He might open his off-side door in your path, either causing you to crash, or making you swerve out in front of the oncoming vehicle. The answer—do *not* attempt to pass under such circumstances. Wait until the moving vehicle has passed, and then give the stationary one a wide berth.

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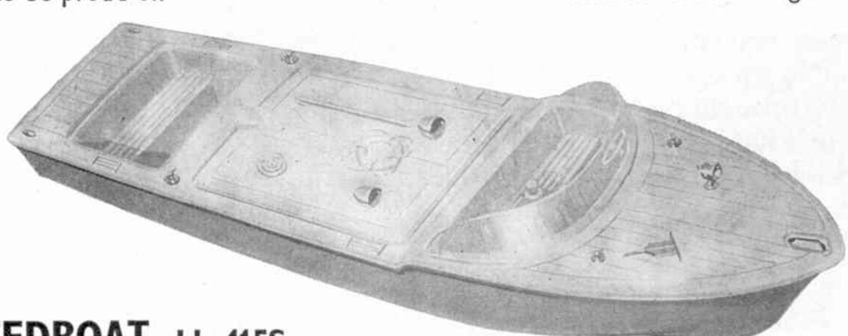

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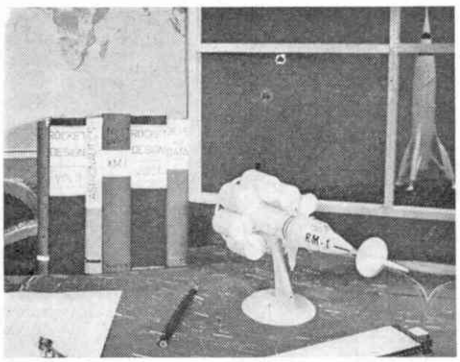

On the cover: Could this be the desk of an aspiring astronaut? A model rocket stands on the desk with books on rocket design and astronautics, and outside the window a giant space-craft stands on its launching pad, awaiting blast-off. Of further interest to space enthusiasts is our feature 'Lunar Vehicles' on pages six and seven.

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Next month: another fine ship plan from Ian Stair, features the Liverpool Pilot Boat. Railway enthusiasts will enjoy the story of the Bay Area Robot Trains.

'Brave Moppie' has gone! Readers who enjoyed the 'Project 66' model power-boat feature in Meccano Magazine earlier this year, and particularly those who built from it a model of 'Brave Moppie' will, I am sure, be sorry to read the following bit of news.

Undoubtedly the most famous and most successful of the modern off-shore high speed racing power boats, 'Brave Moppie' met her end in this year's first big race, for the Sam Griffith Memorial Trophy.

Starting from Miami and running along the coast to Fort Lauderdale, the course then stretched out across the Straits of Florida to the Bimini Islands and back. Conditions were atrocious with the wind whipping up waves between eight and ten feet high—but those were the conditions 'Brave Moppie' had been designed to cope with and give of her best performance. Everyone who knew her reckoned 'Brave Moppie' to be just about the best of the 'rough weather' racers.

Sure enough, 'Brave Moppie' was leading the field after the first turn out from the main crossing—and the weather had already caused twenty-one of the thirty-one starters to fall out, most of them badly damaged and capable only of limping or being towed home. 'Brave Moppie' meantime had been averaging just a little under 50 miles per hour!

Suddenly—so suddenly, in fact, that nobody really knows what happened—'Brave Moppie' started to slow down and fill with water. The bottom of her hull had cracked open. Within little more than a minute she had gone to the bottom, leaving Dick Bertram and his two crew members clinging to a half inflated life raft they had hurriedly launched. The British boat 'Surfury' which had been chasing 'Brave Moppie' stopped to pick them up; having suffered hull damage herself by this point, abandoned the race and returned to port.

Eventually just two boats completed the full course. The first, 'Thunderbird' driven by Jim Wynne, was not eligible for the trophy since she was powered by gas turbine engines, but recorded a 37 m.p.h. average for the 172 miles course. Only other boat home—and trophy winner—was a tiny 20 ft. Deaco Craft driven by Jerry Langer and powered by twin 100 horsepower *outboard* engines—a fantastic feat of endurance in conditions which had wrecked or brought to a halt so many much larger and more powerful boats.

'Brave Moppie' now rests 600 feet below the surface of the waters of Florida Straits, and only about 20 miles from where she was built and first started on a racing career which set new standards in performance. With her sank Dick Bertram's hopes of a win in the forthcoming Nassau race, and a repeat win in the Cowes-Torquay race over here in August—plus an investment of about £55,000 which is the amount she cost to build.

There will probably never be another boat quite like 'Brave Moppie' and off-shore powerboat racers will always remember her. It is fitting that she was the main feature model of the 'Project '66' for she can live again in the hundreds of models built from 'Meccano Magazine' plans.

The Editor

HARRY McDOUGALL

FOR TRAVEL IN A NEW ENVIRONMENT LUNAR VEHICLES

IT is now generally anticipated that, within a decade, a soft-landing interplanetary rocket will deposit a team of astronauts safely on the moon's surface. The ways in which this feat will be accomplished are already known; much of the hardware that will be used is already under test.

But what happens after they arrive? Having accomplished their journey, how will they conduct their explorations?

It is conceivable that the earliest moon - landings will involve only a short stay to permit visual observations to be made through the windows of the capsule, supplemented, perhaps, by a brief sojourn at the end of a tethering umbilical. But eventually, some kind of surface transportation will be required.

The ideal configuration for such a vehicle obviously cannot be established until more information has been gained about the lunar environment, but enough is known to permit serious product design work to be conducted. Lunar vehicle projects are already in various stages of development in the U.S. (and undoubtedly also in the U.S.S.R.).

The basic problem faced by the designer of any lunar vehicle is lack of reliable knowledge of the actual texture of the moon's surface. The Chrysler Corporation, which has a team of scientists and engineers investigating the problems of lunar transportation, has embarked on a very comprehensive study of the various types of soils likely to be encountered. Experiments have been made with basalt, pumice, rhyolite, scoria and volcanic tuff, each type being crushed and pulverized, then spread to form a testing surface. Special equipment was constructed to study the action of the soils under various loading conditions and test the ability of various types of wheels and tracks to negotiate such soils.

Says Chrysler's Dr. Lett, who conducted much of this research, 'We found that soft soils have a greater load-bearing capacity on the earth. We also found that vacuum conditions had marked effects on engineering materials. In particular, friction was increased because of the lack of a lubricating layer of air'.

Describing the problems to be faced, Dr. Lett says, 'The mobility problem on the moon is radically different from that on earth, but there are enough similarities to make terrestrial experience of value. It will be easier to operate in soft soils on the moon because of the complete absence of moisture to make them sticky. The reduced gravitational forces will also ease some problems. But the extreme slopes, crevices, ledges and other obstacles will present serious challenges to the mobility of any vehicle'.

Heading photograph shows an astronaut seated at the controls of a wooden mock-up of the Boeing MOLAB (see picture on facing page)

The proposed 'moon car' evolved by Chrysler is a six-wheeled vehicle powered by liquid hydrogen and oxygen. It would be able to cross crevices of moderate width and would carry a life-support system capable of sustaining two men for up to 24 hours. This would be quite adequate if the vehicle operated from a stationary base to which it would return for systems replenishment.

The vehicle has a rectangular cab to house two astronauts, with circular openings at the front to permit viewing of the moon's surface. A periscope turning through 360 degrees would give additional visibility.

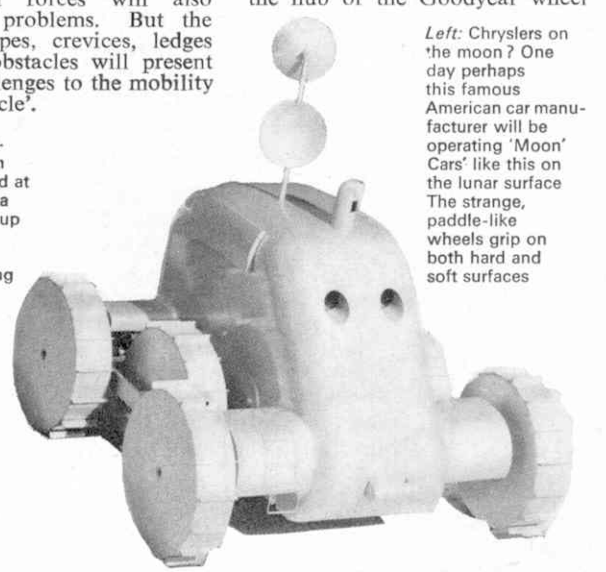
Models of the proposed vehicle show four wide metal wheels each five feet in diameter protruding from the corners of the cab on simple axles. Two other wheels, with a narrower track, revolve on movable arms and are individually powered.

All wheels are fitted with cleats to give added traction under volcanic dust conditions. The four corner wheels, operating on an 80 inch track would normally support the vehicle and give 18 inches clearance. The two smaller centre wheels, being mounted on movable arms, could be extended when necessary to raise the vehicle over obstacles and to negotiate crevices.

The use of tracks appears to have been ruled out by most investigators who have studied the problems associated with lunar travel, but there is still some doubt whether wheels should be rigid or sprung. The Goodyear Tyre Company, drawing on its long experience with tyre problems, has devised a wheel-tyre that may provide an adequate lunar substitute for pneumatic tyres. It has a diameter of 60 inches and a tread width of 12 inches.

DOUGHNUT-SHAPED

The prototype wheel is built around an aluminium hub 12 inches in diameter and 10 inches wide. Since lunar vehicles will be fitted with separate drives for each wheel, the hub of the Goodyear wheel has been designed to serve as a sealable housing capable of accommodating a powerplant and reduction gears.



Left: Chryslers on the moon? One day perhaps this famous American car manufacturer will be operating 'Moon' Cars' like this on the lunar surface The strange, paddle-like wheels grip on both hard and soft surfaces

A doughnut-shaped aluminium tube which functions as both a rim and a tyre-deflection limiting device is connected to the hub by conventional bicycle-type spokes. Fitted around the rim is a tyre of chain-link woven wire, covered by a nylon pad which has a carpet-like surface. The prototype wheel-tyre weighs 58 pounds, of which 54 pounds is metal and the remainder textile tread.

Earlier Goodyear experiments, which led up to the new development, were aimed at devising a tyre capable of functioning only on the lighted, heated side of the moon. The present assembly is designed to operate through the full lunar temperature range which extends from −250°F to +250°F.

The tyre is non-inflatable, all shocks being taken by the flexing of the chain-link wire mesh. Each wheel-tyre is designed for a surface contact pressure of 1 p.s.i. and would be capable of supporting about 265 pounds on earth. This would be the equivalent of 1,600 pounds on the moon, so four such wheels would have a total lunar-carrying capability of 6,400 pounds.

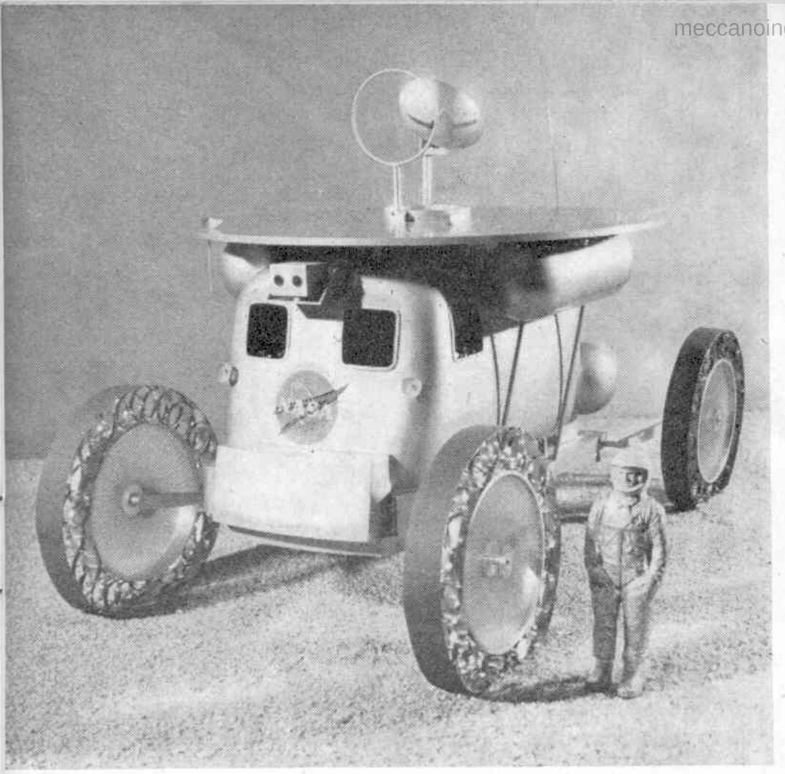
PARTIAL VACUUM

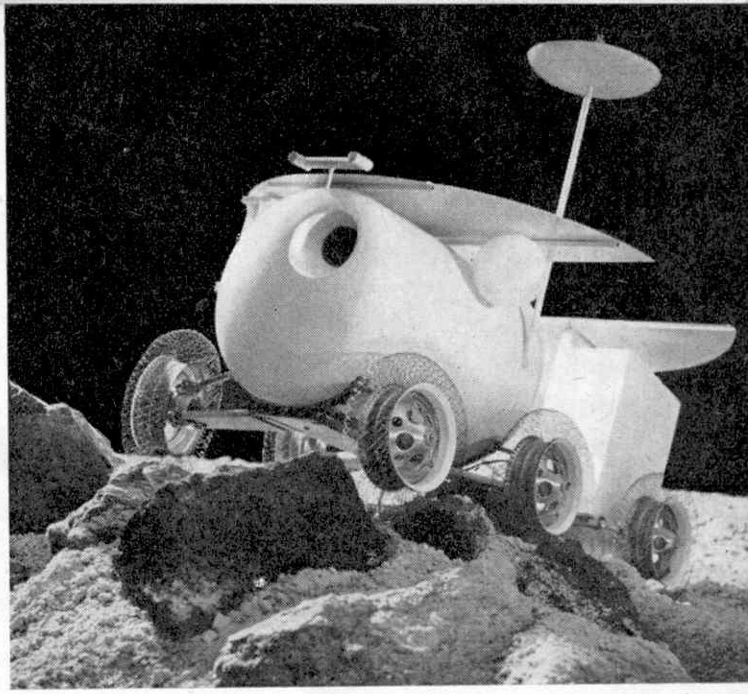
One of the unsolved problems relating to this project — a problem which will also affect other comparable devices — is that on the dark side of the moon, due to the extreme cold temperature and partial vacuum, there is a serious possibility of 'cold' or 'vacuum' welding of the metal loops. This would turn the wheel-tyre into an undeflecting solid structure. How to prevent this happening is, as yet, an unsolved problem. Possible approaches now being studied by Goodyear include the use of neothane lubricant in the joints and of molybdenum di-sulphide as a weld lubricant. It is conceivable that the use of soft metal plating (such as gold or silver) might also be effective in preventing welding.

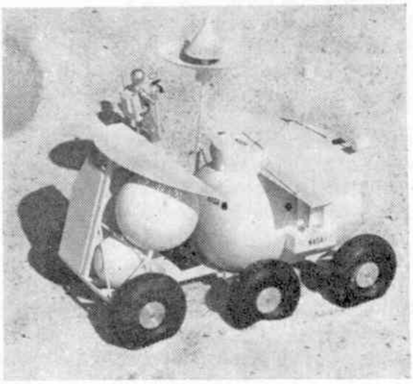
A more radical approach to the problems of wheel construction has been adopted by the Bendix Corporation in designing its metal-elastic wheel. This uses an outer metal tread made flexible by metal coils between it and the inner wheel.

The metal-elastic wheel will be a primary feature of the Bendix Molab (Moon Laboratory) project. The purpose of the Molab, which will weigh 6,500 pounds, is to support two men on a 14-day expedition over the moon's surface.

The horizontal cylindrical cabin is 12·5 feet long and approximately 7 feet in diameter. The forward crew compartment has a volume of slightly more than 400 cubic feet and the rear airlock section has a volume of 125 cubic feet. The crew will







Above: a scale model of a mobile lunar laboratory (MOLAB). This would be the astronauts 'mobile home' during a fortnight's stay on the lunar surface.

Top right: wire-mesh tyres are much in evidence in this view of a mobile laboratory traversing a simulated stretch of lunar 'territory'

Right: the Boeing Molab will weigh about three tons on earth, but the moon's lower gravity will reduce the weight to about 1,000 lbs. at touch-down on the lunar surface

Far right: the 'walking beam' suspension of the Northrop Lunar Surface Vehicle enables it to climb over obstacles, across crevices, and turn completely round in its own length

be provided with 100% oxygen at 5 p.s.i.

The metal-elastic wheels are attached by a torsion-bar suspension system. A six-wheel system was considered but it was eventually decided that there was insufficient advantage to be gained from adding the two extra wheels. Tracked systems were also studied but discarded primarily because of their mechanical complexity.

An important feature of the Bendix Molab is the way in which its bulk can be reduced by pivoting the wheels upward. This action reduces its overall length and permits the vehicle to be stored in the nose of the missile which will deliver it to the moon.

Electric motors mounted inside the wheel hubs will be used to drive the vehicle, and any two will be sufficient to provide propulsion. The primary power source is a three-module package of 2·5 kW fuel cells—sufficient to provide 700-800 kW.hr. of power to carry the vehicle on a 250 mile journey. It is estimated that 650 pounds of hydrogen-oxygen expandables will be required to operate the fuel cells and a further 450 pounds will be needed for the life-support systems.

A secondary power source has been included in the design. This is a radio-isotope thermal generator and battery system to be used for the initial remote-controlled test-run of the Molab.

A radiator on top of the vehicle will be used to dissipate heat from the environment control system and from the hydro-oxygen fuel cells. It will also provide the primary thermal and micrometeoroid shielding.

Bendix is making studies of the structural and chemical changes that occur in particular earth minerals when they are subjected to a simulated lunar environment. Simulated lunar materials are also being made by suddenly exposing melted rock materials to a vacuum.

Says J. Lynn Helms, general manager of the division which has undertaken this work, 'We are studying a number of different earth minerals, plus glass, tektite and several other synthesized minerals which we think may have counterparts on the moon's surface. We are also planning to simulate the returning-spacecraft environment and test the stability of lunar minerals when exposed to the temperature, humidity and atmospheric conditions of the spacecraft and of the earth'.

One of the most advanced vehicles destined for use in lunar exploration has been devised by the Northrop Corporation which has made special efforts to develop a vehicle mobility system capable of traversing virtually any type of surface.

The result of Northrop's investigations is a unique 'walking beam' suspension system utilizing eight wheels. Each pair of wheels at each side is attached to an individually-powered, pivoted beam which can be raised, lowered, rotated, locked or freed in any combination. The wheels are only 40 inches in diameter, but because of the system's self-levelling and variable ground pressure capability it can surmount obstacles more than 45 inches high and cross crevices wider than 80 inches.

The two-man cabin has a 305 cubic foot main compartment and a 120 cubic foot secondary compartment providing radiation protection, an air-lock, sanitation facilities and an emergency life support system. Radiation shielding is incorporated into the cabin structure and additional shielding for solar flares is provided in the airlock compartment which serves as a 'radiation storm cellar'. Used in conjunction with an external bumper, the cabin, which is a welded aluminium monococque structure, gives a very high degree of micrometeoroid protection.

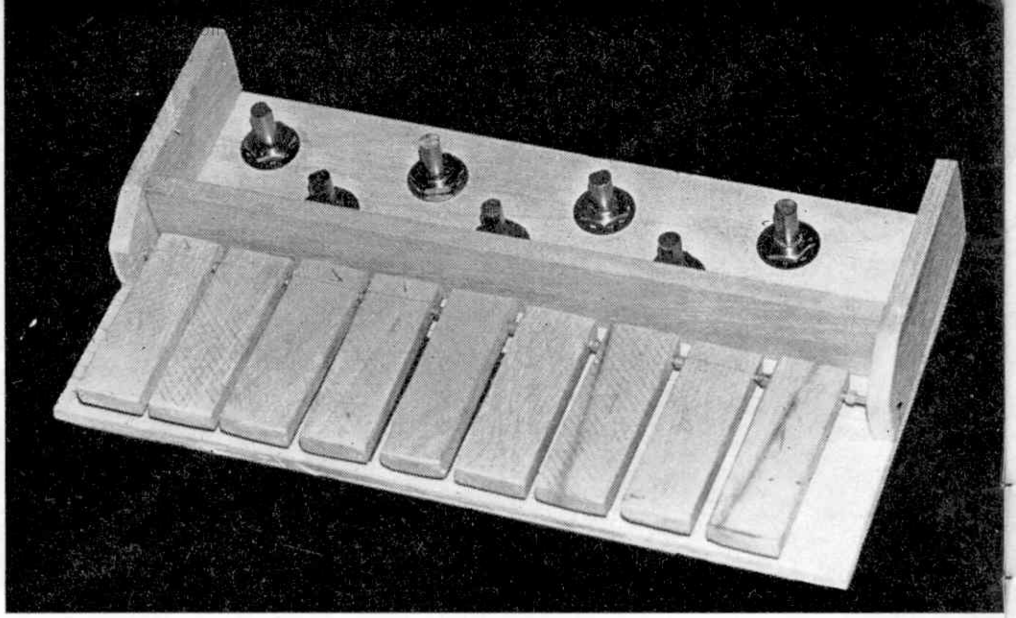
Fuel cells provide a nominal six kilowatts of electrical energy and the potable water by-product supplies cooling, drinking and sanitation requirements.

A radio isotope thermoelectric generator will supply power during the dormant period between the time the vehicle arrives on the moon and the arrival of the crew.

One of the most intriguing aspects of the design problems faced by manufacturers of lunar vehicles is that they give endless scope for ingenuity. In most vehicle design projects, the problems encountered are solved successfully but only by making mechanisms more complex. For a lunar vehicle, operating in situations where malfunctions might be fatal to the occupants and where the prospects of assistance being available are not very high, simplicity of operation and extremely high reliability will be essential.

Says Chrysler's Dr. Lett, in summary, 'The way to achieve reliability is by simplicity, using components with a minimum number of working parts'.

Ron Warring's drawings and instructions together with our photo building hints will help you to make a first class job of this



M.M. ELECTRONIC ORGAN

Part 1. The Keyboard

An electronic organ may seem a very advanced sort of project to tackle, but in fact it is not. More important still, it need not be expensive, either, and you can 'adjust' the size of your organ to what you can afford.

First, let's see just what an electronic organ consists of. Basically it comprises three separate units—a keyboard, a note generator and an amplifier—Fig. 1. The keyboard acts as a switch for the note generator, which can be a very simple transistor circuit (similar to, but simpler than, the metronome described in the May issue of Meccano Magazine). In order to make the notes audible at a suitable listening level via a loudspeaker a simple amplifier stage must then be added. That's all there is to it!

Rather than a single switch the keyboard, of course, really comprises a series of switches, each providing a different note. You can go on extending the number of keyboard notes by increasing the number of individual switching circuits. Also, to extend the performance of the organ further you can use separate keyboards for treble and base notes. In this case each keyboard feeds its own separate note generator and amplifier—Fig. 2.

Now the important thing is that regardless of the number of notes you want in the keyboard the following note generator and amplifier units remain exactly the same, provided you are content to play each note separately. Also most of the expense is in the keyboard unit, so you can decide just how far you can afford to go. Then if you want to extend the range of your electronic organ at a later stage you can do this quite easily by adding more keys and key circuits.

For our model we have chosen a nine-key keyboard. This will give eight notes to cover a full octave and leave one key spare for adding a 'tremulo' circuit later to enrich the sound of the organ. One keyboard will then give full octave coverage, which means that you can play virtually any simple tune on it. If you want to extend the performance of your organ then rather than increase the number of notes it is better to build a second keyboard to give 'base' notes. Construction is identical, so you can build one first (the treble keyboard) to get the organ working; then build another (base) keyboard to go with it. This will mean making another note generator and amplifier circuit to go with it.

Part 1 will be devoted to describing the construction of the nine-key keyboard so you can build one for a treble-only organ; or two for a treble and base organ. Part 2 next month will then describe the simple 'electronics' involved in making the note generator and amplifier. At the end of this stage you will have a full working electronic organ. Part 3 will then describe how to add an additional 'tremulo' circuit operated by the spare key on the keyboard.

A plan view of the complete keyboard is given in Fig. 3 and a side view in Fig. 4. In Fig. 4 two keyboards are shown mounted together, as they will appear if you are making a treble and base organ. If you are only making a single keyboard organ you will need only the top keyboard.

Construction can be followed more easily from the step-by-step illustrations of Figs. 5, 6, and 9. As a further help, full size patterns are given in **Fig. 7.**

Start by cutting out the base panel to size from ¼ in. ply. Mark and drill the holes for the seven potentiometers. Also mark the positions of the nine screws which hold the contact strips to the base; and the nine roundhead screws which form the contacts. Then cut and fit the remaining pieces required to complete the keyboard assembly to the stage shown in Fig. 5.

The seven potentiometers can then be fitted through their respective holes (see material list for specification). Cut and bend seven contact strips from springy brass to the size and shape shown in Fig. 6, drilling one end to take a retaining screw. Insert the roundhead screws in their positions and then secure each brass strip with a countersunk head screw so that it lies over the top of its corresponding contact screw without actually touching it. You can use machine screws in both cases (i.e. brass nuts and bolts); or woodscrews. In the former case you will have to drill holes. Woodscrews should be at least ⅜ in. long (brass again) so that the points emerge through the bottom of the base.

Having mounted all the potentiometers and the nine brass strips and contacts, turn the assembly over and make the wiring up connections shown in Fig. 8. Ordinary copper wire will do for this; it does not have to be insulated. Note that all the points or ends of the roundhead screws (contacts) are joined together, whilst the potentiometer tags are connected to individual screws as shown. *Solder* each wire connection in place; and also solder on two lengths of insulated wire (e.g. flex) to complete the extension leads A and B. These will connect to the note generator circuit.

Turn the keyboard the right way up once more. The keys are 2½ in. lengths of ¾ in. wide

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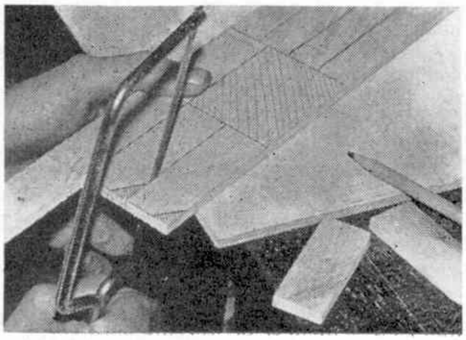

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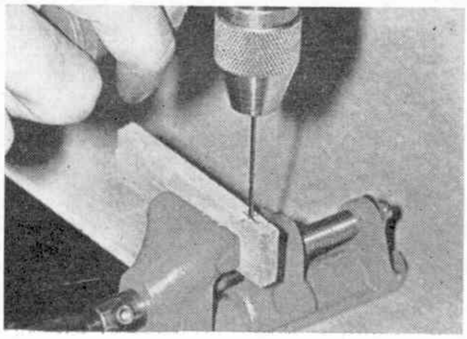

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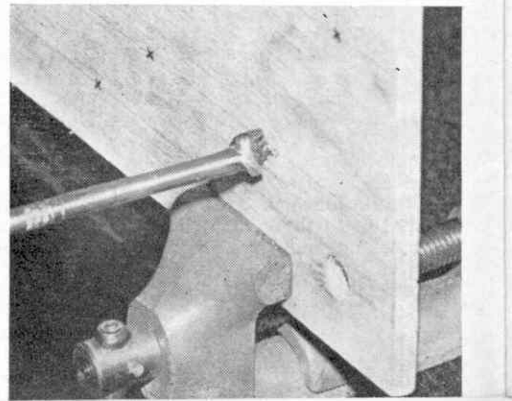

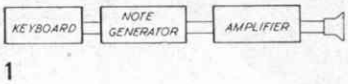

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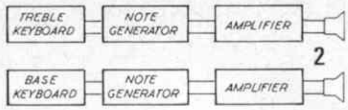

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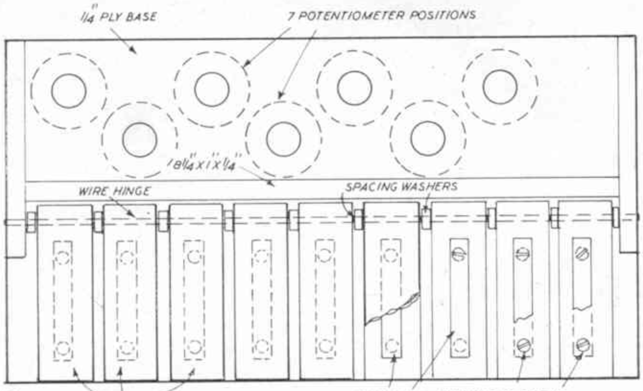

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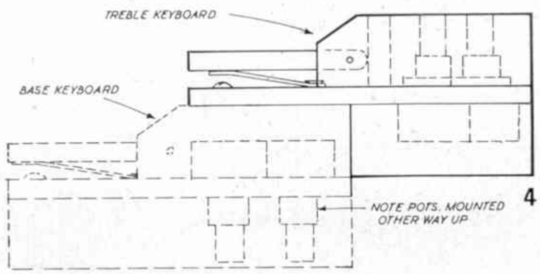

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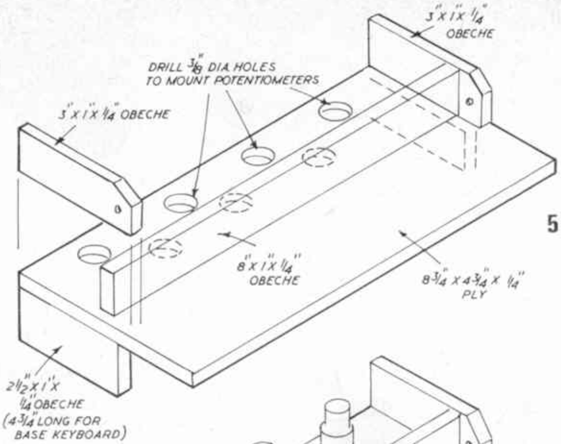

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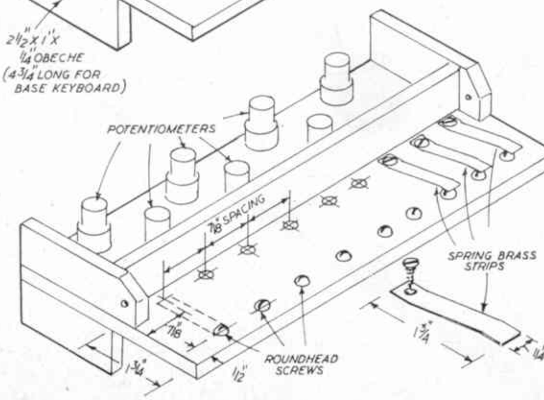

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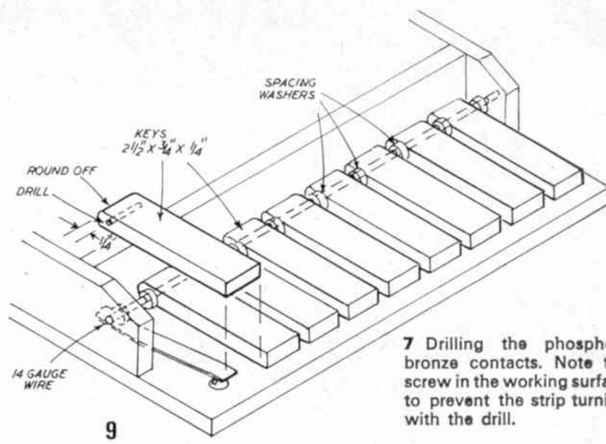

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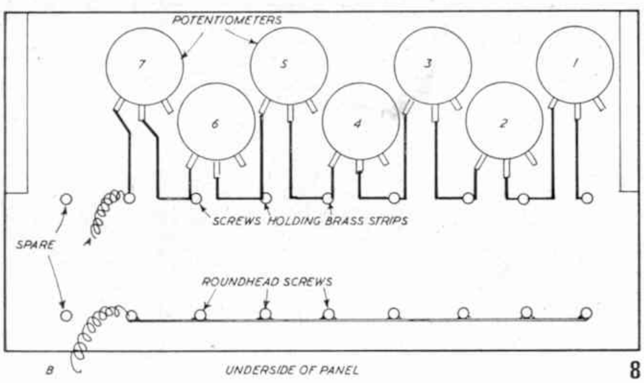


8

7 Drilling the phosphor-bronze contacts. Note the screw in the working surface to prevent the strip turning with the drill.

8 Contact strips are now screwed in place on the obeche base. Note the slight bend in each strip, and the round-head contact screws.

1 Cutting out the parts marked on ½ in. obeche sheet.

2 Drilling a key held firmly in the vice.

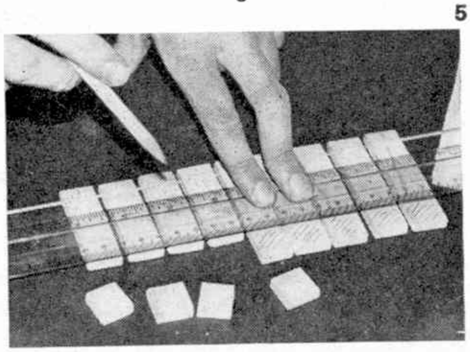
3 Cutting the large holes for the potentiometers with a ⅜ in. bit held in a carpenters brace.

4 Using a gimlet to prepare holes for the brass screws.

5 Keys are initially cut over length, then strung onto the wire and trimmed to correct length as shown.

6 Contacts are cut from ¼ in. wide phosphor bronze or hard brass strip, obtained from Smiths of Clerkenwell, using tin-snips.

5



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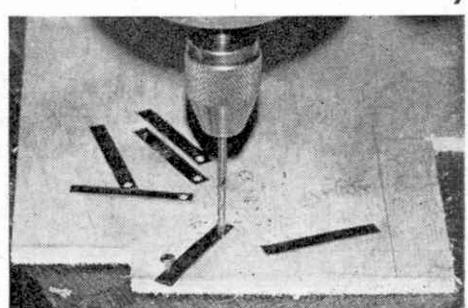

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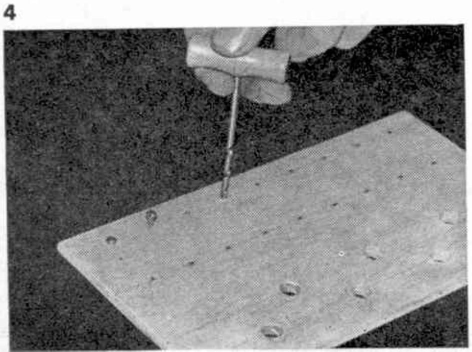

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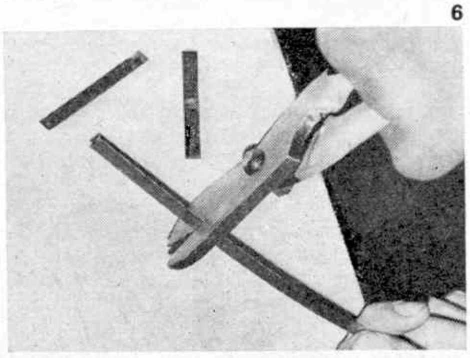

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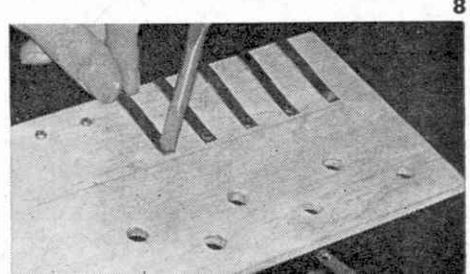


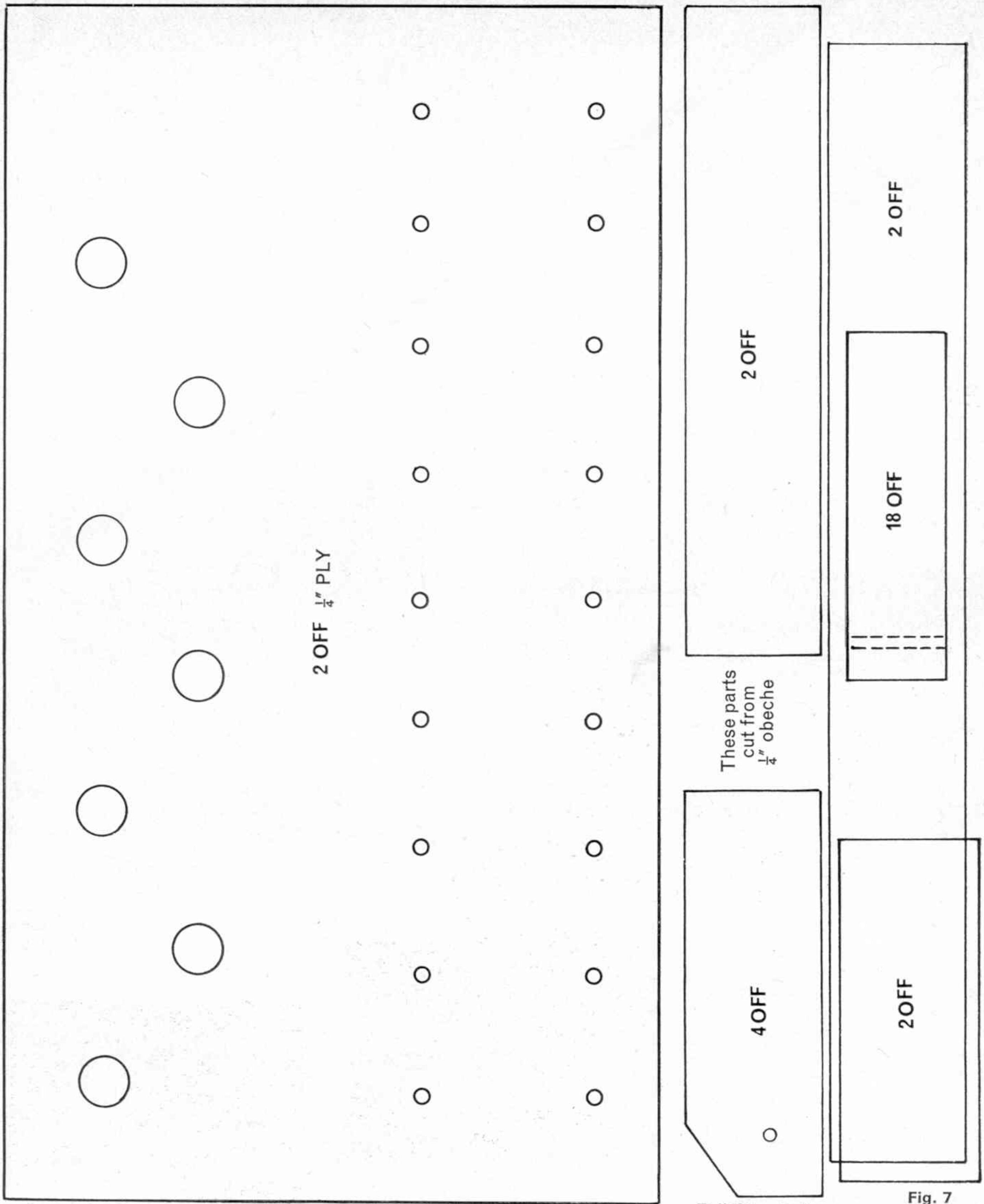


Fig. 7

Full Size Patterns

by ¼ in. thick obeche or similar wood. Round off one end neatly and drill with a 5/64 in. drill ¼ in. from the rounded end as shown in Fig. 9. When you have made a complete set of nine keys, mount in position on a 14 gauge piano wire, as shown, with small spacing washers located between each key. Adjust the shape of the brass spring strips, as necessary so that all the keys are uniform and level. Then check that gentle pressure on each key closes the respective contact underneath it—i.e. forces the end of the brass strip down onto its roundhead contact screw.

