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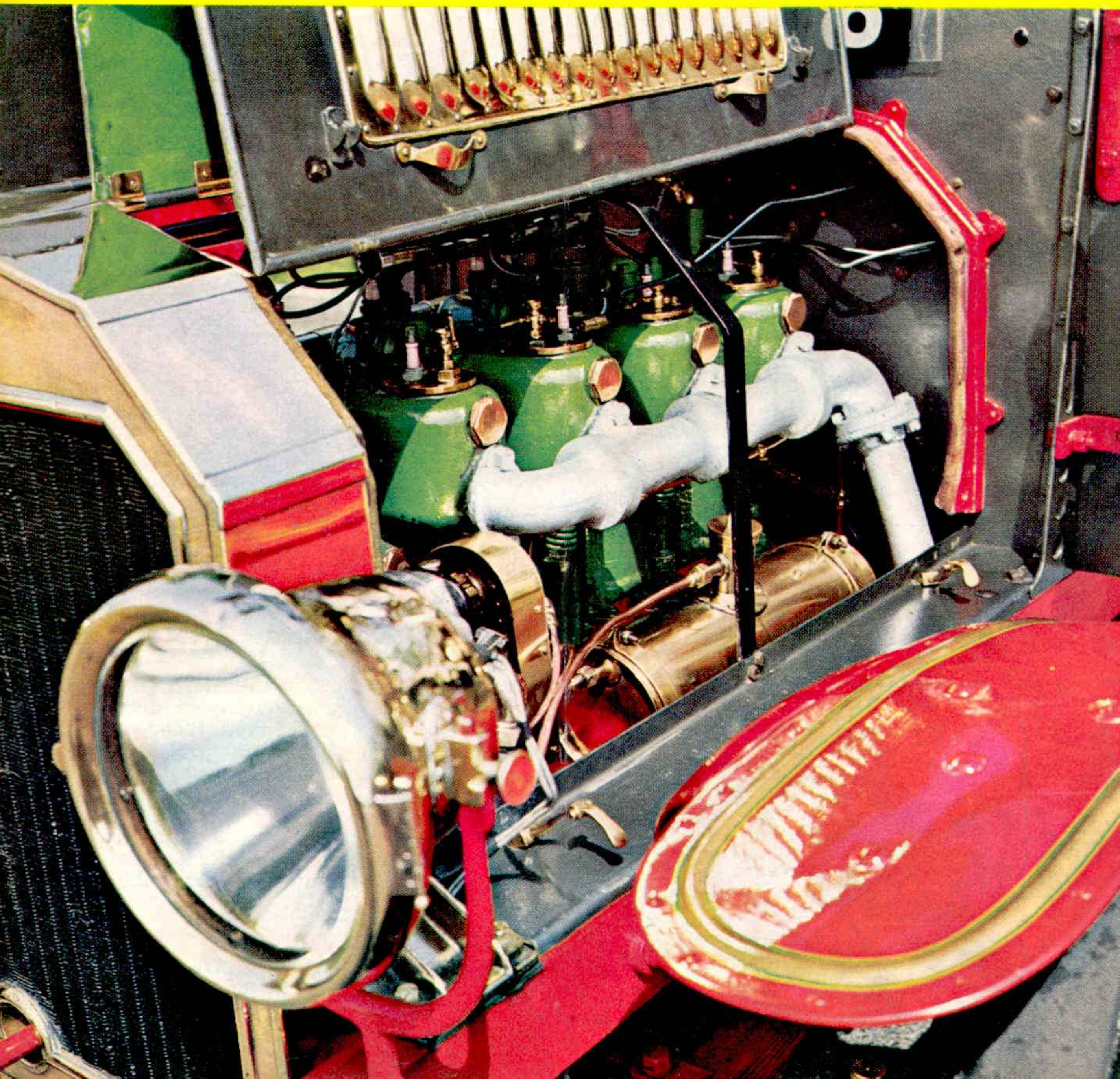

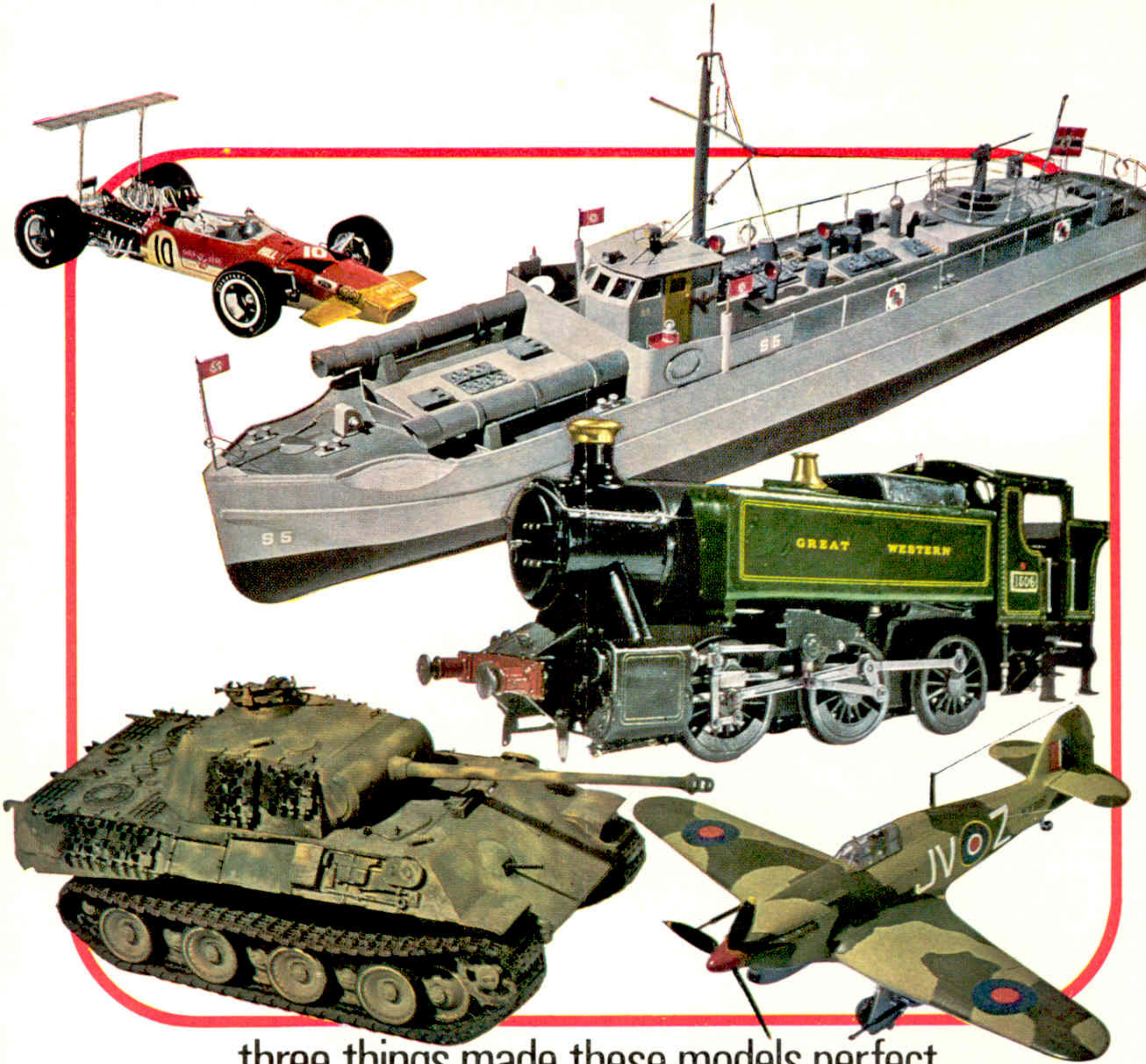
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MECCANO® Magazine

APRIL 1971 VOLUME 56 NUMBER 4

Meccano Magazine, founded 1916.

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CONTENTS

FRONT COVER

Some idea of the degree of restoration and preparation lavished on old-timers entered in the veteran commercial vehicle run on the first Sunday in May can be gleaned from this photograph of the bonnet and under-bonnet details of one of the 29 fire-engines in last year's event. We wonder how many miles per gallon—of Brasso ! Picture by R. V. Canham, who also took those on pages 178 and 179.

NEXT MONTH

Another full-size plan, this time for aircraft enthusiasts, will feature in the May issue. The model is a highly successful electric R.T.P. design, and in a two-part feature we shall be telling you how to make the simple pylon and fly the model. More questions were asked about this at our London Exhibition than anything else, so we know it will be popular !

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5 M 24 'General Chaffee'—1944/50 (US); M4 'Sherman' 105mm Howitzer HVSS—1944 (US); 10.5 cm PzFH 18 auf Pz II (SF) 'Wespe' 1942/44 (GE); Volkswagen Personenwagen, 3 versions 1940/45 (GE).

6 Cruiser tank 'Cromwell Mk IV'—1943/45 (UK); Pz Kpfw IV J.—1944/45 (GE); Sturmgeschuetze III D—1941 (GE); Jeep with trailer and Jeep—1942/45 (US).

7 Sherman VC (17 pdr) 'Firefly' 1944/45 (US/UK); M 41 155 mm HMC 'Gorrila'—1945/55 (US); Pz Kpfw III F—1941/42 (GE); SU 85 Tank destroyer—1944 (SU).

8 'Jagdpanzer' Sd Kfz 173—1944/45 (GE); Cruiser tank 'Comet Mk I'—1944/45 (UK); T 28 Super heavy tank (double coverage) 1945 (US).

9 M10 3" GMC 'Wolverine' 1942/43 (US); 8.8cm FLAK 18 and Zg Kw 8 ton Sd Kfz 7 1934/44 (Double coverage) (GE); T14 Assault tank—1943 (US).

10 Carro Armato Tipo M13/40—1940/42 (IT); 7.62cm PAK 36 (r) auf Pz Kpfw 38(t) 'Marder III' Sd Kfz 139-1942 (CZ/GE); 15 cm FH 'Lorraine'—1942/43 (FR/GE); A7V Sturmpanzerwagen.

11 Pz Kpfw IV D—1939/40 (GE); Medium tank T6—1941 (US); Light tank M22—1943 (US); Armoured Command Vehicle H.P. and L.P. (ALC)—1944/45 (UK).

12 S. Pz Spaehwagen (8 rad) Sd Kfz 232 (FU) 1939/42 (GE); M 3A1 'General Stuart' III and IV—1942 (US); Australian Cruiser Mk I 'Sentinel'—1942 (A); Ope 3-ton Trucks 1937/49(GE).

13 Pz Kpfw 'Tiger I' E (Double coverage 1941/44 (GE); M 4A3E2 Sherman 'Jumbo'—1944 (US); 17 pdr. 'Challenger' Mk I—1942/44 (UK).

14 Tank Mk IV—1917/18 (UK); Canadian Cruiser 'Ram II'—1942/43 (CA); 15 cm sFH auf GW III/IV 'Hummel'—1942/45 (GE); VK 3001 (P)—Porsche type 100 'Leopard' 1939/41 (GF).

15 M3 'General Lee Mk I'—1941/42 (US); Armoured Car 'Daimler Mk I' 1941/44 (UK); T 82 105mm HMC—1942/43 (US); Pz Spaehwg. II 'Luchs' Sd Kfz 123 1942/43 (GE).

16 Light Tank Mk I—1929/30 (UK); Pz Kpfw 'Panther' G.—1944/45 (GE); Armoured Car 'AEC Mk I'—1942/43 (UK); Infantry Tank Mk I—1935/39 (UK).

17 Cruiser Mk I and Mk ICS (A9)—1936/39 (UK); M 26 'General Pershing'—1943/46 (US); Light Tank M 2A1—1938/41 (US); Pz Kpfw II F—1940/44 (GE).

18 17 pdr. SPG 'Archer'—1943/45 (UK); Pz Kpfw 'E 100'—1941/45 (GE); (Double Coverage). Light Tank M 2A4—1939/42 (US).

19 'Churchill Mk I'—1940/41 (UK); Vickers MBT 'Vijayanta' 1963 (UK); Heavy Tank M 6—1940/41 (US); Armoured Car 'AMD Panhard et Levassor 178' (FR).

20 The German Panzerkampfwagen III—late models. Ausf L—1941/42. Ausf M 1942/43; the 7.5cm 'Sturmpanzer III' Ausf N 1942/43 and the 'Flammpanzer III' 1942/43 Ausf M (FI). British Cruiser tank A 13—A 13 Mk IfCruiser tank Mk III (Reworked); A 13 Mk II and IICS/Cruiser tank Mk IV and Mk IVCS and A 13 Mk IVA-IVACS/Cruiser tank Mk IVA-Mk IVACS.

21 The German tank destroyer—7.5cm PAK 40/2 and Sfl. II 'Marder' 1942/43 early and late models based on the Panzerkampfwagen II chassis; British 'Tortoise' 1942/47; British light tank Mk IA—with drawings of the A4E6, A4E7, A4E8, A4E9, A4E10; 1930/35 American Howitzer Motor Carriage T 3 based upon the Combat Car M 1, 1939.

22 American heavy 155mm Gun Motor Carriage M 12 'King Kong' with the GMC T6 prototype and 155mm GMC M 12 production model; Cargo Carrier M30 and the T14 prototype 1941/44; ISU 122—1944/45 Soviet Assault Gun Motor Carriage ISU 122—D195 and A 25 S versions, 1944/45.

23 Bundeswehr main battle tank—Kampfpanzer 'Leopard', Prototype I (Group A), Prototype II (Group A), Production Kampfpanzer 'Standard'—Leopard; Recovery and Engineer Vehicles, Bergepazner 'Standard' and Pionierpazner 'Standard' 1962/70.

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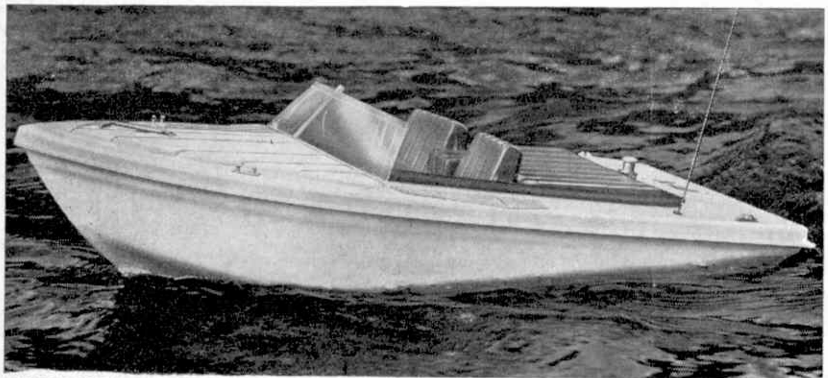

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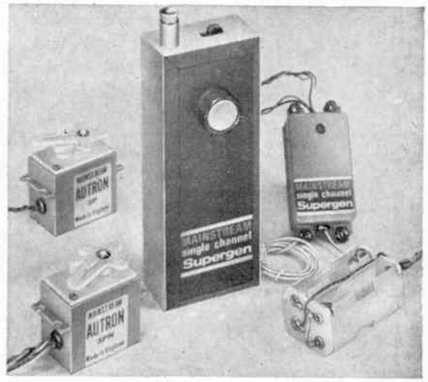

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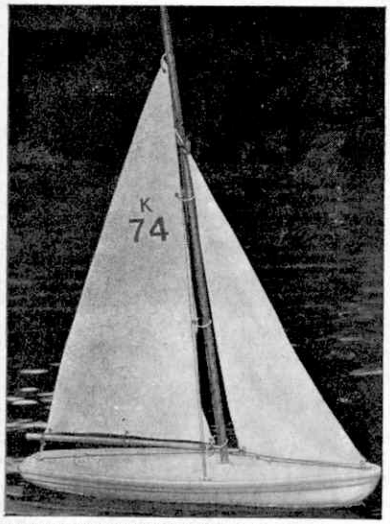

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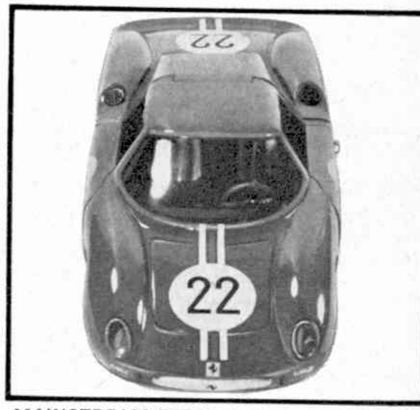

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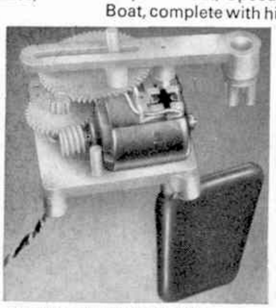

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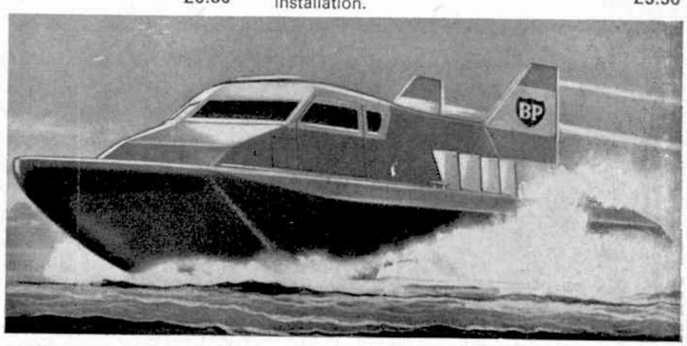

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Cecil Gibson

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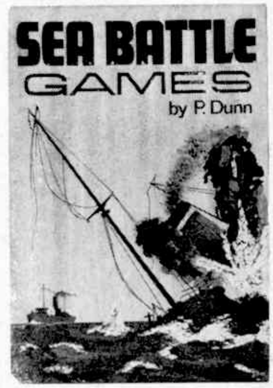

Naval wargaming is here treated in fine detail. Author P. Dunn has been playing seabattle games for a number of years and has wide experience of the various methods of playing advocated. The author deals in great detail with Napoleonic period, ironclads, and pre-Dreadnought gunnery systems, with a chapter on early periods—Armada and similar. Of special interest are his rules for map campaigns and a hypothetical world war game.

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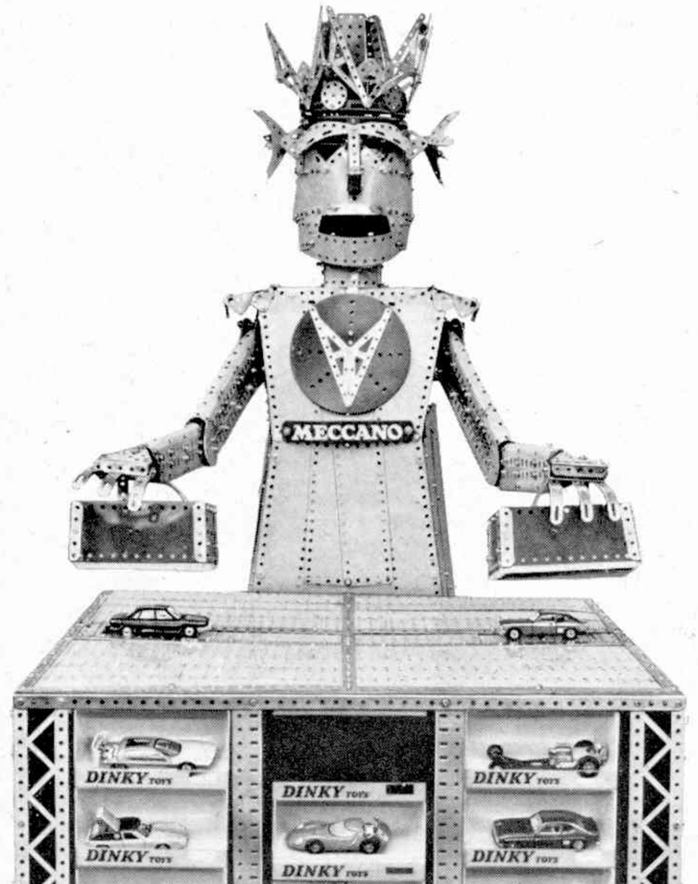
THE ITALIAN MECCANO MAGICIAN

The mystery of the ever-changing Dinky Toys!



The Meccano Magician is one of the most original and entertaining Meccano Models ever built.

Its use of Meccano pieces is so cunningly clever that before your very eyes it changes two Dinky Toys into entirely different models! Built by Italian model-making genius Giuseppe Servetti, its overall height is 42″. In front of the Magician is a Meccano-built table which is some 26″ wide by 32″ deep by $7\frac{1}{2}$″ thick.

How does it work?

The two Dinky Toys on the apparently solid table are in fact standing on moveable platforms (Meccano $5\frac{1}{2}$″ x $2\frac{1}{2}$″ flat plates) which come from inside the table. When the boxes in the Magician's hands are lowered sufficiently to hide the Toys, the platforms sink into the table and revolve on an internal turntable until two new platforms with different models are in position. These are then raised until the holes in the table are filled, at which point the Magician lifts his arms to reveal the two new Dinkys. There are eight platforms in all, each carrying a different Dinky model, and the whole operation is completely automatic.

Throughout all stages the Magician continuously opens and closes his mouth and moves his head from side to side.

Power for all movements comes from 2 Meccano 3-12 volt D.C. motors with a 6-ratio gear box and one mains motor inside the table which drives the Magician's head. The various movements are governed by three separate Meccano-built gearboxes. The intricate gearboxes and linkages governing all movement will operate continuously for long periods—a tribute to the tremendous skill of the designer.

No matter how simple or complicated they are, we should like you to write about any models you've made which you think would be of interest to other Meccano enthusiasts around the world. Please send photographs and descriptions to Meccano Tri-ang Limited, Binns Road, Liverpool L13 1DA.

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There will be cash prizes for the best models every three months, both senior and junior and finally the best modeller overall at the end of the year will be awarded a further cash prize of £250 and the handsome Bic championship trophy.

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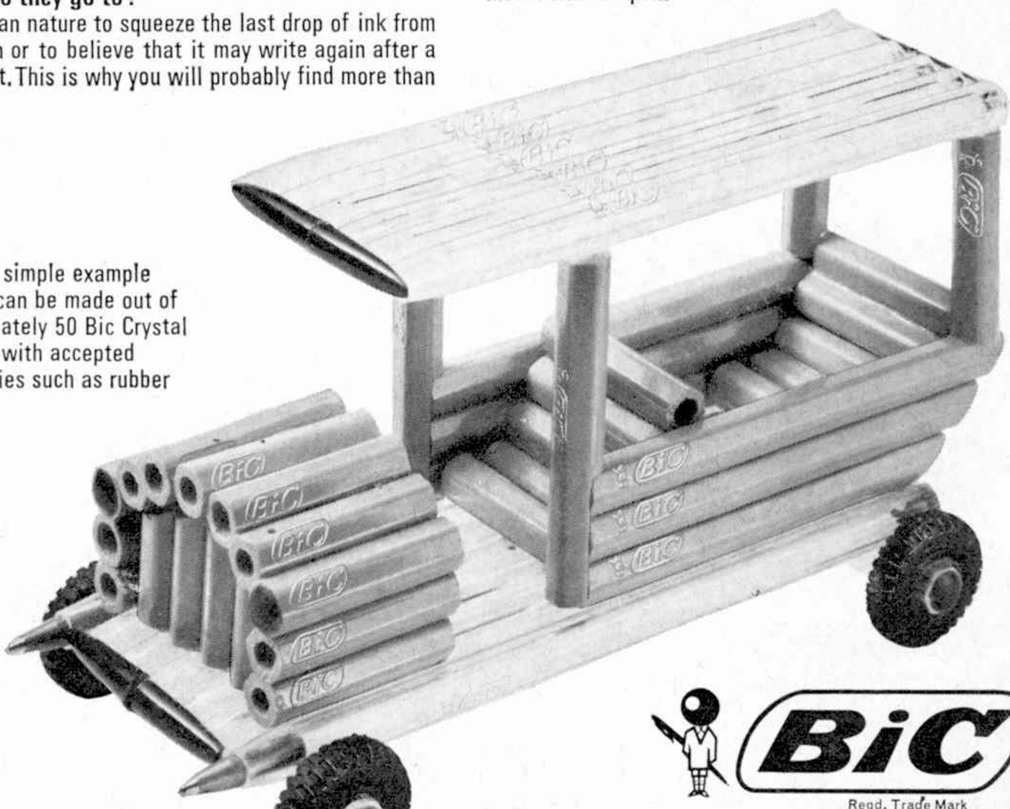


This is a simple example of what can be made out of approximately 50 Bic Crystal ballpens with accepted accessories such as rubber wheels!

BiC

Regd. Trade Mark

the pen they model on

ON THE EDITOR'S DESK

Post

No doubt by the time this issue appears the postal strike will be over (one hopes!) but we have felt it advisable to omit the usual Car Competition from this issue, since it may be a little while before the postal services are back to normal and some entrants may therefore be under an unfair handicap. In fact, we have been unable to despatch the 50 prize models to winners in the last competition, so we must ask indulgence for circumstances beyond our control!

