MECCANO MAGAZINE

VOL. 64 No. 4

1979 OCTOBER £1

SPACE 2501 AND MECCANOIDS
—FULL REPORT INSIDE

NEW AIRFIX MODEL

HAWKER HURRICANE MK.1

This famous single-seat fighter is now the subject of a new 1:72nd scale kit from Airfix. The Airfix Hurricane Mk.1 is the most accurately shaped version of the fighter, in this scale, portraying the precise detail of the aircraft as flown by Flying Officer A. Clowes of No. 1 fighter squadron – the R.A.F.'s premier fighter squadron.
For each kill of an enemy aircraft F/O Clowes added an extra stripe to the wasp motif featured on the nose of his aircraft and this fine detail is exactly represented in the kit.
Features include:-

- Superbly defined fabric skinning on rear fuselage.
- Extremely fine overall detail.
- Optional undercarriage position.
- Full-colour markings for F/O Clowes of No. 1 Fighter Squadron based at R.A.F. Wittering.
- Look out for this outstanding new construction kit at your local Airfix stockist.

HAWKER HURRICANE MK.1 **SERIES 2** **CODE No. 02067-9**

AIRFIX

NEW FROM THE WORLD'S LARGEST RANGE OF CONSTRUCTION KITS

MECCANO MAGAZINE

Vol. 64, No. 4 October 1979

ON THE COVER: It had to happen, Meccano could not remain an Earth-bound hobby much longer! Exciting action-packed Space 2501 models take Meccano into the Space race, to find, who knows, mysterious, crawling Meccanoid creatures. Create your own Space adventures in miniature using these new theme sets from Meccano!

EDITOR
MICHAEL J. WALKER

MECCANO exhibitions are so much a part of the Meccano scene these days that many find it difficult to recall the time when there weren't any! The relative explosion in the number of these exhibitions in recent years has highlighted the massive degree of involvement many enthusiasts have with the hobby.

It can be seen as no small tribute to the basic ingenuity of the system Frank Hornby devised some 80 years ago, that advanced modellers of 1979 are even now pushing ever further the frontiers of its possibilities.

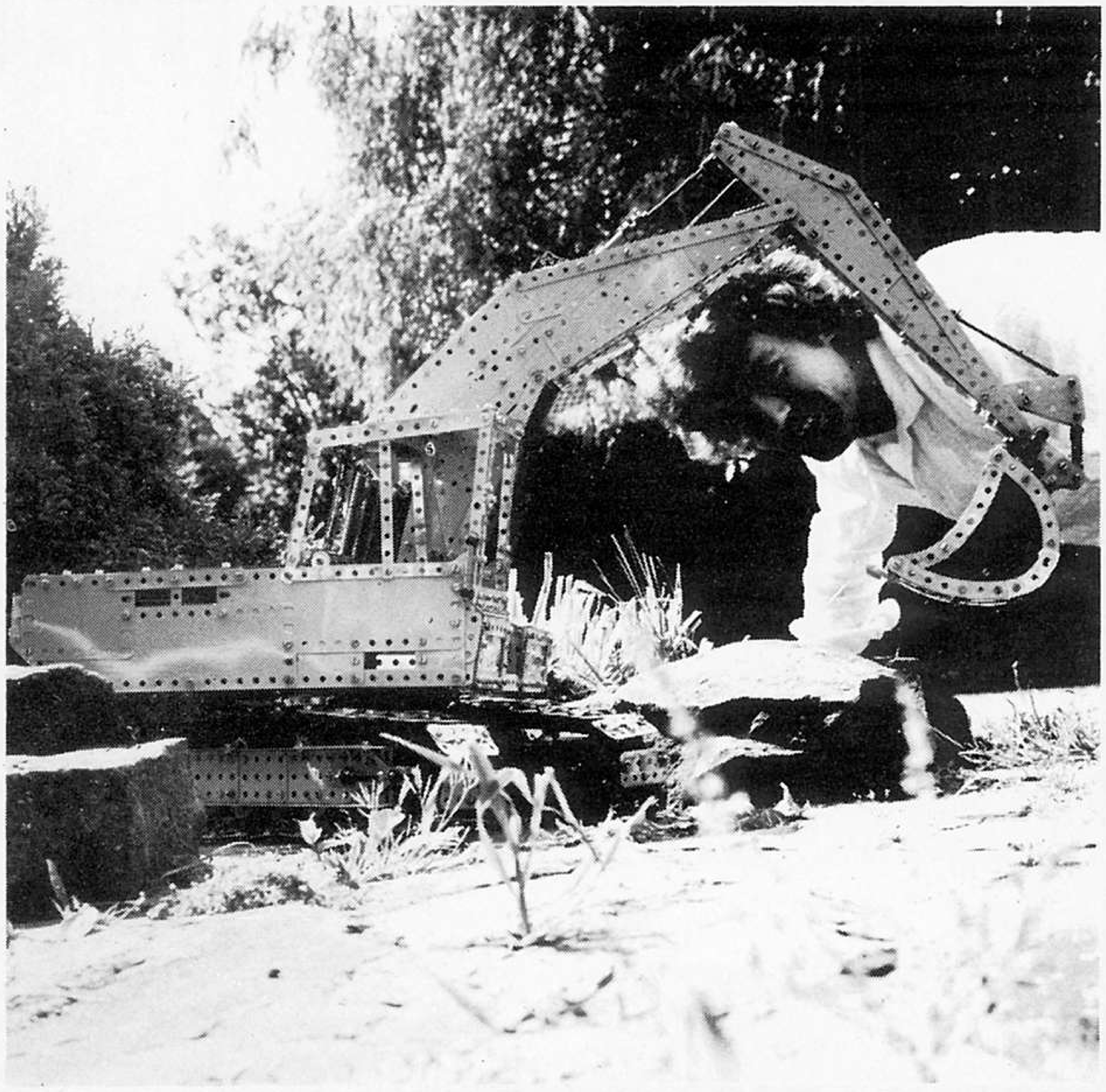
Meccano exhibitions provide the general public with an unrivalled opportunity to glimpse large numbers of magnificent models, assembled together to form a truly magnificent showcase for the system's capabilities. Four pages of exhibition models are featured in this issue, representing the work of members of the Solent Meccano Club, and the Club des Amis du Meccano, in France.

A chill wind blows outside as I write, reminding me that, for those of us in the northern hemisphere at least, Winter will soon be with us. Old Meccano Magazines that I have in my collection referred to Winter as the 'model-building season', and it is true that fewer diversions in the way of holidays and sporting activities are present.

However, most modellers of my acquaintance tend to construct on a year-round basis, looking upon the lull in club and exhibition activity over the Winter as a chance to complete that new super model! I hope that the models in this issue give many enjoyable hours in construction during the bleak months ahead!

Those who study the history of Meccano have pointed out an error in the caption accompanying the illustration on page 49 of the April 1979 'MM'. The page depicted was taken from a 1926 manual of instructions, not 1913 as stated. This should have been immediately obvious to me as two of the parts on the page, 6" diameter Circular Plate part 146 and the Collecting Shoe for Locomotive part 149 were only introduced in 1925, (January and November respectively). Thanks to all who brought this to my attention.

Finally, as this is the last Meccano Magazine of 1979 I'd like to convey my very best wishes to all readers for a really Merry Christmas and a Happy, Prosperous New Year in 1980.



HI THERE! Seen here from a rather unusual viewpoint is Chris Lester of Stafford, who specialises in the construction of highly-capable excavating machines. His latest model along these lines, a JCB 807B, came to the attention of JCB Ltd. with the result that Chris was invited to demonstrate the highly-realistic movements of his model to company executives, who were most impressed. The photograph above is one of a series taken for a press release soon afterwards. A history student at Manchester University, 19 year-old Chris has been a keen Meccano enthusiast for some ten years and possesses a collection of Meccano parts worth well over £500. Other interests include Hi-Fi, travel, local history and many types of sporting activity.

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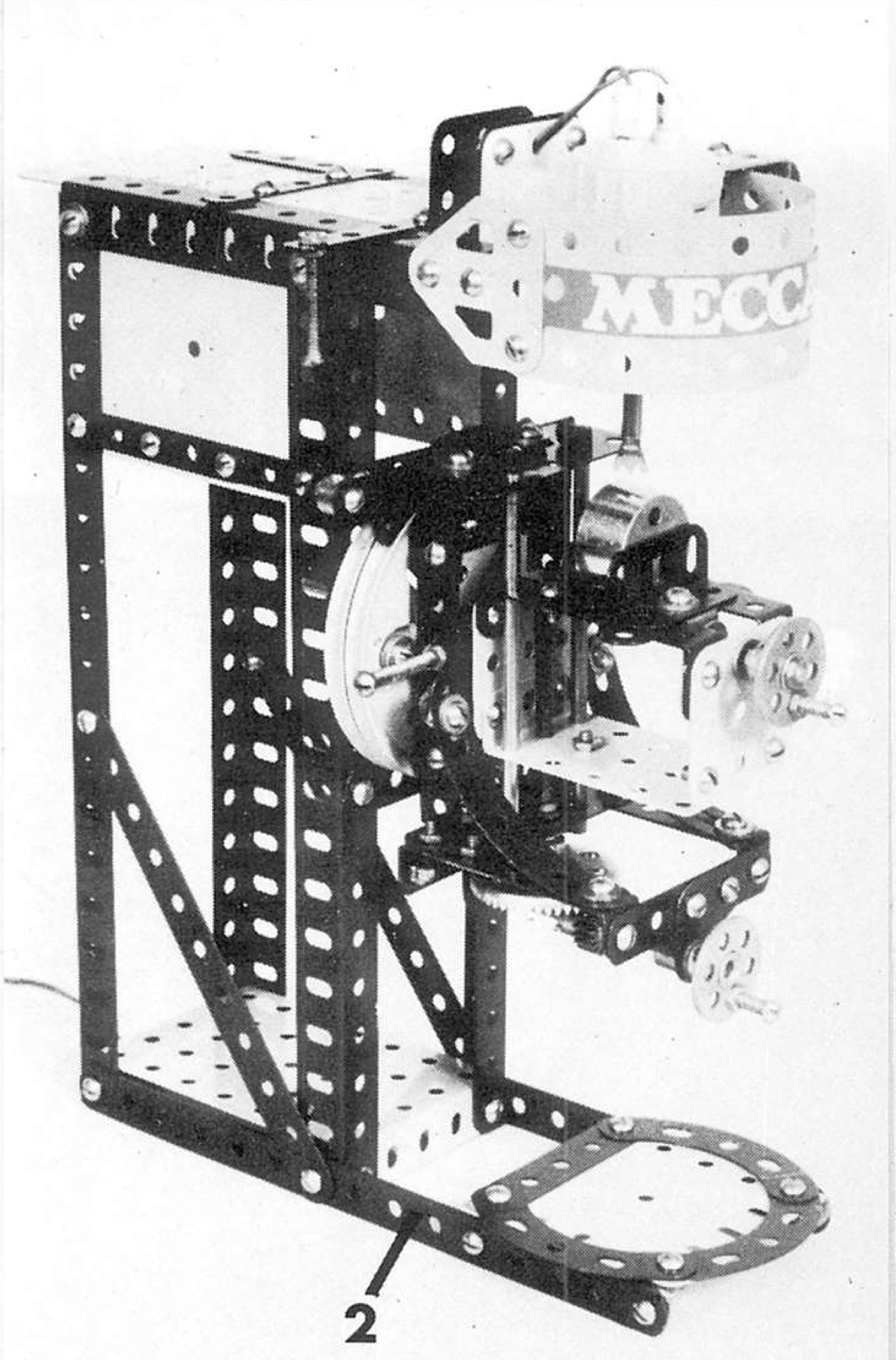


Left front 3/4 view of Dr. Cameron's Shaping Machine.

Shaping Machine

Built from the contents of Meccano Outfit No. 4.

Designed and described by Dr. Keith Cameron

THIS is a model of a machine tool designed for machining convex surfaces. The work table can be revolved through a circle while cutting is in progress. The tool is driven by a motor held on a headstock which can be moved back and forth on slides. The worktable can be raised and lowered and is fitted with a vice. The only part that is required in addition to the contents of the No. 4 set is something to represent the tool. A Centre Fork, (obsolete part No. 65) can be used if available. Right and left on the model are as viewed from the front, i.e. the worktable.

MAIN FRAME

Four vertical 9½" Angle Girders 1 are bolted by their lower ends to the flanges of a 3½" x 2½" Flanged Plate, and to two forward-projecting 7½" Perforated Strips 2. Two 5½" Perforated Strips brace the Girders 1, one 5½" Strip on each side. The Angle Girders 1 are connected at their upper ends by two 3½" x 2½" Flexible Plates on the sides and a 2½" x 2½" Plastic Flexible Plate at the rear.

These Plates have their lower edges overlaid by Narrow Strips, a composite 3½" Narrow Strip is employed on one side. The top holes of the 9½" Angle Girders 1 are connected by two 5½" Angle Girders 2a, these project forward and are secured as shown. A 2½" x 2½" Plastic Flexible Plate surrounded by three 2½" Stepped Curved Strips and one 2½" Perforated Strip is affixed to the two 7½" Perforated Strips 2 by ½" x ½" Angle Brackets and ½" x ½" Double Brackets.

A 3" Pulley, boss to the rear, is bolted across the two forward vertical 9½" Angle Girders 1 at the eighth hole from the top, and is spaced from these Girders by two Washers on each Bolt, the Nuts being on the forward surface of the 3" Pulley. The rim of the 3" Pulley rests above on a 3" Narrow Strip fixed with one free hole to the left of the left-hand forward 9½" Angle Girder 1; to this hole a 3½" Narrow Strip is lock-nutted, a ½" Bolt passing through its end hole, using a Collar as a spacer. The 3" Pulley rests below on a 2½" Perforated Strip bolted between the forward vertical 9½" Angle Girders 1. These Strips assure firm support for the 3" Pulley in all directions. A 2½" Stepped Curved Strip is bolted to the 3½" Narrow Strip via its slotted holes, centrally placed and with the concave edge facing down.

THE SADDLE

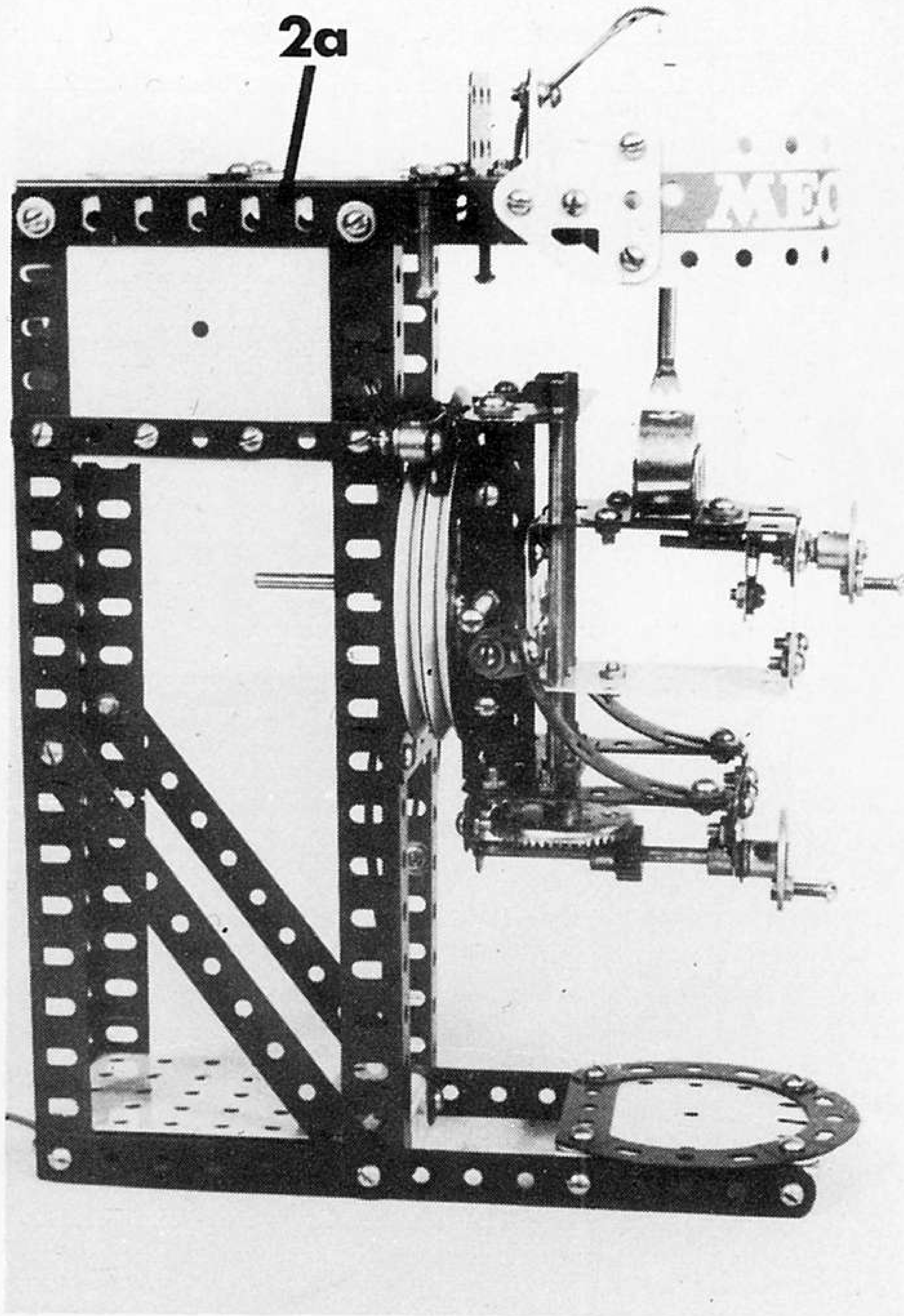
The saddle carrying the worktable comprises two vertical 3½" x ½" Double Angle Strips, their lugs bolted above and below to the second and fourth slotted holes of two 2½" Flat Girders 3. The 3½" x ½" Double Angle Strips are also connected at their second and sixth holes by two 1½" x ½" Double Angle Strips 4, spaced by a Washer on each Bolt; and at their centre holes ½" x ½" Angle Brackets 5 are bolted using 1-1/8ths' Bolts lock-nutted and the slotted holes of the Angle Brackets 5. This assembly is now bolted to a 3" Pulley, boss forward, using the centre holes of the 1½" x ½" Double Angle Strips 4 and the round holes of the Angle Brackets 5.

Two Washers are placed under the Bolt heads at the latter location, and the 1½" x ½" Double Angle Strips 4 are each spaced from the 3" Pulley by two Washers. 2½" x ½" Double Angle Strips 6 are bolted to the outer two holes at each end of the lower 2½" Flat Girder 3, their lugs are directed downward and are connected across by 2½" Perforated Strips 7 front and rear. 1" Corner Brackets bolted to these Strips 7 carry a 2½" Axle Rod, and on this Rod are mounted, (from front to rear), a 1" Bush Wheel, Washers, a Collar and a 19t Pinion 10. Two 3" Formed Slotted Strips 8 brace the 2½" x ½" Double Angle Strips 6, being bolted to their forward holes and to ½" x ½" Angle Brackets connected to the 3½" x ½" Double Angle Strips immediately below the 1-1/8ths" Bolts.

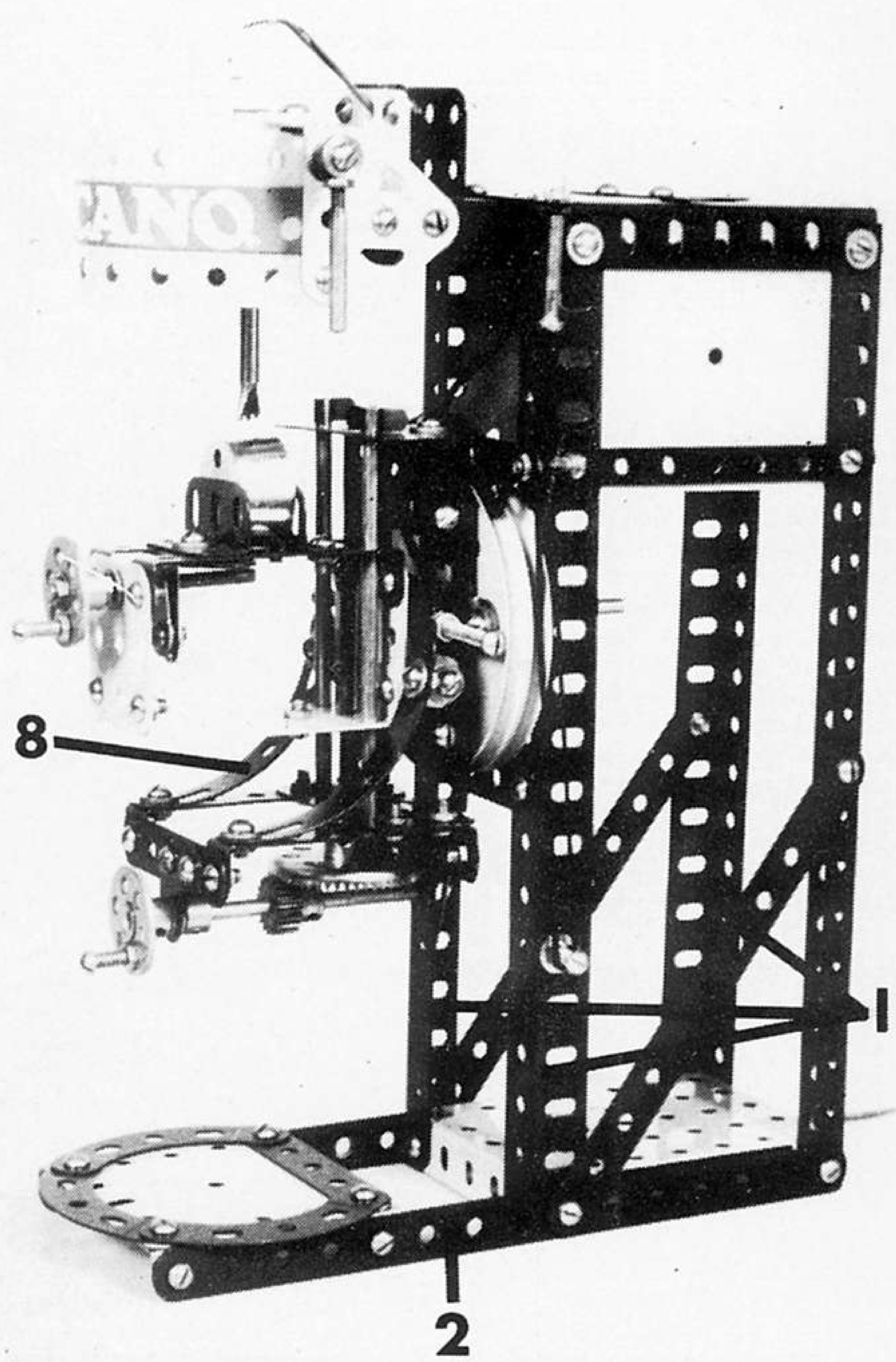
THE WORKTABLE

This consists of two 1½" x 1½" Flat Plates fastened by their lower edges to the front and rear flanges of a 2½" x 1½" Flanged Plate, and above, to two 2½" x ½" Double Angle Strips 9. The rear jaw of the vice is a 1½" Angle Girder bolted across the 2½" x ½" Double Angle Strips 9 at the fourth holes from the front. The forward, adjustable jaw is represented by another 1½" Angle Girder bolted by its centre round hole to the short lug of a 1" x ½" Angle Bracket and, (below the lug), the centre hole of a 2" Perforated Strip placed below the 2½" x ½" Double Angle Strips 9.

A Washer is placed under the head of the fixing Bolt for spacing purposes, so that its shank does not foul the 2" Screwed Rod employed later in the construction of this assembly. The 1" x ½" Angle Bracket faces down and forward, its lug slides in the space between the Double Angle Strips 9, thus preventing the jaw from rotating. A Nut is held against the forward surface of the upper hole of the long lug of the 1" x ½" Angle Bracket by a Fishplate bolted to



Side view, from the left.



Main view from right, front.

the lower (slotted) hole. A 2" Screwed Rod is passed through this Nut and the top central hole of the forward 1½" x 1½" Flat Plate, and a 1" Bush Wheel lock-nutted at its forward end.

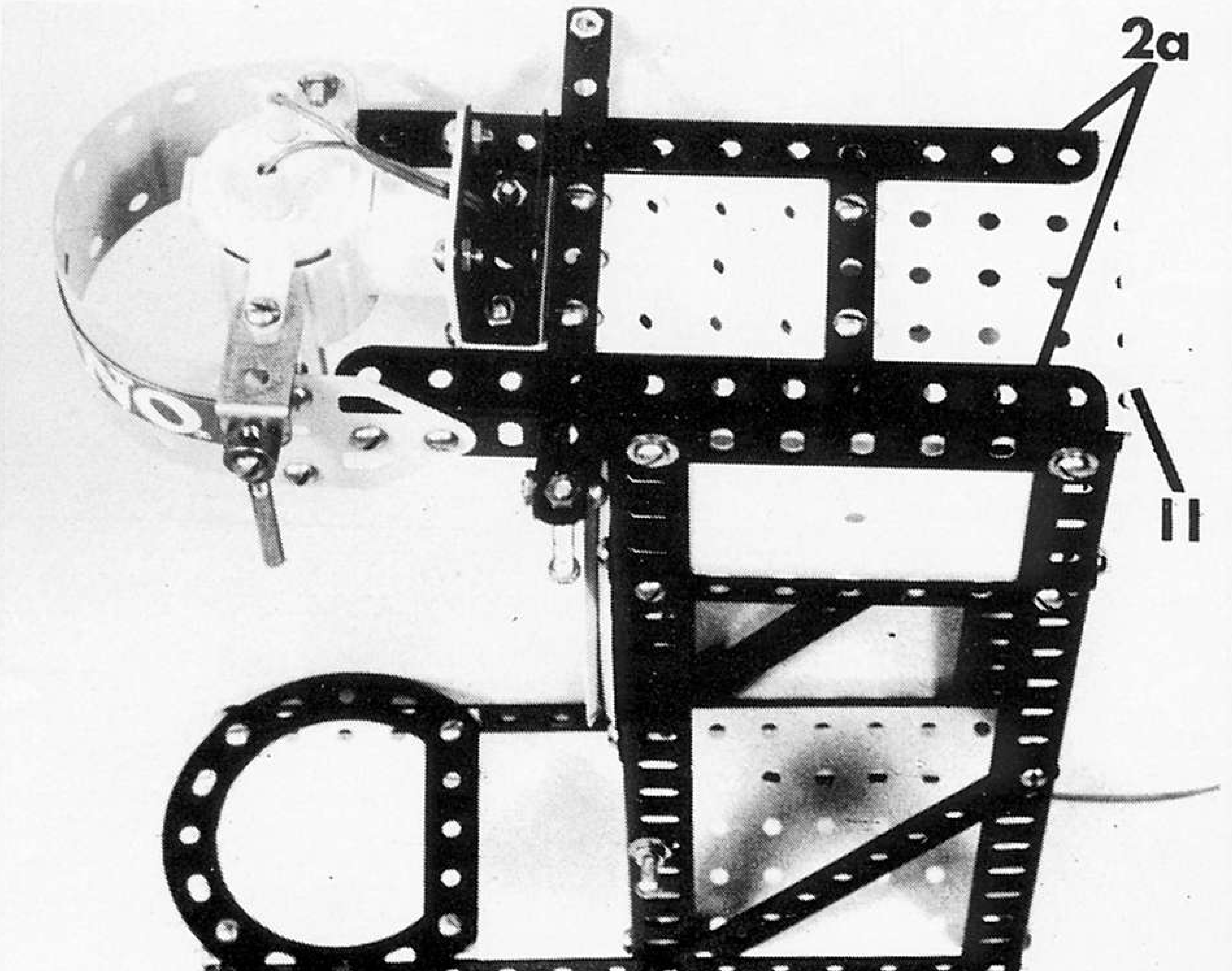
A ½" Bolt lock-nutted in a hole in the 1" Bush Wheel forms a handle for control of the vice. The table is held on two 4" Axle Rods passed through the rear holes of the 2½" x 1½" Flanged Plate and the 2½" x ½" Double Angle Strips 9, and are secured by Spring Clips in the second and fourth holes of the 2½" Flat Girders 3. A Nut is held against the rear centre hole on the lower surface of the 2½" x 1½" Flanged Plate by a Fishplate, and a 3" Screwed Rod is passed through this Nut and the centre round hole of the lower 2½" Flat Girder 3, a 50t Contrate Wheel lock-nutted on its lower end meshing with the 19t Pinion 10. Lock-nuts on the 3" Screwed Rod above the lower 2½" Flat Girder 3 hold it in place and allow it to control the height of the worktable as it is rotated by operation of the lower 1" Bush Wheel.

THE SADDLE-WORKTABLE ASSEMBLY

The completed unit is held in place on the main frame by a 1½" Axle Rod held in the boss of the saddle unit 3" Pulley and passed through the boss of the 3" Pulley attached to the main frame. The rims of the two 3" Pulleys are held firmly together by a Collar on the 1½" Axle Rod which is free to rotate in the boss of the main frame Pulley. Further stability is provided by the 2½" Stepped Curved Strip which is made to lie in the groove of the saddle unit 3" Pulley. Tension is provided by a 6" Driving Band passed aound a ½" Bolt lock-nutted to the right-hand end hole of the 3½" Narrow Strip, and a ½" Bolt lock-nutted to the frame. The 1-1/8ths' Bolts provide handles for rotating the assembly.

View from above after removal of worktable and saddle.

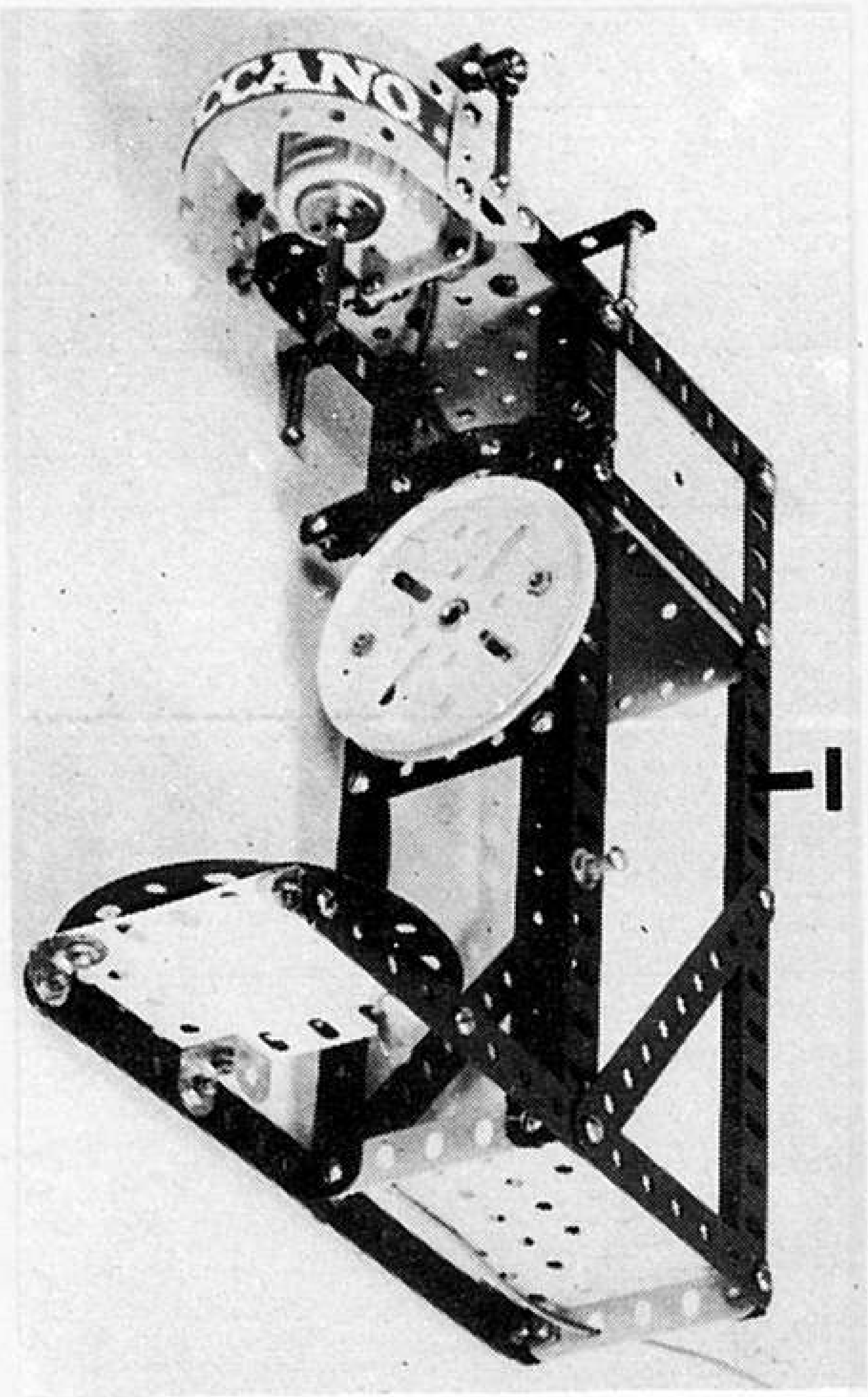
Note position of 11053 'Crane' Motor.



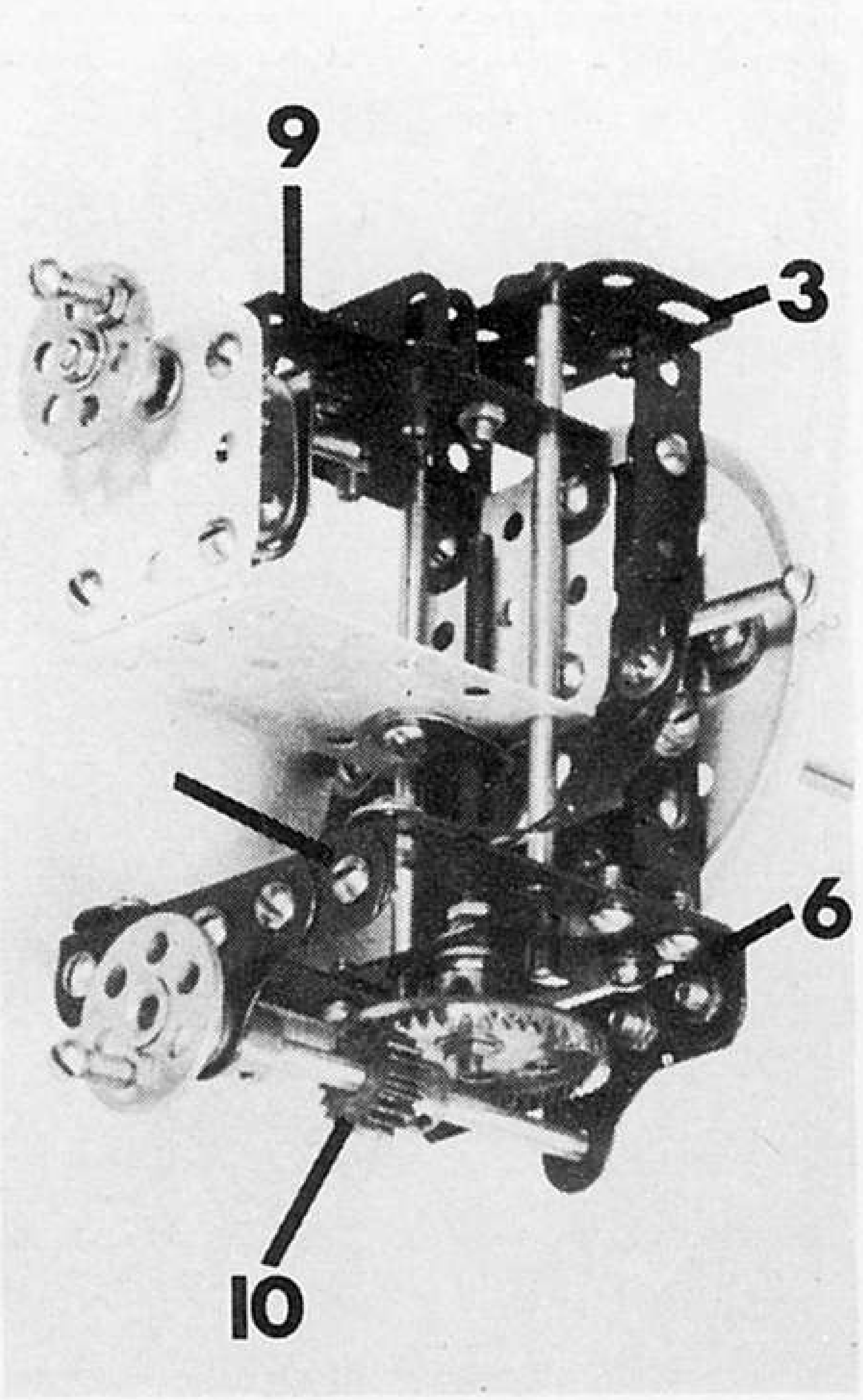
THE HEADSTOCK

This is a 5½" x 2½" Flat Plate 11 free to slide on the under surfaces of the round hole flanges of the 5½" Angle Girders 2a and held in correct location by 2½" and 4½" Narrow Strips bolted crosswise and spaced from it by three 2½" x 1½" Plastic Flexible Plates. A Channel Bearing is fixed to the Flat Plate 11 at its forward centre three holes, the bolts in the outer pair of holes also securing two downward-directed ½" x ½" Angle Brackets. A 11053 Motor is attached to the Channel Bearing and the ½" x ½" Angle Brackets.

The Motor is then surrounded by a 5½" x 1½" Flexible Plate shaped into a U-form and held to the 5½" Angle Girders 2a by Flat Trunnions. 1-1/8ths' Bolts lock-nutted to the outer holes of the 4½" Narrow Strip provide handles for adjusting the position of the headstock. A Long Threaded Pin is lock-nutted in a transverse threaded bore of a Collar bolted to the short lug of a 1" x ½" Angle Bracket by a ½" Bolt. This Angle Bracket is attached by its slotted hole to the control lever of the Motor. A Road Wheel Centre, (part No. 187e), can conveniently be used to represent work clamped in the vice. A suitable tool, in this case an obsolete part 65 Centre Fork, (not included in the No. 4 Set), if available, can be attached to the Motor output shaft by means of a Rod Connector.

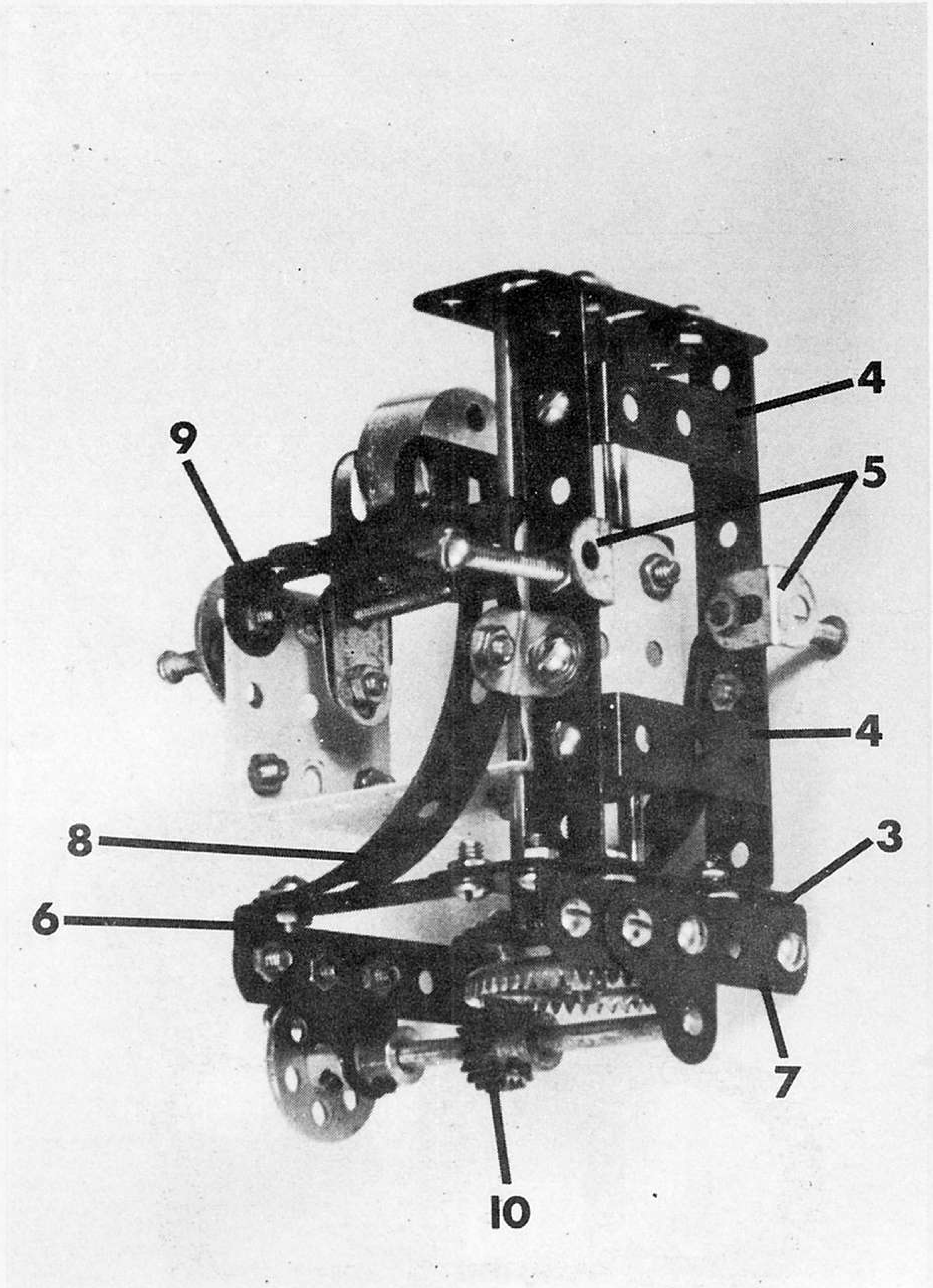


View from below, right, after removal of worktable and saddle.



Worktable and saddle assembly separated from main frame, as seen from below, right.

Below: Worktable and saddle from rear, right hand.



Parts Required:

2 of No. 1B
2 of No. 2
4 of No. 5
1 of No. 6
4 of No. 8A
2 of No. 9
2 of No. 9F
1 of No. 10
2 of No. 11
2 of No. 12
2 of No. 12B
2 of No. 15B
1 of No. 16A
1 of No. 18A
1 of No. 19B
1of No. 26
1 of No. 28
4 of No. 35
93 of No. 37B
121 of No. 37C
34 of No. 38
2 of No. 48
4 of No. 48A
2 of No. 48B
1 of No. 51
1 of No. 53
3 of No. 59
1 of No. 70
2 of No. 74
1 of No. 80C
1 of No. 81
4 of No. 90A
2 of No. 103F
5 of No. 111A
4 of No. 111D
1 of No. 115A
2 of No. 126A
2 of No. 133A
1 of No. 160
1 of No. 186A
1 of No. 189
2 of No. 190A
3 of No. 194
2 of No. 194A
1 of No. 213
2 of No. 215
4 of No. 235
2 of No. 235A
2 of No. 235B
1 of No. 235D
4 of No. 611
1 of No. 618
1 of No. 11053
1 of No. 13624
1 of No. 187C
2 of No. 518

Also: (obsolete)

1 of No. 65

Midlands Outlook

by ROGER WALLIS

Keeping electrics tidy and simple

MANY modellers fight shy of electrics, or make their models unnecessarily complicated. My column this month looks at some ideas that enable electrics to be kept tidy and simple.

The Meccano coloured lamps are excellent for the illumination of models, but can be an expensive outlay if a lot are to be used. A cheaper alternative is to buy, from the local radio spares dealer, 12 volt 0.lamp MES bulbs for around half the price of the Meccano lamps. One needs the 12 volt kind, as they will be underrun on our 6volt supplies, yet they will give adequate illumination and therefore last a lifetime.

A few tins of plastic enamel paints, preferably in Meccano shades, are then required to paint the glass of the bulbs. This is best carried out when the bulbs are in position, using a thinned-down paint. It is a case of two thin coats being better than one thick coat, which will result in a better finish, and afterwards, the paint can be used to touch up those tattier parts that every Meccano collection seems to have!

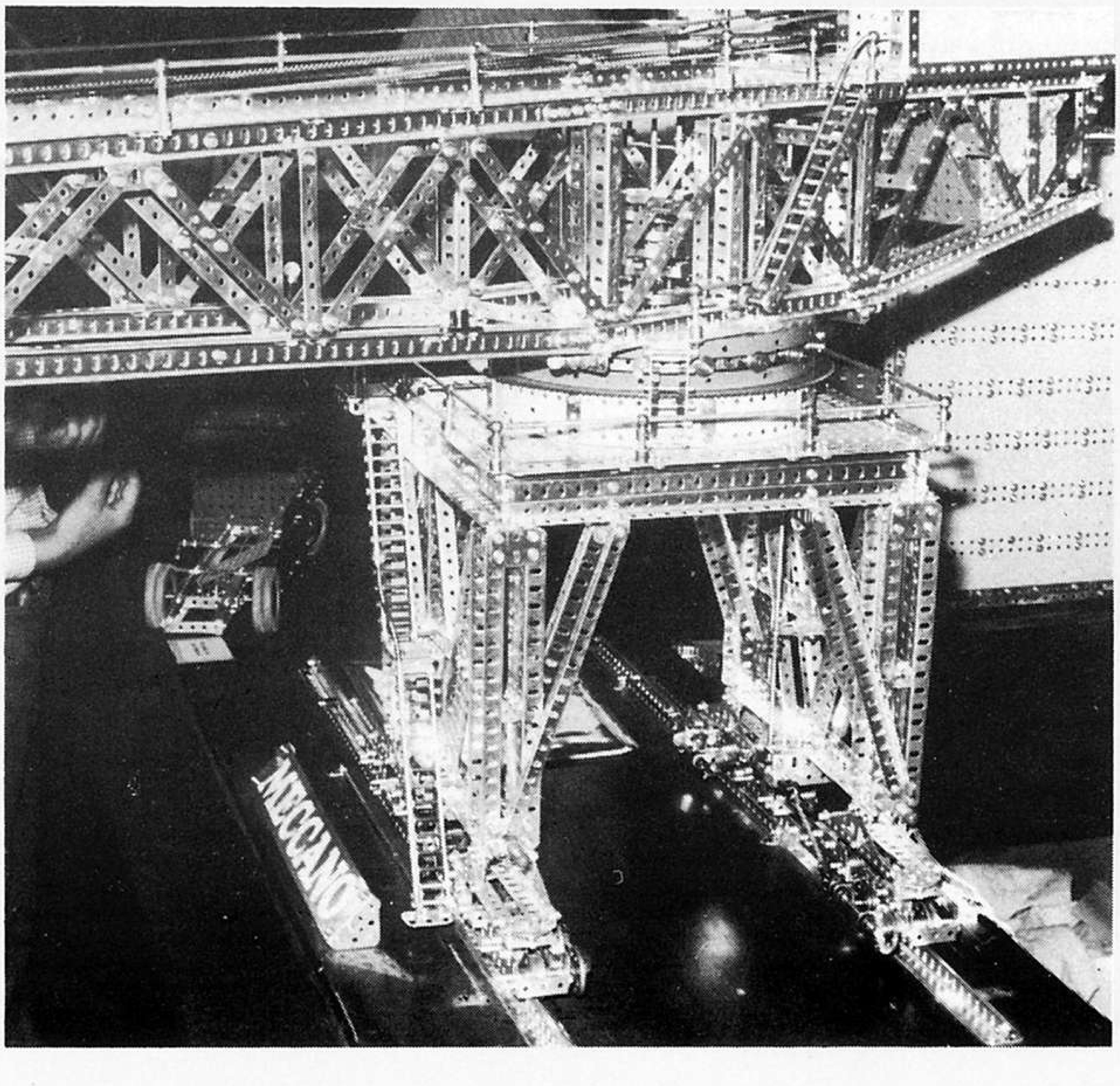
Using the 12volt bulbs, remember they MUST be 0.lamps if it is intended to use a lot of them at once, should enable you to have around 50 lamps on your model if a 5amp charger is used as a power source—without any danger of overheating.

Right then, what about controlling our super galactic model? The easiest way is to use a common return for each of the motors and lamps. (Common return is where we use the frame of the model to pass the return current back to the power source).

Two separate supplies are needed, with the positive of one supply connected to the negative of the other, this common connection going to the frame of the model. The two remaining output connections go to the two fixed contacts of a centre off, two-way switch. The centre contact of the switch, which actually controls the switching, is connected to the vacant connection on the motor. Thus, with the switch in the centre, the motor will be off. As the switch is moved to the first position, negative volts will be put through the motor and this will rotate in one direction. Moving the switch to the other 'on' position will put positive volts through the motor and it will rotate in the other direction. Simple!

If you are using lamps as well, then their supply can be shared between the two, as the lamp is not worried whether it receives positive or negative volts.

Close-up of the tower and boom of the Author's Block-Setting Crane, showing the stacked Wheel Flanges in the centre of the boom. This model featured four motors and was remote-controlled using methods described in this article, yet there is not a wire to be seen.



Now to the wiring itself. Some modellers use solder tags. However, I have rejected them due to the fact that when a model is broken up, a soldering iron is needed, and this lengthens an already rotten task! (I have yet to meet a Meccanoman who actually likes this side of the hobby!) Instead, I use Meccano size washers, and neatly wrap the connecting wire, in a clockwise direction, around the bolt and underneath a washer. For wiring, I try to use a different colour wire for each feed. A useful source for this type of wire is the local telephone engineer, as they tend to use reels of it, and if a system is being enhanced or altered, there is usually plenty of waste!

The correct type of wire to use is the solid conductor variety and not the flexible type that connects the phone to the junction box. This connecting wire is usually available in four, six or eight ways. I prefer to strip off the outer protective covering, leaving me with several strands of insulated solid conductor wire. Being in single strands, it can easily be hidden in the framework of the model.

Next, we come to the current pick-up. I have seen several excellent cranes spoilt by the outsize loom that dangles from the cab to the control panel. Instead, screw the running rails to the wooden baseboard and wire them together for the common return. Now, using insulating spacers, strips can be bolted, on edge, on either side of the running rails. These vertical strips are wired to the appropriate switches. On the crane itself, rubbing contacts, either built up from wiper arms or spring loaded contact studs, will make contact with the insulating strips.

These contacts are then wired to a series of stacked wheel flanges, insulated from each other by means of more insulating bushes, that rise from the centre of the boom, or jib, turntable. On the boom itself, further wiper arms, fixed to a spring loaded insulating strip, make contact with their respective wheel flanges. This arrangement enables the boom to be rotated continuously, without any danger of a multiple cable becoming twisted or damaged.

I admit that this arrangement does prohibit the use of the hallowed GRB, but in my humble opinion, this is rather a useless and inefficient part anyway!

Finally, all wires should be brought to the edge of the baseboard and either terminated in a connecting block, for economy, or a plug and socket, if you want to impress your friends!

The golden rule is to keep all the wiring simple and as neat as possible, which will result in few faults and good reliability. A good idea, if the wiring is going to be at all complicated, is to keep a good drawing of the wiring circuit, hidden, either in the model, or on the baseboard. Otherwise, you can bet that the only fault you will get will be at an exhibition, and the circuit will be back in your den!

One further tip. Having separated the strands of wire from our cableform, how do you remake a loom? A quick and neat way is to clamp all the loose ends in the vice and the other set of loose ends in the chuck of a hand drill. Keeping the wire taut, turn the handle of the drill. In next to no time you will end up with a nice neat loom, but woe betide you if you failed to label those four red (or green, or whatever) wires you have just twisted together, unless you have access to an ohmeter of some kind!