This completes the keyboard assembly. Make one or two as required. With the exception of the potentiometers, all the materials required are 'standard' materials which you can obtain from any model shop.

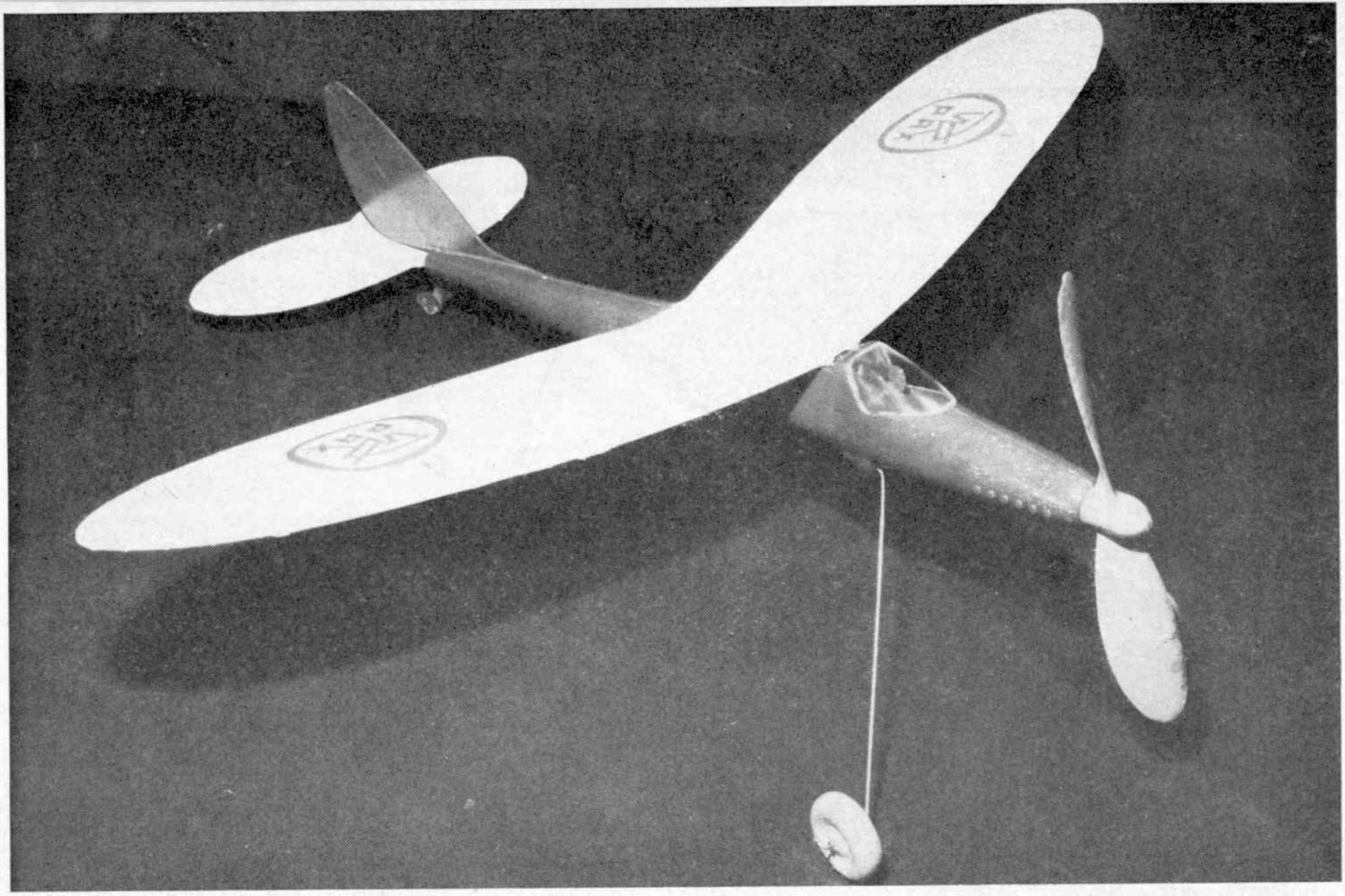
The potentiometers should be of linear type, approximately 1 in. diameter, with the following values:-

Treble keyboard:

Potentiometers 1, 2 and 3 - 5 kilohms
Potentiometers 4, 5, 6, and 7 - 10 kilohms

Base keyboard:

Potentiometers, 1, 2, 3 and 4 - 10 kilohms
Potentiometers 5, 6, and 7 - 20 kilohms



PRANG PROOF PAX

From Germany comes a new range of flying models—it's quite an extensive range too, from a little catapult glider at 6s. 6d. to the rubber powered giant Pax 17-30 in. wingspan, costing 42s. 6d. The models clip together in a most ingenious way and are quite the toughest flying models we have ever seen! The wing and tail construction is very interesting—consisting of a spring steel wire frame with wire ribs soldered in place, and the covering is a particularly puncture-resistant plastic sheet.

Wire-frame wings are, of course, not really new. The Japanese made models on this principle many years ago, and early flying models used the idea before the days of balsa wood. These old planes used oiled silk as a covering material, and this was quite a vulnerable fabric. The new plastic sheet on the other hand is virtually indestructible!

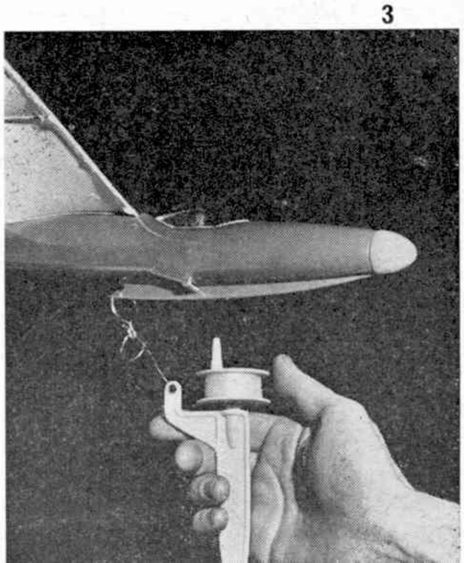
Fuselage and propeller are moulded plastic and extremely strong. The 18 in. span 'Pax 7' in our photos had been flown for a whole afternoon *before* the photos were taken. In this time it had repeatedly flown full tilt into wooden and wire fences, been stranded up trees and ensnared in gooseberry bushes. The only evidence of this rough treatment are the very slight chips from the front of the propeller.

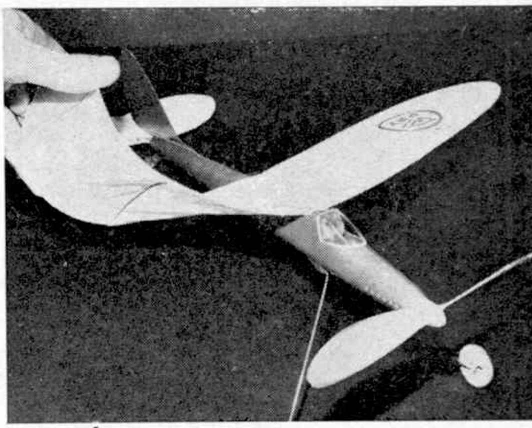
1 You can't do this to the ordinary model and get away with it! In fact we don't recommend the treatment for these Pax jobs either, but the photo does demonstrate the toughness of the wire-framed wing, which, on release, returned to it's original shape!

2 The covering is almost puncture-proof. Here we are trying to push a finger through it and having little success.

3 The 'Pax 14' glider comes complete with this tow-line winch and line already fitted with launching rings. The nose is made from a very soft plastic and this minimises the risk of damage—to property—not the glider which, like the other models in this range of just about prang-proof!

3





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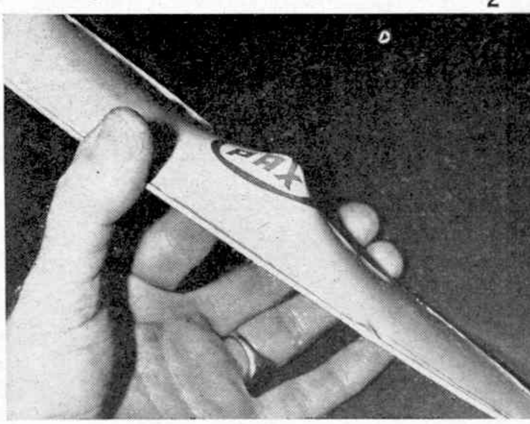


For further details of Pax Models you should write—mentioning Meccano Magazine—to A. A. Hales Ltd., 26 Station Close, Potters Bar, Herts. They will send you an illustrated price list showing the complete range.

RAILWAY NOTES

New Track relaying Equipment
The London-Midland region have taken delivery of three pairs of Secmafer single line relaying gantries specially designed for them to permit relaying operations under overhead catenary equipment, when only a single line is under the possession of the permanent way engineers. This enables train services to be maintained on normal routes, with diversions on to the adjoining line in the vicinity of relaying operations, reducing delays to a minimum. The gantries operate in pairs and are carried to the site on specially fitted Flatrol wagons from which they can be loaded and unloaded under their own power in a few minutes. The gantries propel themselves on long welded rails up to 10 feet in gauge, subsequently used in place of the 60 feet temporary rail in the prefabricated track laid by the gantries. Mounted on four double flanged wheels, the gantry is driven by hydraulic motors on two wheels to give a speed of 6 m.p.h.

Problem Bridge at Ibrox
The problem faced by the Scottish Region of British Railways in demolishing the deck of a massive bridge was to raise it 18 inches, build a new deck on, keep traffic moving on the busy highway crossing it, and surburban trains running on the lines below, while the work was going on. The bridge is the one at Ibrox, Glasgow, which carries busy Paisley Road West diagonally over the main railway line to the Clyde Coast. The bridge also carries gas, electricity and water pipes, and also the cables for Glasgow Corporation School's television service. It is expected that the conversion will take nine months and will entail re-routing the pipes and cables which will have a bridge specially built for them. The first stage will be to lift 135 ft. of the deck, diverting east bound road traffic only, later attending to the other side of the bridge and diverting the westbound traffic.

Relaying at Ravenglass
The Ravenglass and Eskdale Railway has recently relayed the whole of the line from Raven Villa Corner to Black Bridge near Muncaster Mill, and from there to Mill Wood, with new sleepers and ballast. This proved a particularly difficult undertaking because of bad weather and also because this is normally the wettest and most overgrown part of the line. Many of the concrete standard gauge sleepers that were previously used have been replaced at Murthwaite for approximately $\frac{3}{4}$ of a mile, making this one of the best sections with smooth gradients and sweeping curves. The locomotive 'River Esk' has also been overhauled and was the engine used for the Easter traffic.

Stranraer Terminal Stranraer, the Scottish Terminus of the short sea route to Northern Ireland, now has a new terminal building, costing £35,000. Designed to cope with the ever increasing number of motorists using the 'Caledonian Princess' Car Ferry, the new terminal is a single storey timber building with a spacious T-shaped main hall around which is located a booking office, telephone booths, toilet facilities, bookstall, cafeteria, and office accommodation for the motoring organisations.

New Locomotives for Welshpool
Recently acquired by a member of the Welshpool and Llanfair Light Railway Society is the 0-4-0+0-4-0 Mallet Locomotive 'Monarch' from Bowater's Paper Mills. It is to be presented to the Welshpool and Llanfair Light Railway Company, who intend repainting it in the standard Bowater Livery of green edged with black with a yellow line. The Company say that the locomotive will be of great value when the section of line to Welshpool is reopened.

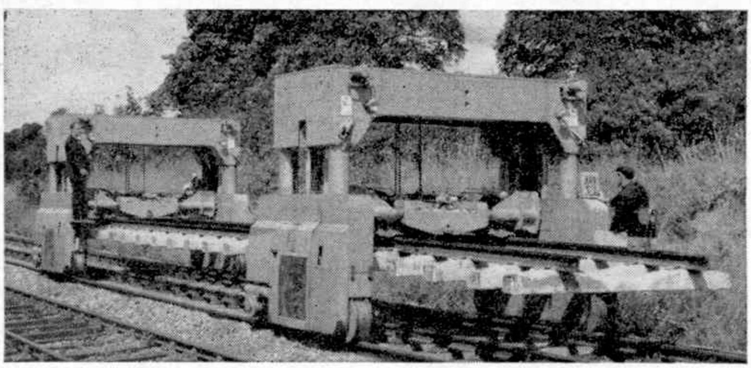
A ceremony was also held at Llanfair on April 9th, 1966 when representatives of the Zillertalbahn, the Austrian narrow gauge line, presented two bells for Welshpool locomotives 'The Earl' and 'The Countess' in return for nameplates bearing the inscription 'Castle Caereinion' which are now carried by Zillertal locomotives.

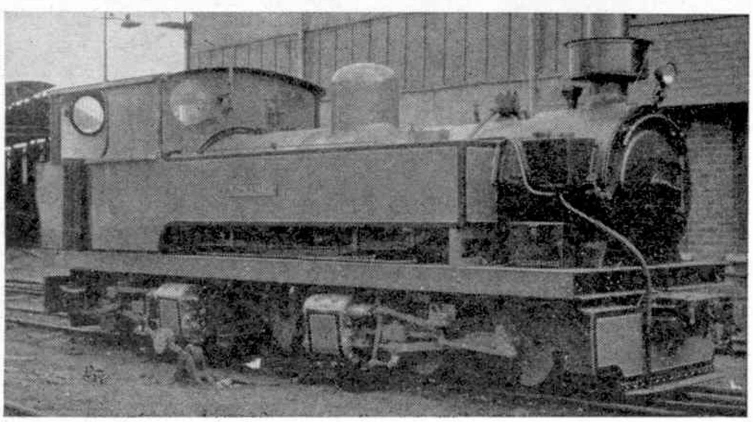
Eastern Region Speed-up
Although the improvement in train services on the Euston-Liverpool-Manchester main line have to some extent eclipsed developments on other regions of British Railways, many train services are being accelerated in other parts of the country. The Eastern Region have for instance recently announced that the 'Flying Scotsman' running between Kings Cross and Edinburgh has had its running time cut to 5 hrs. 50 mins., for the 393 mile journey, 5 mins. less than at present and the fastest ever. The region also plans to run new high speed trains between Kings Cross and Leeds. The journey will take 2 hrs. 40 mins., making an average speed of fractionally under 70 m.p.h., as compared to the present fastest time of 2 hrs. 55 mins. A new pattern of regular services on the East Coast route and an hourly service between Kings Cross and Darlington and Newcastle is also planned, and accelerations of up to 19 mins. are to take place between Kings Cross, the West Riding, the North East and Scotland on regular interval timings.

'Ton-up' Trains to Bristol
The British Rail Western Region's new 1966/67 timetable includes the first over 100 m.p.h. trains linking London with Bristol. Six crack trains a day on this important business route will regularly travel at over 100 m.p.h., over sections of new high speed jointless track between Paddington and Challow (halfway between Didcot and Swindon), a distance of over 60 miles. The trains, painted in B.R's new blue and light grey livery and specially equipped with smooth riding bogies, will each be hauled by two diesel locomotives working in tandem to give a combined output of 3,500 h.p. Two Expresses, the 08.45 hrs. from Paddington and the 16.15 hrs. from Bristol, will each cover the 118$\frac{1}{4}$ mile journey in 105 mins. maintaining average speeds of close on 75 m.p.h. A higher average speed over the shorter distance of 94 miles between London and Chippenham will be achieved by the 14.15 hrs. from Paddington, cutting 10 mins. off its journey time. Two other Bristol-London trains, the 11.15 hrs. and 18,15 hrs. serving Bath, Chippenham, Swindon, Didcot and Reading, will also run up to 10 mins. faster.

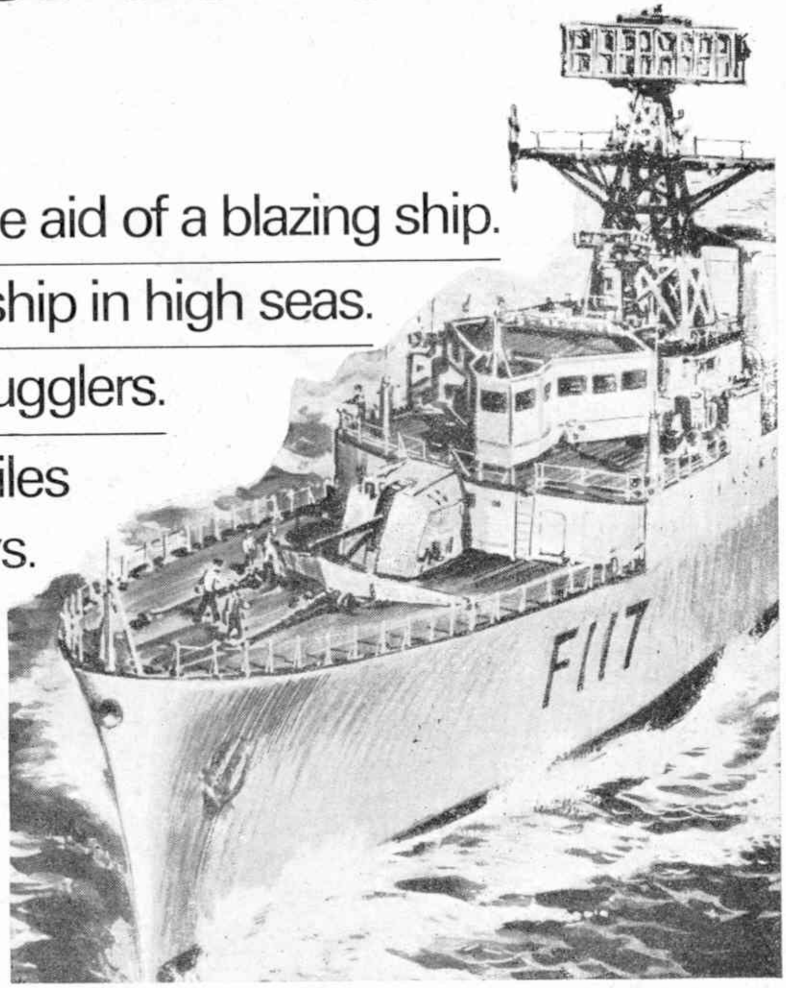
Other features of the timetable are the introduction of the first day—Car Carrier train to link London with Devon and Cornwall, and a new regular 100 m.p.h. train from South Wales to London. This will be the 08.20 hrs. from Swansea which was previously timed to cover a run between Newport and Paddington, 133$\frac{1}{2}$ miles, at an average of close on 70 m.p.h., reaching the 100 m.p.h. mark on the last 60 miles of its run into Paddington.

Top: Boyer Schwatz Secmafer diesel-operated track relaying gantry at work laying new concrete sleepered permanent-way. Bottom: 0-4-0+0-4-0 Mallet locomotive 'Monarch' recently acquired by the Welshpool and Llanfair light railway from Bowater's Paper Mills





Looking for adventure?

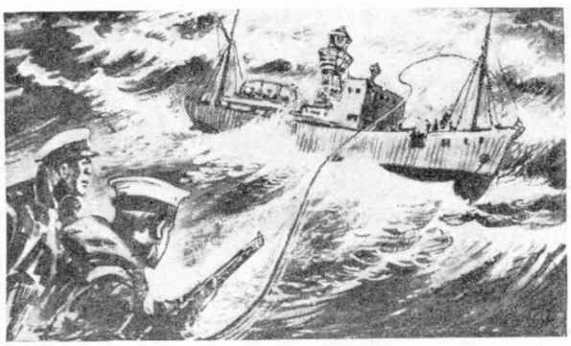


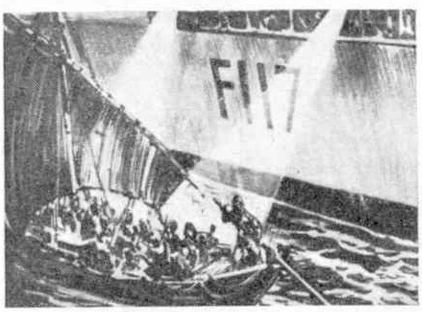
How about dashing to the aid of a blazing ship.

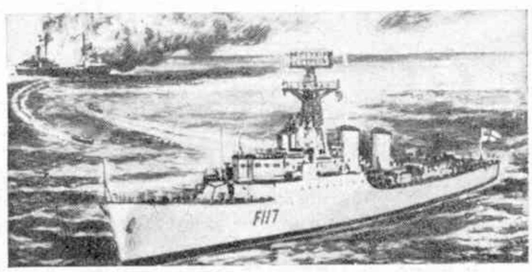
Rescuing a drifting light-ship in high seas.

Searching for armed smugglers.

Steaming 50,000 sea miles in 150 action-packed days.







That's adventure - and it can be yours!
These were just some of the exciting things that happened to HMS Ashanti in the Middle East recently. And that's life in today's Royal Navy. Action and adventure – all the way.

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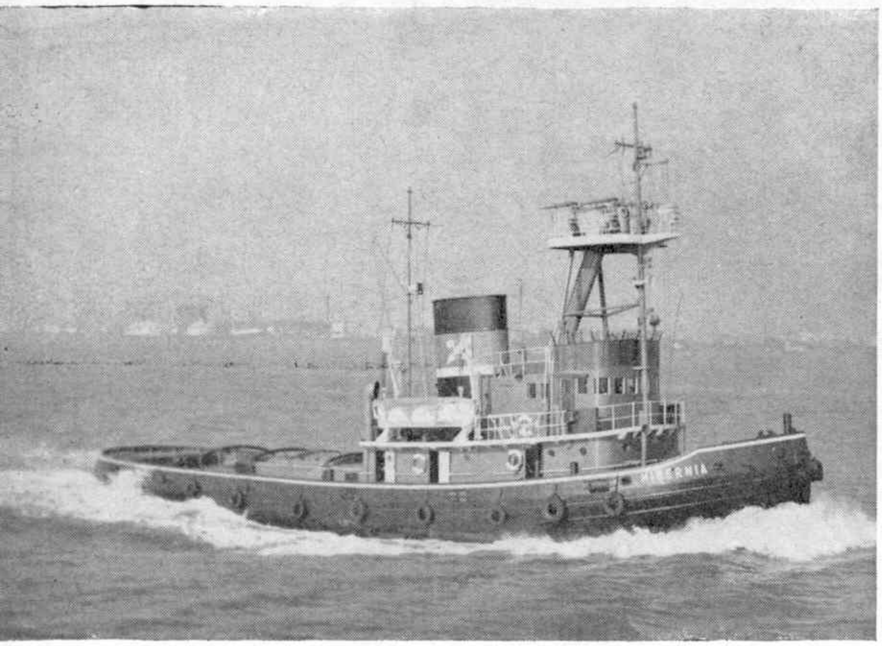
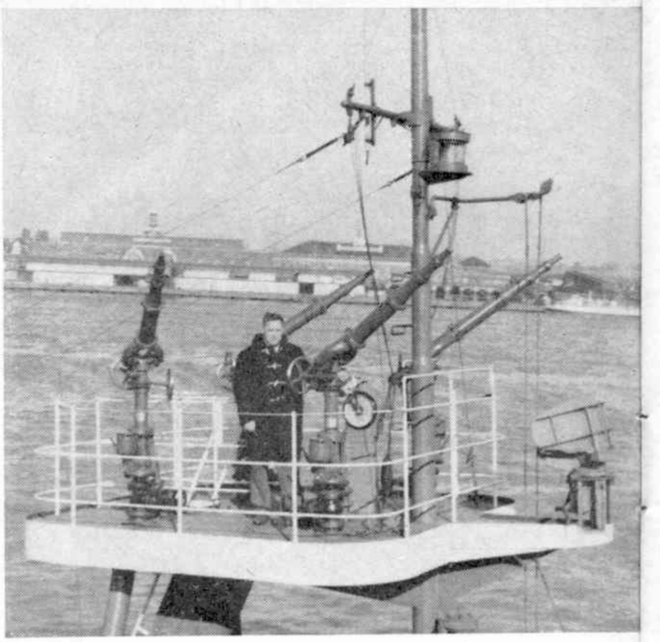



Photographs by A. O. Pollard Jr.

Work-horse of the sea and all-time ship modellers' favourite—the tug—is the subject chosen by Ian Stair this month for his scale drawing and ship feature.

THE THAMES TUG HIBERNIA

FOR the first powered vessel in this series we have chosen a modern tug. This seems particularly appropriate as tugs are directly related to the earliest steam boats and are a deservedly popular subject for working models. A model tug ¼ in. to 1 ft., about 28 in. long, will have adequate displacement for radio control and yet be handy carrying around. For readers who wish to make a working model hull lines have been included in the drawing. These have been drawn parallel to the keel as this makes things easier for building a hull by the 'bread and butter' method. These hull lines are typical of the modern tug and are not the actual lines of the *Hibernia*. Although less often made for display, tugs are very effective both as full hull and waterline models.

When steam power was first applied to ships, engines and boilers were both large and inefficient. Enough fuel could not be carried for long sea voyages and as auxiliary power in sailing ships they took up far too much cargo space. The earliest steam boats were essentially river craft where distances were short and the sailing ship at a great disadvantage unless the wind was in the right quarter. One of the first practical steam ships was built as a tug to work barques on the Forth-Clyde Canal. This was Symington's *Charlotte Dundas*, which was abandoned due to the problem of erosion of the canal banks and not to any technical defects.

At this time large sailing ships coming into river ports were towed in, when necessary, by small rowing boats, a method slow and costly even with prevailing low wages. This must have been very hard work particularly if overcoming an adverse wind as the resistance of masts, spars and rigging was considerable even with sails furled. Despite this the watermen opposed the advent of power in no uncertain manner, especially on the London river. However, resistance against progress is usually a losing battle and this proved no exception.

By the eighteen-twenties the first paddle tugs were operating on the Clyde and on the Thames by the mid-thirties. The tug *Monarch* of this period was immortalised by Turner in his famous painting 'The Fighting Temeraire', showing the Trafalgar veteran being towed to her final berth for breaking up. The *Monarch* was owned by John Rogers Watkins.

By the middle of the century tugs were getting larger and the engines more compact and efficient. This enabled them to proceed to the open sea to meet the incoming ships and to take on long towing jobs to Europe and the Mediterranean. A well known tug of this period was another Watkins ship, the *Anglia* of 1866. Famous for her three funnels, one forward and two abreast aft, and because of her voyage in 1878 to Alexandria to bring back Cleopatra's Needle encased in a special vessel.

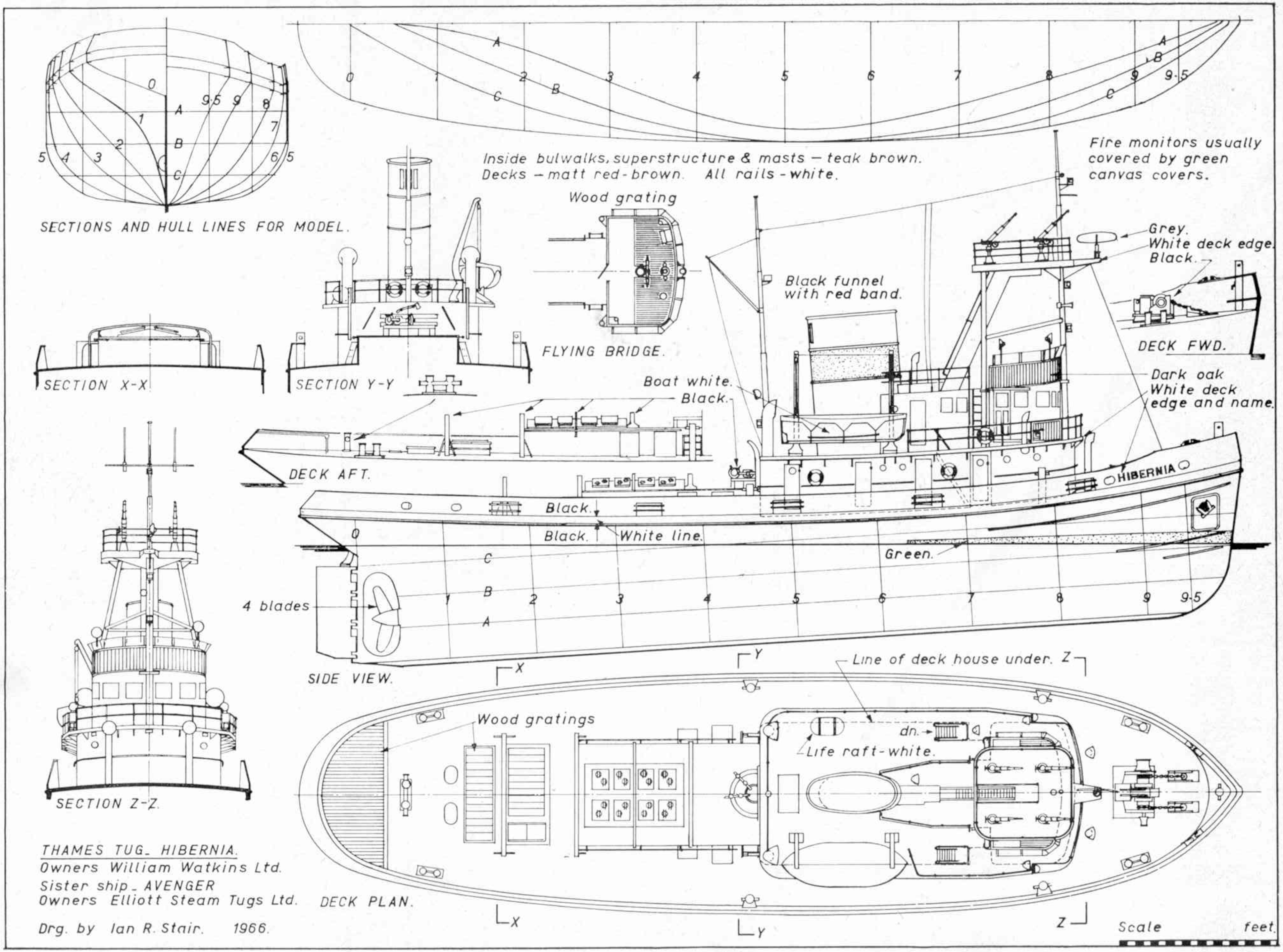
The *Anglia's* return coincided with the beginning of the end for the paddle tug. The first screw tugs had appeared and by the First World War they had almost completely supplanted the paddle tugs. The previous *Hibernia* was among the best known of the earlier screw tugs. Entering service in 1884 she took on several long tours, not only to Europe but as far as Alexandria and the Persian Gulf. As H.M.S. *Hibernia III* she saw service in the Dardanelles during the 1914-18 war. Rebuilt in 1923 she carried on working until 1961.

With the old *Hibernia* having such a distinguished career it is not surprising that William Watkins Ltd. revived the name for a new tug delivered during the following year. It is this handsome strong looking ship which is the subject of the accompanying drawing.

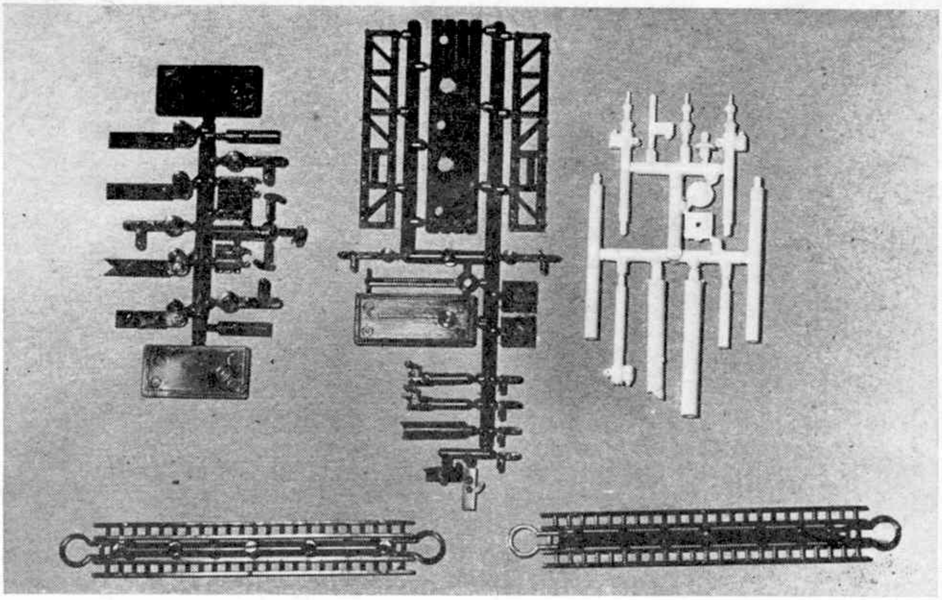
The *Hibernia* and her sister ship, the *Avenger*, owned by Elliot Steam Tugs Ltd., are quite similar in appearance to the earlier post war tugs but the addition of the fire fighting platform makes them look rather more powerful than their predecessors. Appearances are not deceptive in this case for at the time of their introduction into service they were the most powerful tugs engaged on harbour work on the Thames having 9 cylinder British Polar M49M diesel engines which develop 1,800 s.h.p. at 320 r.p.m.

This greater power is required to manage the larger tankers now in use and it is this increasing tanker trade which accounts for the fire fighting equipment. Oil fires spread rapidly and there is no time to send for a special fire float if the fire is to be brought under control. Therefore, the attendant tugs are well placed to perform this duty.

SHIPLANS NO.3


SECTIONS AND HULL LINES FOR MODEL.
Inside bulwalks, superstructure & masts — teak brown.
Decks — matt red-brown. All rails - white.
Fire monitors usually covered by green canvas covers.
Wood grating
FLYING BRIDGE.
SECTION X-X
SECTION Y-Y
SECTION Z-Z.
Black funnel with red band.
Grey.
White deck edge.
Black.
DECK FWD.
Dark oak
White deck edge and name.
Boat white.
Black.
DECK AFT.
HIBERNIA
Black.
Black.
White line.
Green.
4 blades
SIDE VIEW.
Line of deck house under.
Wood gratings
dn.
Life raft - white.
DECK PLAN.
Scale feet.
THAMES TUG_ HIBERNIA.
Owners William Watkins Ltd.
Sister ship_ AVENGER
Owners Elliott Steam Tugs Ltd.
Drg. by Ian R. Stair. 1966.

HAVE YOU SEEN ?



Sorry! Two price errors were inadvertently included on this page last month. The correct price of the Corgi Rolls Royce Silver Ghost is 14s. 6d., and that of the Marcos 1800 GT 6s. 6d.

GERMAN SUBMARINES
Vols. 1 and 2
by H.T. Lenton
Navies of the Second World War Series.
Published by Macdonald & Co. Ltd., Gulf House, Portman Street, London, W.1. **Price 15s. each**
Size 6 in. by 4¼ in. 126 p.p. Many photographs and drawings.

The German Navy undoubtedly was master of the submarine. Introduced during World War I, its large and highly trained fleet brought Germany very close to victory, and history repeated itself only twenty years later. The two little volumes under review are packed with technical information about these fascinating and little-known craft, and many line drawings and photographs appear in the text. Not the least fascinating aspect of the books are the tables giving complete details of the career of individual vessels, with dates of launching and ultimate fate—it is incredible how many were scuttled in 1945. Volume 1 deals with vessels up to the outbreak of the Second World War and Volume 2 carries on from there. Both books are attractively bound, and fit easily into the pocket. A must for All enthusiasts of naval warfare.

INSTRUCTIONS IN ELECTRONICS
by C. N. G. Mathews
Published by Museum Press Ltd., 26 Old Brompton Road, London, S.W.7. **Price 15s.**
Size 5½ in. by 8½ in. 109 p.p. Many drawings in the text.