The interruption in the post also affects us in other ways, and one obvious one is in new products which are normally posted to us for examination and review. Thus we are forced to miss the regular "Have you seen?" feature; like television, we can only say "Normal service will be resumed as soon as possible!"

Meccano Club

The continuing success of the adult Meccano Club in the Midlands has prompted Mr. Peter Matthews of 7 Trinity Road, Hurstpierpoint, Sussex, to take steps to form a similar club in the South. A suggested name is Holy Trinity Meccano Club, in honour of the very first club affiliated to the Meccano Guild in 1919; by a coincidence, one of the members of the new club would be S. H. Wilson, who founded the first club.

Unfortunately, the date of the first meeting called, February 27th, will have passed before this issue is published, but would-be members are urged to write to Mr. Matthews, enclosing a stamped adressed envelope, in order that he may gauge potential support.

Radio Cars

It looks as though 1971 will be the year which saw radio-controlled racing cars established. There is growing interest in these $\frac{1}{8}$ scale, $2\frac{1}{2}$ cc powered, 45 m.p.h. racers, and M.A.P. Ltd., is in fact staging the first-ever meeting for them during the Easter week-end at a big school in Berkhamsted. There are several such cars being built around our offices, and there is one "works team" already in existence. At present, the cost of building a car is a bit on the high side, but as the sport develops costs will come down and no doubt a "simple" class will be evolved. Stand by for further news!

Next year's Exhibition

Boating enthusiasts will be pleased to hear that the 1972 Model Engineer Exhibition will be extended to take in the "small" swimming bath at Seymour Hall, Marylebone. This pool is 110 × 42 ft. and it will be possible to run a wide assortment of boats on it, including evening competitions for straight running and radio controlled boats, electric, steam, and small diesel or glow engine powered. The last will have to be very effectively silenced.

It is expected that there will be various demonstrations throughout the day, and that the Model Power Boat Association will take over for the evening competitions. With what is a somewhat restricted space, real speed models will not be possible, but fast electrics and other lively boats will have enough room, and some attractive demonstrations will be possible. Pity that there won't be any wind, but it might be possible to arrange some form of yacht competition. It all sounds rather fun, anyway!

Future Contents

This issue has a full-size plan for a simple model to build, and we expect such plans to appear quite often in future. If you like the idea, or would like to see something special, don't be afraid to write and tell us. What readers do and don't like is always interesting to us and helps to shape the magazine to readers' tastes.

Telescopes and the Amateur

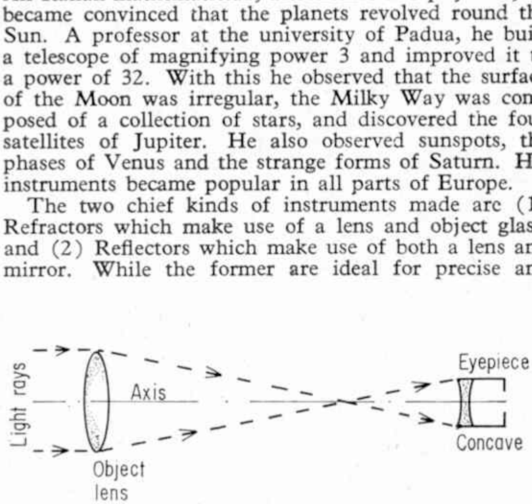
Charles A. Rigby discusses history and principles etc. of types of astronomical telescopes

Left: An 11¾ inch Cassegrain reflecting telescope. Photograph by courtesy of the Fullerscope Telescope Company.

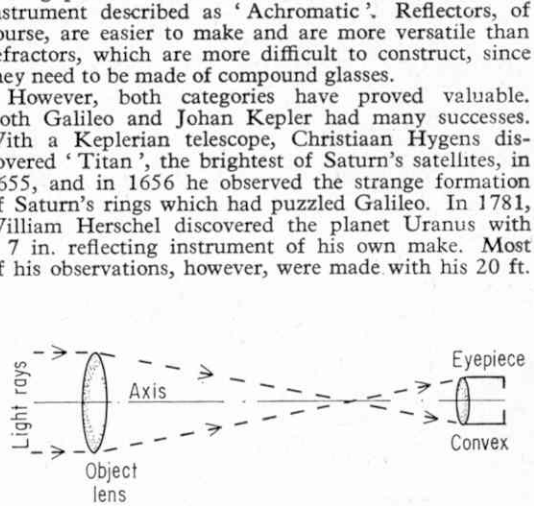
ALTHOUGH GENERALLY CREDITED with the invention of the telescope, Galileo (1564-1642) really got the idea from Hans Lippershey of Holland. An Italian mathematician, astronomer and physicist, he became convinced that the planets revolved round the Sun. A professor at the university of Padua, he built a telescope of magnifying power 3 and improved it to a power of 32. With this he observed that the surface of the Moon was irregular, the Milky Way was composed of a collection of stars, and discovered the four satellites of Jupiter. He also observed sunspots, the phases of Venus and the strange forms of Saturn. His instruments became popular in all parts of Europe.

The two chief kinds of instruments made are (1) Refractors which make use of a lens and object glass, and (2) Reflectors which make use of both a lens and mirror. While the former are ideal for precise and accurate observation, reflectors have the advantage of being 'achromatic' or free from colour distortion and of enabling apertures to be used to increase the resolving power. This has resulted in another class of instrument described as 'Achromatic'. Reflectors, of course, are easier to make and are more versatile than refractors, which are more difficult to construct, since they need to be made of compound glasses.

However, both categories have proved valuable. Both Galileo and Johan Kepler had many successes. With a Keplerian telescope, Christiaan Hygens discovered 'Titan', the brightest of Saturn's satellites, in 1655, and in 1656 he observed the strange formation of Saturn's rings which had puzzled Galileo. In 1781, William Herschel discovered the planet Uranus with a 7 in. reflecting instrument of his own make. Most of his observations, however, were made with his 20 ft.



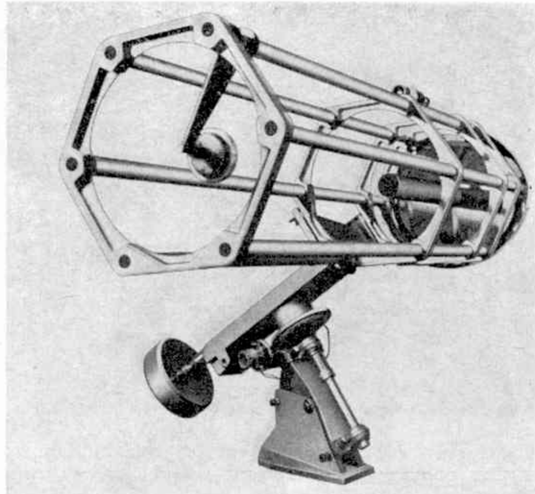
Galilean Telescope. A concave or negative eye-lens is placed so as to intercept the rays from the Object Glass before they reach the Focus. A magnified *erect* image of the object is produced. Invented by Lippershey, it was improved upon by Galileo.



Keplerian Telescope. A Convex or positive lens is used as an eye-piece, which magnifies the real image produced by the Object Glass as if it were an object after the manner of a microscope. With a simple eye-piece this gives an INVERTED IMAGE, and with a special eye-piece this is corrected to give an erect image.

10½ inch Cassegrain telescope. This instrument consists of a specially designed Skeleton Tube along which the various optical and mechanical components are placed as desired, instead of being fixed immovably. This arrangement also prevents swirling heat-currents from being trapped in front of the mirror and producing a trembling or "boiling" image.

Photograph by courtesy of Astronomical Equipment (Luton) Ltd.



telescope of 19 in. diameter. Newton also made a small reflector employing a mirror of tin and copper alloy which he ground and polished himself.

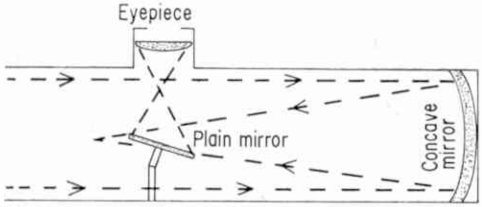
Lenses and mirrors were gradually improved. Spherical mirrors of reflectors often suffered from the defect of spherical aberration though free from chromatic aberration. When, however, the mirror is in the form of a paraboloid of resolution, light from a distant star on the axis of the paraboloid is bright and accurate to focus, the image being completely free from spherical aberration. This property does not hold for a star that is not on the axis, the images of off-axis objects suffering from the defects of coma and astigmatism. The angular view within which the images are reasonably good is small. In 1722, Hadley, the inventor of the sextant, found a method of parabolizing concave mirrors, and reflectors came into more general use.

As is well-known, Optics is the science of the nature and laws of Light and an important branch of physics. This is employed in the construction of all telescopes using lenses, or mirrors and lenses combined. A lens is a portion of some refracting material having at least one curved surface. Ordinary lenses are made of glass and while 'crown' glass and 'flint' glass were often used because of their high refractive power, other kinds such as 'pyrex' are also used. Lenses are either converging lenses or diverging lenses. The former collect the rays that fall upon them and bring them to a point or 'focus'. The latter spread out the rays and prevent or tend to prevent them coming to a focus.

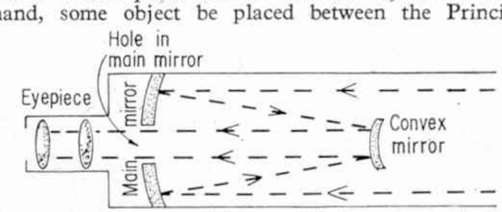
An ordinary magnifying glass is an example; being thicker at the centre than at the edges, and bulging out at both sides, is known as a double convex lens. A straight line through the centre of a lens and perpendicular to the surface is called the Principal Axis. The rays from the Sun are parallel rays, hence if an ordinary lens is held in front of the Sun, the rays entering are bent or refracted, and form at the point of inter-section an intensely bright spot of light. If the lens is carefully moved to and fro until the spot is at its brightest, the centre of the spot will be the Principal Focus of the lens. If the distance from this is carefully measured, this gives the Focal Length. The images of all objects placed at a greater distance than its focal length are Real and Inverted. When the object is nearer the lens than the Principal Focus, an Erect magnified vertical image is formed on the same side of the lens as the object.

Images may be Real or Virtual. All images formed by ordinary mirrors are Virtual Images, since they regularly reflect light. The beam or ray that falls upon the mirror is called the Reflecting Ray or Beam. If a light straight rod is held at right-angles to the surface of a mirror, it will be noted that (1) The Incident Ray, the Reflected Ray, and the normal or perpendicular to the surface at the point of incidence are all in the same plane, and (2) The angle of Incidence is equal to the angle of Reflection.

Main mirrors are also important. A concave mirror is a portion of a hollow sphere of metal brightly polished, such as silvered tin, copper or a portion of such a sphere of glass 'silvered' on the convex side, the chief parts being the Principal Axis, Centre of Curvature and the Principal Focus. The point midway between the Centre of Curvature and the mirror is the Principal Focus, and is so called because all rays which meet the surface parallel to the Principal Axis will after reflection intersect at that point, and conversely, if a luminous point be placed in the focus all the rays from it reflected by the mirror will proceed outwards in parallel straight lines and no image of the luminous point will be formed. If, on the other hand, some object be placed between the Principal



Newtonian Telescope. In this telescope designed by Newton, a plain mirror is placed in the converging beam formed by the Concave mirror a short distance before its focus and at an angle of 45% with the axis of the beam, so as to form a real image at the side of the tube where it can conveniently be examined.



Cassegrain Telescope. This form of instrument was designed by Cassegrain in 1672, in which the converging light, reflected from the main mirror, is brought to a focus after reflection from a Convex secondary mirror, the light being brought through a hole in the main mirror, giving a more compact instrument than the Gregorian telescope, invented by James Gregory. This made use of a small concave mirror, instead of a secondary convex mirror (as shown above). In this connection, the Gregorian telescope has never come into general use.

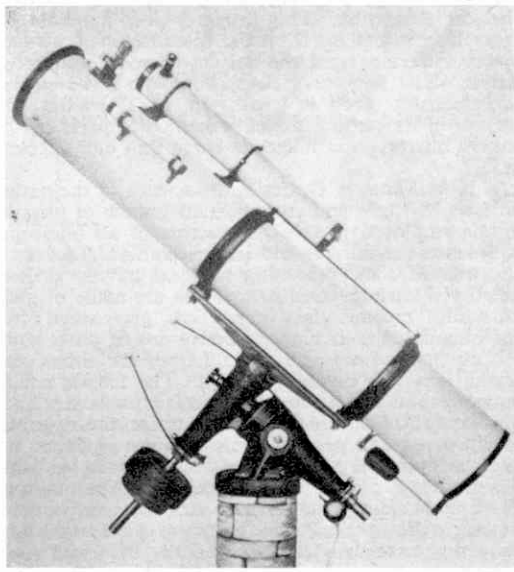
A typical do-it-yourself mirror making kit for a reflecting telescope. *Photograph by courtesy of Austin Roberts Practical Optics, Birkenhead.*

Focus and the Centre of Curvature, a magnified image of the object will be formed beyond the Principal Focus.

The aperture of a telescope is important because of its effect on the Resolving Power. For instance, a 5-inch aperture is required to reveal that a double star whose components are separated by one inch is actually double. The Magnifying Power is measured by the Ratio of the Focal Lengths of the Object Glass and the Eye-piece. Thus, with an object glass of 20 ft. focal length, a magnification of 480 is obtained when an eye-piece of ½-inch Focal Length is used; and of 240 when an Eye-piece of 1-inch Focal Length is used. The magnification is independent of the aperture. The aperture diameter is always referred to as so many inches. Thus, a 7-inch instrument refers to the main mirror with a diameter of 7-inches. The largest telescope construction was the 200-inch Hale Reflector at the Palomar Mountain Observatory in California, U.S.A. There are several others in various observatories, ranging from 120-74 inches.

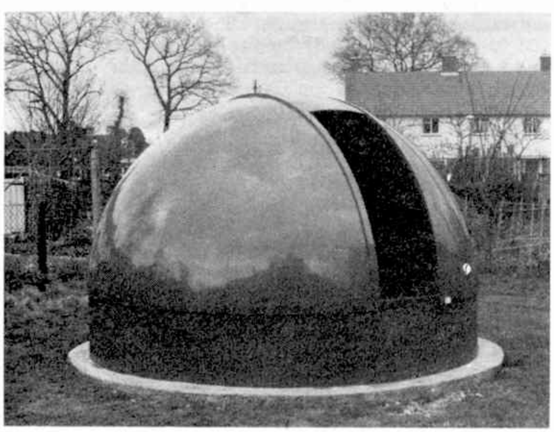
Another important point is the mounting of both large and small instruments. To an observer situated on a plane parallel to the equator, a fixed star appears to change in azimuth only. This fact is used in the design of mounts for optical telescopes, thus simplifying the problem of observing fixed objects in that once the axis of the instrument has been aligned to the angle of declination, it need only be driven at the same rate and in the opposite direction to the earth's rotation. They are, therefore, mounted Equatorially or on Altazimuth, and this is another technical point for consideration by amateur astronomers.

It is occasionally possible to buy a good second-hand telescope for sale, but such bargains are few. If not, the obvious thing is to buy one from a reputable dealer. An alternative is to make one, a Reflecting instrument being the best proposition. For amateurs who have decided upon a particular make of instrument, a variety of kits may be bought, not only for doing the job, but containing the various necessities and parts to make a first-class telescope. These include everything from grinding and smoothing powders and the essential parts and pieces required such as fibreglass tubes and mirror blanks, etc. Besides this, the amateur can have both optical and mechanical services, if required.



An 8½ inch Newtonian reflecting telescope. *Photograph by courtesy of the Fullerscope Telescope Co.*

Here are some useful hints from an authority on telescope-making: (1) Anyone with a little patience can make a mirror good enough to show Moon craters, Jupiter's Moons, and Saturn's 'rings'; (2) A 6-in. mirror is large enough for a first effort. Difficulties increase with greater diameters, so don't be too ambitious; (3) Grinding and polishing should be carried out with slow 'strokes', since fast 'strokes' invariably result in a faulty mirror—so don't hurry this process; (4) Carry out each stage of grinding for the full recommended time, namely, 1 hour for a 6-in. mirror and be careful not to mix the 'Grades'. Clean up thoroughly before proceeding with the next Grade.



This fibreglass observatory is a 10 ft. diameter hemispherical dome on a 1 ft. 9 inch wall. *Photograph by courtesy of Austin Roberts Practical Optics, Birkenhead.*

SPACE STAMPS

by James A. Mackay

ON OCTOBER 4th, 1957, Russian scientists launched the first man-made space-craft. Sputnik I, as it was called, was little larger than a football in size, and the instruments it carried were very elementary. Nevertheless, here was history in the making, though few people could have then realised that within 12 years men would actually set foot on another planet. Three days after the launching of the first Sputnik, Russia issued a multicoloured pictorial stamp to mark the centenary of the birth of K. E. Tsiolkovsky, a writer who, like Jules Verne in France, pioneered science fiction. In his works Tsiolkovsky outlined the space exploits of the future. Appropriately the stamp bore his portrait flanked by spacecraft and thus this stamp, planned long before Sputnik I made its momentous flight, ranks as the first in the collection with Space as its theme.

On November 28th the Tsiolkovsky stamp was re-issued with an overprint celebrating Sputnik I. At the time of issue this stamp was freely available for a few pence; now it is catalogued by Gibbons at £3.25, indicating the fantastic popularity of Space stamps and the rising value of the earlier stamps of this subject. Since 1957 the number of Space stamps issued by Russia runs to well over a hundred, but this is merely a drop in the ocean compared with the output of other countries. By comparison the United States has had few Space stamps. These have been confined to stamps featuring the communications satellite Echo I (1960), Project Mercury (1962), the Atlas rocket (1964), Gemini 4 (1967) and Apollo XI (1969). Britain, whose contribution to space research has been considerable, has not produced a single stamp so far in this subject. On the other hand this deficiency has been more than remedied by the majority of the other countries who have issued stamps illustrating almost every aspect of space development and the various rockets and satellites launched.

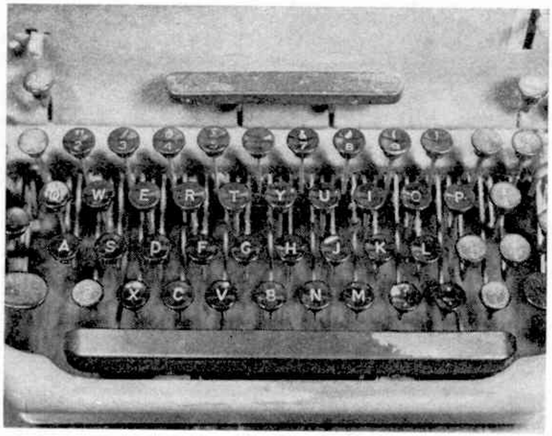
The pattern of these stamps is surprisingly diffuse. It was to be expected that the countries of the Communist bloc should extol the successes of Russia in this field, but a large number of them have shown amazing impartiality and featured American space achievements as well as Russian exploits. Hungary, Czechoslovakia, Roumania and Poland have all commemorated space achievements by non-Communist countries; Hungary even went so far as to issue a special stamp in mourning for American and Soviet astronauts who had been killed.

During the past few months the spate of Space stamps has continued unabated. Undoubtedly the greatest single event commemorated on a world-wide basis has been the Apollo XI moon landing. Illustrated here are some of the stamps of Ghana, Togo and Dominica which feature the astronauts, Armstrong, Aldrin and Collins, their spacecraft and various aspects of that momentous mission. From Dahomey came a set of four stamps whose approach to the subject was more whimsical; the 70 francs stamp shows the moon gazing up apprehensively at the approaching astronauts, while the 110 f stamp shows the moon smiling benignly as two astronauts plant the Stars and Stripes on its surface.

On February 8th of this year Yugoslavia released a set of six stamps with the theme of Space in the service of Science. The 0.50d stamp featured an assorted array of spacecraft symbolising the extension of the number of countries engaged in space research. The other stamps featured the use of artificial satellites (05.7p), automatic devices used for exploring the moon's surface (1.20d), the conquest of outer space (2.50d), the first experimental space station (3.25d) and man on the mon (5.75d).

The island of Ascension in the remote South Atlantic is of importance nowadays as the site of a satellite tracking sation manned by personnel of NASA. The opening of the Apollo Communications Satellite Earth Station on the island was marked by a set of four stamps released in November 1968. Now Ascension has taken the oportunity of decimalisation to introduce a new definitive series featuring the history of space exploration. The ½p stamp features a medieval Chinese rocket about to be launched. The Chinese

(please turn to page 174)



PROOF by the PEN

Pens—or typewriters—find it a hard job to fool expert document examiners

By Peter Wilkes

IF AN AMERICAN ATTORNEY called Patrick had carried out a simple experiment that is within the reach of anyone possessing paper and pen, it is odds on that he would have given more thought to his method of fraud and may even have been successful in obtaining millions of dollars.

Within a few days of the death of a multi-millionaire, Patrick, his attorney, produced an impressive four page document purporting to be a will naming him as the sole beneficiary. The will had all the appearance of authenticity, including the millionaire's signature on each page.

Immediately they had got over the shock of realising that the whole estate could pass from their control, relatives challenged the will in the Courts.

The first step was for A. G. Osborn, America's leading handwriting expert, to be called in to give an opinion as to the genuineness of the signatures, which some of the family, people familiar with the writing of the dead man, felt were, in fact, genuine.

It did not take Mr. Osborn long, to the relief of the genuine claimants, to prove the will false.

Patrick could have learned one of the basic principles of document examination if he had taken a pen and piece of paper and signed his name a few times—he would have found that no two examples of any signature are ever exactly alike. The will contained four absolutely identical specimens. So identical that they must all be tracings of one genuine signature.

To Osborn, the case was simple and straightforward, but it showed how the profession had been uplifted from the time when courts viewed with suspicion so-called experts giving only an opinion regarding handwriting, and when two such people often gave entirely different views.

The proof presented to the American court was not in the form of an opinion. The expert produced photographic enlargements of each signature, superimposed over a squared grid, to show in full the complete likeness between them.

The work of the handwriting expert, or document examiner as he is called, has been developed until it is as exact as a science, and the scientist himself is part of the team of forensic experts whose aid is an essential service to detectives engaged in the round the clock war against crime.

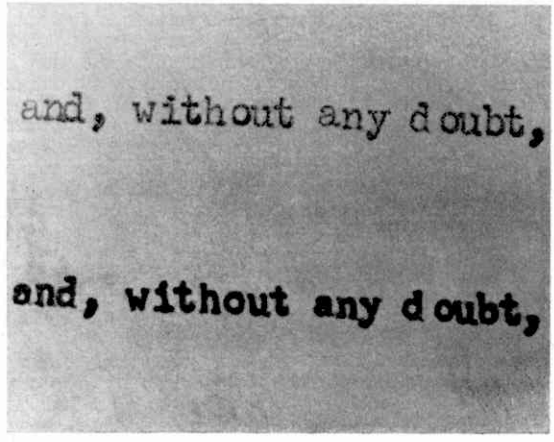
Suspected documents which come under scrutiny can be either false in their entirety or those to which alterations have been made in part, and vary from an attempt to execute a large scale fraud in business, through altered road fund licences for motor cars, to those who try to defraud a bookmaker by changing the writing on an envelope which has a postal stamp for a time before a particular race was run.

If the document under question is handwritten then it is essential for the expert to have, as a comparison control, a sample of the writing of the person believed to have made it. This is usually obtained by the detective in charge of the case, but the taking is far from simple.

Obviously, if the person knows that the police require a specimen of his handwriting to prove an offence of forgery, he is going to do all in his power to camouflage it. To avoid this the detective will give the suspect a piece of dictation and ensure that, while he is writing it, the speed of dictation is varied to prevent the writer adopting a false style.

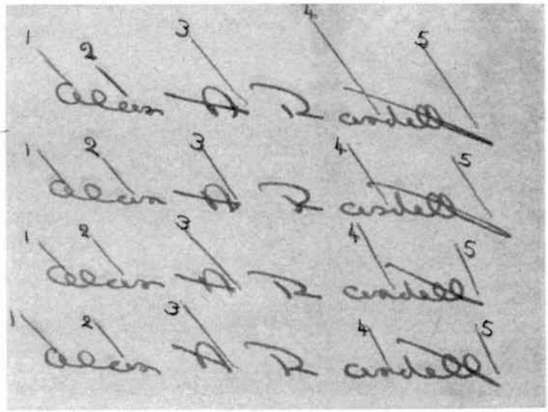
The work of the document examiner, when comparing handwriting can, in many ways, be likened to the fingerprint expert because both search for points of similarity and, when bringing their findings before the court, produce charts showing just these very points that prove beyond reasonable doubt the truth of their evidence.

It is not only in the field of comparison that the



Attempts are made to confuse the expert by disguising type by outlining the latters with ink. Such attempts are doomed to failure because of the ability of the expert to remove ink by chemical means while leaving the type. Even this method, however, cannot alter the position of the letters.

Heading picture, opposite: The keyboard of a typewriter, to the document examiner, is as individual as a signature and the expert can help the crime fighter by identifying, from individual type, the make and age of the machine, and when it has been traced, tell if the machine made the type in question.