CHINESE SOUTH-SEEKING CHARIOTS

by Noel C Ta'Bois

TO enable the Chinese to navigate to the sunny south before the invention of the compass it is thought that they used south-seeking chariots. These are vehicles having two wheels connected by gearing to a vertical rod on top of which is a pointing figure set to indicate south and remaining so no matter in what direction the chariot is driven, providing the wheels remain in rolling contact with the ground. Articles on the subject appeared in the MMs for September 1955, January 1957 and January 1977 describing models using ten or eleven gears.

It is not essential to use as many, and in January 1978 the MM offered a prize for the chariot using the lowest possible number. The writer submitted an entry consisting of a treatise on south-seeking chariots, in which the theoretical principles were illustrated by models using progressively fewer gears, the final two gear version being the winner. It is possible to build a gearless chariot but the wording of the competition would have disallowed it as an entry. This article is a shortened and modified version of the treatise and also includes with permission some gratefully acknowledged additional material from John Nuttall and Alan Partridge.

THEORETICAL PRINCIPLES

Fig. 1 shows the plan view of a chariot, the body being represented by a rectangle. Two wheels 1 and 2 of diameter D1 and D2, spaced apart by distance X, are mounted on diametrically opposite axles and independently drive the pointer P, fixed to a vertical rod, through gearing of ratios R1 and R2 respectively.

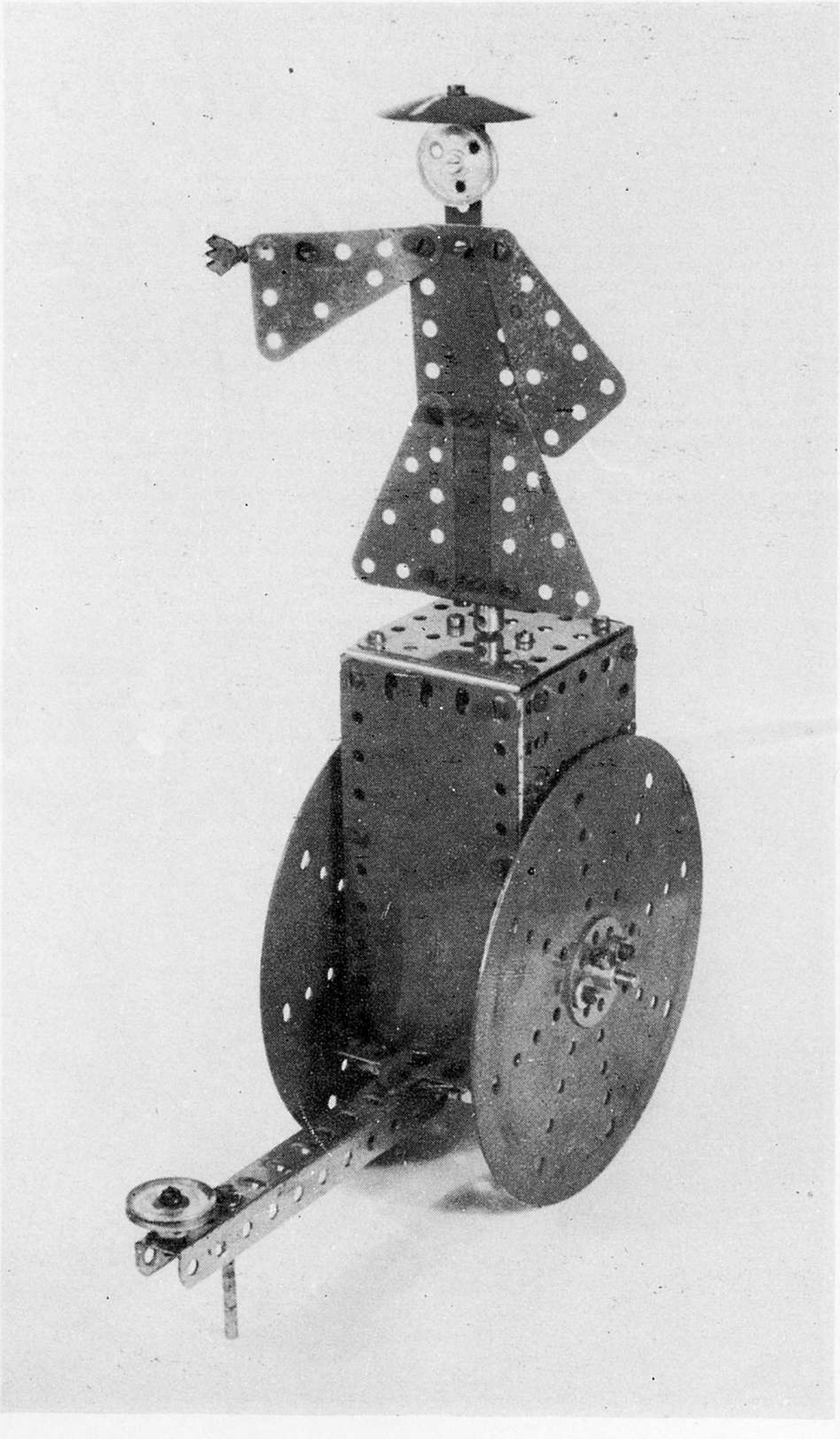
The gearing must be such that the pointer rotates in the opposite direction to that in which the chariot turns . . . (1). For example, if wheel 1 turns in the direction shown by the arrow and wheel 2 is stationary the chariot will pivot about point C in a clockwise direction, so the gearing must turn the pointer in an anti-clockwise direction.

Wheel 1 follows the path shown by the dotted circle, and if the spacing between the wheels is made equal to D1 then, because the *radius* of the dotted circle equals the *diameter* of the wheel, the circumference of the dotted circle will be twice the circumference of the wheel which will therefore rotate twice for a 360 degree turn of the chariot. So R1 must be 2:1 step down if the pointer is to appear stationary.

If X is less than D1 the wheel will turn less than twice, and R1 must be proportionately less than 2. Similarly if X is greater than D1, R1 must be proportionately greater than 2. The same argument applies to D2 and R2. It is not essential that the wheels are the same size or that X equals D1. The chariot will function correctly provided that condition (1) is satisfied and that D1 x R1 = D2 x R2 = 2X . . .(2).

This is confirmed by the model shown in Fig 2 which has unequal wheels (for use on hillsides?). The 2" Pulley with Tyre (3" diameter) transmits the drive through a 4:1 ratio and the 3" Pulley with Tyre (4" diameter) through a 3:1 ratio. As 4 x 3 = 3 x 4 = 2 x 6 the chariot functions correctly with the wheels 6" apart. Further constructional details of this model are given later.

Fig. 6.



Note that there is nothing in equation (2) to relate the distances of the two wheels from the centre of the chariot. It is not necessary, just as it is not necessary to specify the position of a differential gear in the driving axle of a road vehicle.

If the wheels are the same size, as they normally will be, then R1 and R2 must be made equal and (2) can be modified to give the very simple formula, which can be used to check the wheel spacing of any model, X = D x R ÷ 2. (3) where X is the wheel spacing, D is the wheel diameter and R is the ratio of the gearing between either wheel and the pointer.

Fig 3 shows a fascinating little seven gear chariot to a design by John Nuttall in which R = 4 and therefore the wheel spacing is twice the wheel diameter. The only components fixed to the 5½" Rod on which the model is built are four Collars, one at each end to hold the vehicle together, and the two which carry the Pivot Bolts for the ¾" Contrates. By turning this model upside down one can demonstrate the effect produced by not complying with condition (1).

DESIGN PRINCIPLES

If X = D formula (3) shows that R must be 2:1. This ratio can be obtained either from a differential gear which needs four or three bevels or, more economically, from an epicyclic gear with two pinions of equal size as in Fig 4. Rod A turning in the boss of Bush Wheel C carries a ½" Pinion meshing with a similar Pinion on Rod B which passes through one of the outer holes of the Bush Wheel. Hold A and rotate B and Pinion B will ride round Pinion A and turn C at half the speed of the rotation of B. Hold B and rotate A and C will again turn at half speed.

By connecting A to wheel 1 of the chariot, B to wheel 2 and C to the pointer, independent drives to the pointer will be satisfied as also will be equation (3) but not condition (1) because the wheels rotate in opposite directions. Furthermore the pointer, connected to wheel C will not be rotating on a vertical axis. Therefore to make a workable chariot modification is necessary and the following would seem to be the essential gear requirements:

(i) Two epicyclic pinions 1:1 ratio.
(ii) Two pinions 1:1 ratio to reverse the direction of rotation of one of the wheels, which one being determined by condition (1).
(iii) Two bevels, or a contrate and pinion 1:1 ratio for a right-angle drive to the pointer.

Total six gears. By using a contrate for (iii) the pinion meshing with it can be one of the pinions of (i) thus reducing the total to five. A chariot using this number is hown in Fig 5. Because A and B (Fig 4) are not in line it is more practical to up-end the epicyclic mechanism and provide two right-angle drives to the wheels as in Fig 5 where the axle of the right-hand wheel has a ¾" Contrate meshing with the first ¾" Pinion of the epicyclic gear (this Pinion is free on the Rod) making a ratio of 1:1 i.e. R = 1. Applying this to formula (3) gives X = D÷2, so the spacing between the wheels must be half their diameter, and as they are 6" Circular Plates they must be 3" apart.

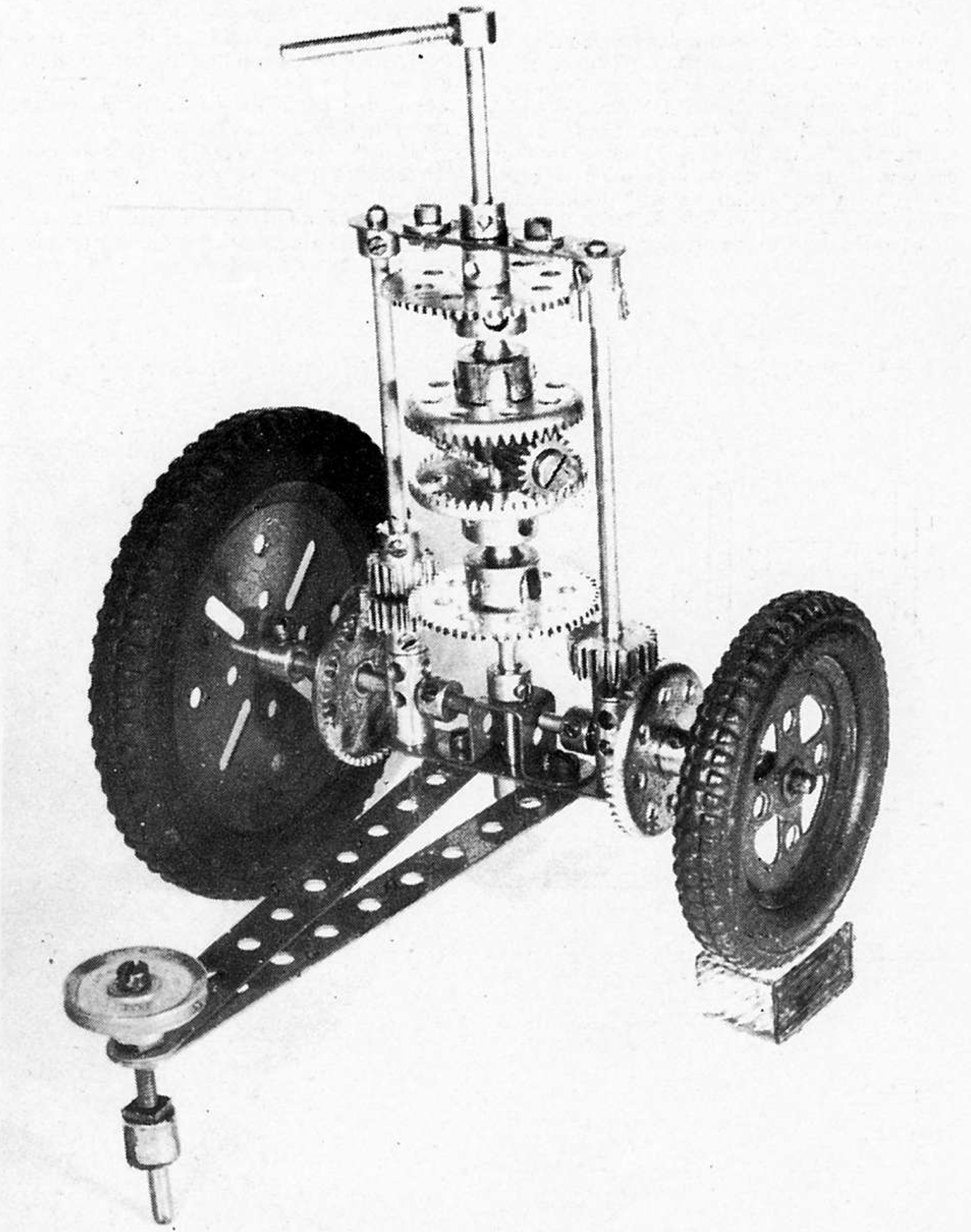
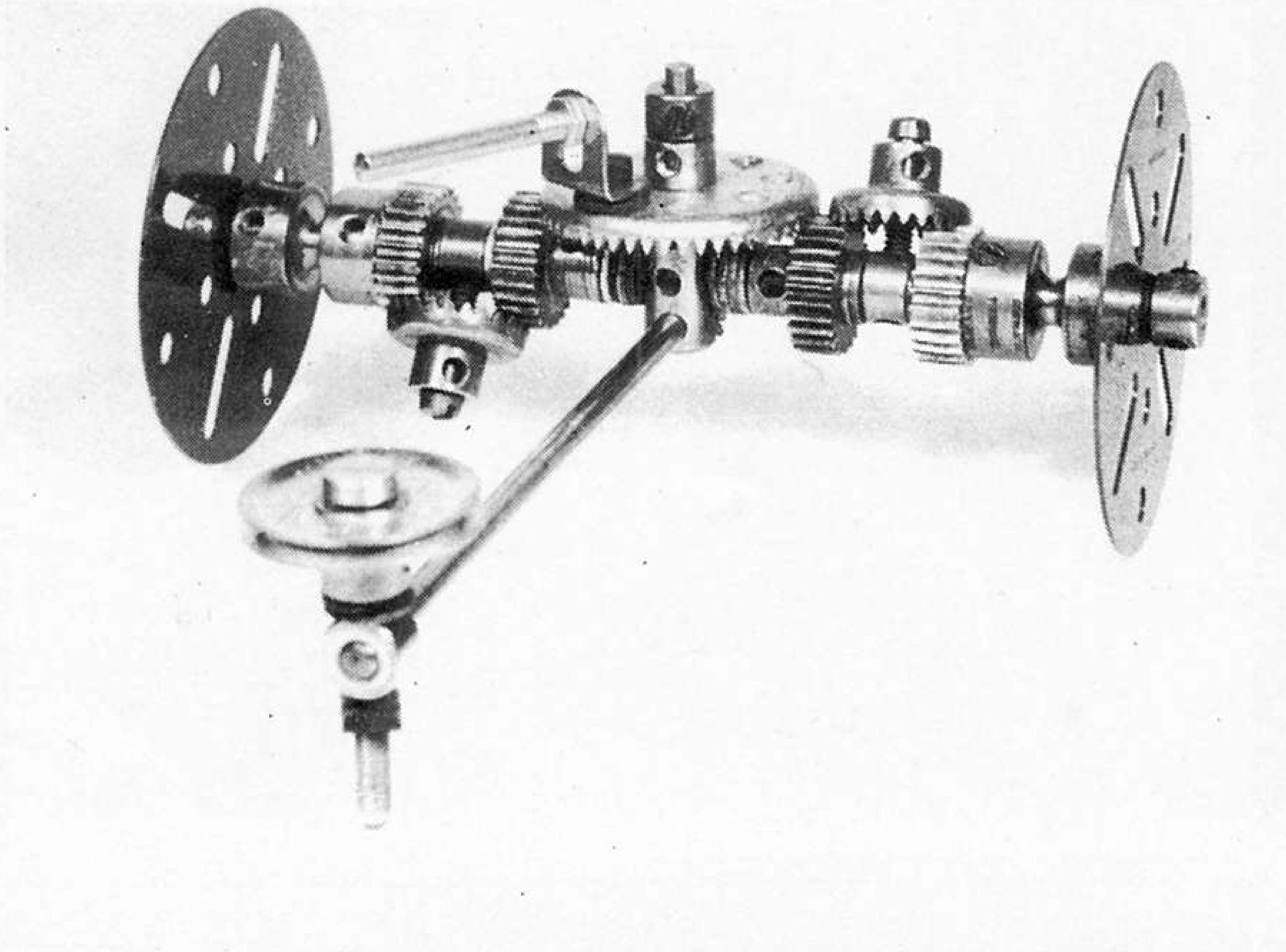


Fig. 2.

Fig. 3.



The drive from the left-hand wheel is 2:1 step down through a ¾" Pinion and a 1½" Contrate on a centrally placed vertical 3" Rod to the top of which a Collar is anchored by its Grub Screw. A Handrail Support, fixed to the Collar by a Nut, forms the bearing for a 1" Rod carrying the second ¾" Pinion of the epicyclic pair, which give a step-up ratio of 2:1 resulting in the required overall 1:1 ratio to match the drive from the right-hand wheel. The orbital motion of the outer epicyclic Pinion is transmitted to the pointer through a linkage consisting of two ½" Reversed Angle Brackets connected by locknutted Bolts to two 1" Corner Brackets secured to Rod Sockets on the driving and driven shafts.

Alan Partridge has designed an enclosed version of this chariot with a delightful Meccano Chinaman perched on top. The model shown in Fig 6 is similar.

Is it possible to use less than five gears? Study of the gear requirements mentioned above suggests that (ii) can be replaced by crossed connecting rods (and the 'Chuff-chuff' competition results, MM January 1978 page 35 Fig 8, show how to do this with only one pair of cranks) and as Meccano Universal Couplings work quite nicely at 45 degrees, two in tandem can be used to replace (iii) Thus only two gears are required. Fig. 7 is a photograph of such a model, with up-ended epicyclic gear and two right-angle drives. Another view was shown in the MM for April 1978 page 75.

A miniature Meccano Chinaman holding a pointer is mounted on a Bush Wheel corresponding to C in Fig 4, and the drives from the wheels are taken via pairs of Universal Couplings above and below through 'Chuff-chuff' competition result linkages 7 and 8 to the epicyclic Pinions. Two six-hole Bush Wheels united by three Fishplates with locknutted Bolts pivoting in the holes of the Bush Wheels transmit the drive to the orbiting epicyclic Pinion.

IN CONCLUSION

A 1" Pulley pivoted on a Bolt on the tow-bar of each model facilitates testing by running the vehicle round in circles in one direction only, when small errors add up and are readily detected. If it is found that the pointer drifts in the same direction as the chariot is turning, the wheels are too close, and if in the opposite direction they are too far apart.

Of all the models, apart from the competition viewpoint, Fig 2 is probably the most interesting because it is the most versatile. Two Threaded Couplings bolted vertically to a 2½" Strip provide the bearings for the vertical Rods carrying the required Pinions, and also the bearings for the wheel stub axles which can be made any required length. Fixed to the middle of the 2½" Strip is a Double Bent Strip providing support for a vertical 6½" Rod carrying the pointer.

All components on this Rod are free to rotate except for the retaining Collars and the 'Spider' carrying the two Pivot Bolts for the Pinions of the differential gear, the Contrates of which are joined by Socket Couplings to the Gear Wheel so that other sizes can be easily substituted as required. Gear ratios, wheel sizes and wheel spacing can all be readily varied to enable the principles of south-seeking chariots to be studied in detail.

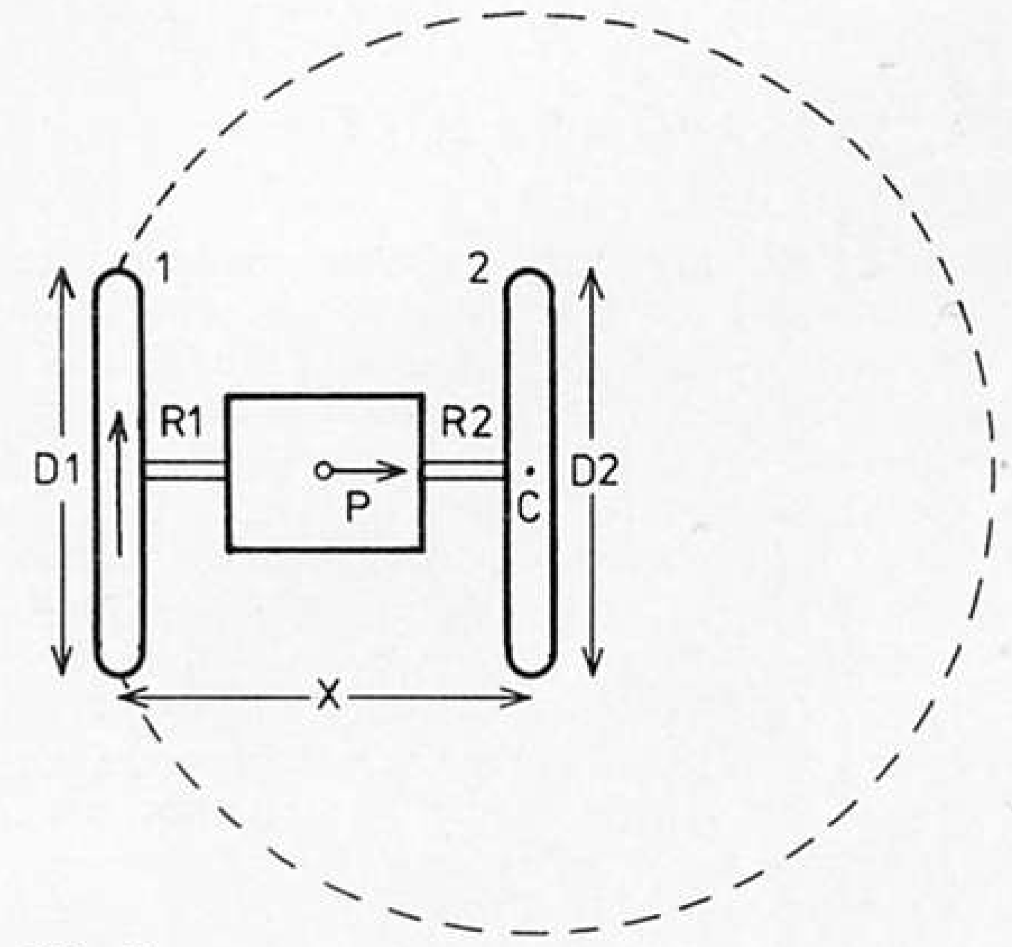


Fig. 1.

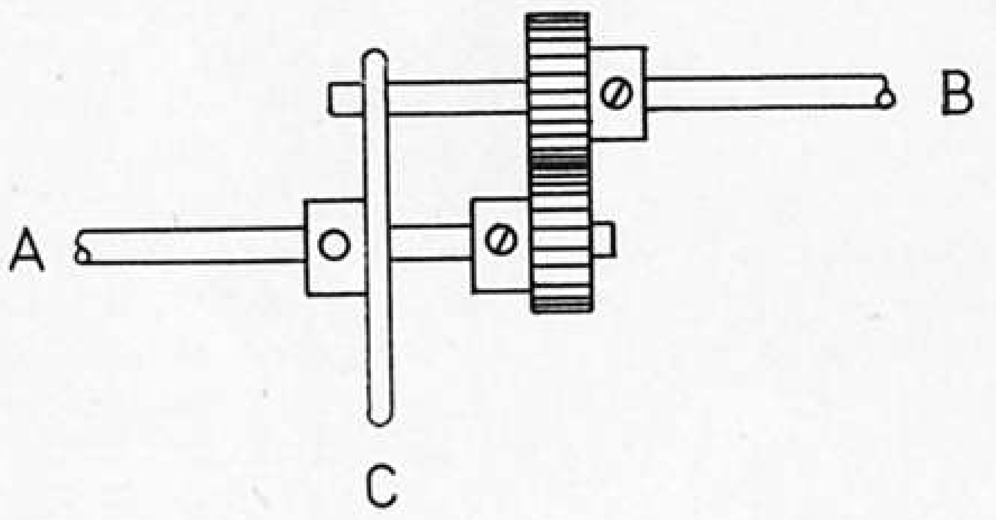


Fig. 4.

Fig. 5.

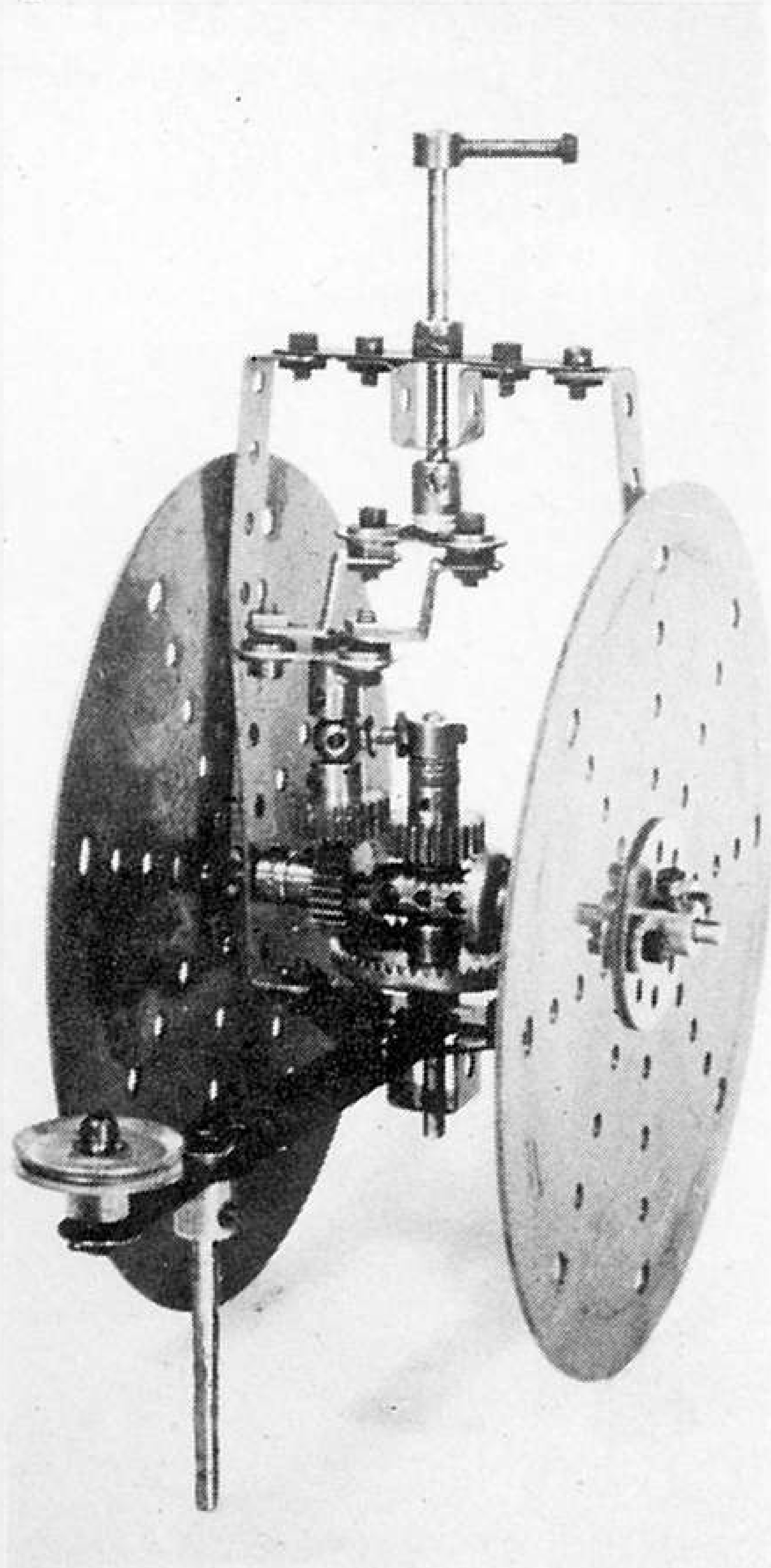
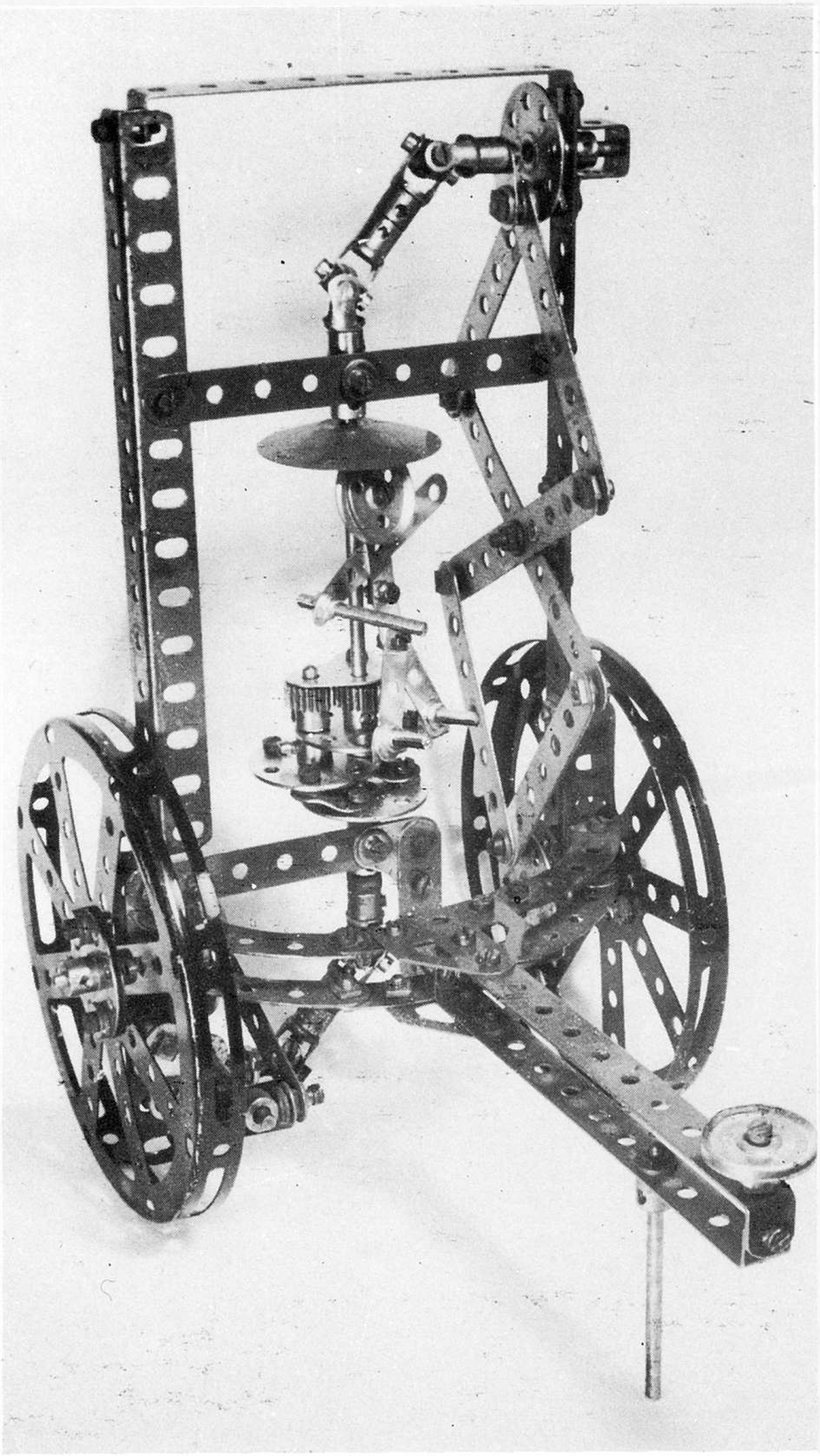


Fig. 7.



MECCANO
and the History of Aviation

by Brian W. Williams

PHOTOGRAPHS BY CHARLES HARRISON AND DAVID GRACE

PART 3—'STICKS AND STRING' 1903 to 1914

THE years 1903 to 1914 were the 'Golden Years' of aviation, during which the powered aeroplane was developed and became established as a practical means of transport.

As briefly mentioned in the Introduction to this series, to refer to aircraft of the period 1903-14 as being of 'Stick and String' construction is in fact unkind and inaccurate. The aeroplanes of the period had beautifully-made frames of mahogany, hand-carved propellers, and hand-wrought metal fittings; the entire machines were of course hand-built, in common with other products of that age. The rather skeletal appearance and construction of the aeroplanes was due only to the lack of knowledge of aerodynamics at the time.

After the Wright brothers' successful flights in December 1903 they continued their experiments with the aim of improving the flying characteristics of their aircraft: the true greatness of the Wrights lay in what they achieved later, and not in those first shaky hops in the year 1903. They achieved moderate success with their Flyer II in 1904, and their third aeroplane, the Flyer III of 1905, fulfilled all their hopes. The Flyer III could be completely controlled in the air, and was the first aircraft capable of being banked and turned and to perform figures of eight.

Meanwhile, European aviation, which had been moribund since the death of Lilienthal in 1896, was inspired in 1903 by the success of the Wright brothers, to start again. But the European pioneers were slow to grasp the techniques of control in the air. They concentrated only on getting their aircraft off the ground; consequently the machines of such pioneers as Santos-Dumont were capable only of flights measured in seconds, when by comparison the Wrights could remain in the air for up to half an hour at a time. Santos-Dumont made his first flights in his weird '14-bis' in October and November 1906, and these 'hops' caused a sensation in Europe.

The fact that the '14-bis' was a pretty useless aeroplane was immaterial—so too was the Wright aeroplane to a certain extent, as aircraft with forward elevators were far less practical than the now-familiar, tail-at-rear layout of subsequent designs.

It was not until 1908, when Wilbur Wright flew in France, that the second and decisive renaissance of European aviation took place. As Wilbur demonstrated his brilliant mastery of control in the air with the 1907 Wright Model 'A' the watching Europeans were astounded. The Wright 'A' was the culmination of the Wrights' achievements, and it brought about the triumph of aviation and the establishment of the powered aeroplane as a practical means of transport. Inspired, the European aviators began to evolve more practical and successful designs.

The chief reason for their eventual success was that, unlike the Wright brothers, who had firmly clung to the principle of inherent instability, the Europeans were convinced, rightly, that practical aircraft should be inherently stable. So the aircraft which appeared from 1909 onwards combined the principles of flight control so ably demonstrated by the Wrights, and the principle of inherent stability adhered to by the Europeans.

The aircraft build by pioneers such as Farman and Voisin were accordingly much easier to fly than those of the Wright brothers. Pupils of the Wrights could not relax whilst in the air, because the aircraft required to be piloted for every second of the flight.

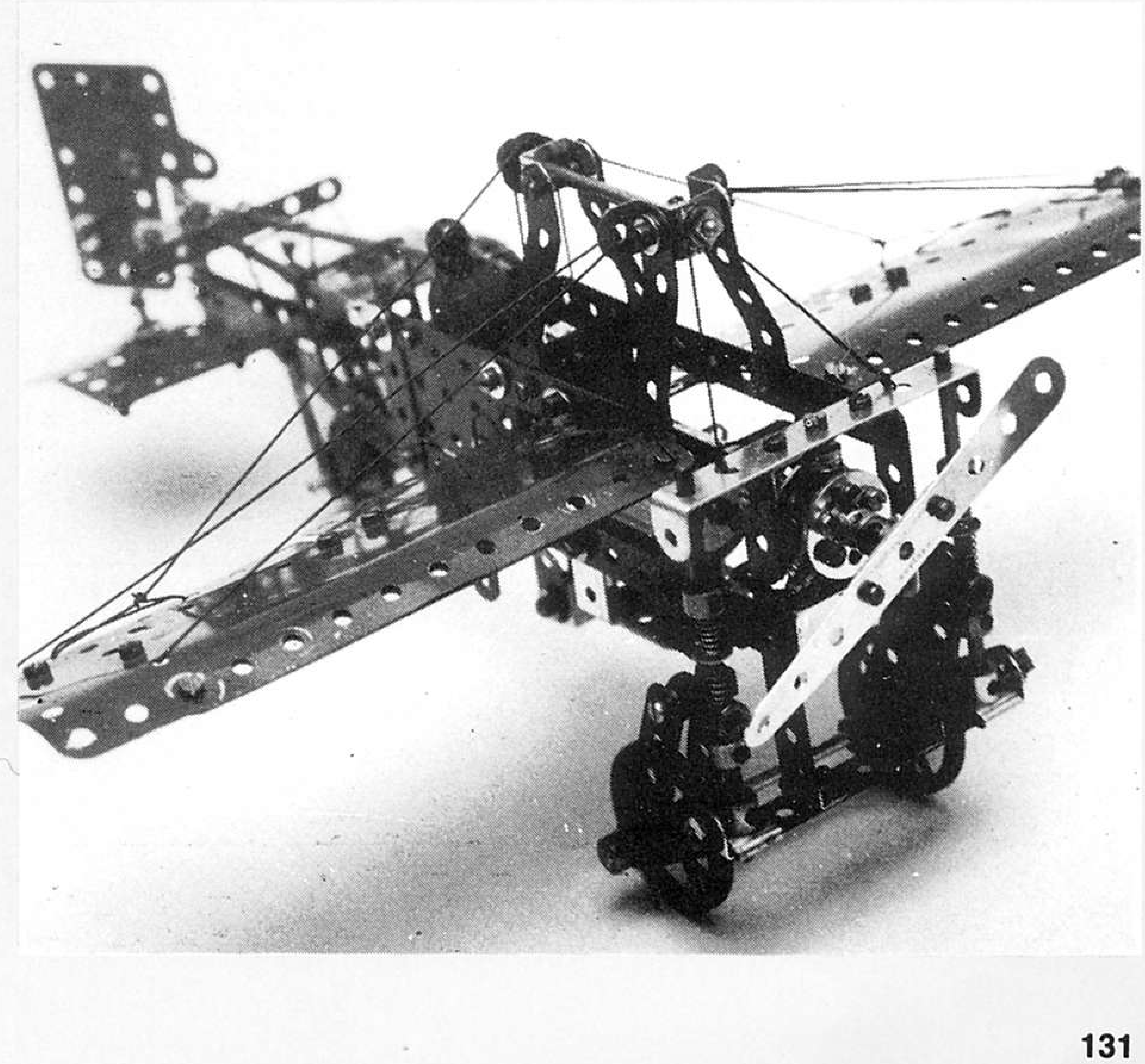
Beginning in 1908, a number of aviation meetings took place, chiefly in France, and these meetings did much to create an interest in aviation. Lord Northcliffe and the 'Daily Mail' did much to promote the cause of aviation by the award of large prizes for feats of flying. A few professional builders appeared on the scene at this time, among them the Voisin brothers in France and the Short brothers in England. Early pioneers in the U.K. included A. V. Roe, Horatio Phillips, and Samuel Cody. Cody was a key figure in the development of British military aviation in the decade before the First World War. He built the Army's first aeroplane and flew it at Farnborough. Nicknamed the 'Cathedral' because of its lofty dimensions, it was a dead-end design, but it helped to make people in Britain air-minded.

The outstanding aviation event of the year 1909 was Louis Bleriot's flight across the English Channel in July in his modified Bleriot XI (fig 1) for which he won the Daily Mail prize of £1,000. Luck played a large part in Bleriot's success, for his historic flight was made in a frail and quite unsuitable flying machine, whereas Hubert Latham, who attempted the flight several days previously, although using a robust Antoinette machine fitted with a 50 h.p. Antoinette engine, had the ill-fortune to suffer engine failure when several miles out, and was forced to 'ditch' in the Channel. The Antoinette aeroplanes, built by Leon Levavasseur, were elegant little mono-planes with tapering wings, bird-like tails and boat-shaped fuselage, and were powered by compact V-8 engines, which were fairly reliable for their day.

Bleriot's epoch-making flight made a staggering impact on the general public, and gave tremendous impetus to aircraft construction on a commercial scale. As a result of this historic Channel crossing the powered aeroplane became established as a practical vehicle.

The second notable event of 1909 was the great aviation meeting and the first air races at Rheims in August, with numerous prizes for distance, speed, and altitude; it was an outstanding success, for the aeroplane, in both biplane and monoplane forms, flew successfully before the public and journalists, and became accepted by the world at large. Notable amongst the many aircraft which flew successfully at Rheims were the Henry Farman III and the Curtiss 'Golden Flyer', both biplanes; and the Antoinette and Bleriot XI, which were

Fig. 1: Bleriot XI model. The landing wheels are paired Steering Wheels with their centre 'caps' removed.



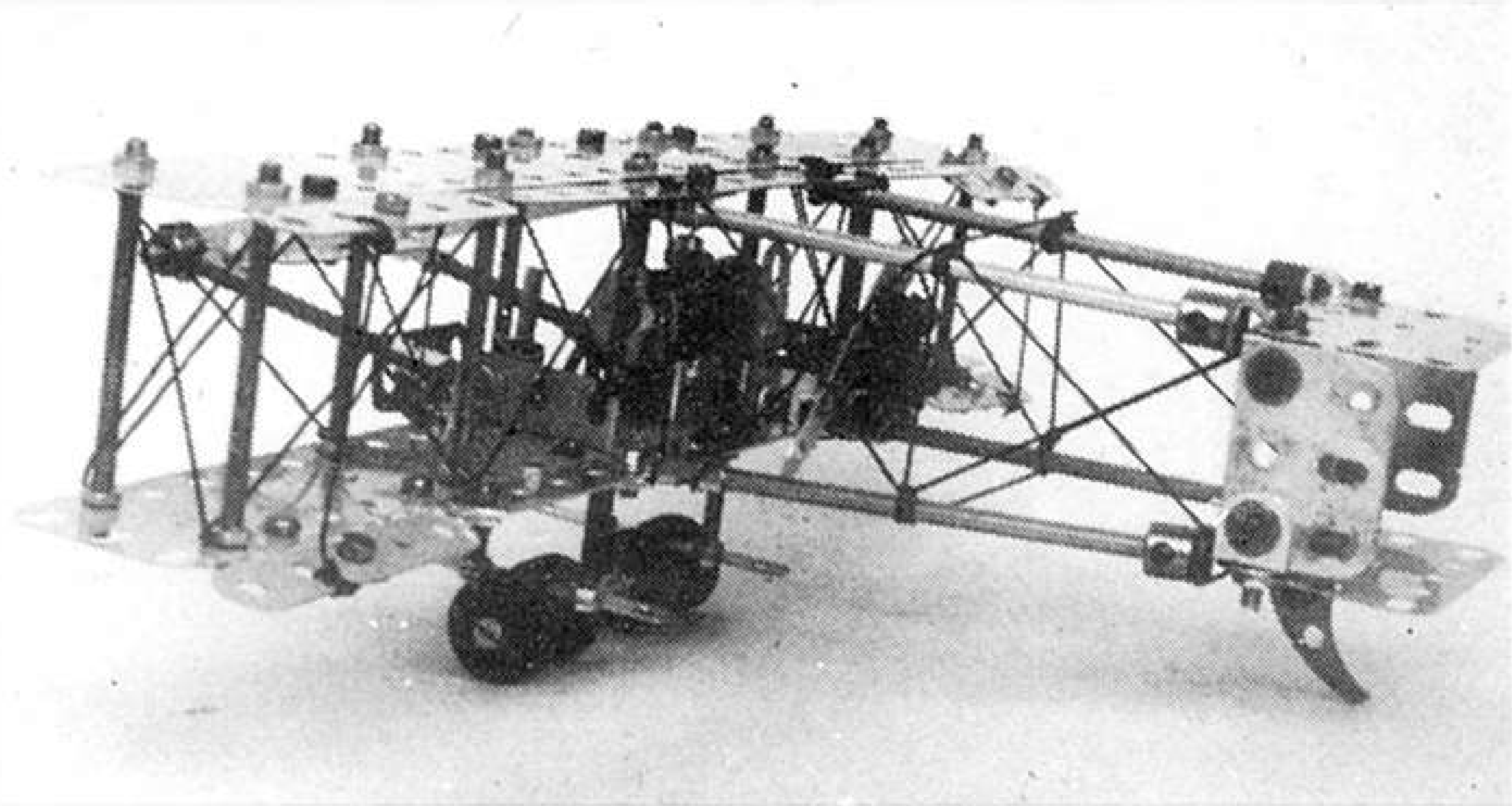


Fig. 2 The Bristol 'Boxkite'—an exercise in small-scale Meccano aircraft.

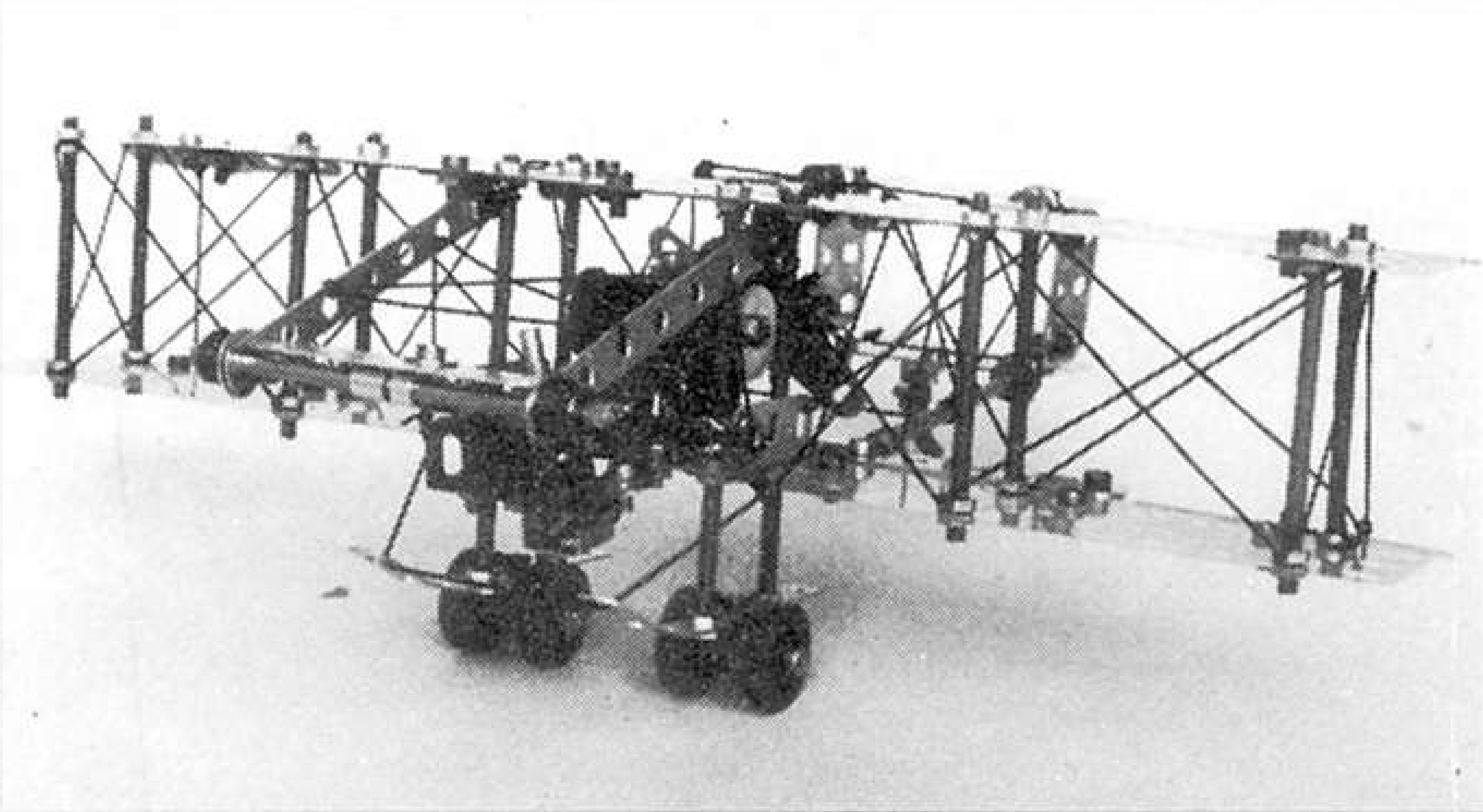


Fig 2a: Another view of the Bristol 'Boxkite'.

monoplanes. But it was the biplane configuration which, in tractor rather than pusher propeller form, came to dominate future design for many years.

In both America and Britain, until the epoch-making events of 1909, there had been pronounced lack of interest in aviation. But Bleriot's success, and the added impact of the Rheims meeting, inspired British pioneers such as A.V. Roe, the Short brothers, Frederick Handley-Page, and T.O.M. Sopwith, who became the founders of the British aircraft industry. In America, Glenn Curtiss and the A.E.A. (the Aerial Experiment Association) who had built aircraft such as the 'June Bug' and the 'Golden Flyer', were similarly inspired to produce further successful designs; although the aircraft industry in the USA remained at a low level for many years.

In the realm of propellers, the year 1909 at last saw a European design, the Chauviere, to equal the efficient designs of the Wright brothers. But the chief weakness in aviation lay in the engines, which on the whole were unreliable. Until 1909 the aero-engines commonly in use were the Wright 16 hp and 30 hp, and the Antoinette 24 hp and 50 hp. The Curtiss 50 hp V-8 powered Glenn Curtiss' Golden Flyer at Rheims and met with considerable success there and later.

But the greatest advance in engine design in the period 1903-14 was the Gnome 50 h.p. rotary engine, designed by Laurent Seguin and first used in June 1909. It was based on Lawrence Hargraves' design of twenty years earlier. An air-cooled 7-cylinder engine, it had the best power-to-weight ratio (3.3 lbs per h.p.) of any of the engines then available. This engine, and its successors, such as the Le Rhone, became the most popular type of aero-engines in general use until the development of more efficient and reliable radial engines a decade later.

Although the rotary outwardly resembled a radial engine, the cylinders and crankcase revolved about a stationary crankshaft. The crankshaft was hollow and bolted rigidly to the airframe, and the propeller was fixed to the revolving crankcase. A simple carburettor supplied petrol via the hollow crankshaft to the crankcase, from where it was drawn into the cylinders. Rotary engines used castor oil for lubrication, because it does not readily mix with petrol.

From the year 1910 onwards, practical aircraft designs appeared in increasing numbers; aeroplanes which were reasonably safe and easy to fly, with quite reliable engines; but on the whole, flying was regarded as a sport in the years up to 1914, rather than a serious mode of transport. During the period 1910 to 1914 a large number of aviation meetings and air races were held, and the competitive nature of these events helped to ensure that designs were continually improved.

Competitions such as the Daily Mail's London to Manchester air race in 1910 spurred on the enthusiasts to greater efforts. An example of the aircraft of this period is the Bristol 'Boxkite', a Meccano model of which is illustrated in Figures 2 and 2a.

This aeroplane first appeared in 1910 and was an improved version of the Henry Farman III. It was a commercial success and was used as a trainer by a number of flying schools, and also by the Royal Flying Corps.

In 1911 an event occurred which foreshadowed a use for flying machines which Wilbur and Orville Wright had never foreseen. This was the first employment of an aircraft as a machine of war, when during the Italo-Turkish war of 1911-12 a Bleriot XI was used by the Italians in a reconnaissance flight over the enemy lines at Azizia in Tripoli. Shortly afterwards the first bombing raids were made by the Italians, pointing the way to the future possibilities of air power.