It is not so very long ago since the subject of electronics was a 'closed shop' to the great majority of people, but today, as it plays a greater and greater part in our everyday lives, it receives a better understanding from the public in general. It still remains, however, a fairly difficult subject to grasp, and an even more tricky one to teach. This presents no problems to the author of this book who treats his subject in a simple yet lucid style which is in no way reminiscent of a dreary school text book. He assumes that his reader has a relatively limited knowledge of mathematics and electrical theory, and deals fully with the practical aspects of electrical and magnetic fields, alternating currents, reactance and impedance, power supply circuits, valves, radio receivers and transmitters and transistors. All this is backed by a host of circuit diagrams within the text.

For the young (or not so young) electronics enthusiast, or to the serious student in his early stages, this book is an essential addition to the bookshelf.

MY COLOUR BOOK OF KNOWLEDGE
by Bertha Morris Parker. Illustrated by Harry McNaught.
Published by Paul Hamlyn, Drury House, Russel St., London, W.C.2. **Price 10s. 6d.**
Size 8 in. by 11 in. 103 p.p. Fully illustrated in colour.

This book is something of a miracle. Designed to appeal to the very young reader, it sets out, in a hundred pages or so, to be a complete encyclopedia of facts about the world in general. It succeeds, not only in this respect, but also manages to include profuse colour illustrations on every page. Every subject that a young enquiring mind can think of will be found, simply and attractively explained and illustrated: animals, fish, insects, plants, mountains, light, weather, flight and, of course, space travel.

The delightful presentation and illustration of this book is out of all proportion to its very modest price. Any big brother who has a little brother with a birthday should bear this in mind.

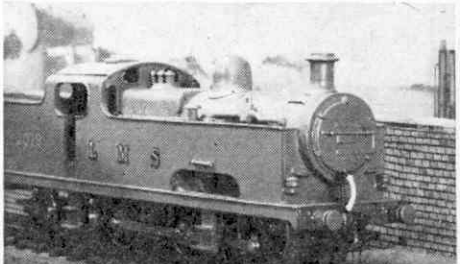
Hamo trams have for many years been popular in this country and the new catalogue, received from the importers of these products, Edward Exley Ltd., of The Ridge, Eaton Hill, Baslow, Derbyshire, lists the comprehensive range of tramcars now available. Hamo also produce a working catenary and track system, and these are also listed and illustrated in some detail.

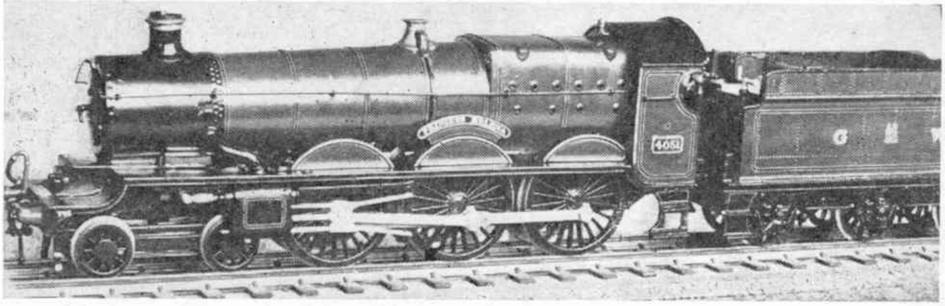
GANTRY SIGNAL KIT

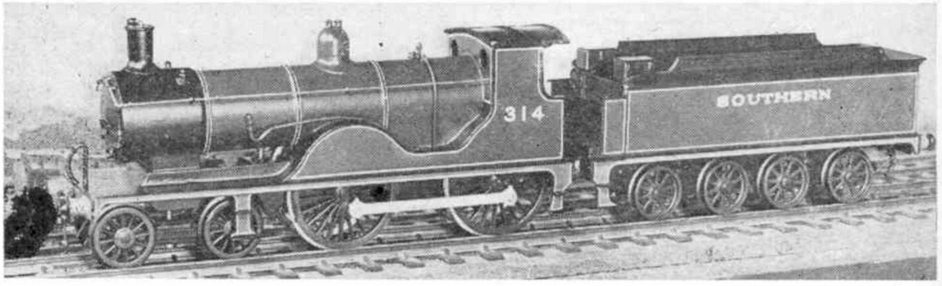
Railway enthusiasts wanting to add signals to their layouts will be pleased to learn of the new and very useful Ratio signal gantry kit recently to become available. This provides sufficient parts to allow a selection of different types of gantry to be built, but can also, when combined with additional kits, be used to produce a very wide range of different signal gantry structures. The kit is intended to build G.W.R. lower quadrant type signals and is provided with four arms and one shunting disc of the G.W.R. pattern. Moulded in black plastic, the kit makes up into a pleasing model, and has sufficient parts left over with those from another kit, to make another signal! The kit costs 9s. 11d. and is available from Ratio Plastic Models, of Nanuoya, White Hill, Goring-on-Thames, Oxfordshire. *(photo above)*

THREE LOCO KITS

Three new additions to the Wills range of cast white-metal locomotive kits were recently announced. The first, a model of the M.R. 0-6-4T 'Flatiron' locomotive costs £2 16s. 0d. for the body only, which is designed to be fitted onto a standard Tri-ang 0-6-0 chassis. The bogie is included with the kit, and this also is made from white metal. As with all kits of this sort, construction is fairly simple, but care is needed if a pleasing finish is to result. The construction of a Wills locomotive kit was covered in the December 1965 Meccano Magazine. Like the above kit, the L.S.W.R. 'Greyhound' 4-4-0 is remarkably free from flash, and construction is carried out on similar lines. The body kit costs £2 16s. 0d., and the special Wills Finecast chassis, available as an extra, costs £1 19s. 5d. The distinctive eight wheel tender has its own chassis in the Finecast range, although parts for the water cart tender are included with the kit. The third new kit, the G.W.R. 'Star' and the latest to be released, will be very popular among enthusiasts. The locomotive chosen shows the 'Star' in its later guise with outside steam pipes and 4,000 gallon tender. It is intended to be fitted on the Tri-ang B12 4-6-0 chassis, although our illustration shows one of these fitted with Romford wheels. Plastic tender wheels and cast white-metal name and number plates for the No. 4051 'Princess Helena' are supplied. The kit costs £5 18s. 7d., chassis extra.



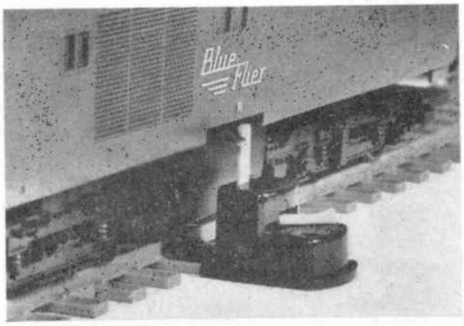


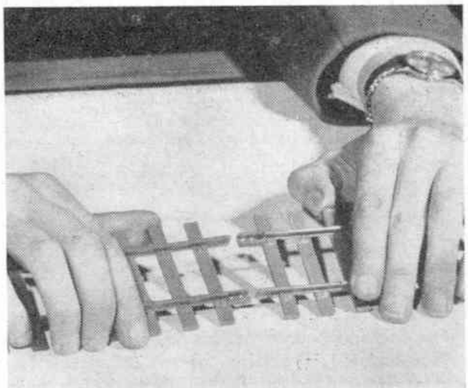


The heading photograph gives a good idea of the size of this new O gauge equipment. The detail included in the scale-length loco is very extensive

Below: this is the trackside switch to stop or reverse the train by remote control. Track sections clip together very simply as shown in the bottom picture

THE BIG ONE!





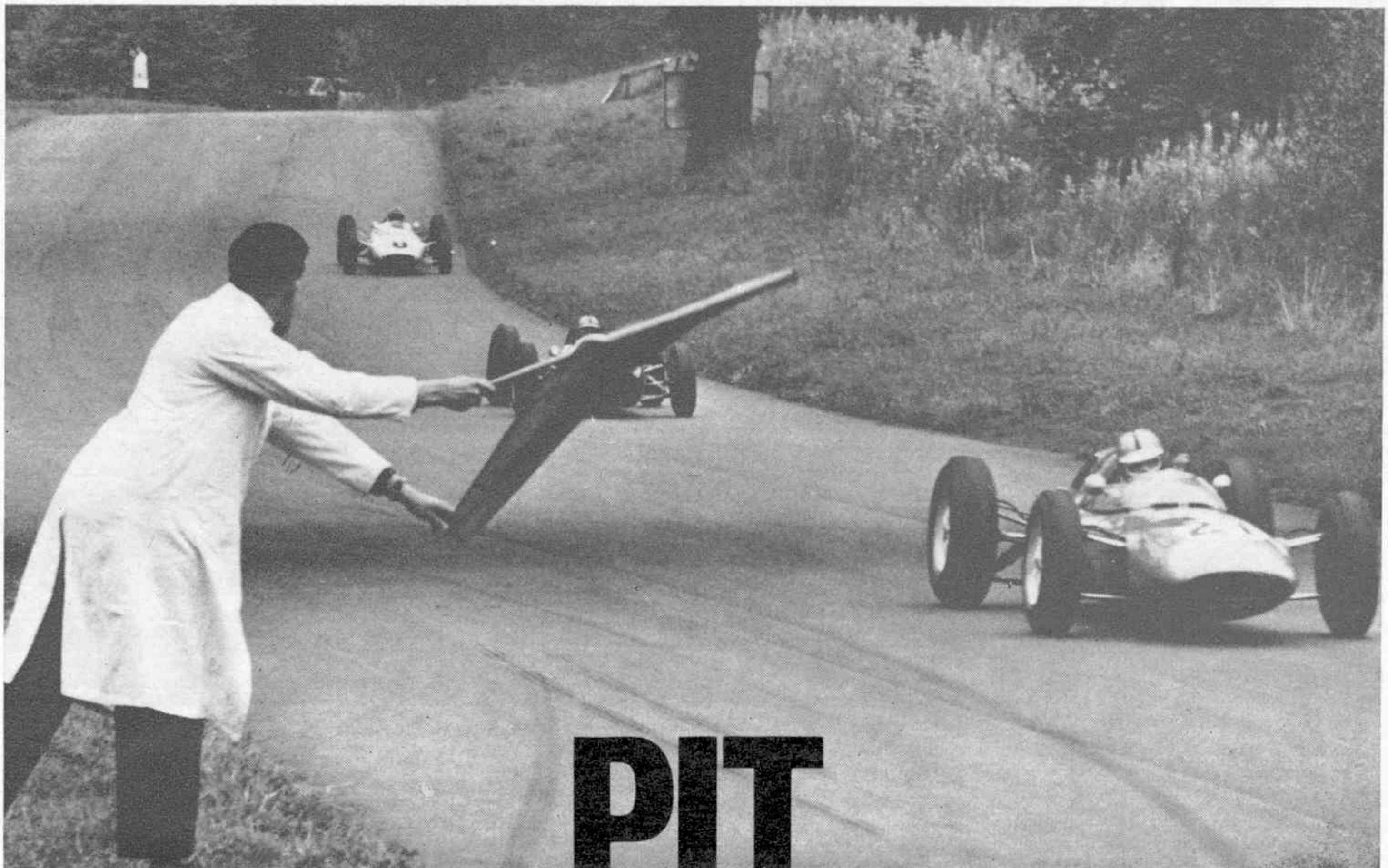
ALTHOUGH 'O' gauge is a popular scale in the ranks of the more serious model railway enthusiast, it can also have many advantages for the youngsters wanting a train set large enough to allow a certain amount of rough handling, but small enough for the modern house. 'O' gauge fulfils both these conditions, although for some reason little has hitherto been produced for the scale and the serious enthusiast, if interested in 'O' gauge has had to rely on hand built models or specially produced kits. What has really been needed for many years is a cheap range of 'O' gauge equipment, accurately detailed, but simple and reliable enough for the younger enthusiast.

The latest set to emerge from the Lines Bros. organisation will be welcomed by all 'O' gauge enthusiasts, for it is both a reliable toy, and a collection of well detailed models. The most exciting item in the set is the locomotive, a model of a B.R. Hymek Bo-Bo type 3 locomotive. Made almost entirely of plastic, this has a body coloured in the new blue livery now standard on British Rail, and is scale length and superbly detailed. The locomotive is intended to be operated from batteries situated in the locomotive itself in a special chamber under the roof, held in place by two screws, one at either end. Holding four U.2 or equivalent batteries, a motor is situated between two of the bogie side frames, driving onto one axle with two rubber wheels. Although the locomotive is operated by batteries, it can pull a surprising load, and we were surprised to find that the battery life was quite long. As an example, at the Model Railway Exhibition at Central Hall, London, one set of four batteries lasted for almost three days of continuous running from approximately 9 a.m. to 8 p.m. with admittedly greatly reduced power at the end of the third day.

The serious more advanced enthusiast can, if he so wishes, convert the locomotive for operation from a Power Control Unit in the normal way. This would involve the removal of the existing motor and the fitting of a more powerful type driving through a worm and worm-wheel. With no batteries, the locomotive would also require additional adhesion weight and it would also be necessary to replace the plastic wheels by metal types to allow current to be returned. A collector would also have to be fitted, presuming, of course, that normal metal 'O' gauge track is in use. The locomotive side frames need not be replaced however, for the detail is extremely crisp and the frames are scale size in every way.

Although only a set is produced at the present time, all components will become available separately, and it is also quite possible that the range will be extended in the future with both coaches, points and other items, providing that the initial set is well received. In addition to the locomotive described above, the set contains four items of rolling stock, all very suitable for any scale 'O' gauge layout. These two Hopper Wagons, and two Mineral Wagons, all have plastic wheels that have the correct back-to-back measurement for 'O' gauge, and the scale enthusiast need only bother repainting the rolling stock in somewhat more realistic colours. All four wagons are highly detailed and, like the locomotive, are fitted with couplings very similar to that used on Hornby-Dublo rolling stock, with the difference that it is somewhat larger. The hopper wagon is very similar to the cauldron wagons often used on quarries and other mineral railways, and the model actually tips.

Intended primarily for the youngster, the set includes sufficient track to build up a large oval. Made of plastic and coloured red, the track is made in both straight and curved sections and is ideal for garden layouts where temperature and humidity are likely to vary considerably. If the locomotive is, however, converted as suggested above, normal brass track will be necessary, although as designed, with its own batteries, the locomotive is highly successful in a garden layout. The track sections are clipped together and a switch can be fitted at any position on the track for stopping or reversing the direction of the locomotive. Done by means of levers situated on both sides of the locomotive, one for switching the current on, and the other for reversing the direction, these are pushed over by the trackside switch lever. This completes the items supplied with a train set for which we would forecast a bright future.



PIT STOP!

The pit staff, with their lightning-fast refuelling, wheel-changing and running maintenance techniques contribute enormously to the smooth running of any motor-race. Now, with the Scalextric "Pit-Stop", you can add authentic excitement to your own circuit.

AMONG the many exciting additions that can be made to a Scalextric model car track layout is the inclusion of the extremely interesting Pit Stop sections. If these are also combined with another ingenious Scalextric item—the Fuel Gauge—the racing becomes even more competitive and thrilling for every contestant. By incorporating these features in a layout the already absorbing sport gains in fascination, and in resemblance to the real thing.

Even the simplest 2-lane circuit will gain in interest by adding Pit Stops and Fuel Gauges, and of course when they are fitted in 4, 6 or 8 lane layouts they considerably increase the realism of a Scalextric model race meeting.

By means of the Pit Stops it is possible for drivers to pull off the track into the pits in order to refuel, change tyres, or make minor adjustments and then streak off again into the race. A series of compulsory pit stops for each competitor during an event will obviously require more concentration and skill, and a carefully practised pit stop will enable a driver to gain a well-deserved advantage.

Fuel Gauge

Scalextric Pit Stop sections operate in a similar manner to railway points and are manually operated by finger tip control on the track itself. Later, cable hand controls are scheduled to become available and these will enable the 'points' to be operated from the side of the track.

In their constant search for ideas that will add to the thrills and excitement of electric model car racing, Scalextric designers hit on a brilliant notion and introduced the Fuel Gauge accessory. This gauge represents the amount of fuel in a car's tank. At the start of a race the tanks are full and the load of fuel carried restricts a car's performance. As the race progresses fuel is used up and the load becomes lighter. Consequently, the maximum speed of the car increases and when the tank is nearly empty, it travels its fastest. When the tank is dry of course the engine stops through lack of fuel and the car comes to a halt. For short races a 'full tank' will probably not be necessary, but in long races tactics will require careful planning and pit stops to refuel may have to be made. This gauge is therefore a perfect device to use in conjunction with the Scalextric Pit Stops and can increase the realism of a long distance model car event.

Grand Prix

The inclusion of these items not only adds to the interest, but could also provide an opportunity for more individuals to take an active part in race organisation. For example: a mechanic to service the car using his particular pit; a team manager, and perhaps a pit marshal to check the operations carried out in all the pits. If during a race, the regulations specify one or more compulsory pit stops for each competitor of 10 or 15 seconds, it would be the latter's duty to ensure that the cars remained stationary in their pits for the specified time. Stops could also be made compulsory for tyre changes—a job for the driver's mechanic. These and many other interesting possibilities suggest themselves and combine to widen the scope of racing on circuits fitted with Pit Stops and Fuel Gauges.

In the realm of full-scale, pit stops for the purpose of refuelling are no longer necessary in modern Grand Prix racing because of the comparatively short duration and distance of major Grand Prix events. Only in long distance races such as Le Mans 24-Hours are these stops a feature of today. There are many racing enthusiasts who regret the lack of refuelling pit stops in Grand Prix events, and consider such races to have been deprived of much of their former character. Undoubtedly a refuelling pit stop can be one of the most exciting periods during a big race. This fact was emphasised particularly during the immediate pre-war years when some of the immensely powerful machines that raced in those days were compelled to make at least one, and perhaps two stops for a change of wheels and tyres, or to refuel.

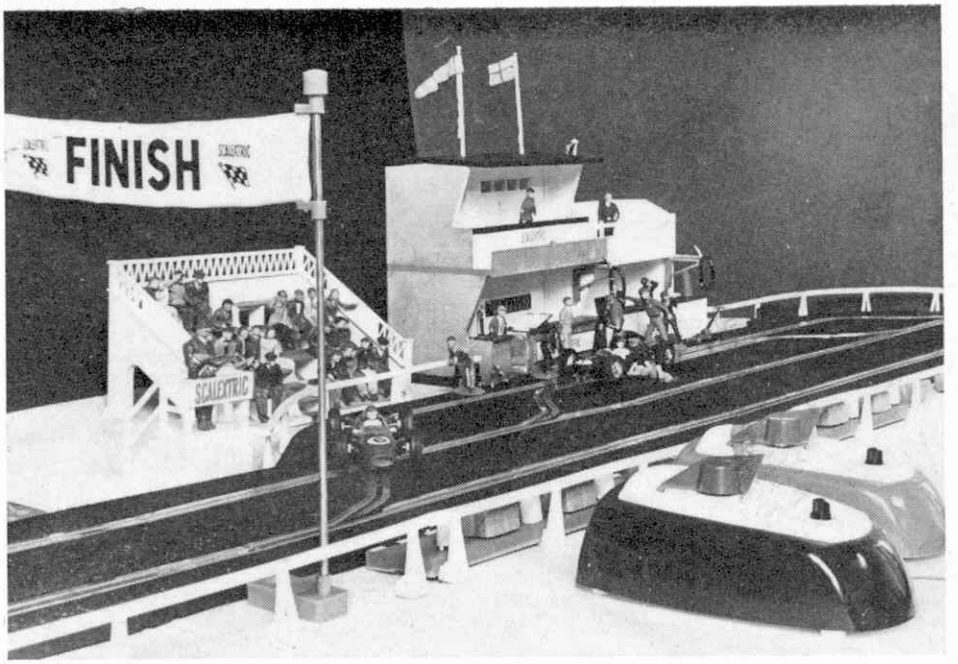
Fantastic Speed

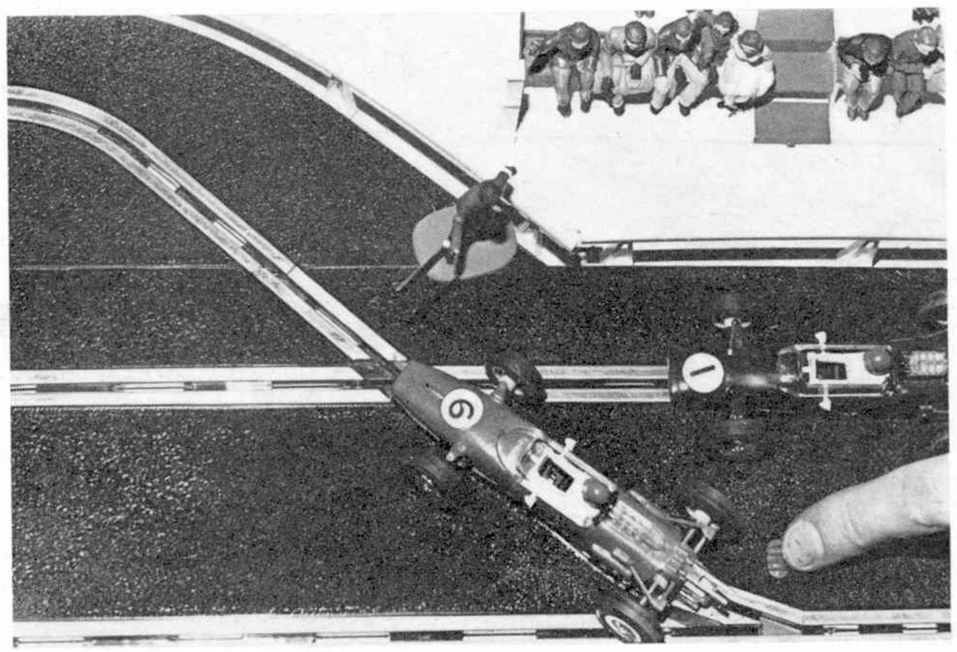
In the late 30's, pit stops were indeed thrilling sights, and spectators fortunate enough to have vantage points from which to view the pits often took the opportunity to time and compare the stops made by the leading teams. It was during such periods that races could be won or lost, and the German Mercedes-Benz and Auto Union pit crews were famous for their fantastic speed in attending to their drivers' machines. The Mercedes mechanics in particular reckoned to refuel a car and change all four wheels in between 28 and 35 seconds; this included wiping the screen, as well as giving the driver a drink and clean goggles. Mercedes-Benz W154 and W163 Grand Prix machines of 1938/39 were fitted with powerful, supercharged V-12-cylinder engines and carried fuel loads of 75 gallons and 85 gallons respectively. They used their fuel at a tremendous rate—consuming just under 3 gallons per mile. Refuelling hoses in their pits were some three inches in diameter and delivered fuel under pressure at five gallons per second. Thus, 75 gallons could be shot into the car in 15 seconds.

Silver Projectiles

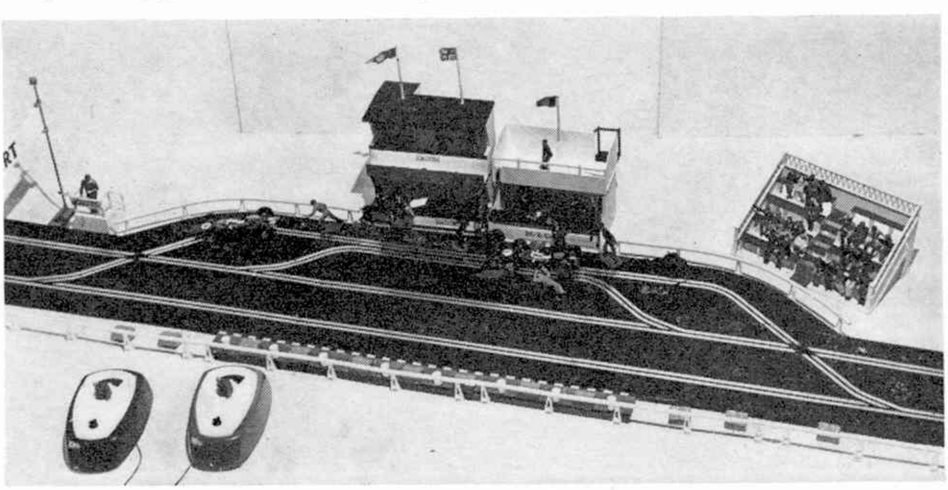
When one of these low, sleek, silver projectiles was due in at its pit the well-trained crew would be waiting in readiness. As the car slithers to a standstill a mechanic flings a cape over the driver's head and shoulders to shield him from possible inflammatory fuel. Another flicks open the fuel tank filler cap in the streamlined tail fairing behind the cockpit—rams in the hose and fuel shoots into the tank. Meanwhile, the front of the vehicle rises as a wheeled trolley-quick-lift-jack is thrust beneath. Other mechanics, with copper hammers, deftly knock off the winged hub-caps on each wheel—a quick twist—the wheels are free, slung aside and new ones, complete with tyres, swiftly replace them—more hammer blows—down comes the jack and at a nod from the team manager the engine bursts into life—a mechanic snatches the cape from the driver's shoulders as with an indescribable scream the machine rockets away from the pit, smoke pluming from its big rear tyres under the tremendous acceleration. It almost takes longer to describe than the time taken over the whole actual series of operations, but the drama, suspense and excitement of such a typical pre-war pit stop during a major Grand Prix can well be imagined. Thus, by introducing their excellent Pit Stop sets and Fuel Gauges, Scalextric have provided today's racing modeller with a wonderful opportunity to experience, on a small scale, the tense thrills associated with one of motor racing's most interesting features.

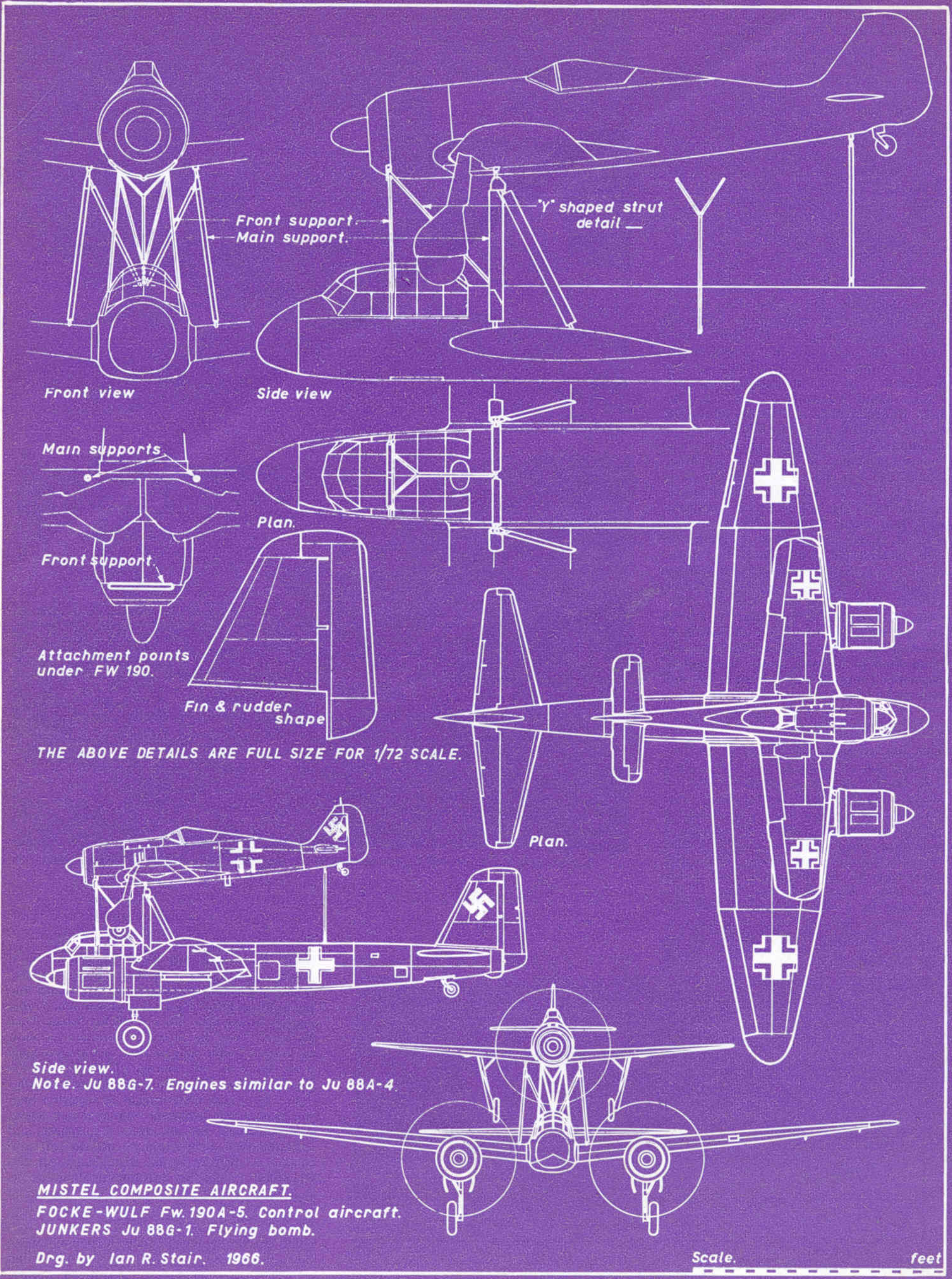
Walkden Fisher

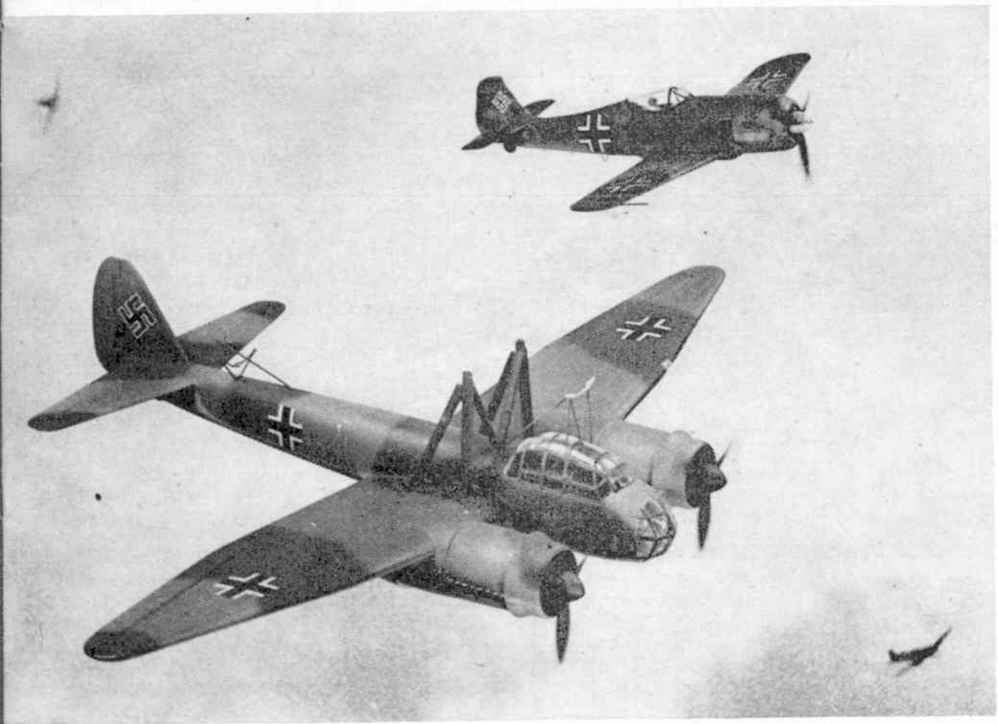


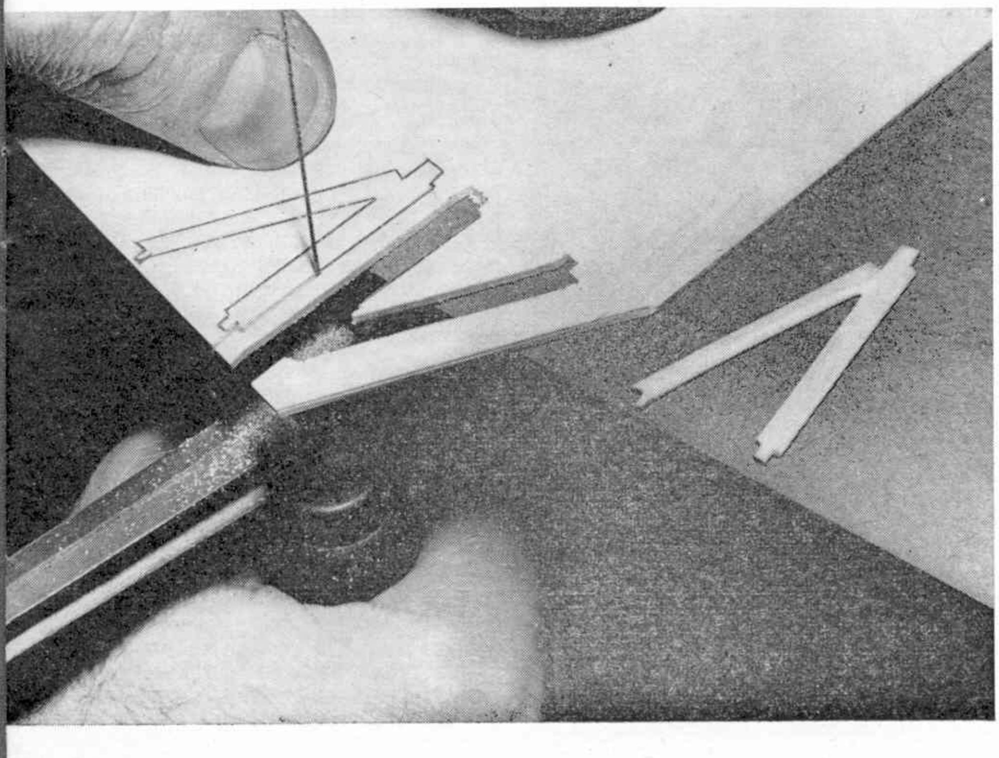


Top: general view of the pits. One car is receiving attention from the mechanics, while another leaves to continue the race
Above: entrance to the pits, showing 'points' and finger-tip control on the track itself
Below: aerial view of pit-stop shows very clearly the interesting track layout




Front support.
Main support.
"Y" shaped strut detail
Front view
Side view
Main supports
Plan.
Front support.
Attachment points under FW 190.
Fin & rudder shape
THE ABOVE DETAILS ARE FULL SIZE FOR 1/72 SCALE.
Plan.
Side view.
Note. Ju 88G-7. Engines similar to Ju 88A-4.
MISTEL COMPOSITE AIRCRAFT.
FOCKE-WULF Fw. 190A-5. Control aircraft.
JUNKERS Ju 88G-1. Flying bomb.
Drg. by Ian R. Stair. 1966.
Scale.
feet





IT'S A BOMB

YES, the 'Mistel' was a bomb—a four-ton bomb, in fact, for that was the weight of high explosive packed into the nose of the lower aeroplane of the composite, a twin-engined Junkers Ju 88. On nearing the target, the pilot of the top plane would release the big pilotless bomber and direct it, by radio, to its goal. Several warships were sunk in this way, and in the closing stages of the last war the deadly weapon was used against the vital bridges over the river Elbe.

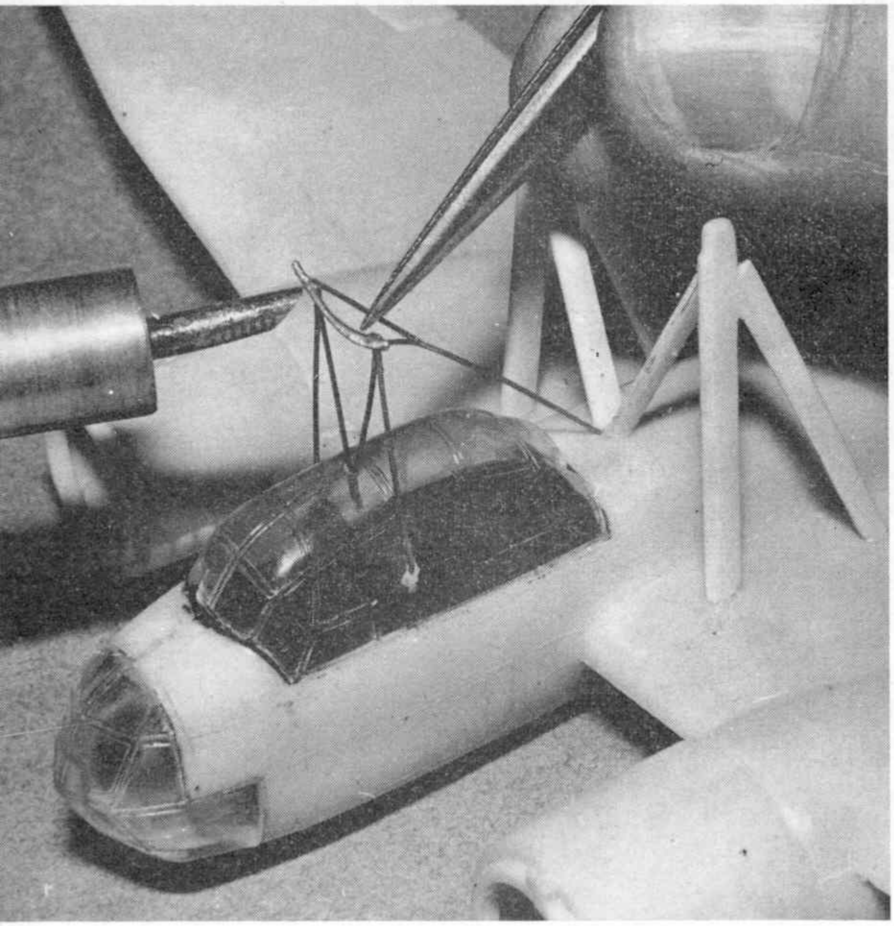
There are Frog kits for both the FW 190 and Ju 88, and Doug McHard's little exercise this month shows you how to combine the two into a passable representation of the "Mistel". *Complete* accuracy would be a much bigger job for the following reasons.