Right: No signatures are ever identical. Examples of four signatures made by the same person in rapid succession. Note the obvious five points of difference.

handwriting expert can provide assistance in the legal field, both to prosecution and defence, for, by chemical analysis, they can give details of the age of writing and also the type of ink used.

The exception to this rule is the modern ball point pen, for with this type of writing instrument it is impossible to date writing. For this reason ball point pens are rarely used to sign important documents and also because, in some cases, such a signature can be raised by pressing the thumb onto it and then planting it onto a fraudulent document.

Often documents that find their way to the laboratory of the document examiner are suspected of being altered in some material form. If an erasion has been made by either rubber or scraping, examination under a microscope will reveal the broken fibres of the paper, whereas chemical removal will have to be proved by using ultra violet light.

As well as being an expert in the art of handwriting, the document examiner must have a thorough knowledge of photography, for it is by photographing these altered documents by infra red light that 'erased writing' can again be brought to view, and the words that the criminal has vainly tried to erase can once again tell their damning story for the courts.

This method is used to reveal words that have been covered by a thick ink blot, and also in cases where an attempt to defraud a bookmaker is made by a hopeful punter who sends an unsealed envelope, addressed lightly in pencil, to himself. On receiving it the trickster rubs out his name and address and writes in that of the bookmaker. Details of a bet on a race whose result is now known are put in the envelope which is left at the bookmaker's office, as if it had been delayed by the post and delivered late. Should the attempt be suspected, it can be immediately detected by the laboratory using infra red photography.

Document examination also concerns 'unwritten' writing, and an example of how this caused a murderer to be brought to justice occurred when Vivian Messiter, an oil company representative, was found dead in his garage. The case was undoubtedly one of murder, but it was made more difficult than normal due to the fact that the victim, a single man, was not discovered until nearly six weeks after the crime.

In a search of the garage, the police found a piece of paper measuring less than three inches square, and covered in so much oil and general filth that it was impossible to say if it contained writing or not.

The exhibit was entrusted to a document examiner who, by carefully cleaning it with benzin, found that it contained the name, 'W. F. Thomas'. An order book, the property of the victim, was found to have had two pages torn out of it but, in the laboratory, by illuminating the next blank page by angled light, to shadow any indentations caused by heavy pressure when the original writing was made, the name 'W. F. Thomas' was again revealed. The police were very interested as to why Mr. Thomas should take such trouble to hide his name and soon decided he was a person to whom they must have an introduction.

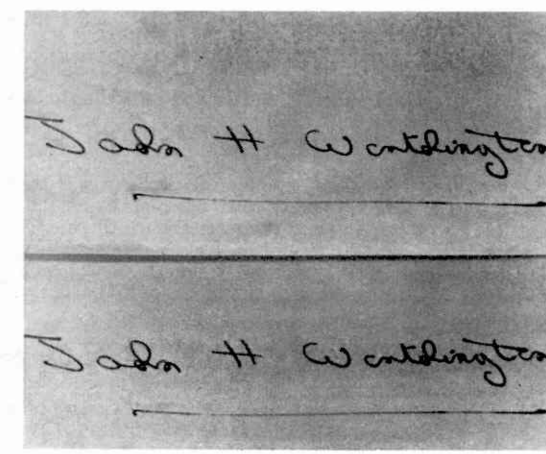
The meeting soon took place and, after some thorough investigations, W. F. Thomas was charged with murder and eventually executed—a triumph to the ability and knowledge of the document examiner, without whom the murder would, in all probability, have remained undetected.

In recent years, document examiners have proved that it is not only handwriting that has a character of its own; even the type of individual typewriters can be identified with certainty.

Laboratories which specialise in this form of work start by collecting, often from the manufacturers, specimens of type fitted to each of the models supplied by them. With a collection covering all makes, they can then arrange comparison with typescript under suspicion, and tell investigators the type of machine that made the impressions.

If, eventually, a particular typewriter comes under suspicion of having produced a particular document, the detective will take a specimen similar to that obtained when handwriting is compared. From this the expert will compare the typings and give a definite opinion as to whether both were made by the same machine.

Continued on page 181



Examples of a signature as would be used in forgery—each signature is absolutely identical—sure evidence to the expert that this is a copy.

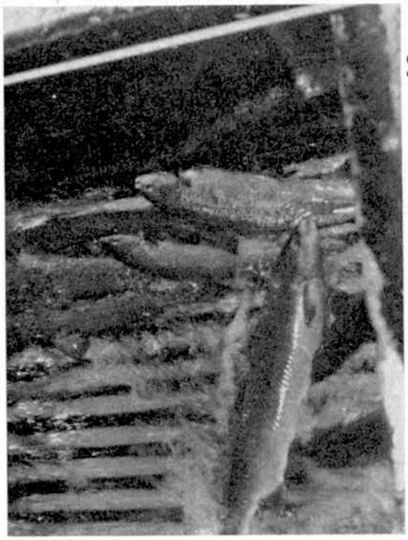
SALMON, sea trout and brown trout are of great sporting and commercial importance to the Highlands of Scotland, attracting angling enthusiasts from all over the world. When plans for developing the country's hydro-electric resources were first announced, there were widespread fears that trout and salmon would suffer severely.

If the Scottish Electricity Boards had not taken prompt and energetic measures to co-operate with nature and the various fishery authorities, those fears would have become tragic fact.

The dangers were three-fold. Millions of fish would have been killed when passing through the turbines, the dams would be unsurmountable obstacles to the passage of migratory salmon and trout, and the bayed up waters behind the dams would have flooded the gravel beds where the salmon spawn.

A few words on the life-cycle of salmon and trout will be helpful when considering the problems the

LADDERS FOR FISH !



How Scotland's fish passes are saving the salmon

by Trevor Holloway

hydro-electric authorities had to tackle. The female salmon usually spawns in late autumn, covering the eggs with gravel. The little fish, known as alevins, hatch out the following spring, wriggle up through the gravel and disperse in search of food. Small free-swimming salmon and trout are known as fry.

After one to four years in the river they become silvery and are known as smolts. In late spring they travel down-stream in shoals to the sea and make their way to the Atlantic where they feed and grow rapidly. Incidentally, some of their feeding grounds are believed to be off the West coast of Greenland. The salmon remain at sea for up to three years before returning to the river of their birth to spawn.

After spawning the salmon—now known as kelts—drop downstream. Most of the male fish die. The females make their way back to the sea, but not more than five per cent survive to tackle the journey up-stream a second time.

Sea trout follow a somewhat similar pattern, but unlike salmon they feed in estuaries and coastal waters around the British Isles and along the continental shores of the North Sea. Sea trout make many journeys between sea and river in their life-time.

If no provision is made for salmon and sea trout to climb from the river up to the waters of the dam, then they will be unable to reach the gravel beds vital to successful spawning. And, of course, the passage of the young salmon, or smolts, downstream to the sea would be arrested. In short, the life-cycle of both salmon and sea trout would be put out of gear and reproduction of the species in that particular river would come to a halt.

One of the first efforts to solve the problem was the building of a fish ladder, or fish pass, at Tongland, to enable fish to climb from the river Dee to the waters of Tongland Dam, 70 ft. above, in easy stages. The ladder consisted of a series of concrete pools, each measuring 15 ft. by 10 ft., rising up one above the

Top picture: The fish pass at Clunie dam.

Centre: Salmon on the floor of the trap at Loch Poulary. The photograph *is* the right way up!

Left: Salmon being taken from the trap at Loch Poulary for stripping.

other like the steps in a staircase. There were 35 such pools, built in a zig-zag course, with four large resting pools, each about 100 ft. in length, at intervals up the 'ladder'.

Each pool had an under-water opening which gave access to the next pool above. The length of the ladder was 700 ft. so the gradient of the 70 ft. climb was only 1-in-10.

On one occasion when the pass was closed for inspection, over 60 salmon were counted making their way up the ladder and there was no indication that the fish found any difficulty in making the ascent.

Another very successful fish pass is the one at Pitlochry power station. It has 34 pools and three large resting pools. The rise from pool to pool is 18 inches and the total length of the pass is 1,020 ft.

Some fish passes are of the overfall type. These have no underwater orifices through which the fish pass from pool to pool; instead, a carefully-controlled flow of water overflows from pool to pool all the way down the 'ladder', the fish climbing the ladder by leaping from one pool to the next above until finally reaching the open water of the dam, from whence they can proceed upstream to their gravel-bed spawning ground.

Although these 'ladder' type fish passes have worked quite successfully, they are costly to construct and take up a lot of space. A 'ladder' type pass for a 60 ft. high dam may cost as much as £100,000 to build. The North of Scotland Hydro-Electric Board now favour a completely different arrangement which is cheaper, more convenient and less space-taking. It is known as the Borland Fish Lock, named after its inventor, Mr. J. H. T. Borland, of Kilmarnock. A particularly pleasing feature is that fish can make the ascent (or descent) without the effort of making a succession of leaps as is the case when negotiating a 'ladder' type pass.

In principle it works in much the same way as a lock on a canal or waterway. On the downstream side of the dam the fish are attracted by a flow of water into a chamber at tailrace level. A sluice is then shut behind the fish. As water from the reservoir above continues to pour down the connecting shaft, the lower chamber fills to capacity and the water level in the shaft begins to rise, carrying the fish up until they reach the upper chamber and from there they can easily swim or leap out into the reservoir.

In order to obtain accurate records of fish ascending or descending their passes, the North of Scotland Hydro-Electric Board have developed an electronic counter. This consists essentially of a tubular lining with three built-in electrodes for fitting into a submerged orifice between the pools of a fish pass.

The passage of a fish through the tube causes a disturbance in the electrical field maintained in the electrode and this is transmitted through electronic circuits to be recorded on a meter. The counter distinguishes between ascending and descending fish and between the larger and smaller sizes of fish, for example between grilse and the larger salmon, or between sea-trout and salmon. As refinements, the time of day when each fish passes through can also be recorded on a time chart. Also, the fish can be automatically photographed or filmed as it emerges from the counter tube to determine either its type or species.

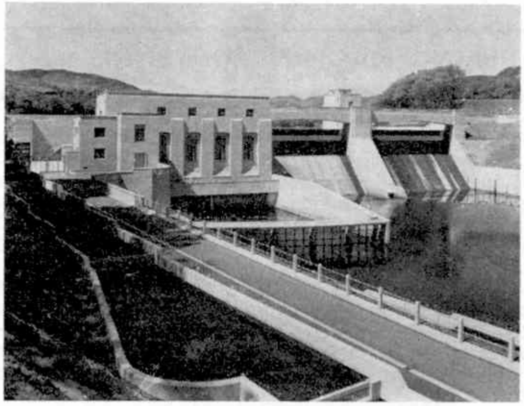
It is very important that salmon or trout making their way upstream should be prevented from entering tailraces of generating stations where they might be trapped, injured, or delayed in their upward passage.

Fixed mechanical screens have long been used for this purpose, but recently the Board have developed the

Above: Salmon fry in a measuring dish. When large enough they will be "planted" in suitable water.

Below: The Pitlochry dam and power station, with the fish pass in the foreground.

Bottom: The fish pass at Carsfad generating station, with part of the Carsfad dam in the background. *Photos courtesy of North of Scotland Hydro-Electric Board.*



design of an electric impulse screen to serve the same purpose. It works on much the same principle as that of an electric cattle fence.

Actually, the Board have done very much more than merely provide fish passes. For example, to offset the loss of spawning gravels resulting from the creation of reservoirs, the Board have opened up many waterfalls hitherto impassable to salmon so as to provide access to new stretches of river with spawning gravels.

Where, above a dam, spawning grounds have been flooded out by the creation of the reservoir, ascending fish are trapped and stripped of their eggs. There are hatcheries at Contin, Invergarry, Pitlochry and Inverawe. The Invergarry hatchery is one of the largest in Europe and has accommodation for about eight million salmon ova. When the resulting fry are ready to feed they are planted out in suitable waters where they can develop naturally.

The conventional hatchery consists of a series of troughs in which the eggs are placed in grills over which a steady stream of water passes.

Recently, however, the Board have developed a design which offers substantial economy in space, cost and water consumption. The arrangement consists of a series of eight to ten trays in a vertical frame somewhat similar to a filing cabinet. The water, fed in at the top, descends from tray to tray. A hatchery of this type, like the one at Inverawe with accommodation for two million eggs, is no larger than a two-car garage and about one-tenth the size of a conventional trough type hatchery.

Industrial expansion is inevitable, but the North of Scotland Hydro-Electric Board have proved that man can co-operate with nature to their mutual advantage.

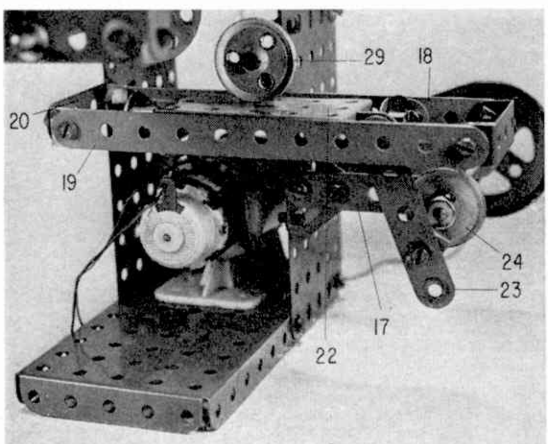
SPACE STAMPS *(continued from page 169)*

were using rockets in battle as early as 1232 A.D. Medieval Arab astronomers are shown on the 1p, while instruments invented by the Norwegian Tycho Brahe and the Italian Galileo Galilei are shown on the 1½p and 2p respectively. Sir Isaac Newton and an apple (alluding to the incident which demonstrated the law of gravity to him) are shown on the 2½p, while Harrison's chronometer of 1735 appears on the 3½p stamp. America's first manned orbital flight by Colonel John Glenn in 1962 is the subject of the 4½p. The giant telescope at Mount Palomar and the radio telescope at Jodrell Bank are shown on the 5p and 7½p stamps. Mariner VII and a view of Mars appear on the 10p while Laika, the first dog in Space, is portrayed on the 12½p. The first of the Gemini "walks in space" is featured on the 25p and the Apollo XI moon-landing is shown on the 50p. The £1 stamp depicts an artist's impression of a space research station of the future.

MILLING MACHINE *(from opposite page)*

other lugs of which are held by the Bolts connecting Strips 7 and 8.

Now bolted to one Flat Plate 2 are two Trunnions, to each of which a 2½ in. Strip 17 is fixed, then a 5½ in. Strip 18 is attached to both Flat Plates 2 by Angle Brackets. Another 5½ in. Strip 19 is attached, at one end, to Strip 18 by a 1½ × ½ in. Double Angle Strip, the other end of the Strip being connected to nearby Plate 2 by a 2½ in. Strip 20, attached to Strip 19 by an Angle Bracket. Two further Angle Brackets are bolted to Strip 18 to provide journals for a 4 in. Rod 21, held in place by Spring Clips. This Rod serves as the runner for a 2½ × 1½ in. Flanged Plate 22 which slides backwards and forwards between Strips 18 and 19.



Fixed to the outside flange of Plate 22 is an Angle Bracket, to which a 2½ in. Strip 23 is lock-nutted, a further Angle Bracket being lock-nutted through the fourth hole of the Strip. The free lug of this Angle Bracket is fixed to the boss of a 1 in. Pulley 24, mounted on the end of a 3½ in. Rod held by Spring Clips in the end holes of Strips 17. Fixed on the other end of the Rod is a 2 in. Pulley 25 which is connected by a 10 in. Driving Band (packed with the Motor) to a ½ in. Pulley mounted on the Motor output shaft.

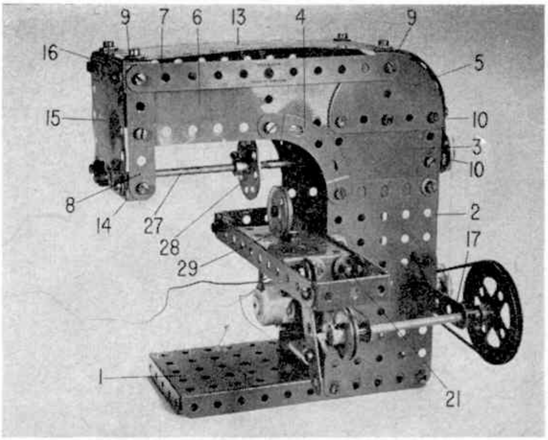
Also mounted on the Motor shaft is a 1 in. Pulley which is connected by a Cord driving band to another 1 in. Pulley 26, fixed on the end of a 7½ in. compound rod 27 held by Spring Clips in Double Angle Strip 14 and lower Double Angle Strip 10. The compound rod is built up from one 4 in. and one 3½ in. Rod, joined together by a Rod Connector. The cutting tool is represented by an 8-hole Bush Wheel 28, mounted on compound rod 27, the actual "job" being supplied by a 1 in. Pulley without boss 29 fixed to an Angle Bracket which is, in turn, secured to the top centre of Flanged Plate 22.

PARTS REQUIRED

4—2	1—22a	1—48	1—126
7—5	1—23a	5—48a	1—188
10—12	1—24	1—51	2—189
2—15b	6—35	1—52	3—190
2—16	68—37a	2—53a	1—192
1—20a	63—37b	2—90a	1—200
3—22	14—38	1—111a	1—213
1—3-12 volt Motor with 6-ratio Gearbox			2—214

A close-up view of the sliding platform carrying the "job", with the simple crank mechanism used to drive it.

Meccano Set No. 5, with the addition of a 3-12 volt Motor with 6-ratio Gearbox, contain all the parts required to build this simple Meccano Milling Machine.



A No. 5 Meccano set contains everything needed to build this fine model except the motor and gearbox

A LARGE PROPORTION OF MODELS built with Meccano tend to be based on road vehicles or cranes of one sort or another, but it would be grossly inaccurate to imagine that Meccano modellers are interested only in these subjects. On the contrary, there are many other types of models which are regularly reproduced and one of the largest of these comes under the general heading of "Bench Machinery"—drills, lathes, milling machines, etc.

Of all the machines in the category, perhaps the most frequently reproduced in Meccano is the lathe and so, by way of a change, we thought that we would try something different, finally coming up with the very basic, yet appealing—we hope!—Automatic Milling Machine described here. Basic it undoubtedly is, but it captures the general features of a real machine and it also "works", in the sense that it reproduces the major movements of its real-life counterpart, although it cannot, of course, be used for actual milling. It is built with a Meccano No. 5 Set, with the addition of a 3-12 volt D.C. Motor with 6-ratio Gearbox.

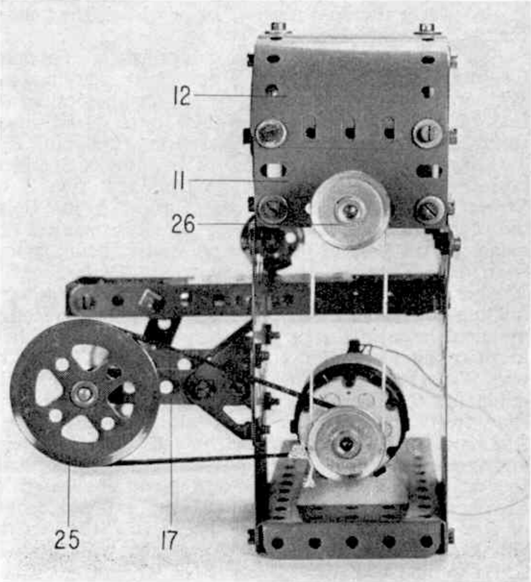
Automatic Milling Machine

By 'Spanner'

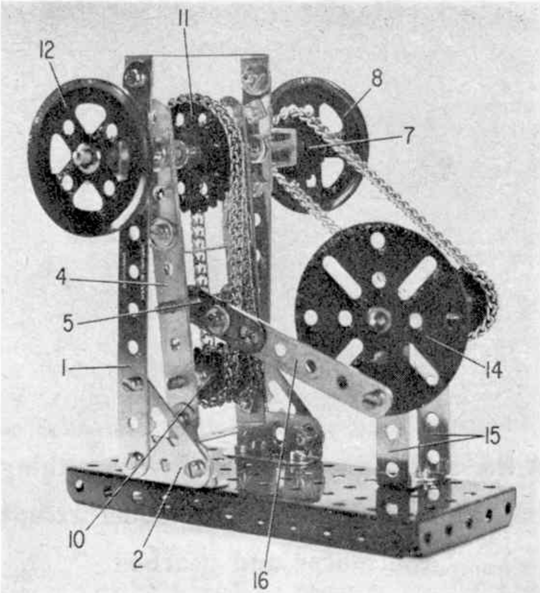
A base is supplied by a 5½ × 2½ in. Flanged Plate 1, to each side flange of which a 4½ × 2½ in. Flat Plate 2 is bolted, the Motor being fixed to the top of the Plate, as shown. Each Flat Plate is, in turn, extended three holes upwards by a 2½ × 2½ in. Flexible Plate 3, one of the securing Bolts also fixing a 2½ in. Stepped Curved Strip 4 in position. Bolted to the Flexible Plate, as shown, are a Semi-circular Plate 5 and a 5½ × 1½ in. Flexible Plate 6, the latter being edged by a 5½ in. Strip 7 and a 2½ in. Strip 8. Note that the upper Bolts securing these edging Strips in place also fix two 2½ × ½ in. Double Angle Strips 9 between the sides of the model. The upper end of Stepped Curved Strip 4 is bolted to Flexible Plate 6.

In addition to Double Angle Strips 9, the sides of the model are also connected by two further 2½ × ½ in. Double Angle Strips 10. Bolted between all the Double Angle Strips are a 2½ × ½ in. Flexible Plate 11, a 2½ × 2½ in. Curved Plate 12 and a 5½ × 2½ in. Flexible Plate 13. Another 2½ × ½ in. Double Angle Strip 14 is bolted between the lower ends of Strips 8, a 2½ × 2½ in. Flexible Plate 15 being secured to the front of this Double Angle Strip. The upper edge of this Plate is overlayed by a 2½ in. Strip 16, the securing Bolts fixing two Angle Brackets in place, the

continued opposite



An end view of the Milling Machine showing the drive from the Motor to both the sliding platform and the "arbor", i.e., the rod carrying the cutting tool.



Among the Model-Builders with 'Spanner'

Meccanograph mechanism

This is one of a pair of Meccanograph attachments designed by Mr. H. J. Halliday of London, S.E.15. Space prevents me from including both units this month, but because Meccanograph improvements always create a great deal of interest among the many modellers who build these fascinating machines, we hope to cover the second mechanism in the near future.

Illustrated in the two accompanying diagrams, the mechanism in question, in Mr. Halliday's own words, " Is designed to overcome the drawback of the varying resistance resulting from the use of a Tension Spring or Driving Band to keep the pen arm in contact with the Crown Head cams, when two or more are in use. It also serves the dual purpose of providing the ' slide ' for the pen arm."

As far as construction is concerned, a Threaded Coupling 1 is fixed by a $\frac{3}{8}$ in. Bolt, carrying two Washers, to the parent model in an upright position in line with the driven shaft of the Crown Head and a suitable distance away for clearance. A $1\frac{1}{2}$ in. Rod 2 is secured in the Coupling. Two Cranks 3 and 4, bosses downward, two $1\frac{1}{2}$ in. Strips and two 2 in. Strips are then bolted together, using $\frac{3}{8}$ in. Bolts, the completed assembly being loosely mounted by means of the boss of Crank 3 on Rod 2, being spaced from the Threaded Coupling by a Collar and a Washer, a second Collar spaced by a $\frac{3}{4}$ in. Washer 5 holding the assembly in place. Another $1\frac{1}{2}$ in. Rod is mounted loose in the boss of Crank 4 where it is held in place by Collars. Spaced from the top Collar by two Washers is a Slide Piece 6 which serves as the guide for the pen arm. Note that the pen arm must slide freely in the Slide Piece, while the Slide Piece Rod must be perfectly free in the Cranks/Strips arrangement, this arrangement itself being perfectly free on Rod 2. A Wire Hook on the end of a length of Meccano Cord is hooked round the exposed length of Rod between Crank 4 and the $2\frac{1}{2}$ in. Strips in the Cranks/Strips arrangement. A weight will later be added to the Cord.

A second section (diagram 2) is built up from two 1 in. Corner Brackets 7 bolted to the end of a suitable Angle Girder through its slotted holes. Passed upwards through the vacant holes in these Corner Brackets is a $1\frac{1}{8}$ in. Bolt, carrying a Washer, a second Washer being added to the Bolt, followed by a Short Coupling 8, the Bolt then being screwed into a Threaded Coupling 9. The upper transverse smooth bore of the Threaded Coupling must be arranged in line with the Angle Girder. Fixed in this bore is a 1 in. Rod, on which are mounted, in order, a Washer, a $\frac{3}{4}$ in. Washer and a $\frac{1}{2}$ in. loose Pulley, these all held in place by a Double Arm Crank 10, slotted hole upwards. A $\frac{3}{8}$ in. Bolt carrying a Washer is held in this slotted hole, as shown, to serve as a retainer for the Cord.