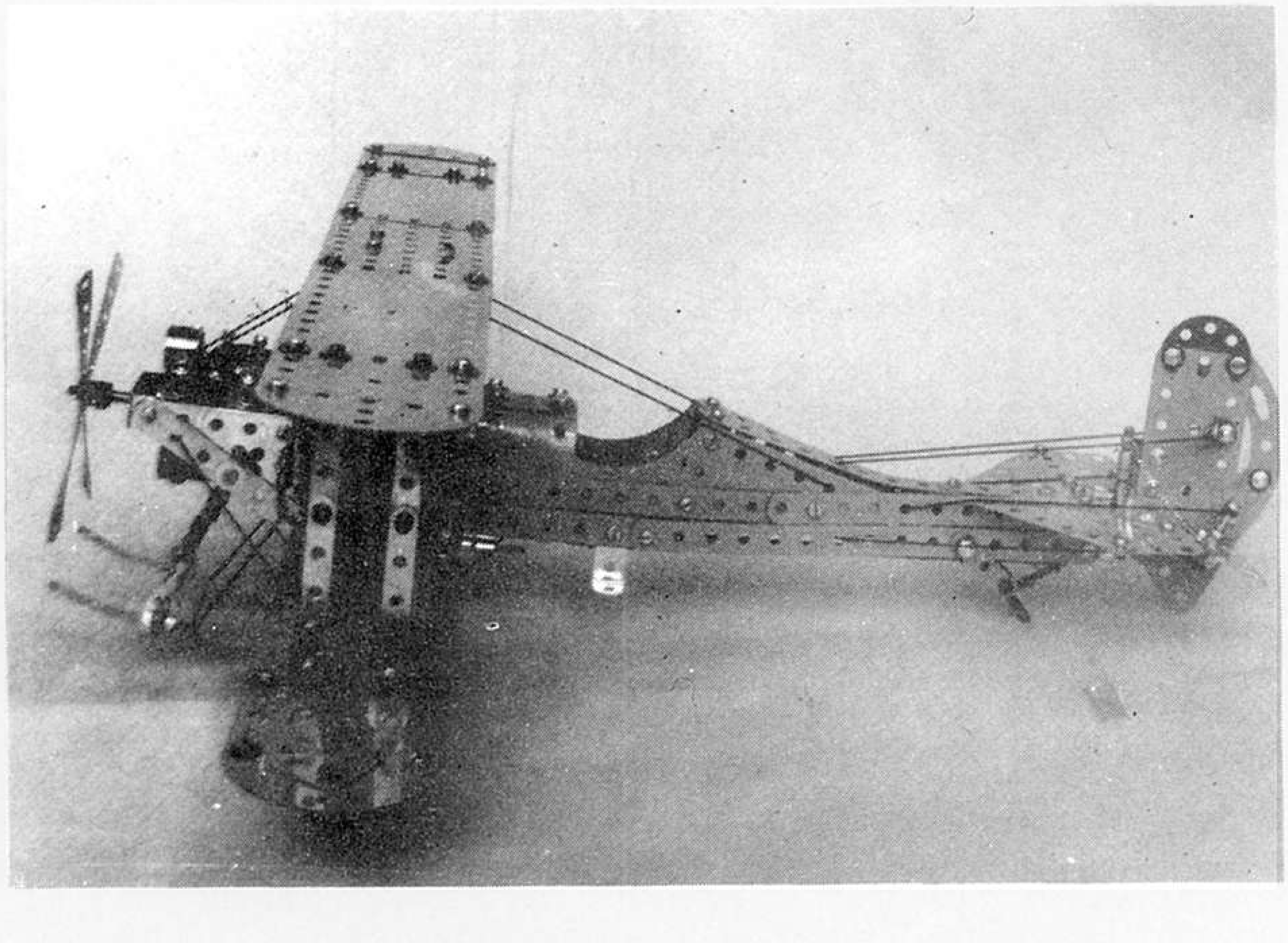
Also in 1911 the first experimental air-mail services pointed to the possibility of future commercial uses for the aeroplane. By 1912 what can be regarded as true air forces were in existence, and aircraft were being built expressly for military purposes. In Britain, the Royal Aircraft Factory was established in 1910, and machines such as the B.E. 2, which was to be used in great numbers by Britain in the forthcoming war, were developed specifically for the Army.

The B.E. 2 was to become one of the most famous aircraft in military flying history. It was an extremely stable aeroplane and an excellent flying observation platform. But in war, as events were to prove, this very stability resulted in its becoming an easy target for enemy aircraft.

A Meccano model of the B.E.2a of 1912 is shown in Figure 3. Notable features of the aircraft apparent from the illustration are the large gap between upper and lower wings, the uncowled engine, and the skids forming part of the undercarriage. The pilot occupied the rear cockpit, in theory to afford a better view for the observer from the front cockpit. In fact, in the B.E.2 and its variants, the observer's position was very restricted as he was surrounded by struts, wires, and the engine.

The B.E.2 formed the mainstay of the Royal Flying Corps, which was formed in 1912 and consisted of a Military and a Naval Wing. In 1914 these Wings became the R.F.C. and the R.N.A.S., the Royal Naval Air Service.

Fig. 3: Model of the B.E.2a, with generous use of yellow Parts to represent the fabric covering of the original aircraft.



Meanwhile the R.N.A.S., equipped with a variety of aircraft, were conducting experiments at sea, including the dropping of torpedoes from aeroplanes. In the USA the brilliant designer-pilot Glenn Curtiss produced the first really practical seaplanes and flying-boats in 1911-12. This and other developments persuaded the Royal Navy in 1912 to convert an old light cruiser into the seaplane carrier HMS 'Hermes', which ushered in a whole new era of naval warfare—although this was far from apparent at the time!

It is notable that the great majority of successful military aircraft of the time were biplanes, in spite of their more obvious shortcomings compared with the faster, cleaner monoplane. But because of a number of fatal crashes involving monoplanes in both France and Britain in 1912, a complete ban was imposed on monoplanes by the R.F.C. The resultant prejudice delayed the development of military monoplanes for over twenty years.

In spite of the scepticism of most military experts, not only in Britain but also in other countries, and the minor role which flying machines were expected to play, the World War which was soon to begin was to have a tremendous impact on aviation.

MECCANO MODELS OF AIRCRAFT OF 1903-14:

It seems that very few Meccano models of aircraft of this period have appeared in Meccano literature over the years. The only examples that the author has found in Manuals are the Bleriot-type model featured in the 1914-19 manuals, which was illustrated in Part 1 of this series, and an attractive No. 2 set model in the current series of Manuals.

A smaller, simplified version of the 1914 Bleriot-type also appeared in the 1914-19 manual as a No. 1 Outfit model. The paucity of aircraft models in the early years of Meccano seems strange in view of the interest in aviation generated at the time by such events as Bleriot's cross-Channel flight.

A model apparently of the Wright Type 'A' was illustrated in Gamages' catalogue in 1910; an illustration appears in the New Cavendish publication 'The Life Story of Meccano' published in 1976. Another example is the model of the Wright Flyer I of 1903, described and illustrated in the Meccano Magazine for July 1936; but although fairly large, being some 25" in wing span, the model is very inaccurate and incorporates very little detail.

A model of the Wright Flyer III of 1905 was featured in Part 2 of this series. Another example of aircraft of the period 1903-14 is the fine model of the Bleriot XI to a scale of about 1/12th, built by Roger Le Rolland and illustrated in the M.M. for April 1970—this model captured well the appearance of the original machine.

Another model of the Bleriot XI as used in the cross-Channel flight of 1909 is illustrated in Figure 1. The model is approximately 1/24th scale, with a wing span of 14½", and is fitted with a representation of the 3-cylinder 25 h.p. Anzani engine of the original, constructed chiefly from 1" Bush Wheels and Rod Sockets. The model also features sprung main undercarriage and movable control column and control surfaces. M. Bleriot is represented by an Aeroplane Constructor Pilot. Construction of the fuselage, and wing 'main spar' (which is a 12½" Strip) entails full use of the adjustment provided by the slotted holes in the various parts used, and also entails the use of Slotted Strips.

A Crane Motor is used to drive the propeller, and the limited space available means that the reduction drive obtained is only about 3:1, but if the power supply is not more than 3 volts the propeller revolves at a realistic speed. A larger reduction could be obtained by using a 1" Pulley instead of the ½" Pulley on the driven (propeller) shaft, but this would mean mounting the Motor ½" lower in the fuselage.

Another famous aircraft of the period, already mentioned, was the Bristol 'Boxkite' of 1910, which was inaccurately named, since it had no boxkite features, and in flight it resembled an aerial galleon, with its mass of struts and wires. The Boxkite is represented by the model shown in Figures 2 and 2a, and is to a scale of approximately 1/45. This small scale was deliberately chosen to investigate its possibilities for Meccano aircraft models, and certain aspects, such as the struts and spars, are considerably over-scale.

Lack of suitable slim tyres for the ½" Pulleys originally intended for the landing wheels necessitated the use of (!) Fischer-Technick ¾" pulleys to provide reasonably-scaled wheels. The wings consists of 1½" wide Flexible Plates with the chord increased to 2" by adding 7½" Strips or 7½" Braced Girders. The fuel tank mounted on the lower wing is a Sleeve Piece with ¾" Washers forming its ends.

The rotary engine is a Multi-purpose Gear Wheel and two Collars fixed on a 2" Rod which is free to turn in the boss of a Double Arm Crank forming the engine mounting; the Rod being retained by a further Collar. It will be noted that on the 'Boxkite' and similar aircraft of the era, the pusher propeller was mounted *between* the airframe and the engine. The centre section struts and undercarriage legs combined are 3½" Screwed Rods, the gap between upper and lower mainplanes being slightly less than 2". The front elevator is a 2½" Flat Girder, fixed to a 3½" Rod by a Right Angle R & S Connector (although two of these would be better), the Rod being pivoted through the front fuselage members as shown.

The third model illustrated in this issue is the B.E.2a of 1912, already mentioned earlier in this article. The B.E.2a was, as previously mentioned, built by the Royal Aircraft Factory at Farnborough and later versions were used by the RFC in large numbers during the 1914-18 war, chiefly for reconnaissance duties.

The model is to approximately 1/24th scale and is constructed mainly of yellow Meccano parts to represent the fabric portions of the full-size aircraft, and zinc-plated parts to represent aluminium and other metal parts. An exception is the elevators, which are zinc-plated 2" Flat Girders. Each side of the fuselage consists of 7½", 5½", and 4½" Strips, 2½" x 1½" Flexible Plates, Flexible Gusset Plates, and a 3½" x 1½" Triangular Flexible Plate. The engine mountings and forward part of the fuselage are constructed from 2", 3½" and 4½" Strips forming a triangle. The fuselage sides are joined by 1½" x ½" Double Angle Strips and also by a 3" Formed Slotted Strip curved to a diameter of 1½"; the sides are tapered towards the tail where they are joined, via the rudder post, by Right Angle Rod & Strip Connectors and Fishplates.

The 'engine' fitted to the model is a representation of the original's Renault 70 h.p. V-8 power unit, and is shown in the sketch, Fig. 4 and the photograph, Fig. 4a. The cylinder banks are Threaded Bosses or Rod Sockets fixed to 1½" x ½" Double Angle Strips, the D.A. Strips being bolted as shown to two 1" Bush Wheels.

A more accurate version of the engine may be modelled by utilising 2" Strips and Angle Brackets in lieu of the 1½ x 1½ D.A. Strips, thus providing four cylinders to each bank.

A 3½" Rod forms the dummy propeller shaft and also helps to locate the engine in its mountings. A 2" Screwed Rod carried in the upper holes of the Bush Wheels carries a Collar, the ends of two Tension Springs, and a Coupling. A Chimney Adaptor representing the air intake is fixed tightly to the Collar, by a short Bolt. The crankcase is a Channel Bearing which is a push fit between the Bush Wheels and is retained by a 1" x ½" Angle Bracket at the front. Rigid location of the engine is obtained by a 2" Slotted Strip connecting the crankcase and one of the 1½ x ½ Double Angle Strips bolted across the fuselage behind the engine.

The twin exhaust pipes are lengths of Spring Cord pushed into the free (rear) ends of the Tension Springs representing the manifolds, and run through guides which are Right Angle Rod & Strip Connectors. The sprung Tailskid is a Flexible Coupling Unit (Part No. 175) pushed through a hole of the Strip forming the underside of the fuselage rear, and secured *only* by a Collar held by bolts between two 1½" Narrow Strips pivotally attached to the fuselage. The tailskid is biased towards the tail by a looped 2½" Driving Band. The gap between upper and lower wings is 4", which is necessary to achieve the characteristic height of the B.E.2's upper mainplane. Interplane struts are overlapped Narrow Strips.

The model is inaccurate insofar as it has been built as a single-bay biplane, with only one pair of interplane struts each side, when in fact it should be a two-bay biplane, as shown in the illustration of the prototype, Fig. 5. Other details have been incorporated in the model, such as cockpit fittings, and external bracing and control wires, as shown in the illustration, Fig. 3.

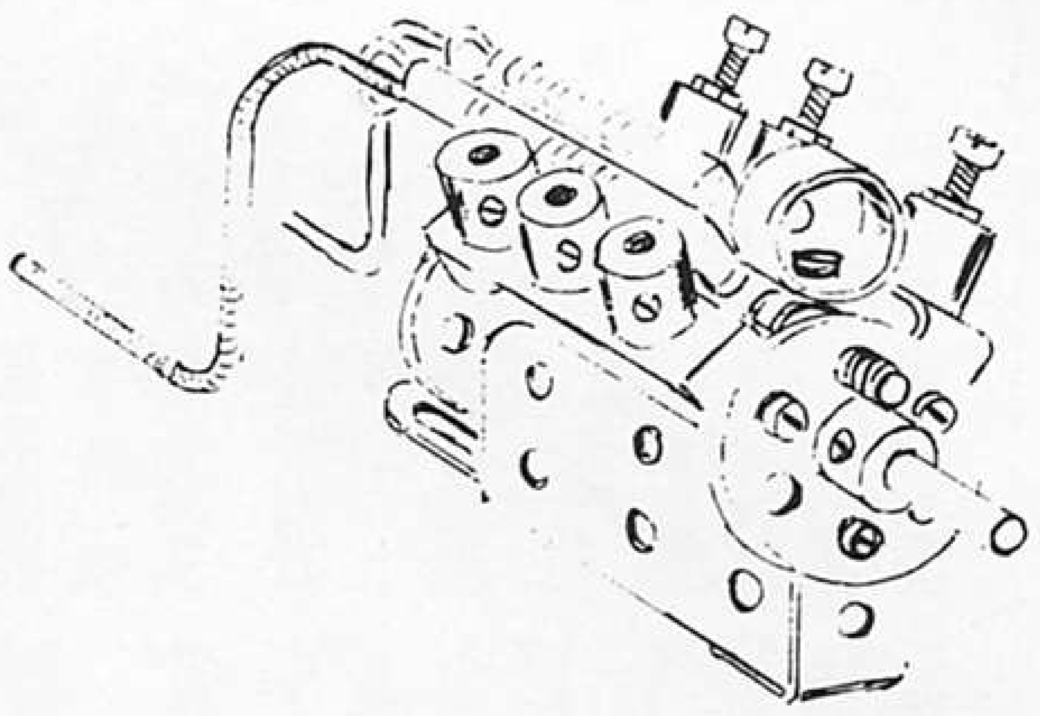


Fig. 4: General arrangement of the B.E.2a engine.

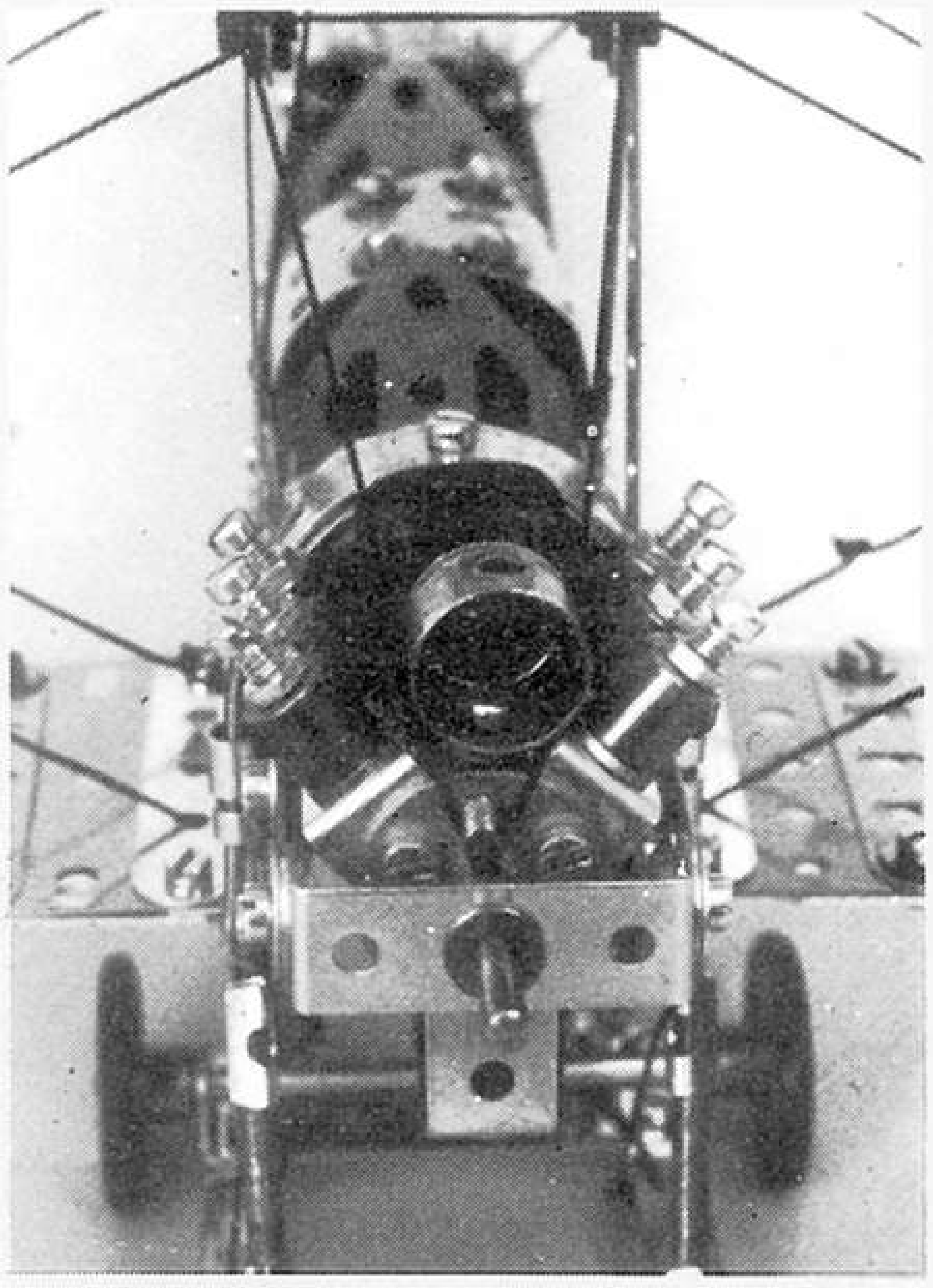


Fig. 4a: Close-up of the engine compartment of the B.E.2a—the airscrew has been removed temporarily.

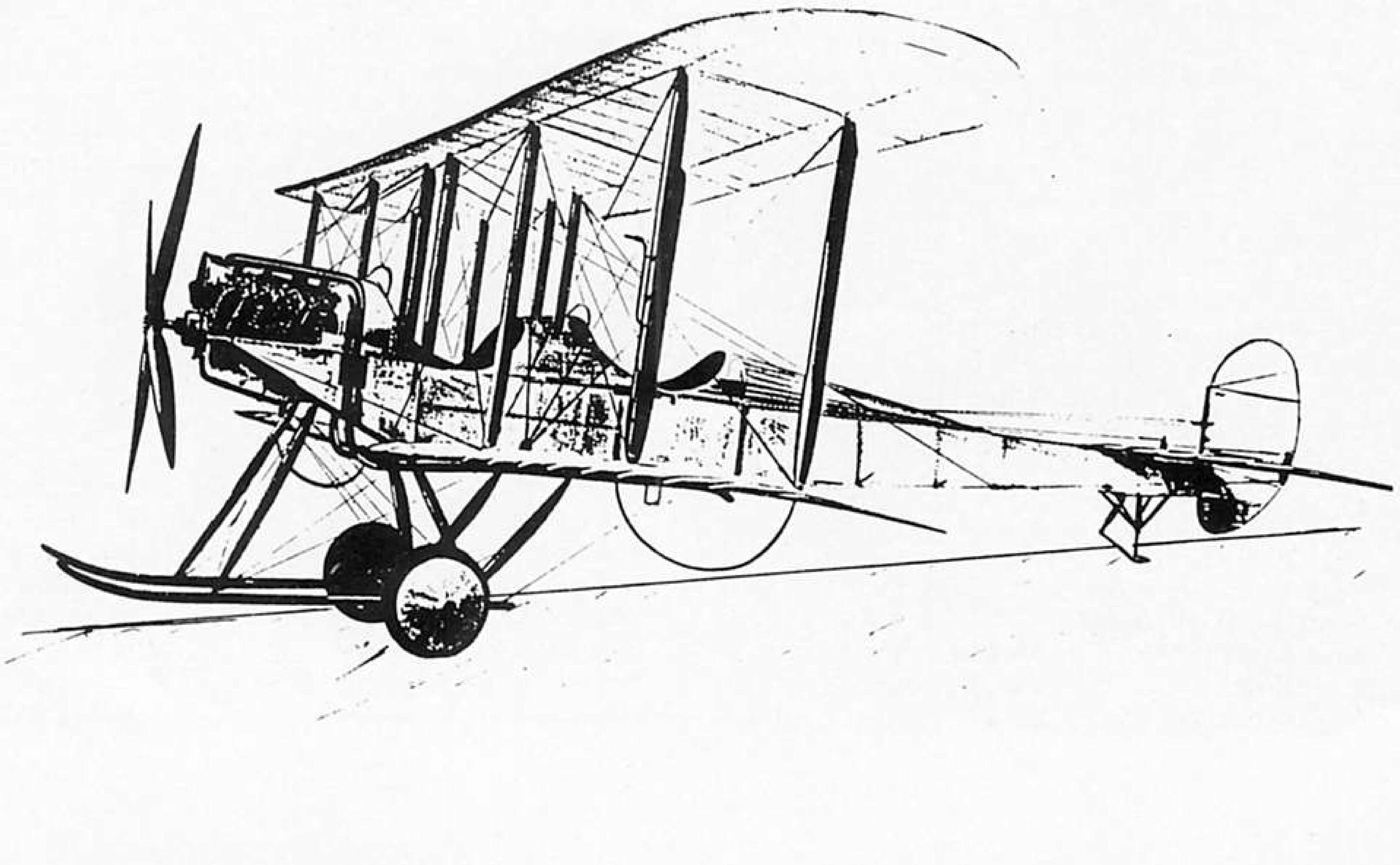


Fig. 5: Prototype B.E.2a of 1912.

DISNEYLAND MATTERHORN BOBSLEDS

FROM an original model by Jack Taylor and Bob Carter of the South California Meccano Club, rebuilt with modifications and photographed by Keith W. Cameron.

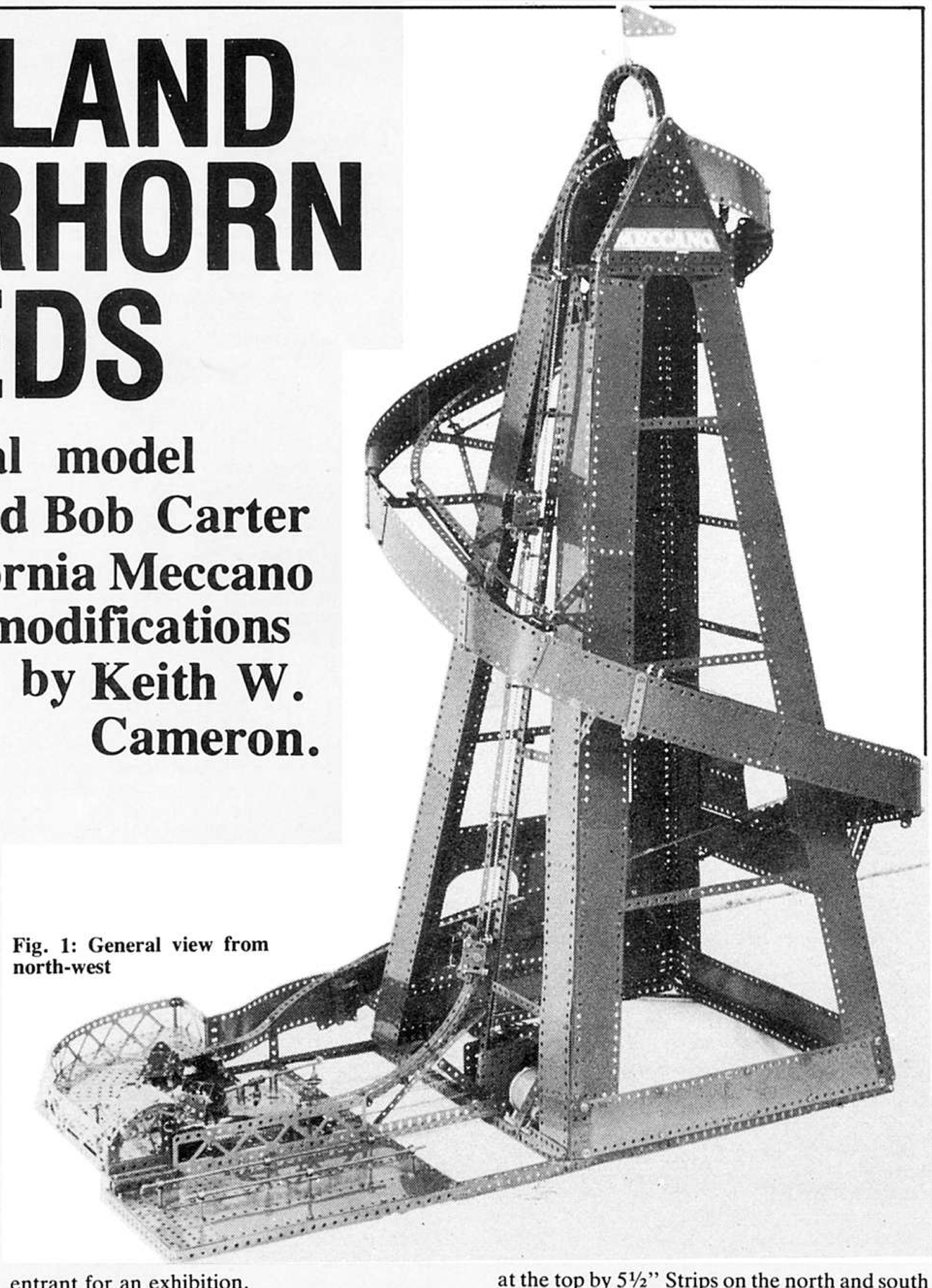


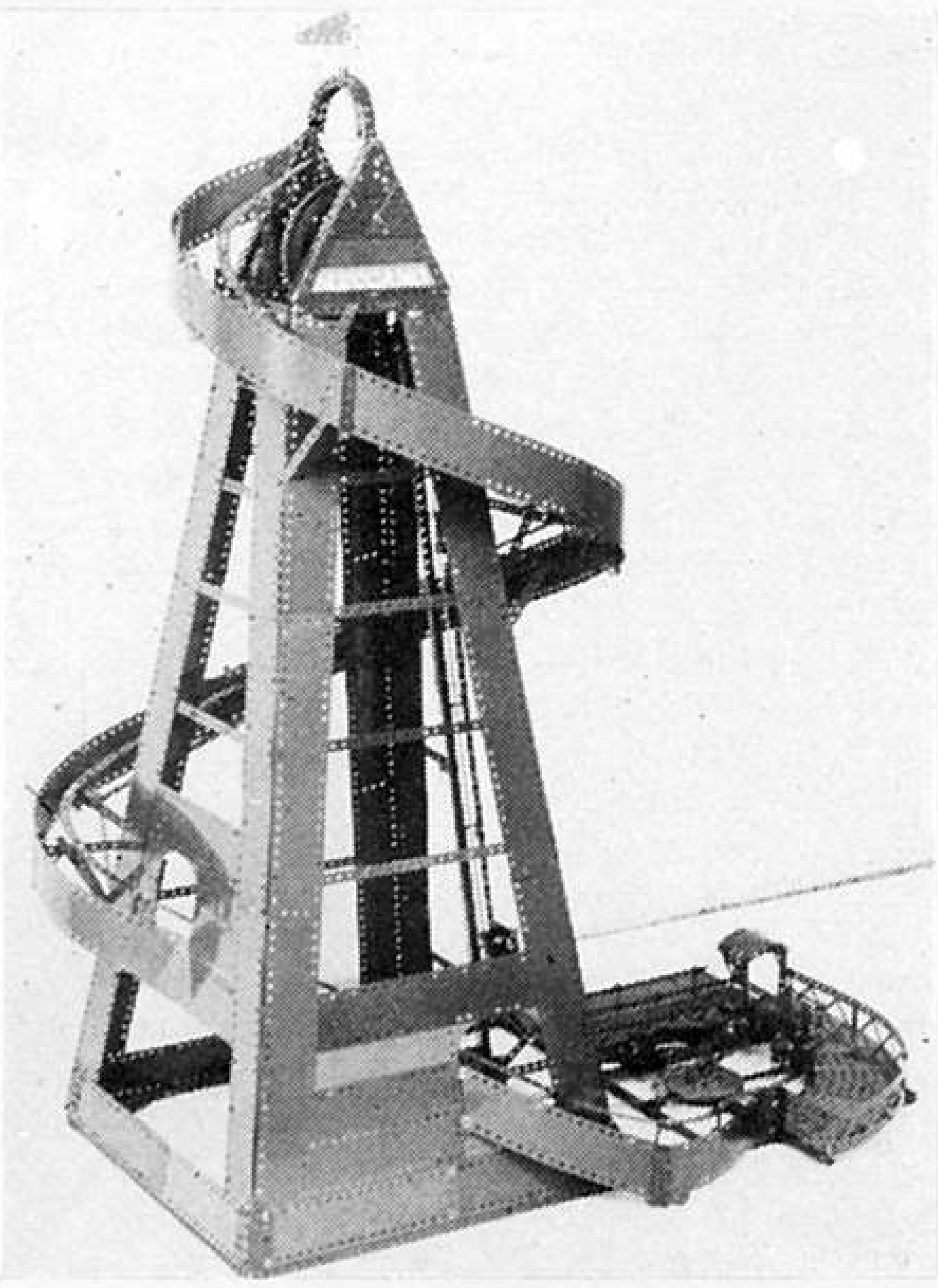
Fig. 1: General view from north-west

ONE of the most unforgettable rides at Disneyland, California, is the Matterhorn Bobsleds. The miniature Matterhorn is 146 feet in height, with two bobsled tracks, one on each side of the mountain, each track about 1200 feet long. A dozen bobsleds on each track can carry over 1800 passengers an hour, and on a summer afternoon there may be a long queue winding around the base of the mountain, with a two hour wait.

In this model, the bobsleds are taken at a steep angle up one side of the mountain tower, over a large wheel at the summit, and released to hurtle around the 'mountain', even inside the lower section, and down to the base station. As constructed, four bobsleds can be operated at one time, with a waiting period at the station. The model will run continuously without attention. Many variations in design are possible, to suit individual taste and numbers of parts available.

Side members of the tower and the bobsled track are shown lined with Strip Plates. This is done entirely for enhancing the appearance and is not necessary for correct operation. Some builders may well decide on different methods of 'decoration'. Although basically similar to the well-known 'scenic railway' or 'big dipper', the model incorporates enough new action and style to make it a novel and eye-catching entrant for an exhibition.

Fig. 2: General view from south-east.



The parts list is quite modest for a large model, not being much in excess of a No. 10 set. In the instructions, points of the compass are used to denote the parts under description. North is that aspect of the model where the station platform is situated.

THE BASE Figs. 1, 5, 6

West side, a 24½" and an 18½" Angle Girder, overlapping 11 holes, same length girders on east side but overlapping 13 holes. These two composite girders are joined by six 18½" Girders placed as shown. Note position of flanges. The base is completed by the addition of two 12½" Strips, a 9½" Strip, a 12½" Flat Girder, and a 24½" Angle Girder.

Two 12½"x2½" and one 9½"x2½" Strip Plates, a 5½"x2½" and a 4½"x2½" Flat Plate are added at the north-west end, and railings added for queues—two 11½" Rods held in Collars locknutted to 1 ⅛" Bolts. A Ball Race Flanged Disc is bolted where the radially placed strips meet the 18½" Angle Girder. A Channel Bearing is fixed to that same Angle Girder just to the east of the 24½" Girder, another Channel Bearing to the 12½" Flat Girder.

THE TOWER Figs. 1, 2, 3, 4

Each side is a 24½" and an 18½" Angle Girder overlapping seven holes forming a truncated pyramid 18½" square at its base where it is attached by ½"x½" Angle Brackets to the Angle Girders of the base. The sides are joined at the top by 5½" Strips on the north and south sides, and by 7½" Strips on east and west.

The tower should now be either finished with Strip Plates or with appropriate struts and braces for rigidity. Horizontal strips (some regular, some composite) are added for strength and appearance. If Strip Plates are used, their free edges should be strengthened by 12½" Strips running their full length and overlapping the cross strips.

A support for the track lift is made from a 24½" and an 18½" Angle Girder overlapping eight holes and held on the north aspect of the tower, flanges inward and to east, being bolted above to the 5½" Strip and below to a Fishplate fixed to the cross Girder. This composite girder is braced by a 7½", a 5½" and a 4½" Strip, all being fixed horizontally between it and the north-west side girder. The four corners of the base below the tower should be braced with 5½" (or longer) Strips.

THE SUMMIT PULLEY Figs. 7, 12, 13

Two 7½" Strips are bolted to the 5½" Strips at the top of the tower, using ½"x½" Angle Brackets and the top hole of the flange of the track-lift-support girder. These 7½" Strips, spaced three holes apart, with their surface planes vertical, support two Corner Gussets each. The upward pointing Gussets have bolted to them a 4½" Angle Girder on the east and a 5½" Angle Girder on the west. The free flanges of these Girders are supported by being bolted to a 2½" Strip and a 2" Strip, which converge to be connected by an Angle Bracket to the outer 7½" Strip in each case.

A 2½" Rod is journalled in the fifth hole from the lowest in each Angle Girder, and the Rod carries Collars and a 6" Pulley, which has had its groove partly filled with three carefully placed 15" Driving Bands to provide a flat surface for the chain. See diagram Fig. 24. The lower Corner Gussets carry a 2½" Rod in their lowest hole and this rod carries Collars and a 1" Sprocket Wheel.

THE BOBSLEDS Figs 8, 9, 13

These should be assembled next in order to have them available to check out the track and chain lift as they are assembled. Each bobsled consists of a lower frame made from a rectangular arrangement of 1½" Strips, front and rear, and 2" Strips on each side. These strips are held together, the 2" Strips *above* the 1½" Strips, by ¾" Bolts at each corner of the rectangle. The Bolts are head down, and each carries two ½" Brass Pulleys, a Washer, a Nut, two Washers, the two strips, and a locknut. Only allow enough play in the Pulleys for free rotation.

Adjust the assembly so that a 12½" Strip can run through the grooves and between the corresponding sets of Pulleys on each side without slipping out. Considerable play is correct—it is needed for curves. The bobsled body is composed of two Trunnions joined by a 1½"x½" Double Angle Strip. On each side are 1½" Flat Girders connected to the Trunnions by ½"x½" Angle Brackets bolted to their irregular holes. One Flat Girder has a Pawl without Boss fixed to its lower central hole by an Obtuse Angle Bracket.

Two ¾" Washers are bolted to the corresponding hole of the other Flat Girder for balance. Body and frame of the bobsled are united by a 1½" Strip bolted to the centre holes of the 2" Strips and to the centre hole of the Double Angle Strip. Note the direction of the Pawl. Its point should be 1" below the level of the groove of the upper set of Pulleys. A double set of Pulleys is used to provide tracking at joints, where the lower pair ride on Fishplates spaced from the main track by *two* Hexagonal Nuts. This prevents jamming of Pulleys on rounded ends of strips. *Metal* pulleys must be used, plastic pulleys wear excessively.

TRACK

As already noted, Hexagonal Nuts *must* be used on all track sections to allow the bobsled

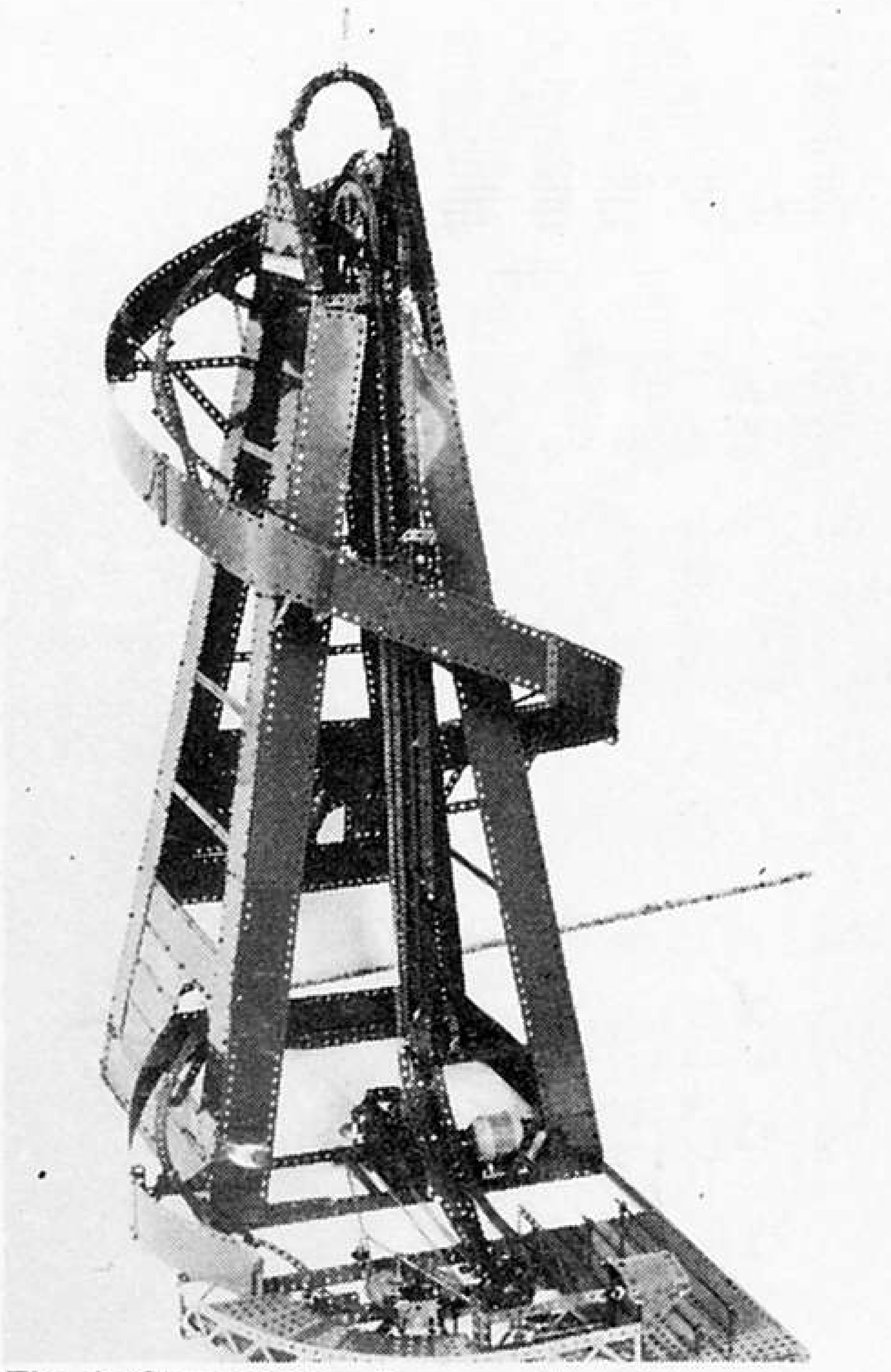


Fig. 3: General view from north-east

Fig. 4: General view from south-west

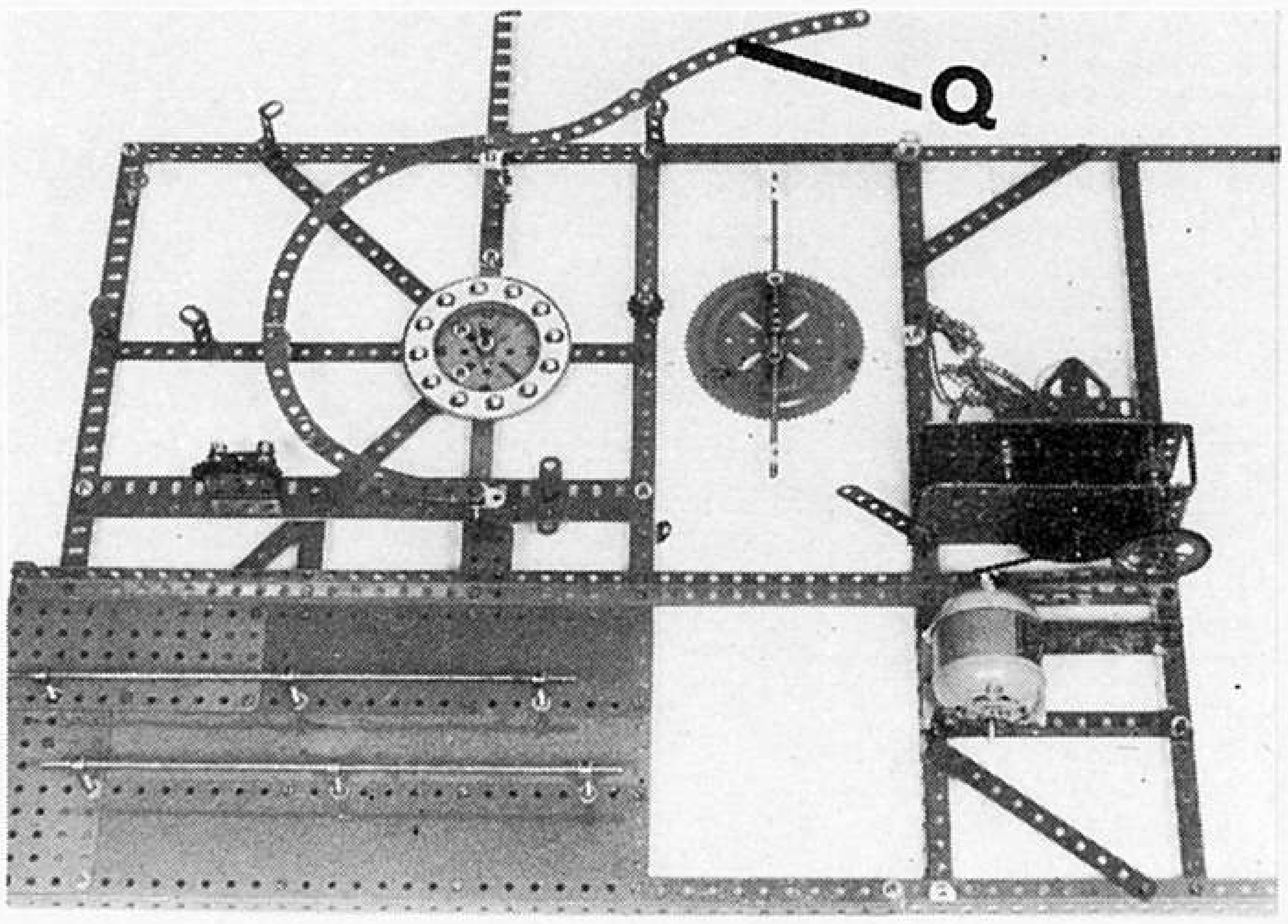


Fig. 5: Base, north end, from above

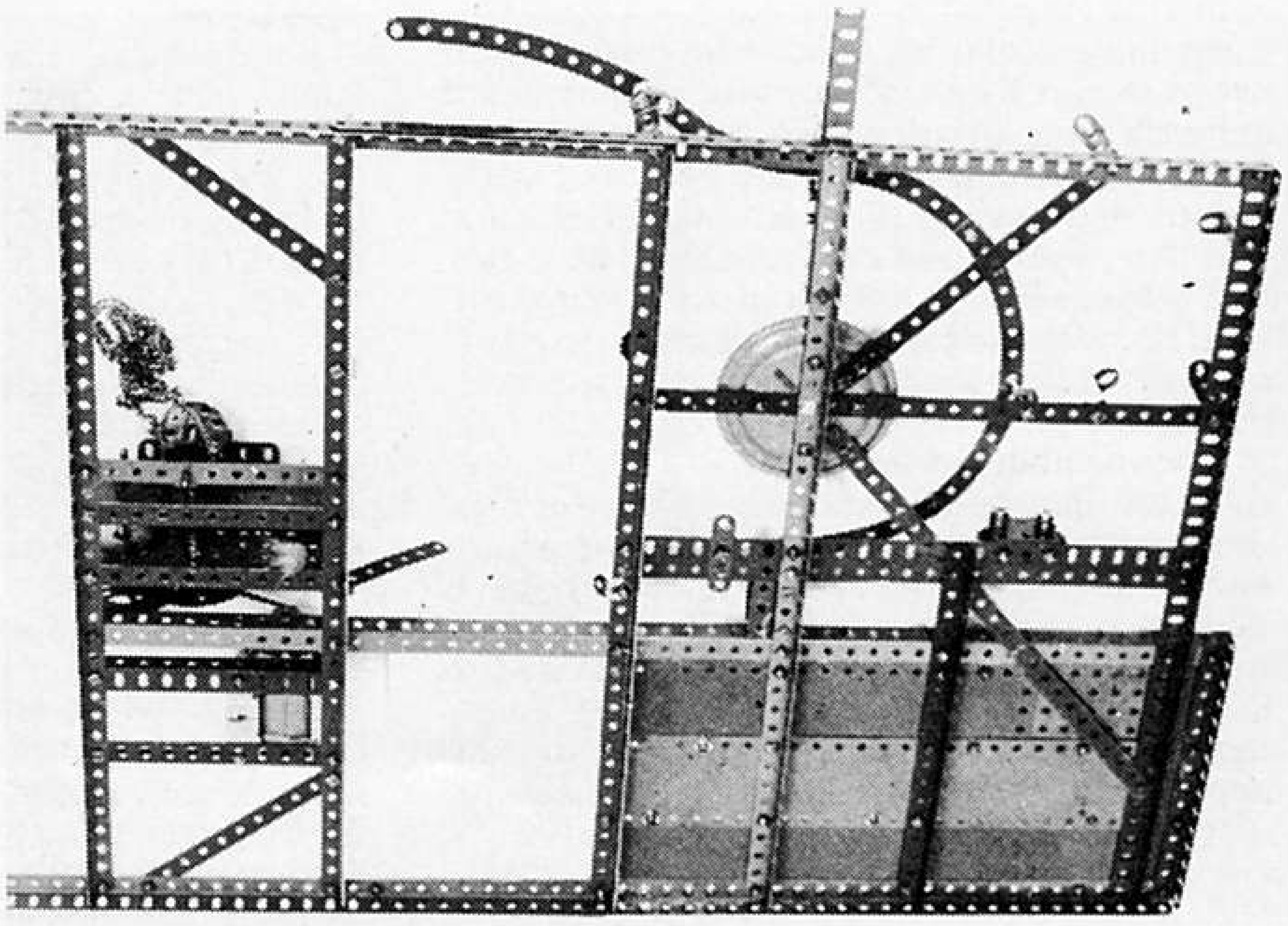


Fig. 6: Base, north end, from underneath

Below: Fig. 7: Summit pulley, summit track and supports

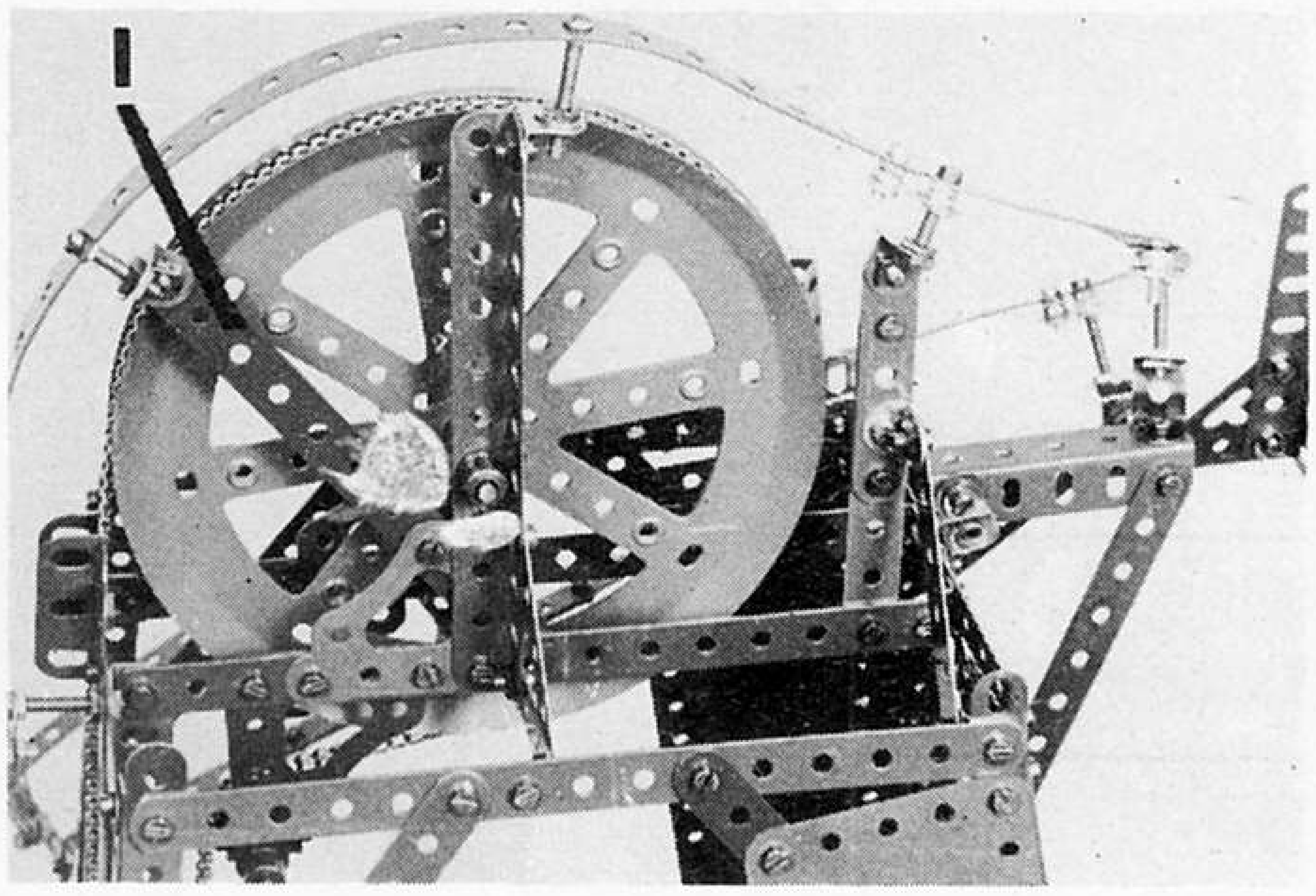


Fig. 8: Bobsled, dismantled to show frame and body separately

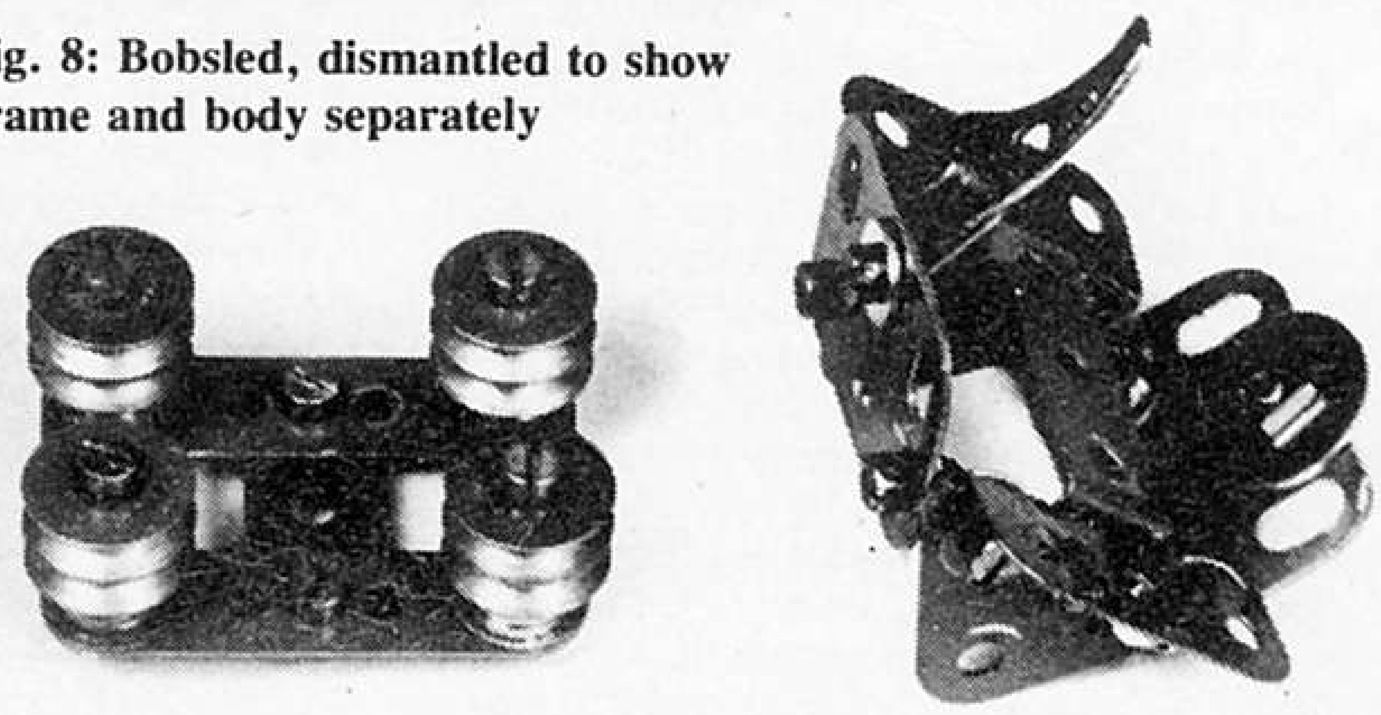
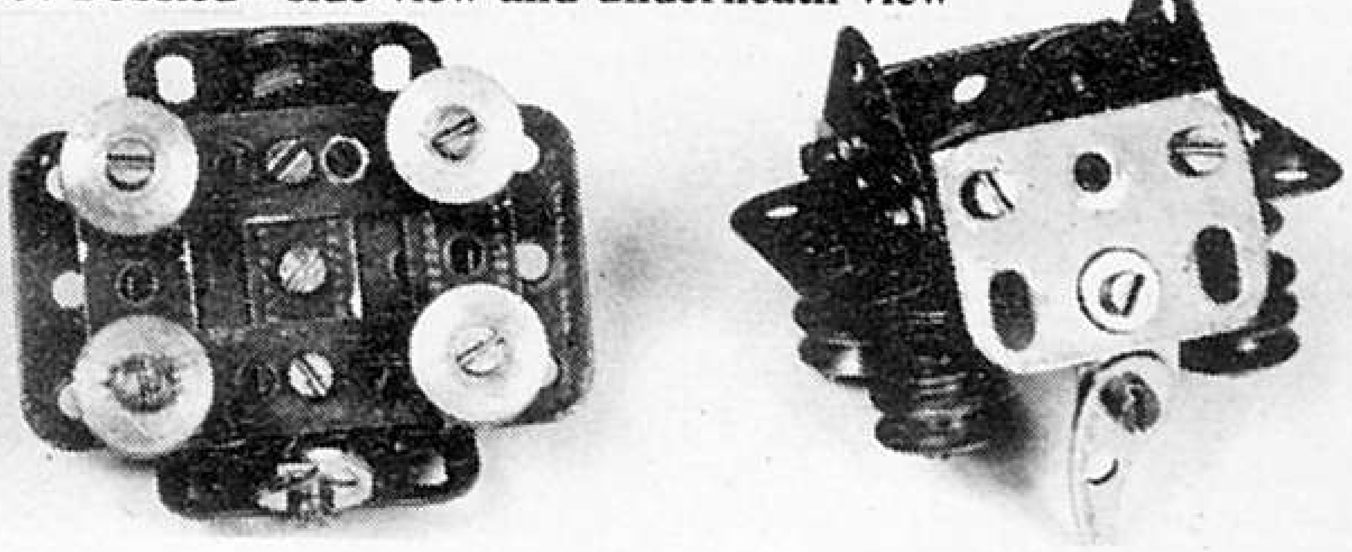