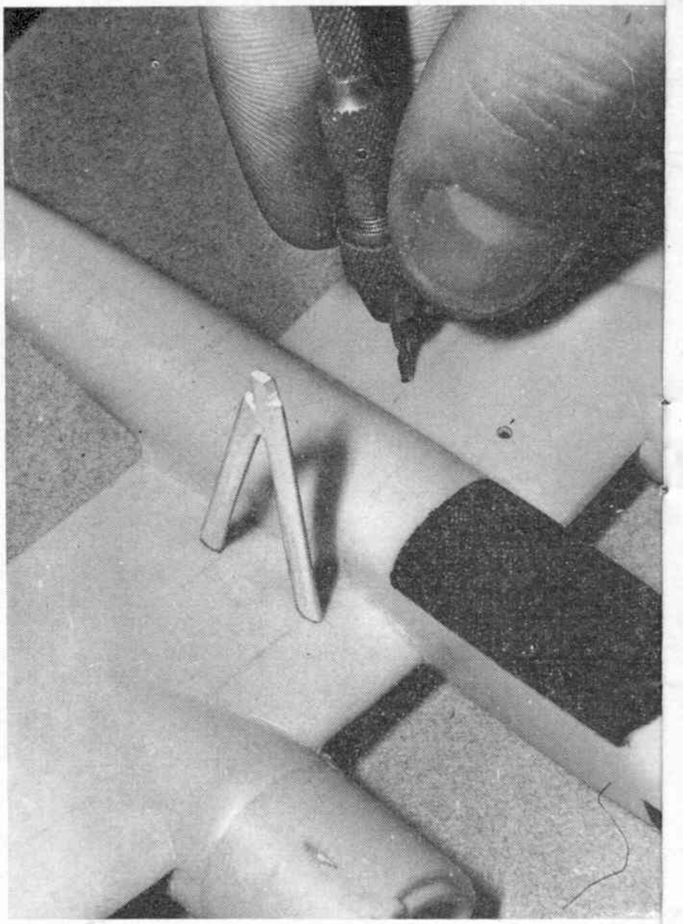
The Frog Ju 88 represents the A 4 version of this much modified aeroplane and, as far as is known, the A 4 always carried an Me 109*G* as its piloted top plane. Unfortunately, there is no Me 109*G* in the Frog range. The Fw 190 upper plane (like the one we've used) was, we understand, always flown with a Junkers Ju 88*H* or G-7 (as shown in Ian Stair's drawing opposite) and no one makes a kit for one of these! So we've cheated a bit, and modelled the 'Mistel' composite that was seen just after the war at Farnborough, in an exhibition of captured German aircraft. This pair consisted of a Ju 88A4 and an Fw 190—just like our models. Unfortunately, we understand, this was a 'freak' combination and never actually flew. Nevertheless it did exist, and twenty years later—in our photo—it became airborne and was set upon by a flight of ghostly Spitfires—even if the spectacle did only take place in 1/72nd scale on our table top!

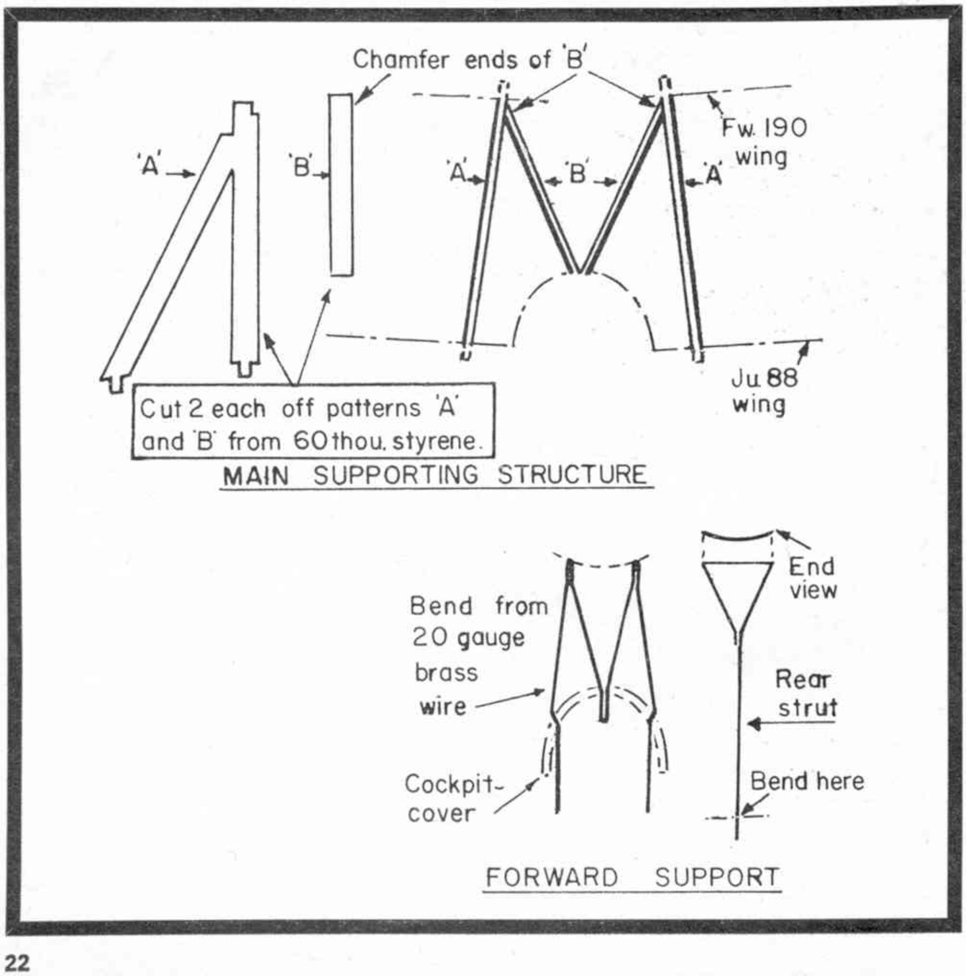
Top photo shows our models at rest—compare it with the photograph on page 43. Note the 'rear support catcher' just ahead of the fin which was used on training aircraft to prevent damage to the rear fuselage when this strut folded back following separation.

The crafty bit of flying in the centre photo shows the models to good advantage.

Left: main supporting struts are cut from 60 thou. thick styrene sheet and then sanded to a streamlined section. Full size patterns are given overleaf.







In the photo top left the wire front support is being soldered up. If you are not confident of your ability with a soldering iron you *can* use Araldite to stick the wire parts together.

Small holes are drilled in the sides of the canopy to take the side wires and the existing aerial hole is used for the centre strut.

$\frac{1}{16}$ in. diameter holes are drilled in the top wing surface to coincide with the small pegs on the lower ends of the main support struts. Use the engraved 'first rib line' as a guide for spacing these holes.

Notice the cockpit interior, which is painted before the fuselage is assembled. If the 'Mistel' is to represent an operational machine no crew should be installed, but a training aircraft would have a pilot and radio operator. The remaining crew member supplied with the J.U.88 kit can be used in the Focke-Wulf as shown in the photo on page 21 as this kit does not provide one!

Colour scheme of our model was light and dark green upper surface and light blue under sides. If you build a J.U.88 G-7 it should be painted light grey and mottled with dark grey on the upper surfaces.

Small details, such as the direction finding loop beneath the F.W.190 rear fuselage, are best made from thin wire fixed in place with Araldite. Notice that the tailwheel of the F.W.190 must be cut to appear in the semi-retracted position shown in our photos if the main undercarriage is to be retracted. Holes are cut in the underside of the F.W.190 wing to accept the upper ends of the main supporting struts. It is not necessary to cement the aircraft in place.

DON'T ARGUE-RACE!

by Godfrey Arnold

THE tremendous growth in the popularity of slot racing can be gauged by the increasing number of firms producing the goods demanded by this expanding market. Unfortunately, probably half the sets, bought in an initial burst of enthusiasm, end up lying forgotten, in a cupboard within a short space of time just because the initial novelty has worn off, never having been raced on as opposed to played with. Racing, by its very nature, has to be organised and to this end a little preparation and discipline is required.

Obviously, before any racing can be done, a track is required. The usual figure-eight supplied in sets is a good introduction but it is quickly learned by heart, especially by its owner, and should be extended as soon as this can be afforded. If two or more people are racing together, and if they buy the same make of track initially, they then expand their own tracks, a better and longer circuit being obtained by combining the various persons' track. An average commercial set would be about ten feet per lap with 540° of bends; combine two and you have twenty feet and 1,080° of bends; a few extra straight sections and you have thirty feet per lap. The accompanying diagrams give a couple of examples of tracks that can be built in this way. It is essential, in order to maintain equal lane length, to have a fly-over bridge or cross-over sections but, generally speaking, a bridge is preferable. Diagram A gives the basic figure-eight and B and C tracks that can be built from two sets plus a few extra straights. Beware of any projected circuit that is basically as in D, because there are two concentric 'circles' and this, in fact, increases the difference in length between the two lanes.

The next thing to do is to decide upon some system of lap scoring. In a later issue of Meccano Magazine I hope to tell you how to make your own but, for the meantime, work out some system of doing it by hand unless you have a track for which commercial lap counters are available. About the easiest method is by using a squared mathematics exercise book and putting a line through a square as a car completes a lap.

For the moment we will assume that the track is two lane, for it is better to have a long two lane than a short four lane. Following on this, if there are more than two people it is better to race over a set time rather than over a set number of laps; in this way everyone can race once on each lane for a predetermined time, such as two minutes. One person who is not in a particular race should look after the timing, the usual method being, after the cars have been brought to the start line, to say 'One, two, three, go', and switch on the power. When the chosen time has elapsed he switches off the power and notes the number of laps and parts of a lap that each car has covered and, for this purpose, the track should be marked out in tenths of a lap. The easiest way to do this is to take a piece of string one yard long and, with a piece of chalk, mark the track off in yards; running the string in the slot, count up the yards, convert to feet, add on any odd amount and you now have the length of the track in feet and inches. If you now divide this by ten and cut a piece of string to this length you can mark the track off in tenths in the same way and paint these distances on. If the track has to be dismantled and re-assembled then, from the start line, number all the pieces on the underside as you dismantle the track and put dots on each end, as in the diagram E, so that the track can be re-assembled in exactly the same way. The only other thing to do is to mark in the lane colours. These should be chosen by you to suit 'stickers' that you can obtain, but Boots do a good selection and I would suggest red and green. Cars can now carry stickers to indicate which lane they are meant to be on.

Also worth putting in initially are sockets for controllers so that everyone can use his own and not only is he responsible for damage to it but controllers have an easier time.

THE RULES

As mentioned earlier, racing should be over a fixed time. If a 'knock-out' competition is held then some people get very few races and bickering can result by all those beaten by the winning finalist saying, 'I could have beaten the other finalist', and the trouble is that this may well be true in some cases. Before racing starts, a list of heats should be drawn up so that everybody races once on each lane, as in table F. The laps covered by the cars can then be put down in the appropriate columns, as in table G, then each competitor's laps in the two races added together to give totals from which the first, second, third, etc., can be found.

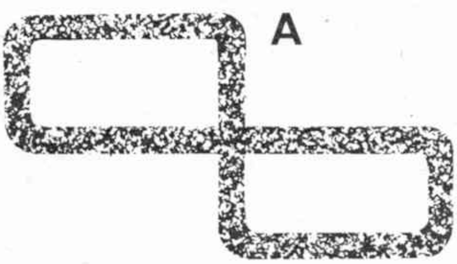
It is essential that you decide, before racing starts, what the procedure is if a car leaves the slot. If 'resting' drivers are available then they can marshall the cars, always, in the case of a collision, putting the offending car on last. If there is nobody available to marshall you have three alternatives:

1. If you come off you stay off.
2. Stop the race until the car is put back on.
3. Marshall your own cars.

The third is by far the most satisfactory.

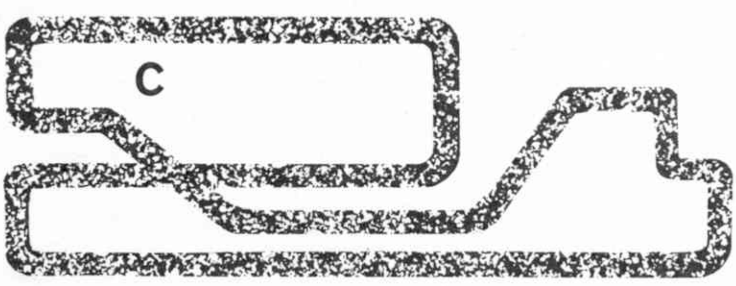
Eventually you will want to run different classes of cars and the number possible is, of course, enormous, but once people have more than one car a good start is to have two classes, one for open-wheeled cars and one for those with covered wheels. Later on this can be extended to four classes—pre-1960 Grand Prix cars; post-1960 Formula One cars; G.T. and sports cars, and saloons.

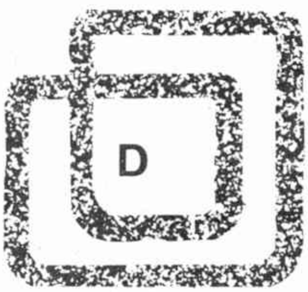
This article is just an indication of how to start racing for it would be easy, although unpopular with most readers, to fill a complete issue of Meccano Magazine with this aspect of slot racing alone. Various 'modifications' can be carried out to suit one's particular circumstances but remember that if a problem crops up during an evening's racing always decide before the next meeting how it will be dealt with in the future, so that time and tempers will be saved the next time.



G

Name	Laps		Total	Position
	1st Heat	2nd Heat		
A	14·4	16·9	31·3	3
B	15·6	15·8	31·4	2
C	13·4	16·2	29·6	4
D	14·8	10·3	25·1	5
E	17·0	15·9	32·9	1



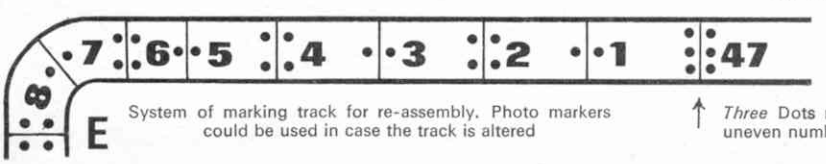


F Odd number

A races B
C " D
E " A
B " C
D " E

Even number

A races B
C " D
E " F
B " C
D " E
F " A

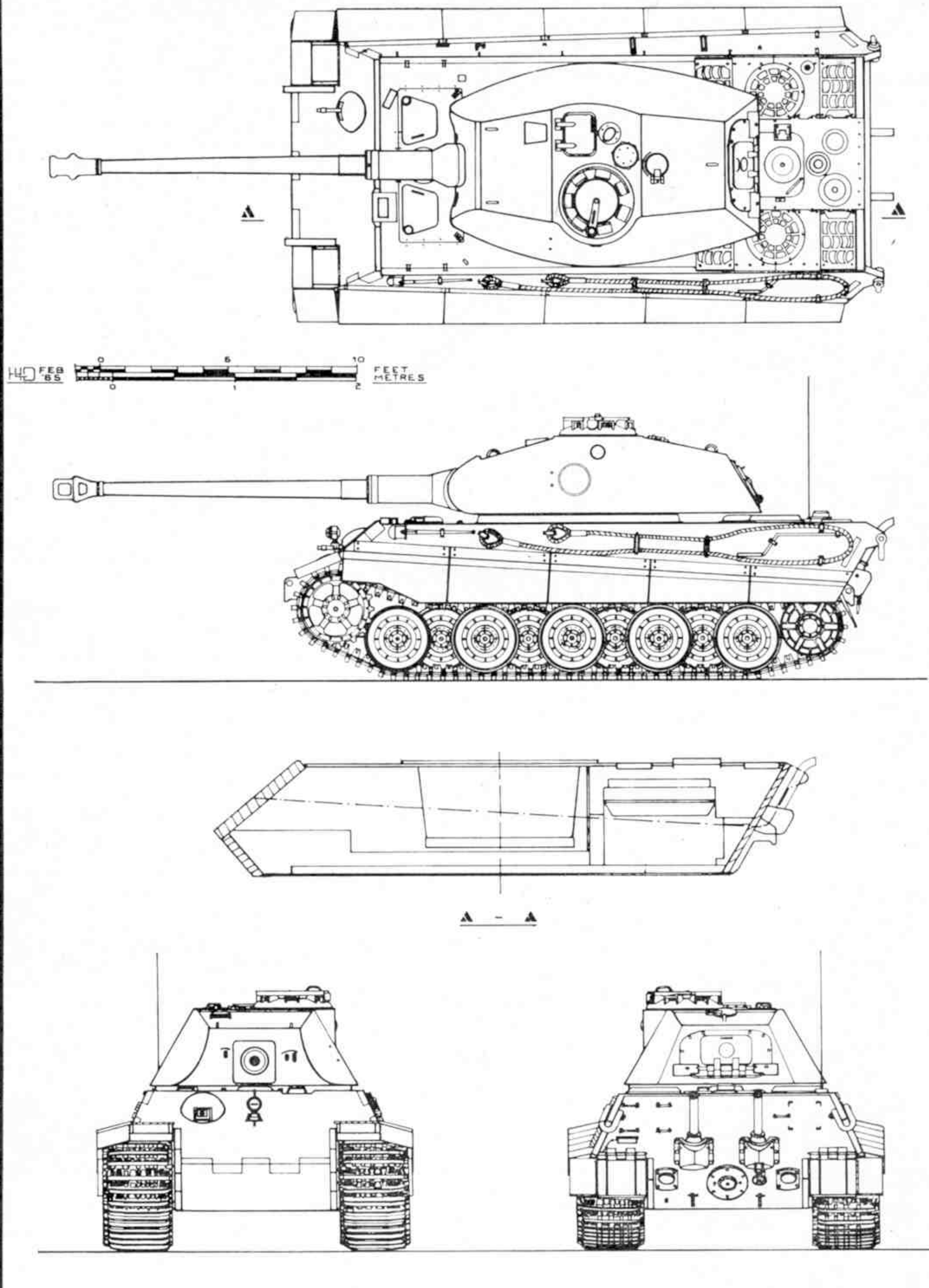


E System of marking track for re-assembly. Photo markers could be used in case the track is altered

↑ *Three* Dots needed here if there are an uneven number of pieces in the track

THIS TIGER IS A TANK

Pz Kw VI, Sd Kfz 182



Sd Kfz 182 TIGER II with Porsche Turret - 1943
Scale 1:76 (4mm. to 1 Foot). Drawn by H. L. Doyle

The Tiger II drawing is included in the 'Series 2' set of Belona Military Prints The other vehicles in the set are the Japanese Medium Tank Type 97, Russian S.U.100 Tank Destroyer and German Hanomag Sd Kfz 251/1 Troop Carrier.
Each one is fully described and illustrated enabling the modeller to reproduce them in considerable detail. Colour prints of several armoured vehicles are a recent introduction to the range.

The drawing and information in this feature are taken from one of the Merberlen Military Vehicle Prints which are available in sets each comprising four different plans and featuring a wide variety of interesting prototypes.

Further information and details of larger scale drawings may be obtained by writing to Merberlen Ltd., Badgers Mead, Hawthorne Hill, Bracknell, Berks., and mentioning this Meccano Magazine feature.

Royal Tiger, knocked out in France 1944. An example of this vehicle is on display at the R.A.C. Tank Museum, Bovington, Dorset

32 Tiger II with Porsche Turret 1943

EVEN before the first Tiger I models were in service it was realised that a better vehicle would be required if German tank superiority was to be restored at Russian expense. Dr. Porsche received orders, therefore, to develop a heavier version of his original Tiger design (see Bellona Print No. 4) which would mount either a 15 cms. L/37 or a 10·5 cms. L/70 gun. His first design was rejected but the second, which had a rear mounted turret, central engines, and electric transmission, was given a production order. At this time the weapon requirement was altered to call for a standard 8·8 cms. L/71 gun.

Lack of copper, required for the electric transmission, put the Porsche project in some doubt and it was ultimately cancelled, suffering the same fate as the Porsche Tiger I. Meanwhile a parallel design had been ordered from Henschel in January 1943. Design on this vehicle — the VK 4503(H) — was finished in October 1943, three months behind schedule due to insistence by the Production Ministry that features of the projected Panther II should be incorporated in the design. Production began in the following December alongside the Tiger I at Kassell, and the first 50 vehicles utilised the turrets originally produced for the cancelled Porsche design. The drawings show the Henschel Tiger II in this form, but all subsequent production incorporated the Henschel turret.

The first vehicles went into service on the Russian front in May 1944, but the type was not met on the Western front until the following August. Known as the 'Royal (or King) Tiger' to the Allies and as the 'Koenig Tiger' to the Germans, the Tiger II suffered from lack of power, unreliable transmission, and short engine life. This is not so serious when it is remembered that the Tiger II was primarily a defensive weapon and that the life expectancy of German tanks was very short at the time of its introduction. Tiger II was the heaviest operational tank of World War II.

Technical details

Weight 68·4 tons; Crew 5; Road speed 23·6 to 26 m.p.h., cross - country 9 to 13 m.p.h.; Maximum gradient 35 degrees; Fording depth 5 ft. 3 in.; Range 75 to 106 miles; Armament—1 by 8·8 cms. KwK 43, L/71, (78 rounds, A.P., H.E., H.C.), 2 by 7·92 mm. MG-34, one coaxial and one in hull (5,850 rounds); Armour—lower front and turret front 100 mm., upper front 150 mm., sides 80 mm., top surfaces 40 mm. Engine — 1 Maybach HL 230 P30 water-cooled V-12 developing 694b.h.p. at 3,000 r.p.m.; Gears 8 forward and 4 reverse, Torsion bar suspension.

Modelling

From Airfix Panther Kit: Remove front plates and set to new angle; cut hull deck in centre and insert extension; fit card sides over existing ones; extend belly; use hull rear; discard trackwork; modify hatches and details. From Airfix Tiger: Use all trackwork and wheels and find extra wheels for extra axle; modify exhaust; carve new turret from balsa. Mudguards are optional.

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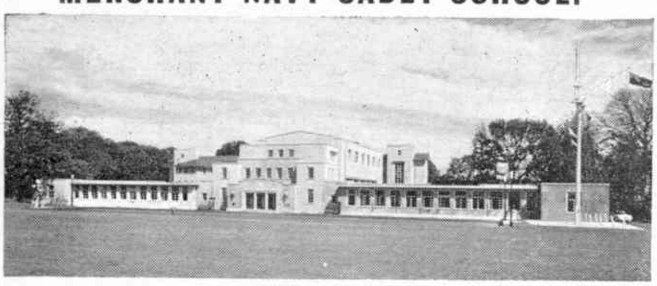

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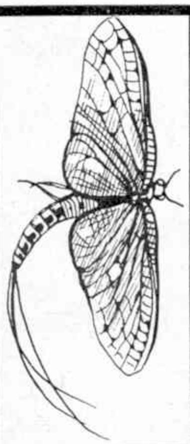


FLIGHT PLAN '66 PART 2

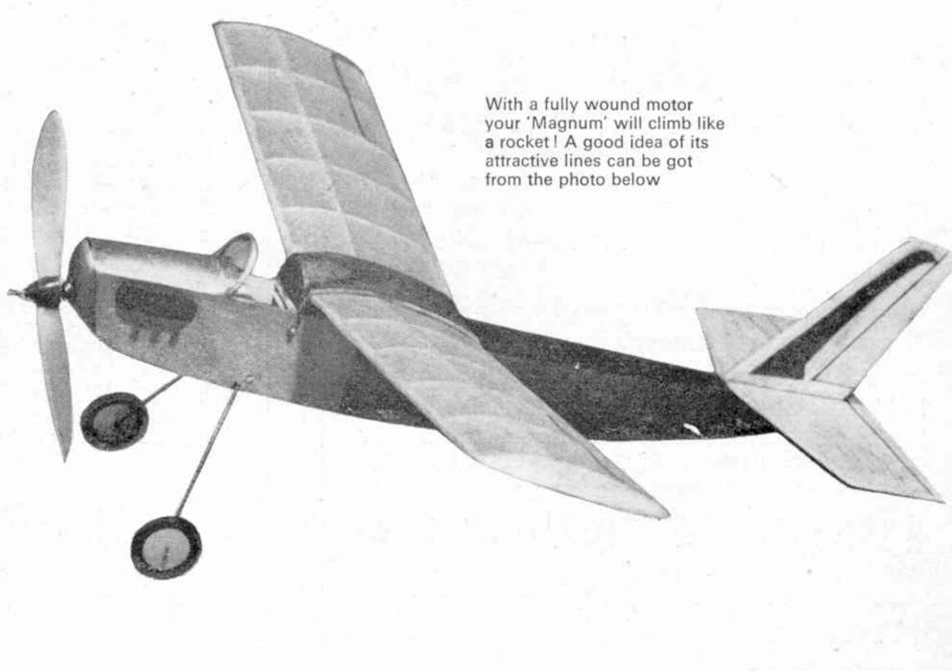
TRIMMING AND FLYING YOUR MAGNUM

Last month we gave you full size plans and comprehensive building instructions for this super little flying model. Hundreds of them are now nearing completion or awaiting a calm day before that first exciting flight test. To make certain your test programme goes smoothly, designer Ray Malmström has prepared these really comprehensive trimming and flying notes—of tremendous value to all modellers who want to get the very best from their planes.

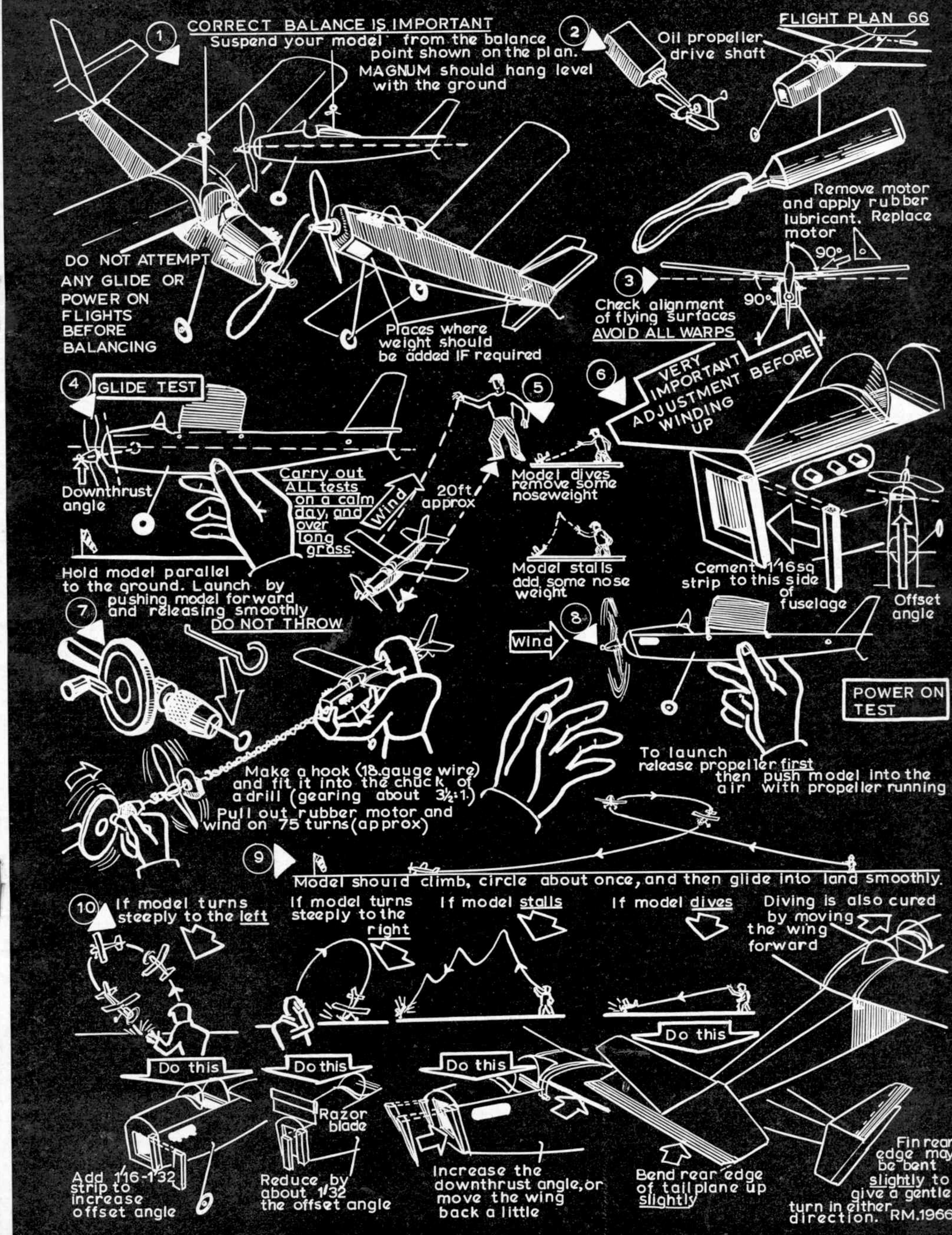
If you missed last month's issue with the 'Magnum' plans, a few are still available from our back-numbers department—price 2s. 6d., including postage.

HELLO again! With your 'Magnum' standing on the work bench ready for that exciting first flight, let's get right down to business.

An all-important first operation is balancing your model. For this 'Magnum' must be complete, with rubber motor in position. Although 'Magnum' has been designed with the balance point (or centre of gravity to use the correct aeronautical term) correctly located, the weight of balsa wood does vary quite a bit, so on your particular model you may need to add a very small amount of weight. Suspend your model by pushing a pin attached to a length of thread into the exact spot on the wing centre at the balance point on the plan (see sketch 1). Let the model hang free and see if it hangs with the fuselage parallel to the ground, (don't do this on the side of a steep hill!) If it does—excellent, no extra weight will be needed. If, however, the nose hangs downwards slightly, carefully fold up a piece of flattened old cement tube (or a small piece of sheet lead is perfect) and place it on the extreme edge of the tailplane. Add to, or take away, some of the weight until the model hangs level. Then cement it under the fuselage at the rear end as shown in sketch 1. Dope several strips of tissue paper over it to hold it firmly and neatly in place. If the tail hangs down add a small amount of weight to the nose in exactly the same way. Plasticine and drawing pins are often used for weighting models—and they do the job, but oh! how ugly they look, completely ruining a carefully built and decorated model. Having balanced the model, remove the rubber motor and rub on some rubber lubricant. This is a special formula and you must never use oil



With a fully wound motor your 'Magnum' will climb like a rocket! A good idea of its attractive lines can be got from the photo below


FLIGHT PLAN 66
1
CORRECT BALANCE IS IMPORTANT
Suspend your model from the balance point shown on the plan.
MAGNUM should hang level with the ground
DO NOT ATTEMPT ANY GLIDE OR POWER ON FLIGHTS BEFORE BALANCING
Places where weight should be added IF required
2
Oil propeller drive shaft
Remove motor and apply rubber lubricant. Replace motor
90°
3
90°
Check alignment of flying surfaces
AVOID ALL WARPS
4
GLIDE TEST
Downthrust angle
Carry out ALL tests on a calm day, and over long grass.
Hold model parallel to the ground. Launch by pushing model forward and releasing smoothly
DO NOT THROW
Wind
20ft approx
5
Model dives remove some noseweight
Model stalls add some nose weight
6
VERY IMPORTANT ADJUSTMENT BEFORE WINDING UP
Cement 1/16sq strip to this side of fuselage
Offset angle
7
Make a hook (18.gauge wire) and fit it into the chuck of a drill (gearing about 3½:1.)
Pull out rubber motor and wind on 75 turns (approx)
8
Wind
POWER ON TEST
To launch release propeller first then push model into the air with propeller running
9
Model should climb, circle about once, and then glide into land smoothly.
10
If model turns steeply to the left
If model turns steeply to the right
If model stalls
If model dives
Diving is also cured by moving the wing forward
Do this
Add 1/16-1/32 strip to increase offset angle
Do this
Razor blade
Reduce by about 1/32 the offset angle
Do this
Increase the downthrust angle, or move the wing back a little
Do this
Bend rear edge of tailplane up slightly
Fin rear edge may be bent slightly to give a gentle turn in either direction.
RM.1966

A gentle test glide—the pilot looks apprehensive but his assistant is plainly delighted by the results!

for this job. Tubes cost 6d. from your hobby shop. Replace motor and put a drop of oil on the propeller drive shaft. See sketch 2. Now check that your model is accurately assembled, that the tailplane is at right angles to the fuselage, and the fin is upright. Make sure there are no warps in the wings, tailplane or fin. If there is a warp brush on a coat of clear dope, and hold the part near a fire, or electric lamp. With your fingers, twist out the warp, and hold the surface firmly until the dope has dried. This should remove the warp.

A calm day

Choose a *calm* day and a field with some long grass. You'll have to be patient here, as testing a new model on a windy day makes trimming very difficult, and in the process you will very probably damage your model—tough as the 'Magnum' is! Face into any breeze that may be blowing, and holding 'Magnum' about shoulder high, and level with the ground, gently push it forward into the air and let go. On no account *throw* the model, or it will most certainly stall, nose dive and crash. 'Magnum' should leave your hand, settle into a shallow glide and touch down on its wheels about 20-25 ft. in front of you. See sketch 5. If it turns to the left or right check the fin to see that it is upright and not twisted. You can very gently warp the fin very slightly. 'Magnum' is very sensitive to fine adjustment. If the model dives into the ground (unlikely if you have built it accurately and balanced it correctly) remove some of the nose-weight. If it rears upwards, and then nose dives (stalls) remove some weight from the tail, or add a little to the nose. Once you have obtained a straight shallow glide you can proceed to what is called a 'Power-on' test. But before winding the rubber motor, you must make the most important adjustment of all. Cement a strip of $\frac{1}{16}$ sq. in. balsa strip down the *left-hand* side of the front nose former (model viewed from the rear). This points the noseblock and propeller shaft to the right. This is called 'off-set' or 'off thrust' angle. See sketch 6 on page 29.

Winding several hundred turns onto a rubber motor is rather a wearisome business, so aeromodellers use a drill, which is usually geared in the ratio of $3\frac{1}{2}$:1 or 4:1 (check the gearing of the drill so you will know how many *actual* turns you have put on). Into the drill chuck is put a hook, see sketch 7. This hook engages with the winding ring you made on the propeller shaft. Get a friend to hold your model as in sketch 7, and pull out the rubber motor to about twice its length (do not be afraid—if it is well lubricated, and the rubber is fresh it will not break). Then wind on about 75 turns on the winder (250-60 actual turns). Holding the propeller, unhook the drill and carefully replace the propeller-noseblock, seeing it is the right way up. Now for your first 'power-on' launch. See sketch 8.

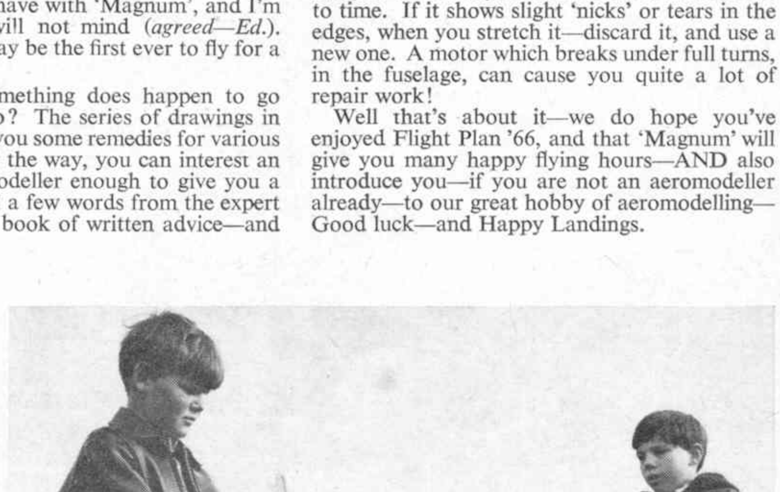
Holding the model in the right hand (or vice versa if you are left-handed) release the propeller first, and then with the propeller running, gently push the model forward and let go—just as you did for the glide tests. Sketch 9 shows you what should happen. If 'Magnum' completes this short flight successfully you can increase the number of turns by about thirty (100 actual turns) with each successful flight, up to a maximum of about 180 winder turns (630 actual turns). On these turns you will get some really high and long flights, starting with a really dazzling steep climb, and lasting for around 25-30 seconds. My own original 'Magnum' (featured in all the photographs) on a cold, sunny early-spring day did a best flight of 47 secs. If you can better this time, perhaps you would care to let me know, just write to me c/o The Editor, Meccano Magazine, St. Alphage House, Fore Street, London, E.C.2. I'd be delighted to hear about any successes you have with 'Magnum', and I'm sure the Editor will not mind (*agreed—Ed.*). Your 'Magnum' may be the first ever to fly for a minute!