The finished arrangement is attached to the forward right-hand corner of the parent Meccanograph by means of the Angle Girder, with the Pulley being arranged in line with the Slide Piece of the first section and its groove level with the Wire Hook. The earlier-mentioned Cord is looped twice round the Pulley, then a weight is attached to its end, a suitable weight being provided by sixteen 1 in. Triangular Plates held together by two $\frac{3}{4}$ in. Bolts, with two Washers beneath each bolthead and Nut.

I leave the last word on the subject to Mr. Halliday. " It works very well in practice," he says, ' And noticeably reduces the amount of jarring in the Pen Arm as it maintains return contact with the cams, after being extended to the maximum throw of the Crown Head."

Variable speed mechanism

I am especially pleased to feature here a very interesting Variable Speed Mechanism designed by Mr. Colin Hoare of Beaconsfield, Quebec, Canada. Mr. Hoare is a well-known Canadian modeller who does a great deal to assist Meccano agents in his area with the construction and servicing of Dealer Display Models. His Variable Speed Mechanism is quite unique, being a unit which will convert rotary motion into a complex harmonic motion, working on a pendulum principle. By variation of the reduction ratio between the input and output drives and the

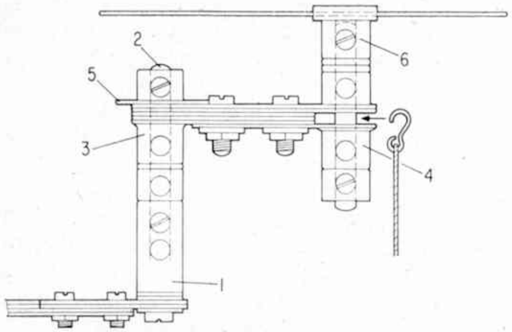


Diagram 1. The Meccanograph Mechanism designed by Mr. H. J. Halliday of London, S.E.15. It is designed to keep the Pen Arm of a Meccanograph at a constant tension against the Crown Head cams.

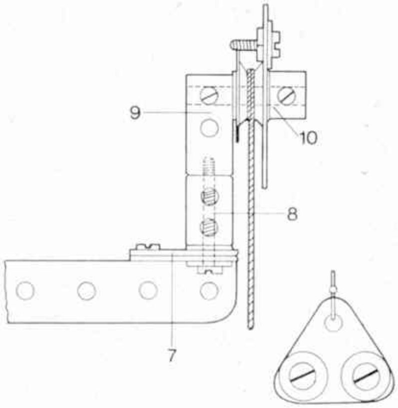


Diagram 2. The second section incorporated in Mr. Halliday's Meccanograph Mechanism.

angle through which the "pendulum" is swung, it is possible to achieve a period of zero, or even reverse motion in output drive. "The mechanism," says Mr. Hoare, "Has potential as a means of varying the speed of rotation of the table in a Meccanograph (Meccanographs, again!), or in any machine where workpieces have to be moved forward intermittently. It has the disadvantage, however, of requiring a large amount of space to operate, even if the Sprockets and Chains mounted in the pendulum are replaced by gears."

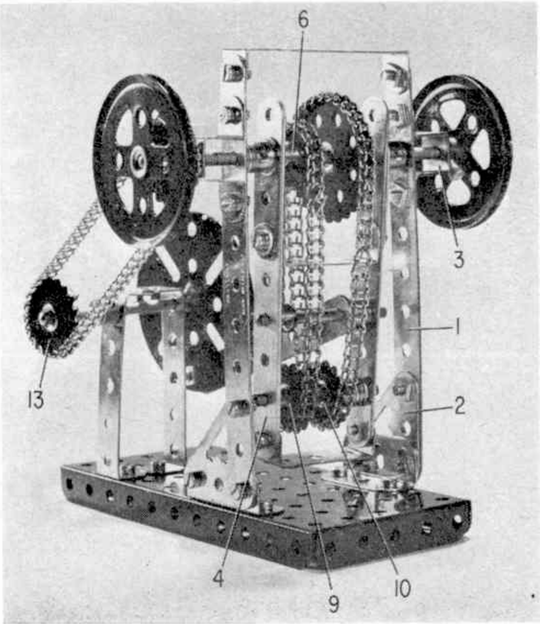
Mr. Hoare stresses that the mechanism, as described here, is for demonstration purposes only. Two $1\frac{1}{2}$ in. Angle Girders are fixed to a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate, a $5\frac{1}{2}$ in. Strip 1, strengthened by a $1\frac{1}{2}$ in. Corner Bracket 2, being bolted to each of these Girders. The Strips are joined at their upper ends by a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip. Two Double Bent Strips 3 are bolted one to each Strip, the central hole in the Double Bent Strip coinciding with the third hole from the top of the Strip.

Next to be built is the pendulum unit which consists of two pairs of two $4\frac{1}{2}$ in. Strips 4, placed one on top of the other for strength, the two pairs being connected together by two $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips fixed through the first and sixth holes of the Strips, the latters' securing Bolts also helping to fix a Crank 5 to the outside of each pair of Strips. The bosses of the Cranks line up with the second holes from the free ends of the Strips. The input shaft, supplied by a $2\frac{1}{2}$ in. Rod, is mounted loose in one of these bosses and in nearby Strip 1 and Double Bent Strip 3, two Washers spacing the Crank boss from the Strip. It is held in place by a $\frac{3}{4}$ in. Sprocket Wheel 6 on the inside end of the Rod and by a 1 in. Sprocket Wheel 7 outside the Double Bent Strip, a 2 in. Pulley 8 being fixed on the outside end of the Rod to receive the input drive.

Connected by Chain to Sprocket Wheel 6 is a similar $\frac{3}{4}$ in. Sprocket Wheel 9, fixed on a 2 in. Rod journalled in the second holes from the lower ends of Strips 4. Also mounted on this Rod, but spaced from nearby Strip 4 by five Washers, is another $\frac{3}{4}$ in. Sprocket Wheel 10, this Sprocket being connected by Chain to a $1\frac{1}{2}$ in. Sprocket Wheel 11 on the inside end of a $2\frac{1}{2}$ in. Rod journalled in remaining Double Bent Strip 3, Strip 1 and Crank 5, in line with the output shaft. Mounted on the outside end of the Rod is a 2 in. Pulley 12, from which the output drive is taken.

Sprocket Wheel 7 on the input shaft is connected by Chain to a second 1 in. Sprocket Wheel 13, fixed on a $2\frac{1}{2}$ in. Rod held by a Collar and a Face Plate 14 in two $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 15, bolted to the baseplate of the mechanism. Lock-nutted to Face Plate 14 is a $3\frac{1}{2}$ in. Strip 16, carried between two Washers, to the other end of which a Crank is bolted, the boss of the Crank being mounted on a 2 in. Rod held by Collars in the pendulum frame.

In operation, the variable motion is brought about by the movement of the pendulum. "As it moves in one direction," says Mr. Hoare, "It has an additive effect on the output drive, and causes it to go faster, whereas, in the other direction, it opposes the circular motion and the output shaft slows down."



Opposite page, An interesting Variable Speed Mechanism designed by Mr. Colin Hoare of Beaconsfield, Quebec, Canada.

Right, Another view of Mr. Hoare's mechanism, showing its simple but effective design.

VETERAN VEHICLES

The Autumn London-Brighton run of veteran cars is very well-known, especially since the film "Genevieve." However, an equally interesting event takes place annually on the first Sunday in May, when veteran or vintage buses, lorries, vans, fire engines, steam wagons and the like, all of the Historic Commercial Vehicle Club, leave Battersea Park at 7.30 a.m. for the run to Brighton. Most of the vehicles were built in the 1920's and 30's, but the range is vast—up to jeeps, etc., of World War II—in a total of ten classifications. There were over 200 vehicles last year, including 29 fire engines from 1911 on, six London taxis from 1910-1938, half-a-dozen steam lorries, buses, trucks, military vehicles, in fact a fascinating collection altogether.

Individual vehicle histories are outlined in the programme sold by the H.C.V.C., and "found in a field" or "rescued from a scrap-yard" crop up frequently. We liked the Fordson tractor "found embedded in sawdust after driving a sawbench for 20 years", the 1926 Austin Twenty Hearse registered 92 FLU, and the taxi which had covered nearly 600,000 miles in 16 years, though these are only random examples of the interesting backgrounds of some of the old-timers.

Cerainly the first Sunday in May is one on which to get up early; even if you can't get to Battersea, there are plenty of spots on the Clapham-Croydon-Redhill route where one can have a grandstand view of these fine old veterans thundering by.

Last year's run was sponsored by the National Benzole Company Ltd., and the address from which further details can be obtained is: Historic Commercial Vehicle Club Rally Secretary, Geoff Stubbington, 4 Highview Road, Thundersley Common, Benfleet, Essex.

Photos below—Upper left: A McCurd 5-ton box van built in 1913.

Lower left: On the left a Ford Model B pick-up built in 1931 and used for 25 years by a small boat-building firm in Walsall, delivering completed boats on a trailer. It used trade plates for some time and the log book was mislaid, hence the new number. Centre is a Morris 10 cwt. van built in 1929, which was built as an open-sided ice-cream van and spent all its working life in and around Cambridge until its retirement in 1958. The body was totally enclosed to comply with new regulations, but restoration to its original condition has now been carried out. A 1929 Austin 7 h.p. van, found derelict in a field in 1963, is shown on the right.

Upper right: This Daimler TL30 "Bottle" van, built in 1924, was used for advertising purposes rather than for the carriage of goods, as the two spare wheels take up a lot of space. The original engine has been replaced by a 30 h.p. 6 cyl. Bedford.

Lower right: A Dennis G.L. type built in 1930 for J. Lyons & Co. Ltd., as a mobile gift shop, this vehicle was bought by its present owner in 1947. It was converted into a mobile fish and chip shop, retaining its original external shape, and is still in regular use as such.

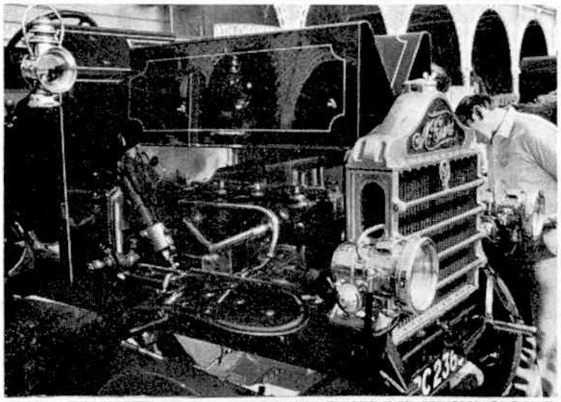
Opposite, upper left: Built in 1922, this A.E.C. "S" type was one of 928 54-seater buses built for the L.G.O.C. between 1920 and 1927, and originally worked from Nunhead Lane garage.

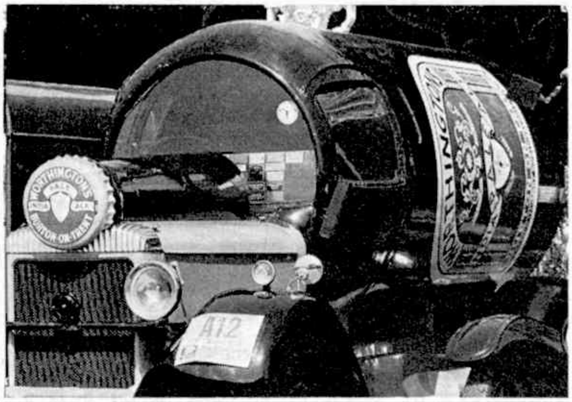
Lower left: A Morris Commercial 1-ton truck built in 1929, which has been driven for over 80,000 miles since reconditioning without giving serious trouble.

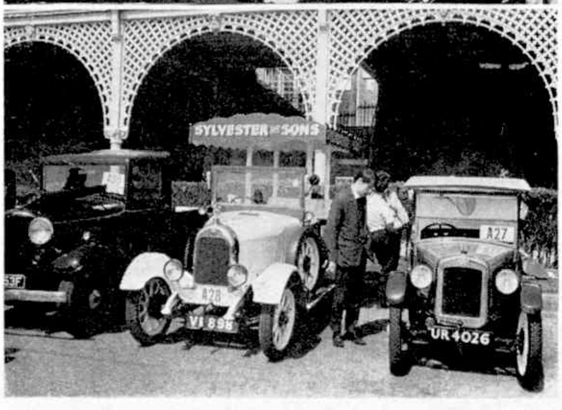
Upper right: The pump end of one of the 29 fire engines taking part in last year's run.

Centre right: A Dennis fire engine built in 1916. "Jezebel" was originally with the London Fire Brigade and then with a Warrington soap manufacturer until 1955, when it was bought for preservation.

Lower right: This 1918 American built Traffic 2-ton truck was probably brought to this country shortly after World War 1. Unusual features include the rounded chassis ends, spur drive in the rear wheels, and a two axle arrangement, one to carry the load and the other to drive the vehicle.





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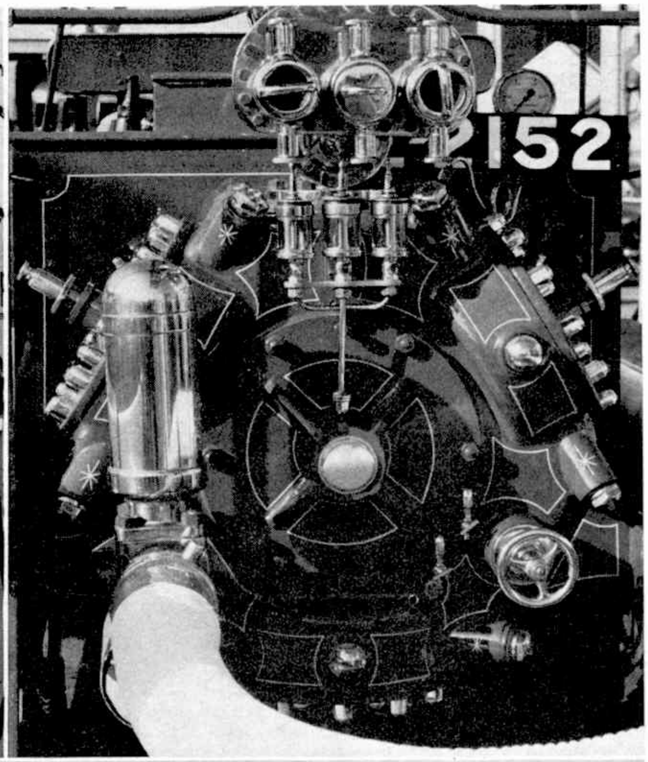
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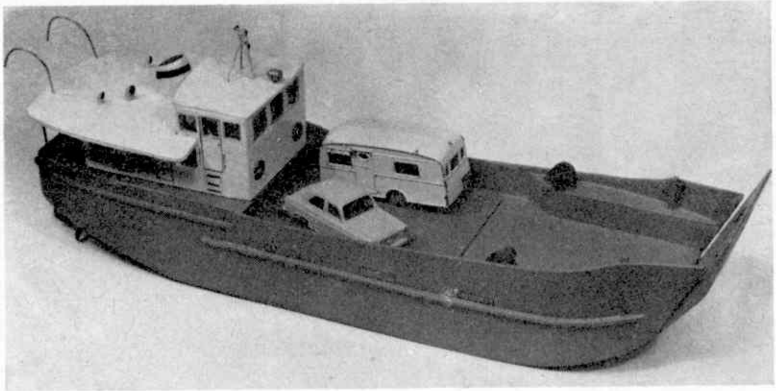
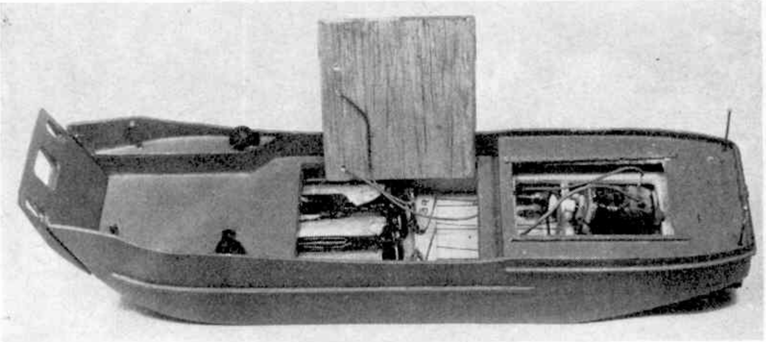
MOTOR
CARMEN



A simple working Car Transporter

This little model is cheap and easy to make and performs extremely well. Takes small Dinky and similar die-cast cars

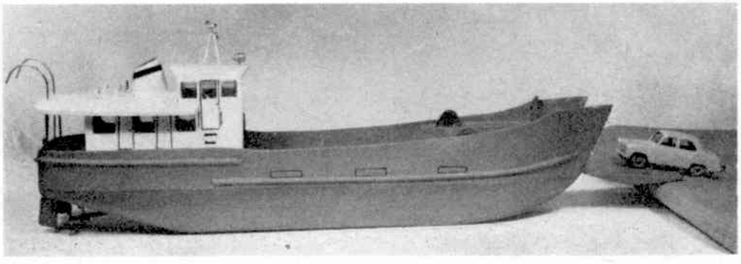


THIS SIMPLE LITTLE WORKING MODEL first appeared as a full-size plan ten years ago in "Model Maker" and there have been many requests since for the plan to be made available again. With its obvious tie-up with small die-cast cars and its very simple and inexpensive construction, Meccano Magazine seems an ideal place to reintroduce it, so here we are.

The design is based very broadly on the "Thames Transporters" built by the Thames Launch Works Ltd. at their yard at Eel Pie Island. Scale is approximately 1/72, which means it fits the smaller die-casts and is also close to 00 railway size, making it an attractive subject for a bit of scenic work with a dock or creek, etc. One sheet of $\frac{1}{8}$ in. balsa and one of $\frac{1}{16}$ in. are the main requirements, plus some scrap (a balsa pack would be fine) and a few inches of brass tube. The electric motor (any inexpensive one up to 1 in. wide), pulleys, and other odds and ends are available through most model shops.

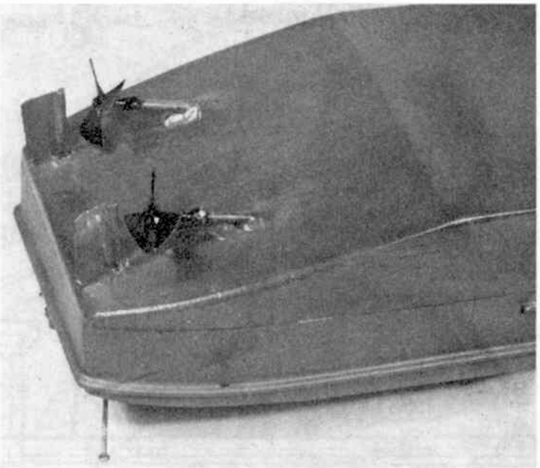
First trace the main or landing deck on the $\frac{1}{8}$ in. sheet; cut out and cut the battery and motor hatches. Cut and cement in place B1, B2, B3, B4, and the stern plate, all $\frac{1}{8}$ in. A wedge across the stern plate makes a good joint, as sketched. Cement in the stern tubes, 16 s.w.g. brass tube; these are so short that there should be little chance of their being out of straight, so that bushed tubes are unnecessary. Cut and cement in a $\frac{1}{8}$ in. sheet motor mounting plate at the same angle as the shaft tubes; the motor (we used an Orbit 205) can be glued or screwed to this. Use a small (Ripmax white) pulley on the motor and $\frac{1}{2}$ in. (blue) pulleys on the shafts. Cut B2 away as necessary to ensure that the pulleys or the rubber band round them do not foul. Now add the after deck (line up carefully) and the rudder tubes. If you have a 18g tube, use it, but 16g can be used to save buying two sizes. Cement the tubes thoroughly and re-cement when the first application is dry.

Now cut the "straight" part of the sides, grain along, from $\frac{1}{16}$ in. sheet and cement in place. The bottom from B2 to B1 can be added to make it easier to hold; cover the bottom with 3 in. wide strips, grain from side to side. Trace and cut the end side pieces,



Two evenings should suffice to make this model—plus another two for painting. Picture of the insides, above, shows the motor and pulley arrangement, and also that the battery has had its card case removed. Wires to underside of hatch are for the car-operated main motor switch.

Simple propellers cut from tin, using an old pair of scissors or, if available, tinsnips, are efficient and drive the model at a smart clip. Take care when cutting the tin not to cut your hands !



grain vertical, and allow $\frac{1}{16}$ in. in length for trimming exactly to fit. Cement and pin the bow pieces to the flat part of the sides and the deck, but before the cement is dry slip a 2 in. × $1\frac{1}{4}$ in. rectangle as a packing piece between the extreme bow ends; this will put a slight rake on the sides and leave the bow aperture square. Sheet the bottom in and allow to dry before removing the packing piece. The stern pieces just need pinning to the curve until dry, when the after ends can be cleaned up and the transom added. To complete the basic hull, cut and cement in the winch platforms at the bow and add the rubbing strips from thin strips of $\frac{1}{16}$ in. A capping of thin card or paper can be glued round the bulwarks if desired.

The ramp door is cut from a scrap of $\frac{1}{4}$ in. sheet or two laminations of $\frac{1}{8}$ in. and sanded to shape. Note the cut-outs at the "top" end. The door can be cemented in place or hinged with a scrap of silk and retained in the up position by rubber bands to the winches. Since the model rides with the door clear of the water, leakage is no problem; if a lot of weight is to be carried it is best to move the battery aft so that the ship is trimmed slightly stern down—not an unusual trim with the full-size version.

Cut superstructure parts (it helps to avoid splitting if you cut the windows before cutting each part out) and assemble. Note that the after part of the wheelhouse extends below the top of the sides. Cut the cabin top (grain fore and aft) and warm to the approximate camber; note that the centre butts to the wheelhouse but the sides extend forward slightly. The wheelhouse top is straightforward. Carve the funnel from $\frac{1}{2}$ in. scrap. Cement a thin card vertical coaming round the after deck hatch to position the superstructure, and cement acetate sheet behind all windows.

Details are few—a central bollard aft and two mooring posts forward, a small tripod mast, nav. lights, two lifebelts, and four cowl vents dress the model adequately. These can all be made from scraps of dowel, wire, etc. or pirated from an old plastic kit model which has had its day. Two large pins or thin wires attached to the hull only make awning stanchions, and if desired a pair of davits can be fitted at the stern and an anchor davit at the bow. Scuttles, doors, ladder rungs, etc. can be drawn on with a mapping pen after painting.

Sand the model all over and apply several coats of sanding sealer, inside as well as out. Tissue covering is desirable but with four coats of sealer and two of paint is not essential. Use flat grey paint for hull, deck, inside of bulwarks, ramp, etc., red oxide for hull below waterline, and white for superstructure.

An Ever-Ready 1289 $4\frac{1}{2}$v. flat battery will just slip in the hull; position it to trim the model and cement a couple of scraps of wood to the bottom to prevent movement. If the battery is a tight fit, one side of the case can be stripped off. Connections can be made with paper clips; a switch is useful and can be contrived by using one of the cars, the weight of which will hold contacts together. Alternatively, if a strip of wood is glued beneath the car it can be arranged to close contacts when the car is twisted slightly. Other forms of switch will also suggest themselves.

When painting is completed, make and fit the rudders in place and solder washers to the heads or bend loops in the ends of pieces of wire and solder to the rudder heads, forming tillers. A slip cut from an ordinary eraser can then be glued under the tillers for friction adjustment. The propellers are cut from tinplate, cleaned up with a file, and soldered to the shafts. Twist each blade to approximately 15 degrees; more twist can be put in experimentally to find top speed and economic battery life, depending on the motor used.

The all-up weight of the model, with cargo, should be about 10 ozs. which will bring it to within $\frac{1}{8}$ in. of the waterline. Weight without cargo but with battery was almost exactly 7 ozs. on the original.