Fig. 9: Bobsled—side view and underneath view



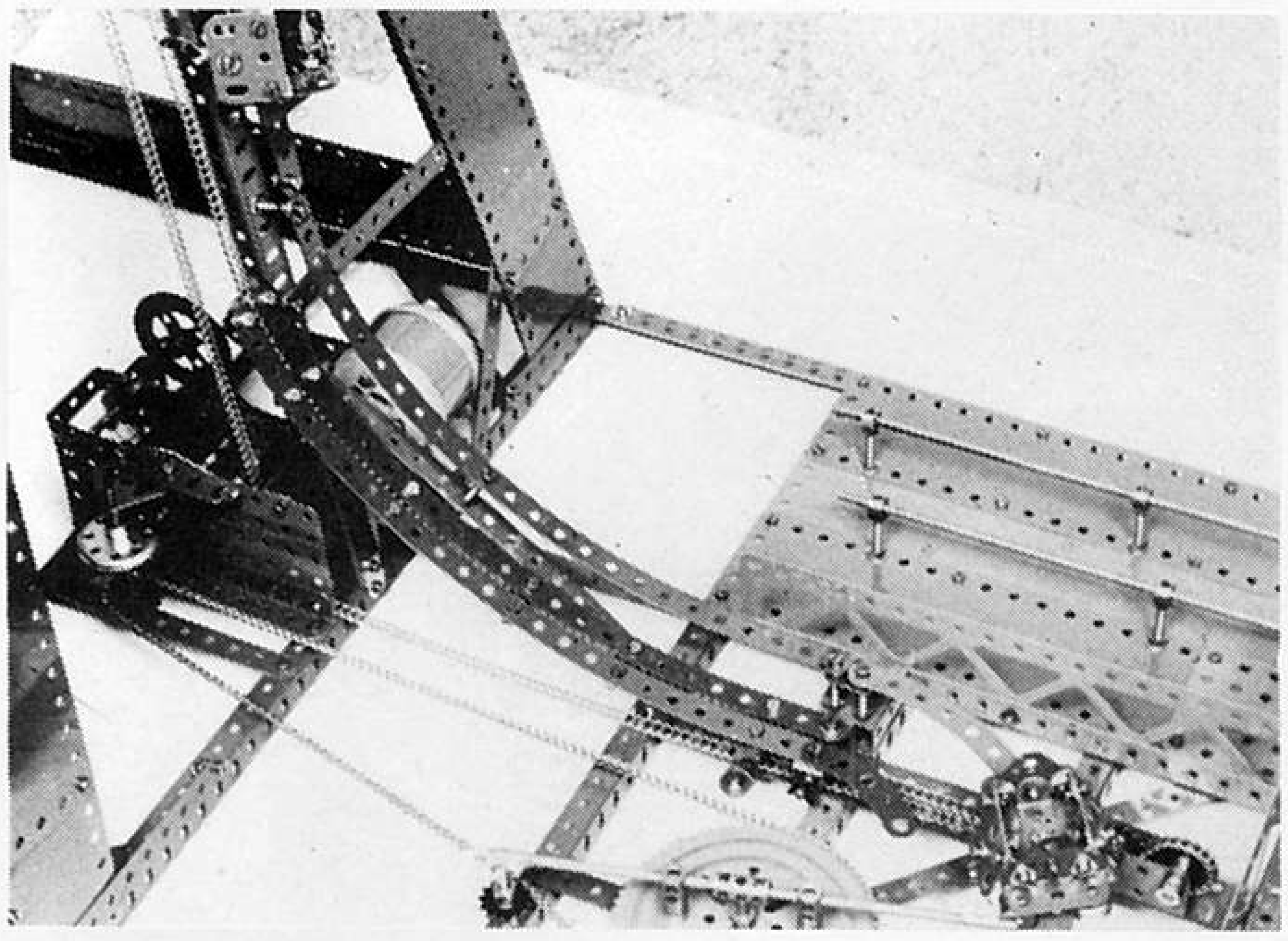


Fig. 10: Lower lift track, chain guide, gearbox and chain (from east)

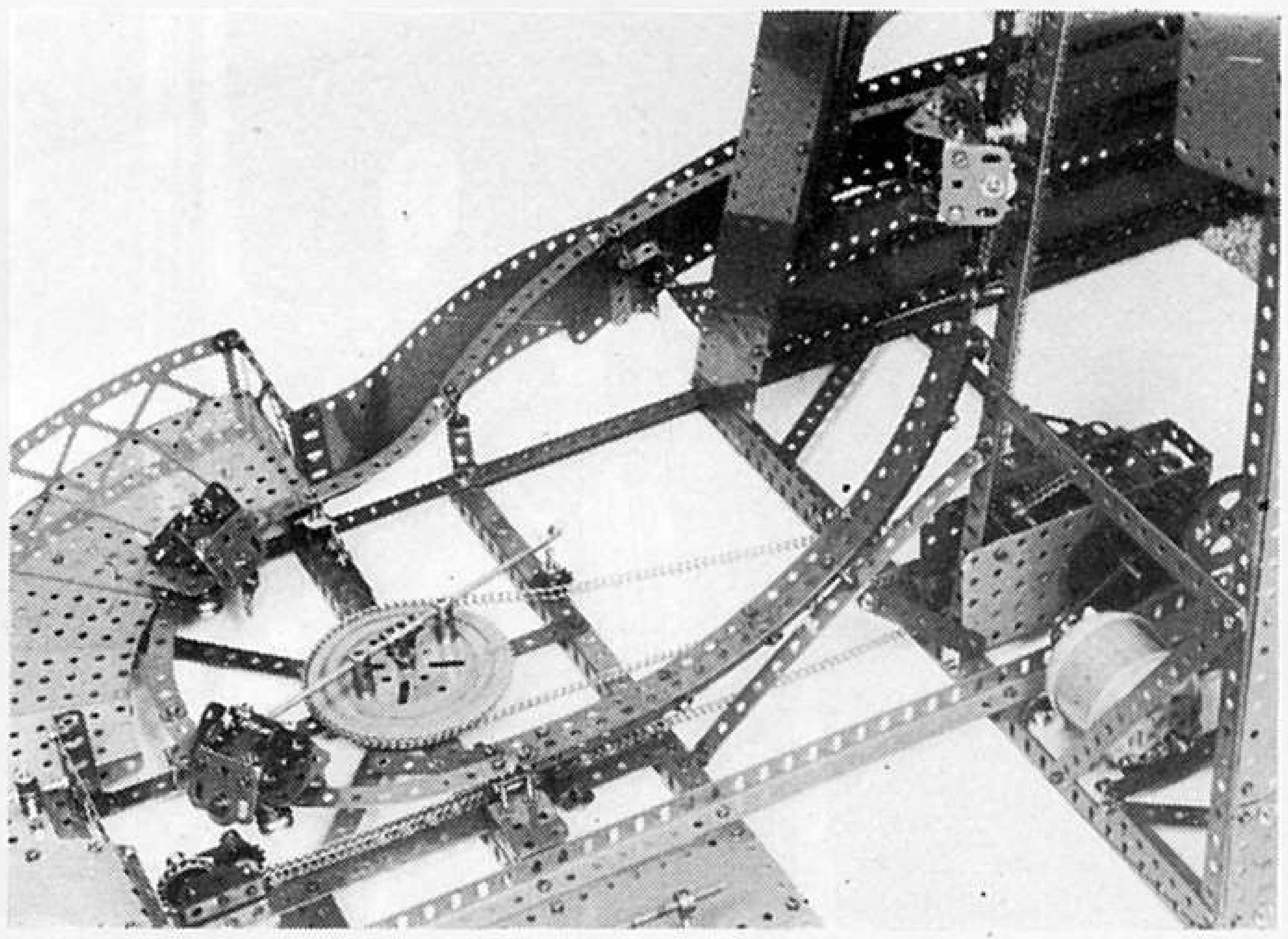


Fig. 11: Same as Fig. 10 from west. Bobsleds on semicircular track.

wheels to pass. No Washers can be used. To simplify description, the following terms will be used uniformly:

Simple support: This is a ¾" or 1⅛" Bolt secured with a Hexagonal Nut and locknutted to the part described.

Track joint: All joints (*except* at the 'semi-circle') comprise a Fishplate spaced from the end holes of neighbouring lengths of track strips by *two* Hexagonal Nuts and secured by a third Nut on each Bolt. ⅜" Bolts are used for the purpose of simple connection of strip and Fishplate but a *Joint-support* will be specified where the Bolt serves both purposes of connection to Fishplate and support to frame. Square Nuts can be used on supporting Bolts to locknut to the frame.

SEMI-CIRCLE Fig. 5

This portion of track is laid first. It consists of a semi-circle of four 4" Curved Strips and an approach strip, five in all. To preserve the correct shape, no Fishplates are used, but each Curved Strip overlaps the one ahead—ie to the west. At the east end of the semi-circle a ¾" Bolt simple support is locknutted in the short lug of a 1"x½" Angle Bracket, which is fixed by a 1" Corner Bracket to the upturned flange of a 7½" Angle Girder bolted at the east end of an 18½" Angle Girder of the base.

At the northernmost point, the track is joined and supported on a 1⅛" Bolt locknutted in one lug of a ½"x½" Double Bracket bolted to the 12½" Strip. At the western end the track is held on a 1⅛" Bolt carrying a Fishplate and locknutted to the Channel Bearing. The joints between the Curved Strips not mentioned are left unsupported. They can be opened conveniently as required to slip bobsleds on the track.

LOWER LIFT TRACK Figs. 10, 11

This concave section leads the bobsled to the steep climb of the tower section. It is a 12½" Strip formed to a curve similar to that of the inner edge of a 5½" Curved Strip. The lowest hole of this formed strip is supported on a 1⅛" Bolt which is also fixed to the Fishplate and Channel Bearing of the semi-circle. The upper end hole of this formed strip is secured by a 1⅛ Bolt (with Fishplate and three Nuts) locknutted to the 16th hole from the bottom of the track-lift-support girder.

A further 1⅛" Bolt for simple support at the 14th hole from the north end of the formed strip is locknutted in an obliquely placed 7½" Strip, this bolt also securing a ½"x½" Angle Bracket. This 7½" Strip is held at each end by Obtuse Angle Brackets attached to the 18½" Angle Girder and the track-lift-support girder—10th hole from the bottom. The ½"x½" Angle Bracket is bolted to a 3½" Strip secured to the west gear plate.

TOWER LIFT TRACK Fig. 1, 12

From below this consists of a 5½" Strip and two 12½" Strips joined with Fishplates and supported on 1⅛" Bolts locknutted to the track-lift-support girder at each join and at the halfway point of the longer strips. This should result in the topmost hole of this track being opposite the next hole to the top of the track-lift-support girder. Run a bobsled along the track so far completed, to assure free running. Tighten all nuts.

SUMMIT TRACK Fig. 7, 12

Add supports as follows: 1) An obliquely mounted 5½" Strip 1, its lower end bolted to the 7½" Strip immediately behind the Corner Gusset, its 4th hole bolted to the upper irregularly placed hole of the Corner Gusset, an Angle Bracket bolted to its top hole. 2) A 4" composite Strip bolted vertically to the 7½" Strip (hole next to the south end) and supported by a slanting 3" Strip held by ½"x½" Angle Brackets to it and the outside 7½" Strip of the tower.

Bend a 12½" Strip so that its first 9 inches conforms to a circle of 8" diameter. Give the remaining 3½" a twist to the left of about 10°. Slightly straighten out the first 2" of the formed end and attach by the end hole to a Fishplate at the top of the tower lift track, using a 1⅛" Bolt to secure it to the 5½" Strip. Fix the next Bolt (¾") through the 10th hole of the track and locknut to the Angle Bracket at the end of the oblique 5½" Strip 1.

The third support point is a 1⅛" Bolt locknutted to a ½"x½" Angle Bracket bolted to the top of the vertical 5½" Angle Girder. A Round Headed Bolt should be used at this support point because the convex track might cause the bobsleds to jam on a Cheese Head Bolt. Old-style Bolts can be used elsewhere. At the other end of the summit track there is a *Joint-support* to a 4" Curved Strip, a ¾" Bolt in the latter being locknutted to the Angle Bracket at the top of the composite 4" Strip. Run the bobsled over this section of track and adjust track height around the circumference of the 6" Pulley. With the bobsled seated level on the track, the tip of the Pawl should bear gently on the rubber surface of the Driving Bands. Adjust the position of the Pulley on the Rod also. A length of Chain should be laid in the Pulley and manually worked to produce smooth propulsion of the bobsled over this section.

DESCENT TRACK Figs. 12, 14 - 19

Each separate strip comprising the track will be given an identifying letter.

A - 4" Curved Strip: **Joint-support** above to summit track as already described; **track-joint** below to rail B.

B - 4" Curved Strip: **Joint-support** above to A, using 1⅛" Bolt locknutted to ½"x½" Double Bracket bent to slope of track and held at end hole of 2½" Angle Girder fixed to the 5½" Strip of the tower by Corner Angle Bracket and braced below by 4½" Strip and ½"x½" Angle Bracket. **Joint-support** below using 1⅛" Bolt lock-nutted to 1"x1" Angle Bracket bent to conform to slope and attached with 1" Corner Bracket to 5½" Strip braced with 3½" Strip. Outer end of 5½" Strip holds 3½" Angle Girder braced by 1½" Corner Bracket for support of Strip Plates.

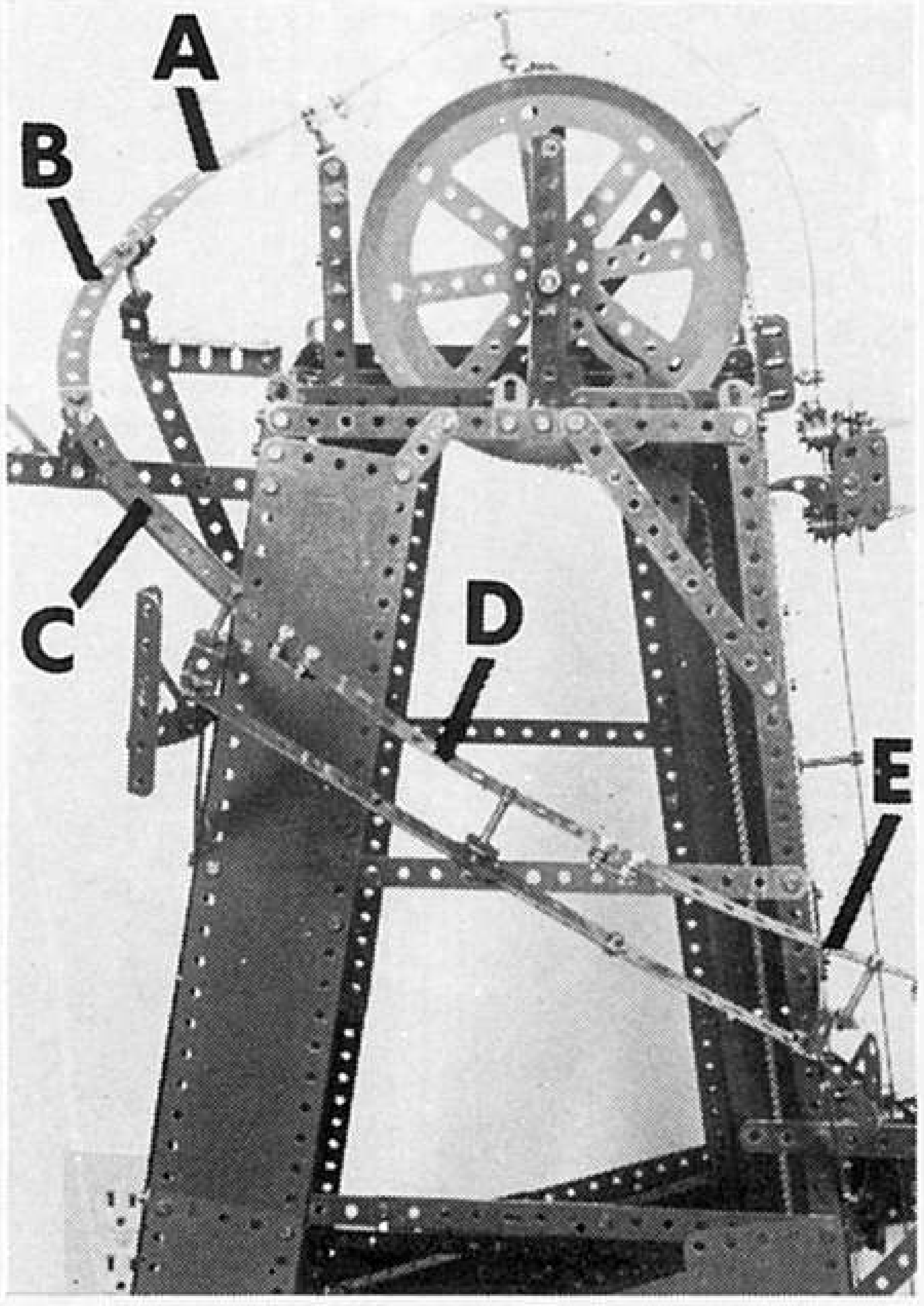
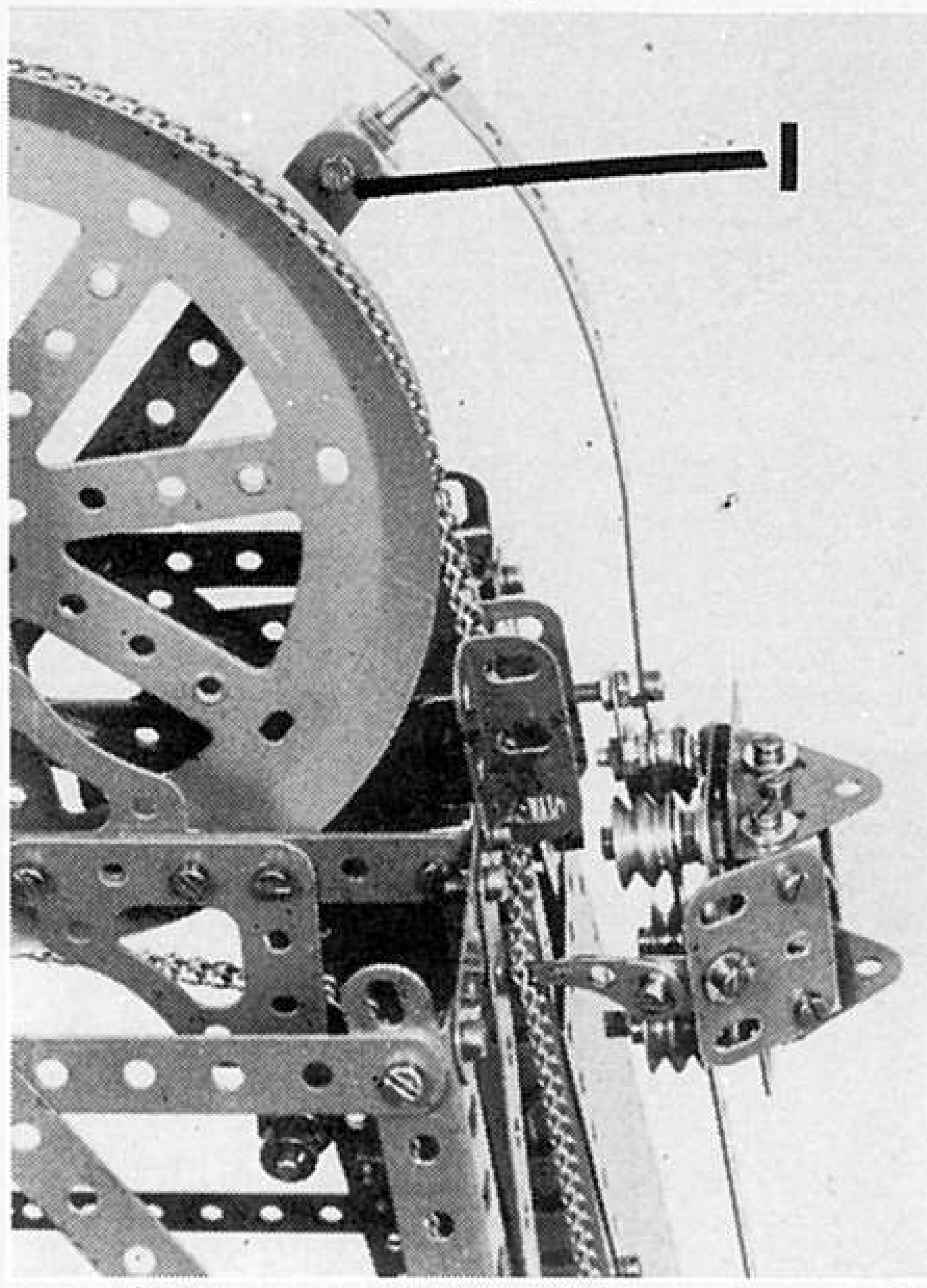


Fig. 12: Summit pulley and track from east, some plates removed.

Below Fig. 13: Bobsled approaches summit.



C - 5½" Curved Strip: **Track-joint** above to B. **Simple Support** at 9th hole, 1⅛" Bolt locknutted to ½" Reversed Angle Bracket ('RAB') bolted to top hole of composite 10½" Strip. This strip is supported above on a 5½" Strip braced by a 4½" Strip, and below on a 7½" Strip braced by a 5½" Strip. **Track-joint** below to D, a 5½" Curved Strip.

D - **Track-joint** above to C. **Simple-support** at

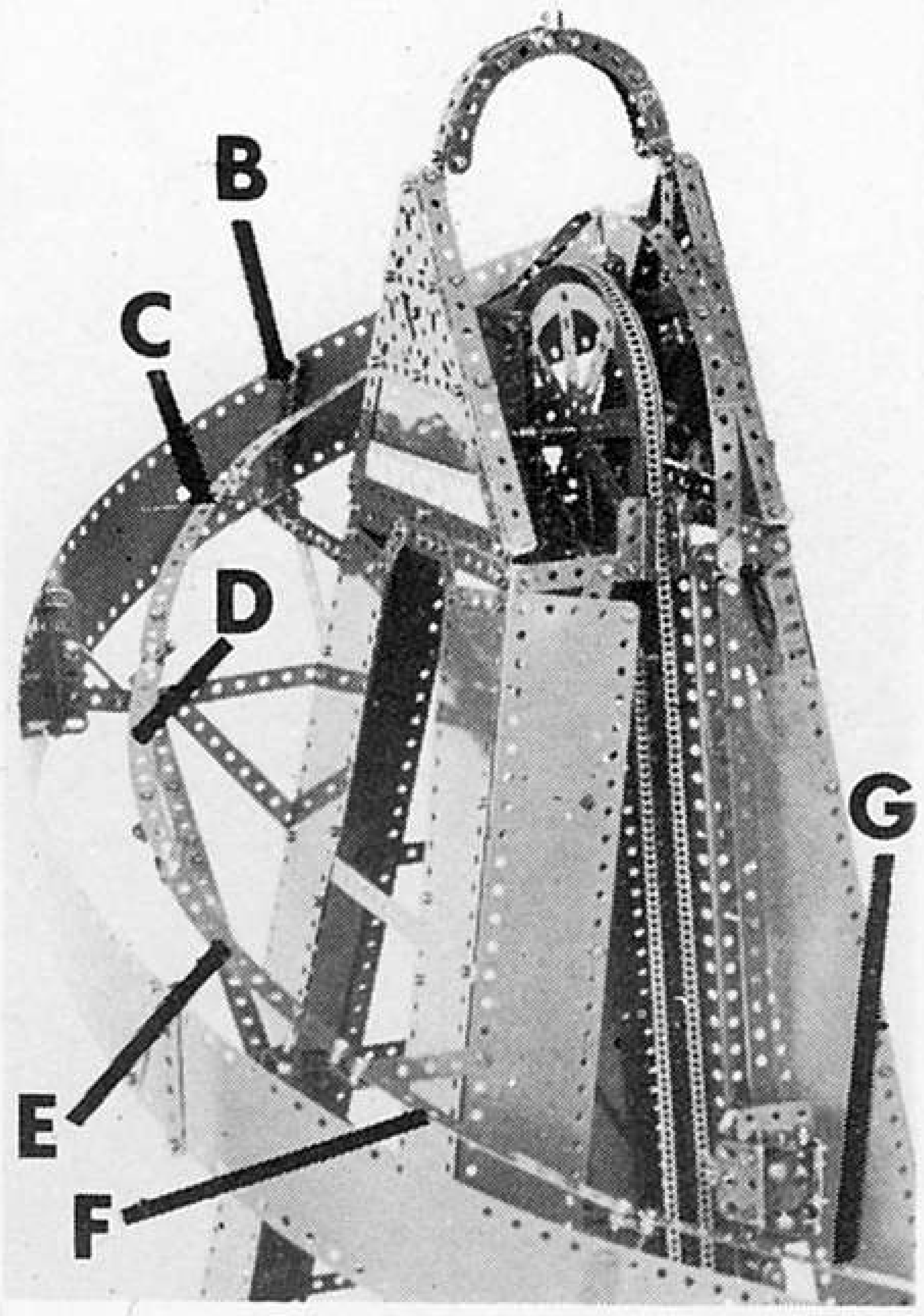


Fig. 14: Summit and upper descent track, from north-east.

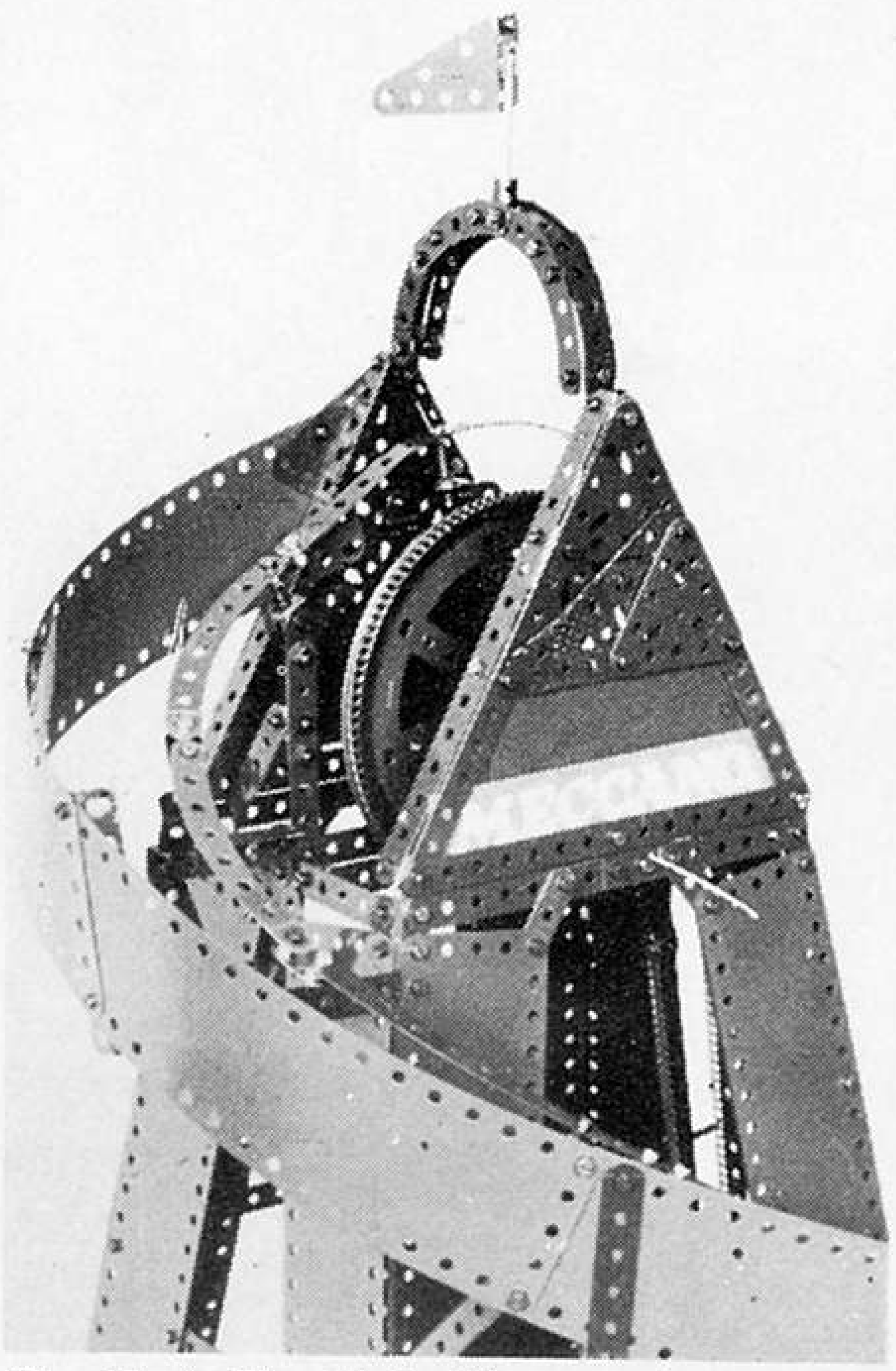


Fig. 15: As Fig. 14, but from south east.

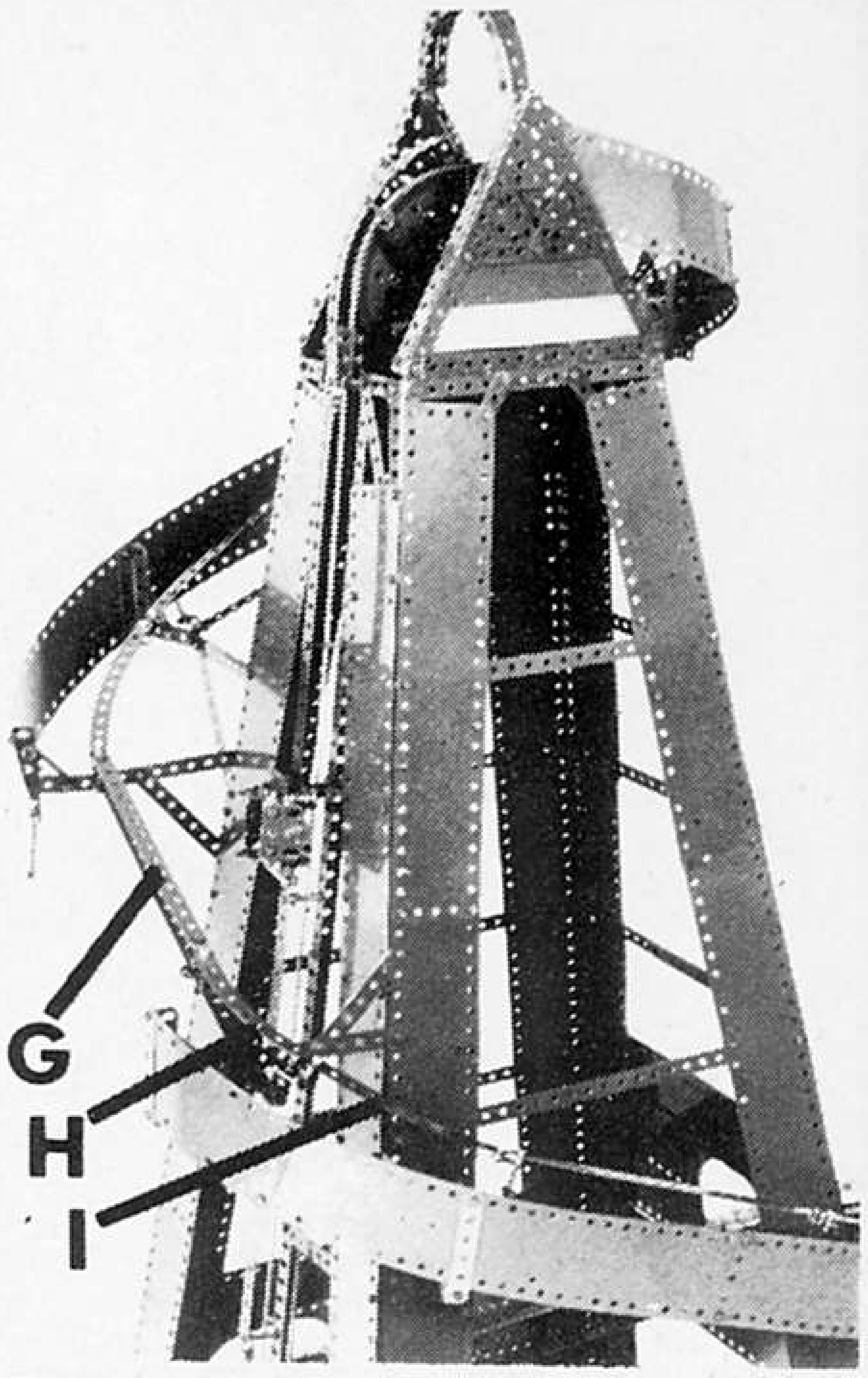


Fig. 16: Mid portion of descent track from north-west.

8th hole using 1 ⅛" Bolt locknutted in RAB bolted to 1" Triangular Plate fixed to the composite strip. **Track-joint** below to E, also a 5½" Curved Strip.

E - Track-joint above to D. **Simple-support** at 9th hole where 1 ⅛" Bolt is locknutted to ½" RAB bolted to lowest hole of composite 10½" strip. E is also a 5½" Curved Strip and has below a **Track-joint.**

F - Track-joint above to E, and below to G. F is a 5½" Curved Strip and has no support other than the track-joints. (Fig. 14).

G - 7½" Strip, lies parallel with north side of tower, and has **Joint-supports** above and below, on 1 ⅛" Bolts, both locknutted to ½" RAB's held on a 12½" Strip supported above and below by 7½" Strips to which it is connected by Obtuse Angle Brackets. The 7½" Strips are braced by a 4½" Strip and a 3½" Strip. Fig. 16.

H - 4" Curved Strip, **Track-joint** above to G. **Joint-support** below on ¾" Bolt locknutted to ½" RAB fixed to lowest hole of 12½" Strip.

I - 5½" Curved Strip. This strip curves round the north-west corner. **Track-joints** above and below, no other support. Figs. 16, 17

J - lies along west side, is a 9½" Strip. **Joint-support** above on 1 ⅛" Bolt locknutted to ½" RAB bolted to composite 15½" Strip which is supported above on a 5½" Strip (braced by a 3½" Strip) and below on a 4½" Strip braced by a 4½" Strip. **Joint-support** below on 1 ⅛" Bolt and ½" RAB. Figs. 17, 18

K - 5½" Curved Strip; **Track-joint** above to J, and below to L. **Simple-support** at 9th hole on 1 ⅛" Bolt locknutted to ½" Double Bracket mounted on a Fishplate at lower end of composite 15½" Strip.

L - 4" Curved Strip, this curves around south-west corner. **Track-joint** above to K. **Joint-support** below on ¾" Bolt locknutted to ½" RAB on a 5½" Strip supported above on a 4½" Strip braced by a 4½" Strip, and below on a composite 21½" Strip to be described.

M - 4" Curved Strip, only supports are **Track-joints** above and below. The 21½" Composite Strip supports the track that lies within the tower and is supported by ½"x½" Angle Brackets on cross strips on the south and east faces of the tower. The cross strip on the south face is a composite 15" Strip bolted at the 22nd holes (from the bottom) of the side Angle Girders. The east face cross strip is a composite 17½" Strip at the 8th holes from the bottom. The 21½" Strip is supported near its midpoint by a 9½" Strip attached to it and the lower part of the frame by ½"x½" Angle Brackets.

N is a 12½" Strip, **O** is a 7½" Strip and both lie within the tower. **N** has a **Joint-support** above and below, using ¾" Bolts locknutted to ½" RAB's supported on the 21½" Strip.

O is supported only by **Track-joints** above and below. (Fig. 19).

P - 5½" Curved Strip has joint-supports above and below on 1 ⅛" Bolts, locknutted above to a ½" RAB on the composite 21½" strip. Below, the 1 ⅛" Bolt is locknutted to a 1"x1" Angle Bracket bolted to a 4½" Strip braced by a 2½" Strip.

Q - 5½" Curved Strip, **Track-joint** above, and **Joint-support** below on 1 ⅛" Bolt locknutted to 1" RAB fixed to frame. The 4" Curved Strip of the Semi-circle is joined to the Fishplate of this joint-support.

GENERAL NOTES ON TRACK SUPPORTS

Fishplates are described at all connecting points except for the Semi-circle. If Nuts are kept carefully tightened, the Fishplates will provide satisfactory operation. However, in cases where long operation periods are expected, 1½" Strips would provide more secure joints. Their use would obviate the slotted holes and the problems they cause in tightening Nuts. They would also allow the use of an extra ⅜" Bolt (and three Hexagon Nuts) at each joint with increased rigidity. (**Not** suitable where two 4" Curved Strips join.)

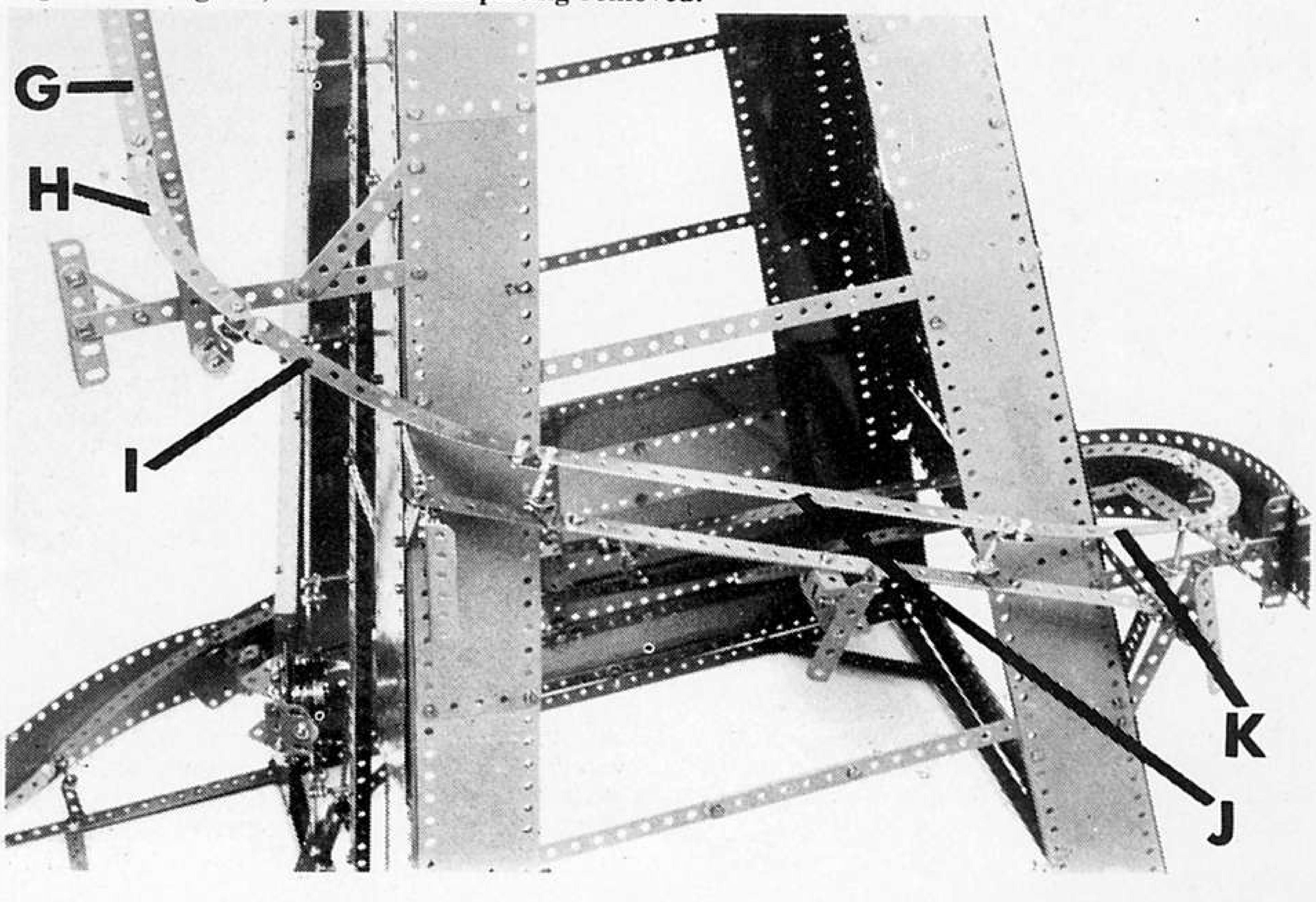
Curved Strips in sloping section of track **must** be given a regular longitudinal twist to allow accurate alighment. The twisting must be smooth and protioned out over the whole curve. If the twist is too extreme, derailment or jamming may result. The horizontal strips supporting the track are described of sufficient length to support spiralling Strip Plates. The strips project beyond the track supports by three or four holes to carry a 3" Angle Girder braced by a 1½" Corner Bracket.

The Strip Plates are fixed to the top holes of these 3" Angle Girders, the Bolt also securing a 3" Strip that grips the Strip Plate on its outer surface, being fastened below it to the lowest hole of the Angle Girder. No exact description of these parts is given, for they will vary with individual ideas. They do add considerably to the general appearance of the model. Archways can be added at the entrance and exit of that section of the track that passes through the tower.

GEARBOX AND MOTOR DRIVE Figs. 20, 21

Two 5½"x2½" Flat Plates are fixed by 5½" Angle Girders to the 18½" Angle Girders at the north side of the tower base. The tops of the Flat Plates are joined by 1½"x½" Double Angle Strips. A Double Bent Strip is attached to the western plate and a 3" Angle Girder supporting a Flat Trunnion is fixed to the east-

Fig. 17: As Fig. 16, but with some plating removed.



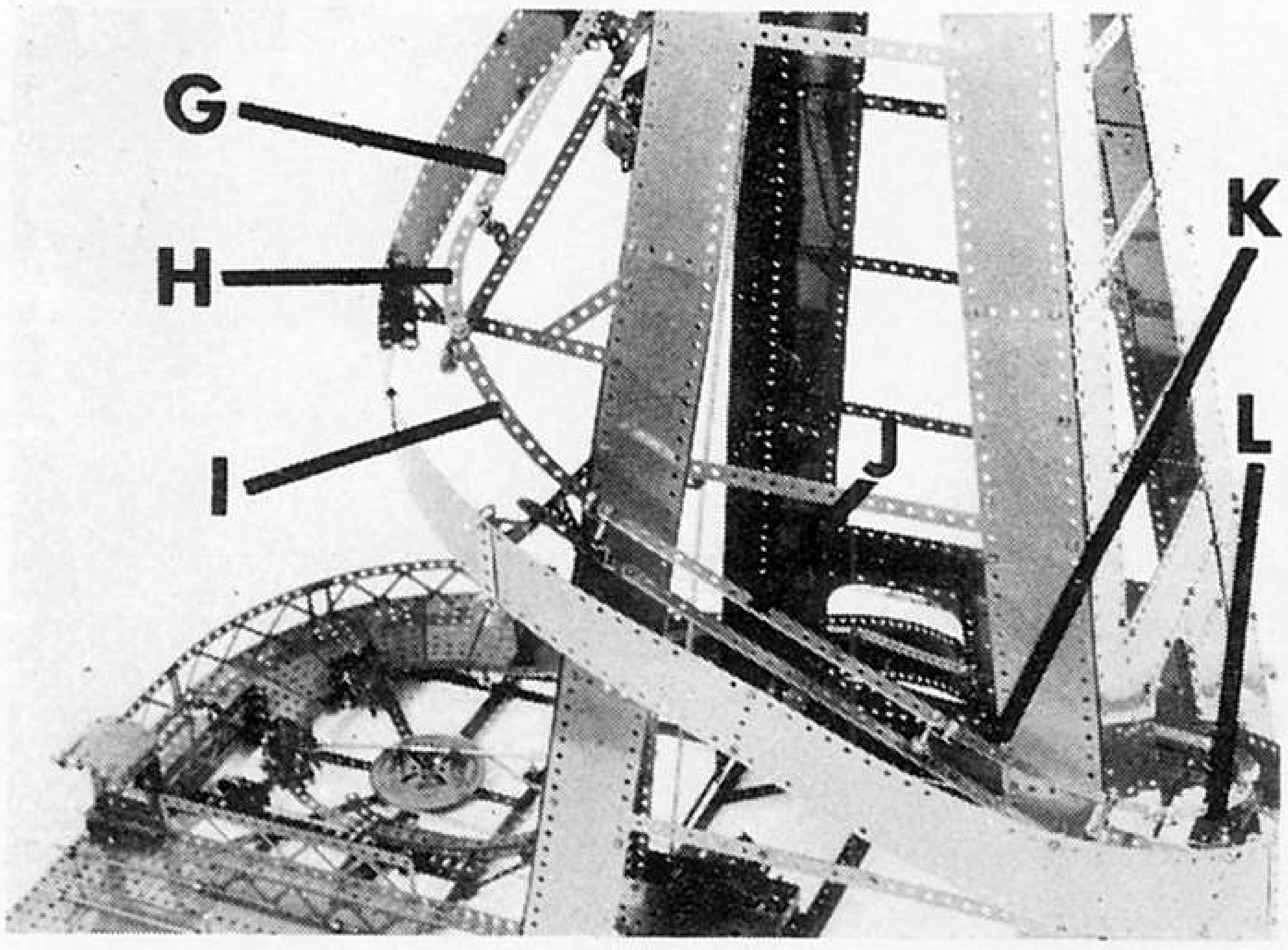


Fig. 18: As Fig. 16, but from south-west.