And now, if something does happen to go wrong—what to do? The series of drawings in sketch 10 will give you some remedies for various flight faults. If, by the way, you can interest an experienced aeromodeller enough to give you a helping hand—well a few words from the expert are worth a whole book of written advice—and all aeromodellers being dedicated enthusiasts are only too willing to help the beginner—so do not be afraid to ask—politely of course! A steep left-bank which builds up into a spiral dive under power is best cured by *increasing* the offset angle. *Reduce* the offset angle if your 'Magnum' banks steeply to the right. Correcting a fairly steep turn can be done by bending the rear edge of the fin about $\frac{1}{32}$ in.-$\frac{1}{16}$ in. to the left to stop a right bank, to the right to stop a left bank. If you breathe on the surface while bending you will help to avoid splitting the wood. *Please remember any adjustments made to the fin or tailplane must be small.* You will notice that 'Magnum' has a built in 'downthrust angle' (the inclination of the propeller shaft to a line drawn through the centre of the model see sketch 4), and because of this it is unlikely that a stall will occur under power. If despite this built-in downthrust angle, a stall does occur *increase* the angle of downthrust, or move the wing back a little. See sketch 10. A dive is corrected by bending up the rear edge of the tailplane slightly, or by moving the wing forward (about $\frac{1}{8}$-$\frac{3}{16}$ in.). It is important to remember that because 'Magnum' is a small model *ALL* the trimming adjustments must be very small too—that is why a movement of between $\frac{1}{32}$ in.-$\frac{1}{16}$ in. can make all the difference. Just be a bit patient with these, admittedly rather tiny adjustments, and you'll soon have 'Magnum' circling above your head on a most satisfying and rewarding flight. When you go out test flying it might be a good idea to take the page of trimming and flying sketches with you—for quick and easy reference.

Some hints

Finally a word about the rubber motor. Keep it *well lubricated.* You will find it necessary to lubricate it, by smearing on some of the rubber lubricant, after every two or three flights—at least to start with. This is quite simple. Just pull the rubber motor out of the front of the fuselage (without removing the rear anchoring peg) as far as it will come. Lubricate this portion of the motor. Then, with a pen, or piece of stick or wire, pull the other end of the motor out of the fuselage, through the rear opening in the bottom of the fuselage. Lubricate this portion—and the whole of the rubber motor has been lubricated without having to take out the rear anchor peg and remove it from the fuselage. This method keeps your rubber well lubricated—and saves time! Of course rubber strip does not last for ever, so examine your rubber motor from time to time. If it shows slight 'nicks' or tears in the edges, when you stretch it—discard it, and use a new one. A motor which breaks under full turns, in the fuselage, can cause you quite a lot of repair work!

Well that's about it—we do hope you've enjoyed Flight Plan '66, and that 'Magnum' will give you many happy flying hours—AND also introduce you—if you are not an aeromodeller already—to our great hobby of aeromodelling—Good luck—and Happy Landings.



This is the correct way to wind up a rubber motor—use a drill brace and stretch the rubber to at least twice its normal length. Walk towards the model as the turns are applied

FUN & GAMES

For answers to puzzles please see page 48

TRICKY TEASERS

A Cricketers like to make centuries—but here's a century problem that will appeal to figure-jugglers! Below is an arrangement of the numbers 1 to 9, inclusive, that will make 100 exactly when the various signs interspersed are taken into account:

$1+(2\times3)+(4\times5)-6+7+(8\times9)=100$

Now that you see how it's done, find a means of producing the same result by introducing only three signs, and still keeping the figures in their numerical order.

● ● ● ●

B Here's a neat word puzzle. Below, you see ten words, all of which at present contain gaps. Replace the X's in each word with the name of a well-known animal to make the words complete.

1. S X X X TER
2. X X X GED
3. X X X X GERED
4. MIL X X X X
5. P X X X R
6. X X X ERED
7. P X X X X X Y
8. X X X X ET
9. G X X X EFUL
10. B X X ER

● ● ● ●

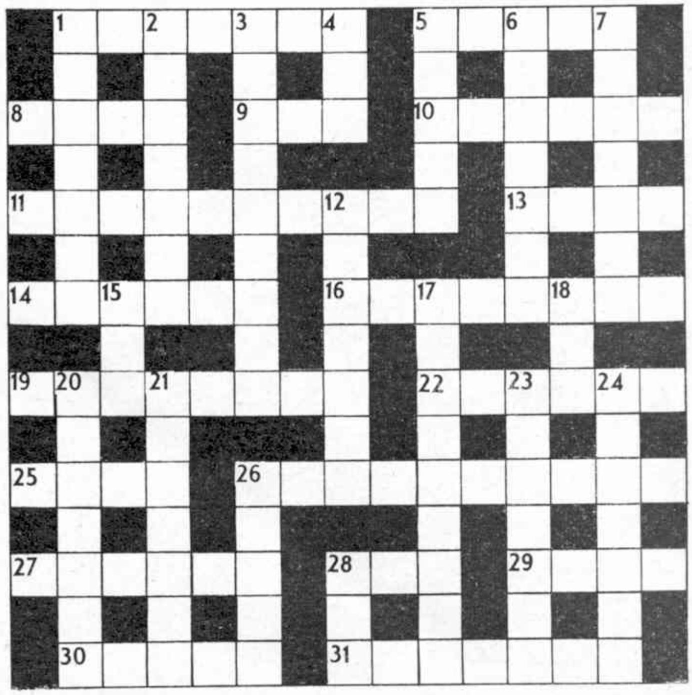
C Another sum to test your wits. A man can go up a hill at the rate of $1\frac{1}{2}$ miles an hour, but when walking down the same hill, he can increase his speed to $4\frac{1}{2}$ miles an hour. If he takes six hours to go up and down, what is the length of the hill?

● ● ● ●

D Here are eight popular English seaside resorts, named in anagram form. Rearrange the letters in each group to find them:

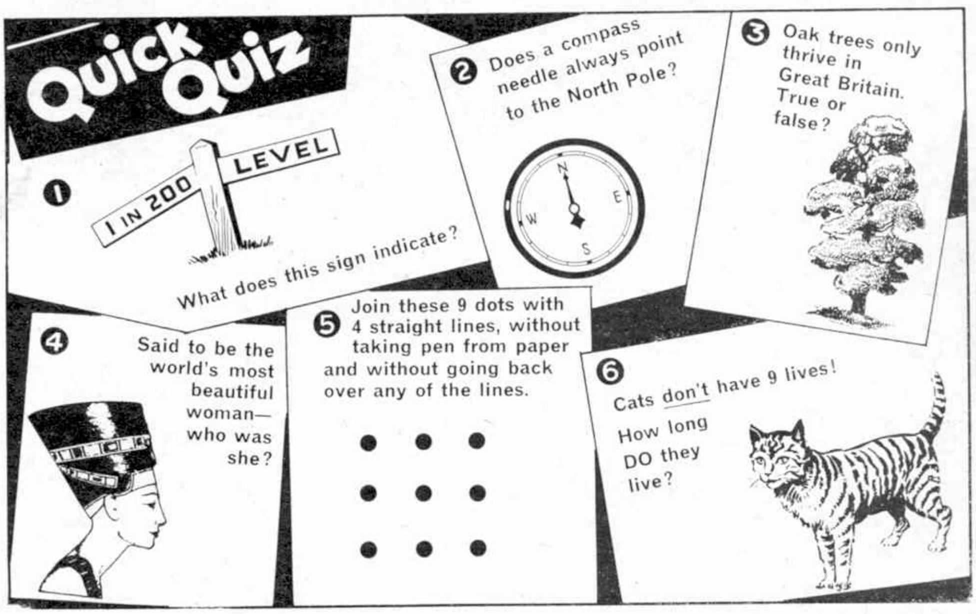
CRAB SO ROUGH. RAG MATE.
AS OUT SHE. THROW GIN.
CAN CLOT. THE SOUND.
HAS STING. BE HEN RAY.

CROSSWORD PUZZLE NO. 17

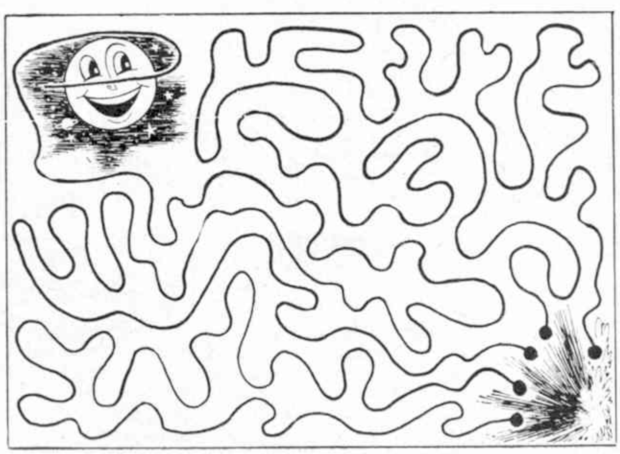


ACROSS
1 Popular constructional toy
5 A possession
8 Length by breadth
9 Seed container
10 Legendary animal
11 Made easier
13 Seen near ports
14 Not the youngest
16 Exact
19 Most secondhand car-owners would like one! (3, 5)
22 Seizes firmly
25 A continent
26 Confectioners' premises
27 The least dangerous
28 To speed up
29 Female servant
30 Devoured
31 As well as

DOWN
1 Military
2 A familiar chap
3 Selected
4 Elderly
5 Assisted
6 Hardy
7 Act of thinking
12 To enjoy without restraint
15 A vapour
17 Escapers
18 —— and outs!
20 To trap
21 The most ungenerous
23 Feeling of guilt
24 Young dogs
26 Glossy silk
28 To steal

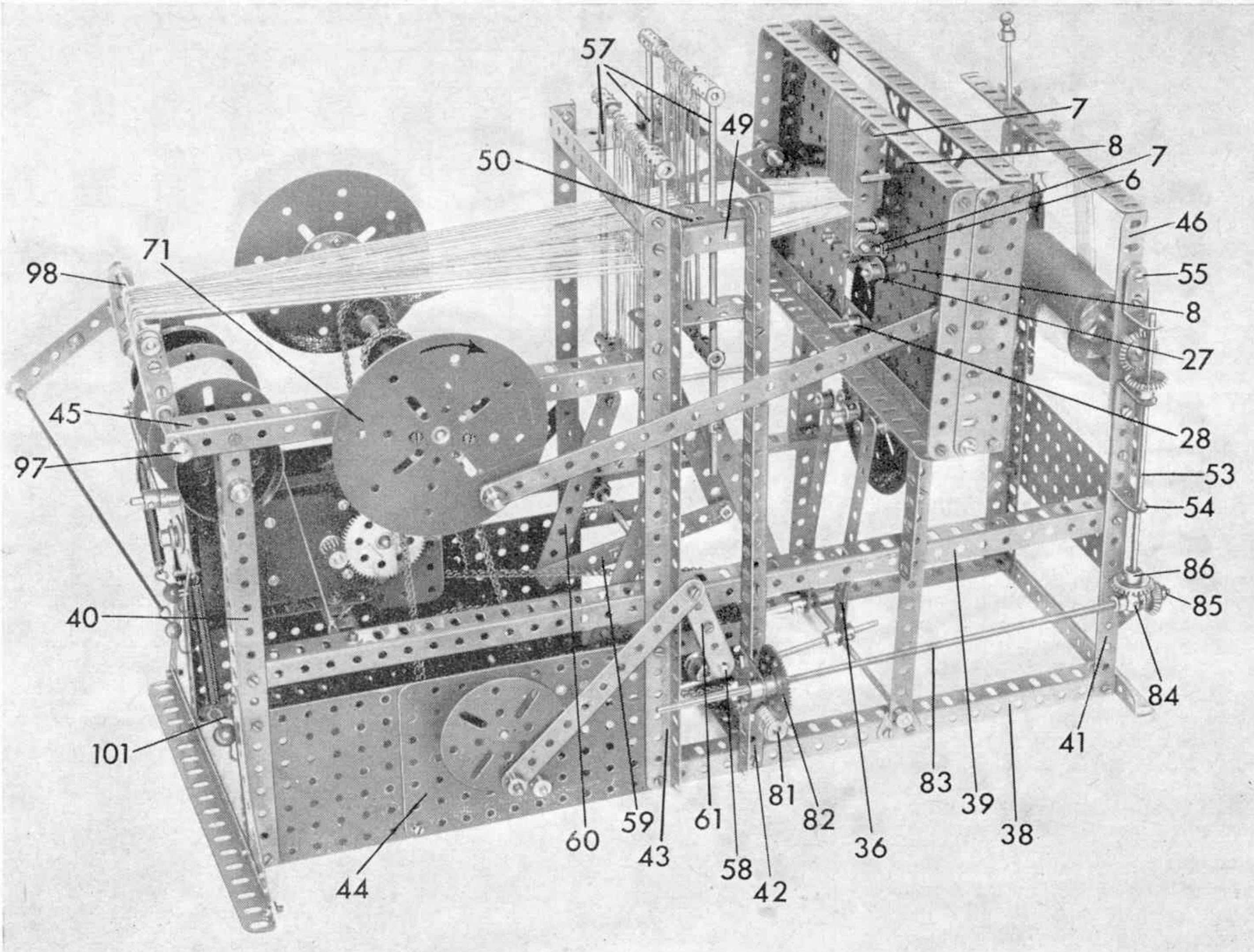


TEST LUCK WITH MOONSHOT



The moon's fair game for target practice in this maze. Only one of five projectiles fired from the lower right hand corner loops the lunar visage. Which one? That's for you to find out. Firing range is at lower right. Not fair starting "moon side" and working backwards, of course. Odds are against success on first try. In fact, you'd better be prepared to duck in four out of five possible choices.

Try seeing through it by eye.



Powered by a Meccano E15R Electric Motor, this correctly-working Ribbon Loom weaves real material

GET WEAVING WITH THIS MECCANO RIBBON LOOM

SAYS SPANNER

YOU don't have to live in the heart of the cloth-making country to appreciate the fascinating action of a machine that, at the flick of a switch, performs all sorts of intricate movements which combine to result in a piece of properly-woven cloth. You don't even have to live in the heart of the cloth-making country to see one of those machines in operation. No matter where you live, all you require is a good stock of Meccano parts, this issue of 'Meccano Magazine', and you can build your own machine—and weave your own material!

Described below is an automatically operated model of a Ribbon Loom, powered by a Meccano E15R Electric Motor. It incorporates all the major features of a full-size commercial loom and it weaves real material in the same way as the original. Construction is not too complicated, but great care must still be taken at every stage, particularly with adjustment of the various operating movements involved, otherwise it will be difficult to achieve the smooth running that is essential if the loom is to operate successfully. Before giving building instructions, however, I should explain some of the technical terms used.

The 'Laysword', incorporating the 'Reed' and 'Shuttle', is the pivoted, rectangular-shaped construction that moves backwards and forwards to pack the lateral 'Weft' threads together, thus producing tightly-woven material. The Reed is a built-up arrangement of several closely-spaced Strips, which serve to separate the lineal 'Warp' threads, only three threads passing through each space or 'dent' in the Reed. The Shuttle is the built-up part on which the Weft thread is wound and which is passed between the Warp threads to produce the weave. In a piece of woven material the Warp threads are those running from one end to the other, while the Weft thread is that running from side to side.

LAYSWORD AND REED

It is best to build this part of the Loom first, as a separate unit, and to fit it to the main framework at a later stage. Incidentally, I feel it is essential that all bosses, used not only in this section of the Loom, but in every section, carry either two Grub Screws or two Set Screws. With the loom completed, none of the Rods must be allowed to slip and the best way of ensuring this is to mount a Grub or Set Screw in each transverse tapped bore of the Bosses.

Two 5½ in. by 3½ in. Flat Plates 1 and 2 are bolted to a rectangle obtained from two 9½ in and two 5½ in. Angle Girders 3 and 4, with Angle Brackets being held by Bolts 5. Further Angle Brackets are then fixed 3 in. away from Bolts 5 by means of the Bolts 6. On two 2 in. Screwed Rods 7, mounted in the Angle Brackets, eighteen 3 in. Strips and seventeen Washers are placed, to result in seventeen spaces or 'dents'.

Eight ¾ in. Bolts 8, each tightly held by a

Nut, are fixed, four in the 5½ in. Angle Girders 3 and four in the Flat Plates 1 and 2 as shown. A second Nut, followed by a Washer, is now placed on each of the Bolts 8 about two threads away from the first Nut. Four 3½ in. Flat Girders 9 are then bolted together through one of their elongated holes, by Bolt 10, the two inner Girders being raised ¼ in. to make a groove. Another three similar arrangements are built up, then all four are mounted on Bolt 8 and held in place by a Washer and Nut on each Bolt. A 6½ in. Rack Strip is placed in the groove, and the Flat Girders are adjusted so that the Rack Strip will glide from one side to the other. The 6½ in. Rack Strip is now no longer required and is removed.

Two 5½ in. Flat Girders 11 and a 5½ in. Angle Girder 12 are secured to each Angle Girder 3, then Girders 12 are connected by a 9½ in Angle Girder 13 and two 9½ in. Strips 14 and 15. Four 1 in. Corner Brackets 16 and 17 are now bolted in position. Two ½ in. fixed Pulleys 18 are mounted on 2 in. Rods journalled in the Flat Plates and Corner Brackets, the Flat Girders resting in the Pulley grooves. It will be found advisable to fix the ½ in. Pulleys on the output shaft of the Motor and then hold a hack-saw blade in the groove while the Motor is run to slightly deepen and square the bottom.

LOOM FRAMEWORK

Both sides of the main framework of the Loom are similarly built, therefore, it is necessary for me to describe only one of them. Two 18½ in. Angle Girders 38 and 39 are connected at their ends by two 9½ in. Angle Girders 40 and 41 and by two 12½ in. Angle Girders 42 and 43 in the centre. Girders 40 and 43 are connected at their lower ends by two 5½ in. by 3½ in. Flat Plates 44 overlapped five holes, and by a 9½ in. Angle Girder 45 at their upper ends. Girder 41 is then extended upwards by a 4½ in. Angle Girder 46. Girders 42 and 43 are now connected by a 2½ in. Strip 47, a 2½ in. Flat Girder 48, attached by Angle Brackets, and by a 2½ in. Angle Girder 49 to which a 2½ in. Flat Girder 50 is bolted. The sides are connected by 5½ in. Double Angle Strips, various Angle Girders and a 5½ in. by 2½ in. Flat Plate, as shown.

Two 4½ in. Strips 51 are fixed, one each, to Angle Girders 41 by ⅜ in. Bolts, four Washers on the shank of each Bolt being used as spacers. A Wood Roller, covered with sand-paper is secured to a 6½ in. Rod carrying a ⅞ in. Bevel Gear 52. Another two ⅞ in. Bevel Gears are mounted on a second 6½ in. Rod 53, journalled in a 2½ in. by 1 in. Double Angle Strip 54 and a 1 in. by 1 in. Angle Bracket 55. A second Wood Roller, on another 6½ in. Rod 56 is held against the first Roller by Tension Springs. These Tension Springs are mounted on the Rod, their other ends being fixed to Loaded Hooks attached to one of the Angle Girders joining the sides as shown. The Rod, incidentally, is journalled between Strips 51 and Girders 41, being free to move up and down.

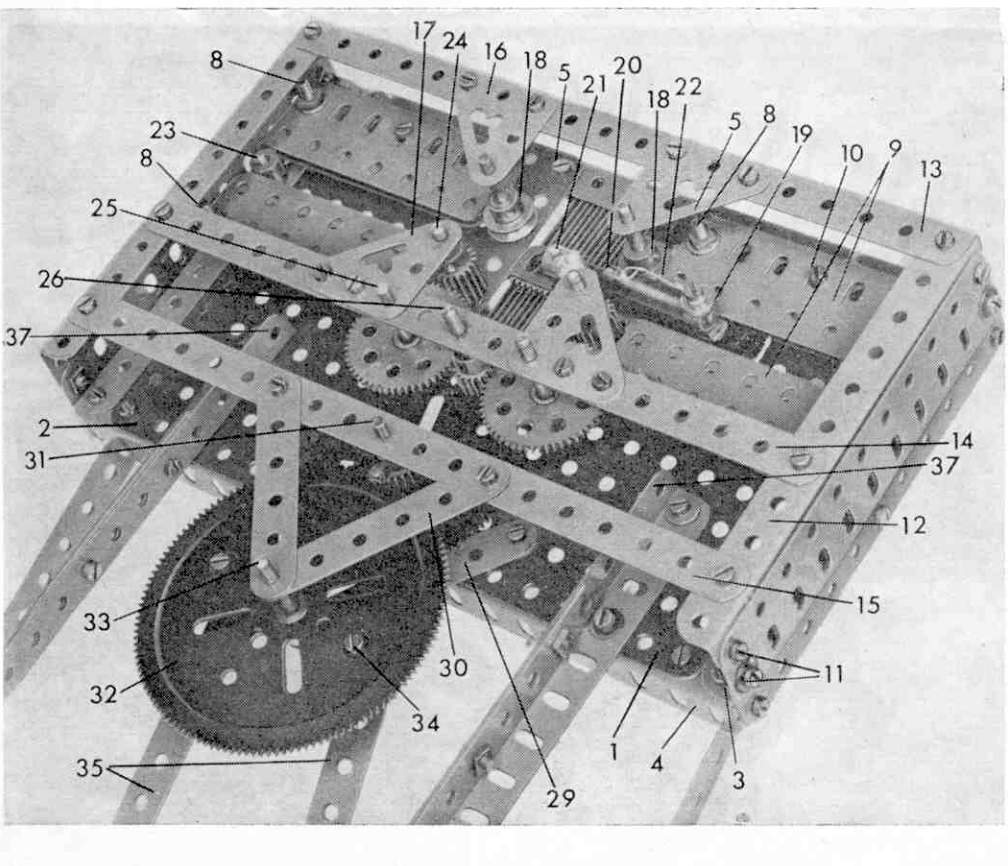
HEALD FRAMES AND OPERATING MECHANISM

Two Heald Frames are included in the model, each being built up from two 18 in. Rods 57. Mounted on each of these Rods are two Couplings, the corresponding Couplings on the two Rods being connected by two 3 in. Rods. Twenty-six Healds are now placed on these 3 in. Rods, care being taken to see that all the 'eyes' face the same way. When both frames have been completed, they are mounted in Flat Girders 48 and 50 by removing one 8 in. Rod at a time. Once in place it is important that the frames be square and that they slide freely in the elongated holes of the Flat Girders.

An 8 in. Rod 58, carrying two Double Arm Cranks, is journalled in 2½ in. Strips 47. The Double Arm Cranks are so placed on the Rod that they lie opposite 8 in. Rods 57. A 4½ in. Strip 59 to each end of which a 4½ in. Strip 60 is lock-nutted, is bolted to each Double Arm Crank, the Double Arm Cranks being positioned in the centre of the Strips. Strips 60 are now connected to the corresponding Rods 57 by Collars, situated ⅞ in. from the lower Coupling. A Crank, extended by a 2½ in. Strip 61, is secured at each end of Rod 58. Note that Strips 61 are set at right angles to Strips 59.

Four 2 in. Sprocket Wheels, one numbered 63 in the illustration, and the two adjacent ones numbered 64, are connected by two 3½ in. Screwed Rods. The Sprocket Wheels are arranged on the Rods in pairs with the bosses of the Sprockets making up each pair, touching. The pairs themselves are separated by a distance of 1½ in. (This space is actually between Sprockets numbered 64 in the illustrations.) Nuts on the Screwed Rods are tightened against both sides of all the Sprocket Wheels, then the complete unit is mounted on an 8 in. Rod 62, journalled in Flat Plates 44 and held in place by Face Plates 65 at each end.

A 5½ in. Strip 66 is lock-nutted to 2½ in. Strip 61 and, at its other end, is held by a Collar on a Threaded Pin fixed in Face Plate 65. When this Face Plate is rotated, the linkage should move the Heald frames up and down in an opposite action. In other words, when one frame is up, the other should be down, and vice versa.



A close-up view of the laysword used in the Ribbon Loom

LAYSWORD AND SHUTTLE DRIVE

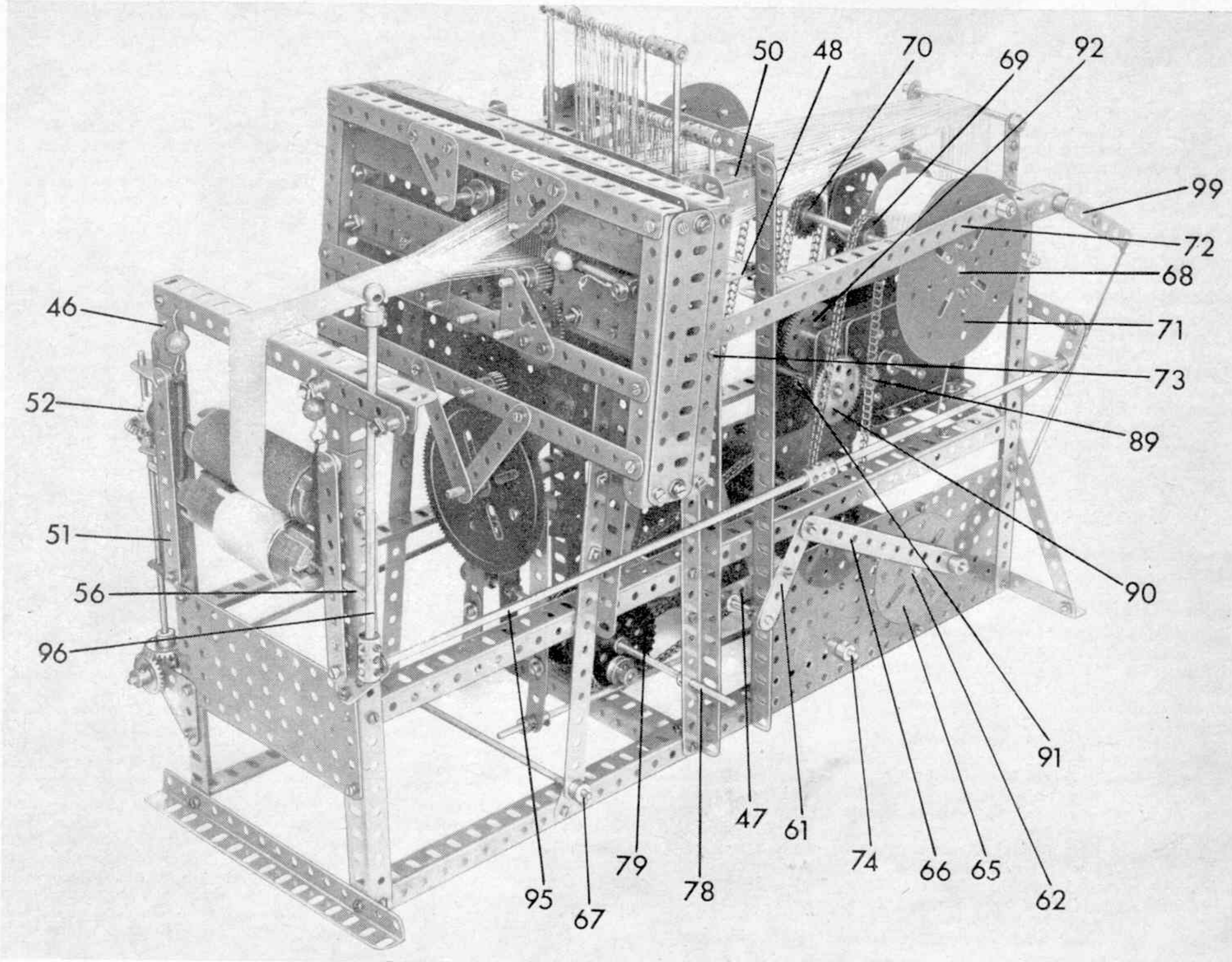
When fixed in position in the Loom, the Laysword is pivoted on a 6½ in. Rod 67, mounted in 1 in. Triangular Plates bolted to Angle Girders 38. An 8 in. Rod 68, carrying three 1 in. Sprocket Wheels, two of which are respectively numbered 69 and 70, is journalled in Angle Girders 45, being held in place by 8-hole Bush Wheels, to each of which a 4 in. Circular Plate 71 is secured. Fixed in this Circular Plate is a Threaded Pin, on which a 9½ in. Strip 72 is held by a Collar. At its other end the Strip is held by a Collar on an Adaptor for Screwed Rod, fixed to the Angle Girder 3 by Bolt 73.

With the Laysword at the front centre of the Loom, and with the top of the Heald frames level with each other, Sprocket Wheels 63 and 69 are connected by Chain, as also are the corresponding Sprocket Wheels at the other ends of the Rods holding Sprockets 63 and 69. Mounted on 6½ in. Rod 74 are two Couplings 75 and 76. In each of these an 8 in. Rod 77 is fixed, being held, at its other end, in Slotted Strip 36 by Collars placed one each side of the Strip. Another 8 in. Rod 78, carrying two 2 in. Sprocket Wheels 79, is mounted in Angle Girders 42, being supported in the centre by a 1½ in. Strip attached to a 1 in. by ½ in. Angle Bracket bolted to 5½ in. Angle Girder 80. Each Sprocket Wheel, in turn, carries a ½ in. loose Pulley held by a Collar on a Threaded Pin, the shank of which points outwards. The Sprockets are arranged so that the Threaded Pins are diametrically opposite each other. With the Laysword at the front centre, Circular Plate 71 is turned until the Laysword has moved 3 in. from the front of the Loom, then Sprocket Wheels 64 and 79 are connected by Chain.

The take-up motion is assembled by securing a Worm 81 to the end of Rod 78. This worm engages with a 57-teeth Gear 82 on an 11½ in. Rod 83, journalled in 1½ in. Corner Brackets bolted to Girders 41 and 42. Mounted transversely on this Rod is a short Coupling 84, which supports the earlier-mentioned Rod 53; ⅞ in. Bevel Gears 85 and 86 are added to the ends of both the Rods, Bevel 85 being spaced from the Coupling by Washers. A Collar, placed in Rod 83 against the Coupling, holds the Bevels in mesh.

MOTOR DRIVE

A Meccano E15R Electric Motor is bolted to two 5½ in. Angle Girders 87 and 88, fixed between Girder 39 at each side. The Motor sideplates are extended by two holes by 3 in. by 1½ in. Flat Plates, as shown. A 7/16 in. Pinion, secured to the armature shaft of the



Another view of the completed model clearly showing the take-up mechanism

Motor, is meshed with a 60-teeth Gear Wheel on a 2½ in. Rod, journalled in the Motor side-plates that carries a ½ in. Pinion 89 at its other end. This Pinion, in turn, meshes with a 57-teeth Gear Wheel 90 and another 2½ in. Rod, journalled in the 3 in. by 1½ in. Flat Plates. Mounted in the centre of this Rod is a second ½ in. Pinion 91 that is meshed with another 57-teeth Gear 92, fixed on a third 2½ in. Rod, also journalled in the Flat Plates. Mounted on the end of this Rod is a 1 in. Sprocket Wheel, which is connected by Chain to Sprocket Wheel 70.

Fixed to the central arm of the Motor switch is an adaptor for Screwed Rod, on which a 4½ in. Strip 93 is held by a Collar. The other end of the Strip is lock-nutted to a Crank 94, fixed on a compound rod 95, obtained from an 8 in. and an 11½ in. Rod joined by a Coupling, journalled 1½ in. Corner Bracket bolted to Girders 40 and 41. At the other end of compound rod 95, a Coupling carrying a 6½ in. Rod 96, is fixed. Rod 96 is mounted between the 7½ in. Angle Girder bolted between Girders 46 and a 2½ in. Strip, held on ¾ in. Bolts and tensioned by Compression Springs, as shown. When Rod 96 is against the inner ¾ in. Bolt, the Motor starting switch should be in the 'off' position.

SHUTTLE

A 3½ in. Rack Strip which has had its sharp corners filed away at the top and ends is fitted with two Nuts and Bolts, secured one hole from each end, the edges of the Nuts to be parallel to the edge of the Rack Strip. Collars 19 and 21 are screwed on these Bolts. A 1½ in. Rod 20, forming the shuttle spindle, is wound with very thin thread by placing it in a Coupling fixed to the output shaft of the Motor. Beginning against the Coupling and moving forward ⅜ in., the thread should be built up like a cone and winding should continue backwards and forwards on the slanting edge of this cone till the Rod is filled. The Rod is now loosely mounted in Collar 19. If necessary, the Bolt holding the Collar in position should be filed down so that it does not grip the Rod.

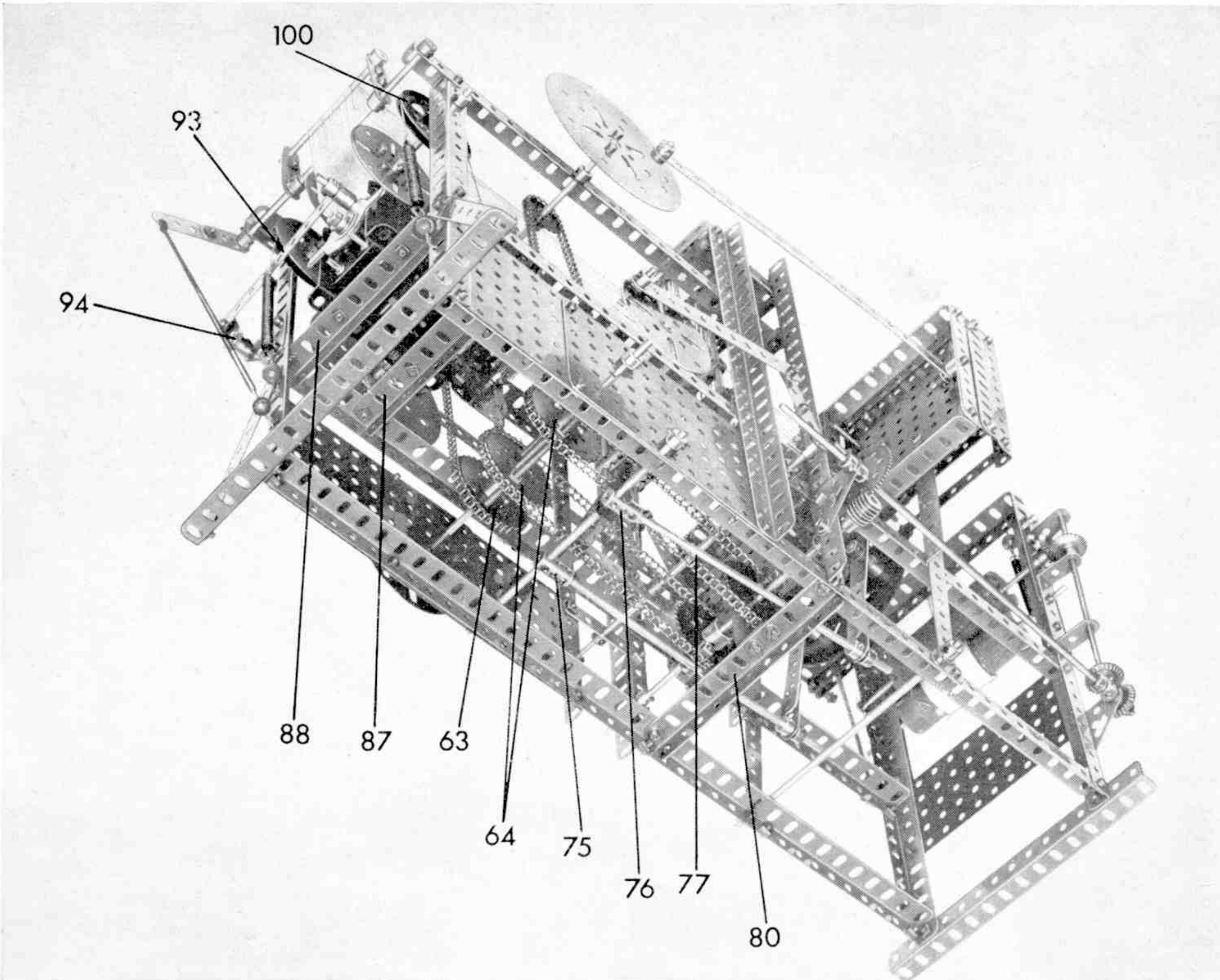
With the Rod in place, the thread is passed into the longitudinal smooth bore of Collar 21 and out by way of the Grub Screw hole. A small piece of cotton wool is put into the bore to tension the thread. A Meccano Heald is now cut just below the eye leaving a straight length of wire 22 with a small loop at the end. The wire is twisted around a Bolt which is then screwed, along with two Washers, into the unused transversed tapped bore of Collar 19. The loop should lie midway between Collars 19 and 21, and note that the Bolt in this case must grip Rod 20. The thread, which should come off the Rod fairly easily, is passed through the loop, then the completed shuttle is placed in the grooves in the arrangements built up from Flat Girders 9. A Threaded Boss 23 is bolted in each Angle Girder 3 as shown.

SHUTTLE OPERATING MECHANISM

A ½ in. by ½ in. Pinion is fixed on a 2 in. Rod 24, four Washers spacing it from Flat Plate 2. In constant mesh with the Pinion is a 57-teeth Gear Wheel mounted on another Rod 25, three Washers being used as spacers. A second ½ in. by ½ in. Pinion is secured to another 2 in. Rod 26, one Washer being used as a spacer. At its other side, the Pinion is in mesh with a second 57-teeth Gear which, in turn, meshes with a third ½ in. by ½ in. Pinion, as shown. Incidentally, a 2½ in. Strip 27, placed on Rods 25, provides the rear bearing for Rod 26. Rods 25 and 26 are held in place by Collars behind the Flat Plates.

Bolted to Flat Plates 4 are a 3½ in. Strip 28 and a 3 in. Strip 29, while two 3 in. Strips 30 are bolted to 9½ in. Strip 15. A Rod 31, carrying a ½ in. Pinion and a 2½ in. Gear Wheel, is journalled in Strips 15 and 17. The 2½ in. Gear engages with the ½ in. Pinion on Rod 26. A 3½ in. Gear Wheel 32 is mounted on a 2 in. Rod 33 journalled in Strips 29 and 30. Two Bolts 34 are passed through diametrically opposite holes in Gear 32, after which an Adaptor for Screwed Rod is fixed on their shanks. The two Bolts must be parallel to the Rack Strip when the Rack Strip is in the exact centre of the laysword.