Full-size working plans overleaf ▶

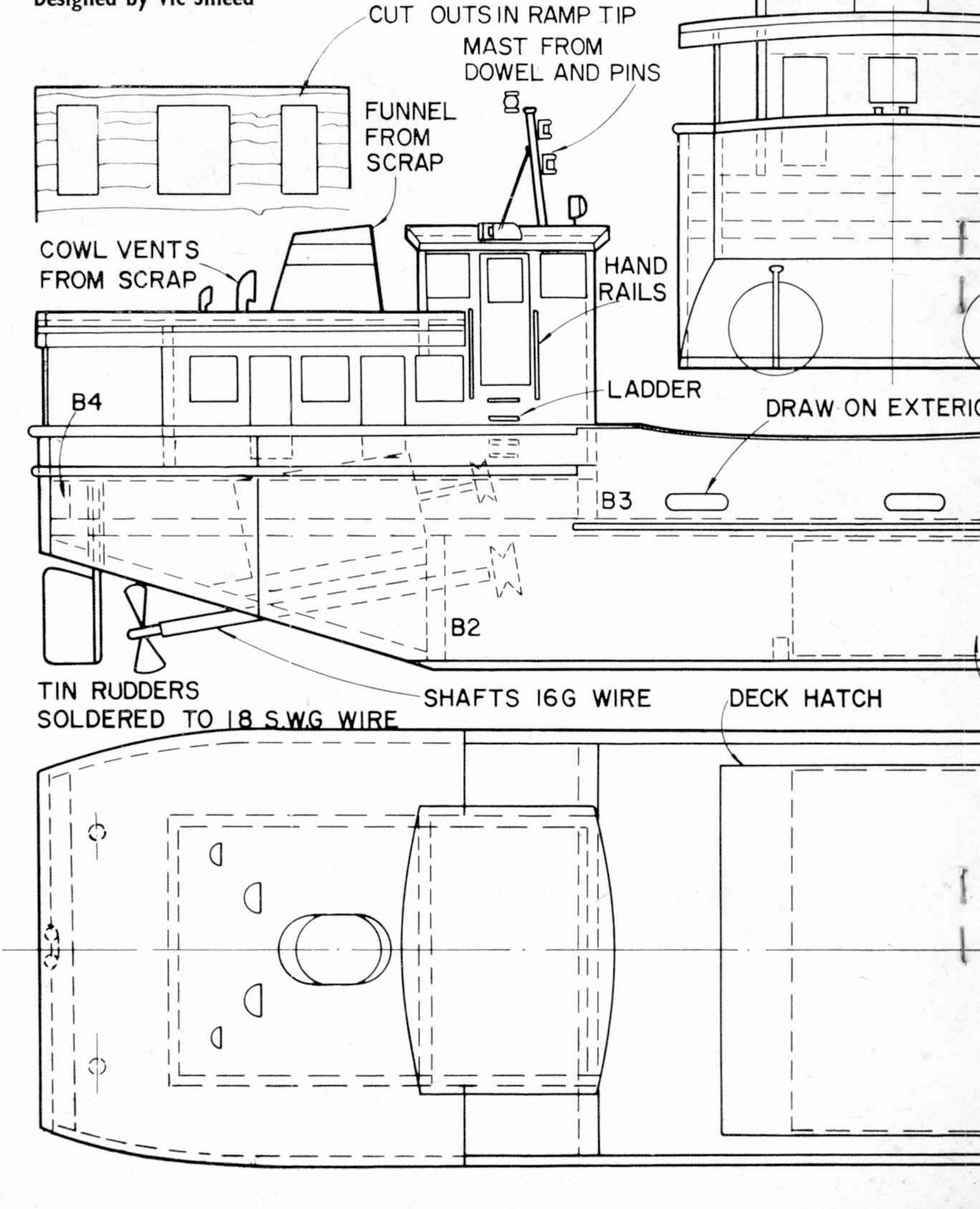
PROOF BY THE PEN *(Continued from page 171)*

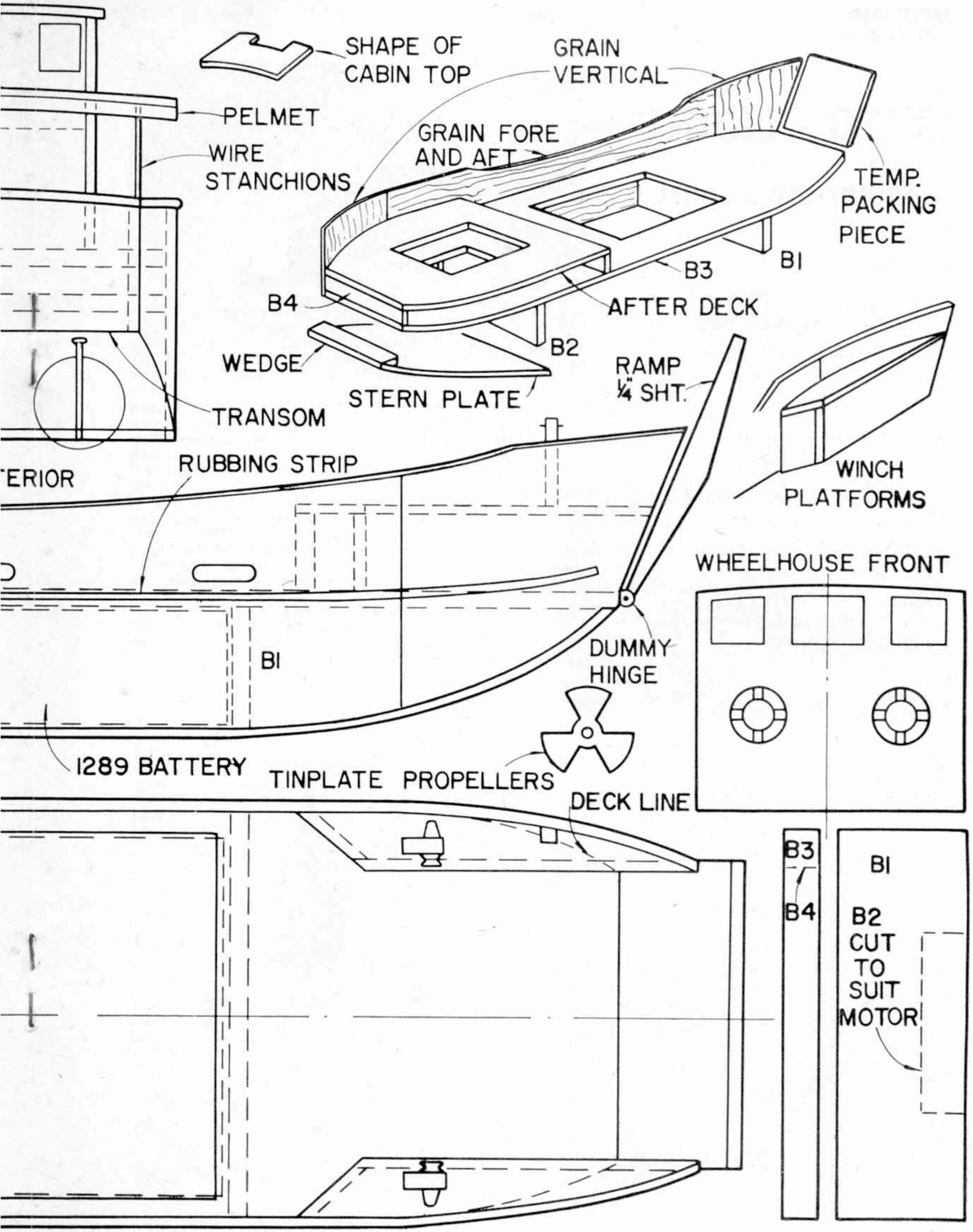
The certainty of the findings is due to the fact that, in this age of mass production, no two machines can ever leave a factory absolutely identical. Furthermore, with the wear and tear that is inevitable in the everyday commercial life of such a machine, minute differences in the impressions left by the type can be distinguished. The actual type letters show signs of wear which are identifiable under magnification and, when a comparison type is obtained, can be enlarged for production at court with the distinctive points indicated as with fingerprint identification.

So far no murder enquiry has been solely solved by typewriter identification but, as the science of the document examiner continues to develop, the day will come when this latest branch of their work provides the vital evidence in a capital case.

Car Transporter

Designed by Vic Smeed




SHAPE OF
CABIN TOP
GRAIN
VERTICAL
PELMET
GRAIN FORE
AND AFT
WIRE
STANCHIONS
TEMP.
PACKING
PIECE
B1
B3
B4
AFTER DECK
B2
WEDGE
STERN PLATE
RAMP
¼" SHT.
TRANSOM
WINCH
PLATFORMS
TERIOR
RUBBING STRIP
WHEELHOUSE FRONT
B1
DUMMY
HINGE
1289 BATTERY
TINPLATE PROPELLERS
DECK LINE
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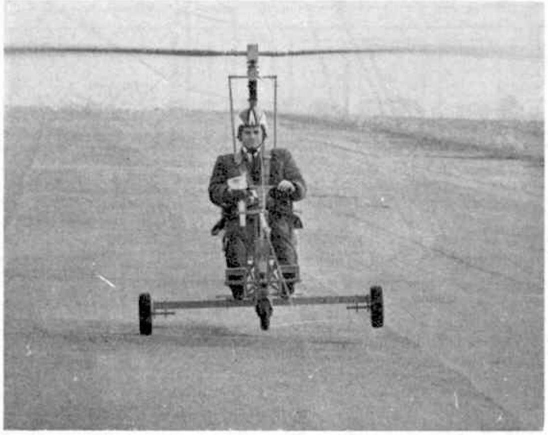
GYRO-GLIDING —tomorrow's sport?

Peter Lovegrove discusses a growing aviation-type sport



WE ARE LIVING IN AN AGE of recreation. Everywhere are signs of the increased earnings and greater leisure-time which most people are now enjoying. Every conceivable pastime seems to have been exploited. The old stand-bys like gardening, stamp-collecting, modelling and so on have given pleasure to more and more folk who would otherwise have found that too much spare time can hang heavy upon one.

Do-it-yourself arts and crafts have amused others, but these tend to develop into simple annual routines —still enjoyable— leaving plenty of time to be filled. So we have seen features like the fantastic increase in boating. Our rivers, lakes and canals are rapidly becoming as jammed as our roads and, as soon as that happens, the fun will be gone and people will start to look elsewhere for recreation.

Some folk prefer exciting sports like different forms of racing; at first it was grass-track motor-cycles, but now we see stock-car and dragster racing. Go-Karts seem to have come and gone, possibly because such sports tend to evolve around financial reward and the consistent winners are those who make a profession of it.

Heading picture gives an idea of the thrill of this sport. Above, whoops—come off the ground level! Right, Geoff Whatley testing a new "whirly-bird" on a short line.

In the upper cost bracket, we have light aircraft flying. It takes about 40 hours and £300, at least, to allow one to acquire a Private Pilot's Licence. This is not the end of the story either, because you must keep flying regularly and, at £9-£13 per hour, that becomes a hobby that only a relative few can afford. But still flying remains the biggest draw of all, even though it is beyond the means of most of those who would greatly enjoy it. For proof of this one only has to take note of the huge attendances at Air Shows or at films which include flying sequences. Our newspapers and magazines feature flying pictures more and more frequently, too.

Fixed-wing gliding is a cheaper way to get airborne, but still requires quite a lot of skill and a licence. Added to this, the clubs tend generally to have too many members and too few aircraft.

Standard single-seat machines shows how basic it is; still hurts to fall from 10 plus feet though!

So is there any 'family flying' one can do? Yes, indeed there is, and that is gyro-gliding. But what, you might ask, is gyro-gliding?

Basically, a Gyro-Glider consists of a very simple, but immensely strong, airframe which has a three-wheel under-carriage, a seat for one (or two) persons, and a mast. To the top of this mast is attached a rotor assembly, usually about 20-22 feet in diameter. All control is achieved by tilting the spindle of this rotor by means of the joystick system which is coupled to it. The whole structure is as rudimentary as it can be made.

The necessary lift is achieved by the passage of air up and back through the rotor 'disc'. To produce this airflow, the 'plane must be towed forward by a car and, because of this requirement, it must at all times remain tethered. Since it is permanently tethered, one does not need a licence in order to fly it, and this is a tremendous advantage. Whole families can learn to fly since, with correct training, it is quite straightforward. For example, an 11-year boy, Rex Whatley, soloed on an early type of gyroglider and my own son Paul flew a later version solo at the age of 13 and made an appearance in a National newspaper as a result.

To purchase a two-seat, fully-dual gyroglider can cost as much as £700, but it is possible to home-construct one for much less than half that amount from plans and raw materials. Dual instruction costs only £3 per hour and most people manage to solo in about 4 to 5 hours.

Any car can be used as a tug provided it is of at least 60 h.p. Since many family cars have that sort of power today, that presents no problem. Where clubs and groups are being formed for gyro flying, it is the usual practice to convert an old pre-war car which can be run on "cooking-fuel".

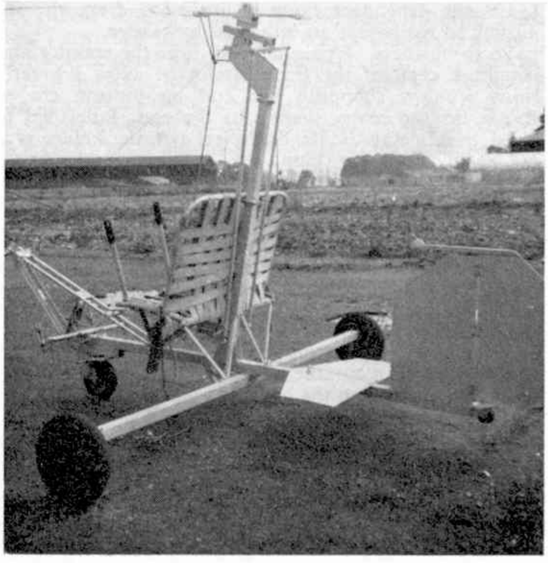
The height to which a gyro-glider may be flown is decided only by the length of tow-line. On 1,000 feet of wire it is possible to reach 600 feet. Naturally, you need a useful length of runway, say on a disused airfield, in order to take full advantage of such a tow-rope length. At the other extreme, one can operate safely and pleasantly with only 50 feet of tow-rope. During training flights it is customary to use a short rope of that order because it allows maximum co-operation between the flying instructor and the towing-car driver.

Gyrogliders are not restricted to land runways; it is possible to mount them on floats and operate by being towed behind a powerful motor-boat. To demonstrate the point one machine in America was actually mounted upon a small rowing boat, and towed behind a power-boat! The strange assembly flew well and landed stably.

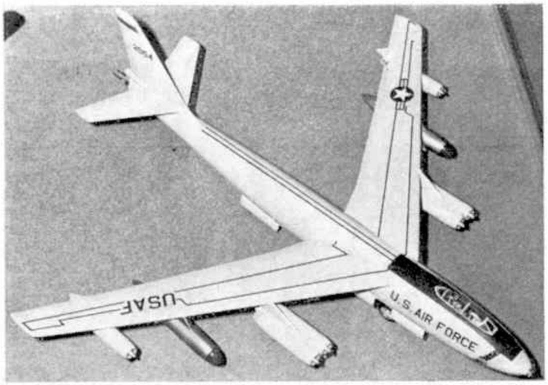
Such is the appeal of gyrogliding that an extremely active club has been formed in the Royal Air Force. At the time of writing, it had 64 members, the number increasing daily. Members are not all airmen; WRAF's and the families of the men are included. It is expected that, with such marvellous airstrips available all over the country on the various military bases, and with some financial aid from the R.A.F. and other organisations, this most interesting and exciting hobby will spread rapidly throughout the Service.

There is one other aspect of gyrogliding; it is not necessary to be in the position of R.A.F. personnel and have access to hangar storage-space. The rotor is removed from the head unit of the gyroglider by simply unscrewing one bolt, normally locked firmly in place, of course! This gives an airframe which is only about eleven feet long, easily stowed in a garage. The 20 feet rotor, being narrow, is not difficult to store. So one has a little aeroplane which is very simple, very rugged indeed, but rather ugly. Appearance has been sacrificed in order to produce a design which is 100 per cent functional, with no useless weight anywhere upon it. The success of the resultant product has fully justified this philosophy.

In view of the overall simplicity of a gyroglider, from the operational and maintenance aspects, it is not surprising that Air Scouts are becoming very actively interested. It is hoped too that Air Training Corps units may take advantage of this in order to give their members some low-level 'air time'.



Dual-control, too. This two-seater makes it easier for novices to get the hang of it all before going off alone.



Dick Emery's Review

Dick builds the Frog Boeing B47E Stratojet

HELLO, THIS IS MY FIRST ATTEMPT at writing a review column, so you must forgive me if it takes a month or two to get settled into the rhythm of things. For a long time now I have enjoyed building kits, chiefly plastic, and though I am sure many of you experienced modellers would show me up, I gain great satisfaction from recreating miniatures of machinery. I have a passion for anything mechanical and have owned quite a number of aeroplanes and cars. At the moment I run an S3 Bentley, an open Lotus Elan SE and three Honda bikes; a moped, the monkey bike and the massively powerful Honda 750 c.c. Four. Incidentally, Tamiya have, as you know, released a fine 1/6th scale version of this bike.

At the moment, my life is rather hectic with BBC Television rehearsals and filming my new series of ' Dick Emery Shows ', so this month I have tried not to be too ambitious in my choice of kit. The general idea is that each month I should select one of the more impressive kits from a manufacturer. This month it's from Frog, then there is the Tamiya Honda or one of the impressive classics of sail from Revell.

I will try and choose each kit from the normal catalogues on shop counters, rather than directly upon the advice of eager manufacturers. Whenever I can, I will try and be honest about the kit—fortunately I am not dependent upon a livelihood from the industry, so really, am an impartial bystander.

So to business. I paid my 7½p over the counter and bought a copy of the Frog catalogue. Now I greatly enjoy window shopping and end up putting crosses beside far too many items. In the end, I decided to build the Boeing B47E Stratojet, but the choice was not easy. For one thing, the booklet actually made no description of any of the models nor illustrated them. Indeed, the only gem I gathered was from the price sheet, which—in brackets—referred to BOAC Vickers Super VC10 (with flashing lights).

The art work—paintings of the real thing—was very good, but I like to know what the dimensions of the model are going to be and what particular good points the kit has to offer. Even on the box, most of the space is given over to boasting knowledge of six languages, though in its favour there is a very well laid out aircraft colour guide on the bottom.

The kit itself was moulded in grey plastic of the slightly brittle nature, but the actual detail was very good. The instructions are by numbers and symbols only, presumably to allow marketing overseas without problems. Stage one recommended the building of the pilots/cockpit detail and the joining together of the two fuselage halves. The cockpit is a pleasingly complex floor-side console moulding with good deep slots to accept the two in-line seats. In addition, the joy stick fits snugly into the floor between the two pilots, once they are in place. This I then painted in matt colours and set aside. Incidentally, I always use Humbrol paints and tools from the Keil Kraft X-Acto range, though this kit seems relatively free from unwanted bits of moulding. Instead of immediately gluing together the fuselage, I then went on to clean up and assemble the four sets of undercarriage wheels. The main groups are clustered at two points down the fuselage and the detail within the wheel hubs is very fine indeed. Assembling stage four is undoubtedly the most boring, for it is the building of 24 bombs from a total of 72 bits (two halves each plus a tail). These are then glued to two vertical racks which are to be slotted into the bomb hold. The next three stages are the putting together of the wing fuel tanks and engine units. I found on my kit that the exhaust sections to the jets were not too good a fit and needed a certain amount of reworking.

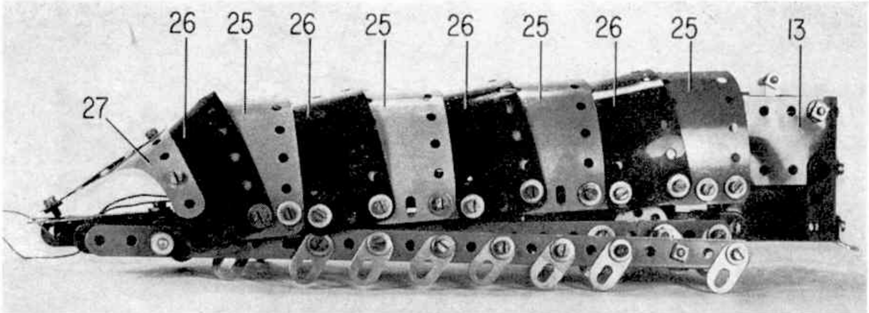
At this point, I checked the cockpit paint job, added tiny highlight detail to the pilots' gear and glued together the two halves of the fuselage, watching that the cockpit rested correctly inside from the forward cutaway section destined to be filled with the undercarriage. I sellotaped the body and tail section in a number of places to ensure a snug fit and went about painting the detail upon the wheels, undercarriage and tanks and engines, which we had been preparing. I am not one of the real modellers who researches and knows every detail and variation between the full-sized versions of the model. I know there must be many enthusiasts however—like myself—who would welcome some guidance on the colour scheme details like the bombs, their racks and hold. Having spent a good deal of time building and cleaning up the little things, I'd very much like to make a feature of them. Again, with the frontal view of the craft, notably for facts about the intakes for the six engines.

Whilst all the bits are drying, I turned back to the now firmly glued body, removed the tape and cleaned down the main joint. It was initially quite proud and I pared down the worst of the ridge with one of the X-Acto knives before sanding it flush. The wing sections, both front and rear, were excellent fits and the main wings boasted very long slot/tabs which made a splendidly firm join. Next came various bits and pieces of detail, the cockpit canopy and the rear guns which, though rather simple, allowed a little up/down movement.

Section 10 is the fitting of front and rear undercarriage recesses and the bomb hold between. At this point I wasn't paying enough attention and became concerned, as neither front nor rear section would drop into place through their appropriate holes in the underside of the body. However, another look at the instruction sheet disclosed that both the front and rear section are to be fed in via the large bomb area and that the latter slips into place last. Incidentally, I glued the front and rear sections prior to slipping them into

(please turn to page 196)

Completely out of the ordinary run of Meccano models is this amazing "Centipede," designed by Mr. Andreas Konkoly of Budapest, Hungary.



Watch out for the . .
. . HUNGARIAN CENTIPEDE says 'Spanner'

MECCANO MODEL-BUILDERS OF DISTINCTION can be found in nearly every country of the world. Some we know about, others we don't. Most work away in quiet anonymity, but a dedicated minority are loud in their praise of Meccano and do all in their power to make the system as widely-known as possible; not for any personal gain, but purely to interest other people in a hobby which offers them endless enjoyment. A gentleman who leads in this latter category is undoubtedly Mr. Andreas Konkoly of Budapest, Hungary.

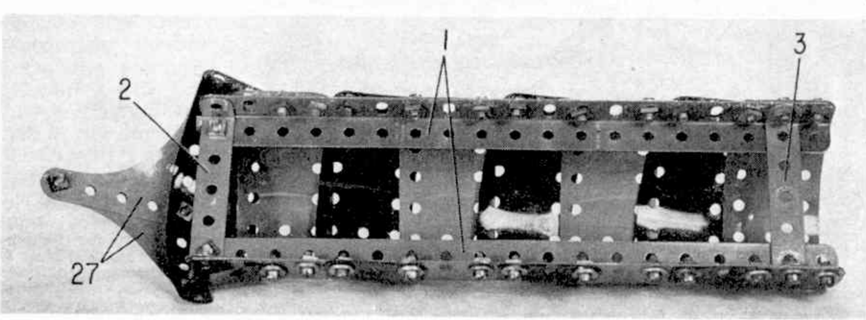
As long-standing readers of Meccano Magazine will know, Mr. Konkoly has been a keen and highly capable modeller for many years. He has done much to promote Meccano, on a purely personal basis, in Hungary, and has even appeared several times on Hungarian television with models he has built. Among international Meccano circles, he is perhaps best-known for several outstanding Meccanograph designing machines, at least two of which we have featuured in these pages in the past. He is, in my opinion, one of the world's leading authorities on this type of model, although I must hastily stress that his model-building capabilities are not limited only to Meccanographs. On the contrary, he has produced a wide variety of different types of models, all clearly designed without being over-complicated, and covering the most unusual subjects. And if you don't believe me, just look at the model featured here—a Meccano Centipede! How's that for an unusual subject?

Like all Mr. Konkoly's models the Centipede is fully mobile, trudging along with a fascinating action on its multiple feet. Power can be supplied either by a Magic Clockwork Motor, or by a 3-12 volt Motor with 6-ratio Gearbox and, in fact, the model illustrated is fitted with both units to show their relative positions. In a "production" model, of course, only the one chosen Motor would be used.

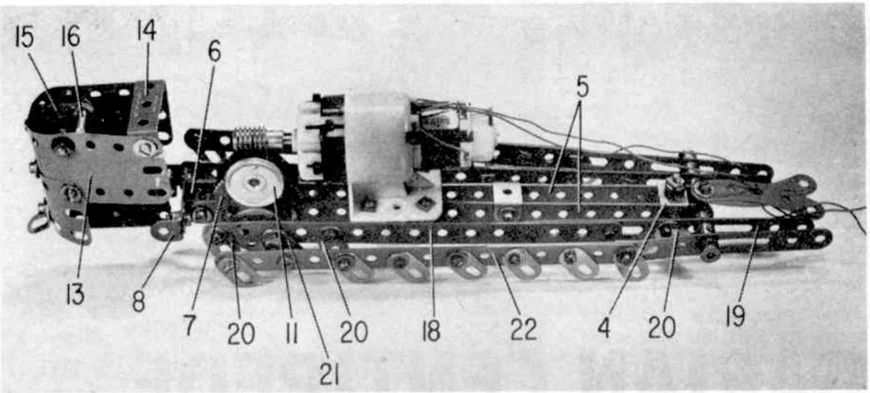
Despite the intricate movements of the model, construction is not difficult. A strong framework is built up from two 9½ in. Angle Girders 1, joined together at one end by a 2½ × ½ in. Double Angle Strip 2 and, through the second holes from the other end, by a similar Double Angle Strip 3. Attached to the centre of Double Angle Strip 2, but spaced from it by a Collar on the shank of the securing ½ in. Bolt, is a Double Bracket 4, to the lugs of which two 9½ in. Strips 5 are bolted, the fixing Bolts passing through the second holes of the Strips. Secured to the other end of each of these Strips is a 1 × ½ in. Angle Bracket 6, the rearmost securing Bolt helping to fix a Flat Trunnion 7 to the Strip, apex pointing upwards. The free lugs of Angle Brackets 6 are connected by a 1 × ½ in. Double Angle Strip 8.