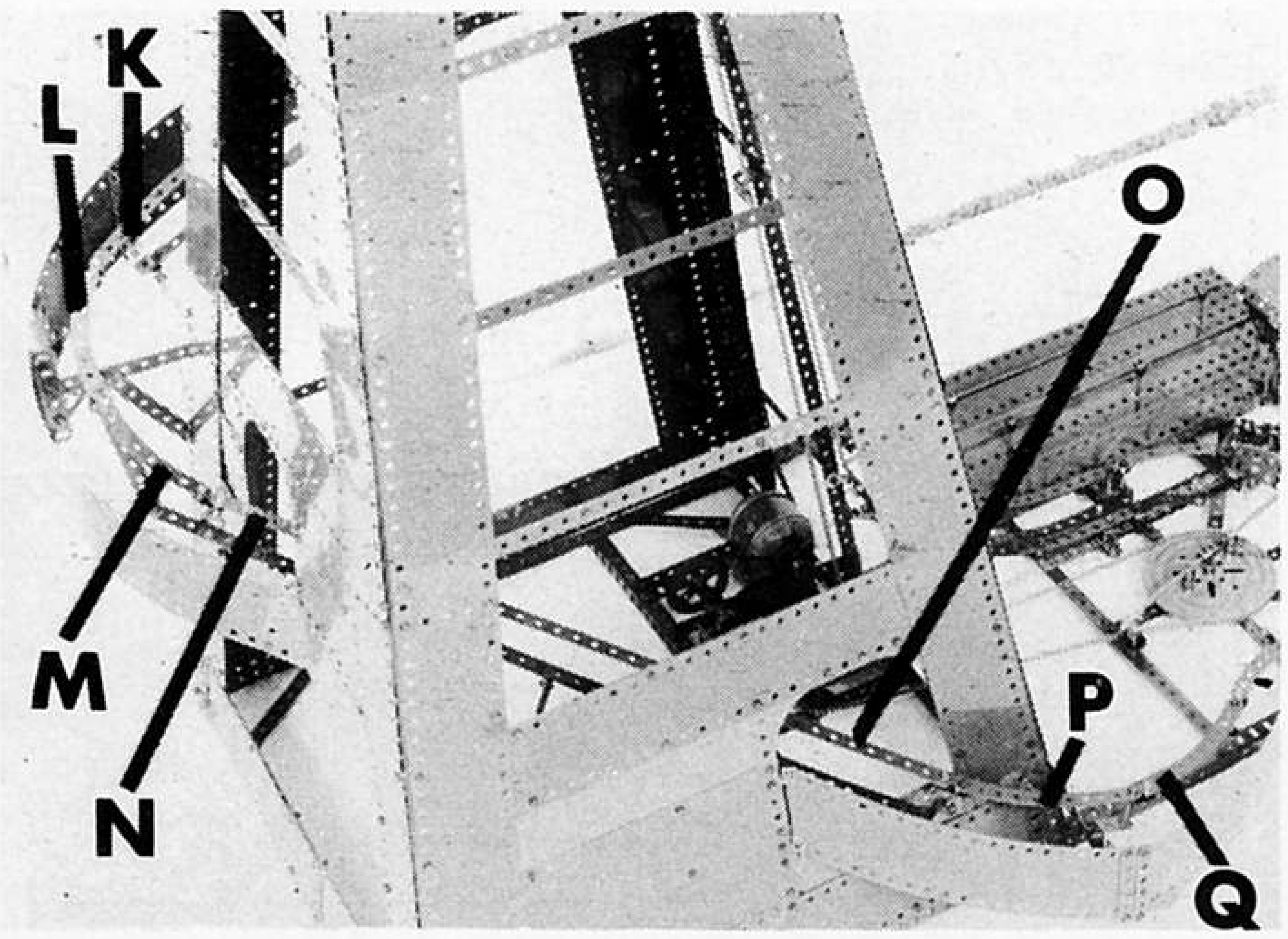


Fig. 19: Lower portion of descent track, from south-east.

ern plate. A 5½" Strip is bolted across the 18½" Angle Girders below the Flat Trunnion. The 3½" Strip mentioned in 'Lower Lift Track' is secured to the west gear plate.

A 1072 Motor is bolted to two 5½" Angle Girders on the west side of the gearbox. Using the original Motor Pulley on the slower of the output shafts, a 10" Heavy Driving Band drives a 2" Pulley on a 3" Rod journalled in the Double Bent Strip and the two Flat Plates. The Rod carries a ¾" Pinion driving a 1¼" Gear Wheel on a 2½" Rod immediately below, and which in turn carries a ½" Pinion driving a 2½" Gear Wheel on a 3½" Rod journalled three holes to the north.

This Rod carries a 2" Sprocket Wheel close to the west face of the east Flat Plate, separated by four Washers so that Chain will not scrape the Plate. On the east side of the plate, the 3½" Rod carries a 30-tooth Pinion (Argentine) or, if not available, a 25t Pinion, driving a 1½" Contrate on a 3" Rod journalled in the 5½" Strip and the Flat Trunnion and carrying a 1" Sprocket Wheel above the 5½" Strip. A ¾" Sprocket is free on a Long Threaded Pin fixed in the position shown to the east Flat Plate.

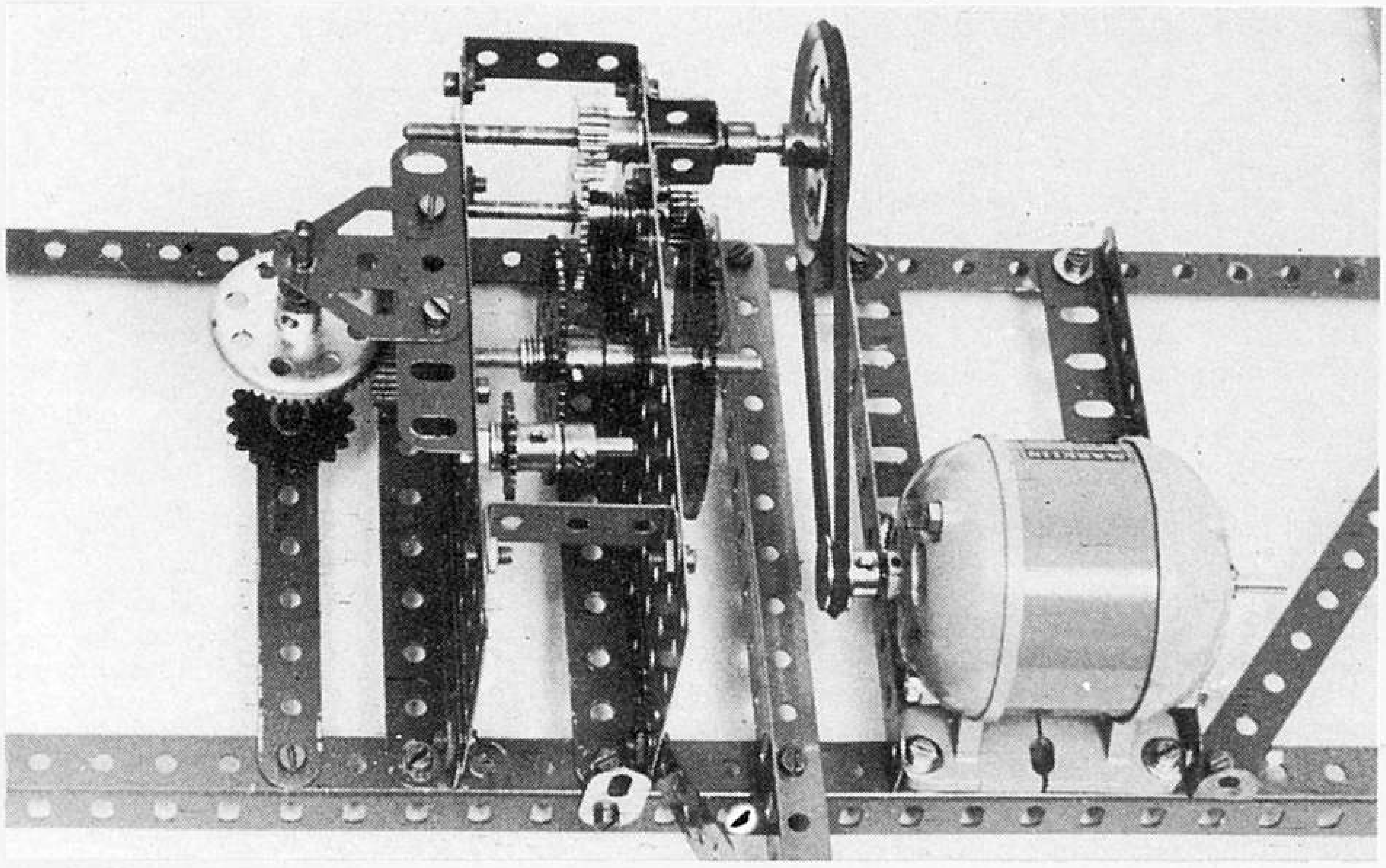


Fig. 20: Motor and gearbox from above, north (removed from model)

CHAIN GUIDE Figs. 10, 11, 22, 23

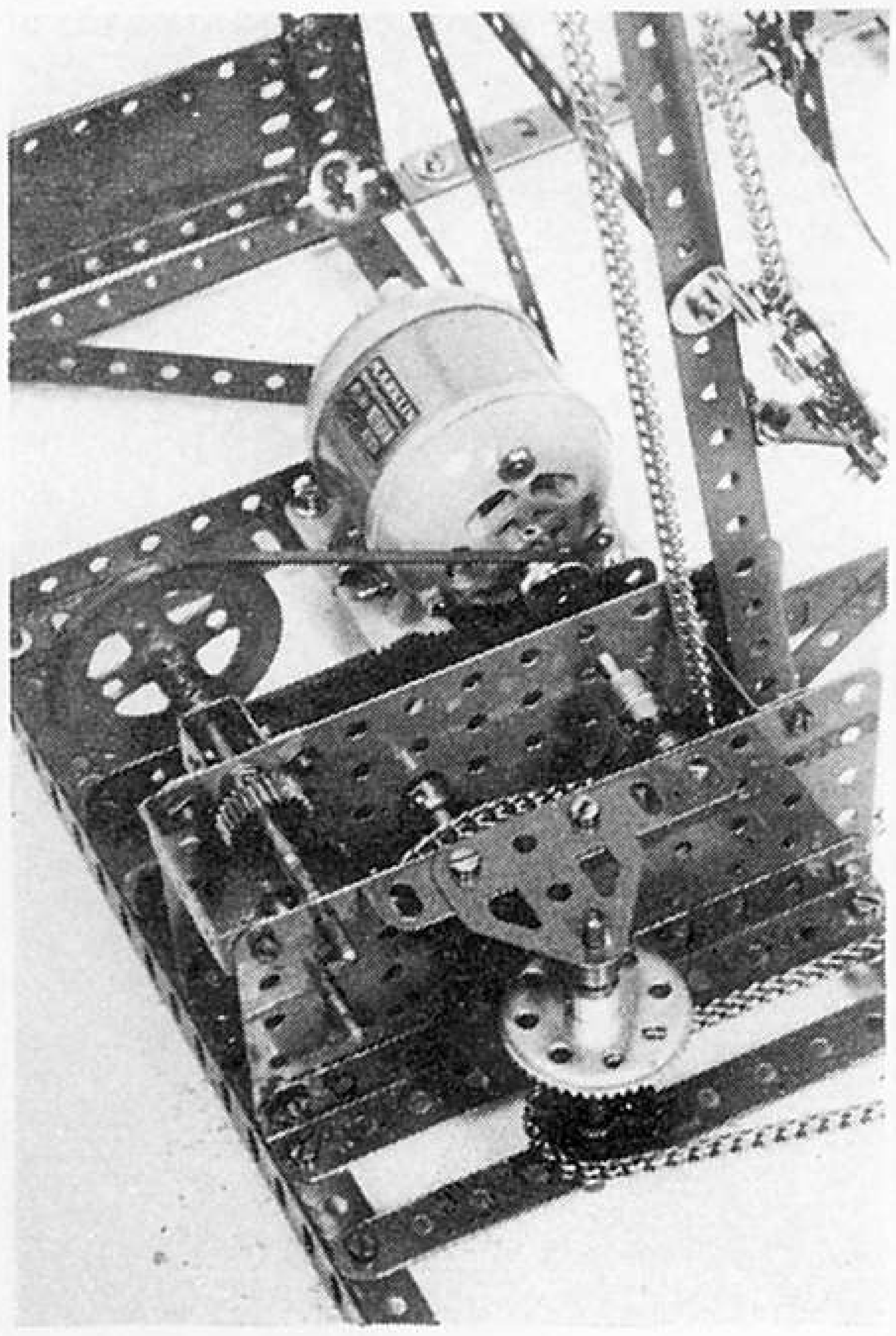
Two 12½" Strips are formed into identical curves, about 1" larger in radius than the lower lift track. They must conform as closely as possible to allow proper register of the distance from bobsled to Chain. The two formed Strips are joined by Fishplates, ⅜" Bolts, and three Hexagonal Nuts on each bolt, at (counting from the north end) the 3rd, 8th, 12th, 17th, and 22nd holes of each strip.

The 25th holes are joined by the long lug of a 1"x½" Angle Bracket. The Bolts at the 3rd holes also are secured in the round hole lugs of ½" Reversed Angle Brackets. ½"x½" Angle Brackets are secured below the 1st holes and a 2½" Curved Strip is also held at the 1st hole of the east strip as shown. A 1½" Rod is held by Spring Clips in the round lug holes of the Angle Brackets. The chain guide is held in place by the Reversed Angle Brackets below, fixed by their slotted holes to the end holes of a 2" Strip which is below the 12½" Flat Girder and fixed to the Girder slotted hole by a Bolt in its centre hole.

Above, the chain guide is fixed to the track-lift-support girder by the lug of the 1"x½" Angle Bracket, in the 13th hole from the bottom. The space between the 12½" Strips must be wide enough to admit easily the tip of the Pawl. Its most northerly point should be opposite the 1 ⅛" Bolt supporting the last 4" Curved Strip of the semi-circle, and the Reversed Angle Brackets can be rotated to achieve this.

Run a bobsled on the lower lift track and adjust it and the chain guide so that the point of the Pawl remains well within the guide but does not catch on the Fishplates. A 1" Sprocket and a ¾" Sprocket each held on 1" Rods are placed in the Channel Bearing that is near the north end of the 12½" Flat Girder, and the Rods are secured with Collars.

Below:
Fig. 21: Motor and gearbox from east. Note chain location in guide.



THE CHAIN

This must be arranged to face the opposite way to usual practice, that is, the open hooks must face inward. This is necessary to allow free movement of the Chain in the guide. The part of the Chain that normally faces outward is narrower and tends to jam in the slot of the guide.

Two lengths of Chain are joined and fed though the guide, up the tower and over the 6" Pulley, around the 1" Sprocket, thence down to the ¾" Sprocket of the gearbox, around the 2" Sprocket, out along the 12½" Flat Girder, under and around the 1" Sprocket of the Channel Bearing, and down again under the ¾" Sprocket where the join can most conveniently be made between it and the guide.

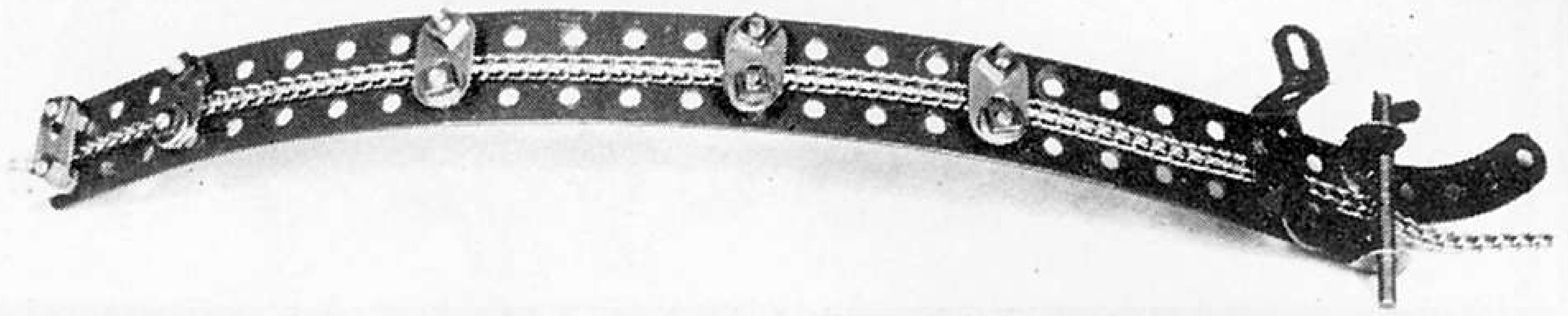
Note that the Chain enters the guide **under** the 1½" Rod, then rises to the space between the 12½" Strips and the Fishplate. It is at this point that the tip of the Pawls of the Bobsleds engage at the commencement of their climb, being brought to this point by the pusher that will now be described.

THE PUSHER Figs. 10, 11

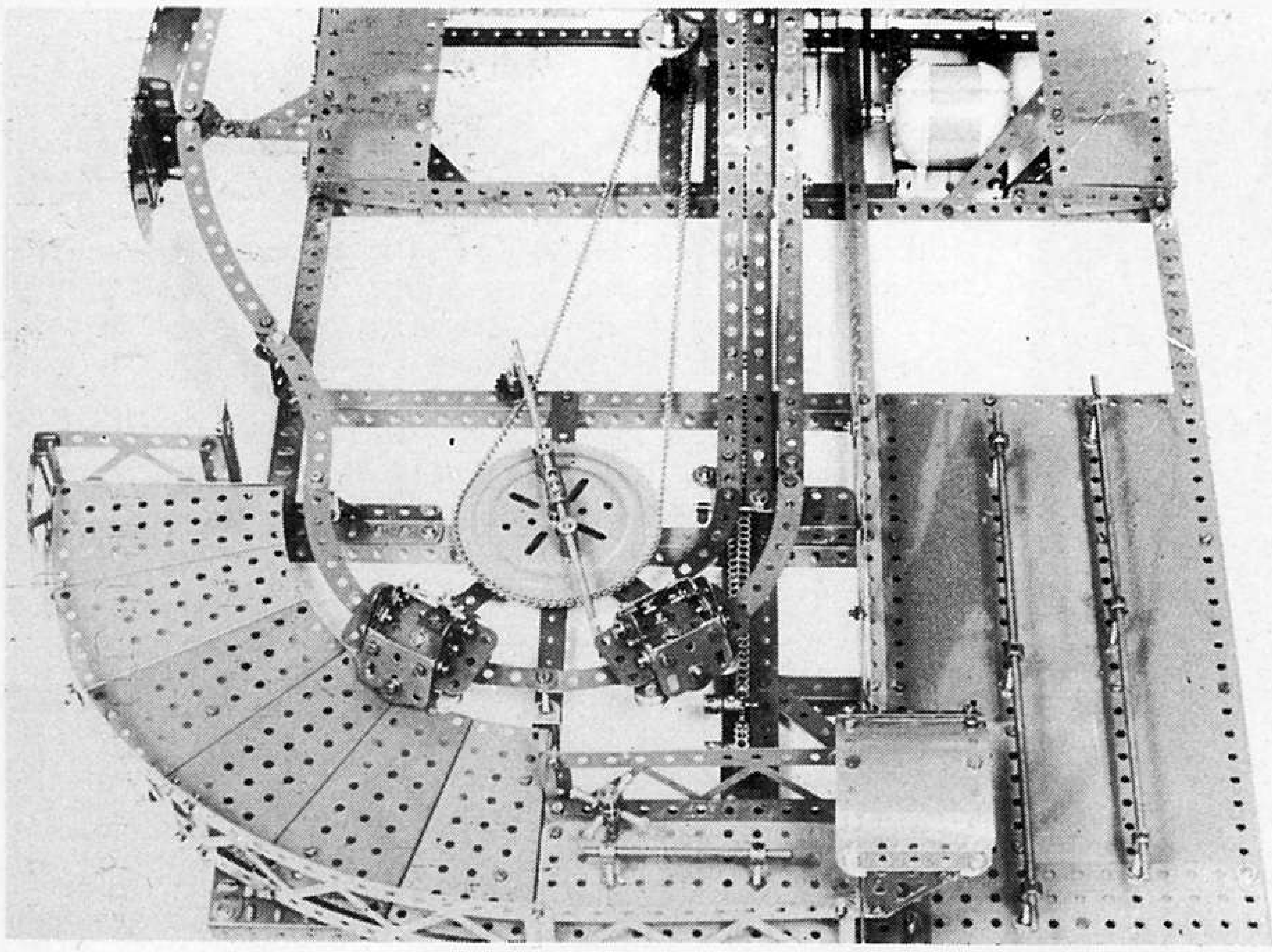
Secure a Rod Socket to the centre hole of the Ball Race Flanged Disc, with a 1" Rod held in the Rod Socket. Fix two Threaded Couplings to the outer holes of the Ball Race Toothed Disc, separated from the upper surface by three Washers on each bolt. Secure an 8" Rod in the end transverse untapped holes of the Threaded Couplings with equal lengths extending. At the ends of the Rod fix Rod and Strip Connectors facing as shown. Assemble the complete Ball Thrust Bearing and hold in place with a Collar on the 1" Rod.

Connect the Toothed Disc to the 1" Sprocket with Chain adding as guide, a ¾" Sprocket on a Long Threaded Pin secured to the 18½" Angle Girder. Adjust the Rod and Strip Connectors so that they do not touch the semi-circular track. They should engage with the pair of rear ½" Pulleys. With the gearing described, one end of the pusher will have just launched a

Right: Fig. 22: Chain guide, aspect from below, removed from model.



Below: Fig. 23: Chain guide from the north, showing chain location, also details of station and pusher.



bobsled on its upward journey and the other end will engage a waiting bobsled when a further bobsled will be released from the summit and should enter the semi-circle before the next sweep of the pusher.

Any alteration in the number of bobsleds or of the track will require alteration of the gear ratios. Part of the fun of the model is figuring out such individual changes.

STATION Fig. 23

The platform consists of a quarter circle consisting of six Flanged Sector Plates joined by their flanges and connected near the entrance by a 3" Angle Girder to a 5½"x2½" Flat Plate and a 5½" Angle Girder. It is supported at the east end by a 4½" Flat Girder bolted to the 7½" Angle Girder of the base. At the entrance, support is by four 3" Angle Girders arranged in step formation. At intermediate points, support is given by 1" Reversed Angle Brackets between the Sector Plates and the base.

A covered arch is added, made from a 3½"x2½" Flexible Plate, edged with 2½" Narrow Strips and 3" Formed Strips, and secured to two 3" Curved Strips, 1½" Corner Brackets, and 3½" Strips. The platform is edged with Braced Girders attached by Angle Brackets. A rail and a turnstile (from 4-hole Collar) are added.

SUMMIT ARCHWAY Figs. 14, 15

This provides a focus of decorative appeal, helps to hide the 6" Pulley, and gives space for a 'MECCANO' emblem and a crowning flag! It is composed of two identical sides edged by 7½" Strips in girder formation joined by ½"x½" Angle Brackets. Four 2½" Triangular Plates are fixed in the upper portion on each side.

Below them the space is filled in with a 4½"x2½" Flexible Plate and two 3½"x2½" Triangular Flexible Plates. An archway consisting of a 12½" Strip formed into an inverted U-shape and edged by 2½" Curved Strips held to it by Double Brackets is secured to the apex of the sides by locknuts on ¾" Bolts, the ends of the Strip being secured by RH and LH Corner Angle Brackets to 2" Strips bolted to ½"x½" Angle Brackets fixed to the 2½" Triangular Plates.

A Rod Socket at the top of the arch holds a 2" Rod to which a 'flag' (a 2½"x1½" Triangular Plate) is attached by means of a Rod and Strip Connector. The Strip Plate on the outside of the bobsled track is attached to the west side of the archway as shown.

OPERATION

A bobsled released from the summit should course freely over the track and should come to rest near the centre portion of the station platform. Careful oiling with suitable light oil ensures free movement of the bobsleds and will help toward a predictable length of travel. All irregularities of track should be corrected. If the bobsleds tend to overshoot the platform, a braking strip should be incorporated under the semi-circular track.

If a 30-tooth Pinion is not available, a 25-tooth Pinion can be used, but the 1" Sprocket must be replaced with a ¾" Sprocket. This gives almost as good timing of the sweep action of the pusher.

DIAGRAM

This represents a cross-section of three 15" Driving Bands laid in the groove of the summit pulley. One band is laid in position and the twists taken out of it to make it conform to the groove. Two more bands are laid side by side as shown, and these two are adjusted to lie evenly without twists.

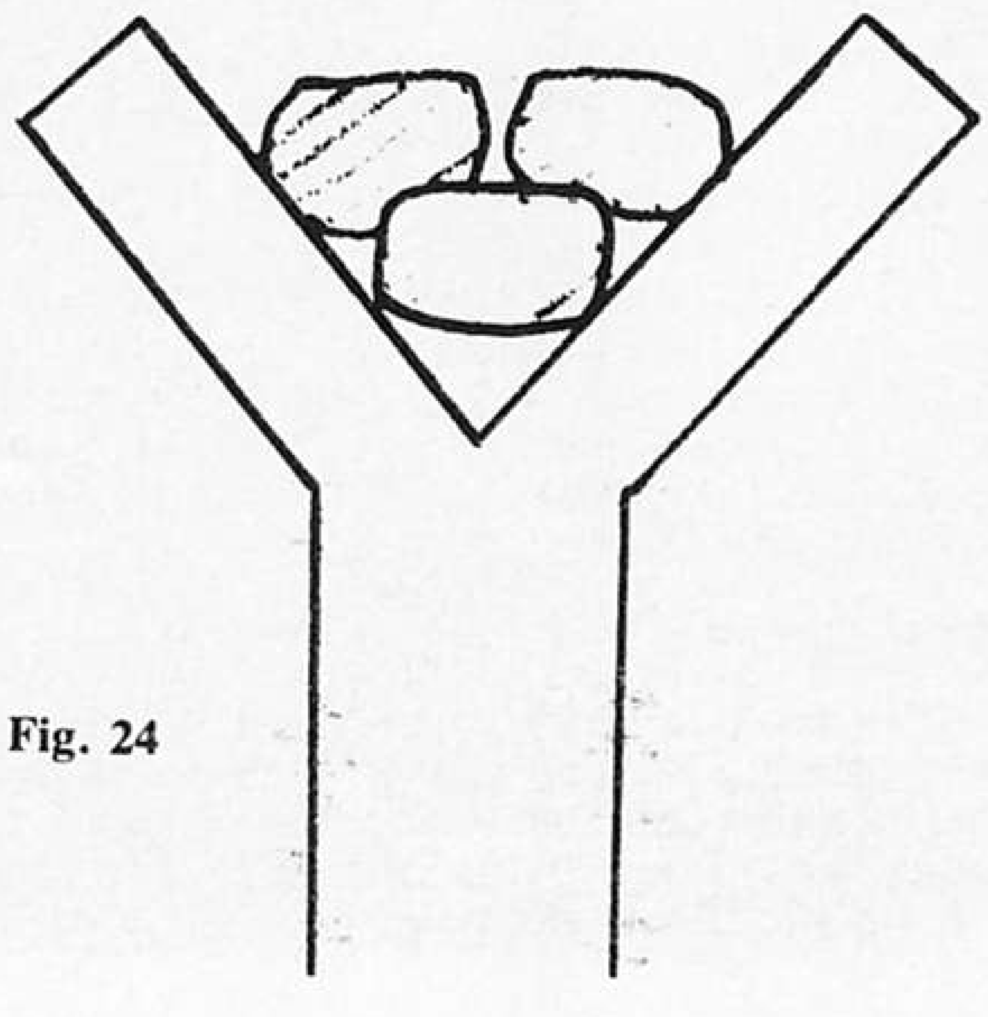


Fig. 24

PARTS LIST

A simple version, fully functional, but unadorned by Strip Plates and edging Strips can be built with No. 10 set with the addition of the following parts:

6 of No.	1B
8 of No.	8
10 of No.	10
28 of No.	23B
1 of No.	26K
4 of No.	54
2 of No.	48
2 of No.	89B
1 of No.	94
1 of No.	96A
24 of No.	111D
6 of No.	125
2 of No.	147C
26 of No.	111C

This list includes eight 12½" Angle Girders for making four composite 18½" Angle Girders required.

The version shown in the illustrations required the following:

52 of No.	1	8 of No.	76
18 of No.	1A	1 of No.	77
31 of No.	1B	8 of No.	89
29 of No.	2	2 of No.	89A
6 of No.	2A	10 of No.	89B
7 of No.	3	9 of No.	90
15 of No.	4	4 of No.	94
7 of No.	5	1 of No.	95
15 of No.	6	3 of No.	96
13 of No.	6A	3 of No.	96A
8 of No.	7	1 of No.	97
12 of No.	7A	1 of No.	99
1 of No.	8A	2 of No.	99A
2 of No.	8B	1 of No.	99B
6 of No.	9	2 of No.	100
1 of No.	9A	1 of No.	103B
1 of No.	9B	1 of No.	103C
14 of No.	9C	6 of No.	103F
4 of No.	9D	8 of No.	103H
1 of No.	9E	4 of No.	108
2 of No.	9F	20 of No.	111
38 of No.	10	10 of No.	111A
7 of No.	11	50 of No.	111C
55 of No.	12	30 of No.	111D
3 of No.	12A	1 of No.	115A
2 of No.	12B	5 of No.	124
15 of No.	12C	12 of No.	125
2 of No.	13	8 of No.	126
1 of No.	13A	1 of No.	126A
3 of No.	16	12 of No.	133
3 of No.	16A	3 of No.	133A
1 of No.	16B	1 of No.	140Y
3 of No.	18B	4 of No.	147C
1 of No.	19C	1 of No.	154A
1 of No.	20A	2 of No.	154B
32 of No.	23B	2 of No.	160
1 of No.	25	1 of No.	168
1 of No.	26	2 of No.	179
1 of No.	26K	1 of No.	186C
1 of No.	27	3 of No.	186D
1 of No.	27C	2 of No.	189
1 of No.	28	3 of No.	190A
850 of No.	37	4 of No.	191
150 of No.	37C	2 of No.	195
400 of No.	38	10 of No.	196
8 of No.	38D	37 of No.	197
1 of No.	45	4 of No.	201
6 of No.	48	3 of No.	212
1 of No.	53A	2 of No.	215
6 of No.	54	3 of No.	221
22 of No.	59	4 of No.	226
2 of No.	63C	2 of No.	235
4 of No.	70	1 Electric Motor E.U. 1072	

Prototypes

BY BERNARD DUNKLEY

WHEN I was planning this article, I particularly had in mind all those Meccano enthusiasts who have built crawler track bases, used them for fairly conventional models and then kept them intact in case inspiration should strike again.

When I spotted the Muskeg in a magazine advertisement, I was attracted to it instantly as an intriguing break from the very familiar and all too usual devices we all recognise as belonging on crawler track bases.

When I contacted the suppliers of the Muskeg, Rolba Ltd. of East Grinstead, Sussex–I found that they had a whole range of related tractors and carriers, and so this article is based on these Rolba vehicles, which are supplied under the generic title of 'Bombardier'.

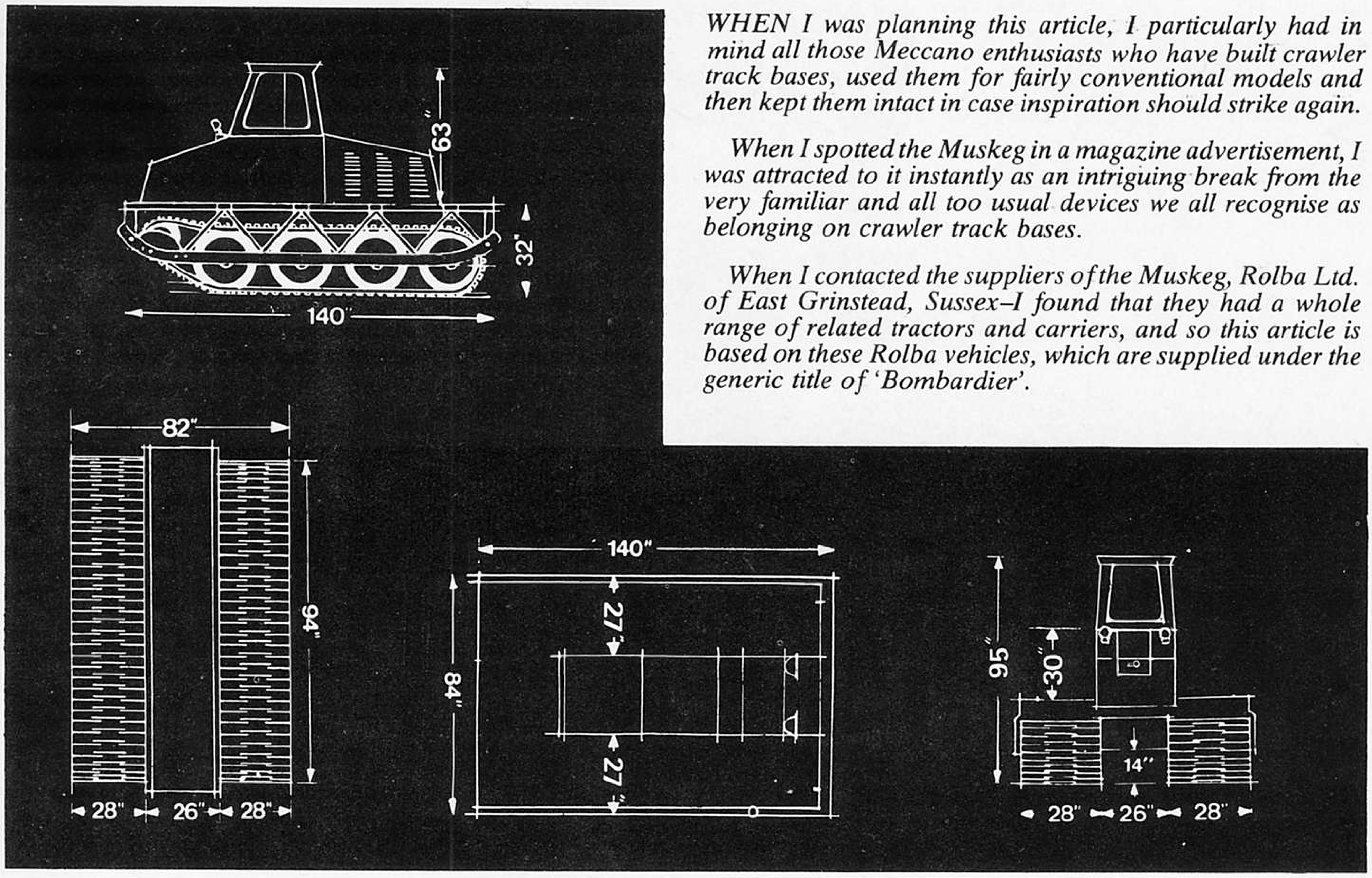


Fig. 2 Main dimensions of the Muskeg tractor

The Bombardier Muskeg Tractor

Fig. 1 The Muskeg tractor with ditch-digging attachment

Fig. 1 shows the Muskeg tractor with a rear mounted ditch digger. The ditch digger is a bolt-on feature, and it is easy to imagine the purposeful look of the basic tractor. Some salient dimensions are given in Fig. 2. Each side platform above the tracks is 27in. wide, and the overall width is 7 ft. The tracks themselves are 28 in. wide and 94 in. long.

A load of up to 3000 lb (e.g. logs, pipes, machinery, tools or timber) can be carried on each of the side platforms, and with this 6000 lb total payload the Muskeg can still tackle soft ground and areas that other tractors cannot reach.

Power comes from a 4-cylinder 78 hp Perkins diesel engine behind the cab, driving forward through a 4-speed synchromesh gearbox and a transmission shaft to a controlled differential gear (3.9:1 ratio) and a 1.6:1 final drive to the raised double sprockets at the front of the tracks. Suspension is by four independent bogies, two for each track, each bogey having four wheels in two tandem sets.

The bogies are centrally pivoted in rubber blocks. The wheels have solid treadless tyres of rubber or nylon. Each track consists of a steel-cable-reinforced rubber and fabric belt with spring-steel crosslinks. The engine radiator is just inside the grille at the rear of the engine housing.

The Muskeg tractor has a maximum speed of 16 mph and can drive through water up to 30 in. deep. The ditch digger is only one of many devices that can be mounted on the Muskeg, and the hauling possibilities of this versatile little machine are obvious.

The Bombardier Muskeg Carrier

Obviously closely related to the Muskeg tractor is the Muskeg carrier. The overall dimensions and specifications are the same from the ground up to the platform level. Fig. 3 shows the variation from there up, the forward mounted cab leaving a wide platform behind that can be used for load carrying as it is or can support a goods-carrying bodywork or any conceivable contracting plant. The version shown in Fig. 3 has an extendable work platform.

The same engine is used as in the Muskeg tractor, but in the carrier a 5-speed and reverse gearbox is used and the radiator is at the front. The Maximum speed is 10 mph, and the maximum load is 8000 lb. Steering is manual, through a controlled differential, and there are disc brakes in the drive line.

Fig. 3 The Muskeg carrier with extending working platform

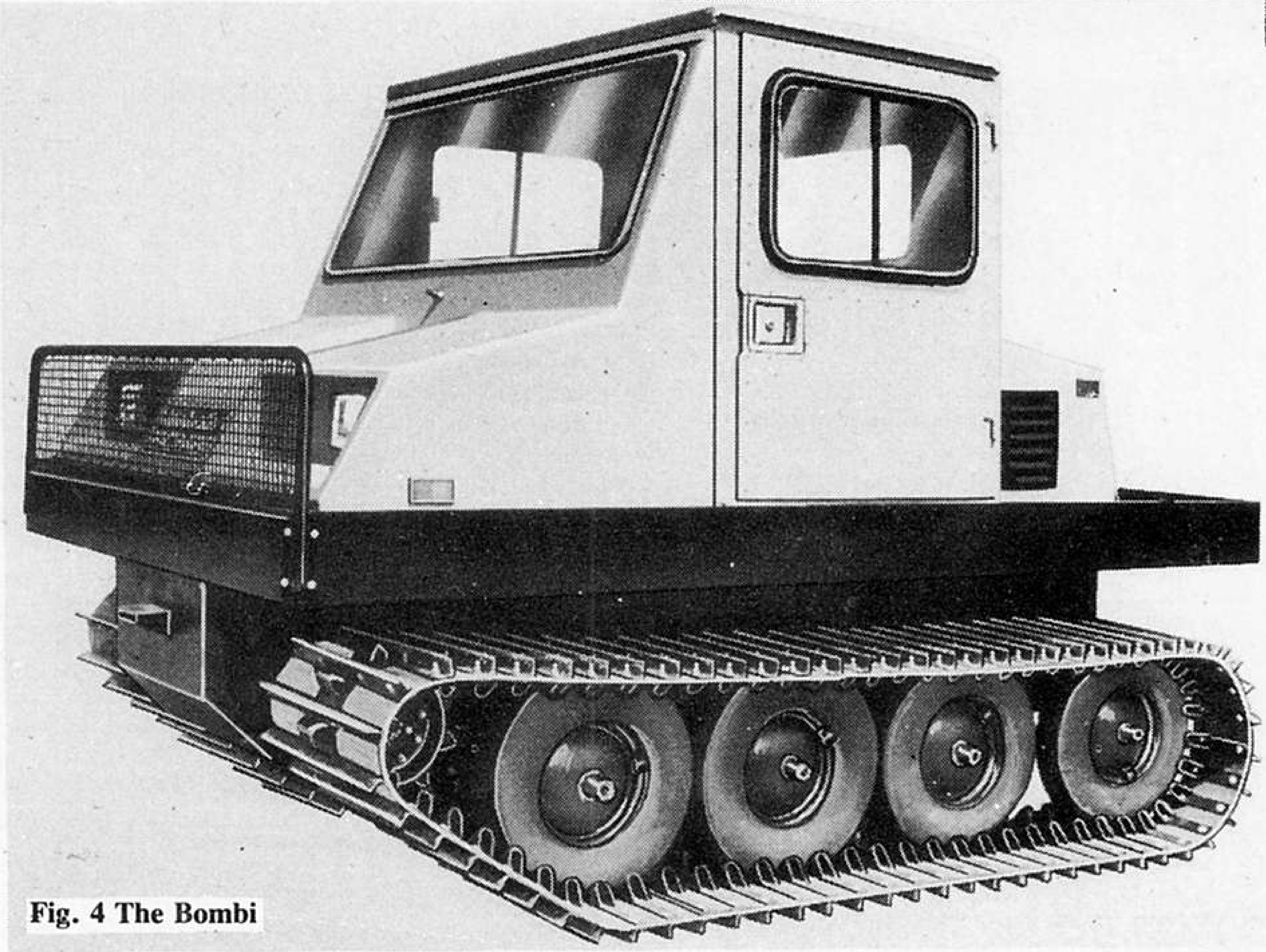


Fig. 4 The Bombi

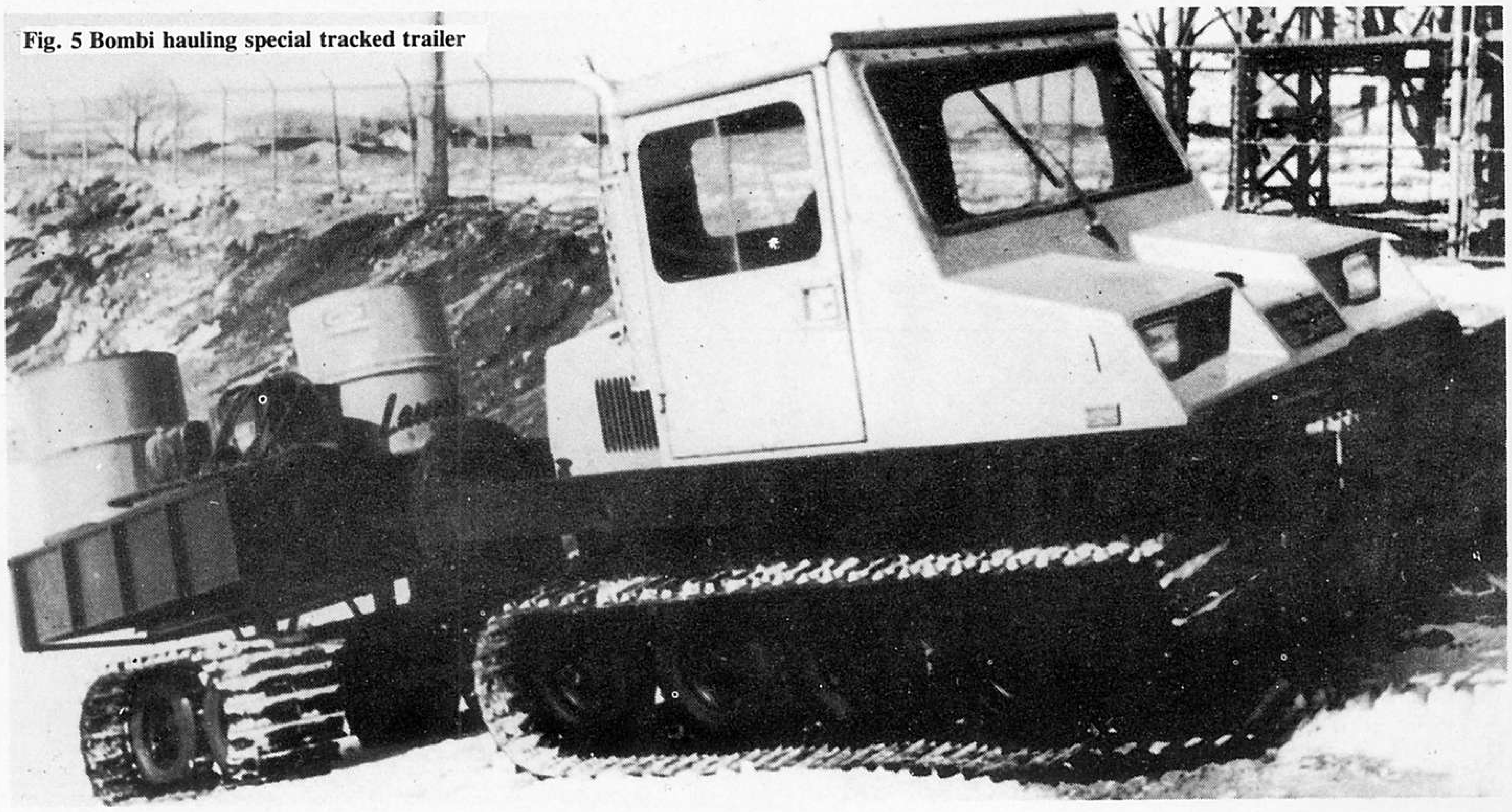
The Bombardier Bombi

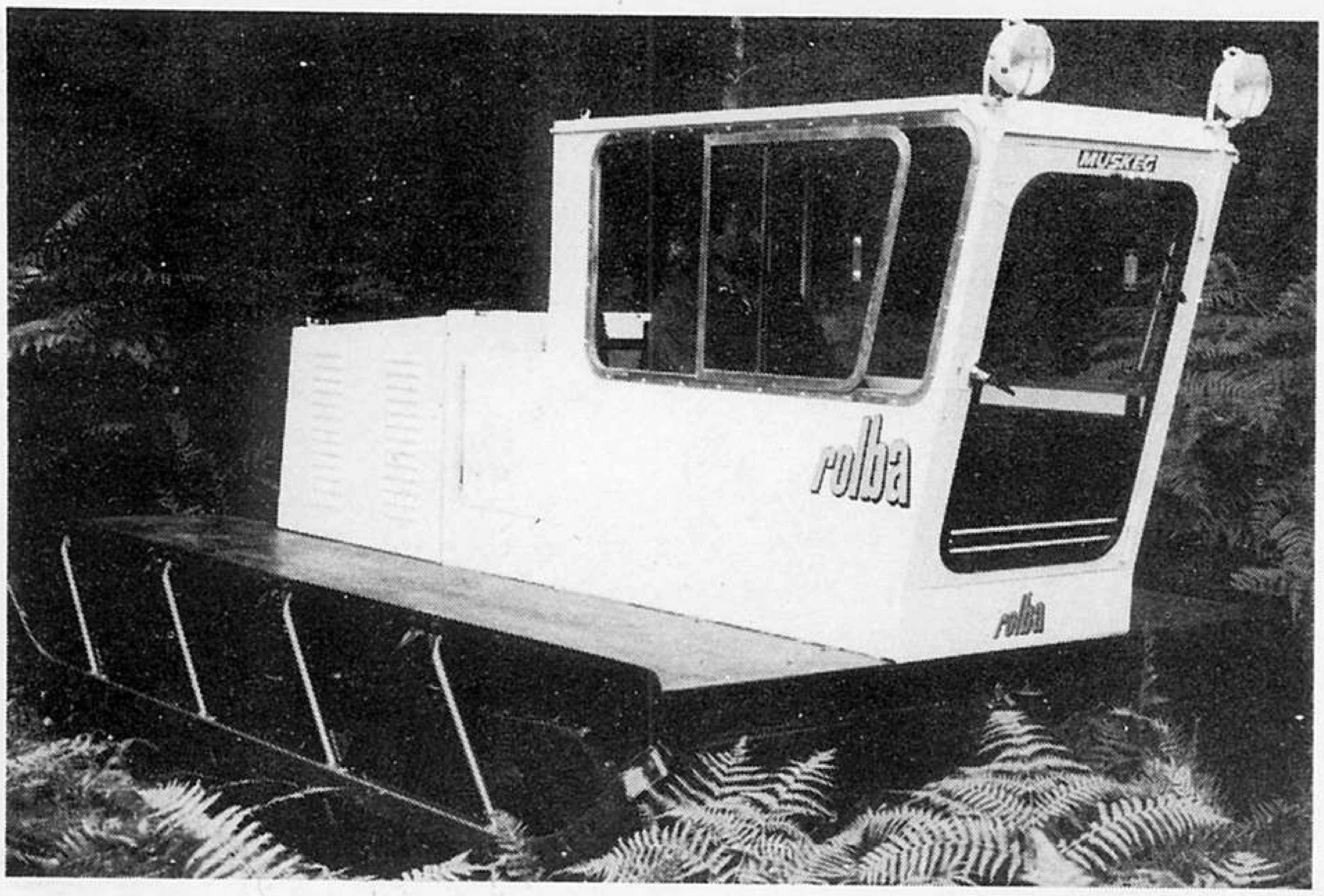
The Bombi, illustrated in Fig. 4, seems to be one of the most versatile items in the Rolba range. Some of its uses include Arctic exploration, tropical pest control, ski-trail grooming, and desert military duties. It is a tractor with a full-width 3-man cab, and it can carry special equipment (e.g. for pest control) on its side platforms, at the rear. Fig. 5 shows the Bombi hauling a specially designed tracked trailer and sporting one of the optional extras, a spare wheel.

The Bombi's overall length is a diminuitive 102 in., and its width is 60 or 70 in. depending on the choice of track (winter tracks are 5 in. wider than summer tracks). Height to the platform is 26 in., and the overall height is 73¾ in. Note that all the wheels have pneumatic tyres. Each wheel is mounted independently on rubber torsion.

The power unit is a Ford 1600 4-cylinder engine driving the track through a 4-speed and reverse manual synchromesh gearbox and a planetary differential that is controllable for steering.

Fig. 5 Bombi hauling special tracked trailer





The Bombardier MM80

Before we leave the Rolba fleet of go-anywhere vehicles, we ought to look at the MM80. This is a new item and no technical data has been provided, but from Fig. 6 we can deduce that it is a variation on the Muskeg with a very trendy cab design, which may appeal to the modernists among us.

Fig. 6 The MM80 vehicle.

In View

'RAILWAY STEAM CRANES' By John S. Brownlie. 396 Pages, 137 Illustrations, Hardback. Price £3.50 including postage.

Available only from:– J. S. Brownlie, 71 Kingston Road, Kilsyth, Stirlingshire, Scotland.

A QUICK glance round a Meccano show and those models which first take the eye, and often best express the idea of Meccano modelling, are the cranes. In recent years we have seen some of the most thoughtful and complex structures of this kind ever built in Meccano, and not just any crane, but splendid models of specific prototypes. Everyone will have his own special favourite and all I do now is to remind you of this tradition which goes back right to the beginnings of the hobby. They are nearly always dockside cranes, blocksetters or modern crawlers, but there is one type of crane which one might think lends itself as much as any to Meccano modelling, is comparatively seldom tackled and still less as a prototype model. I refer to the Railway Breakdown Crane, the main subject of the book under review.

If it is true that the railway crane (apart from the very un-prototypical 'Supermodel') has been substantially neglected in the Meccano world, then it is interesting to speculate on the reasons for this. After all, the real thing has all the charisma of the Block-Setter, all the constructional problems and the ingenuity required to solve them; and it is also the last bastion of steam operation on the railways. Mr. Brownlie's most important book helps to answer the question and emerges as required reading for anybody whose constructional speciality is cranes.

It appears that the literature on railway cranes, especially the accident variety, is exceedingly thin on the ground for the simple reason that the railway companies, in the days when most of the great cranes were built, (and that can be 60 or 70 years ago), did not discuss these matters publicly. Exactly! It was not reassuring to passengers to know that accidents happened and had to be prepared for. This sheds a most interesting light on Victorian thinking which is still relevant today. Despite the undoubted drama of the wrecking cranes for enthusiasts, (and to some small boys, just to see one pass was enough to get them excited), the companies chose to be very coy about breakdown and permanent way cranes.

The peculiar problems of designing a railway crane are legion. There is the overriding demand of the loading gauge; there is the weight to be considered against the axle loading; there is the special geometry required for working in often obscure situations; and there is, of course, the problem of maintaining stability on a narrow base. All these factors and many others, Mr. Brownlie patiently and individually analyses, using diagrams where necessary and quoting sometimes humorous, sometimes macabre situations.