Two 4½ in. Strips 35, extended by 2 in. Slotted Strips 36, are loosely mounted on the Screwed Rod Adaptors, being held in place by Collars. Two 5½ in. Angle Girders 37, lengthened by a 7½ in. Strip, are then bolted



An underneath view of the Loom showing the extensive use of Sprocket Wheels and Chain for transferring drive to the various moving parts of the model

to Flat Plate 2. Gear Wheel 22 should now be moved to and fro (using very little power) thus causing the shuttle to travel from side to side. Any necessary adjustments should now be made until the operation works quite smoothly.

WARP THREAD TENSION DEVICE AND BEAM

Two Cranks, extended by 1½ in. Strips are secured to a 6½ in. Rod 97, journalled in Girders 45. The 1½ in. Strips are then connected by a 3½ in. Rod 98, held by Collars. Another Crank, extended by a 3 in. Strip 99 is mounted on Rod 97, being tensioned by a 10 in. Driving Band attached to a Loaded Hook.

Two Face Plates are connected together by four 1½ in. by ½ in. Double Angle Strips and are fastened on a 6½ in. Rod, to form the Warp Thread Beam. Two 2 in. Pulleys 100 are added to the Rod, which is then journalled in Girders 40, being held in place by Collars. Lengths of Cord, attached to Angle Girders 87 are passed over the Pulleys and attached to Tension Springs anchored to Angle Girders 40 by Loaded Hooks. Two 9½ in. Strips 101 are crossed, and bolted to Angle Girders 38, first being joined together by a Bolt through their centre holes.

WARP BEAM PREPARATION

For the Weft thread we recommend that Sly-ko No. 40 to No. 50 be used, and Sly-ko No. 10 to No. 20 for the Warp threads. To prepare the Warp threads ready for the beam, two 6 in. nails which we will call A and B are placed on a flat surface about three yards apart. Another two 6 in. nails C and D, 3 in. apart, are then placed between them with about 18 in. separating them from nail A. A thread is now fastened to nail A, is passed over nail C and under nail D, is passed around nail B, taken over nail D and under nail C to be finally passed around nail A. This sequence is repeated until 51 threads have been used.

Using a comb or a built-up reed the threads are divided evenly over a width of 1½ in., then, where they have been cut off nail A, they are tied together in one large knot. This knot is placed in the centre of the warp beam, between two of the Double Angle Strips, and the beam axle placed through the centre of the threads. With the comb or Reed held by a friend in front of the beam, the threads will fan out to the width of the Face Plates, as the threads are tightly wound around the beam.

Nails C and D are now replaced by two 8 in. Rods fastened at the ends by Couplings. With all the Warp wound on the beam, the threads are cut off at nail B. The beam is now mounted in the Loom without the comb or Reed, but the 8 in. Rods remaining in position about 1 ft. from the ends of the threads.

Having placed the beam in position with the Cords tensioned around the 2 in. Pulleys 100, the 8 in. Rods are temporarily mounted in 9½ in. Girders 45 near the back of the Loom. The first thread at either side is now taken from the 8 in. Rods and passed through the eye of the corresponding first Heald on the front frame, then the second thread is taken from the 8 in. Rods and passed through the first Heald on the rear frame. This sequence is repeated until all the threads have been drawn through the Healds, after which the first three threads are passed through the first dent or slot in the Reed. The next three threads are passed through the second dent and so on. When finished, the threads are brushed until they lie evenly and then are passed around the sand paper-covered Wood Roller to be fixed to the ordinary Wood Roller by a 2 in. Rod in its groove. The Motor must not yet be started.

With the Shuttle Rod wound with thread, Circular Plates 71 are slowly turned in the direction of the arrow to make quite certain that the Heald frames are nearly fully open when the Shuttle is about to pass through the opening or 'shed' of the threads. The shed must, of course, remain open until the Shuttle has passed through. The sequence should be continued to ensure that the Shuttle returns in a similar manner.

Slotted Strips 36 are adjusted so as to keep the Shuttle against the Threaded Bosses after passing through the shed. If this is not done

Continued on page 46

MAILBAG

An Old Coaching Inn

The Cleveland Tontine Inn, standing at the junction of the main Yarm-Thirsk and Stokesley-Thirsk roads in the North Riding is a fine example of an old coaching inn, and the name is also a memento of a form of investment popular in the 18th and early 19th centuries.

In 1804, the sum of £2,500 was raised by subscription to build the Inn. Any person was at liberty to subscribe for any number of shares either on his own or on another person's life and to be entitled to a proportionate share of the rent and when the number of nominees was reduced to three the property was to become theirs in proportion to the number of their shares. *L. Gowan, Whickham, Newcastle-upon-Tyne.*

A Unique Windmill

This unusual windmill, said to be unique because it is thought to have been designed by Inigo Jones, is to be restored. Built in 1832, it stands near Chesterton in Warwickshire and an appeal has been launched for £3,500 to put it in working order, including the sails and machinery. All the machinery is housed in the upper storey and this has caused speculation that it may have been designed originally as an observatory. One of the millstones has fallen through the floor and now lies beneath the arches. *F. Rodgers, Allestree, Derby.*

Model Warship

Here is a picture of a warship model I built a few years ago. It is built mainly of pine and cedar wood and is all hand made. As can readily be seen it looks real in the photo taken with a box camera using Kodak 127 film. She is floating on the Sydney river, in Sydney C.B.

She represents a model of the British battleship H.M.S. Revenge and can be driven by an outboard motor fitted on the stern. The hull is solid, not hollow, so the weight tends to make her float low for greater realism. The flags are just pieces of coloured paper cut and draped over the flag lines. I am now working on a model of the British tourist liner S.S. Caronia, one of the best ships of her type I have seen so far. *D. Armitage, Ontario, Canada.*

You Too?

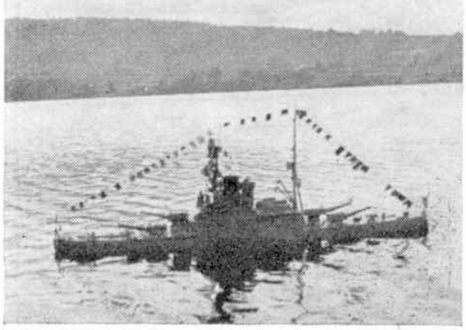
On a lawn in the grounds of Hohensalzburg Castle in Austria, this unusual sign is set, to keep people off the grass. The words on the sign mean simply 'You Too?' But even without them, the purpose of the notice is clear to the tourists who come to visit the castle from many countries. The elephant blunders across the lawn, shamefacedly leaving a trail of damage behind, and discourages the others from following his example. *B. Malone, Bristol, 8.*

The Monk's Clock

Here is a model of a church, with a flight of steps leading to the doors, and it is complete with roof, belfry and Cross. The interior is illuminated. The door opens at the strike of the hour and half-hour, when a jovial monk appears. He pulls the ropes and tolls the bell. An interesting feature about this 200 years-old Bavarian clock is the fingers which were once part of piano keys. The owner is Mr. Donald Urquhart, of the Highlander Inn, Crosby, Isle of Man. Horology has been a hobby of Mr. Urquhart for close on sixty years; he now possesses a large and unique collection of clocks. *F. J. Chapple, Isle of Man.*

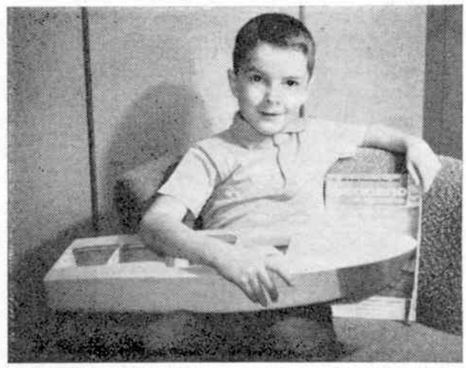
Above: a 200 year old Bavarian clock owned by Mr. Donald Urquhart

Below: Canadian reader D. Armitage sent us this photograph of his model of H.M.S. Revenge



Brave Moppie'

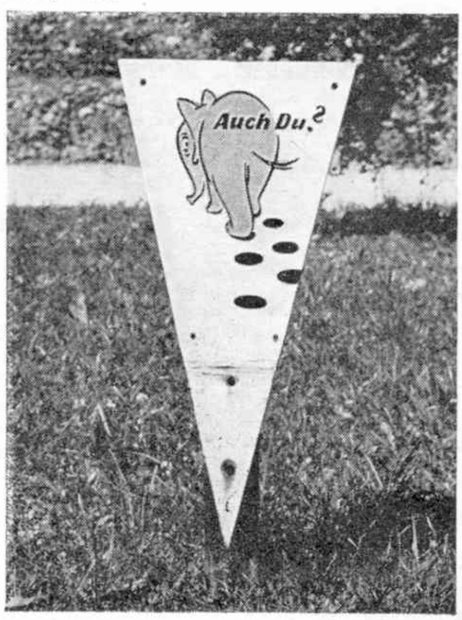
Here is a photograph of myself holding the hull of my 'Brave Moppie' which I am building from your plans with the help of my father. I sure look forward to receiving your magazine, which my grandparents send me every month. I am eight years old *(see page 5, Ed.). W. Robertson, Quebec, Canada.*



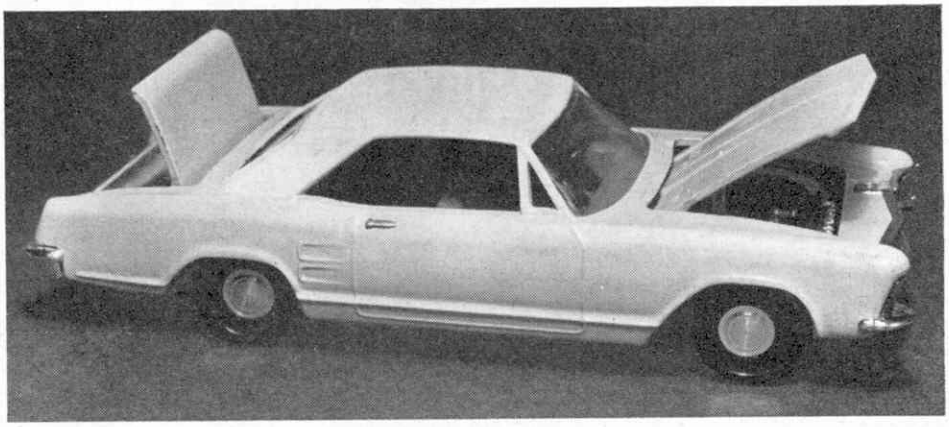
One of the most youthful of the many 'Moppie' builders who have written to us is 8 year old W. Robertson of Quebec, Canada. Readers will be pleased to know that there will be another boat project later this year

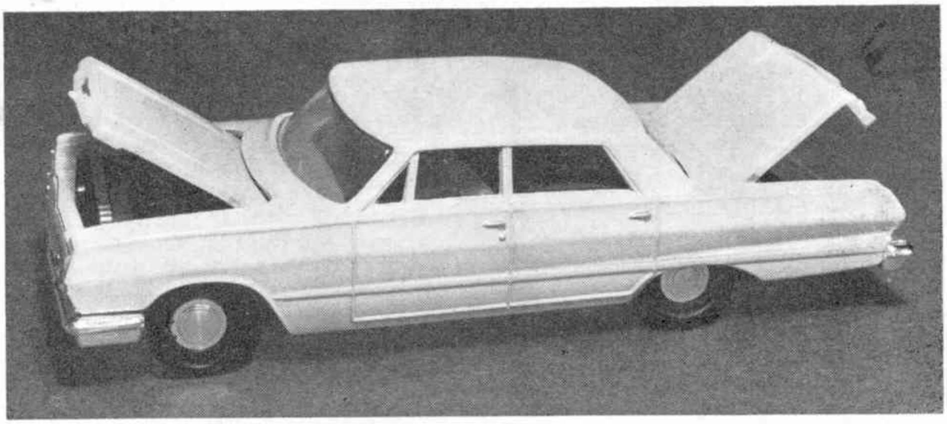
Above: the unusual windmill near Chesterton, described by Mr. Rogers

Below: no need to read the German inscription to get the message here!



MADE IN HONG KONG





Top photograph shows the two new cars side by side. The impressive chrome radiator grilles are notable. Opening bonnets and boots complement the crisp lines of the cars. The Buick Riviera is shown in the centre photo and the Chevrolet Impala in the bottom picture

RECENTLY added to the Dinky Toys range were two models, based on America's Chevrolet Impala and Buick Riviera, which perhaps make the largest contribution to Meccano Limited's history since Dinky Toys were first invented. Why?—Because they are made in Hong Kong. This, however, does not mean that they are in any way inferior to home-produced models. Rather, they are typical Dinkys of excellent quality which have been produced under licence, using Meccano's plans, manufacturing techniques and specified materials.

What are the reasons for a company such as Meccano having models made across the other side of the world? This is a reasonable question and one with an equally reasonable answer. For some time Meccano has been devising ways and means of expanding the North American market, which has always been greatly affected by high costs involved in importing British-made models. After exhaustive discussion with agents in both Canada and the U.S.A., it became obvious that the best way of doing so would be to have the models made in Hong Kong where, it is generally recognised, material and production costs are considerably cheaper than in this country.

IMPRESSIVE

Purely as a limited experiment, therefore, a licence was given to a reputable company in Hong Kong, who accordingly produced the two models in question. These were marketed in North America with enormous success. It must be stressed, incidentally, that this practice is already common among other top-name companies throughout the world, and is by no means unique to Meccano.

In the early stages of the experiment, it was never for a moment intended that the models should be marketed in this country, but, when samples arrived here, everybody was so impressed with their quality that there seemed no reason for withholding them from the U.K. market. The general opinion was that they measured up to the high standards set down for Liverpool-made models, and so supplies were accordingly imported and released.

Without wishing to repeat myself, the Hong Kong productions are genuine Dinky Toys and, as such, are indistinguishable from British examples. To help identify them, therefore, they have been given special Sales numbers—57/001 for the Buick Riviera and 57/003 for the Chevrolet Impala. Produced to the now-standard scale of 1:42, both models are fitted with an opening bonnet, detailed engine, opening boot, suspension and realistic, press-on wheel centres, in addition to windows, seats, steering wheel, number plates and plated radiator-grille and bumpers. The Riviera is finished in pale blue with white roof, while the Impala has an off-white roof and soft-yellow body. The interiors of both are red.

Turning to the real-life Impala, this is available in three basic versions—station wagon, sports sedan or convertible, the Dinky being based on the sports sedan. Power is supplied by an eight-cylinder, o.h.v. engine of 4,638 c.c. capacity that develops 195 brake horse power to give the car a top speed in excess of 100 m.p.h. and a cruising speed of round about 90 m.p.h. In accordance with most

Continued on page 46

Choosing a Controller

'WHICH power unit do I buy?' is a question often asked by anyone with their first train set, and is one that can often be puzzling to the newcomer to model railways. The problem is not helped by the many different types available, usually with widely different specifications.

Generally speaking, a fairly inexpensive unit capable of controlling one locomotive or train will be quite adequate for the first train set, although, of course, the more expensive the unit the greater its ultimate capabilities. It is not, however, absolutely essential for a mains power control unit to be bought at first, and the enthusiast can, if he so wishes, avoid the expense by buying a battery control unit such as the Tri-ang RP.40 costing only 4s. 6d. This is ideal for operating a small train set for short periods, and has the added advantage of a price sufficiently low to make the cost of the first train set attractive. The disadvantage of using it for longer periods, however, is that the cost of replacement batteries will, in due course, equal that of a mains control unit, and for this reason, a unit of this sort is best used only as an interim measure before a mains unit can be bought.

The Tri-ang Battery Control Unit uses three 4½ volt dry batteries of the Ever Ready 126, or equivalent type, and has a forward-reverse control knob with three-step voltage control. The three batteries fit underneath the unit and two leads supply the power to the track.

An alternative to a battery control unit, where a small train set or layout is concerned, is an inexpensive power controller capable of operating one train. Units of this type are usually fitted with one pair of terminals supplying 0-12 volts D.C. at an amperage of about 0·6 or 0·8. Of the units made by Tri-ang and Hammant & Morgan, the Tri-ang RP.3, at 32s. 6d., fulfils this function, and has in addition, two other refinements. These are an automatic cut-out or circuit breaker of the thermal type for disconnecting current in the event of a short circuit, and a high-low resistance switch for making control more flexible. A 'Britannia' locomotive, for instance, would function better on a low resistance because of the smoke unit which in itself acts as a high resistance, while smaller locomotives would operate better on a high resistance. Basically, however, this unit performs the same function as a battery control unit, and is not designed to power a subsidiary control unit or electrically operated accessories. It also, of course, disposes of the need to replace batteries at frequent intervals and is probably a wise choice for anyone with a small train set or layout.

Where the more advanced enthusiast is concerned, a number of these units can be used for more complicated control systems such as cab control where the layout is split into individual sections all linked by one rail which remains 'common'. Each section can be brought under the control of any one controller by suitable switching, resulting in a completely flexible system of control where any locomotive can be operated by any controller. Any number of the Tri-ang RP.3 Units can therefore be used in addition to one of the larger units, instead of a secondary controller used from an auxiliary output of a larger unit. This is an economical way of providing suitable power equipment for a cab control layout, and can be cheaper than buying one of the special units with a double wound transformer.

Accessories

When current for electrically operated accessories, such as points or signals, is required, however, the RP.3 itself will be inadequate, although of course, it can still be used in conjunction with various other power units for controlling a second or third locomotive. Once a layout has reached the stage where accessories are to be fitted, a power controller with a separate output for this purpose will be needed, and although this can be bought at the same time as the first train set, it is cheaper to buy the RP.3 first to keep the initial cost as low as possible, adding the larger unit at a later date.

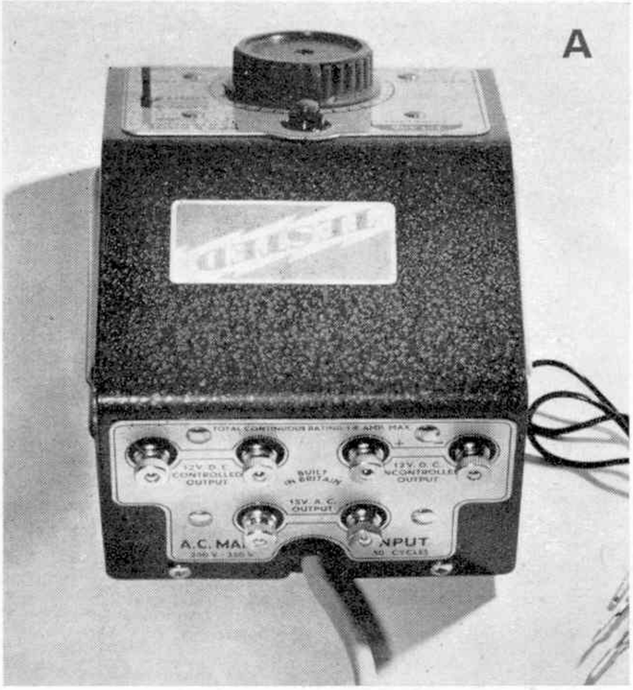
Of the many larger power control units available, all will have a common denominator of one output supplying 12 volts D.C. variable, and a second output supplying 12 volts D.C. uncontrolled. In the Hammant & Morgan range the 'Clipper' Unit gives both 12 volts D.C. controlled and uncontrolled with an additional pair of sockets giving 16 volts A.C. The RP.4·5 in the Tri-ang range also gives a 12 volts D.C. variable output with a secondary 12 volts D.C. uncontrolled for operating points, signals, a Turntable or a secondary controller. In both units, the 12 volts D.C. uncontrolled output and the 16 volts A.C. output in the H. & M. unit is not taken off an independent winding of the transformer, and if, therefore, either are used for a secondary controller, a cab control system of wiring with a common return, also incidentally used by an overhead power supply, cannot be used. The controllers in such cases must be electrically independent.

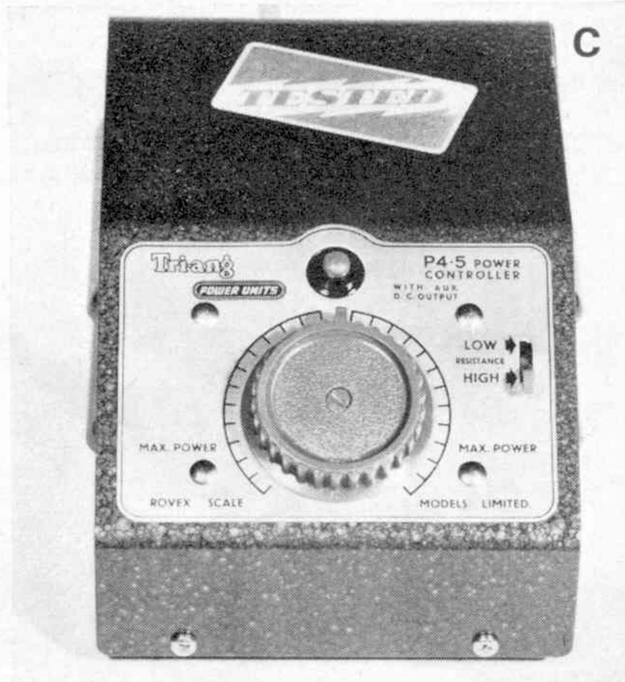
The Tri-ang Unit, costing 42s. includes the same features as the RP.3 except that the cut-out is of the magnetic type and includes a reset button instead of the thermal self-resetting type fitted on both the RP.3 and the H. & M. Clipper. The magnetic cut-out can be the more useful of the two in testing wiring circuits, by being used to create deliberate short circuits. This is done by placing the two leads from the unit on the section of track or wiring to be tested, and if the cut-out button springs up, current will be running through the section of track or wiring concerned. If not, the unit can be used to establish more accurately where the break or fault lies.

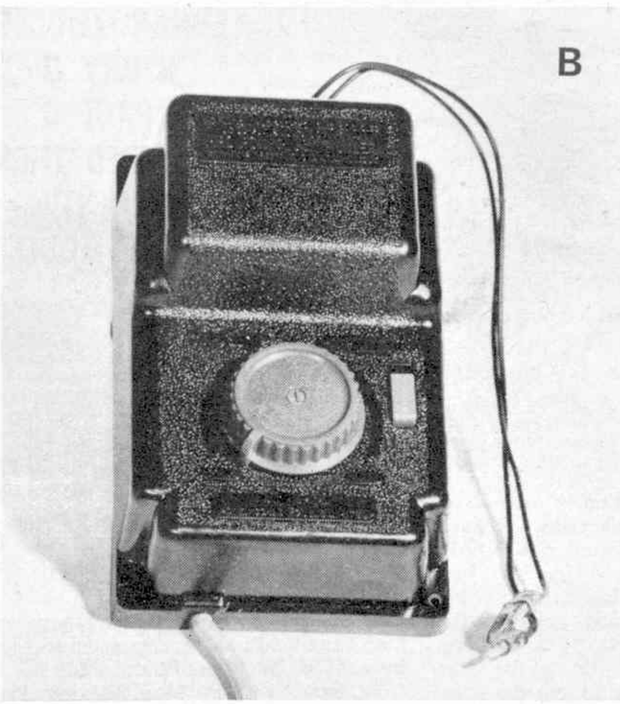
Thermal cut-out

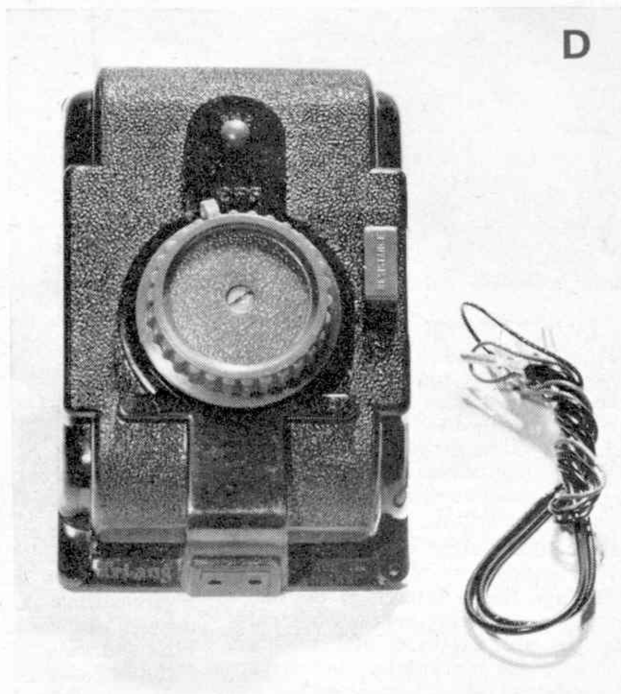
The larger power control units invariably include a third output usually 15 or 16 volts A.C. for the control of extra equipment. On some units, such as the H. & M. 'Minor', this third output is taken from an independent or tertiary winding of the transformer and on others like the H. & M. Clipper and Tri-ang RP.5·5 it is non-independent. The 'Minor' includes a third quite independent output of 16 volts A.C. and includes a thermal self-resetting cut-out. The unit is rated at 1·5 amps as compared to 1·8 amps on the Tri-ang RP.5·5. Capable of handling any number of points providing that only a few are operated at any one time, signals and other equipment such as the Bell Signal Set, the unit cannot be used for layouts with a common return system of wiring, rarely necessary where Super 4 Track is concerned. Like other units in the range, it is fitted with a high-low resistance switch and an automatic safety cut-out. Costing 54s. 6d. either of the two uncontrolled outputs can be used for Tri-ang Hornby accessories which are designed to be used from either a 12 volts D.C. or 15 volts A.C. output.

Circuit control units to be operated from a 12 volts D.C. supply, available on most H. & M. and Tri-ang Control Units, do provide an easy and cheap way of operating two locomotives, and in the case of the Tri-ang RP.42 Circuit Control Unit, both an overload safety cut-out and a high-low resistance switch are fitted. An alternative to the circuit controller is a rectifier controller of the RC1 type made by H. & M. who also, in point of fact, produce a normal circuit controller. Available in two forms, the RC1









A The Tri-ang Hornby RP 5·5 Power Controller has three non-independent outputs giving 15 volts A.C., 12 volts D.C., and 12 volts D.C. variable

B A smaller unit with one output giving 12 volts D.C. variable, the RP 3 Power Controller is suitable for the control of one train only

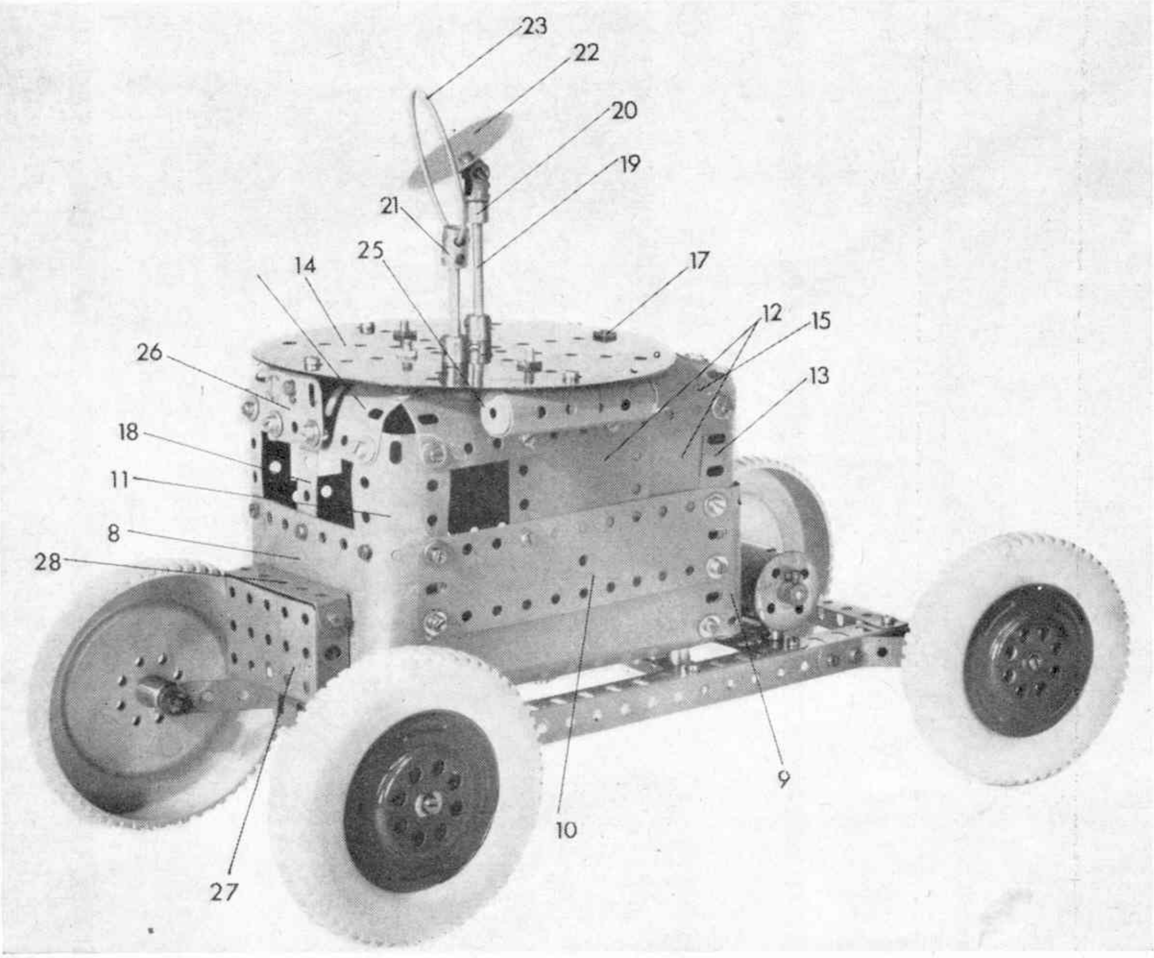
C Complete with two outputs, the Tri-ang Hornby RP 4·5 Power Controller supplies outputs of 12 volts D.C. variable and 12 volts D.C. fixed for the control of accessories or a second train through a circuit controller

D Connected to a power supply of 12 volts D.C., the Circuit Controller can be used for operating a second train

E The Hammant and Morgan 'Safety Minor' incorporates a double-wound transformer for common-return wiring

having an input of 14-18 volts A.C. with an output of 12 volts D.C. variable, and the second, the 'Isotran' having an isolated circuit for layouts using a common return system of wiring. Rated at 1 amp this unit has the same input as the rectifier controller (RC1) and a 12 volts D.C. variable output with a magnetic cut-out and a high-low resistance switch.

A point to remember about all power units for model railways is that they must be used with an A.C. mains supply of 200/250 volts A.C. at between 50 and 100 cycles. They must never be connected to mains D.C. current, and remember that if you do not feel yourself competent to attempt the wiring of a mains plug for your unit, do take it to your local electrician.



BY SPANNER

IDEAS FROM SPACE

OUR LUNAR VEHICLES STORY ON PAGE 6 INSPIRED THESE INTERESTING LITTLE MODELS

Above: general view of the mobile moon laboratory, showing the high degree of realism attained. (Compare with photos on page 7)
Below: chassis and underside of body, showing method of wheel fixing and general simplicity of construction

ARE you ever stuck for new model ideas? If so, you must have wondered how on earth we have managed to feature several new models in every issue of 'Meccano Magazine' over the past half-century. The answer is simple — our model-builders have kept pace with a changing world.

When you think about it, most Meccano models are reproductions of machines existing in real life and life is forever on the move. New inventions constantly appear while existing machines are improved and modified. Ideas, in fact, are everywhere, but perhaps never more so than today, because we are now on the threshold of the Space Age.

As you know, space exploration has already begun and, before long, many weird and wonderful machines will have been produced to assist astronauts in their work. These should make excellent subjects for models. Only recently, the Americans released details of some strange-looking vehicles, planned for travel on the moon, which you will find illustrated on page 7 of this issue. The first model described below is based on one of these vehicles, thus proving my point.

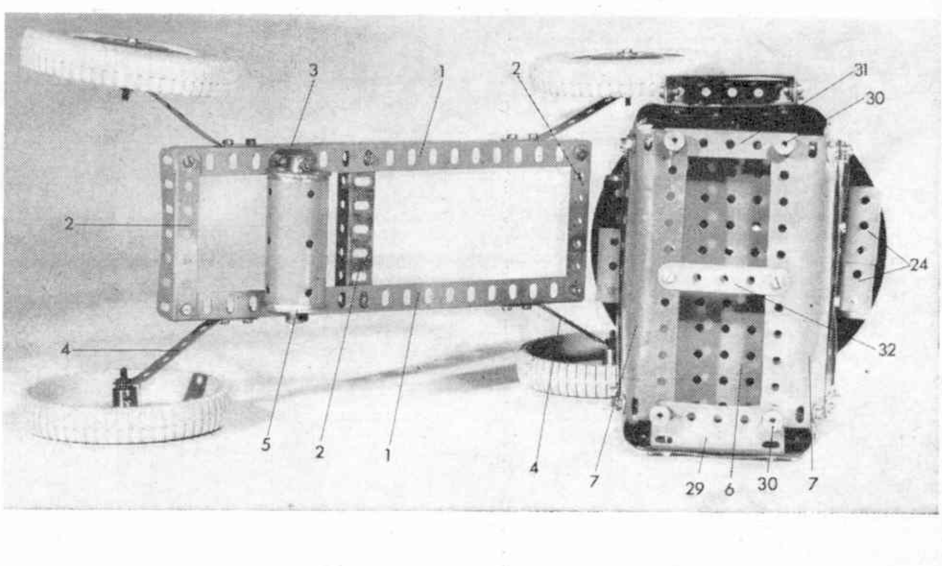
Construction is quite straightforward. A chassis is built up from two 9½ in. Angle Girders 1, connected by three 3½ in. Angle Girders 2 and a 3½ in. Flat Girder 3. Two 3½ in. Strips 4 are bent to shape and are bolted to each Girder 1 so that they project outwards at the corners of the chassis. Four 4½ in. Road Wheels are then loosely mounted on 1⅛ in. Bolts lock-nutted in the end holes of these Strips. A Cylinder, with a 1⅛ in. Flanged Wheel 5 fixed in each end by a 3½ in. Rod, is bolted to Flat Girder 3.

Body

The body is built up on a 5½ in. by 3½ in. Flat Plate 6, to the underside of each long edge of which a 5½ in. Angle Girder is fixed with its vertical flange pointing downwards. Bolted to this flange is a 5½ in. by 2½ in. Flexible Plate 7, the holding Bolts passing through the middle elongated holes in the Plate and securing another two 5½ in. by 2½ in. Flexible Plates 8 and 9 in position at the same time. The latter Plates serve to join the sides.

Added to each side, as shown, are a 5½ in. by 1½ in. Flexible Plate 10, a 2½ in. by 1½ in. Flexible Plate 11 and two 2½ in. by 2½ in. Flexible Plates 12, the rear of the body being completed by another 5½ in. by 2½ in. Flexible Plate 13. With these Plates in position, spaces should remain to represent a window at the sides and a windscreen at the front. Bolted to the upper inside edge of Plate 8, between Plates 11, is a 3½ in. Strip.

Turning to the roof, this is composed of a 6 in. Circular Plate 14, connected to each side by a 5½ in. by 1½ in. Plastic Plate 15, to the front by a 3½ in. by 2½ in. Flexible Plate 16,



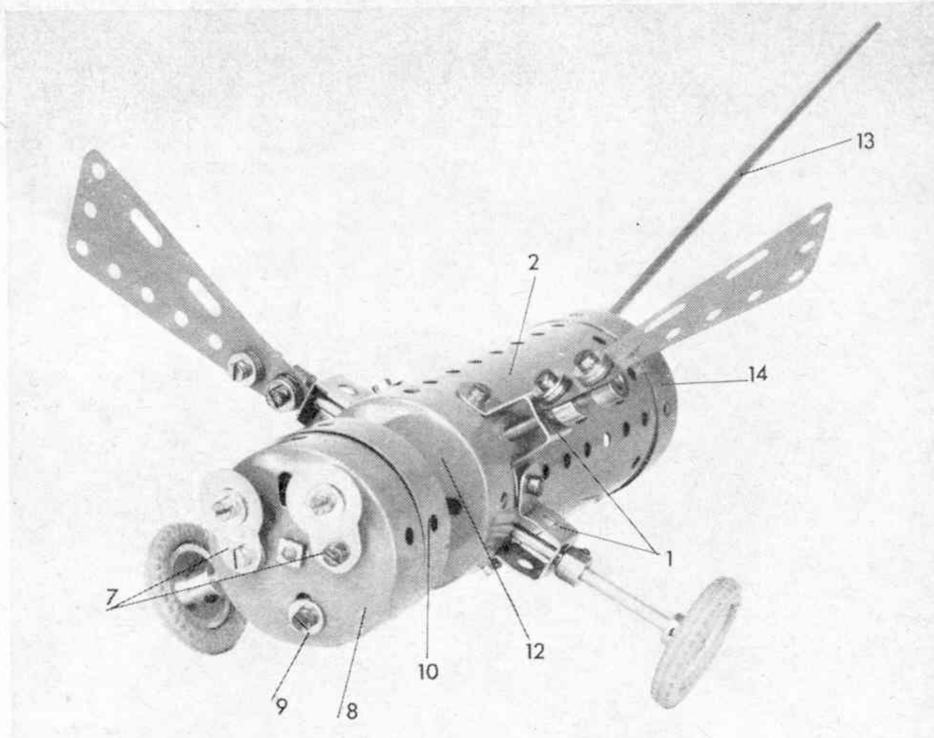
and to the back by two 2½ in. by 1½ in. Plastic Plates, overlapped three holes. These last three Plates are actually joined to the Circular Plate by a Fishplate, secured by Bolt 17, while Plate 16 is joined to the 3½ in. Strip edging Plate 8 by a 2½ in. Strip 18. Two Rod Sockets, two inches apart, are now fixed to the Circular Plate through diametrically opposite holes. In one of these a 2 in. Rod 19, carrying a Swivel Bearing 20, is mounted, whereas a 1½ in. Rod, carrying a Short Coupling 21, is mounted in the other. A Conical Disc 22 on a ½ in. Bolt is fixed to the 'spider' of Swivel Bearing 20 and a length of Spring Cord 23 is attached to Short Coupling 21.