Strips 5 are further connected by another Double Bracket secured through the eighth holes from the rear ends of the Strips, then journalled in the third holes from their front ends is a 1½ in. Rod, on the centre of which a 60-teeth Gear Wheel 9 is mounted. This Gear meshes with a 7/16 in. Pinion 10 on a 1 in. Rod journalled in the apex holes of Flat Trunnions 7 and held in place by a 1 in. Pulley 11.

At this stage, the required Motor can be fitted. If the combined Motor and Gearbox is to be used, this is simply attached by Angle Brackets to Strips 5, with a Worm on the output shaft engaging with Pinion 10. If, on the other hand, the Magic Motor is to be used, this is attached by one corner, as shown, to Double Angle Strip 8, being spaced from it by a Washer and Collar 12 on one securing ½ in. Bolt, and by three



An underside view of the Centipede's body showing the main strengthening Angle Girders.



With the body removed, the comparatively simple construction of the model becomes evident. Note that the two Motors have been included to show their relative positions, but only one of them is required for operation.

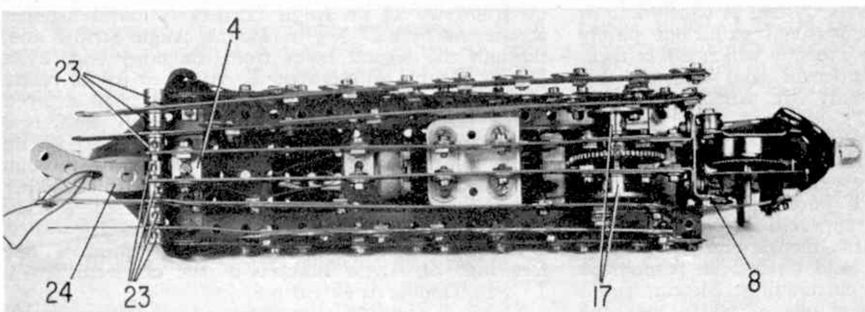
Washers on the other securing $\frac{1}{2}$ in. Bolt. The output Pulley is connected by a Driving Band to Pulley 11. The Motor brake projects upwards.

The Centipede's head is supplied by a $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 13. Plate 13 is curved round and attached to the upper front corners of the Magic Motor by $\frac{1}{2}$ in. Bolts, but is spaced from the Motor by a Collar on the shank of each Bolt. The upper rear corners of the Plate are connected by a $1\frac{1}{2} \times \frac{1}{2}$ in. Double Bracket 14, the right-hand securing Bolt also fixing the Plate to the Motor, with a Collar again acting as a spacer. The top of the Motor is partially covered by a $1 \times \frac{1}{2}$ in. Angle Bracket 15 bolted to the upper edge of Plate 13, as shown, and a Short Threaded Pin 16 is fixed to the Motor brake lever to make it more easily accessible.

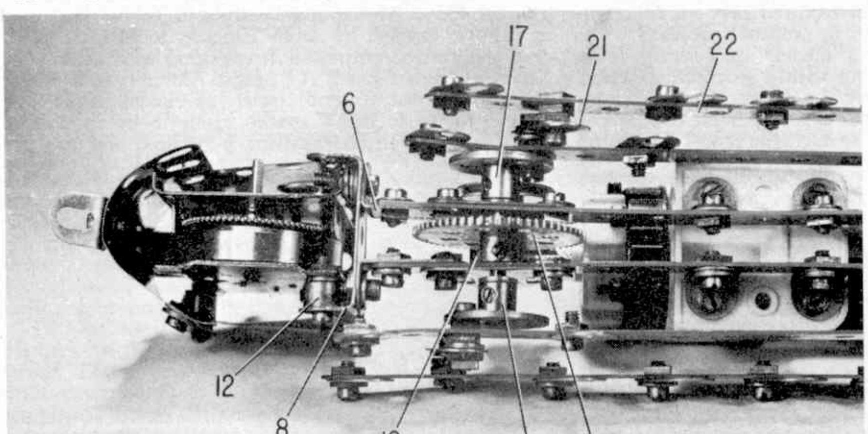
If the Magic Motor is not to be used, a substitute mounting for the head must be provided and I suggest that two $2\frac{1}{2}$ in. Strips bolted to the lugs of Double Angle Strip 8 would be perfectly adequate.

Returning to the Rod carrying Gear Wheels 9, two electrical 1 in. Bush Wheels 17 are mounted one on each end of the Rod. Lock-nutted by $\frac{1}{2}$ in. Bolts and Nuts to the face of each of these Bush Wheels is a $7\frac{1}{2}$ in. Strip 18, extended by a $5\frac{1}{2}$ in. Slotted Strip 19, the two Strips overlapped four holes. Three Fishplates 20 are bolted, in the positions shown, to Strips 18 and 19, then another Fishplate 21 is pivotally-

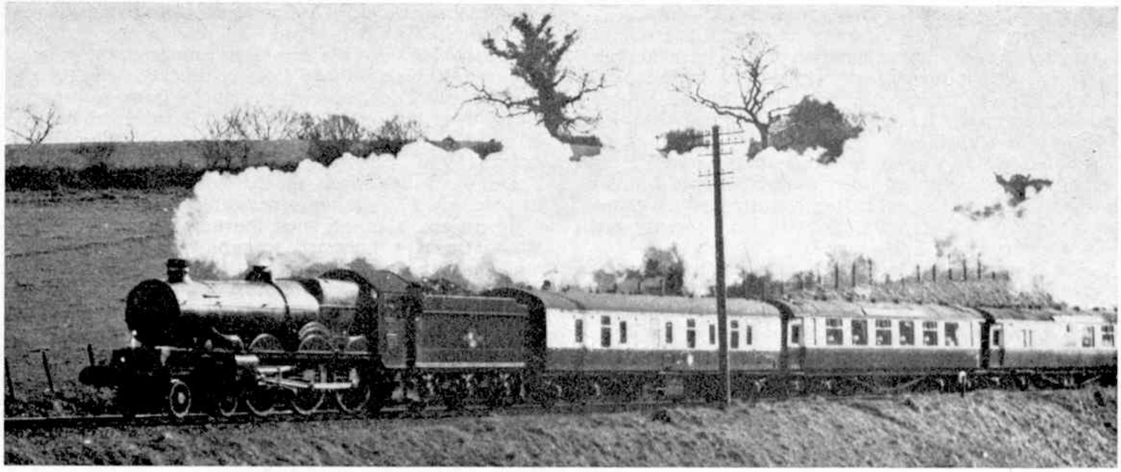
(*please turn to page 190*)



A general underside view of the model showing the layout of the Strips to which the "legs" are attached.



A close-up view of the drive system for the legs. Note that Bush Wheels 17 are the special 1 in. items included in the range of Meccano electrical parts.



THE CHELTENHAM FLYER

A nostalgic reminiscence by George Mann

A SUMMER'S DAY IN JUNE, 1930. The place: Swindon Station, up main, Great Western Railway. Standing at the platform the world's fastest train, headed by 4-6-0 'Cardiff Castle', one of the 'Castle' class locomotives of undying fame.

The train began its journey at Cheltenham but it was the run from Swindon which made it the world's fastest. It was scheduled to cover the 77¼ miles to Paddington, start to stop in 65 minutes. It frequently did the journey in just one hour.

For a chance to travel on the 'Cheltenham Flyer' I would hoard my pocket money for weeks on end, and, alas, occasionally play hookey from school. Retribution was often painful, but this was as naught to the joy of a run on 'The Flyer'.

But on that lovely summer's day, forty years ago, neither I, the crew or gallant 'Cardiff Castle' knew what lay ahead as, steam hissing from her safety valve, she waited for the "right away!"

Conditions for a fast run were ideal. A dry track, clear air and a tail wind. As always I wished the driver and fireman "God Speed", patted the spotless green locomotive and took up my usual position in the corridor right behind the tender.

Leaning from the window I watched impatiently for the green flag of the guard. The piercing shriek of escaping steam precluded any chance of hearing a whistle. The fireman was also looking back and we exchanged a 'thumbs up' sign.

On the platform men and boys stood close to 'Cardiff Castle', for the "flyer" never left without an admiring audience and many envious glances were cast in my direction. And I must tell you that many an enthusiast was found aboard with only a penny platform ticket!

Logging a run was my particular hobby and I had both a stop watch and what I imagined to be an exact replica of the watches carried by driver and guard. But since my timepiece cost only five shillings I was doubtless in error! None the less, it was accurate enough to record whether we were doing well or not.

Came the magic moment to pull away as the green flag fluttered and the station-men turned towards the locomotive, left arms extended in confirmation of the guard's signal. A blast on the whistle and we were under way.

Proudly the shining green locomotive eased her 300 ton, seven coach load away with no trace of wheel spin, for she was controlled by a top flight Great Western crew, a breed of men admired and respected throughout the railway world.

Accelerating away, regulator wide open, 'Cardiff Castle' took up the challenge with all the pride of her noble breed. Forty, 50, 60, 80, 90 miles an hour!

Impossible now to do more than peep from my window, but I could just observe the characteristic sway of the tender as we forged ahead. Even at speed, the safety valve was blowing and I pictured the fireman shovelling furiously to give his driver a full head of steam.

I began to think in terms of a record run, which, believe it or not, stood at an incredible fifty six minutes for the 77¼ miles! The Great Western 'Castles' could sustain high speeds for mile after mile, dependent only on their crews. Magnificent men they were!

And then, approaching Didcot, came the sound I dreaded. The simultaneous shriek of the whistle and the application of brakes. I peered out and saw ahead the yellow fish tailed distant signal. It was against us! By what colossal effrontery was 'Cardiff Castle' being denied the road?

I could have cried in vexation as the brakes continued to slow us down until the crowning indignity of a dead stop became inevitable, for both home and distant signals were 'on'. The run was sabotaged beyond all doubt. Or so I thought. But I had reckoned without the indomitable spirit of two men and a great locomotive.

The halt was brief (although it seemed an eternity), before, once again, the giant pulled away in such a fashion as to make nonsense of accepted standards of steam powered acceleration. She was into her stride as befitted a nonpareil!

A mile or two further revealed the culprit—an express freight rightly shunted onto a slip road, and I wondered how any signalman could have accepted it, knowing that the 'flyer' was due. I hope its crew realised the enormity of their impertinence! As I hoped they might forgive the fist I shook at them!

It was not until we were approaching Reading that I realised we might, at least, maintain schedule and arrive at Paddington on time. As we plunged headlong towards the junction, whistling continuously, I glanced at my watch. Thirty six miles to go. Twenty eight minutes left. Could it be done?

Into Sonning cutting and a chance to check the speed. The quarter mile posts alongside the track are ideal for this and my stop watch clicked. Nine seconds to the next post! One hundred miles an hour! I felt sure that I must have miscalculated and re-checked. Again the magic nine seconds showed. Maintain schedule indeed! We could do it in the hour!

Twyford! Just a blur as we hurried through, never slackening the electrifying dash towards our goal. Maidenhead, Slough, Ealing Broadway, still eating up the miles effortlessly until the first gentle touch on the brakes heralded the end of an unforgettable journey.

Past Old Oak sidings, slowing quickly now, through Westbourne Park, admiring glances from railwaymen along the track as 'Cardiff Castle' threaded her way into the terminus where she came to rest at platform seven.

Despite a dead stop she had covered the 77¼ miles in precisely 57 minutes. Incredible, but true.

There are, alas, no such journeys nowadays. Semi-automatic ugly monsters, seemingly without character, haul our expresses and warrant hardly a second glance. I try to work up some enthusiasm for them but they remain colourless monsters.

For those, like me, who live in peaceful Devon, all is not entirely lost. On any summer day I can proceed to Buckfastleigh, headquarters of the Dart Valley Light Railway, and board a train for Staverton and Totnes. And savour again the sight, the sound and the smell of *steam*. Long may it be so!

CENTIPEDE *(continued from page 188)*

mounted on the protruding shank of the Bolt lock-nutted in the face of the Bush Wheel. Lock-nutted, in turn, to the end of this Fishplate is another 7½ in. Strip/5½ in. Slotted Strip arrangement 22, another seven Fishplates being bolted to this to serve as the Centipede's legs.

Now mounted in the end holes in Strips 5 and in the rear slots of the Slotted Strips is a 2½ in. Rod, each Strip being spaced from its neighbour by a Collar 23, a Washer also being provided at each side of the Slotted Strips. A ⅜ in. Bolt, carrying two 2½ in. Curved Strips 24 to serve as the tail, is screwed into one transverse bore of the centre Collar.

This brings us to the body and, here again, no great difficulty is involved. Four 5½ × 1½ in. Flexible Plates 25 and five 5½ × 1½ in. Plastic Plates 26 are simply curved over and bolted to the vertical flanges of Angle Girders 1, the Plastic Plates being angled slightly by means of their elongated holes to give the "ridged" appearance of the typical centipede. Bolted to the rearmost Plastic Plate are two Flexible Gusset Plates 27, overlapped as shown, to cover the tail and round off the body nicely.

Having seen Mr. Konkoly's Hungarian Centipede in motion, I can confirm its operational success. Indeed, everyone in the office, watching it whirring and clanking along, found it nothing short of hilarious and the fact that its gait can be altered by changing the positions of Bush Wheels 17 in circular relation to each other, makes it all the more interesting. It qualifies as one of the best totally ususual models we have seen for a long time.

PARTS REQUIRED

2—1a	1—22	4—55	5—189
4—1b	1—26	8—59	4—194d
2—8a	1—27a	2—90	2—201
22—10	90—37a	4—111a	2—518
2—11	70—37b	2—111c	1 Magic Motor
3—12b	62—38	1—115	or 1, 3-12v. d.c.
1—12c	1—48	2—126a	Motor with
1—18b	2—48a	1—188	Gearbox

ADDITIONAL PARTS, IF MAGIC MOTOR USED

2—37a	4—38	4—59	5—111a
			1—186a

ADDITIONAL PARTS, IF MOTOR WITH GEARBOX USED

4—12	1—32	8—37a	8—37b
			4—38

MODELS AT THE M.E. EXHIBITION

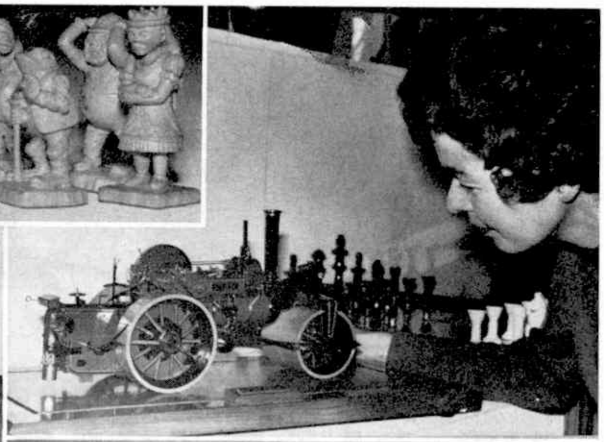
The Model Engineer Exhibition is staged by Model & Allied Publications, publishers of ten model/hobby magazines, which of course include Meccano Magazine.

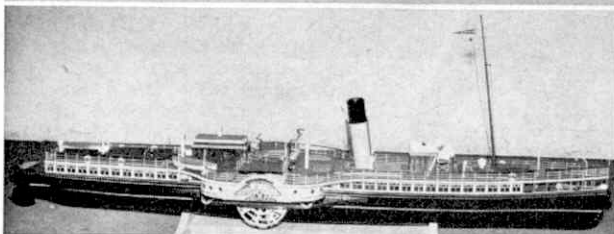
This year's show was the 40th, and there were some wonderful models there, of which the pictures opposite give only a glimpse. The top one shows part of a hand-carved chess set, based on Tenniel's drawings for "Alice Through the Looking Glass," and you will be able to pick out such characters as the Walrus and the Carpenter, Tweedle-dum and Tweedle-dee, and all the others. They won a silver medal for Mr. S. F. Snedker.

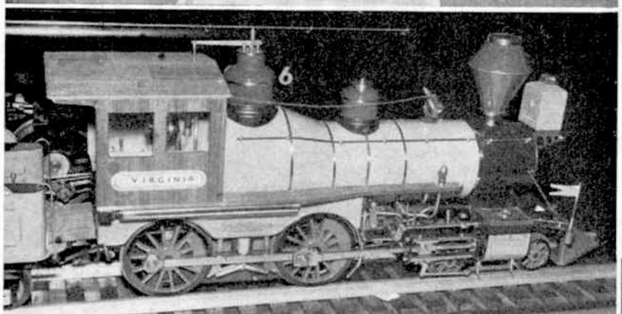
The Aveling & Porter steamroller won the premier award, the Duke of Edinburgh Trophy, for its builder, Miss Cherry Hinds, seen in the picture. It is a working model of incredible accuracy and workmanship; many men model engineers said they'd better take up knitting! Opposite it is the champion working ship model, the paddle-steamer "Duchess of Fife", built by D. A. Ford.

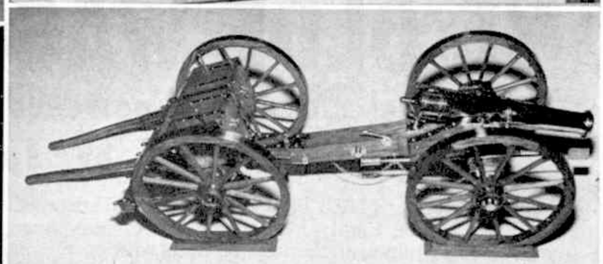
"Virginia" is an American-type 4-4-0 locomotive in 3½ in. gauge, built by D. C. Piddington and K. A. Hughes, and again a working model of course. The artillery piece and limber was by K. Rains, and the ploughing engine by C. Tyler and J. Haining, one of those which gave demonstrations of steam ploughing during the exhibition. A shipwreck is seen next, the barque "Herzogen Cecilie" aground off Devon; the model is only about 6 in. long and won the miniature ship championship for D. Hunnisett.

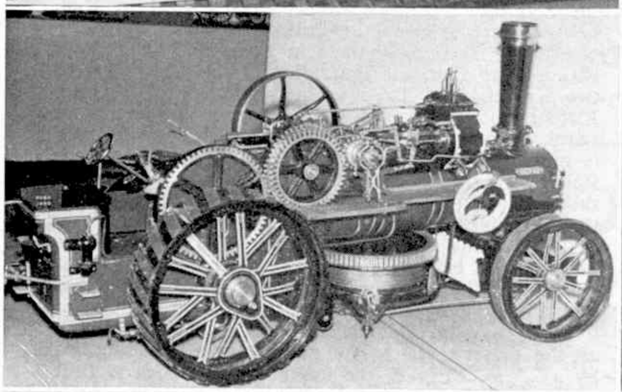
At the bottom we have an unusual monorail steam locomotive, 16 mm. scale, by D. A. Boreham, and a very detailed non-flying Spitfire by W. A. Nicholls. These and hundreds more models attracted record crowds to the Exhibition.

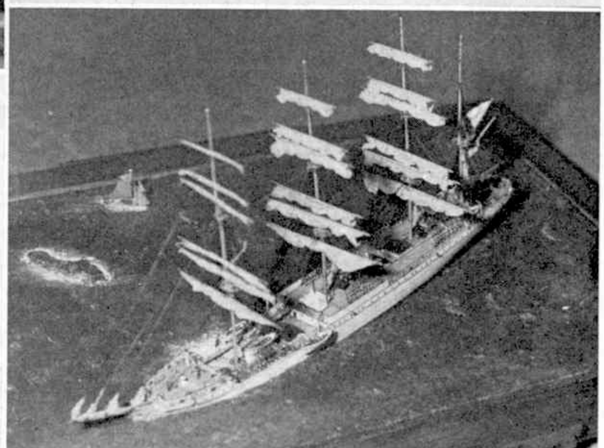


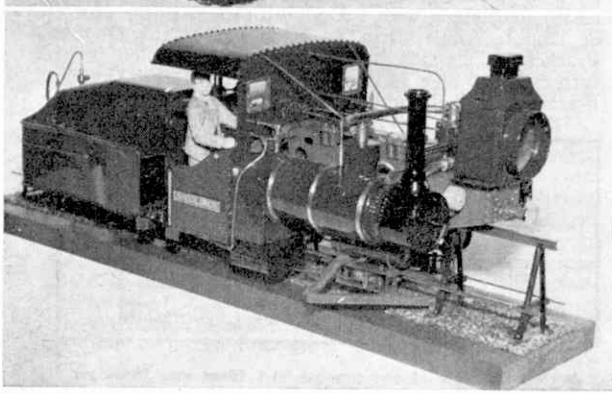



6
VIRGINIA

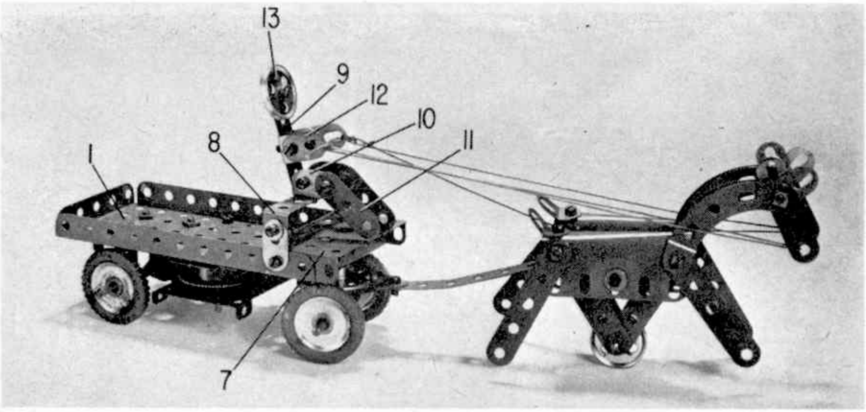









V O K
COMMENDED
VICKERS
SPIT



Ye Olde Waggon and Pair—a simple model for young Meccano modellers built with the contents of a No. 5 Set, plus a few additional parts. It is powered by a Meccano Magic Motor.

YE OLDE WAGGON AND PAIR

A novel clockwork-powered model for younger builders

by 'Spanner'

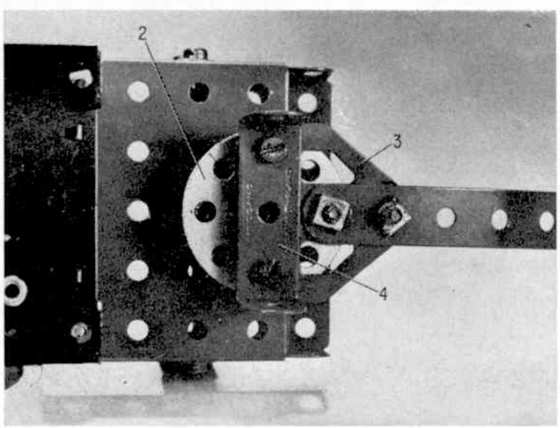
WITH ALL THE TREMENDOUSLY detailed and often highly-complex pieces of miniature engineering equipment that can be built with Meccano, it is often easy to forget that a lot more equally pleasing, yet perfectly simple models can also be produced. In fact, the average young modeller probably gets as much satisfaction from building something small and simple as the advanced man gets from producing an engineering masterpiece!

Featured here specially for the younger builder, therefore, is a simple model which I am sure will be well received—a Waggon and Pair inspired by the more leisurely age of horse-drawn transport. Clockwork-powered by a Meccano Magic Motor, the basic model is built with the contents of a No. 5 Meccano Set, although a few extra parts are required to complete the driver, plus two 1½ in. Strips for the horses' heads.

The waggon, itself, consists of a 5½ × 2½ in. Flanged Plate 1, flanges pointing upwards, to the underside of which an 8-hole Bush Wheel 2 is pivotally attached by a ½ in. Bolt, the Bolt passing through the centre end hole in the Plate and into the boss of the Bush Wheel where it is secured by a Set Screw. Fixed to the face of the Bush Wheel is a Flat Trunnion 3 and a 1½ × ½ in. Double Angle Strip 4, the Double Angle Strip spaced from the Trunnion by three Washers on the shank of each securing ⅜ in. Bolt. Journalled in the lugs of the Double Angle Strip is a 3½ in. Rod, held in place by two 1 in. Pulleys with Motor Tyres.

Another 3½ in. Rod, held in place by 1 in. Pulleys with Motor Tyres, is journalled in the apex holes of two Trunnions 5 fixed to the underside of Flanged Plate 1, but spaced from the Plate by a Washer on the shank of each securing Bolt. A ½ in. Pulley with boss is mounted on the Rod, between the Trunnions, the Pulley being connected by a 2½ in. Driving Band to the output Pulley of a Magic Motor 6, also bolted to the underside of the Flanged Plate.