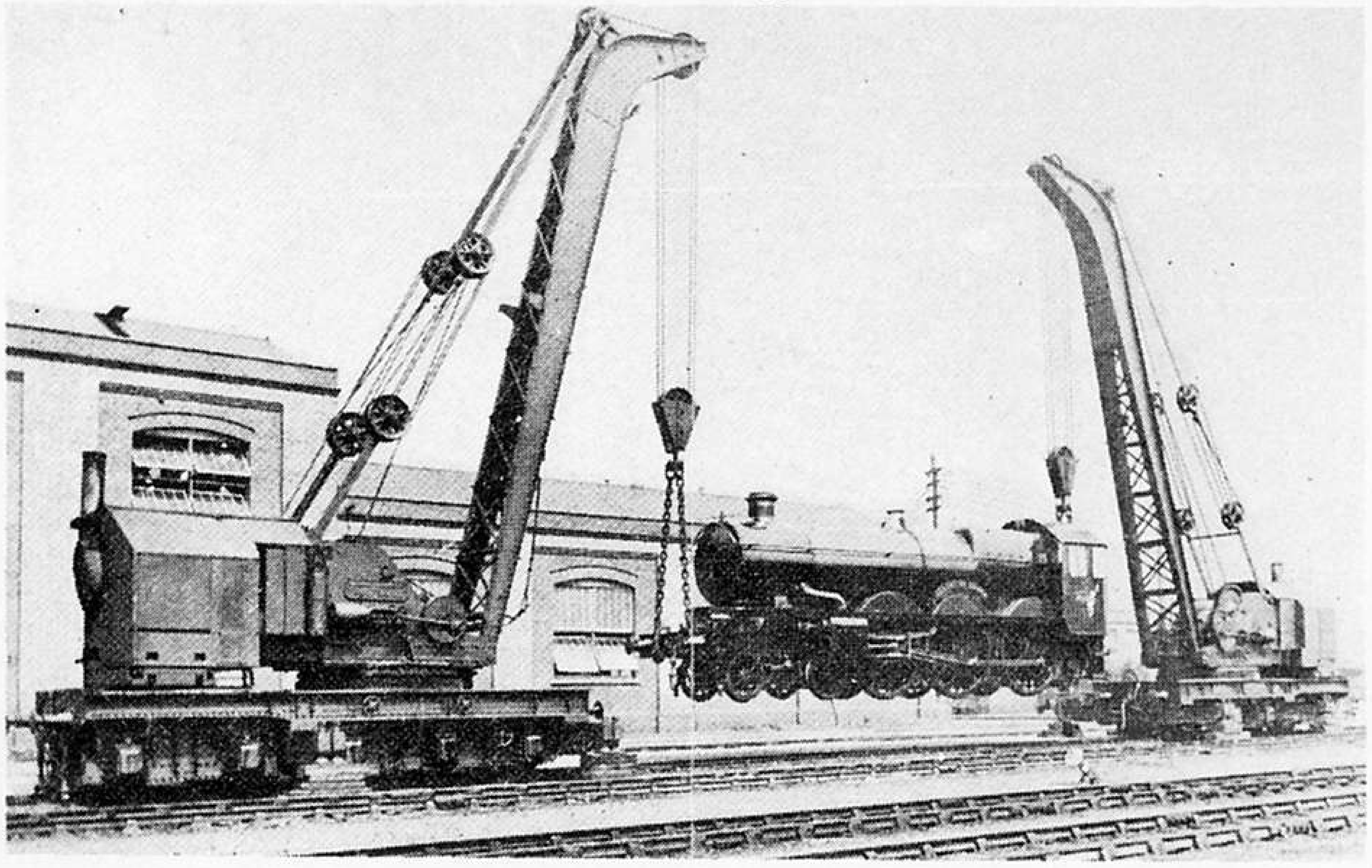
What is true of the recorded information generally is also, it seems, true of photographs. It is understandable that pictures of wrecking cranes at work were often suppressed, but it is surprising that a similar reticence is in evidence where permanent way work is concerned. One is almost left with the impression that, to the railway companies, the steam crane was an expensive but necessary evil. Nevertheless this book collects together photographs of well over 100 different cranes with ancillary pictures of gearing detail, originating over the last 100 years. Most of these machines were manufactured by specialist firms and Mr. Brownlie devotes a large section to discussing the contribution that each known firm made.

I, who am not strictly a crane enthusiast but very much a railway 'nut', enjoyed this book from end to end. I could not, as they say, put it down. It is written with care and authority, and I must admit to being tickled by the Author's seeming idiosyncrasies; he says some hard things about modern experts with 'flowery titles'—he even mentions a recent committee on breakdown cranes where some of the members didn't know what a relieving truck was! One paragraph in which he despatches the 'self-styled Premier Line' contains the remark that the design staff 'had developed webbed feet' which, given the autocratic circumstances known to all railway enthusiasts, I find just about the funniest thing I have ever read in a railway book.

The fans won't like *THAT* of course, but apparently the L.N.W.R. really did lag behind and had to borrow cranes from North Staffordshire. One astonishing fact comes out of this book, and that is the rudimentary form of the brakes, even on some of the largest cranes. It seems that until recently they only had a handbrake, on the principle that for a really heavy lift the crane stood on its outriggers. This meant that there were some fearful runaways and other accidents. Is there a sort of parallel here with the brakes on a Traction Engine?

The book is very well illustrated,—for the Meccano modellers I could have wished for a few more general arrangement diagrams but this is a trivial point compared with the excellence of the book as a whole. At the price it must be the best value I can think of in books today and I wholeheartedly recommend it. It has transformed my view of the subject and it fully underlines the importance of precise information in Meccano modelling from prototypes.

ALF REEVE.

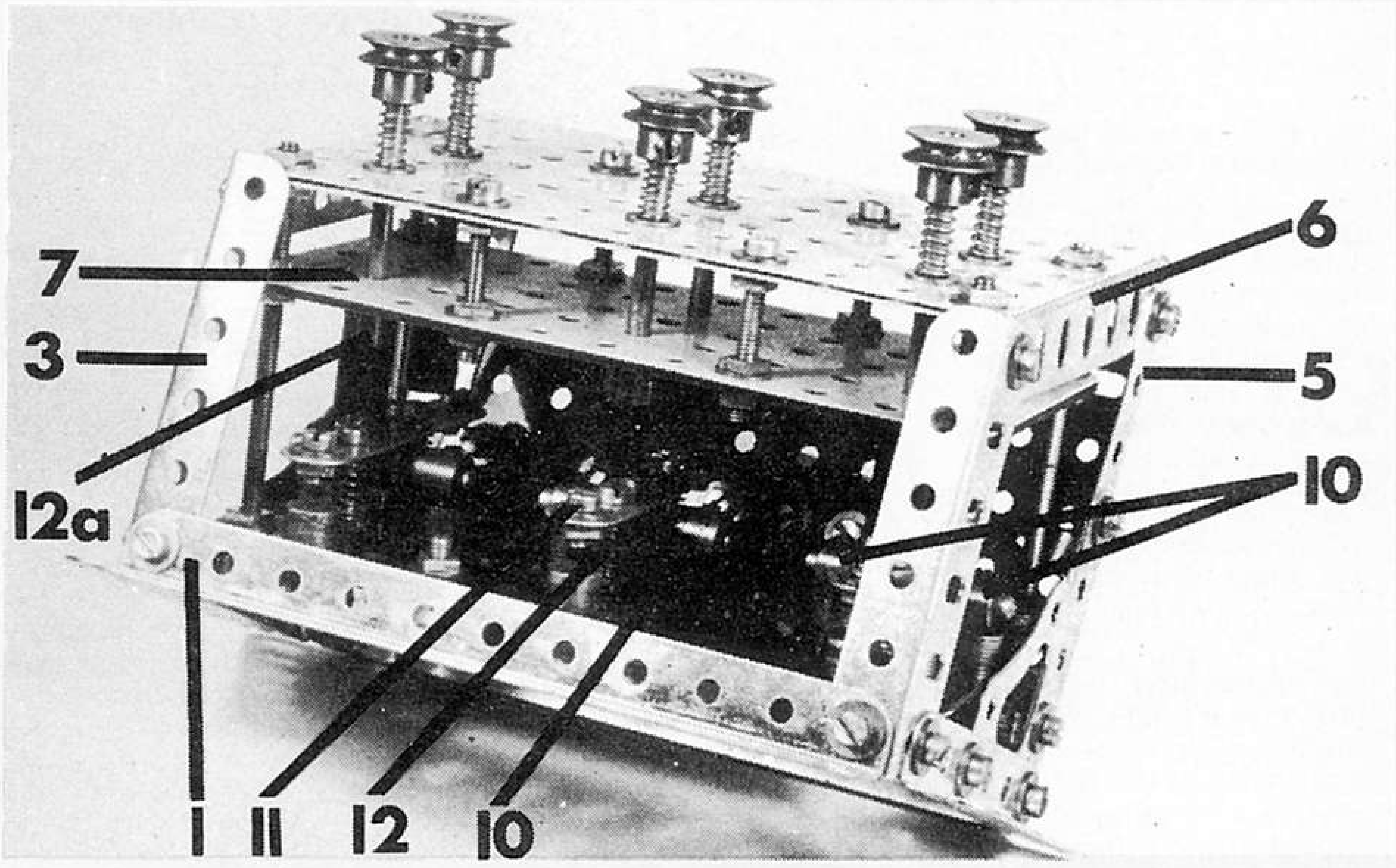


AMONG THE MODEL-BUILDERS

with 'Spanner'

A very efficient and compact remote-control unit is the subject described here by Roger Wallis of Solihull, Editor of the Midlands Meccano Guild Gazette.

REMOTE CONTROL UNIT FOR CRANES



LAST year, I constructed a freelance railway breakdown crane using three 'Crane' motors as the motive power; one for each movement of luffing, hoist and slewing. These movements were controlled by the accompanying control unit, which switched either plus or minus 3 volts, depending on the direction of movement required.

These Meccano-built switches are reliable as there are no moving wires, and are biased to centre-off.

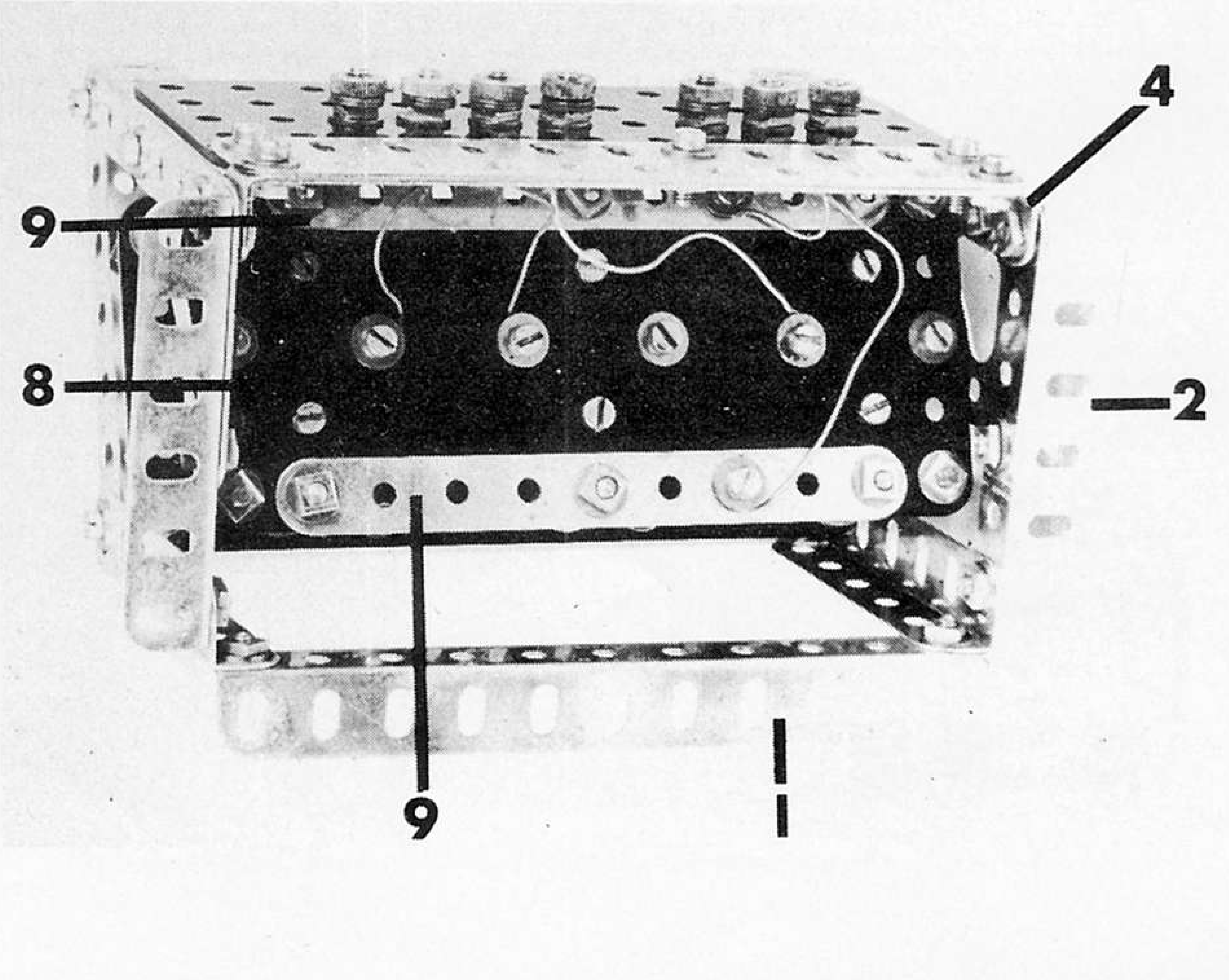
The lower frame is constructed by bolting a 5½" Angle Girder (1) to upright and horizontal 3" Angle Girders (2) & (3). These Girders are joined at the rear by a 5½" Double Angle Strip (4) and held square by a Corner Gusset. These are extended upwards by 3½" Angle Girders (5) and a sloping pair of 3½" Angle Girders (6).

A pair of 5½" x 3½" Flat Plates are held either side of the sloping girders by 3" Screwed Rods, and a pair of 5½" x 2½" Flat Plates (7) are attached, suitably strengthened by four 1⅛" Bolts. At the end of the Screwed Rods, a further 5½" x 2½" Insulating Plate (8) is lock-nutted.

The 'printed circuit' is then added, and this consists of two 4½" strips (9) bolted to the extreme edges of plate 8.

All three switches are of similar construction, so only one will be described. They are built up from two Collars (10) spaced from the Plate 8 by six Washers. These Collars securely hold a 1½" Rod which has a loose Collar mounted in the centre, with Washers taking up the slack. A 2½" Strip (11) is securely attached to this centre Collar and Bolts are fitted through all the vacant holes, with the Bolt heads uppermost.

Contact Studs are spaced by Washers so that they pass through the 4½" strips (9), making good electrical contact to them. The inner pair of bolts in the 2½" strips mate up to a similar pair in the plate 8. A Compression Spring (12) is then slipped over the threads of the bolts. This is best done with the blade of the screwdriver, by slipping it between the coils and inserting the spring first on the lower Bolt and then tilting the switch to give as much room as possible. These springs will thus hold the switch in the centre-off position.



The switch levers are 2" Rods with ½" fixed Pulleys and Compression Springs. These pass through the upper pairs of Plates and are held in place by Rod Sockets 12A. Screwed onto the Rod Sockets are Insulating Bushes and these activate the switch by engaging the inner pairs of bolts when they are depressed.

The rear of the control unit is a further 5½" x 2½" Insulating Flat Plate attached to the Double Angle Strip by a 5½" Flat Girder.

Seven long Bolts with Terminal Nuts attached are securely bolted to the centre of the Flat Plate in groups of four and three. The inner pair are linked to each other by a 1½" Strip. This is the common supply from the plus and minus 3v sources and to the model. The other two of the three set are connected to the plus and minus supplies, and in turn are connected by wire to one or the other 4½" strips. The three remaining terminal bolts are connected to one of the bolts holding the collars supporting the switch pivot.

Thus, moving the switch in one direction with send plus 3 volts to the model and moving the switch in the other direction will send minus 3 volts to the model, thus reversing the direction of rotation of the motor.

DISC BRAKE UNIT

MR. Bernard Dunkley of Knebworth, Herts. has sent details of a novel and efficient disc brake mechanism suitable for use in model cars and lorries. It utilises the screw principle to exert a strong braking effect on a Face Plate.

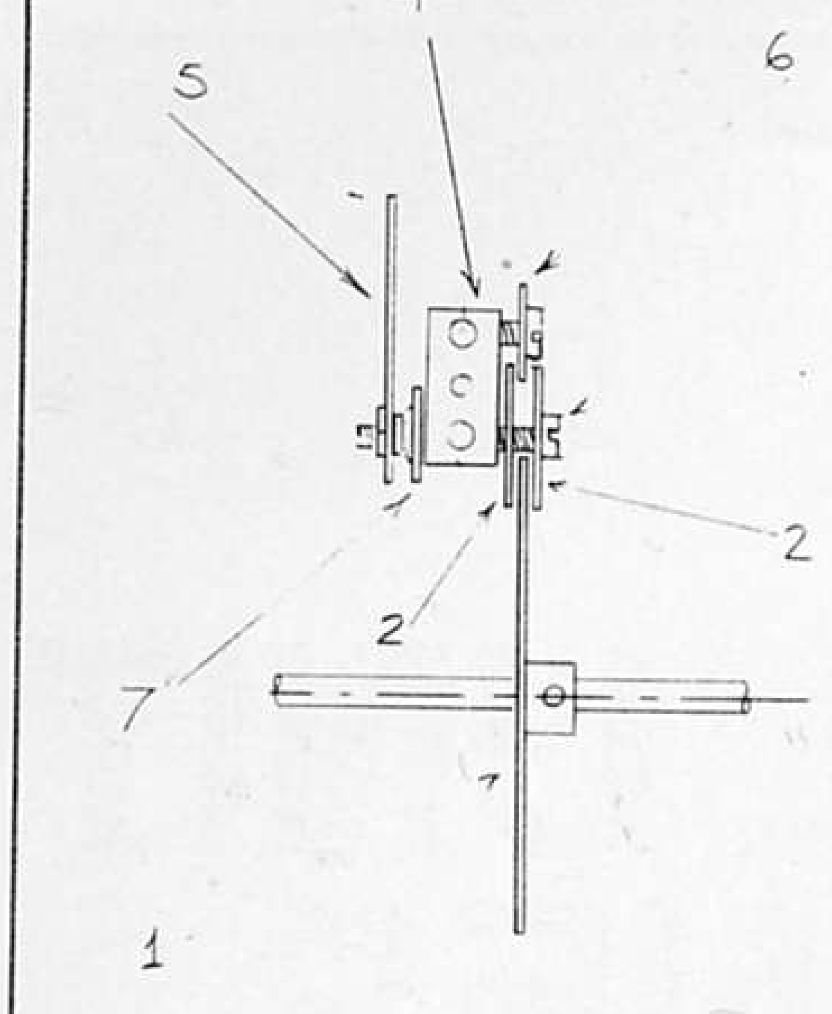


Fig. 1: Diagram of the Disc Brake Mechanism described by Bernard Dunkley, as seen edge-on.

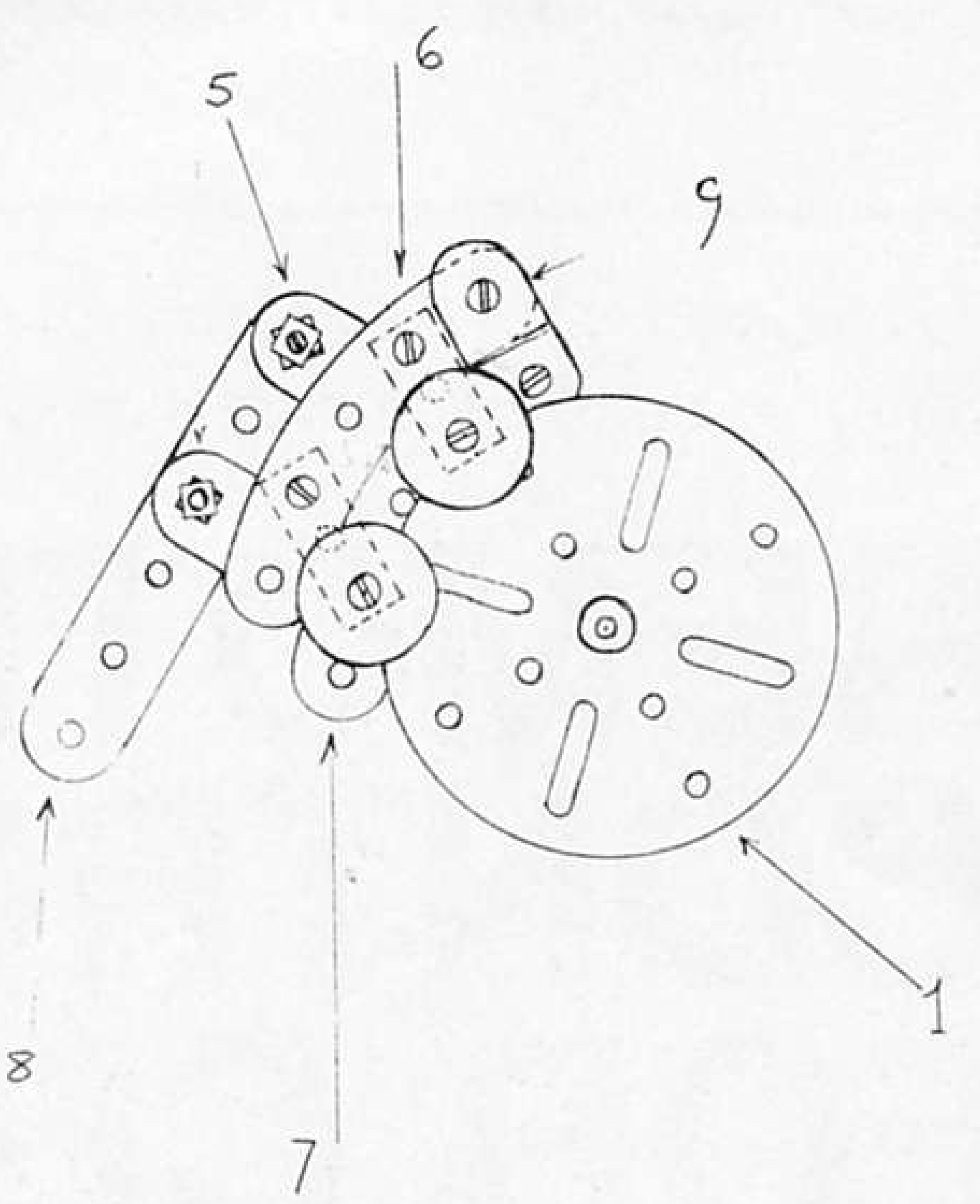


Fig. 2: couplings shown dotted.

The disc is represented by a Face Plate 1, and the 'pads' are formed by 3/4" Washers 2. A 3/4" Bolt 3 passes through a threaded bore of a Coupling 4, and the operating lever 5 is a 1½" Perforated Strip lock-nutted to the 3/4" Bolt 3. When the lever 5 is moved in the correct direction, the Bolt 3 is tightened into the threaded bore of the Coupling, resulting in the 3/4" Washers exerting a grip on the rim of the Face Plate 1.

The 2½" Curved Strip 6 acts as a spacer to maintain parallel alignment of the Washers during operation. Strip 7 constitutes part of the structure supporting the mechanism. The Bolt holding Strip 6 needs to be held firm in the upper threaded bore of the Coupling, and this can be achieved by tightening it against a long Grub Screw, (part No. 69b) entered in the opposite end of the threaded bore. In this way, Strip 6 can be given sufficient freedom to take up the correct position between the Washers, whether the brake is 'on' or 'off'.

In Fig. 1 the parts are shown slightly spaced apart from each other for clarity, but in practice they should be in close contact except from some slackness between the Washers and the Face Plate to permit free movement when the brake is 'off'.

Fig. 2 shows a built-up version of the brake. There are two sets of 3/4" Washers and Couplings, and the operating levers are linked by another Perforated Strip 8, pivotally connected to the levers at their outer ends. Pushing the linking Strip upwards puts the brake 'on'.

The supporting structure is composed of two 2½" Curved Strips, (Part. No. 90) joined by a ½" Reversed Angle Bracket 9.

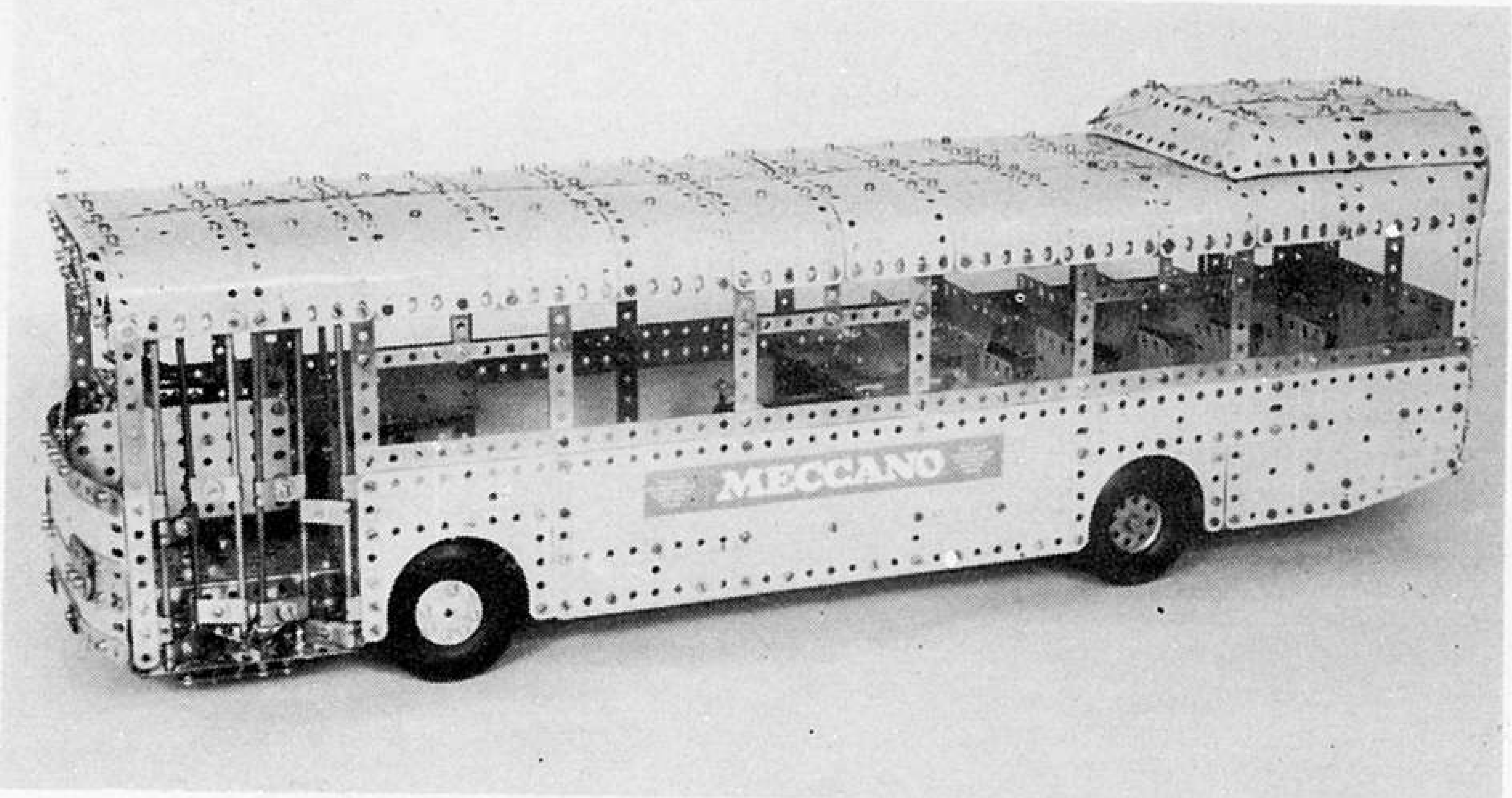
GOOD YEAR FOR BUSES!

1979 has been very much a year for bus models in the Meccano Magazine! The January and April issues described Roger Wallis' set 10 model, the July issue carried details of Andre Barbe's superb motor coach, and here I'm delighted to show the latest model of this type built by Mr. Michael Edwards of Brighton, Sussex.

Working entirely independently of any published instructions, Mr. Edwards has packed a great deal of realistic detail and a wealth of operating mechanisms in the comparatively slender space available beneath the floor of the model. Besides full remote control of forward-reverse and steering, the model incorporates automatic transmission, a bell, full suspension, and most surprising of all, the bus can attain a top speed of a scale 30 mph in top gear. This latter feature is facilitated by a very powerful non-Meccano motor, and it says much for the overall quality of construction that the model is able, without any difficulty, to withstand the quite considerable stresses and strains imposed by such a performance.

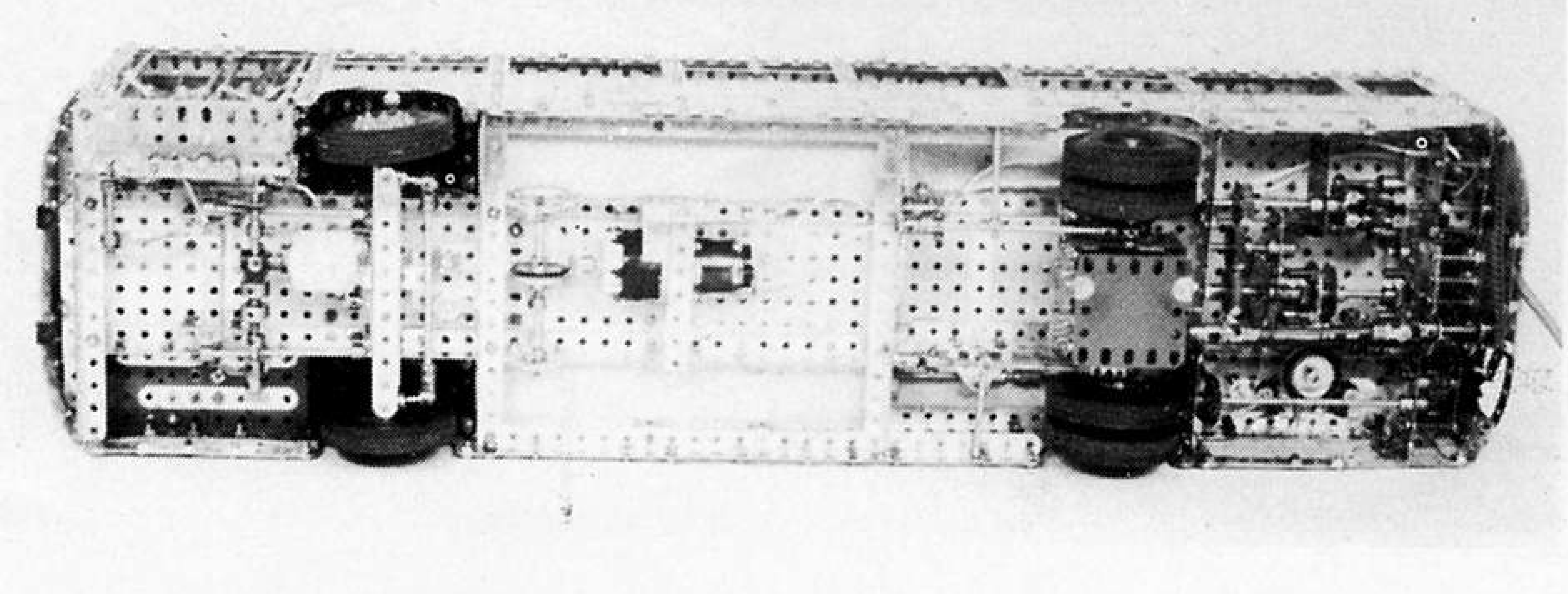
A further partcularly notable feature of the bus concerns the passenger door. By using a 'Crane' motor and further remote-control wiring, this is made to actually open and close at will, the split door sections actually folding up to either side as do the real doors on a National bus! An ingenious arrangement of suitably sized Rods, linked by Rod & Strip Connectors & held by a built-up crank system, permits this quite remarkable feat, for the first time in Meccano modelling so far as I can determine.

As Mr. Edwards points out that this model is but the latest in a long line of similar constructions undergoing constant improvement, one can only speculate as to the innovations that could be seen in years to come!



A general view of Mr. Edwards' National Bus, showing the operating doors in the closed position.

Underside of the National Bus showing the door & steering motors, plus, to the rear, the complex and sophisticated automatic transmission system.



Improved Set 10 Traction Engine

MR. E. L. Priestley of Chester has submitted details of extensive modifications and improvements he has made to the popular Set 10 Traction Engine model.

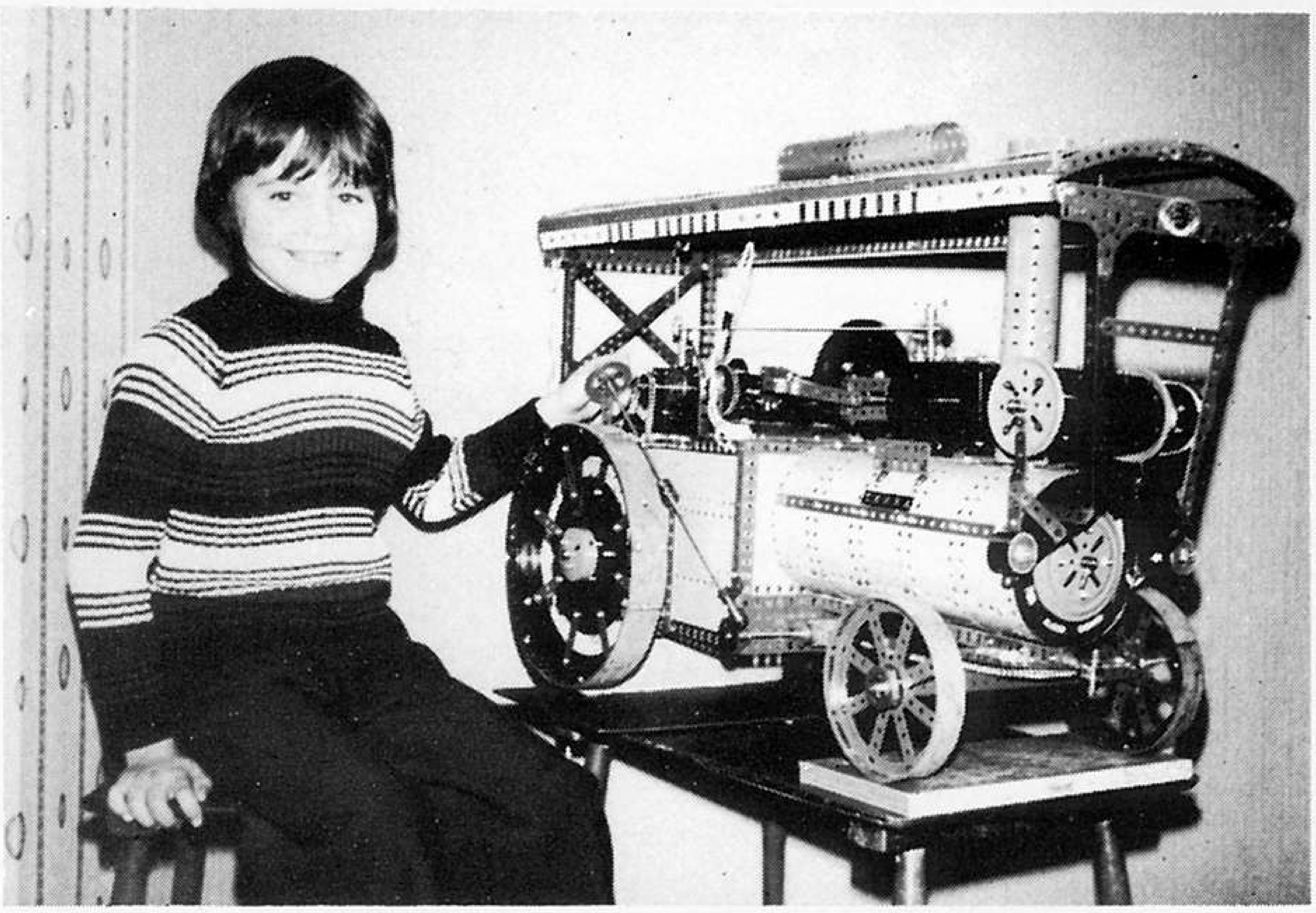
Following his recent retirement, Mr. Priestley resumed his interest in Meccano and one of his first projects was the contruction of the famous model described in leaflet 15 of the current set 10 instructions. During assembly many features not present in the normal version were incorporated, resulting in a vastly improved and more realistic model. To begin with the internal gearing, Mr. Priestley has used a four-Bevel Gear differential mounted on a 3½" Gear Wheel in the final drive to the rear wheels.

This provides much improved performance when cornering, eliminating the tendency to 'scrubbing' of one wheel on a simple Axle Rod without differential when negotiating a bend. The E15R motor has been repositioned to provide more room for the extra gearing necessary to increase the overall gear ratio which in turn provides more power for the rear drive wheels. The motor control switch was in turn re-sited and now a simple push button arrangement provides more convenient control, it being situated on the exterior of the model, just under the flywheel.

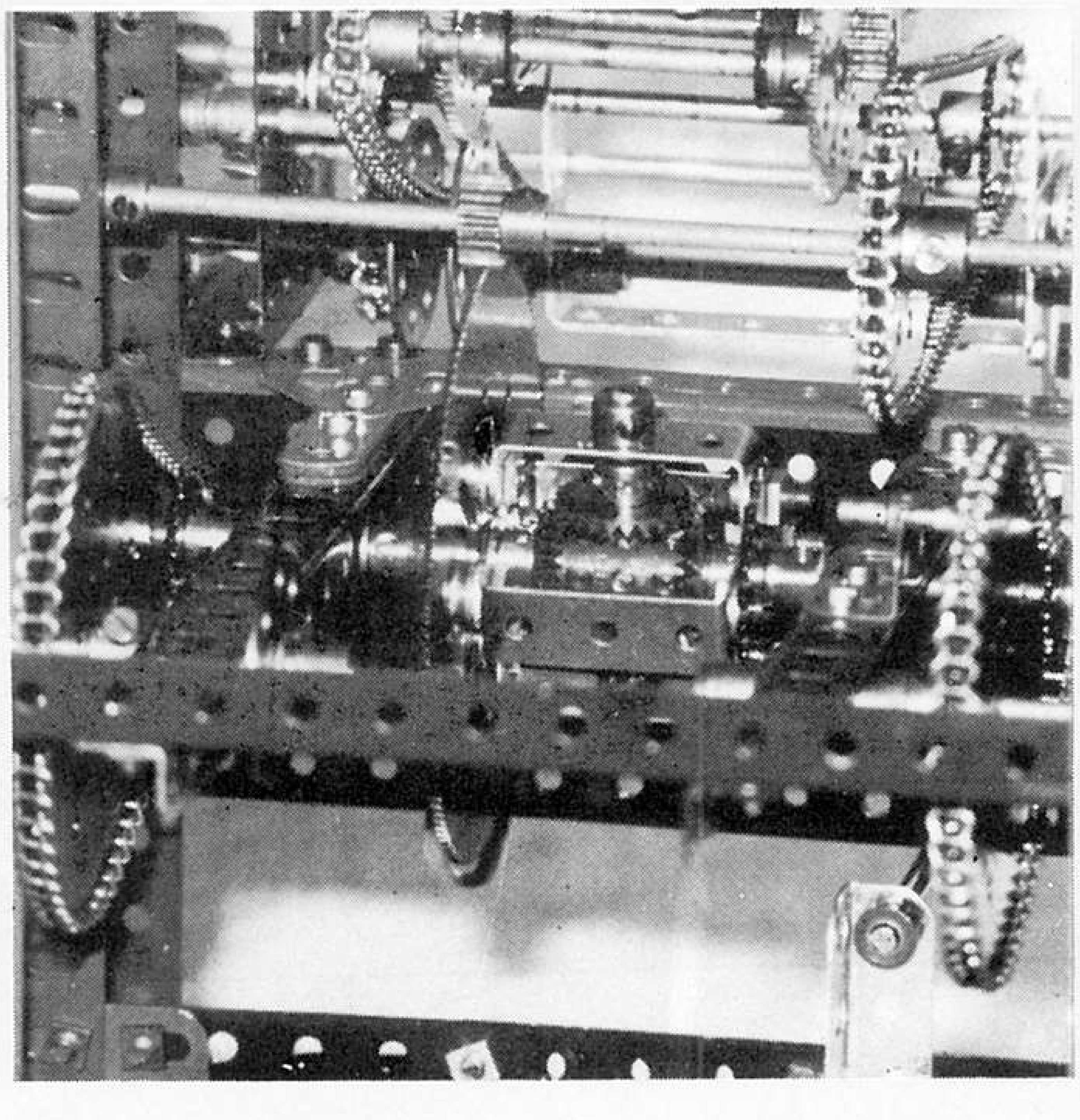
The most striking improvement to the exterior of the Traction Engine is undoubtedly in the 'tyred' front & rear wheels. Readers who have built this model will recall that long Driving Bands are used in the leaflet version around the rear wheels to minimise the uneven ride given by the Bolt heads around the circumference.

In Mr. Priestley's version, 1½" wide rubber strips are expertly positioned, with cut-outs to accommodate the Bolt heads, around the rear wheels, this idea extending to the front wheels although of course in this case the rubber strips do not need cut-outs as no Bolt heads are present. As the rubber is thicker than the depth of a Bolt head, a really smooth ride results. A powered winch has been installed on the rear of the model, this being remotely engaged by means of a control situated near the driver's position.

Use of black & white illustrations do not permit the appreciation of the Engine's bright and appealing colour scheme, but suffice it to say that full use has been made of a large Meccano set to attain a very attractive combination of colours. Since Mr. Priestley completed his model, his home has become a focal point of interest for many of the locally residing youngsters, (plus fathers!), who have taken advantage of yet one more additional facility, a detachable arrangement of small tyred wheels at the rear which permits easy upending of the model for closer inspection of its fascinating 'works'!



Michael Mayers of Chester admires Mr. E. Priestley's modified Traction Engine, originally inspired by instructions in the Set 10 leaflet No. 15.



The model's complex internal gearing, providing ample power for the road wheels.

TRAMCAR

Built from the contents of Meccano Outfit No. 3
Designed and described by Dr. Keith Cameron

TRAMS have been popular subjects with modellers since the earliest days of Meccano, and a well-proportioned 'Trolley-Car', (as they are called in the United States), appeared in the 1915 Meccano Book of Prize Models. With few exceptions American Trams have been single-deckers. One of the largest systems, and one of the oldest, was that of the city of Cincinnati, Ohio, and the history of these interesting vehicles is described in great detail in the protusely illustrated series entitled 'Cincinnati Streetcars' by Richard Wagner and Roy Wright. My model is based on one of the early four-wheelers that appeared around 1888.

A version of the model powered by an M5 Power Drive Unit and capable of running on track is also described, this requires the use of a few extra parts not contained in the No. 3 Set.

THE FRAME

A 3½" x 2½" Flanged Plate 1 and a 5½" x 2½" Flat Plate 2 are bolted together, overlapping one hole. 5½" Angle Girders 3 with their round hole flanges directed upward are fixed to these with their slotted hole flanges under the Plates. Three rows of holes project beyond each end of the Girders, these form the two platforms. Along one side of each platform a step consisting of a 1½" x ½" Double Angle Strip held by two lock-nutted 3/4" Bolts is fixed.

SIDE FRAMES

Each side frame consists of a 5½" x 1½" Flexible Plate edged above and below by 5½" Perforated Strips. Vertical Narrow Strips spaced as shown, (a 3½", a 2½", a further 2½", and a 3" Strip) form the window frames and are connected at their upper ends by a 7½" Strip, the fixing Bolts also securing two 2½" x ½" Double Angle Strips and four ½" Angle Brackets, (two each side). The Double Angle Strips are slightly formed and the ½" Angle Brackets made slightly obtuse to provide the roof curve.

THE ROOF

This comprises a central 2½" x 2½" Plastic Flexible Plate joined at both ends to 3½" x 2½" Flexible Plates and held in place by the Double Angle Strips and the ½" Angle Brackets. Rounded ends are provided by slightly formed 2½" Curved Strips. 3" Formed Slotted Strips are bolted by Obtuse Angle Brackets to the 7½" Strips. A raised roof section (or clerestory) is formed from three 2½" x 1½" Plastic Flexible Plates bolted together to form a compound 5½" x 1½" Plastic Flexible Plate. This is fixed to the main roof by ½" Bolts using ½" Pulleys as spacers near the centre, and Washers for this purpose at each end.

PLATFORM ENDS

At one end, a 2½" x 1½" Flanged Plate is bolted to the flange of the 3½" x 2½" Flanged Plate 1. At the other end a composite 2½" x 1½" Flat Plate comprising two 1½" x 1½" Flat Plates is fixed by means of a 1½" Angle Girder to the 5½" x 2½" Flat Plate 2. This composite Plate is edged on one side by a 1½" Angle Girder. The headlights consist in each case of a 3/4" Washer and a 1" Pulley secured by a ½" Bolt. 2" Perforated Strips form 'no-entry' barriers on one side of each platform as shown.

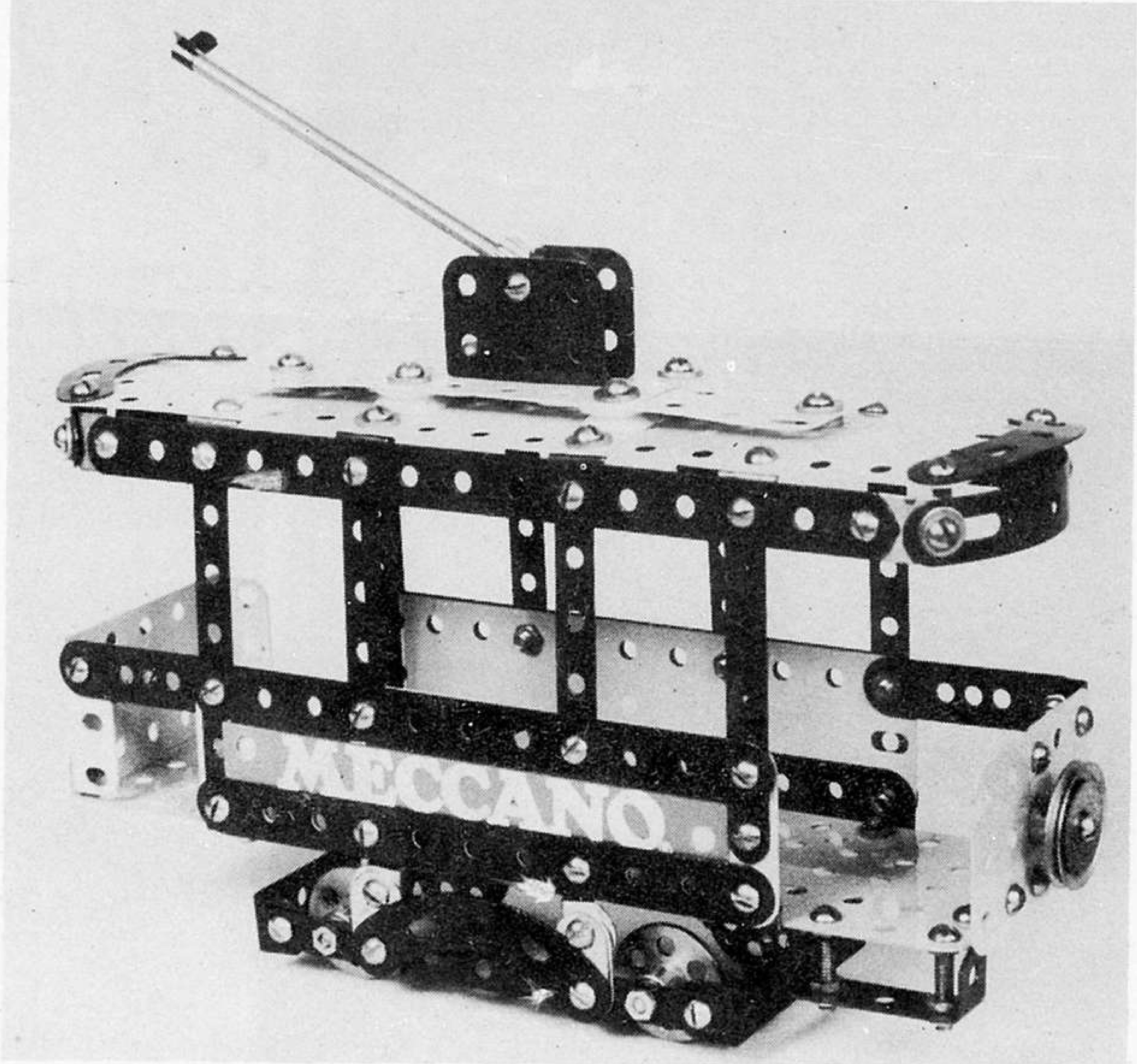
THE UNDERCARRIAGE

This is rectangular, and formed from two 4½" Narrow Strips connected via their end holes by two 2½" x ½" Double Angle Strips. This is held to the frame on one side by two 1" x ½" Angle Brackets, and on the other side by Fishplates and Corner Angle Brackets. The fixing Bolts also secure 2½" Curved Strips. The undercarriage wheels are represented by 1" Bush Wheels, bosses outward, free to rotate on Bolts lock-nutted to the Narrow Strips.

THE TROLLEY POLE

A 4" Axle Rod is held in a ½" Pinion wedged between the two sides of a Channel Bearing, but free to pivot on Bolts held in its transverse threaded bores. The Channel Bearing is free to rotate on a ½" Bolt in its centre hole and the centre hole of the roof, secured below by lock-nuts.

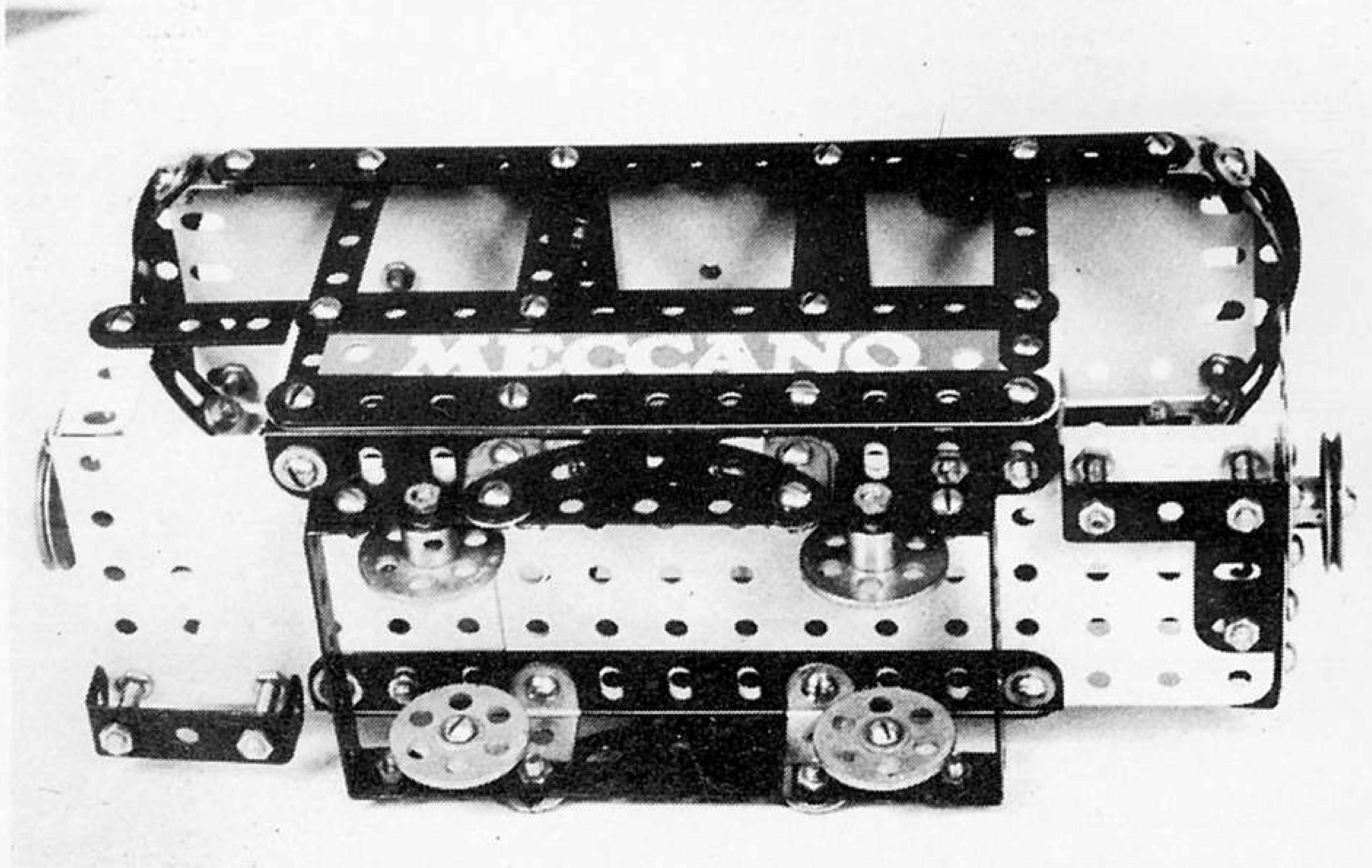
General view of the non-powered version of the Tramcar.