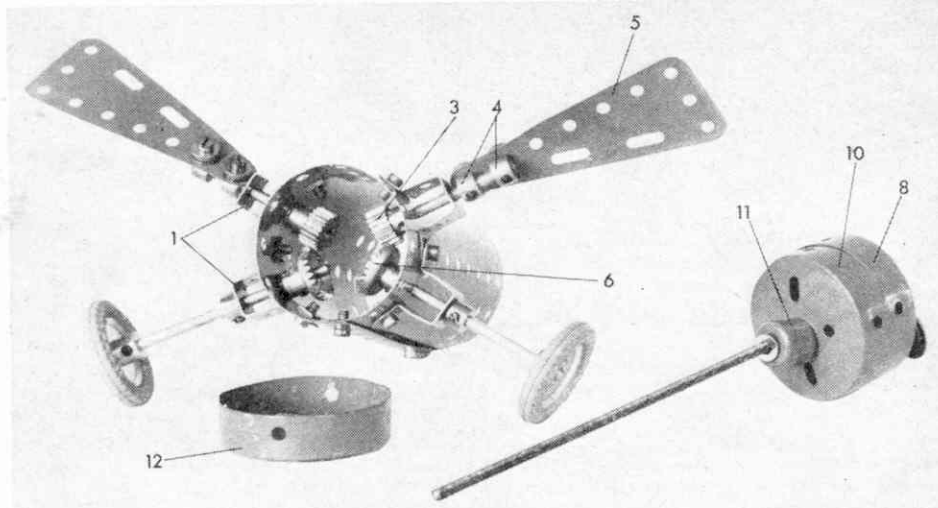
Two cylindrical arrangements are each obtained from two Sleeve Pieces 24 in which two Chimney Adaptors 25 are fixed. They are then bolted to the Circular Plate, the Bolts passing through outer opposite holes in the Plate. Also fixed to the Plate at the front is an Angle Bracket, to one lug of which a 1½ in. Flat Girder 26 is secured. Bolts with a Washer on their shanks are fixed in the lower end holes of this Flat Girder to represent lamps.

To plate 8 at the front of the body, a 2½ in. by 1½ in. Flanged Plate 27 is attached by Angle Brackets, the resulting gap being covered at the top by a 2½ in. by ½ in. Double Angle Strip 28. A 2½ in. by 1½ in. Flexible Plate 29 is bolted to Plate 9 at the back, then Plates 29 and 7 are curved beneath the body and joined together by four Threaded Bosses 30, the front Bosses also securing a 3 in. Angle Girder 31 in place. A 3 in. Strip 32 is bolted between the sides, after which the completed body is fixed to the chassis by passing Bolts through the chassis and into the other sides of the Threaded Bosses.

Parts Required

5 of No. 3	34 of No. 38	4 of No. 164
2 of No. 5	1 of No. 48a	1 of No. 165
2 of No. 8a	1 of No. 51	2 of No. 179
2 of No. 9	1 of No. 52a	1 of No. 187a
3 of No. 9b	1 of No. 58	4 of No. 187b
1 of No. 9d	2 of No. 59	5 of No. 188
1 of No. 10	1 of No. 63d	2 of No. 189
3 of No. 12	4 of No. 64	4 of No' 190
1 of No. 16	1 of No. 103d	1 of No. 190a
1 of No. 17	1 of No. 103f	4 of No. 192
1 of No. 18a	6 of No. 111a	2 of No. 194d
2 of No. 20	4 of No. 111d	1 of No. 216
86 of No. 37a	1 of No. 146	
82 of No. 37b	4 of No. 163	





Two views of the 'Space Beetle'. The contrate wheels and pinions can be clearly seen in the lower picture

Creepie-Crawlie Space Beetle

Although space exploration is new, man has always been fascinated by what might be hidden in space. Long before any facts were known, Science Fiction writers were busy inventing all sorts of strange creatures to inhabit other planets and there's no reason why we shouldn't have a go at it ourselves. The other new model described here, therefore, is a novel 'Space Beetle' designed specially for younger readers. When pushed along the ground, its wings revolve!

It is advisable to first build the body, wings and 'legs'. Four Double Bent Strips 1 are bolted as shown to a Boiler 2. Mounted in each of the upper two Double Bent Strips and the Boiler is a 2 in. Rod carrying a ½ in. Pinion 3 inside the Boiler and two Collars 4 outside the Double Bent Strip. A 3½ in. by 1½ in. Triangular Flexible Plate 5 is fixed to these Collars, three Washers first being placed on the shanks of the supporting Bolts.

Journalled in each of the lower two Double Bent Strips and the Boiler is a 3 in. Rod, held in place by a ¾ in. Contrate Wheel 6 inside the Boiler and a Collar outside the Double Bent Strip. The Contrate Wheel meshes with Pinion 3, while a 1 in. Pulley with Motor Tyre is fixed on the end of the Rod.

The head

Two Fishplates 7 are bolted to a Boiler End 8, but are spaced from it by two Washers on the shank of each Bolt. Another Washer, together with a ¾ in. Washer, are now fixed to the Fishplates, then yet another Washer 9 is fixed through one of the elongated holes of the Boiler End, as shown. The Boiler End is now secured by Nuts on the end of an 8 in. Screwed Rod. A second Boiler End 10 is added, which is clamped against the first Boiler End by a Nut.

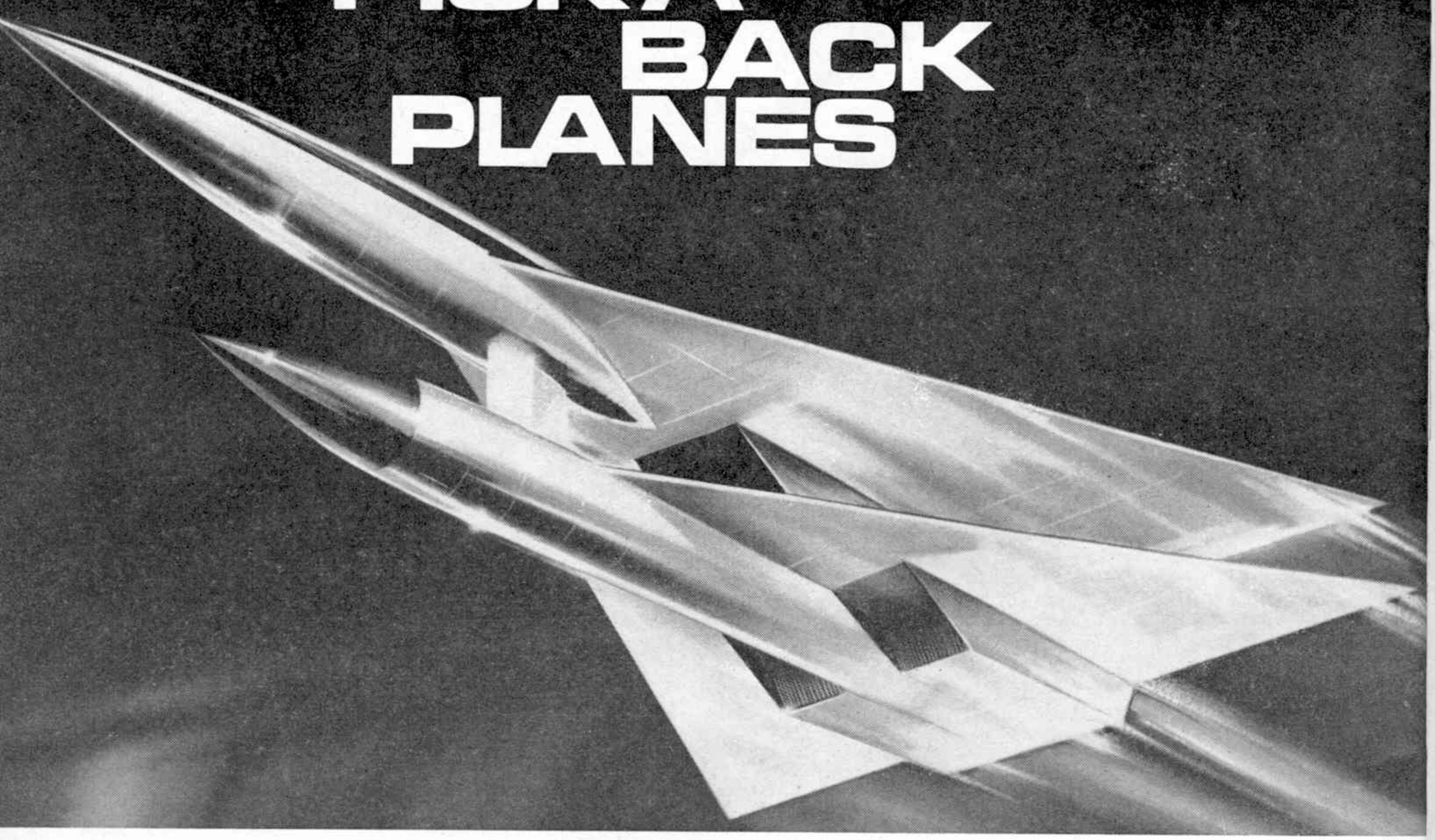
A Sleeve Piece 11 is slipped on to the Rod followed by a Washer. Both these parts are then clamped against Boiler End 10 by a third Boiler End 12, held in place by a Nut. The complete arrangement is now fixed to the body by wedging this last Boiler End 12 on Boiler 2. A Rod Socket, carrying an 11½ in. Rod 13 to represent the tail, is fixed in one elongated hole of a fourth Boiler End 14, which is slipped over the Screwed Rod and wedged on the Boiler. A final Nut on the Screwed Rod holds the complete model together.

When finished as described above, the model looks extremely effective, but it can be made even more so by extending Rod 13 by means of a Coupling and another 11½ in. Rod. I suggest that you try this.

Parts required

2 of No. 10	13 of No. 37b	2 of No. 142c
2 of No. 16b	24 of No. 38	1 of No. 162
2 of No. 17	2 of No. 38d	2 of No. 162a
2 of No. 22	4 of No. 45	1 of No. 164
2 of No. 26	6 of No. 59	1 of No. 179
2 of No. 29	1 of No. 79	2 of No. 224
17 of No. 37a		

PICK-A-BACK PLANES



IF, in 1944, any British intelligence officer had learned that the *Luftwaffe* was training pilots for Beethoven duets, he might have been suspicious but would hardly have associated the report with Germany's 'secret weapons' programme. Yet the code-name *Beethoven - Gerät*, or *Mistel - Programm*, referred to a type of two-plane air attack that might have proved highly effective if it had become operational on a larger scale.

Allied troops and naval units first made its acquaintance during the invasion of Europe in the Summer of 1944, when a number of Junkers Ju 88 twin-engined bombers dived towards them at high speed. Instead of pulling out of the dive and releasing their bombs, the aircraft crashed into the target area and exploded. It seemed as if the *Luftwaffe* had decided to form suicide units, like the Japanese *Kamikazes*. Only later was it realised that the Ju 88s were unmanned and were being dropped near their targets by the pilots of Bf 109 carrier-aircraft.

Zeppelins

There was nothing new in the idea of using pick-a-back, or composite, aircraft. As long ago as 1916, during the First World War, an aircraft had been carried into the air by another and released in flight. On that occasion, however, it was the British Royal Naval Air Service that was trying to evolve a weapon for use against German invaders, in the shape of giant Zeppelin airships.

Nowadays, we remember Zeppelins mainly for the bombing raids they made against England and tend to forget the part they played in the war at sea, around our coasts. Their ability to fly slowly for very long periods enabled them to shadow Allied naval units and report the latter's position by radio to the German navy and shore bases. If they decided to drop some bombs on the Allied ships, there was little to stop them. They cruised high enough to be out of range of light guns and could outclimb the R.N.A.S. seaplanes and flying-boats that were sometimes sent up to drive them away.

What the navy needed was a force of high-speed single-seat fighters to defend the fleet at sea. Unfortunately, the true aircraft carrier was still a year or two away. All kinds of alternatives were investigated, such as flying the fighters from wooden platforms built over the gun turrets of warships, launching them from lighters towed behind fast destroyers—and launching them from a larger aeroplane in flight.

The man responsible for the last of these ideas was Sqn. Cdr. John Porte, who designed the majority of the big flying-boats used by the R.N.A.S. in 1914-18, using the American Curtiss' boats as the basis for the most widely-used versions. Having just designed a real monster named the Porte Baby, with a span of 124 ft. and weight of 8½ tons, he realised that this flying-boat was large enough to carry a fighter-plane far out over the North Sea in search of Zeppelins, so overcoming the fighter's short range.

On May 17, 1916, a little Bristol Scout was hoisted up on to the top wing of the Baby, so that its main wheels rested on crutches forward of the wing leading-edge, while the tail-skid was secured by a quick-release hook. Piloted by Porte, the Baby took off and climbed to a height of 1,000 ft. over Harwich. Above him, in the cockpit of the Scout, Flt. Lt. M. J. Day started up the fighter's 80 h.p. rotary engine and climbed away without any apparent difficulty; but the experiment was never repeated.

Trapeze

The composite idea was resurrected, in different forms, on several occasions during the following 20 years. Both Britain and America carried out trials in landing and retrieving defensive fighters from large airships, using trapeze structures on which the aircraft were 'hooked'. Russia went a rather remarkable stage further by carrying a fighter on each wing of one of its big Tupolev monoplane bombers and launching them in flight.

Once again, however, it was in Britain that the next major achievement by a composite aircraft was planned. Imperial Airways and Pan American flying-boats succeeded in making the first airline crossing of the North Atlantic by heavier-than-air machines in July 1937; but it was clear that commercial services would not be practicable until longer-range aircraft were available, able to carry a reasonable payload as well as sufficient fuel for the flight.

Major R. H. Mayo suggested that the answer might be a pick-a-back machine, consisting of a relatively small four-motor seaplane carried on top of a large four-motor flying-boat, to take advantage of the principle that an aircraft can fly with a heavier load than it can lift off the ground or water. In this case, the little *Mercury* seaplane, heavily laden with fuel and payload, was designed to be carried into the air by the flying-boat *Maia* and released at height. There was little doubt of its success.

On July 20-21, 1938, *Mercury* separated from *Maia* over Foynes, Ireland, and made the first-ever non-stop flight between the British Isles and Montreal, during which it not only broke the record for the East-West Atlantic crossing but also gained the distinction of making the first commercial crossing by an heavier-than-air machine, by carrying a 1,000 lb. payload of mail. Then, in October of the same year, it flew non-stop from Dundee to the Orange River, South Africa—a distance of 5,998 miles—setting up a seaplane record that stands to this day.

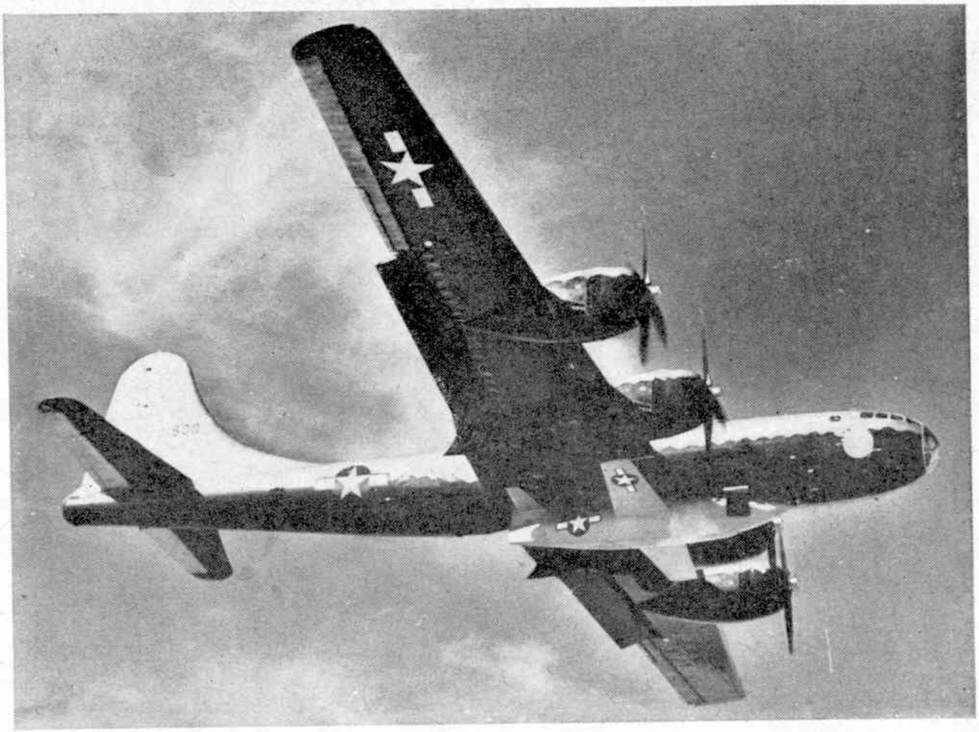
War-Weary

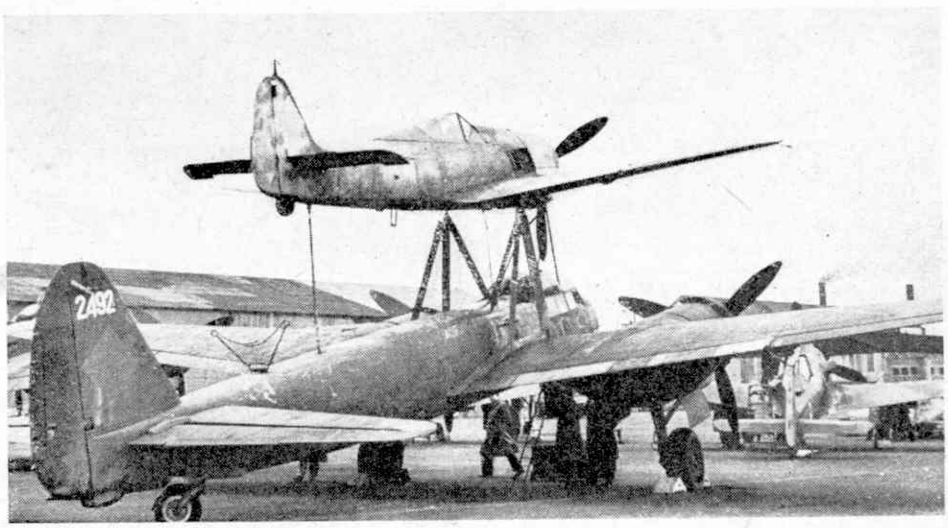
Whether or not the Germans were influenced by *Mercury's* achievements when they conceived the *Beethoven/Mistel* programme is not known. The lead came from their glider designers who suggested that it would be much better to carry gliders under aeroplanes than to tow them behind, at the end of cables.

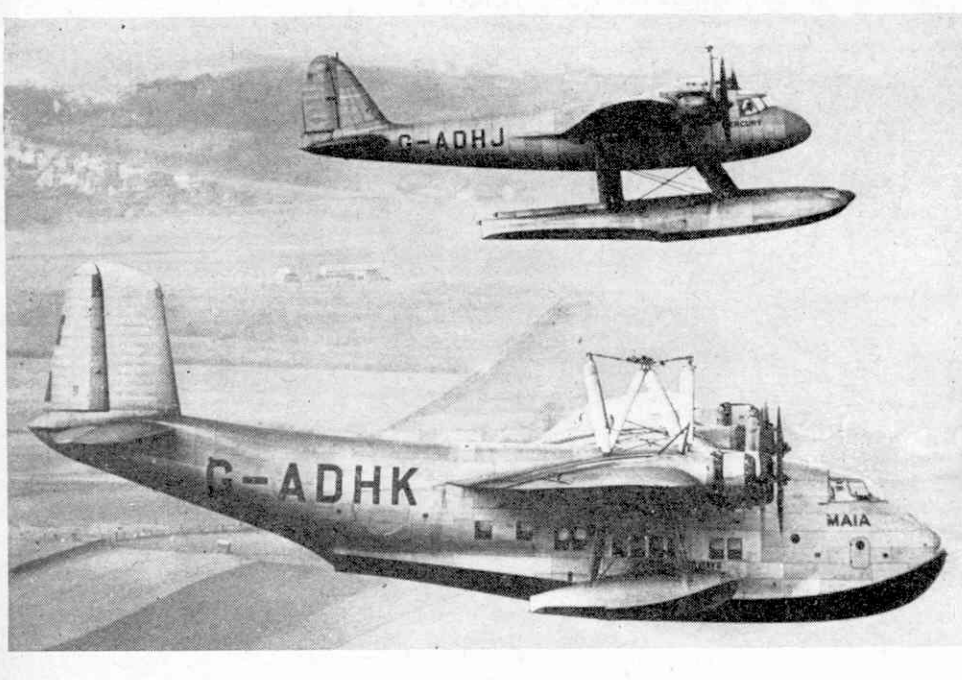
The first tests were made with a small DFS 230 cargo glider, carried under a Klemm lightplane. The carrier-aircraft was not powerful enough to take off with its load, so the whole thing was towed off the ground by a Ju 52. Eventually, a Bf 109E was made available as the carrier, and this was able to take off, fly and land atop the DFS 230, unaided.

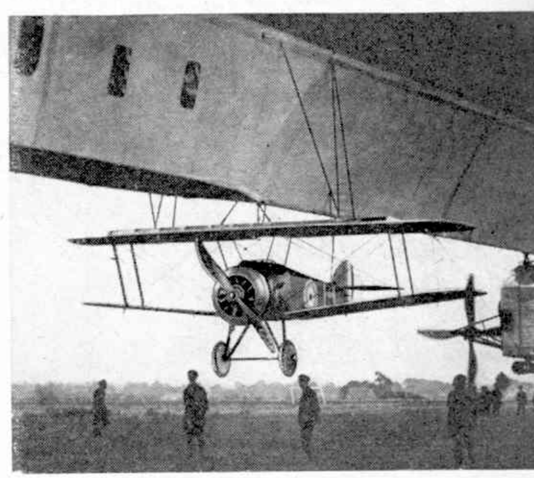
At this stage, someone suggested that if the glider were replaced by a war-weary bomber, packed with explosive, the result might be a very effective and inexpensive weapon. Junkers

Continued on page 48







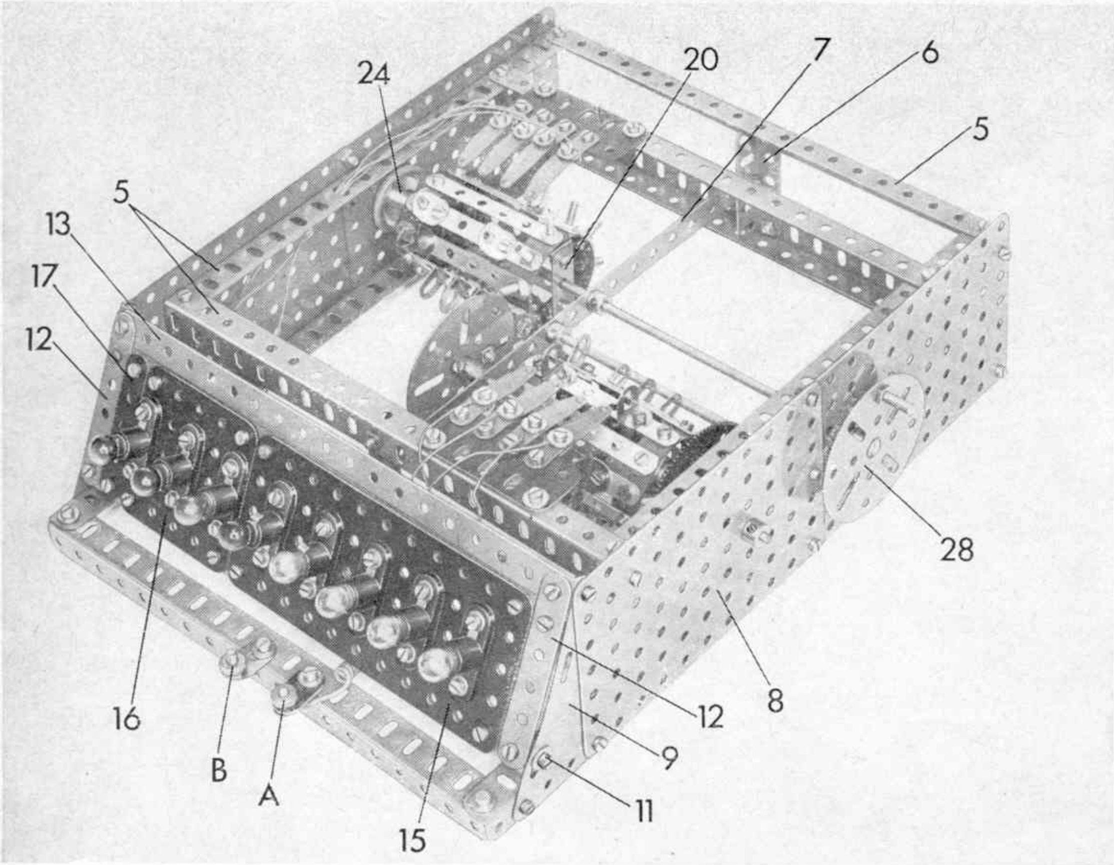


Top of page: modified Boeing B-29 carrying aloft the supersonic Bell X-1 rocket plane

Middle: subject of our plastic conversion this month; Focke-Wulf-Junkers 88 'Mistel' combination at Farnborough after the war

Above: Sopwith 'Camel' suspended from airship R 23 at Howden

Left: Seaplane 'Mercury' lifting off the flying-boat 'Maia'

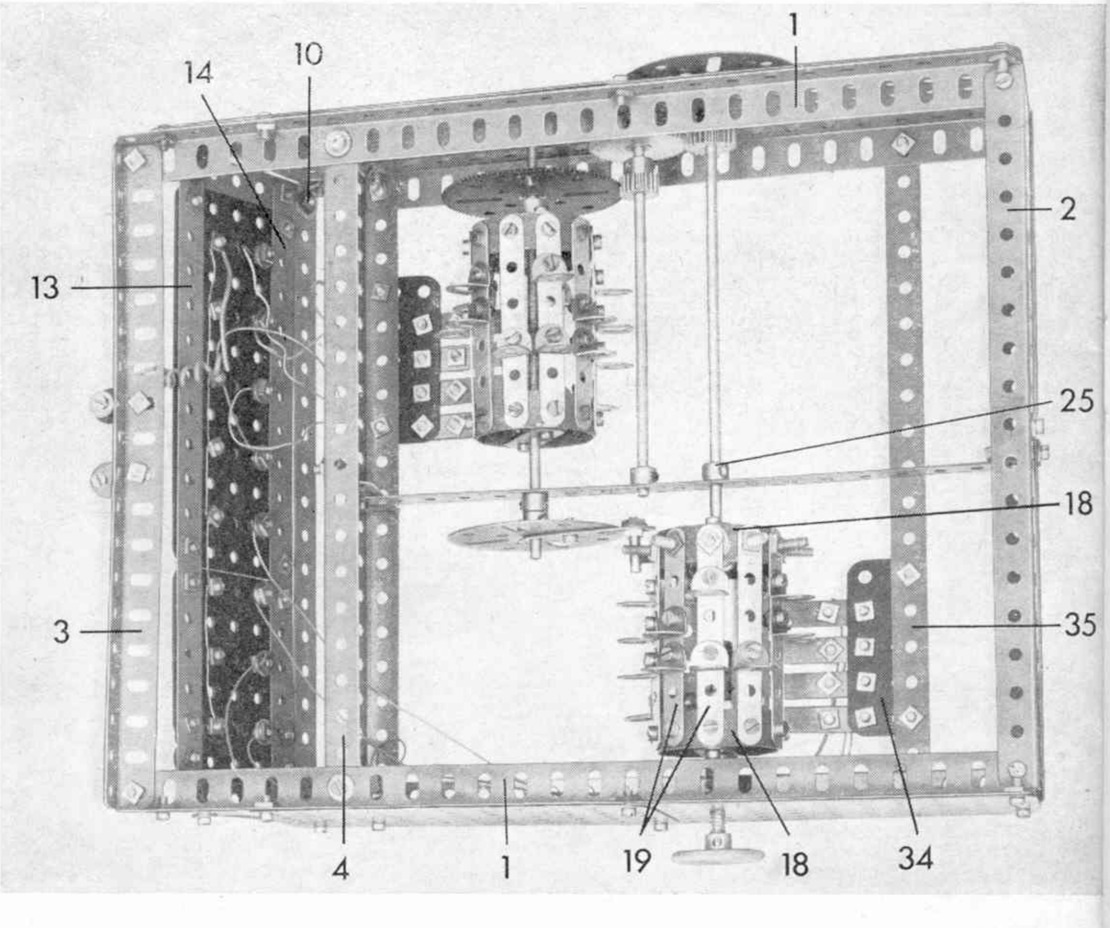


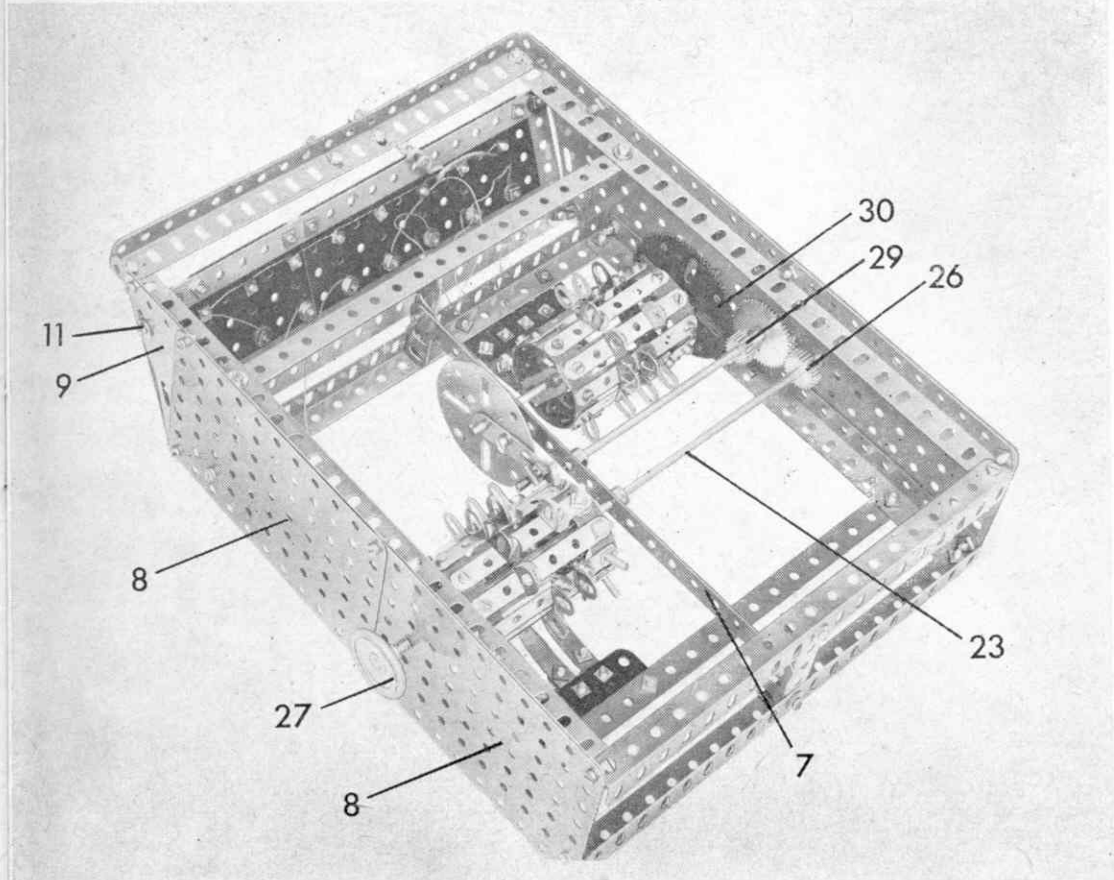
A Meccano-built Binary Counting Machine based on plans supplied by Mr. William Hawkin, of Helsby, Lancs., and his son David

The FIRST MECCANO BINARY COUNTER

We are living in the age of the Computer. Every day these fantastic electronic "Brains" take a greater part in the running of our lives. The Binary Counting system forms an important part of even the most complicated computers, and this month Spanner describes a working Binary Machine built entirely from Meccano parts.

The Binary viewed from beneath, showing the layout of the primary and secondary cylinders





In this view the construction of the main framework is clearly shown

NEVER, to the best of my knowledge, has a Binary Counting Machine ever been built from Meccano parts. If one has, I certainly have never heard about it, and I still would not have done so were it not for Mr. William Hawkin, of Helsby, Lancs., and his son David, who sent me details of an excellent model that they have designed and built. The model described in this article is based on Mr. Hawkin's plans and I must say it works extremely well.

The Binary counting system is used extensively in electronic computers, the counting progressing in single units. In the version illustrated, each revolution of Face Plate 28 adds one unit to the total which is indicated by the eight Lamps fixed to the front of the model. These flash 'on' and 'off' in a pre-arranged sequence and the Lamps illuminated at any one time show the number of times Face Plate 28 has been turned. Ninety-nine different light-combinations are available, therefore, the model will 'count' up to 99.

For descriptive purposes, I have divided the model into easily-identified sections as follows:

Framework

A rectangular construction is built up from two 12½ in. Angle Girders 1, connected by two 9½ in. Angle Girders 2 and 3, with a further 9½ in. Angle Girder 4 being added, as shown. A square construction is then produced using four 9½ in. Angle Girders 5, and this is joined to Girders 2 and 4 by two 2½ in. Angle Girders 6, fixed in the centre holes of the respective 9½ in. Girders. Girders 6 are, in turn, connected by a 9½ in. Strip 7.

Bolted to Girders 1 and 5 at each side are two 5½ in. by 3½ in. Flat Plates 8 and a 3½ in. by 2 in. Triangular Flexible Plate. 9. At the top, Plate 8 is joined to Plate 9, the fixing Bolt also securing an Angle Bracket 10 in place. Another Angle Bracket is fixed in place by Bolt 11, then the two Angle Brackets are connected by a 3 in. Strip 12 at the same time bolting 9½ in. Strips 13 in position between the sides. Another 9½ in. Strip 14 is bolted between Strips 12. Secured to this Strip and to lower Strip 13 are a 5½ in. by 2½ in. Insulating Flat Plate 15, a 2½ in. by 2½ in. Insulating Flat Plate 16 and a 2½ in. Insulating Strip 17.

Revolving Cylinders

Two basically similar cylinders, referred to as primary and secondary, are each built up from two 5½ in. Strips 18, bent to form a circle and connected together by ten 3 in. Narrow Strips 19. Fixed diametrically across one end of the cylinder is a 1½ in. Strip 20, attached to Strip 18 by Angle Brackets 21, while a Double Arm Crank is similarly attached to the other end of the cylinder. Note that in the secondary cylinder, Narrow Strips 19 are secured to Strip 18 at one end by ½ in. Bolts 22, the shanks of which point outwards.

Once the basic cylinder has been built, Angle Brackets are bolted to nine of the ten 3 in. Narrow Strips 19, the tenth Strip being left blank. The quantity and position of the Angle Brackets on the Strips will determine the sequence of the lights, so great care must be taken to see that no two Strips are identical.

For descriptive purposes, we will assume that we are looking at the secondary cylinder with Bolts 22 at the right-hand side. One Angle Bracket is bolted to the first Strip through the first free hole from the right. In the case of the second Strip (above the first), one Angle Bracket is bolted through the second hole. Two Angle Brackets are fixed to the third Strip, one through the first hole and one through the second. The fourth Strip again carries one Angle Bracket, fixed through the third free hole from the right, while the fifth Strip carries two Brackets, one through the first and one through the third hole. The sixth Strip also carries two Brackets, one through the second hole and the other through the third, whereas three Brackets are fixed to the seventh Strip, one through each of the first three holes. The eighth Strip carries one Bracket through the fourth hole and the ninth Strip has two, one in the first hole and one in the fourth. The tenth Strip is blank.

The Primary cylinder is similarly prepared except that the direction is reversed. The same quantities of Angle Brackets are fixed in identical positions on the Narrow Strips only, this time, the second Strip is that below the first Strip, and so on in the reverse direction. This must be done as the same light-sequence is required while the two cylinders rotate in opposite directions.

When both cylinders are finished, they can be mounted in the framework. The secondary cylinder is placed, with the Bolts innermost, on a compound 10½ in. Rod 23 obtained from an 8 in. and a 2½ in. Rod joined by a Coupling. This Coupling is secured to the 2½ in. Rod, but the 8 in. Rod must be free to turn in its other half. A 1 in. fixed Pulley with Rubber Ring 24, a Collar 25 and a ¾ in. Pinion 26 are also mounted on the rod, which is then journalled in Flat Plates 8 and 9½ in. Strip 7, parts 24, 25 and 26 holding it in position. The cylinder is now fixed tightly to the 2½ in. Rod by a Grub Screw in the boss of the Double Arm Crank. A Compression Spring, followed by another 1 in. fixed Pulley with Rubber Ring 27 is secured on one end of Rod 23, outside Flat Plate 8, while a Face Plate 28 in which a Threaded Pin is secured, is mounted on the other end, a Washer being used as a spacer. Pinion 26 is meshed with a 50-teeth Gear Wheel fixed, together with a ½ in. Pinion 29, on a 5½ in. Rod journalled in 9½ in. Strip 7 and Flat Plates 8 at one side.

The primary cylinder is now mounted on a 6½ in. Rod, also journalled in Strip 7 and Plates 8, that in addition carries a 2½ in. Gear Wheel 30. Collars hold the Rod in place, but a sufficient length must remain at the inside end to carry a Face Plate 31. A 2 in. Slotted Strip, in the elongated hole of which a Threaded Pin 32 is fixed, is slipped over the end of the Rod and is bolted to the Face Plate. Gear Wheel 30 meshes with Pinion 29.