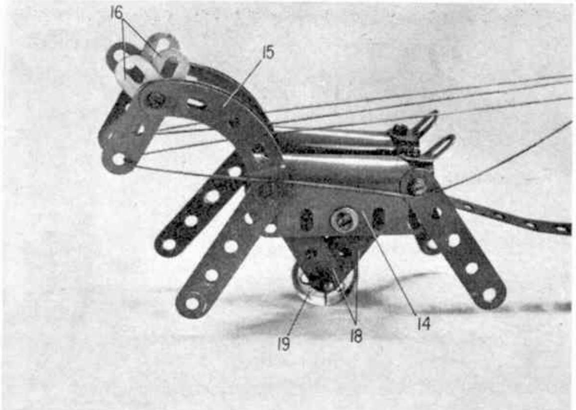
At its front end, Flanged Plate 1 is extended one hole forward by a 2½ × 1½ in. Flanged Plate 7, flanges downward, the securing Bolt at each side holding a Fishplate in position. These Fishplates are connected by a 2½ × ½ in. Double Angle Strip 8 which serves as the driver's seat. The driver himself is supplied by a 2½ in. Strip 9, the lower end of which is bent and bolted, along with a Double Bracket, to the centre of Double Angle Strip 8. Each lug of the Double Bracket is extended by a Fishplate 10, which is in turn extended by a 1½ in. Strip 11, then another Double Bracket is bolted through the third hole from the top



PARTS REQUIRED

1—2	2—16	44—37a	4—90a
9—5	1—18b	42—37b	1—111
4—6a	4—22	10—38	3—111c
10—10	2—22a	1—48	2—126
3—11	1—23a	1—48a	1—126a
4—12	1—24	1—51	4—142c
2—12c	2—35	1—52	1—186
	1 MAGIC MOTOR		2—190

A close-up view of the tow-bar and front axle bearings.

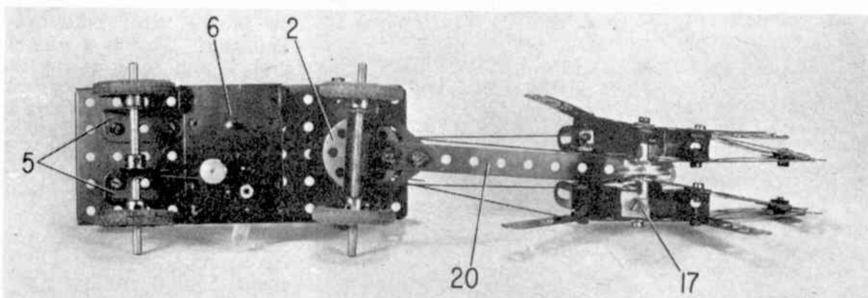


The "matched pair" of horses. Note their simple but effective construction.

of Strip 9, two further Fishplates 12 being secured to its lugs to provide the arms. The head is simply supplied by a 1 in. Pulley without boss 13, bolted to the end of the Strip.

Coming to the two horses, both of these are similarly built up from a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 14, serving as the body, with the legs supplied by $2\frac{1}{2}$ in. Strips, the neck by two $2\frac{1}{2}$ in. Stepped Curved Strips 15 and the head by a $1\frac{1}{2}$ in. Strip, the Bolt fixing this Strip to the Curved Strips also holding two Fishplates 16 in place to serve as the ears. The tail is supplied by an Obtuse Angle Bracket. Note that the two edges of each Plate 14 are connected in the centre by a $\frac{1}{2} \times \frac{1}{2}$ in. compound double bracket 17, built up from two Angle Brackets, the inside fixing Bolt in each case also securing a Double Bracket between the two horses. Note, also, that the inside legs 18 of both horses are brought together, the end holes in the Strips serving as bearings for a 1 in. Rod. carrying a 1 in. Pulley without boss 19 and held in place by Spring Clips. This Pulley acts as a road wheel to enable the horses to move easily on the ground.

When completed, the horses are "harnessed" to the wagon by a $5\frac{1}{2}$ in. Strip 20 bolted between the Double Bracket connecting the horses and Flat Trunnion 3, the Strip being secured to the Double Bracket by a Bolt passed through the second hole in the Strip. The Strip itself is bent slightly to bring Pulley 19 to a level with the wheels of the wagon, then, last of all, four reins are provided by lengths of Cord passed through the end holes in the $1\frac{1}{2}$ in. head Strips and tied to Fishplate 12.



A general underside view of the Waggon and Pair showing the Motor mounting and drive system.

MORE BOOK REVIEWS

(*See also page* 201)

"THE OBSERVER'S BOOK OF AIRCRAFT" by William Green. Published by Frederick Warne & Co. Ltd. Price 35p.

This is another addition to the very popular Observer's Pocket series, and is every bit as good as all the many others that most of us are quite aware of. The Observer's Book of Aircraft is a very neat and compact little book which contains no less than 153 different aircraft descriptions with 279 illustrations. Many of you who enjoy aircraft spotting will find that this book will enhance the hobby greatly as it will enable you to recognise readily any aircraft that you are likely to spot on one of your expeditions. Once having spotted an aircraft with the aid of this manual, you will be able to discover all the relevant details about the particular aircraft such as its country of origin, the type of plane it is, facts about its engines, performance weight, armament and many other notes of interest. It will also be a very useful book for all those modellers who like to add detailing to their models. A very interesting book which is modestly priced. P.M.

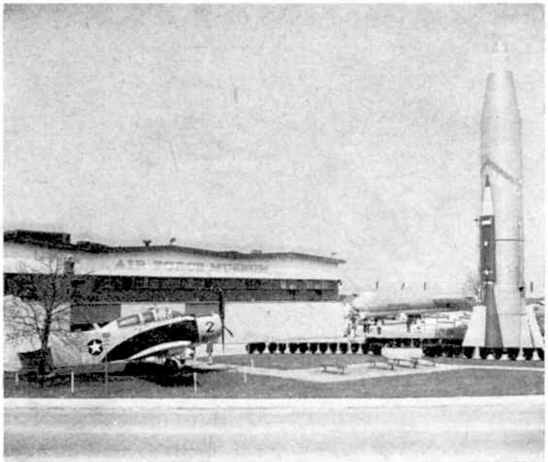
"TRAMS IN COLOUR SINCE 1945" by James Joyce. Published by Blandford Press. Price £1.50.

A recent addition to the shelves of your bookshop, "Trams in Colour" will be of great interest to all Tram enthusiasts, and indeed, to social historians of the last 100 years. It covers a very comprehensive range from Blackpool's illuminated tramcars to the Douglas horse tramway and the Manx Electric Railway in the Isle of Man, in fact, almost any tram that you care to mention over the last century. It contains many pages of beautiful colour photographs (80 in all) and James Joyce's text gives a full historical background and description of each vehicle illustrated. There is also a full list of the museum tramcars for the many enthusiasts who will want to use this book as a guide in the pursuit of their hobby. It is interesting to note that nearly all of the trams described in this volume can no longer be seen in the streets of Britain and unless you are lucky enough to be able to visit museums where you could see some of them in a state of preservation, this book must surely be the next best thing. P.M.

AIR NEWS

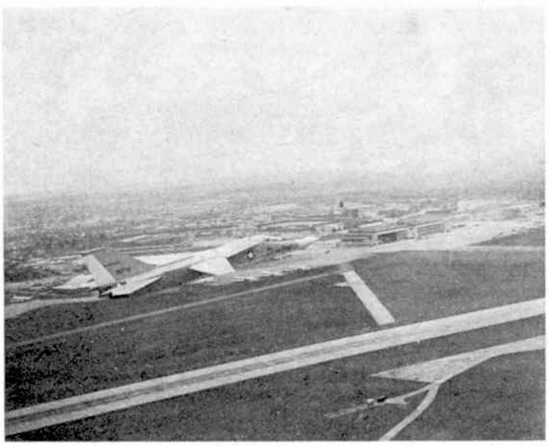
by

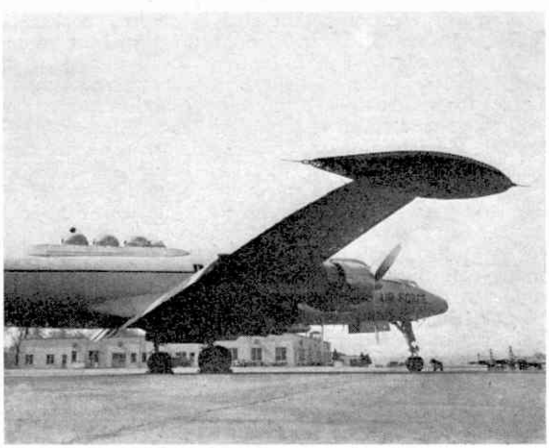
John W. R. Taylor



Outside the U.S.A.F. Museum at Wright-Patterson A.F.B.; on the left a Douglas A-1 Skyraider attack aircraft, on the right an Atlas missile, and at the rear, a B-36 bomber.

Below, an F-111 zooms over the Directorate of Flight Test line. The Directorate has put this aircraft through a complete series of climatic and adverse weather tests.





It's all at Wright-Patterson

Wright-Patterson Air Force Base, Ohio, is the sort of place that aircraft enthusiasts dream about. Home of the United States Air Force Museum, it displays to well over half a million visitors each year scraps of wood and fabric from the biplane on which the Wright brothers made their historic first flights in 1903, samples of the food eaten by astronauts on their way to and from the Moon in 1969-70 and an immense number of the actual aeroplanes that have made history in the intervening years of our century.

Few visitors have an opportunity to see what goes on in the other buildings and hangars at Wright-Patterson. This is a pity, for history is a continuing process and some of the things which are happening now at this air base, or being planned for the future, are as exciting as anything in the Museum.

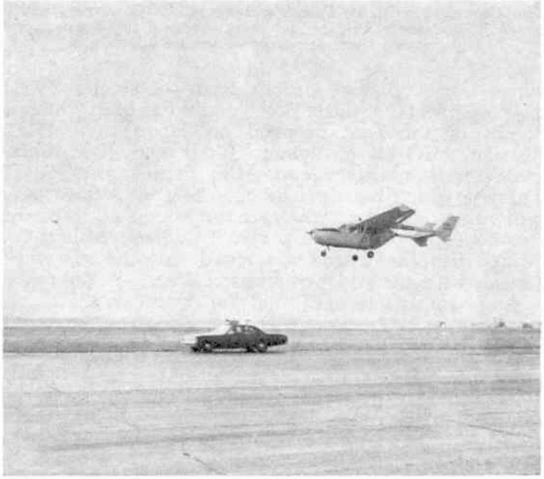
Altogether, Wright-Patterson houses some 50 USAF organisations, representing everything from Strategic Air Command to the Air University. The largest tenant is the Air Force Systems Command, with 190 buildings, five laboratories and nearly 10,000 personnel scattered over a quarter of the base's 10,000 acres. Its Aeronautical Systems Division (ASD) alone spends about $5,000 million (more than £2,000 million) annually on developing and buying aeroplanes and associated equipment. By comparison, the first-ever US military aviation contract, awarded to the Wright brothers, who lived and worked in nearby Dayton, totalled just $25,000 for " one heavier-than-air flying machine ".

A full-size replica of that 1909 Wright Military Flyer can be seen in the Museum. It was simply a device for getting airborne, with no guns, bombs or equipment of any kind, except for the eyes of the pilot and passenger who, it was hoped, could observe from the air the positions and movements of enemy troops on the ground beneath them.

How valuable and accurate would such visual reports be in modern warfare, even if the aircraft could avoid being shot down? That is one of the questions that ASD's Directorate of Flight Test is trying to answer at the moment. Among its collection of unusual aircraft is a C-121 (Constellation) with a man-carrying gondola slung under its centre-fuselage. Sharp-eyed observers are able to sit in one of the two seats in this gondola in flight and try to pick out specially-selected targets on the ground. Their " score " is then compared with the results achieved by infra-red and radar target locators operated by a scientist in the other seat. No research project is more important at this time, for even the best current attack aircraft cannot be

Left, lumps, humps, and blisters break the once-smooth lines of this C-121 Constellation. They contain electronic and camera gear for radar and optical experiments.

Right, Base police help out Flight Test engineers by providing a precision speed check, needed to help in calibration of the 0-2's pitot static tube which measures airspeed.



certain of sorting out friend from foe when two opposing armies are in direct contact with each other at night or in bad weather, and this severely hampers the use of air power to support ground forces.

Another of ASD's C-121's appears even more misshapen, with a row of domed canisters projecting from a hump on its back, and other lumps, humps and blisters breaking the symmetry of the sides of its once-streamlined fuselage. Each protuberance houses electronic or camera gear, about which the USAF prefers to keep a stony silence. Officially, the purpose of the aircraft is "to scan the skies from a single observation point and obtain visual and precise optical tracking, recording and timing data associated with the re-entry of high-speed bodies into the Earth's atmosphere". With such an aircraft, and elaborately-equipped C-135's, available, it can be no coincidence that America has been able to obtain remarkable photographs of Russian multiple missile warheads dropping towards the Pacific Ocean during ICBM tests.

Other specially modified aircraft in ASD's fleet include an F-101 Voodoo with a steel-plated rear seat used for ejection tests, an F-4E Phantom with undernose multi-barrel cannon and new electronics, a B-47 Stratojet with high-powered lighting system, a KC-135 Stratotanker which releases spray in front of other aircraft to see how they react to icing in flight, an F-100 Super Sabre "Rough Rider" which flies deliberately into bad weather to help other pilots survive heavy turbulence, and a "Weightless Wonder" KC-135 that is flown in such a way that people in its cabin are able to experience "zero gravity", freed from the gravitation pull of the Earth, for periods of up to half a minute at a time.

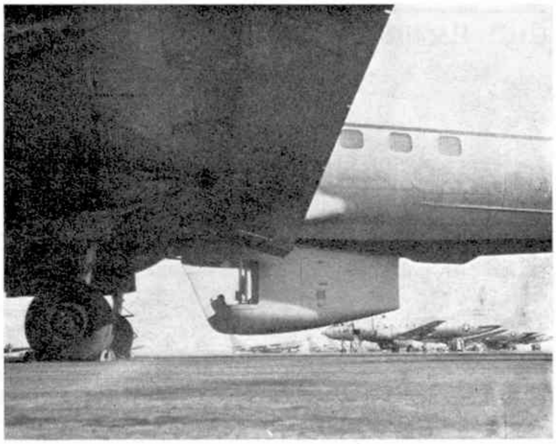
All of America's astronauts have flown in the "Weightless Wonder", performing experiments that taught them the best ways of eating and walking in space and how to use space propulsion devices.

It was an engineer of Air Force Systems Command who first suggested fitting batteries of multi-barrel guns in old Dakota transport to turn it into "Puff the Magic Dragon"—the first of the AC-47 gunships that served so well in Vietnam. The Avionics Laboratory evolved TAPIT, the Tactical Photographic Image Transmission subsystem which, carried under the wing of a fighter-plane, takes panoramic pictures from a low altitude and transmits them within seconds to a ground station for use by army units in the field. New structural materials, advanced types of aircraft power plant, a dynamic escape simulator which can subject a man to high gravity forces, buffeting, vibration, noise, heat, cold and rarefied atmosphere simultaneously, a tower eight stories high which tests the clarity of camera lenses . . . these, and many other things, are being used, tested, improved at Wright-Patterson.

One day, the achievements they make possible will have their place in the Museum. They will join an original Wright biplane of 1911, models of the flying machines devised by Leonardo da Vinci five centuries ago, genuine examples of a Curtiss "Jenny" trainer and D.H.4 bomber of the first World War, one of the Douglas World Cruisers that completed the first round-the-world flight in 1924, *Lucky Lady III*, the B-52 jet-bomber that made the same journey non-stop in 1957, a between-wars Curtiss P-6E Hawk fighter, a

Airborne in more ways than one in the "Weightless Wonder", a KC-135 aircraft which flies parabolic patterns and helps train astronauts and develop tools for space use.

Below, a gondola-equipped C-121. A visual observer and a radar and infra-red scientist sit in the gondola and compare their performance in spotting selected targets.



The Corvette, built by France's Aerospatiale Company, which began flight tests in July of last year. Takes 6 to 13 passengers and conveys them at speeds of around 500 m.p.h.

whole range of great aircraft from the second World War, casings for " Little Boy " and " Fat Man " atomic bombs of the kind dropped on Japan in 1945, a Russian MiG-15 jet-fighter, X-1B and X-3 supersonic research aircraft, an Atlas missile, the XB-70 Valkyrie which remains the only bomber ever to have cruised at three times the speed of sound . . .even the trombone that was once played by Glenn Miller, the famous bandleader who was lost during the war while serving with the Army Air Forces Band.

As I said, it's all at Wright-Patterson.

Butterfly Brigade moves East

All kinds of special flights are offered by airlines nowadays. Flying round the world is commonplace. Those who really seek adventure can go on aerial safaris in Africa; the aviation enthusiast can visit the Paris Air Show, with a trip to the famous Musée de l'Air thrown in for good measure; and there have even been expeditions for gourmets seeking new and exciting food.

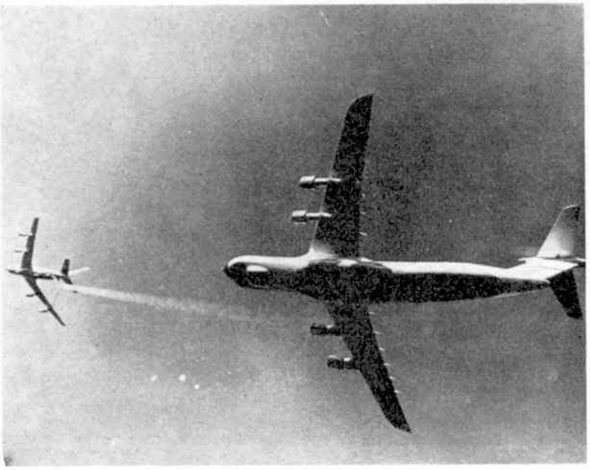
Now Lufthansa are offering " The Lepidopterist ", a tour which will take Britain's keenest butterfly chasers to Northern India, the Khatmandu Valley in Nepal, and the Malaysian Highlands between May 28 and June 16 this year. The first-ever tour of its kind, it is guaranteed to add colourful and interesting specimens to the collection of anyone who joins the party, under the leadership of the world-famous butterfly collector, Michael Dickens.

New engines for " Baby Caravelle "

When Aérospatiale of France first flew the prototype of their little Corvette 6/13-passenger business jet, on July 16 last year, it had Canadian-built Pratt & Whitney JT15D-1 turbofans, each giving 2,200 lb. of thrust. Early flight tests with these engines have gone well, and the next stage of development, with the JT15D-1s replaced by 2,314 lb. Turboméca Larzacs, is expected to begin later this spring.

Aérospatiale was formed by merging the former Sud-Aviation and Nord-Aviation companies and the missile manufacturer SEREB. It has, therefore, more experience of building rear-engined jet transports than any other manufacturer in the world, as Sud-Aviation designed the Caravelle airliner, which pioneered this layout.

The Corvette is considerably smaller than other biz-jets such as the Dassault Falcon, with a span of 42 ft., length of 41 ft. 11½ in. and weight of only 13,007 lb. with Larzac engines. With much the same passenger load as a Falcon and little more than half the power, it is not quite so fast. However, with a designed cruising speed of up to 506 m.p.h. it can match the performance of many jet airliners.



A KC-135 aerial tanker spraying water on a C-5 during icing tests. The C-5 will later be evaluated in frozen Alaska, hot and humid Panama, and hot and dry Arizona, to check its resistance to various climates.

DICK EMERY'S REVIEW (*from page* 186)

place which worked but got a bit messy. No doubt some of you have applied the glue after getting the section nearly into position. Next came further guesswork on the colour of these recesses and finally the gluing into place of the prepainted undercarriages. Incidentally, there is no necessity to have the undercarriages down nor the bomb doors open, but if the model boasts them, I like to show them.

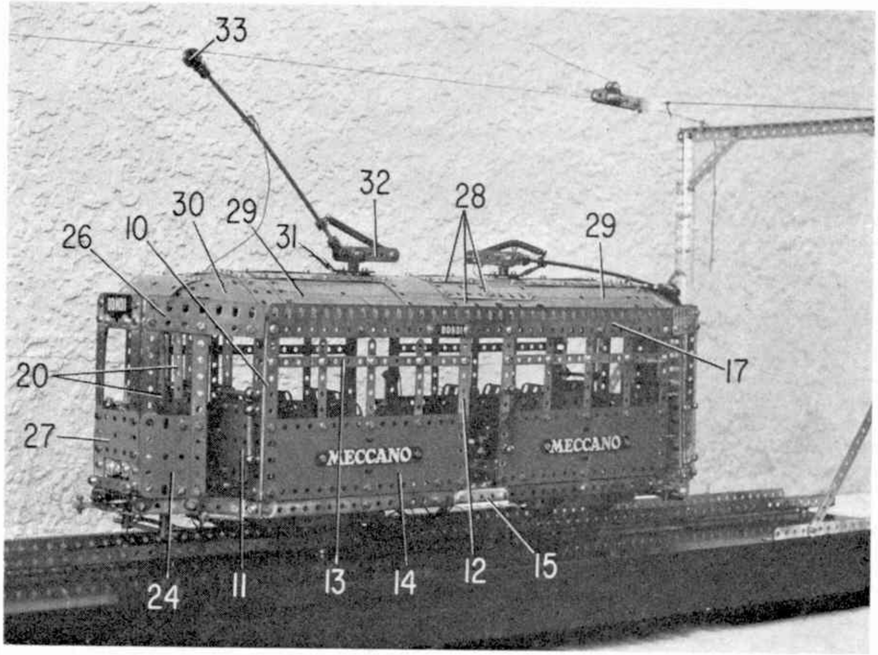
Now comes the attaching of all the open doors underneath and the fixing of the various prebuilt tanks and engines. Assembling section 14 is the fixing of one tiny 'something' called No. 56 (an aerial—I think) and the last piece is the fitting of either a ladder to the cockpit or, as I selected, a closed hatchway.

The final overall painting I greatly enjoyed with plenty of moulded detail to work upon. Frog provide transfers for two different Strategic Air Command Craft and the completed model certainly looks impressive. To anyone collecting military aircraft this craft and kit are an important item. It's well produced, reasonably priced for its size (wingspan 19 in.) at £1.97½, but over dressed at the expense of useful information in its presentation.

Next month I'll be looking at the new Tamiya Honda bike and it will be interesting to compare this to my own full-sized version.

BONDI TRAM

A scale model built and described by Australian reader Colin Campbell

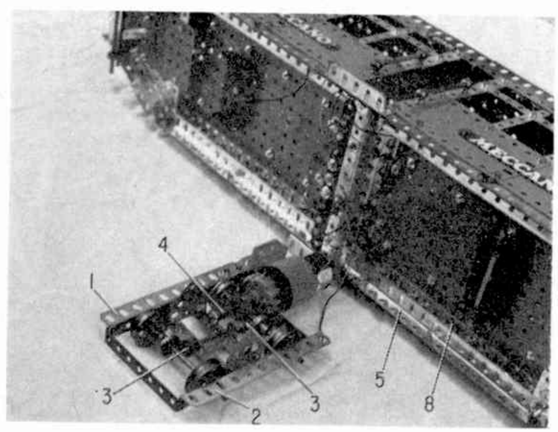


"HE SHOT THROUGH LIKE A BONDI TRAM." This was a common expression used in Sydney during the tram era which finally came to an end 10 years ago on 25th February, 1961. The Sydney Tram system was begun in 1879 as a substitute for the City railway and the Eastern Suburbs Railway, of which the latter is still under construction. Originally steam-driven, electrification was introduced to the system in 1890, full electrification being completed in 1909.

Featured here is a Meccano-built model based on the first type of tram to be constructed specially for the Sydney system, the R1 class, of which 155 cars were built, 55 in 1935 and the remainder between 1950 and 1953. The model was designed and built many years later, of course, actually being produced for display at the 1970 Sydney Toy Fair. As a display model, it is automatic in operation, powered by two 3-12 volt Motors with Gearbox and one of the now-withdrawn Emebo Motors. The Emebo Motor, however, can be replaced by any suitable contemporary motor.

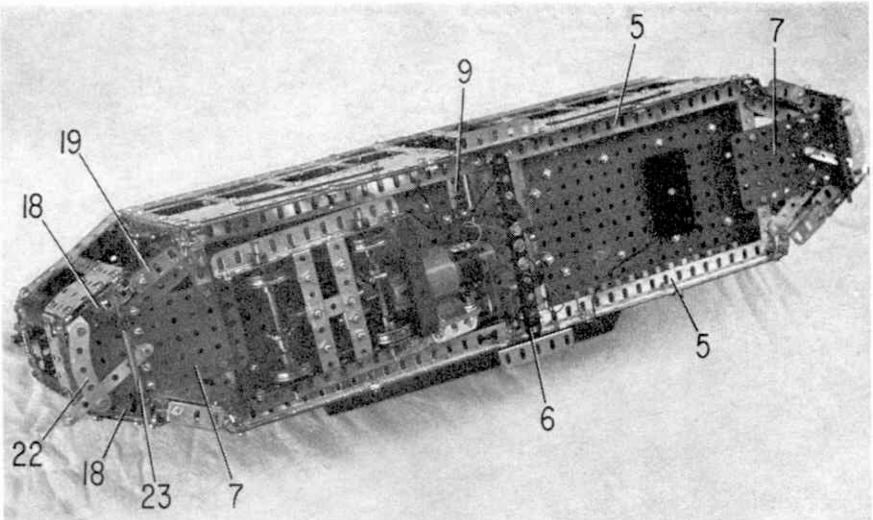
Bogies

Beginning construction with the bogies, both of which are identical, the frame is produced from two 5½ in. Angle Girders 1 and 2, connected by four 3½ in. Double Angle Strips. Girder 1 is extended by a 1½ in. Angle Girder and two 2½ in. Strips to hold a Motor with Gearbox, then the wheels, supplied by 1⅛ in. Flanged Wheels, are set to the required gauge and mounted on two 4½ in. Rods, held by Collars in the frame. Also mounted on each Rod is a ¾ in. Contrate Wheel which meshes with a ½ in. Pinion 3 on one or the other end of a 2½ in. Rod journalled in a 1½ × ½ in. Double Angle Strip bolted between the two inner 3½ in. Double Angle Strips. In mesh with one Pinion 3 is a ¾ in. Pinion fixed on the nearby motor output shaft, but note that the shaft is fitted only partway into the bore of the Pinion. Inserted in the remainder of the bore is an Adaptor for Screwed Rods 4 bolted to a Fishplate, which is, in turn, attached by an Angle Bracket to one of the 3½ in. Double Angle Strips. Two Flat Trunnions are also attached to the inner 3½ in. Double Angle Strips by Angle Brackets, a 3½ in. Rod journalled in the apex holes of these Flat Trunnions later attaching the bogie to a 2½ × 1½ in. Flanged Plate bolted to the underside of the trim.