PARTS REQUIRED—
Non-powered version

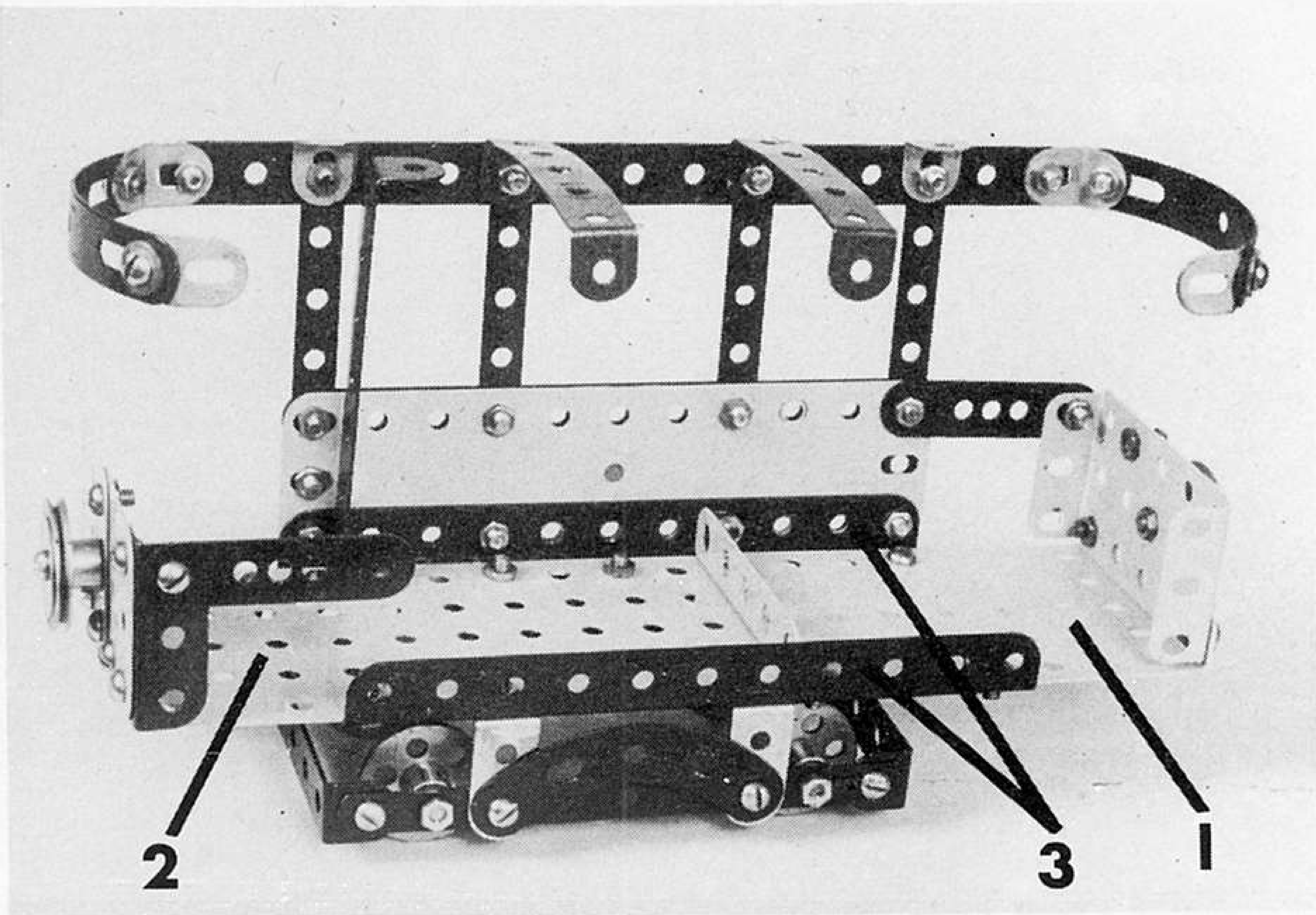
2 of No. 1B	1 of No. 53
4 of No. 2	20 of No. 38
2 of No. 6	1 of No. 70
2 of No. 9	2 of No. 74
2 of No. 9F	4 of No. 90A
2 of No. 10	4 of No. 111
4 of No. 12	11 of No. 111A
2 of No. 12B	1 of No. 154A
4 of No. 12C	1 of No. 154B
1 of No. 15B	1 of No. 160
2 of No. 22	2 of No. 189
4 of No. 23	2 of No. 190A
1 of No. 26	3 of No. 194
1 of No. 35	1 of No. 194A
84 of No. 37B	2 of No. 215
108 of No. 37C	4 of No. 235
2 of No. 38D	2 of No. 235A
2 of No. 48	2 of No. 235B
4 of No. 48A	2 of No. 235D
2 of No. 48B	4 of No. 518
1 of No. 51	from 187C)

'Meccano' emblem for side panels

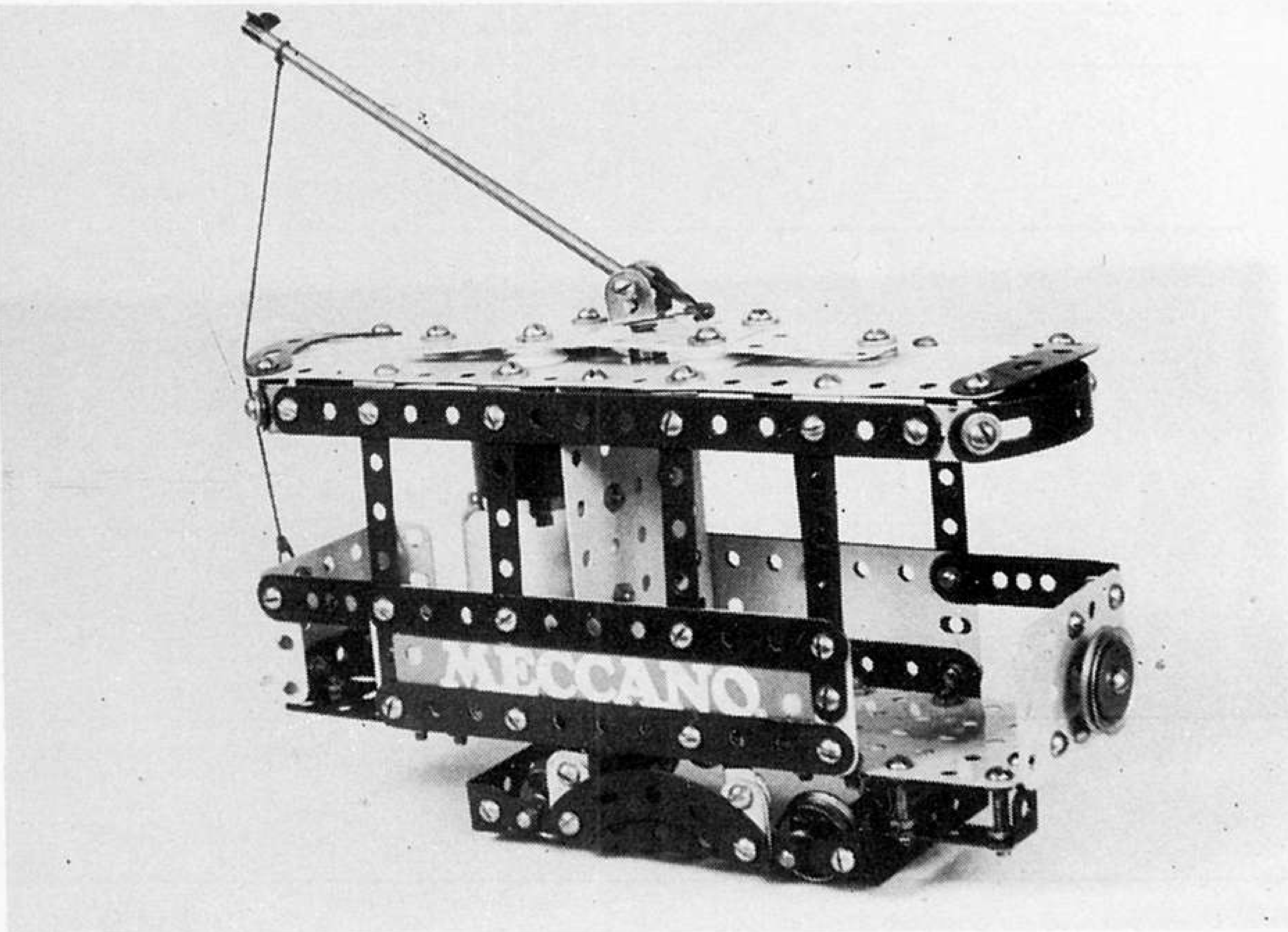


Tramcar undercarriage showing method of attachment to main frame.

Partly-dismantled view showing interior construction.



General 3/4 view of the M5 powered version.



MOTORISED VERSION

This requires an M5 Powerdrive Unit, a Worm Gear, two 3" Axle Rods, four 3/4" Flanged Wheels, five Collars, a 5" Axle Rod, two extra ½" x ½" Angle Brackets, a 1½" Angle Girder, a Fishplate and a 2½" Driving Band. These parts also provide a neat, operating Trolley Pole.

THE FRAME

This must be altered to allow passage of the drive to the wheels. The 5½" x 2½" Flat Plate is retained exactly as in the non-powered version. However, the 3½" x 2½" Flanged Plate is bolted by one of its flanges to the Flat Plate along the second row of holes as shown, and the M5 Motor is secured to this Flanged Plate.

THE REAR PLATFORM

The platform closer to the Motor is composed of two 2½" Flat Girders bolted by their round holes to the slotted hole flanges of the 5½" Angle Girders, overlapping two holes in each case and placing the Flat Girders above the Angle Girders. A 2½" x 1½" Flanged Plate is attached by a 1½" Angle Girder to the end holes of the 2½" Flat Girders.

THE WHEELS

These are 3/4" Flanged Wheels fixed on 3" Axle Rods journalled in the 4½" Narrow Strips as shown. Collars and Washers are used for spacing purposes, and the rear axle also carries a ½" Pinion which meshes with a Worm Gear on the output shaft of the M5 Motor.

THE TROLLEY ARM

This is a 5" Axle Rod secured at its lower end by a Collar pivotting in the slotted holes of two ½" x ½" Angle Brackets by means of ½" Bolts, secured by Nuts in the Collar's transverse threaded bores. The ½" x ½" Angle Brackets are held in the form of a Double Bracket to a Fishplate by a ½" Bolt and a Nut. This Bolt passes through the centre hole of the roof, a Collar being placed between the sections of the roof for stability. A 2½" Driving Band looped through the free hole of the Fishplate is held on the 5" Axle Rod above the Collar and exerts enough tension to maintain trolley pole contact with an overhead wire, this being tracked by a

Spring Clip mounted at the top of the 5" Rod as shown. A length of cord tied to the upper end of the pole can be looped around a Bolt on the platform end.

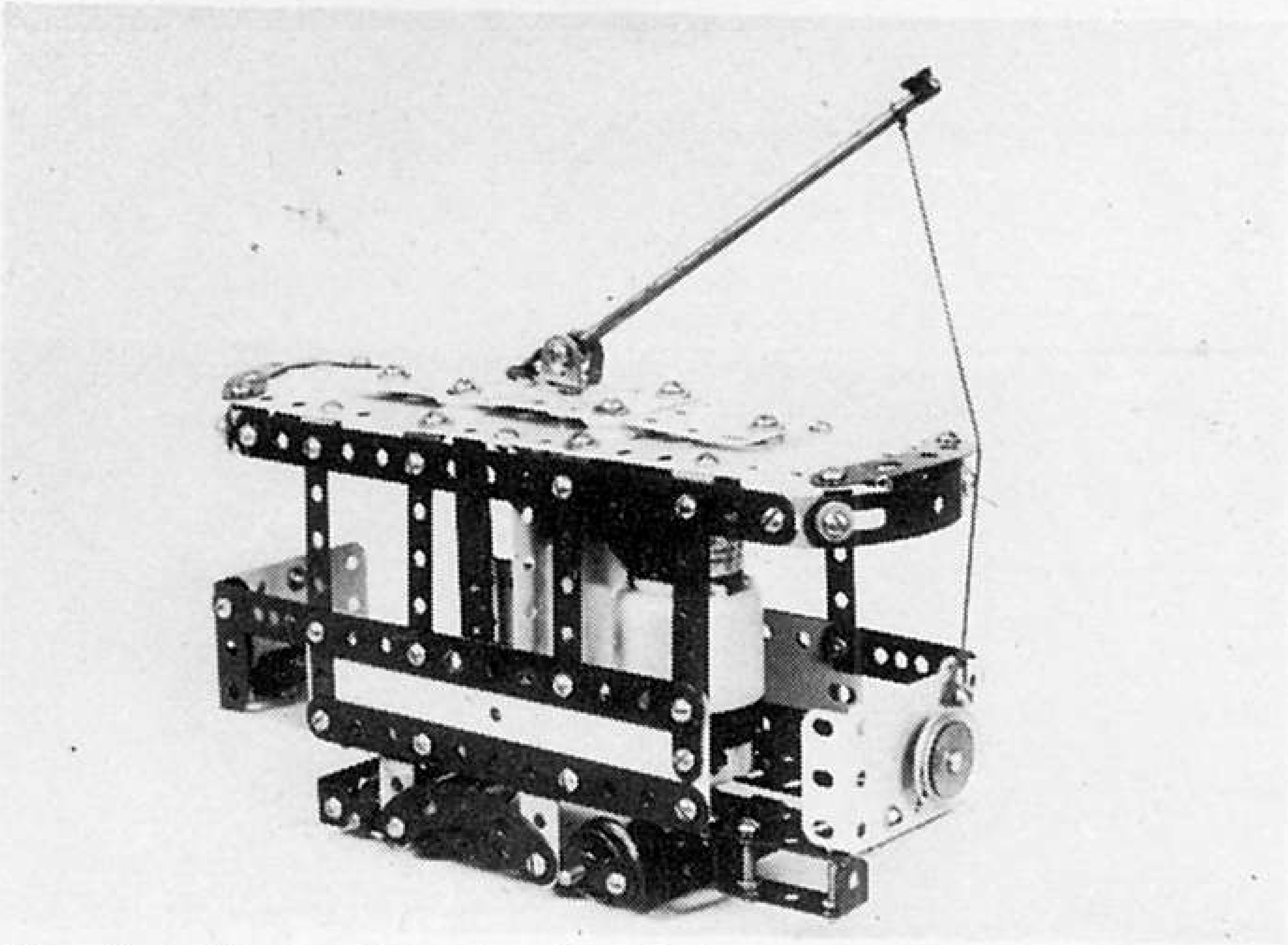
OPERATION

A wire is used to connect the ½" Bolt of the trolley pole to one terminal of the M5 Motor. The ground lead should be taken from the 4½" Narrow Strips forming the undercarriage sides, first removing a small portion of enamel to ensure good electrical contact.

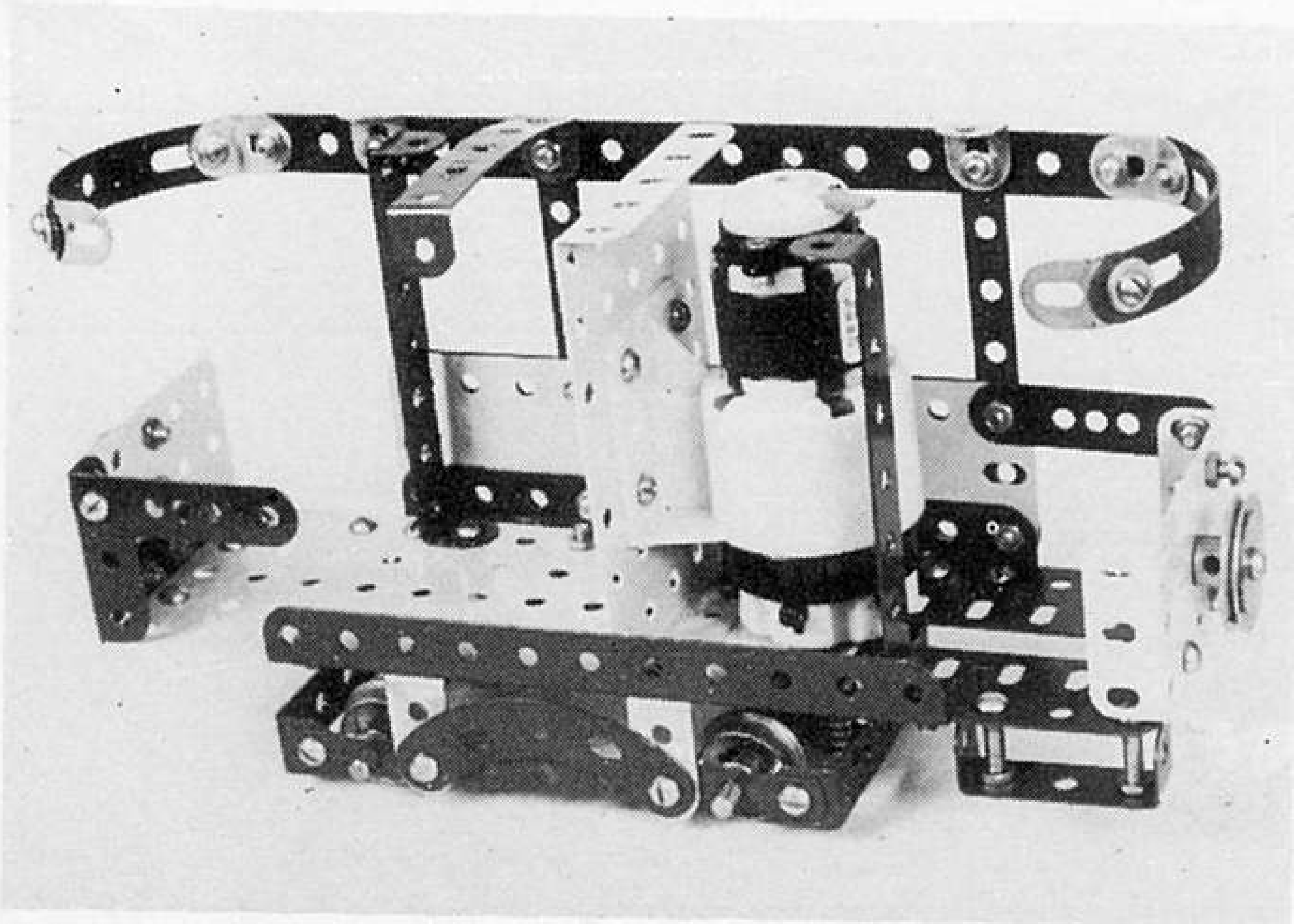
2ND MOTORISED VERSION

This arrangement utilises the 11053 Powerdrive Unit Mark II, and is described for those who do not have an M5 Powerdrive Unit and wish to motorise the tram using the motor supplied with the No. 3 Set.

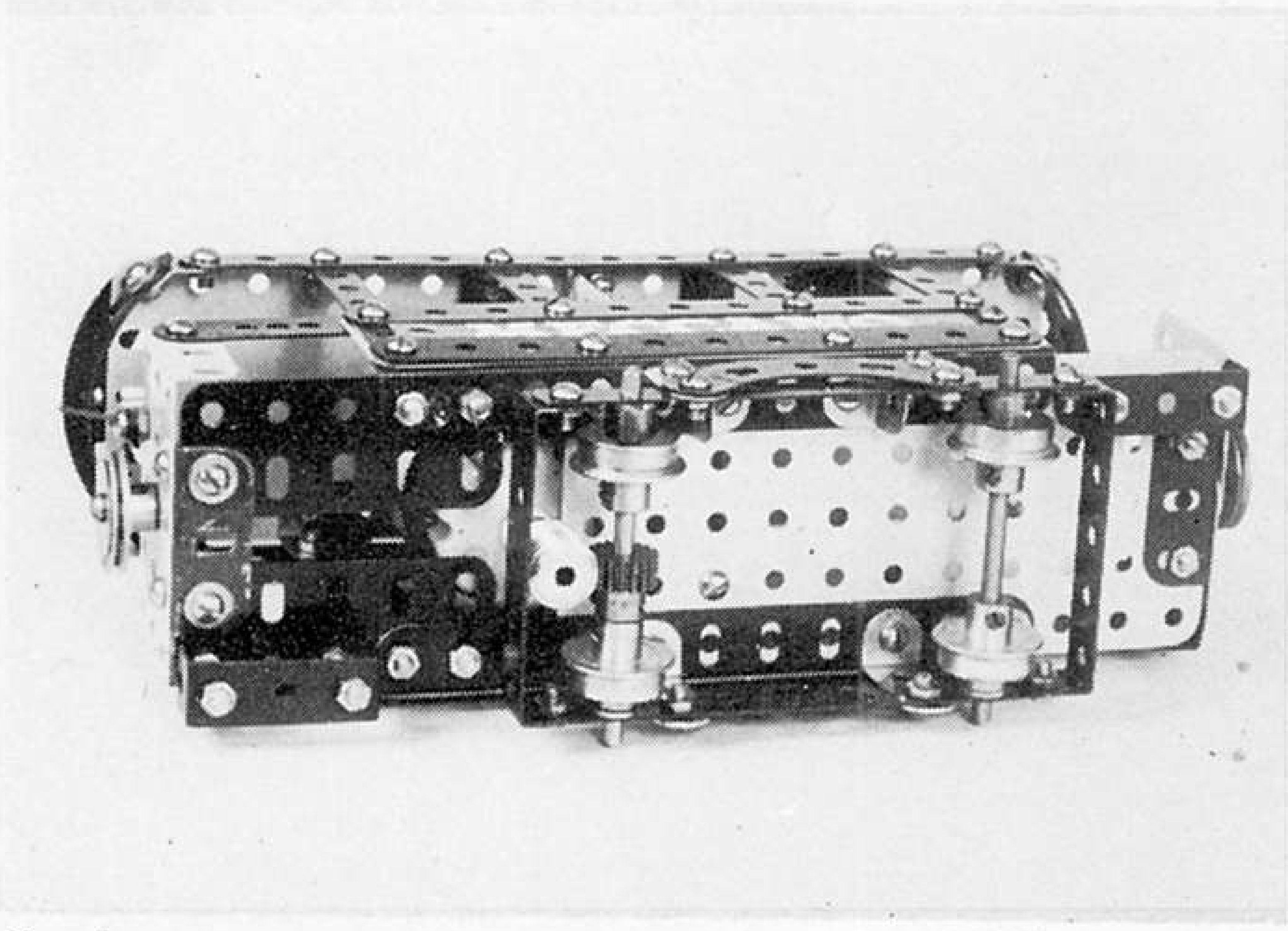
The frame is built up as in the non-powered version using the 3½" x½" Flanged Plate and the 5½" x 2½" Flat Plate. A 1½" Axle Rod is journalled vertically through the Flat Plate and a Double Bent Strip as shown. This Rod carries at its lower end a Worm Gear driving a ½" Pinion as described in the M5 version. At its upper end, the 1½" Rod carries a 50t Contrate Wheel which is driven by a 15t Pinion on the Motor output shaft. Washers are employed where necessary for spacing purposes. The remainder of the tram is constructed as already described.



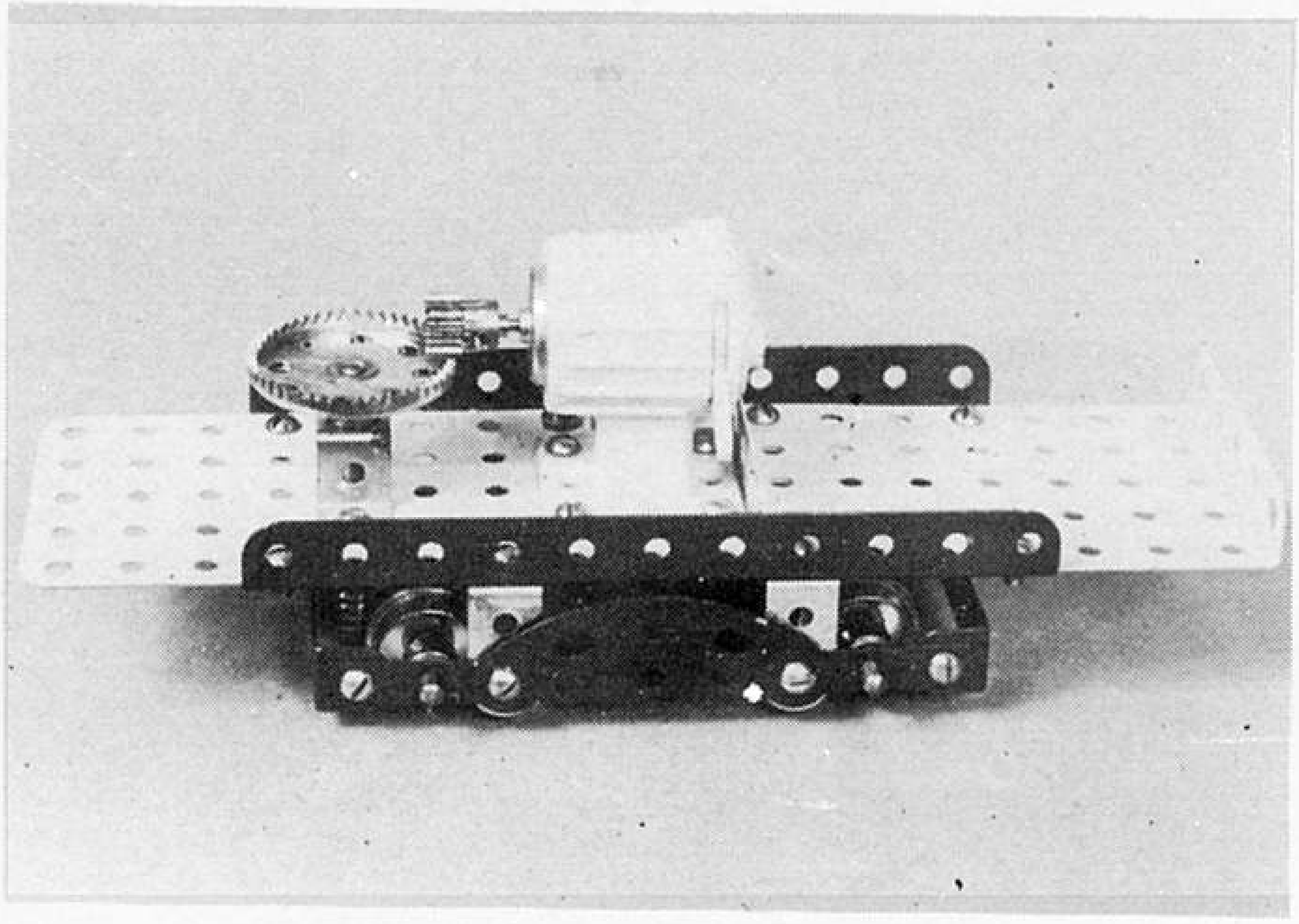
View from the rear (motor) end of the M5 powered version.



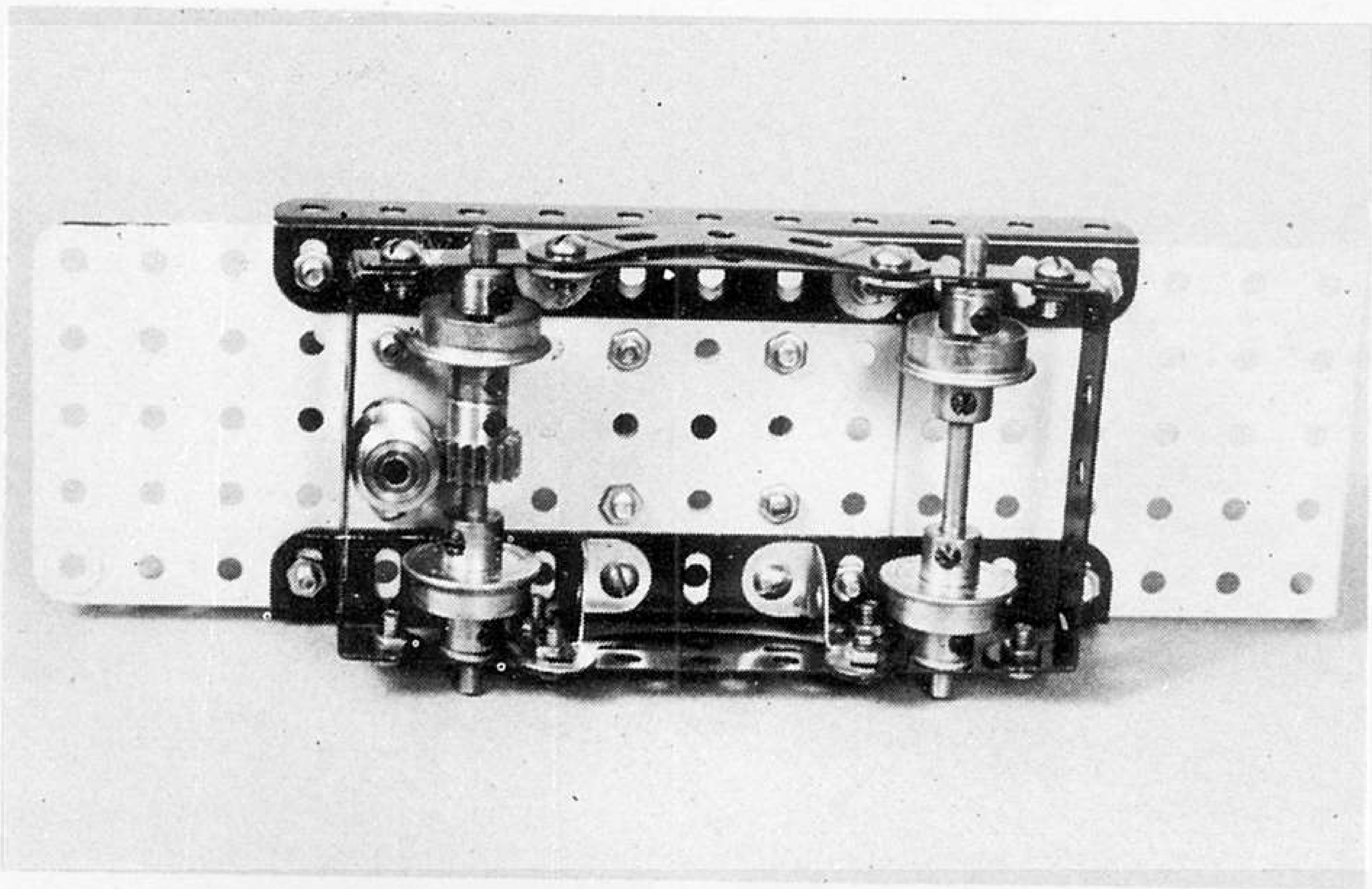
Interior construction; M5 version.



Gearing arrangement of M5 powered Tramcar.



Upper view of chassis frame, 11053 version.



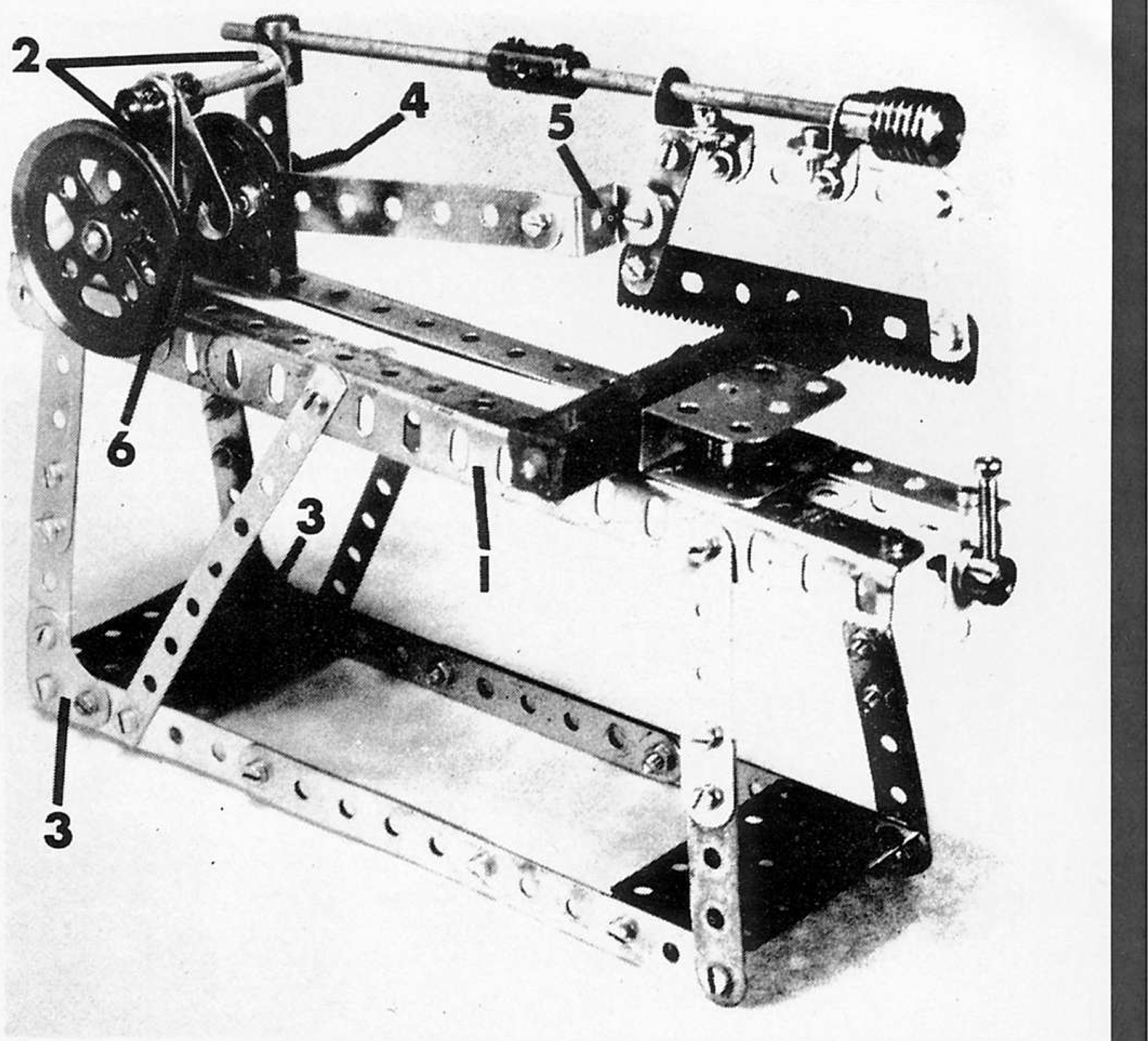
Lower, underside of 11053 version.

Extra parts required to complete the 2nd Motorised Version.

2 of No. 16b
4 of No. 20b
1 of No. 26
1 of No. 26c
1 of No. 28
1 of No. 32

6 of No. 37b
6 of No. 37c
6 of No. 38
1 of No. 45
4 of No. 59
1 of No. 11053 Motor.
(An operating trolley pole, as described in the M5 version, will add to the realism of this model).

TAYLOR'S TEKNIKIT



TAYLOR'S Teknikit is our name for a 'machinery multikit' developed for his own interest by Mr. Harold Taylor of Huddersfield. From a standardised selection of parts, especially chosen for building interesting machine models, Harold has designed a number of excellent machines which we have been featuring in these pages. The 'Kit' is not commercially available, of course, but we give a list of its contents below for those who wish to collect the parts in order to build the models. Already we have featured a Bench Drill, a Shaping Machine, Milling Machine, a Lathe, a Punching Machine, and now we have a

BENCH SAW

CONSTRUCTION of the Bench Saw is best commenced with the table. This consists simply of two 9½" Angle Girders 1 connected at each end by a Trunnion flange, the apex of each Trunnion pointing downwards. The table is filled in by a 5½" x 1½" Flexible Plate and two 2½" x 1½" Flexible Plates, but ensure that the fifth hole centre from the nearside end of the table is elongated, this is to provide adjustment for the clamping vice described later on.

The table legs are represented by four 4" Perforated Strips formed by overlapping four pairs of 2½" Perforated Strips by two holes. The bottom of each table leg is braced by two 2½" x 1½" Flanged Plates arranged as shown, and two compound 8" Perforated Strips formed by overlapping two pairs of 5½" Perforated Strips by six holes, overlay the flanges of the 2½" x 1½" Flanged Plates. The upper holes of the nearside pair of table legs are connected to the elongated holes of the two 9½" Angle Girders 1, four holes from the nearside end.

The rear table legs are similarly connected to the 9½" Angle Girders 1, but at a point only two holes from the rear table end. Before securing these Bolts, two Corner Gussets 2 are inserted between the upper ends of the table legs and the 9½" Angle Girders 1, their 5-hole edges vertical and facing forward. The table leg framework is completed by inserting a diagonally placed 4½" Narrow Strip on each side at the point shown for bracing purposes, and, also for bracing purposes, 1" Corner Brackets are employed at the point labelled 3, on each side.

A 2" Pulley is fixed to a 2" Axle Rod and the Rod is then inserted into the centre hole of the vertical edge of one of the Corner Gussets 2, using a Collar at this point for spacing purposes between the Pulley and the Corner Gusset. The 2" Axle Rod carries at its other end a Bush Wheel, this is connected by a 3/4" Bolt carrying a 3½" Perforated Strip to a further Bush Wheel held on a 1½" Axle Rod 4 journalled in the centre vertical hole of the opposite Corner Gusset. The 3/4" Bolt is lock-nutted to each Bush Wheel in such a manner that the assembly serves the function of a built-up crank. The 1½" Axle Rod 4 is held in place by a Collar on the opposite side of the Corner Gusset. After assembly, rotation of this built-up crank shaft should result in a push-pull (reciprocating) motion being imparted to the 3½" Perforated Strip.

The saw itself is represented by a 3½" Rack Strip, secured by a framework consisting of two 1½" Narrow Strips and a 3" Narrow Strip, via a ½" Reversed Angle Bracket 5, to the 3½" Perforated Strip. The Bolt connecting the Reversed Angle Bracket 5 to the rear saw frame 1½" Narrow Strip, is lock-nutted to permit slight variation of the angle between the two.

The upper holes of the Corner Gussets are connected by a 2" Axle Rod secured on the nearside by a Collar, on the far side by a Short Coupling and carrying a Crank 6. In the Short Coupling is mounted a compound 7" Axle Rod formed from two 3½" Axle Rods connected by a Coupling. The saw frame can slide along one of the 3½" Axle Rods by means of two Corner Angle Brackets, built up from two pairs of ½" x ½" Angle Brackets. A Worm Gear acts as a 'stop' at the end of the 3½" Axle Rod. The Crank 6 is firmly fixed to the 2" Axle Rod and by lifting this slightly the saw frame will be lifted clear of the work held in the vice.

The vice consists of two jaws and the far side jaw, (not shown in the illustration), is simply formed from two 1" x ½" Angle Brackets bolted seven holes from the near side end of the table, lugs facing to the rear. The movable jaw of the vice is represented by a Channel Bearing, and this slides on its fixing Bolt shank in the elongated hole in the table plating mentioned earlier. A Threaded Boss on the underside, secured by a Nut, receives a 3" Screwed Rod though its transverse threaded bore. The 3" Screwed Rod is passed through the upper apex hole of the nearside Trunnion and is secured at this point by a Collar on each side. The nearside Collar is spaced from the Trunnion by means of two Washers, and a 3/4" Bolt mounted in one of its transverse threaded bores serves as a lever for turning the Screwed Rod, and in turn, the movable Channel Bearing jaw of the vice.

PARTS REQUIRED

4 of no. 2	1 of no. 63
1 of no. 3	1 of no. 63d
8 of no. 5	1 of no. 64
2 of no. 8a	1 of no. 80c
4 of no. 12	2 of no. 108
2 of no. 12b	1 of no. 110
2 of no. 16	2 of no. 111
1 of no. 17	1 of no. 111a
1 of no. 18a	1 of no. 125
1 of no. 20a	2 of no. 126
2 of no. 24	2 of no. 133a
1 of no. 32	1 of no. 160
45 of no. 37b	2 of no. 188
49 of no. 37c	1 of no. 189
9 of no. 38	1 of no. 235a
2 of no. 51	2 of no. 235d
4 of no. 59	2 of no. 235g
1 of no. 62	

TAYLOR'S TEKNIKIT
CONTENTS LIST

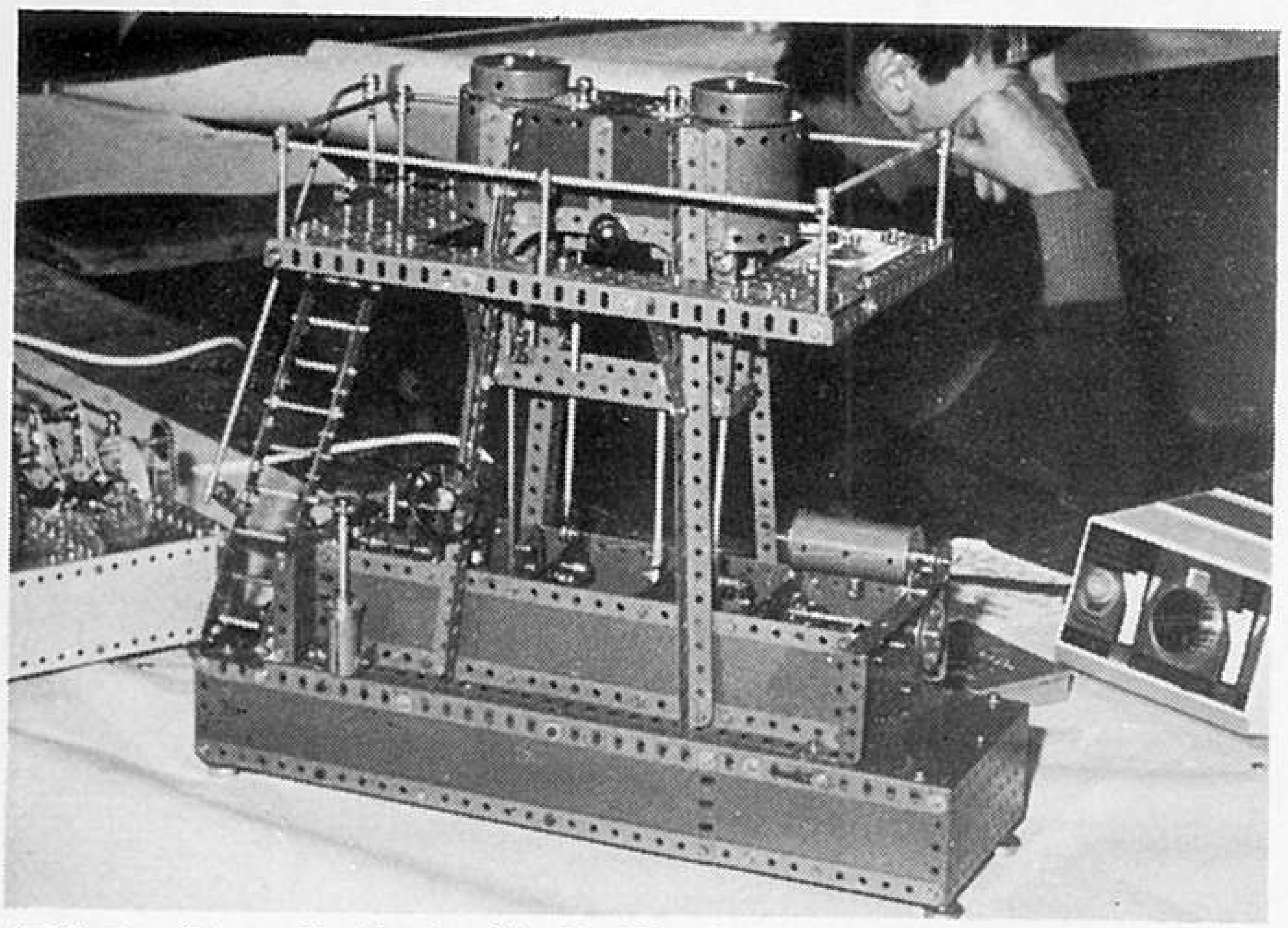
Part No.	Qty	Part No.	Qty
2	4	53a	2
3	2	59	6
5	10	62	1
8a	2	63	1
9	2	63d	1
10	4	64	1
11	2	80c	1
12	8	108	2
12b	2	110	1
15b	1	111	2
16	3	111a	2
17	2	111c	6
18a	2	115	1
20a	2	125	2
22	3	126	2
22a	2	126a	2
24	2	133a	2
26	2	160	1
27a	1	188	4
27f	2	189	4
32	1	190	2
35	2	194a	2
37b	64	194c	2
37c	64	214	2
38	30	230	1
43	1	231	1
48a	6	235a	2
51	1	235d	2
52	1	235g (1½" N.S.)	2

SOLENT MECCANO CLUB DISPLAYS

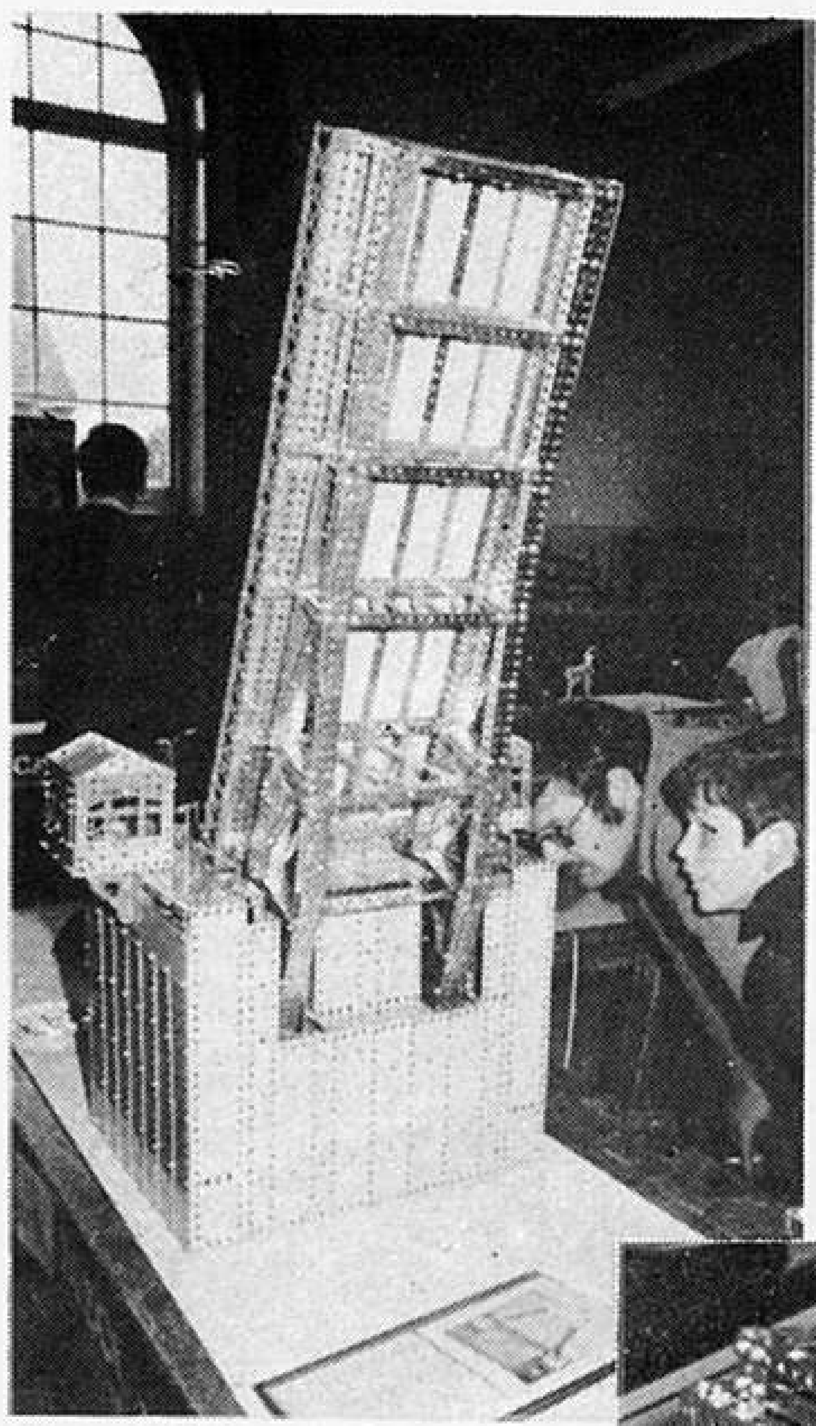
SOME of the many fine exhibits seen at two separate Meccano shows staged by members of the Solent Meccano Club. These displays were held at Chichester on May 19th and at Waterlooville on the 30th June 1979.

Harry Gower's Stothert & Pitt SWL 35 ton capacity Gantry Crane, with Harry in the foreground.

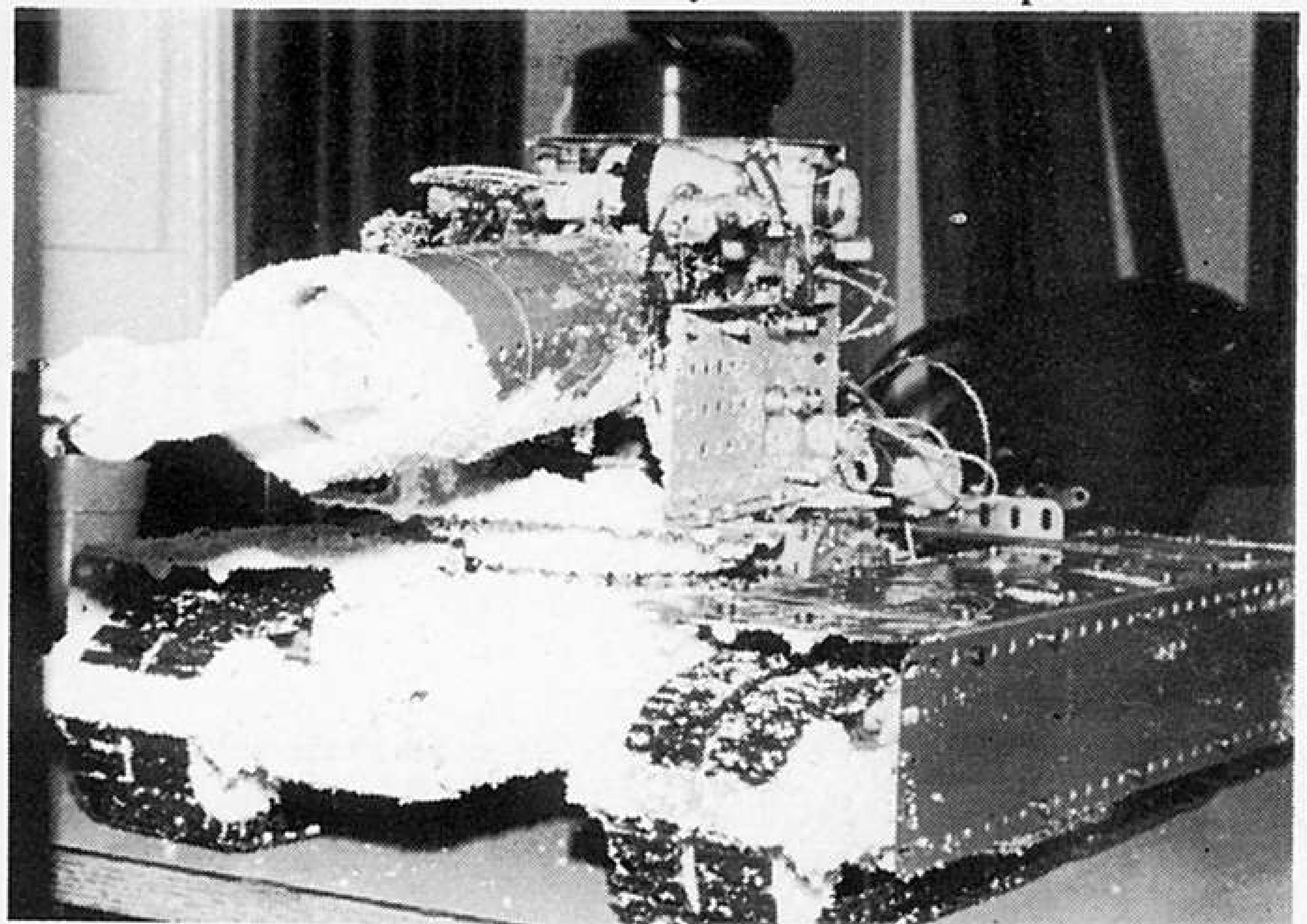
Tony Knowles' collection of vintage Meccano motors & manuals which the public happily reminisced over!