With each revolution of Face Plate 31, Threaded Pin 32 engages with one of the ½ in. Bolts 22, thus causing the cylinder to make one-tenth of a revolution. Consequently the secondary cylinder revolves once for every ten revolutions of the primary cylinder. Ten revolutions of Face Plate 28 will, in turn, result in one revolution of the primary cylinder, but it is essential that Threaded Pin 32 does not engage with the Bolt 22, to move the secondary cylinder, until the tenth revolution of Face Plate 28.

Electrical System

Eight Elektrikit Lamp Holders carrying Lamps are bolted to Insulating Flat Plates 15 and 16. Two 2½ in. Insulating Flat Girders 33 and 34 and then fixed, one to front Angle Girder 5 and the other to a 9½ in. Strip 35, bolted between side Angle Girders 5. Four 1½ in. radius Wiper Arms (Elektrikit part No. 532) are secured to each of the Flat Girders, as shown.

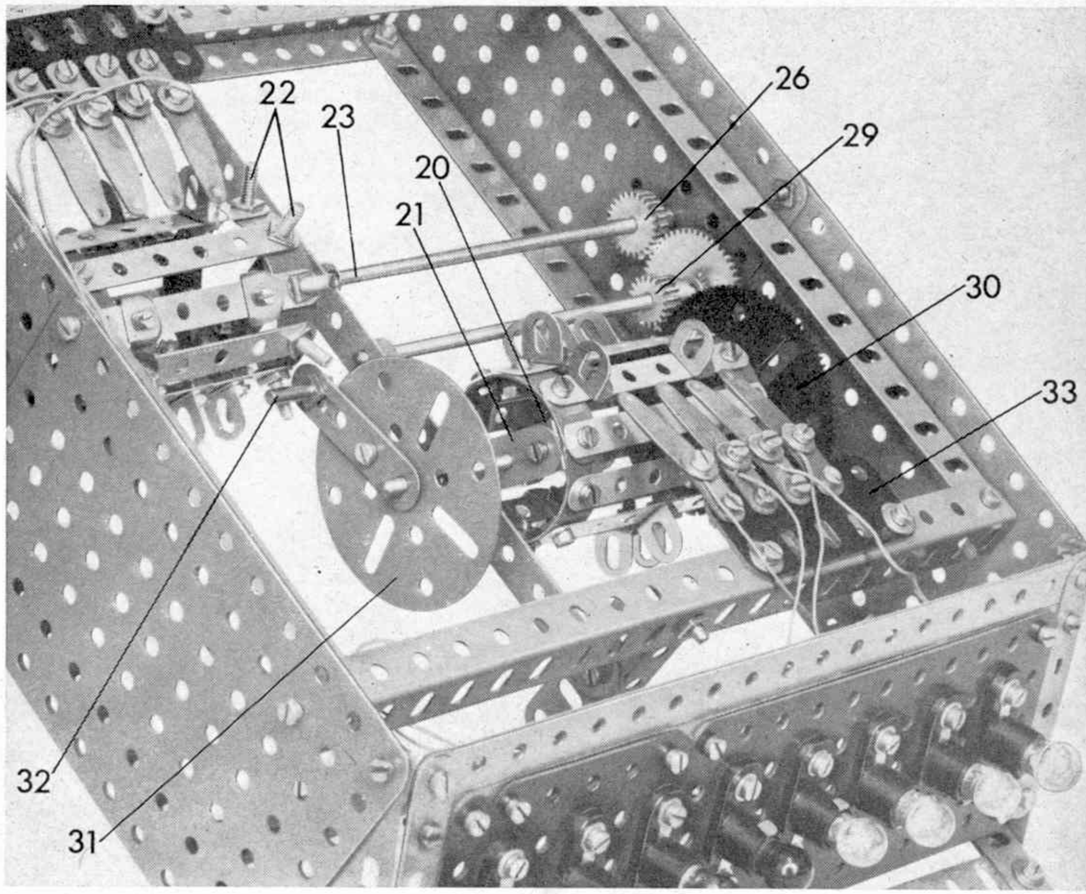
As this model operates on the 'live chassis' principle, great care must be taken with the wiring to see that none of the insulated wires make an electrical contact with any metal part of the framework, as this will cause a short circuit. To begin with, the lower Terminals of all the Lamp Holders are connected together by a length of wire which must not make contact with any metal part of the model. Lengths of insulated wire are then taken in order from the four Wiper Arms attached to Insulating Flat Girder

33 to the top terminals of the first four Lamp Holders to the right of the model, while further lengths of insulated wire are taken from the remaining four Wiper Arms to the upper terminals of the left-hand Lamp Holders.

Two terminals, to receive current from the power source, are built up and are attached to Angle Girder 3. One terminal A is obtained by fixing a ⅜ in. Bolt in an Insulating Fishplate with a Nut, and by adding a Terminal Nut to hold the power source lead in place. The other terminal B is built up in a similar manner, except that an ordinary, metal Fishplate is used. This Fishplate must make an electrical contact with Girder 3, which can be done by scraping off a little of the enamel on the Girder. Terminal A is connected to the lower terminal of any one of the Lamp Holders, using insulated wire.

The Wiper Arms must be positioned as to lie directly over the vertical lugs of the Angle Brackets fixed to Narrow Strips 19. As the cylinders are turned different Wiper Arms make contact with different Angle Brackets or combinations of Angle Brackets, thus causing the Lamps to light in sequence. Before starting to count, the cylinders must be arranged so that the Wiper Arms are above the blank Narrow Strips, to give zero.

To discover the 'code', Face Plate 28 is turned once and a note made of the Lamp which lights up. The Face Plate is turned again, causing another Lamp to light up which is noted. The operation is repeated until the blank Narrow Strip is again uppermost. You will find that Face Plate 28 has been turned ten times, the first nine revolutions causing the four right-hand Lamps to light in sequence. With the tenth revolution, Threaded Pin 32 will have caused the secondary cylinder to revolve one-tenth of a turn, causing one of the four left-hand Lamps to light up. If you continue to turn Face Plate 28, this Lamp will remain lit, while the four right-hand Lamps again light up in the sequence already noted. After another ten revolutions of Face Plate 28 a second Lamp in the left-hand 'block' will light up, and so on until the secondary cylinder has made one complete revolution, when the machine is again at zero. At this stage Face Plate 28 will have been turned one hundred times. To sum up, the right-hand block of Lamps counts the units while the left-hand block counts the tens.



A close-up view showing the primary cylinder and gearing

Parts required

5 of No. 1a	2 of No. 22	2 of No. 109	8 of No. 539
4 of No. 2	1 of No. 25	10 of No. 111a	8 of No. 540
2 of No. 4	1 of No. 26	18 of No. 111c	(any colour)
2 of No. 6a	1 of No. 27	2 of No. 115	2 of No. 542
2 of No. 8	1 of No. 27c	2 of No. 155	1 of No. 558
7 of No. 8a	178 of No. 37a	2 of No. 225	
2 of No. 9d	142 of No. 37b	20 of No. 235a	
1 of No. 10	33 of No. 38	1 of No. 502	
42 of No. 12	4 of No. 52a	2 of No. 507	
1 of No. 13a	1 of No. 55a	1 of No. 510	
1 of No. 14	4 of No. 59	1 of No. 511	
1 of No. 14a	2 of No. 62b	1 of No. 513	
1 of No. 16a	1 of No. 63	8 of No. 532	

Meccano loom from page 35

the Shuttle may foul the Warp threads when entering the shed.

Provided all the above instructions have been carefully followed, the Loom should now run under power without trouble. If the woven fabric buckles between the Reed and the take-up roller, however, the Weft thread is too thick and should be replaced by thinner thread. If the fabric has little loops at the edges, the Weft thread is too slack and requires the cotton wool in the Shuttle pushing further into the Collar. Great care must be taken, however, because, if the tension is too great, it will prevent the Shuttle from reaching the Threaded Bosses or will cause the Shuttle to spring back into the Warp threads. Should the Rack Strip catch the bottom threads of the shed, the Heald frames need lowering by moving the Collars at the ends of 4½ in. Strips 60.

PARTS REQUIRED

6 of No. 1a	2 of No. 2	1 of No. 3
2 of No. 1b	13 of No. 2a	23 of No. 4

6 of No. 5	1 of No. 26c	24 of No. 69a
3 of No. 6a	5 of No. 27a	1 of No. 70
4 of No. 7a	1 of No. 27b	2 of No. 73
4 of No. 8	1 of No. 27c	2 of No. 77
10 of No. 8a	1 of No. 27d	2 of No. 80a
2 of No. 8b	4 of No. 30	2 of No. 81
9 of No. 9	1 of No. 32	6′ 6″ of No. 94
2 of No. 9a	2 of No. 35	6 of No. 95
2 of No. 9d	236 of No. 37a	4 of No. 96
8 of No. 12	196 of No. 37b	52 of No. 101
2 of No. 12a	134 of No. 38	4 of No. 103
2 of No. 13	4 of No. 43	16 of No. 103d
10 of No. 13a	1 of No. 46	4 of No. 103f
8 of No. 14	4 of No. 48	2 of No. 106
1 of No. 16	2 of No. 48d	4 of No. 109
3 of No. 16a	6 of No. 52a	1 of No. 110
4 of No. 16b	2 of No. 55a	10 of No. 111
10 of No. 17	5 of No. 57c	6 of No. 111c
1 of No. 18a	52 of No. 59	6 of No. 115
2 of No. 20a	6 of No. 62	2 of No. 120b
2 of No. 23	2 of No. 62b	8 of No. 133
2 of No. 23a	12 of No. 63	1 of No. 136a
2 of No. 24	1 of No. 63d	2 of No. 146a
3 of No. 26	2 of No. 64	5 of No. 173a
3 of No. 26a	24 of No. 69	1 of No. 186a
		1 E15R Electric Motor

Made in Hong Kong from page 37

other American cars of today an automatic transmission system is fitted as standard, while optional extras include power steering, compass and translucent floor mats!

In the case of the Buick Riviera, only one version is available, this being described by the manufacturers as a 'two-door hard-top coupé'. The power plant comes in the form of a 6,965 c.c. capacity V-8 engine, developing 360 b.h.p. It gives the car a maximum speed of something like 120 m.p.h. and allows it to cruise over long distances at little under the 100 m.p.h. mark. Again, automatic transmission is fitted as standard.

Before finishing, I should just like to say that I expect a few collectors to dislike the new models, simply because they are made in Hong Kong. I, personally, think that they are perfectly good Dinky Toys, especially for the price, and I am sure you will agree with me that they should be judged on their merits —not on their country of manufacture.

Continued from page 43

were given the task of developing a system by which the pilot of the carrier aircraft could operate the flying and engine controls of both halves of the composite and cause them to separate at the right time. This they did and, as a start, repaired and modified 15 Ju 88A-4s as 'payloads' for the Bf 109F-4s allocated to the *Mistel* programme.

In its operational form, the Bf 109/Ju 88 composite had a take-off weight of 36,960 lb. and could cruise at 280 m.p.h. to attack targets up to 440 miles away. Separation usually took place at heights between 3,000 and 10,000 ft., and the Ju 88 reached a terminal velocity of about 370 m.p.h. as it dived into the target with its 7,700 lb. hollow-charged warhead.

Following the *Mistel's* initial success against Allied shipping off the coast of Normandy, in early July 1944, it was decided to switch to an even more formidable Focke-Wulf FW 190/Ju 88G combination for the full production version. The first 50 Ju 88G-1s, suitably modified, were delivered quickly. The second batch of 25 was not so lucky, many of the aircraft being reduced to scrap metal by 12 P-38 Lightnings whose pilots spotted them at Mockau airfield.

Altogether, 95 *Mistels* were produced. Some were used against railway targets and bridges in a vain attempt to stem the Allied advance, between September 1944 and January 1945. In the following month, others were employed to attack the Oder bridges on the Russian front. They achieved little, and within a few weeks the remaining *Mistels* were in the hands of the victorious Allied forces.

Since then, there have been many more composites, some of which have joined the ranks of the great pioneering aeroplanes of history. For example, the Bell X-1 was launched in mid-air from a Superfortress when it made the first faster-than-sound flight on October 14, 1947, and the North American X-15 was dropped from a Stratofortress on the flights which have taken it to a speed of 4,104 m.p.h. and height of over 67 miles. Weapons like Blue Steel and Hound Dog are modern *'Mistels'* of infinitely greater destructive power. And this is only the start, for many designers favour the carrier-plane principle for launching future hypersonic orbital and space aircraft.

J. W. R. Taylor

Make your own 'Mistel' Pic-a-back from our conversion feature on page 20.

New readers will be interested to know that the May issue dealt with the conversion of the Frog 'Wallace' kit into a 'Wapiti', and the June conversion was the Fokker F.VIIa from a 'Southern Cross'. Limited numbers of both issues are still available from our Back-Numbers Department, price 2s. 6d. each, including postage.

Next month the subject will be the Airfix Hawker Hart—order your copy now!

Solutions to puzzles on page 31

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

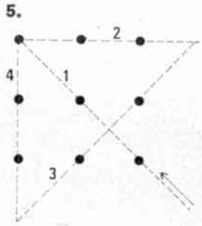
1. A railway line gradient post indicating a slope of 1 inch in 200 inches.

2. No. A compass needle points to the magnetic north which is some thousands of miles away from the actual Pole.

3. False. Oaks grow in all temperate climates.

4. Nefertiti, the sister-queen of the Egyptian pharoah Akhnaton.

5.



6. Maximum is 21 years. (Only in rare cases do they exceed this.)

A. 123—45—67—89—100

B. 1, Scatter; 2, Dogged; 3, Staggered; 4, Million; 5, Paper; 6, Cowered; 7, Pottery; 8, Bullet; 9, Grateful; 10, Boxer.

C. 6¾ miles.

D. Scarborough, Margate, Southsea, Worthing, Clacton, Southend, Hastings, Herne Bay.

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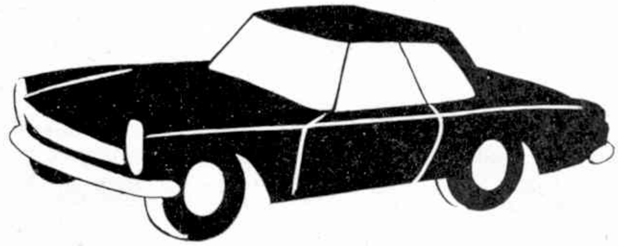
The vehicle illustrated is:—



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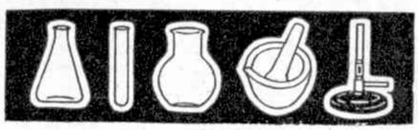

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STAMPS NEWS

BY F. E. METCALFE

Stamp Designs

While most stamp collectors have been delighted at the change in policy of our Post Office, which has resulted in a number of special issues, it is true to say that they have not been anything like as pleased with the designs selected. Of course, the designers were being blamed, until the Post Office illustrated in their Philatelic Bulletin, designs which had been rejected in favour of these which so many are criticising. It is my personal opinion, backed up by several others with whom I have discussed the question, that at least a change of selectors is needed as much as a change of designers. I remember a designer once telling me, that in a stamp design, curves should not be mixed up with straight lines. A classic example of this was the Israeli stamp issued on April 20th, and the object behind the issue (apart, of course, from the nice revenue to be obtained by sales to philatelists) was to mark War of Independence Memorial Day. I think most will agree that a handsome stamp has been designed, and all with straight lines, too.

Love Birds

Of course, well designed stamps can have curves like the one illustrated. This handsome and quite original design was used by the Netherlands Antilles to mark the wedding of the eldest daughter of Her Majesty Queen Juliana of Holland and a most appropriate design it is, too. The Netherlands, or Holland, as we like to call that fine little country, has some really first class stamp designers, and the selectors of these designs really know their job. I often wish there were room to illustrate more Dutch stamps, but with so many new issues all the time, it is only possible to feature Holland when something extra special comes along.

Mongolian Furs

Here's a change of subject. Last February (it was cold enough just then, to make the issue very timely) a set of stamps, printed in Hungary (which handles all Mongolian stamps apparently) was issued depicting the animals to be found in Mongolia, which are used for fox furs. There are eight stamps in all, seven showing the various animals, fox, marten, etc., and the top value stamp shows an illustration of a lady in a sumptuous fur coat. It looks like ermine to me, but I am afraid that there are things I know more about than ladies' fur coats. But the set really is handsome, and if you have a lady friend who is interested in stamps as well as furs, here's a chance of making her a nice little gift, which will cost very little.

Saint Barnabas

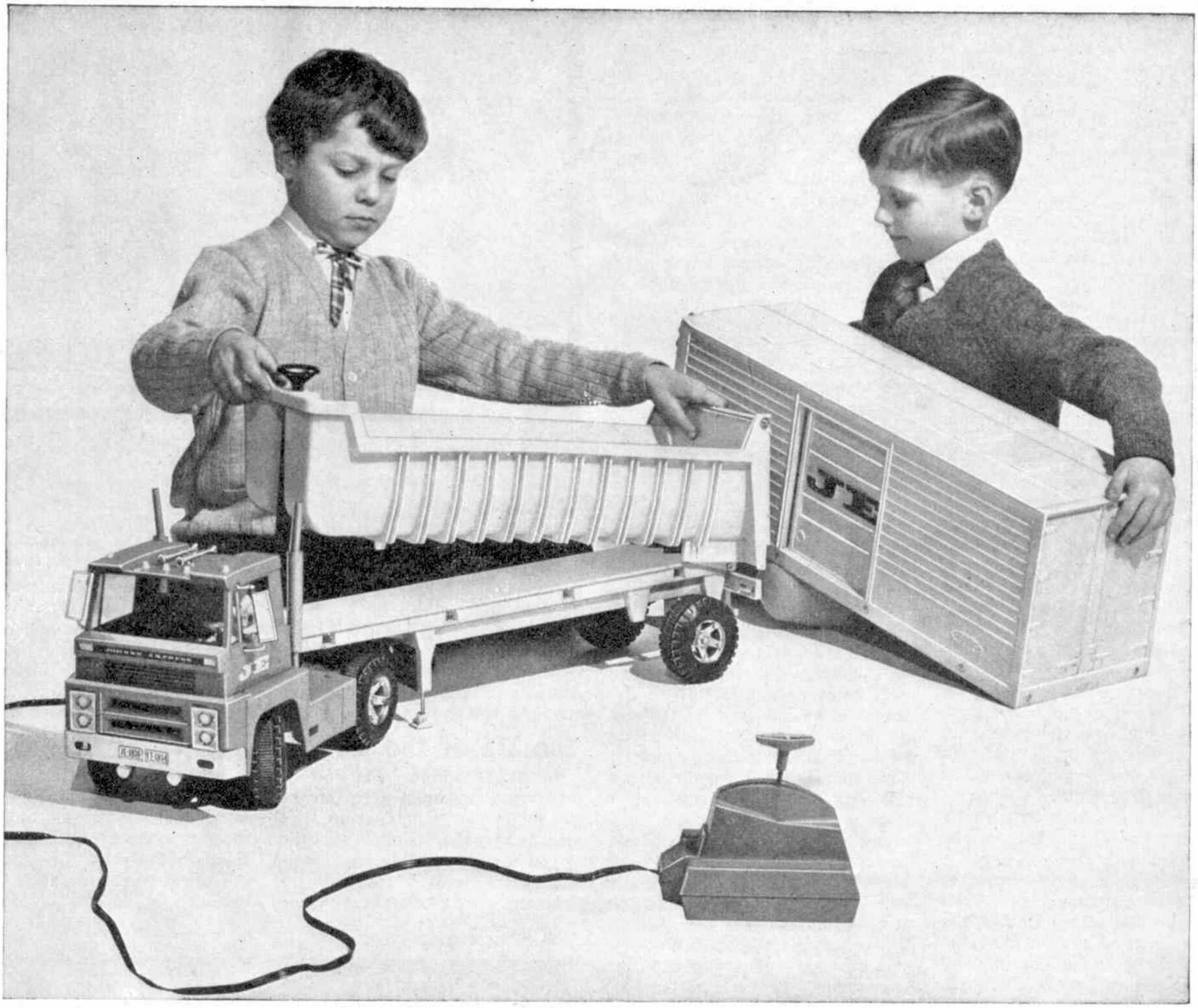
I recently had a chat with a man who had spent most of the winter in Cyprus, lucky fellow, and he claimed that he was counting the minutes to when he could return, for he was interested in archaeology and was able to revel in his hobby. I think the set of stamps issued on April 25th will interest not only him but very many collectors. There are four stamps and their release was to mark the 1900th anniversary of the death of Saint Barnabas. This saint, who is mentioned in the New Testament (Acts 4, 34-7) was a Cypriot by origin and along with St. Paul and St. Mark went to Cyprus in AD 45 to preach. Until AD 477 his tomb was unknown, but it was discovered in that year following a dream of the Archbishop Constantina Anthemios. There are four stamps in the set; that for 250 m. (5 shillings) is much larger than the other three. So much so that it has been called a miniature sheet, though to consider it as a stamp seems to me more sensible, as it only consists of a single stamp and of a different face value to the others. Thus I would certainly think you should include it in your collection, even if you do not bother with miniature sheets as a general rule.

Highway Safety

On May 2nd, Canada released a stamp in support of a campaign to reduce traffic accidents. This is a most laudable idea, for it is not only in Great Britain that motor cars are such a problem and worry to everybody, including motorists themselves. But this stamp will be welcome for another reason. For some years Canada has been using what can only be described as a shoddy gum for its stamps, but this gum has been changed (the new type will be used for future issues) for one which is non-curling (the old gum was terrible in this respect) and resistant to humidity, which that previously used certainly was not, with the result that dealers and collectors alike had an awful job trying to keep their stamps from sticking, whether to album pages or to one another. As a consequence of this I know many collectors would not touch modern Canadian stamps. Let's hope this stickiness is now a thing of the past, and we can all collect Canadian stamps, even those living in the tropics.

The Tip of the Month

I must admit that South African stamps are also favourites of mine, for apart from the stamps themselves, the S.A. Post Office never attempts to exploit collectors. Shortly (perhaps by the time these lines are in print some values will have appeared thus) there is to be another change of watermark, which means that the definitive stamps with the present watermark, which has not had a long life, will be changed. These will be well worth picking up. Of course, there are the stamps of the same designs, which came out earlier, but with no watermark, and yet the earlier stamps which had the 'Arms' type of watermark. Quite a set-up, but as used copies of most of them are not hard to come by, here is a chance for budding philatelists to get together quite a nice little collection, which they will be proud of as time goes on and values mount.



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- ☐ T. H. Smith
- ☐ Warne

NAME ....

ADDRESS ....

....

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 Daimler. If your name does not appear in this list, even though you entered for the competition don't be disappointed—try again!

P. Ayris, Liscombe Park, Nr. Leighton Buzzard, Berks. *L. van Beek,* Rockhampton Close, London, S.E.27. *P. B. A. Border,* East Lodge, Camsfield, Fareham, Hants. *J. Bowyer,* Cherry Way, Upper Halliford Road, Shepperton, Middx. *Barry Burgess,* Sapley Lane, Overton, Nr. Basingstoke, Hants. *G. Bush,* Askew Rd., Shepherds Bush, London, W.12. *Keith Carson,* Marsden Rd., London, S.E.15. *A. Collier,* Paget St., Grangetown, Cardiff. *R. Cross,* Priory Rd., Fishtoft, Boston, Lincs. *C. Crotty,* Wroxham Gdns., Potters Bar, Middx. *D. L. Curson,* Heslop Rd., Balham, London, S.W.12. *A. Egner,* Victoria Terrace, Jarrow, Co. Durham. *B. L. Fawcett,* Regent Gardens, Acomb Rd., York. *A. Fisher,* Sherbrooke Rd., Fulham, London, S.W.6. *C. Francis,* Derby Ave., Upminster, Essex. *J. P. Gee,* Fourth Ave., Bridlington, East Yorkshire. *Malcolm Gilloch,* Normanshire Drive, South Chingford, London, E.4. *Peter Gregory,* Ravencourt Park Mansions, Dalling Rd., Hammersmith, W.6. *J. Harvey,* School House, Bandwell Rd., Oxford. *M. Hill,* Overdale, Ashtead, Surrey. *R. Keyworth,* Cavendish House, Hartington Rd., London, S.W.8. *N. A. Johnson,* Station Rd., Watlington, Kings Lynn, Norfolk. *M. Knight,* 'Martael', Roundle Aquire Rd., Felpham, Bognor Regis, Sussex. *Ian Lander,* Wood St., Wood End, Atherstone, Warks. *J. A. Lavell,* Steerforth St., London, S.W.18. *David Marsh,* Cornflower Terrace, E. Dulwich, London, S.E.22. *P. S. Milligan,* Kings College School, Cambridge. *William Nash,* Abbotts Rd., Farnham, Surrey. *Richard Noble,* Red Cottage, Chandleys Lane, Yatebey, Nr. Camberley, Surrey. *G. S. C. Osmond,* North St., Wilton, Salisbury, Wilts. *T. Pooles,* Brenham Hill, Newbury, Berks. *M. Poste,* Shirley Gdns., Heolgerrig, Merthyr Tydfil, Glamorgan, South Wales. *J. Parsons,* Hall Lane, Upminster, Essex. *A. Pratley,* The Barley Lea, Stoke Aldermoor, Coventry. *P. Pratt,* Parsonage Drive, Rednal, Nr. Birmingham, Warks. *D. J. Retter,* Roundmead Ave., Loughton, Essex. *P. Sanderson,* Heathcote Rd., Twickenham, Middx. *J. Sawyer,* Mayfield, Elm Walk, Farnborough, Kent. *D. Smith,* 158 Askew Ave., Hull. *Martin Smith,* Sherborne Close, Tattenham Corner, Epsom, Surrey. *David Stebbings,* Bexwell Rd., Downham, Norfolk. *Easom J. Tanner,* Bondfield Ave., Hayes, Middx. *M. Tickner,* Cripple Gate Lane, South Water, Horsham, Sussex. *B. Unicombe,* Scotland Rd., Buckhurst Hill, Essex. *Peter L. Vilathorne,* Ashgate Rd., Chesterfield.

Overseas Winners Competition L. M.G. B. Sports Car

Reginald Pisani, Bastion St., Senglea, Malta. *R. Lucas,* La Caroline, St. Ouen, Jersey, C.I. *R. Stuart,* Delongpre Ave., Hollywood 28, California, U.S.A. *J. Xuereb,* Quarries St., Mosta, Malta. *Yves Fleuriot,* Place Sully, 78 Maisons Leffitte, France.

use meccano magazine

Classified Columns for your Sales/Wants/Swops

MECCANO MAGAZINE is the best medium for selling your old train set, stamp collection or any other item which is no longer of use to you but of possible use to others. Also, if you are short of an item for your collection, why not search for it by advertising in Meccano Magazine?

The cost is 4d. per word. (minimum 4s. 0d.) No box numbers. No trade ads.

Simply write each word of your advertisement in the spaces below (capital letters), cut out this quarter page and send it with your remittance to:— Classified Advertisement Dept., Meccano Magazine, St. Alphage House, Fore Street, London, E.C.2.

Sales/Wants/Swops *(Strike out which is not applicable)*

1	2	3
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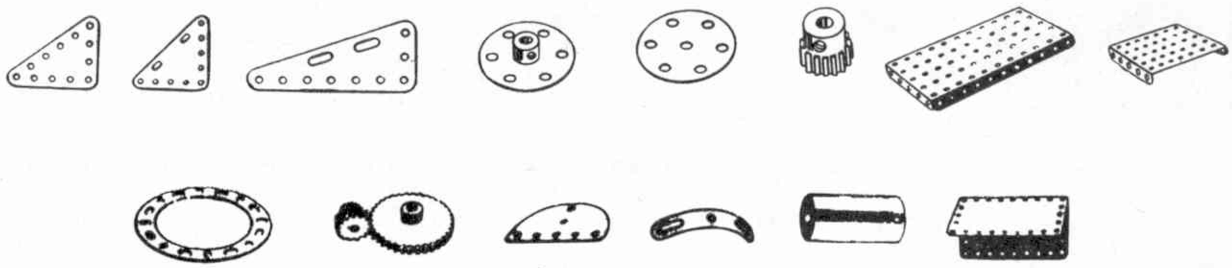
19	20	21
22	23	24

If you require further words please continue on another sheet of paper.



Dealers who specialise in Meccano spare parts

Listed below are some of the dealers who sell Meccano accessories and spare parts. This is intended to aid enthusiasts—and there are many of them—who constantly require additional spare parts for their Sets. All dealers can, of course, order Meccano spare parts for their customers, but those listed here are among our spare part specialists.

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Maxwell Road
BEACONSFIELD
Telephone: 4092

WILTONS SPORTS AND GAMES
Corner Canal and Queen Street
SALISBURY
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2 St. George's Street
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Telephone: 66161

JOHN W. BAGNALL LTD.
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Cheltenham Motor & Cycle Co. Ltd.
31 High Street
CHELTENHAM
Telephone: 53099

H. A. BLUNT & SONS LTD.
38 Fretherne Road
Welwyn Garden City, Herts.
Telephone: Welwyn Garden 26884

LESLIE BROWN
Super Toy and Model Store
95 High Street, Stockton-on-Tees
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168 High Street
CHATHAM, Also at Strood and Grays
Telephone: 45215

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LONDON, S.W.1
Telephone: Regent 1846

DOLL'S HOSPITAL (YOUNGSTERS)
55 Hallgate
DONCASTER
Telephone: 2831

F. T. B. LAWSON LTD.
New George Street
City Centre, **PLYMOUTH**
Telephone: 65363

THE GUILDFORD DOLL'S HOSPITAL LTD.
13 Swan Lane, **GUILDFORD**
Telephone: 61331

LUCAS'S (Hobbies) LTD.
7 Tarleton Street
LIVERPOOL 1
Telephone: Royal 7562

LANE'S TOY SHOP
75 High Street
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Telephone: Chatham 41870

OVERSEAS DEALERS

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(Mail Order, Parts and Sets)
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395 George Street
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Telephone: 29 3566

NEW ZEALAND

BUNKERS LTD.
P.O.Box 58
HASTINGS
(Mail orders from all countries welcomed)

Dealers who stock MECCANO spare parts

This is the third part of a list of dealers who handle the full range of Meccano Spare Parts. It is supplementary to the page of Spare Parts Specialists appearing on Page 54 in this issue. Names are arranged by Counties with entries in alphabetical order of town. This list is a fully revised and amended version of the list published in the February edition of Meccano Magazine and it will be continued next month.

Warwickshire

COLLETT & SON, 19 High St., Alcester.
HORNTONS (MODELS & TOYS) LTD., 32 Stephenson St., Birmingham 2.
LEWIS'S LTD., Bull St., Birmingham 4.
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H. COPE, 28/30 High St., Saltley, Birmingham 8.
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MOSELEY CYCLE CO., 364a Moseley Rd., Birmingham 12.
KINGS NORTON CYCLES, 5 York Rd., Kings Heath, Birmingham 14.
W. WESTWOOD, 7 Maypole Lane, Kings Heath, Birmingham 14.
TERRY'S TOYS & CYCLES, 189 Monument Rd., Edgbaston, Birmingham 16.
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TOYTOWN, 105 Regent St., Leamington Spa.
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W. GOODE (RUGBY) LTD., 19 Clifton Rd., Rugby.
P. H. GRAY (RUGBY) LTD., 19 High St., Rugby.
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WARD'S, 8 Church Walk, Trowbridge.
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J. C. FAIRFIELD, 30 High St., Lurgan, Co. Armagh.
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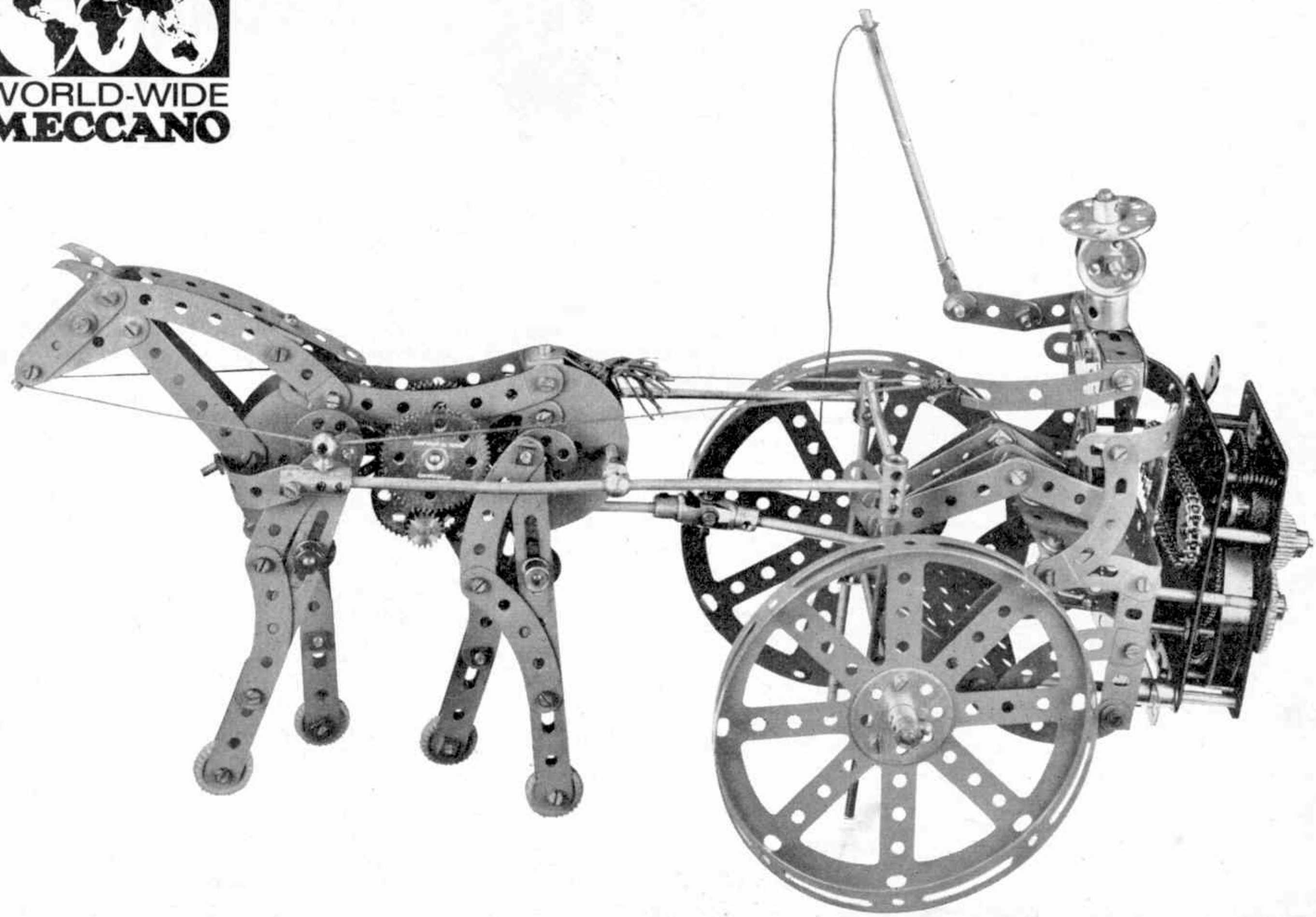
In case of difficulty contact our agents for the name of nearest stockist: MESSRS. KILROY BROS. LTD., Shanowen Rd., Whitehall, Dublin 9.

WORLD-WIDE
MECCANO



A CHARIOT FROM HUNGARY

Meccano enthusiasts round the world make marvellous models. Original, ingenious, simply clever or cunningly detailed; practical, entertaining, educational . . . lots of descriptions apply to these masterpieces. But the best way for you to appreciate them is to see them.

The above illustration shows a splendid Horse and Chariot, devised and built by a keen Meccano man in Budapest. Powered by a Meccano clockwork motor, the horse actually walks and draws the chariot.

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.

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A
Tri-ang
PRODUCT

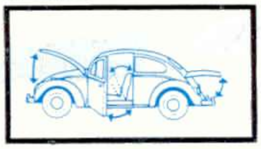
GREAT FEATURES IN LATEST DINKY MODELS!

New! Volkswagen
1300 SEDAN

Be one of the first to own this superb Dinky with *all* the 'action features'. Opening doors · Folding seats · Opening boot and bonnet · Four wheel suspension · 'Prestomatic' steering · Plus: 'Chromed' trim and bumpers with over-riders, special headlights, and engine.

Model No 129
Length $3\frac{15}{16}$"

Price **8/11**

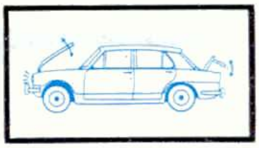


New! Triumph 1300

This is the latest 85 mph Triumph Saloon. It's the best equipped medium-size car in Britain today. Opening boot and bonnet · 'Prestomatic' steering and suspension · Detailed engine · Jewelled headlights · Wrap-round bumpers with over-riders.

Model No 162
Length $3\frac{5}{8}$"

Price **5/11**

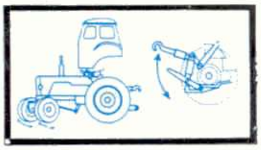


New! D.B. Tractor
AND DISC HARROW

This rugged Dinky model features 'Hydraulic' lifting gear · Pivoting front axle · Steers from driver's position · Engine tick-over sound · Detachable cab with windows · DISC HARROW has two sets of six revolving blades.

Model No 325
Overall
Length $5\frac{11}{16}$"

Price **12/6**



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From Hamleys, Harrods, Gamages, Selfridges and all good toy shops. Manufactured by Meccano Ltd. Binns Road, Liverpool.

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