Above, the automatically-operating model of an early Bondi Tram, designed and built by Mr. Colin Campbell of Beverly Hills, New South Wales, Australia for display at the 1970 Sydney Toy Fair.

Right, One of the two identical bogies as it appears removed from the Tram.



A general underside view of the Tram, with one of the bogies removed, showing construction of the main chassis framework.

The Tram Body

Coming to the tram body, the main chassis is made from two 18½ in. Angle Girders 5 connected at each end by a 5½ in. Strip and, in the centre, by three 5½ in. Strips. Suspended from the centre 5½ in. Strip by Double Brackets is a 5½ in. Insulating Strip 6, while a 4½ × 2½ in. Flat Plate 7 is bolted to each end 5½ in. Plate.

As can be seen from the illustrations, the saloon consists of two similar sections. The floor of each section is built up from three 5½ × 2½ in. Flat Plates butted together and bolted to two 7½ in. 8 Angle Girders, which are extended two holes by two 1½ in. Strips, then the floor is finished by a 5½ in. Strip at the outside end and a 5½ in. Angle Girder 9 at the inside end, both attached to the relevant Flat Plates by Fishplates. Attached vertically to the outside end of each Angle Girder 8 is a 5½ in. Angle Girder 10, extended downwards by a Fishplate for later bolting to the chassis. These Girders at each side are connected top and bottom by 5½ in. Strips, these Strips in turn being connected vertically by two further 5½ in. Strips, to each of which a 2½ × 1½ in. Flexible Plate 11 is bolted to complete the end wall of the saloon section.

Attached to the inside end of each Girder 8 is a 5½ in. Strip 12, this Strip being connected to Girder 11 by an 8½ in. compound narrow strip 13, built up from two 4½ in. Narrow Strips, and an 8½ × 1½ in. compound flexible plate 14, built up from two 4½ × 2½ in. Flexible Plates. Note that the ends and centre of the compound plate are also extended downwards by Fishplates for bolting to the chassis. Compound plate 14 is connected to compound narrow strip 13 by three 3 in. Narrow Strips, representing window frames. The handrails are supplied by 1½ in. Rods in Handrail Supports at the end doorways and from 2 in. Rods in Handrail Supports at the centre.

Each saloon section is fitted out with eight seats, each seat consisting of two 2½ × 1½ in. Flexible Plates, suitably formed and attached to two 1½ × ½ in. Double Angle Strips connected together by Fishplates to form a rectangular " box ", the lower Double Angle Strip being bolted to the floor.

With the two saloon sections thus far completed, they are secured to the main chassis by the earlier-mentioned Fishplates, leaving a centre doorway with a width of three clear holes. A 2½ in. Angle Girder 15 is bolted to the chassis at this point to serve as a step. Inside the saloon an 18½ in. Angle Girder 16 is bolted between the upper ends of Girder 11 and Strips 12 at each side, the securing Bolts also holding an 18½ in. compound flat girder 17 in position to provide an external fascia " board ".

Driver's Cabs

Like all other trams, the Bondi units were " double-ended ", i.e., fitted with a driver's cab at each end. On the model, each cab is produced from two 2 in. Angle Girders 18, bolted one to each forward corner of Flat Plate 7. Attached to each end of this Angle Girder is a Fishplate, the securing Bolt in each case also holding an Angle Bracket in position. Fixed to the rearmost Angle Bracket by another Angle Bracket is a 1½ in. Angle Girder 19, the other end of which is attached to the main chassis Angle Girder by an Obtuse Angle Bracket extended by an ordinary Angle Bracket. Two 2½ in. Strips are also bolted to Plate 7 to complete the floor.

The rear of the cab is built up from two vertical 5½ in. Strips 20, attached to Plate 7 by Angle Brackets. The lower halves of the Strips are connected together by a 2½ × 1½ in. Flexible Plate, while, at the top, they are joined by a 1½ in. Strip, one of the securing Bolts also helping to fix a 1½ × ½ in. Double Angle Strip 21 between the Strips and the top of the saloon. Attached by an Obtuse Angle Bracket to the centre of the 1½ in. Strip is a 1 in. Double Bracket, in the lugs of which a ¾ in. Bolt carrying a ½ in. loose Pulley is fixed. The Pulley later serves as a guide for the trolley pole cord.

Now bolted between the Angle Brackets secured to the front end of Angle Girders 18, is a 2½ in. Curved Strip 22, which supports the tow-bar, supplied by a 3 in. Narrow Strip pivotally attached to Plate 7 by a lock-nutted ¾ in. Bolt. A ½ in. Bolt is fixed in the free end hole of the Strip. The track clearing grid 23 is made from a 3½ in. Rod or a 3 in. Screwed Rod, depending on the end of the model being constructed, and it is carried in the lower transverse bores of two

Threaded Couplings bolted to the underside of Flat Plate 7.

To complete the cab sides, a 5½ in. Angle Girder is bolted to the rear Fishplate secured to Angle Girder 18, while a 5½ in. Strip is bolted to the forward Fishplate, the securing Bolts fixing a 2½ × 2 in. compound flexible plate 24 in place, the compound plate consisting of two 2½ × 1½ in. Plates. The upper ends of the Strip and Angle Girder are connected by a 3½ in. Angle Girder 25 and a 3½ in. Flat Girder 26, the Angle Girder also being attached to the top of Girder 11 by an Angle Bracket. The cab front consists of two 5½ in. Strips, each attached to the adjacent cab side by three Obtuse Angle Brackets, the two 5½ in. Strips themselves being connected together at the top by a 2½ in. Flat Girder and, lower down, by a 5½ × 1½ in. Flexible Plate 27. The Flat Girder is attached to Flat Girders 26 by Obtuse Angle Brackets. The space immediately below this Plate contains a Lamp Holder bolted to two Angle Brackets connected to the 5½ in. Strips by Fishplates. One terminal of the Lamp Holder must be electrically insulated from the metal of the model and to this terminal is connected a length of insulated wire sufficient to reach the farther of the two trolley poles. The Lamp Holder itself is fitted with a clear Lamp. Beneath the Lamp Holder, a bumper bar is provided by two 2½ in. Narrow Strips, one on top of the other, bolted to the 5½ in. Strips.

Inside the cab, an imitation control lever is provided by a ½ in. Bolt held in a Fishplate, secured to a Threaded Coupling which is, in turn, bolted to the 5½ in. Strip included in the left-hand side of the model. A brake lever is provided by another ½ in. Bolt held in a Fishplate, this one lock-nutted to an Angle Bracket connected to the right-hand 5½ in. Strip.

The Roof

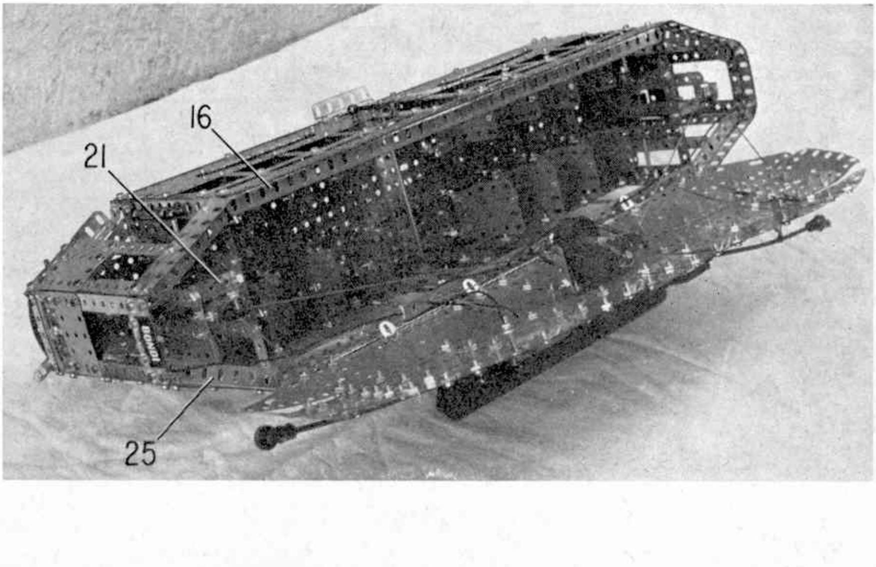
This brings us to the roof. Starting from the centre, six 2½ × 1½ in. Flexible Plates 28 are bolted together and extended each way by a 5½ × 2½ in. Flexible Plate, thus producing a compound 6½ × 6½ in. plate. This is further extended in each direction by two 5½ × 1½ in. Flexible Plates in the centre of the roof and two 5½ × 2½ in. Flexible Plates 29 towards the outside, then three 2½ × 1½ in. Flexible Plates extend the roof to the end of the saloon. Secured to the centre one of these last Plates is a 2 in. Slotted Strip, to which four 2 in. Strips are bolted on either side. A 2½ × 2½ in. Flexible Plate is bolted to these 2 in. Strips together with two 3½ × 2 in. Triangular Flexible Plates 30 to complete the roof.

Attached at intervals to each side of the roof are four Obtuse Angle Brackets and, when ready, these are slid between Angle Girders 16 and compound flat girders 17, curving the roof at the same time. It is only necessary actually to bolt two of the Obtuse Angle Brackets to the body at each side, as the "spring" in the Plates will hold the roof in place. Similarly, the Triangular Flexible Plates are curved under the 2½ × 2½ in. Flexible Plates, which slips under the Bolts at each end.

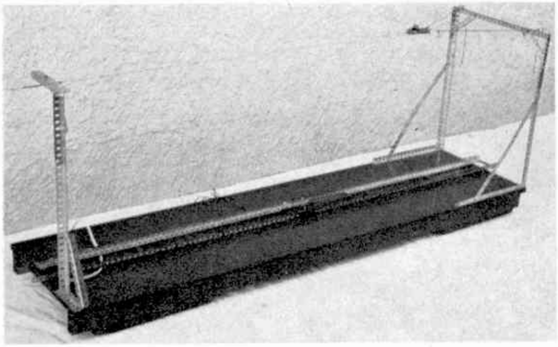
Trolley Poles

Two trolley poles are fitted to the model, these both being identical in construction. In each case an electrical Insulating Bush Wheel is bolted to the roof in the position shown, being spaced from it by a Washer on the shank of each securing Bolt. Note that the outer securing Bolt also holds the earthing contact, provided by a 1½ in. Flexible Wiper Arm 31, the end of which is curved up to receive the pole. Attached by a ½ in. Bolt to the boss of the Bush Wheel is a Double Bracket to the lugs of which two 2½ in. Strips 32 are bolted, the securing Bolt passing through the second holes in the Strips and the Strips being spaced inwards from the lugs by a Washer on each Bolt. One motor wire and the wire from the Lampholder at the opposite end of the tram are also bolted between the Bracket and one of these Strips, then a Tension Spring is attached by a ½ in. Bolt to the longer ends of the Strips, the Spring being positioned between the Strips. Held by a Pivot Bolt between the shorter ends of the Strips is a Coupling, in the longitudinal bore of which an 8 in. Rod is fixed. Mounted on this Rod is a Collar, to which the free end of the Tension Spring is attached by a Bolt. A Small Fork Piece, carrying a brass ½ in. Pulley 33 on a Pivot Bolt, is fixed on the end of the 8 in. Rod.

Secured to the centre underside of the roof is an Emebo Motor, the drive shaft of which must first be removed and inserted in the other side of the Motor after being extended by a Rod Connector and 1 in.



A top view of the tram with the roof "opened" to show the seating arrangement. Note that all wiring is brought up one side only to allow the roof to be "hinged" to one side.



One of the end segments of track, with the support gantries, used at the Sydney Toy Fair.

Rod, to which a Collar is fixed. A length of Cord, long enough to reach both poles when they are fully extended, is knotted in the centre, this knot being located in the slit in the Rod Connector. Two guides for the Cords, provided by 1½ in. Strips, are attached to the underside of the roof by Angle Brackets, then the Cords are passed through these guides, around the guides in the cabs, through the Slotted Strips in the roof and tied to the trolley poles. One pole is then wound down to roof level by coiling the relevant Cord round the Motor shaft, after which the roof can be secured in place. The bogies can also be fitted at this stage, the earlier-mentioned 2½ × 1½ in. Flanged Plates being spaced from the floor of the saloon by six ¾ in. Washers.

It should be pointed out at this stage that the Emebo was fitted to provide automatic trolley pole changeover for exhibition purposes to enable the model to continue operating unattended. If automatic changeover is not required, then there is no need for the Motor, as the change over can be achieved by hand.

Electrical Wiring

In wiring up the electrical side of the model, care should be taken that all non-earthed joints are successfully insulated. The trolley pole Motor is wired to two 2 in. Wiper Arms 34, bolted to Insulating Strip 6, under the floor. These make contact with two copper strips (the only non-standard parts used in the model) at each end of the track. The two traction Motors with Gearbox are wired in series, one lead from one Motor being connected to the opposite lead from the other Motor. The remaining lead from one motor is earthed by connecting it to a metal part of the model, while the other lead from the other Motor is connected to the trolley pole, making quite sure that the trolley pole is insulated from the rest of the model. One terminal of each Lamp holder is earthed, while the other terminal is connected to the further of the two trolley poles.

The Track

The track used with the original model was made up of six similar sections, each section consisting of two 24½ in. Angle Girders connected by five 2½ in. Strips. The track was laid on three four feet-long boards, the two end boards being raised about 1 in. at the extremeties to allow easier control of the tram. The end sections of track were isolated from the main track by joining them to the main track with 2½ in. Insulating Strips instead of ordinary Strips.

The two contacts for the trolley pole motor were made from sheet copper about 6 in. long by ½ in. wide and were situated so that the trolley pole broke contact with the overhead wire when the rear wheels of the tram were just about to pass onto the isolated section. The overhead wire was provided by the reel of copper wire in the Electrical Set and was supported at each end by a Y arrangement to guide the trolley pole onto the wire. The Y was made from two suitably bent 3½ in. Strips attached to two 1in. Triangular Plates, the wire being clamped between these Plates by Washers. The wire was attached to end support gantries, built up from Angle Girders, by Cord.

It is worth mentioning that this model operated successfully during the Sydney Toy Fair and created an enormous amount of interest among visitors to the Fair.

PARTS REQUIRED

31—2	4—16	2—53a	62—188
14—5	2—16a	2—55a	4—189
8—6	4—17	11—59	2—190
8—6a	8—18a	2—63	8—191
4—7a	8—20	6—63b	6—192
4—8b	2—23 (Brass)	6—70	1—213
14—9	2—25	2—80c	4—225
4—9b	4—26	2—90	10—235
2—9d	4—29	4—103a	14—235a
4—9e	600—37a	4—103d	8—235d
6—9f	660—37b	2—103f	1—501
66—10	18—38	20—111	2—516 or 514
8—11	12—38d	8—111a	2—539
2—11a	1—40	2—116a	2—540c
34—12	2—43	4—126a	2—532
28—12c	36—48	24—136	2—533
2—13a	8—48b	4—147b	2 Motors with Gearbox
4—15a	2—51	2—173a	1 Emebo Motor

"BRITISH WARSHIPS 1845-1945" and "STEAMSHIPS—1: Merchant ships to 1880," both written by B. W. Bathe and published by Her Majesty's Stationery Office and priced at 35p each.

These two delightful Science Museum booklets arived at the office recently and we were very impressed by their quality. Although only small booklets, they are extremely informative on their subjects and we must admit that we learnt a lot whilst reading through them. The British Warships booklet covers twenty different warships, each having a beautiful colour photograph and short history. The Steamships one also covers twenty subjects with a colour photograph of each, starting with the P.T. *Charlotte Dundas*, 1801, going right through the years to the P.S. *Inez Clarke* 1879. These two booklets are part of a series of Science Museum illustrated booklets and really are very good value for their nominal price of 35p. Other books in this range cover such subjects as Timekeepers, Ship Models, Railways, Chemistry, Aeronautics, Lighting, Making Fire, Cameras, Agriculture, Fire Engines, Astronomy, Surveying, Physics for Princes and Motor Cars—a very wide range, you must agree, and if they are all as nicely printed and informative as these two, would be well worth collecting. P.M.

(More reviews on page 193)

Recent Books

" INTERNATIONAL MOTOR RACING BOOK No. 4." Edited by Phil Drackett. Published by Souvenir Press Limited. Price £1.25.

We certainly seem to have been very fortunate recently at the Meccano offices, as we have received many very interesting books and this one is a fine example of the selection on the office desk. Photographs are abundant, and there are some really hair-raising ones. Many of the world's leading experts on motor racing are present and they recall such things as the heart stopping moment when Denny Hulme's brakes failed in the middle of a race, or Jack Brabham's near decision to quit motor racing forever. Then there are many other exciting pieces from Jackie Stewart, Jo Siffert, Bruce McLaren, Chris Amon and lots more. If you have a secret desire to become a racing driver, then you are not alone, and we think you will enjoy this exciting, thrill packed volume from the very first page until the last.

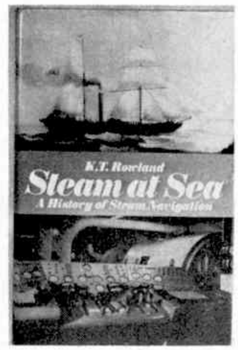
It is an extremely nicely presented book and would appeal to many of you who enjoy motor racing and rallying and who have always had a secret desire to have a go yourself. We enjoyed the book very much and hope that, if you get a copy, you too will derive the same pleasure from it. P.M.

" THE THAMES SAILING BARGE. Her Gear and Rigging " by Dennis F. Davis. Published by David and Charles. Price £2.50.

This superbly produced book, wrapped in an extremely attractive black hard bound cover, is yet another book that will certainly be of interest to all who enjoy looking at and reading about sailing barges and indeed learning more about their history. The photographs included in this book, of which there are many, are the thing that struck us most, as they really are excellent. They include close-ups of all the rigging and gear, taken, whenever possible, on working barges. The detail is superb and there are about fifty of these photographs which would really serve as inspiration for model makers. Therefore, although the book is quite pricey, for anyone making a model sailing barge, it would be well worth looking out for on the shelves of your nearest bookshop. P.M.

" PROTOTYPE 1968-70." Published by Pelham Books Limited. Price £2.25. By Mike Twite, Roger Taylor and David Windsor.

Here again we have an extremely nicely produced book which is hard bound, measuring $10\frac{1}{4}$ in. × $8\frac{1}{4}$ in. in an extremely attractive white leatherette covering. I don't know if any of you are familiar with the sister publication of Meccano Magazine, Model Cars, but if you are you will already be familiar with the superb workmanship put into the Prototype Parade features in each issue and this will give you some idea of the quality of the drawings in this book, as they are drawn by Roger Taylor who has been regularly contributing to Model Cars for some years now. The photography is also of very high quality and all in all it is a well balanced book divided into three sections which cover 1968's leading cars, 1969's sports cars and 1969's single seaters. What the book actually provides is a detailed analysis on 27 of the world's leading cars, photographs of each and three view plans so that you have all the details you need to make superb models as well as learning much about their history. We think this is a very well presented book of good quality which will be of interest to all of you who are mad keen on racing cars, and of course, all you slot racers who will enjoy making your models from these plans. P.M.



" STEAM AT SEA " by K. T. Rowland. Published by David & Charles. Price £2.75.

" Steam at Sea " is a history of Steam Navigation. It is a very well presented, hard bound book of attractive appearance and includes numerous photographs and diagrams which certainly add much to its value. The book describes the development of steam navigation from the end of the eighteenth century to the present day. It also describes in detail the work of the early pioneers in Britain, France and the USA and traces the origins of the British Marine Engineering Industry. Famous ships of the age of steam such as Fulton's *Clermont*, and Brunel's trio of ' Greats ' the *Great Western*, *Great Britain* and *Great Eastern* are all described and accounts are given of inventions such as the compound engine, triple and quadruple expansion, surface condensers, water tube boilers, and turbines. All in all this is a book that will be of great value to the historian, covers a very comprehensive range, and is, we think, good value for the £2.75 asked. P.M.

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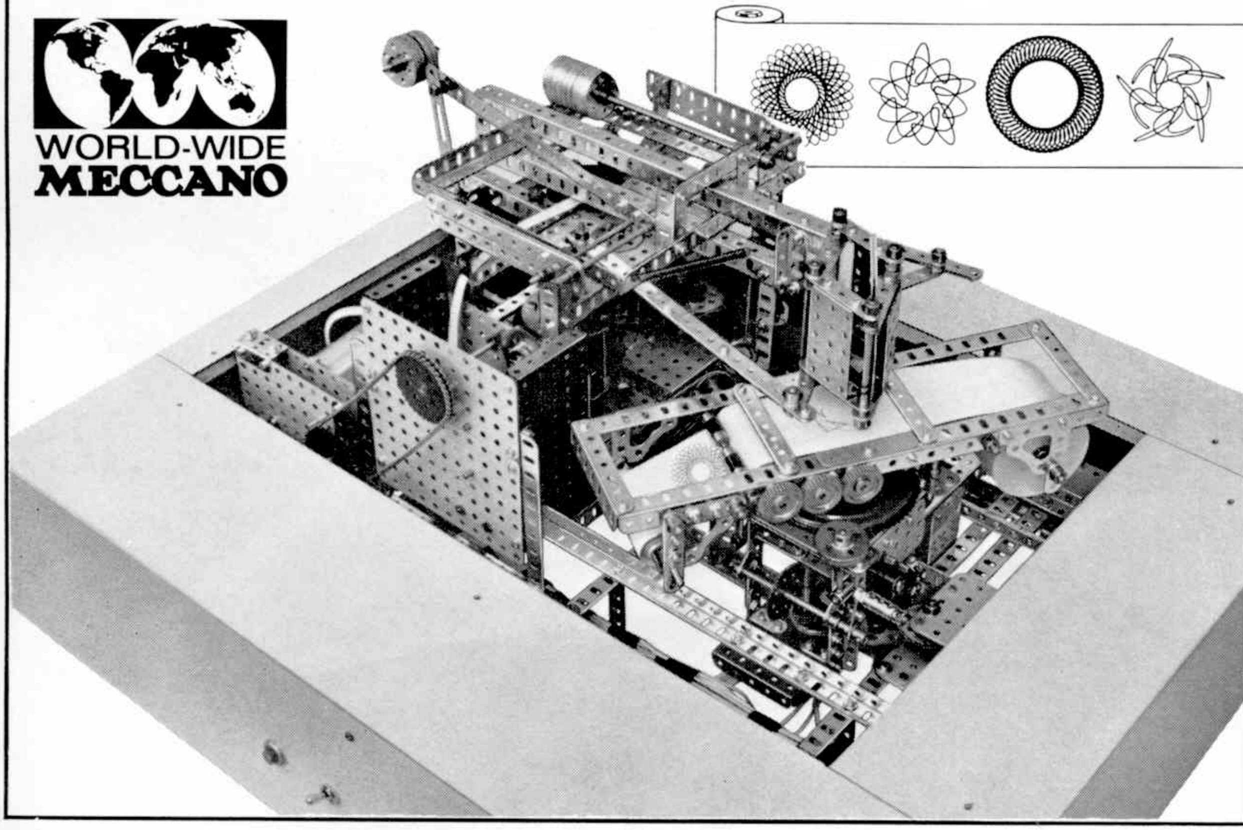

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The pen is driven by two linkages, which in turn are driven by a crank from a separate gear-set.

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But in practice this never happens because in the time between the designs the phase relationship of the two cranks that drive the pen linkages changes, and a special mechanism changes the amplitude of their motion. So in fact all the designs drawn by the machines are different, and it is impossible to tell in advance what they will be like. Beat that for originality!

No matter how simple or complicated they are, we should like you to write about any models you've made which you think would be of interest to other Meccano enthusiasts around the world. Please send photographs and descriptions to Meccano Tri-ang Limited, Binns Road, Liverpool L13 1DA.

THE WORLD'S GREATEST CONSTRUCTIONAL TOY

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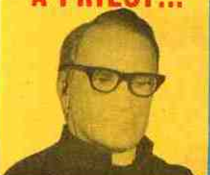

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