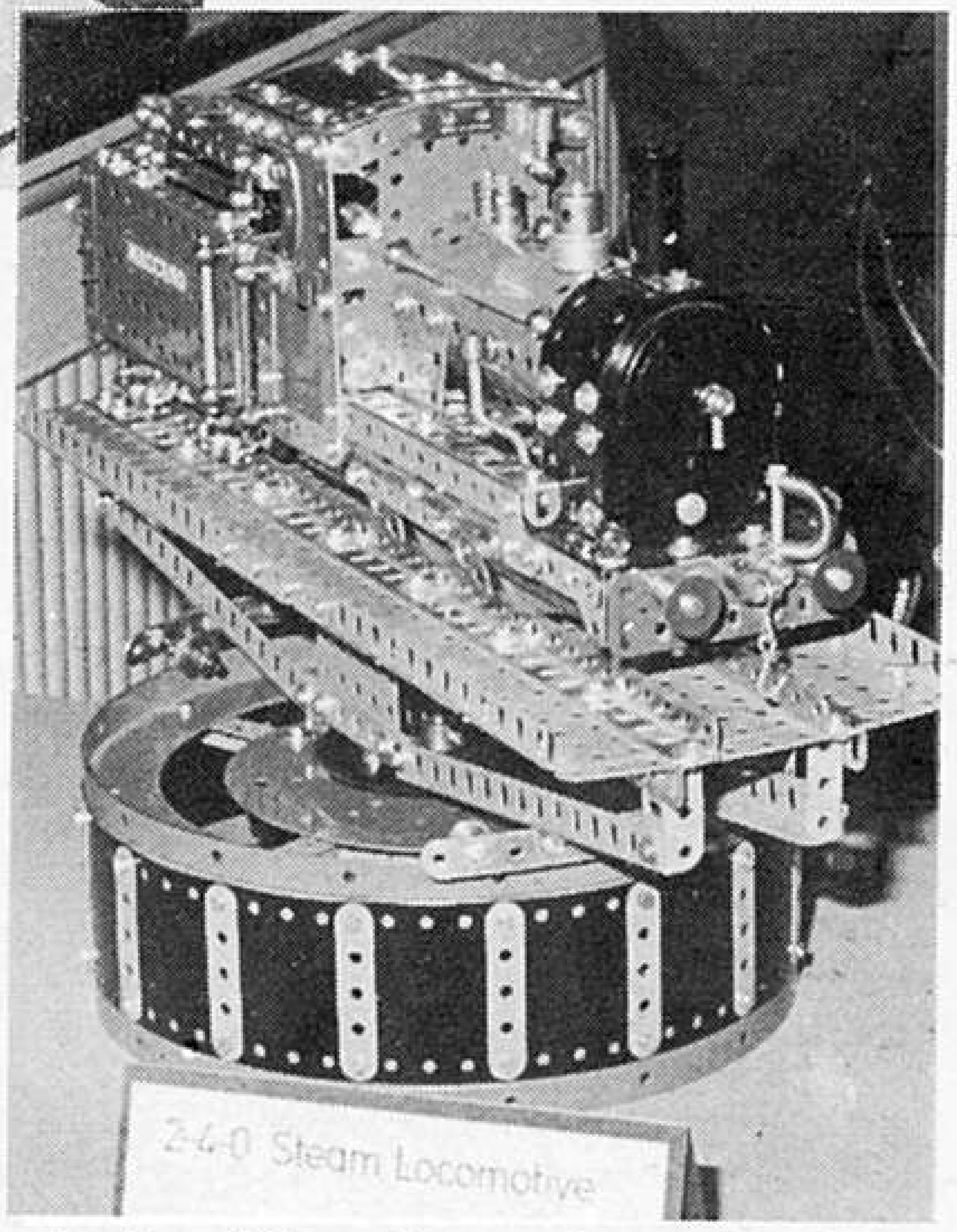
A Marine Steam Engine by Charles Harrison, originally inspired by an instructions manual model, but heavily modified and improved.



Giant Lifting Bridge with span raised, by Charles Harrison.

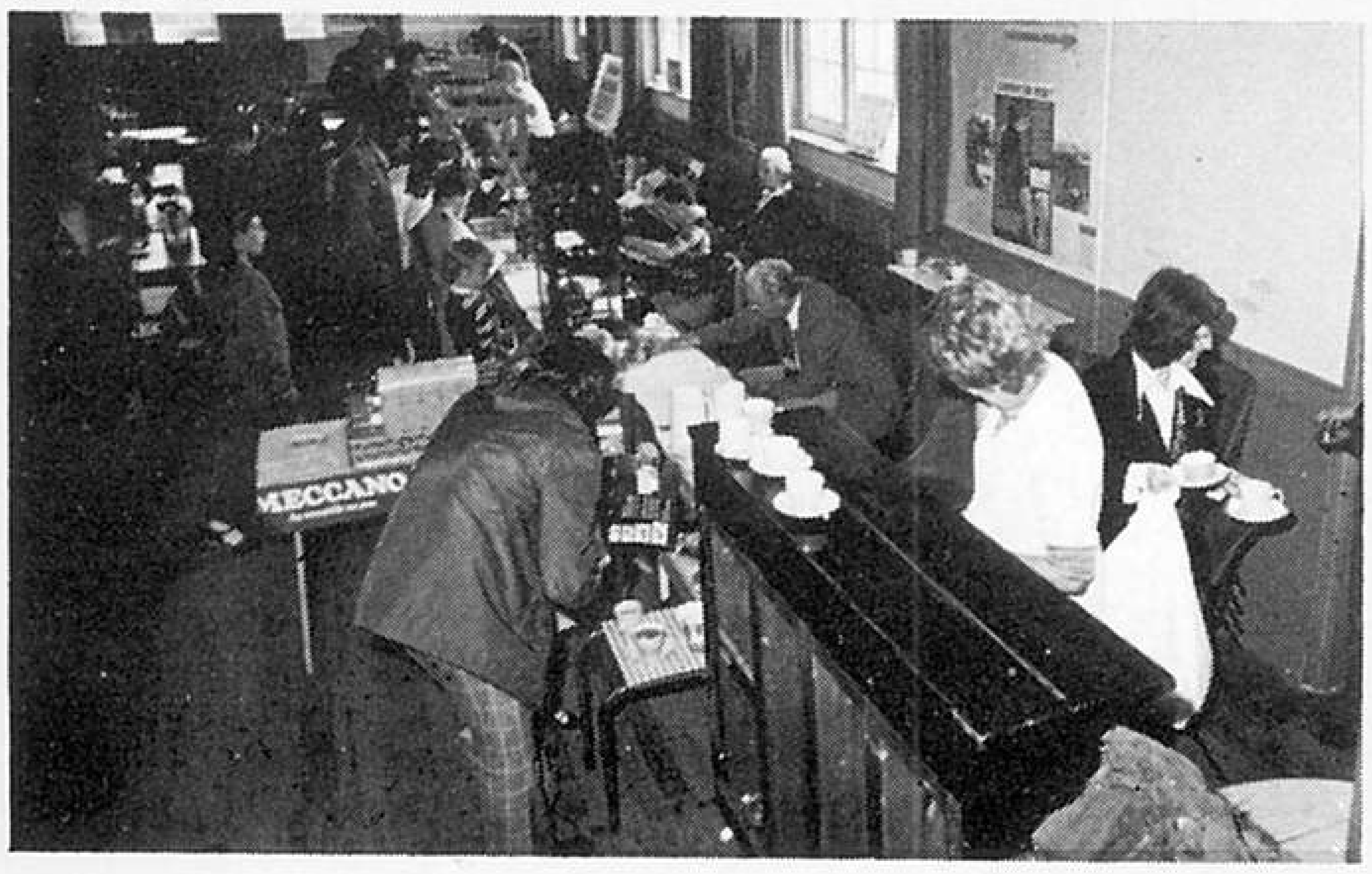


Eric & Michael Dormer's spectacular Rock Drill. This employed a high-speed bit to drill holes in walls of expanded polystyrene, producing clouds of white granules that seemed to cover the immediate area. Note the heavily encrusted forward portion and rugged construction.

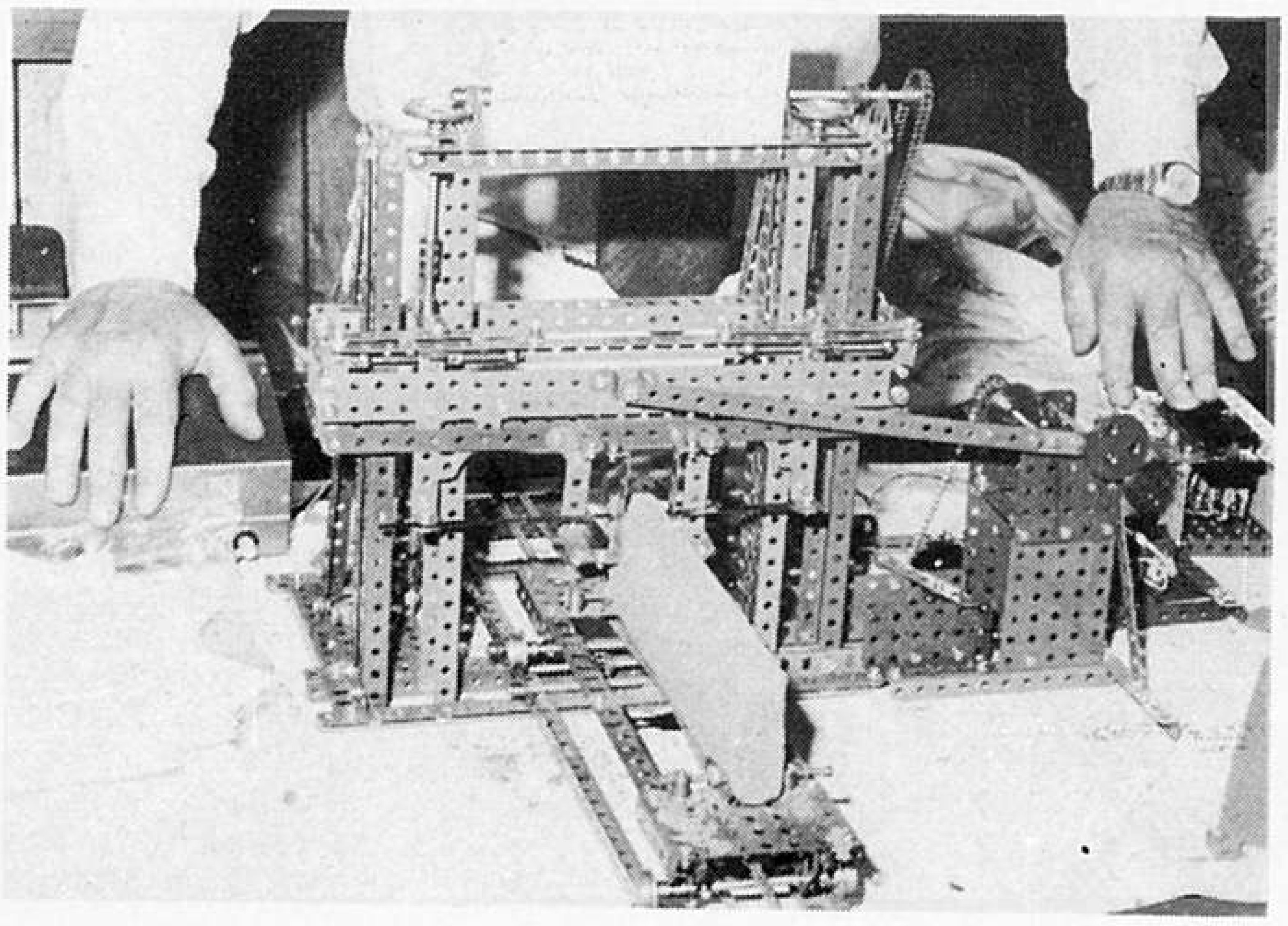


One of Charles Harrison's original design Steam Locomotives, seen here on a rotating display table.

The all-important members wives keeping the men refreshed at Waterlooville Hall.



Also by Harry Gower, a reproduction of the rather rarely seen Log Saw built from the pre-war Supermodel leaflet No. 10.



Meccano en France

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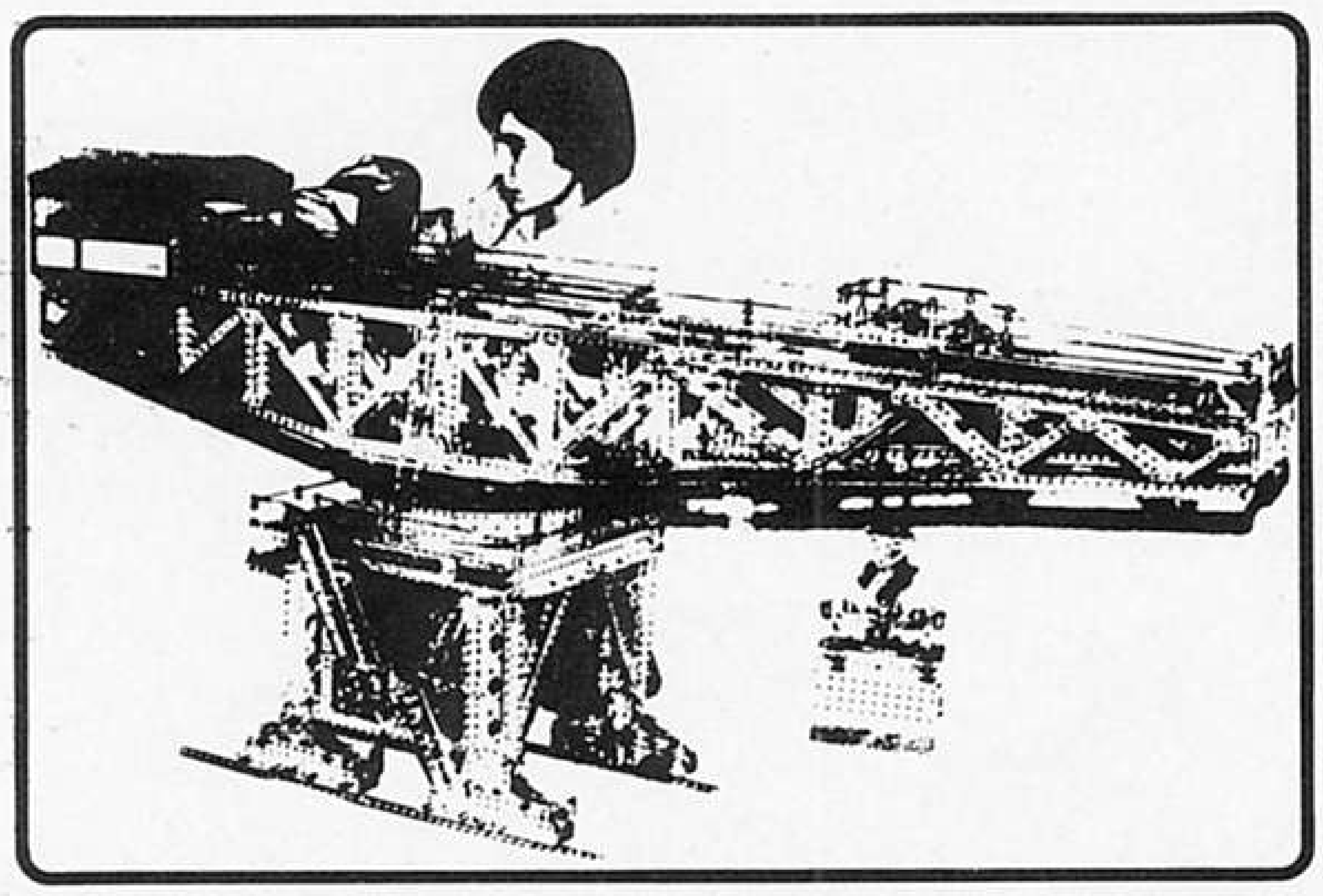

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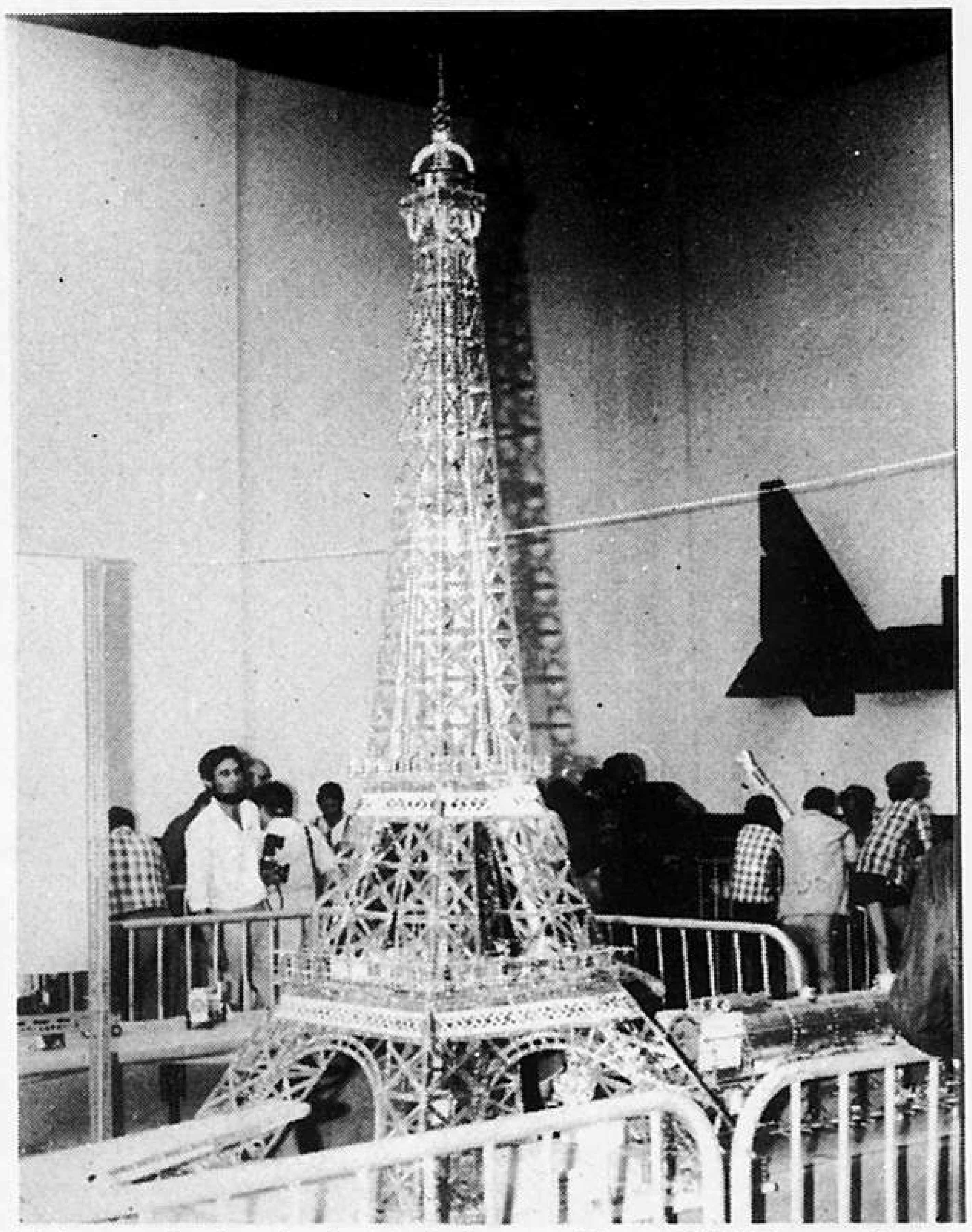
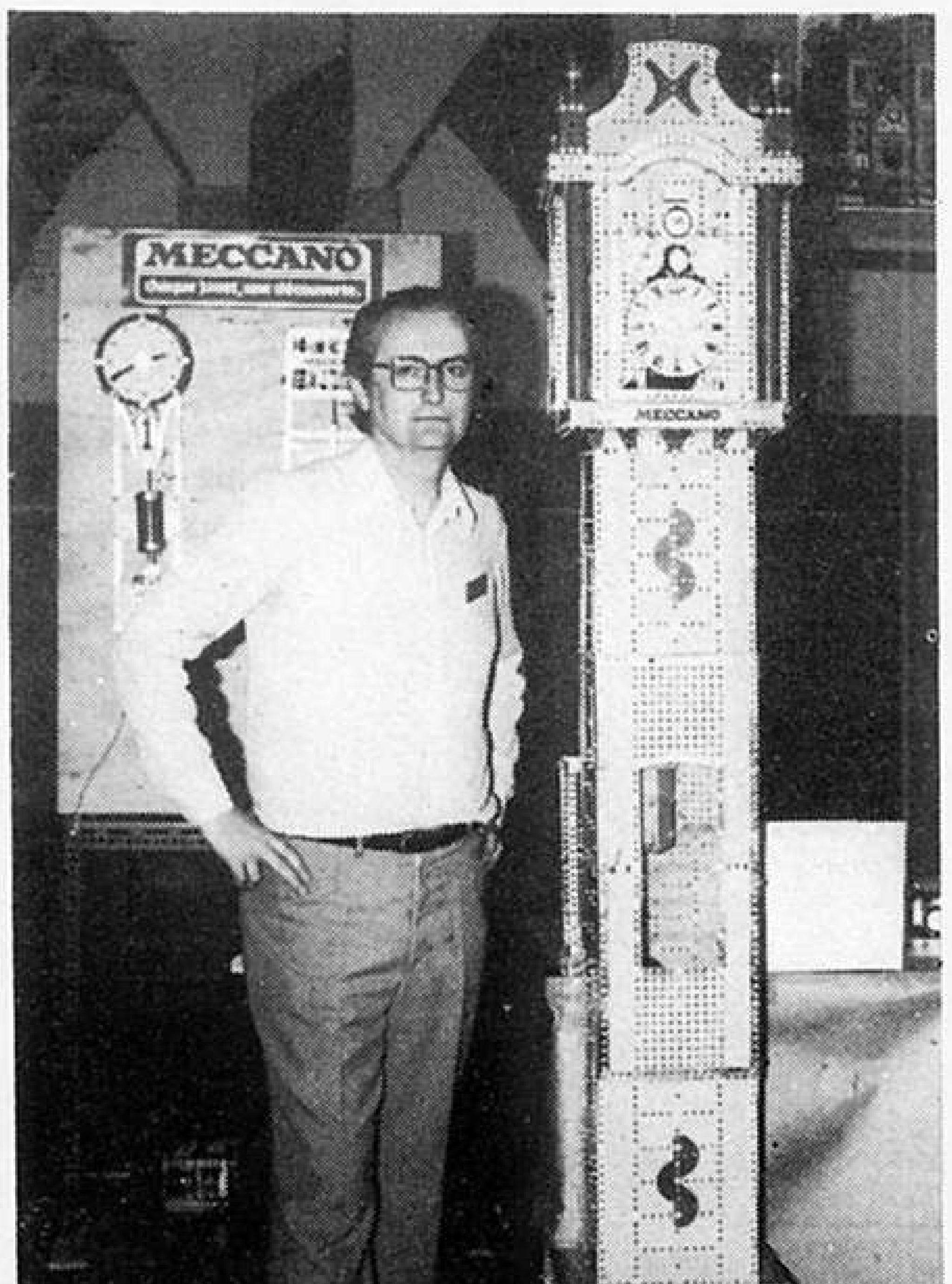


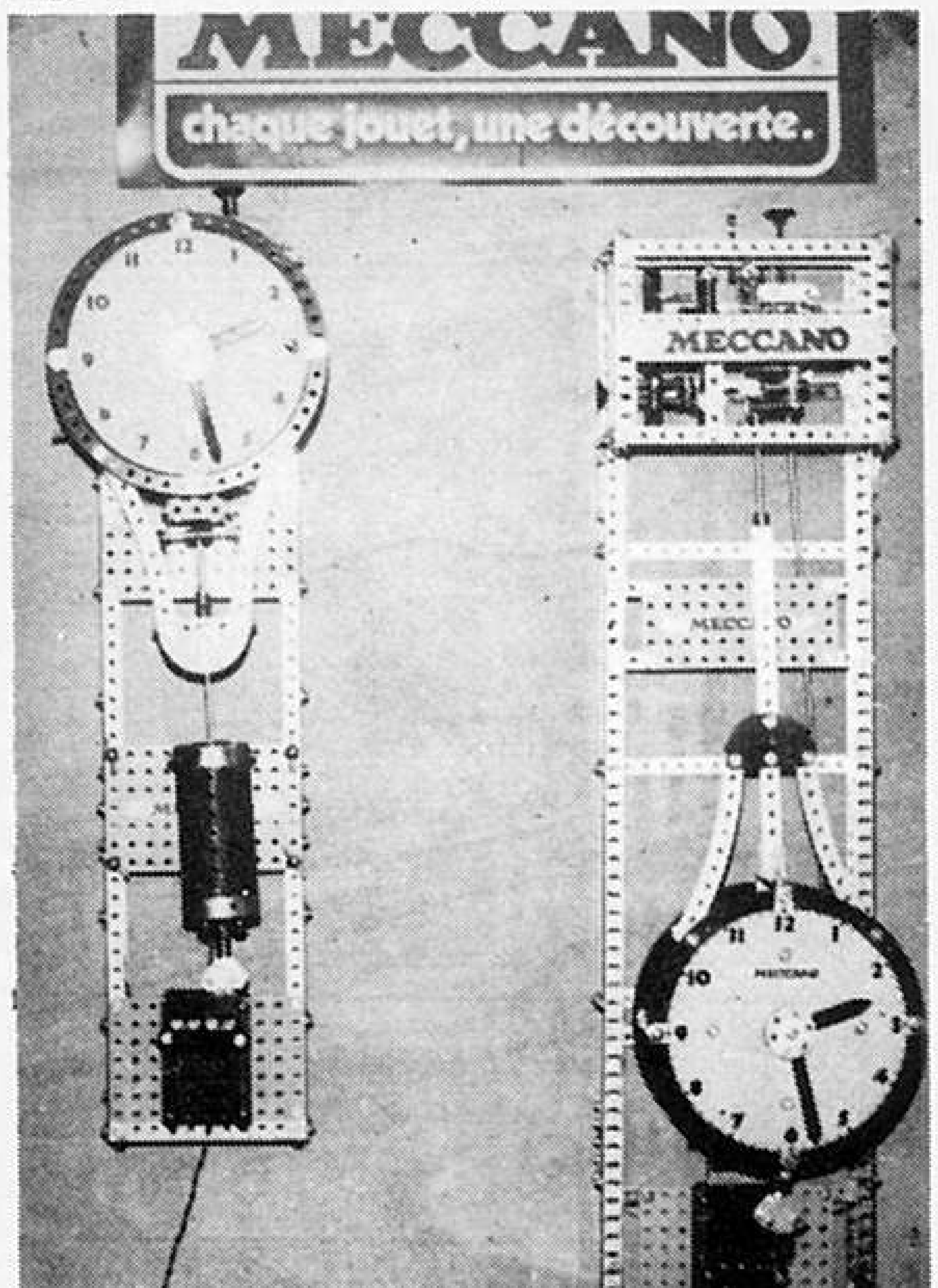
Voiron enthusiast Andre Barbe's magnificent Eiffel Tower. Built to 1/125th scale it stood 9 feet high.

A photo-report on the models displayed at the Salle des Reunions in Voiron by the Club des Amis du Meccano, on the weekend of June 2nd and 3rd 1979

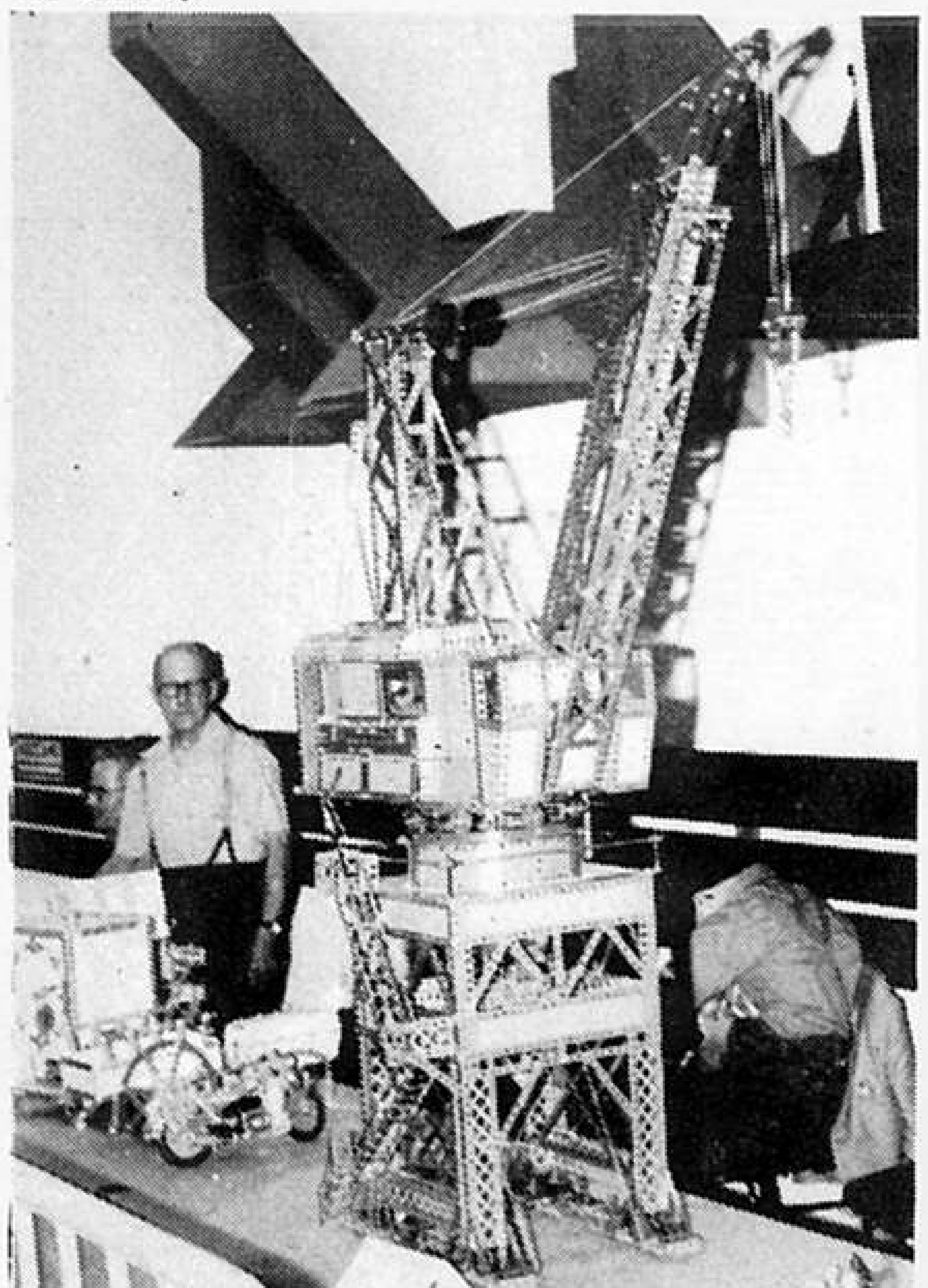
Claude Lerouge with his Clock, giving a good idea of the large size of the model. Note the tastefully-decorated Clock face



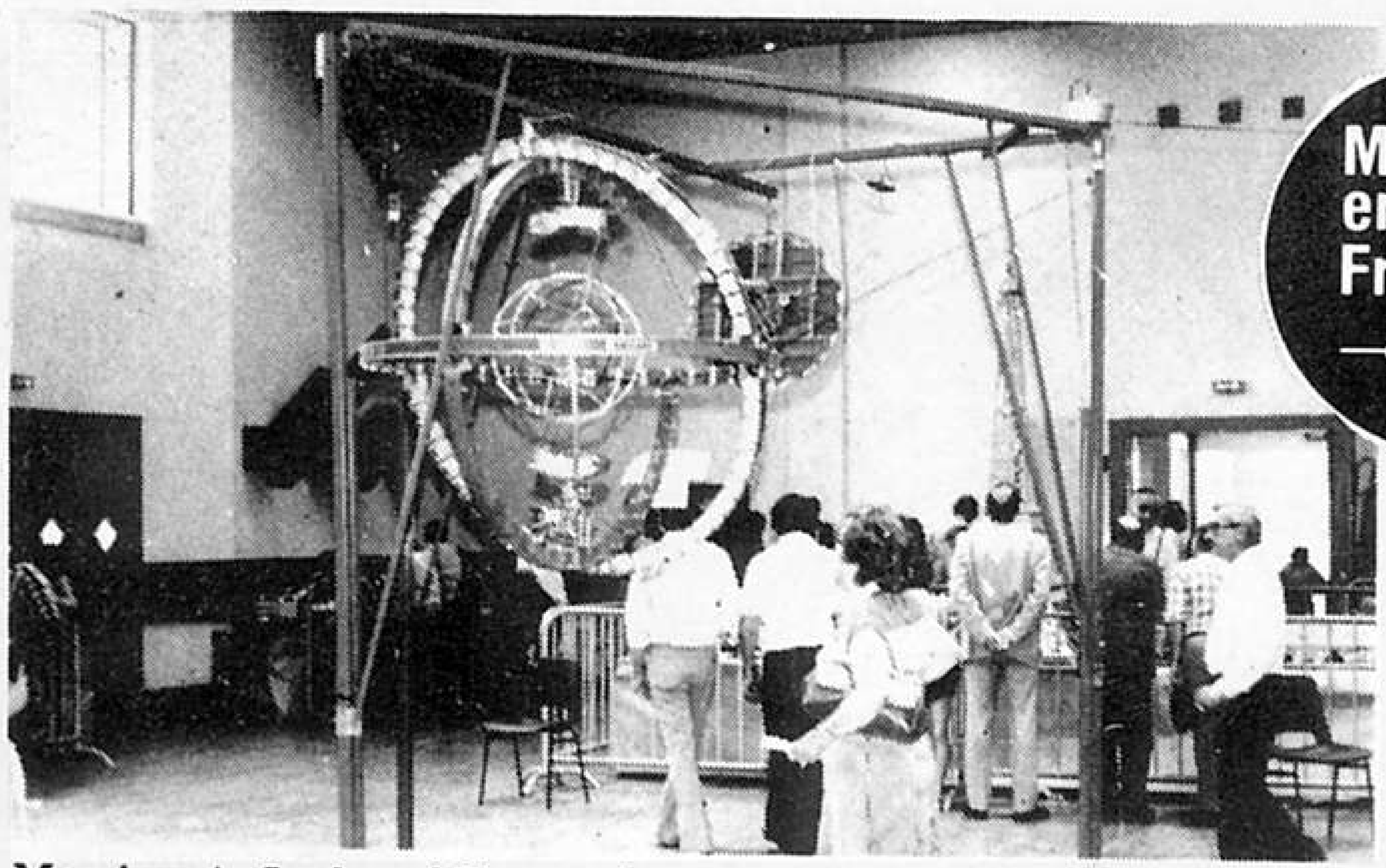
By Claude Gobez, two very accurate and decorative electric Pendulum Clocks. These kept correct time throughout the show.



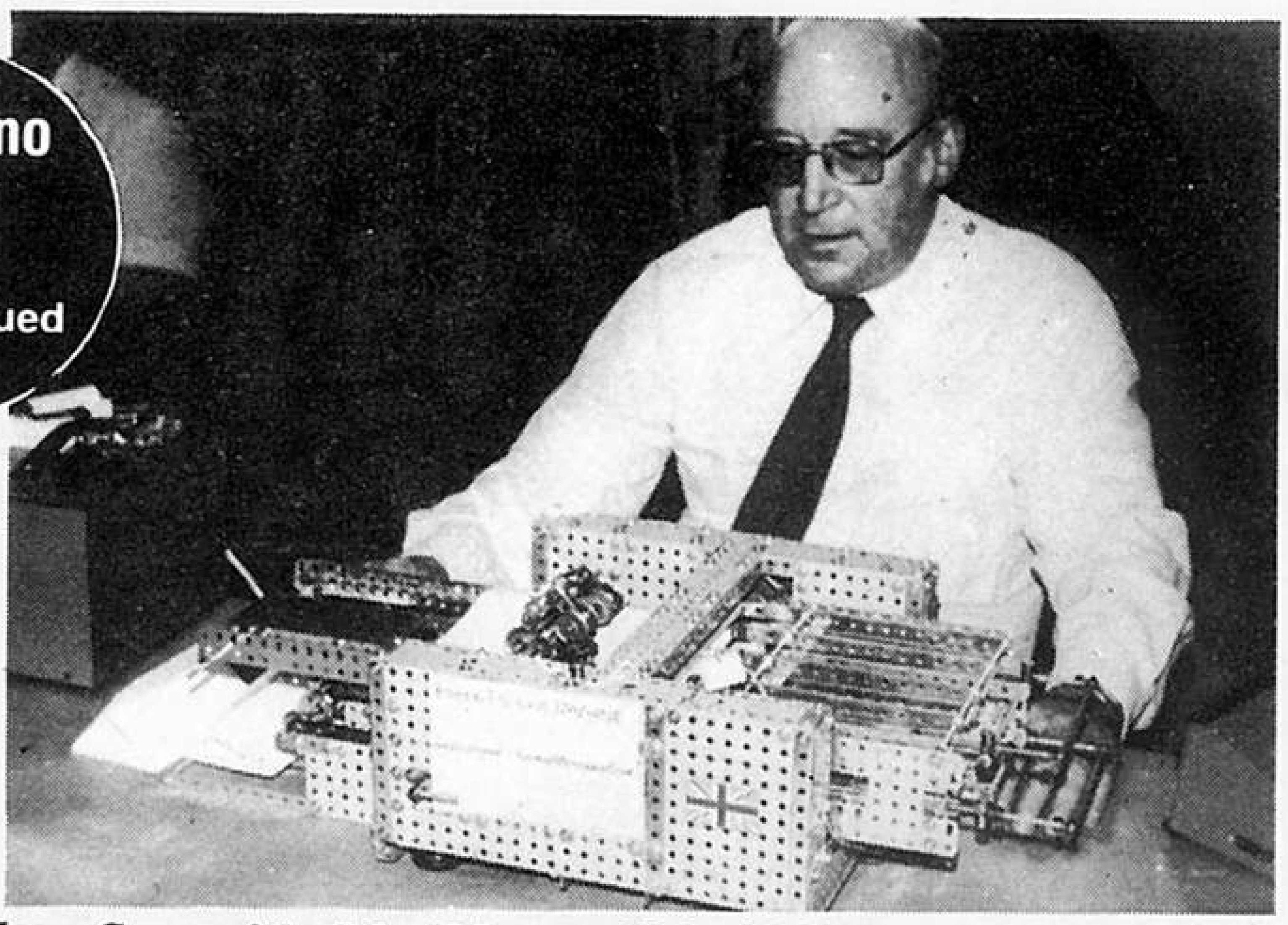
A Dockside Crane in the French blue-gold colour scheme by Georges Logat of Rives.



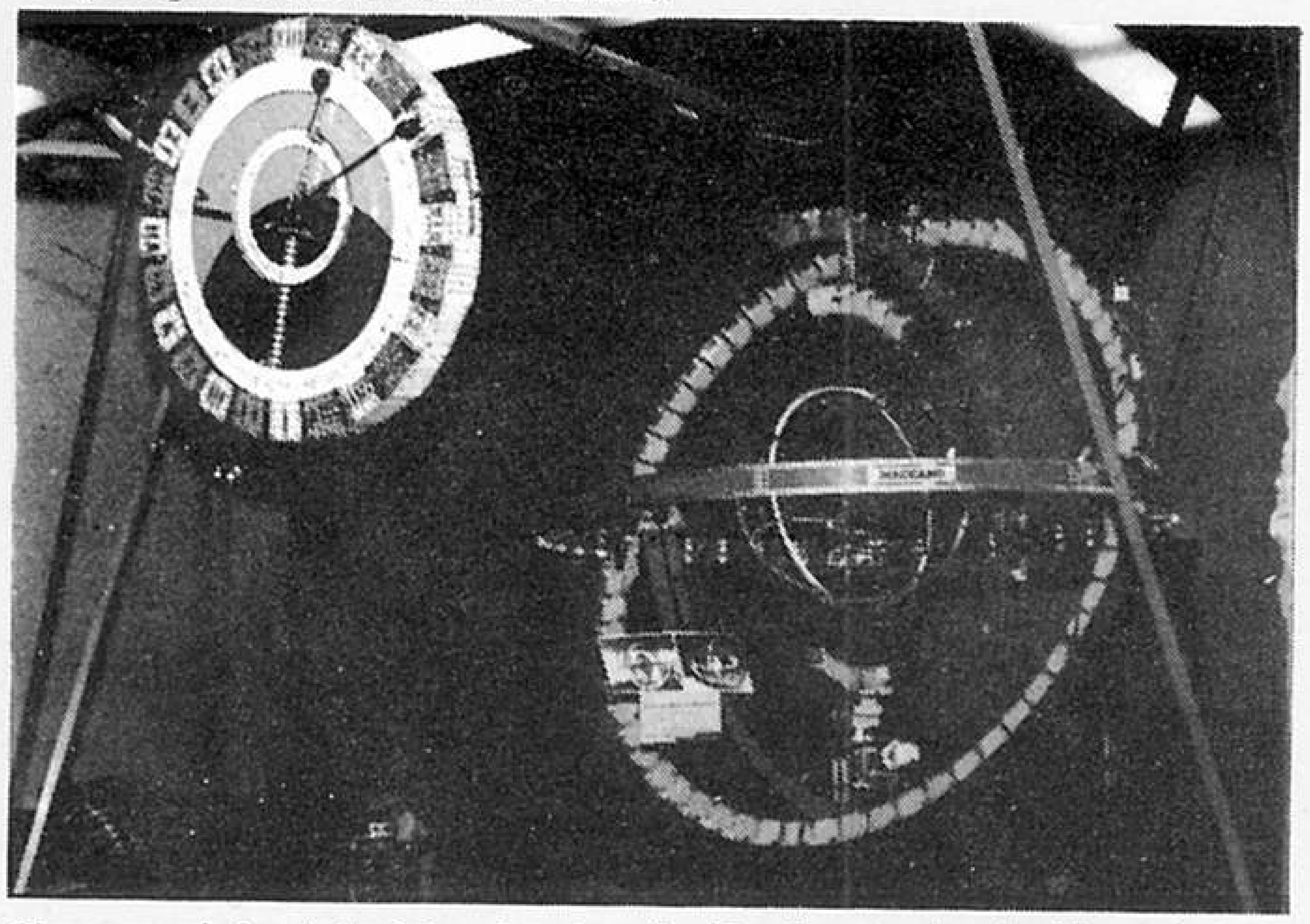
Meccano en France —continued



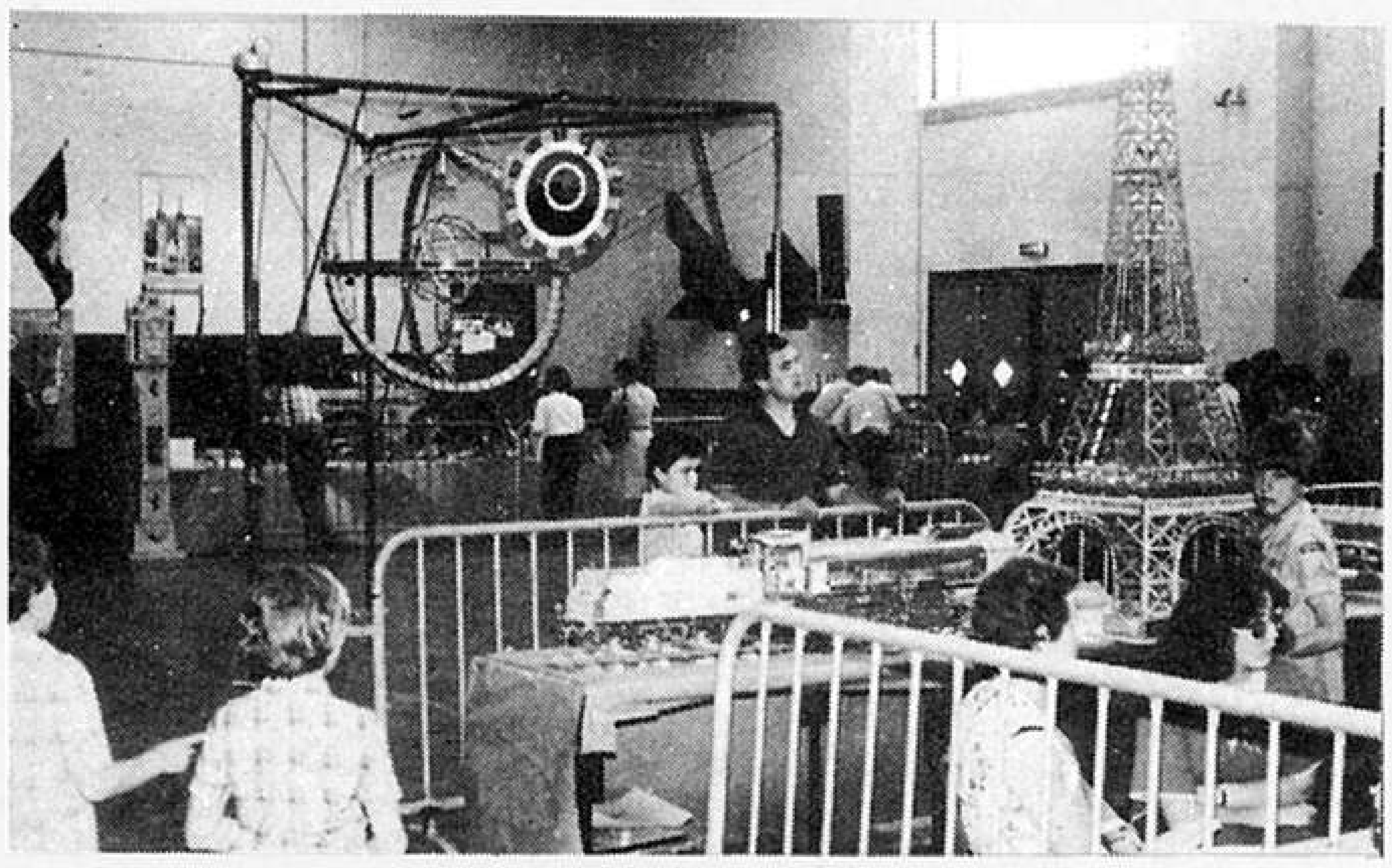
Monsieur A. Jordan of Chennevieres provided the centre-piece of the hall, a reproduction of l'astrolabe d'Orly. The original holds pride of place at Orly Airport on the outskirts of Paris.



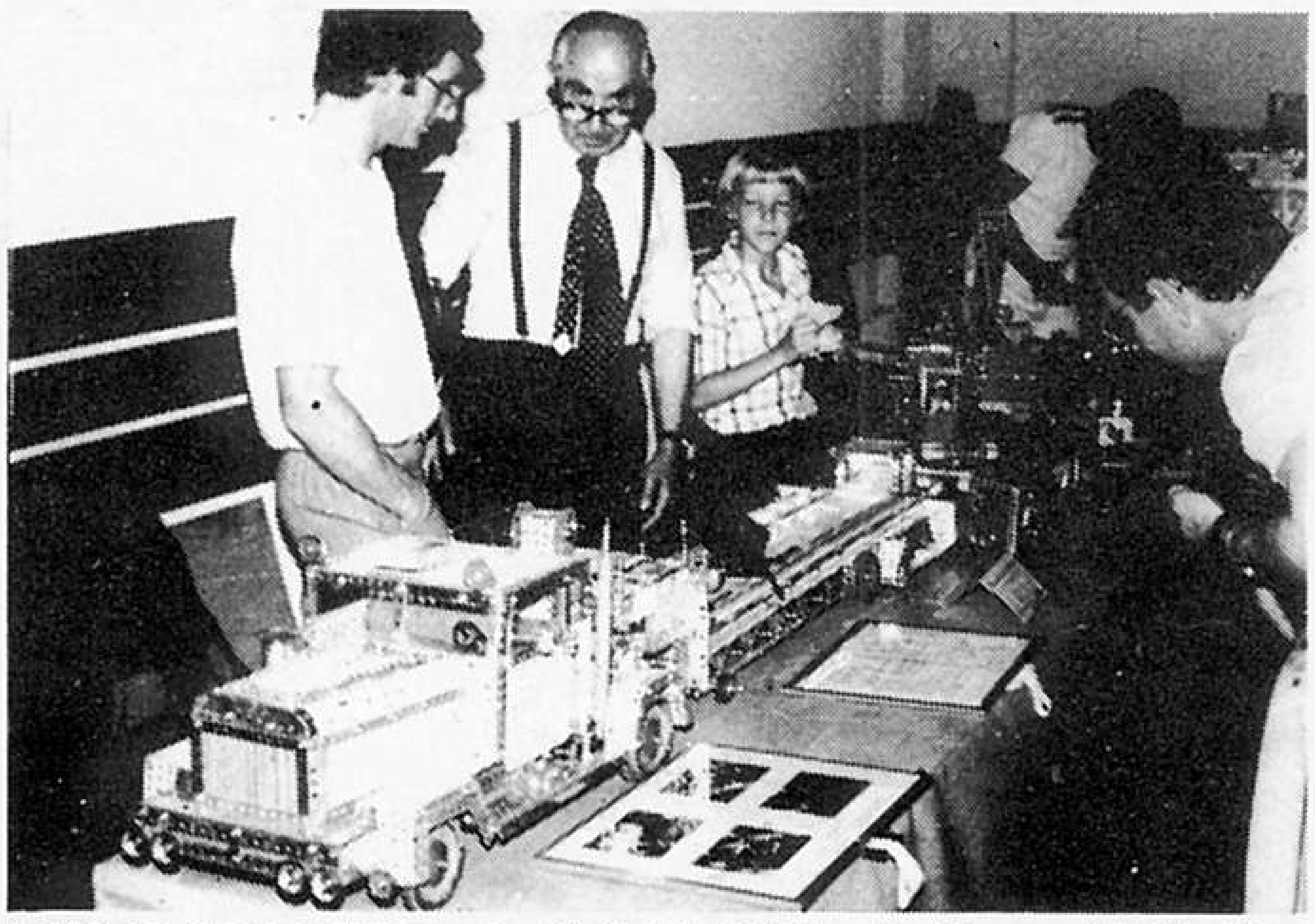
Harry Gower of the Solent Meccano Club with his Paper-Folding machine. This operated continuously throughout the exhibition.



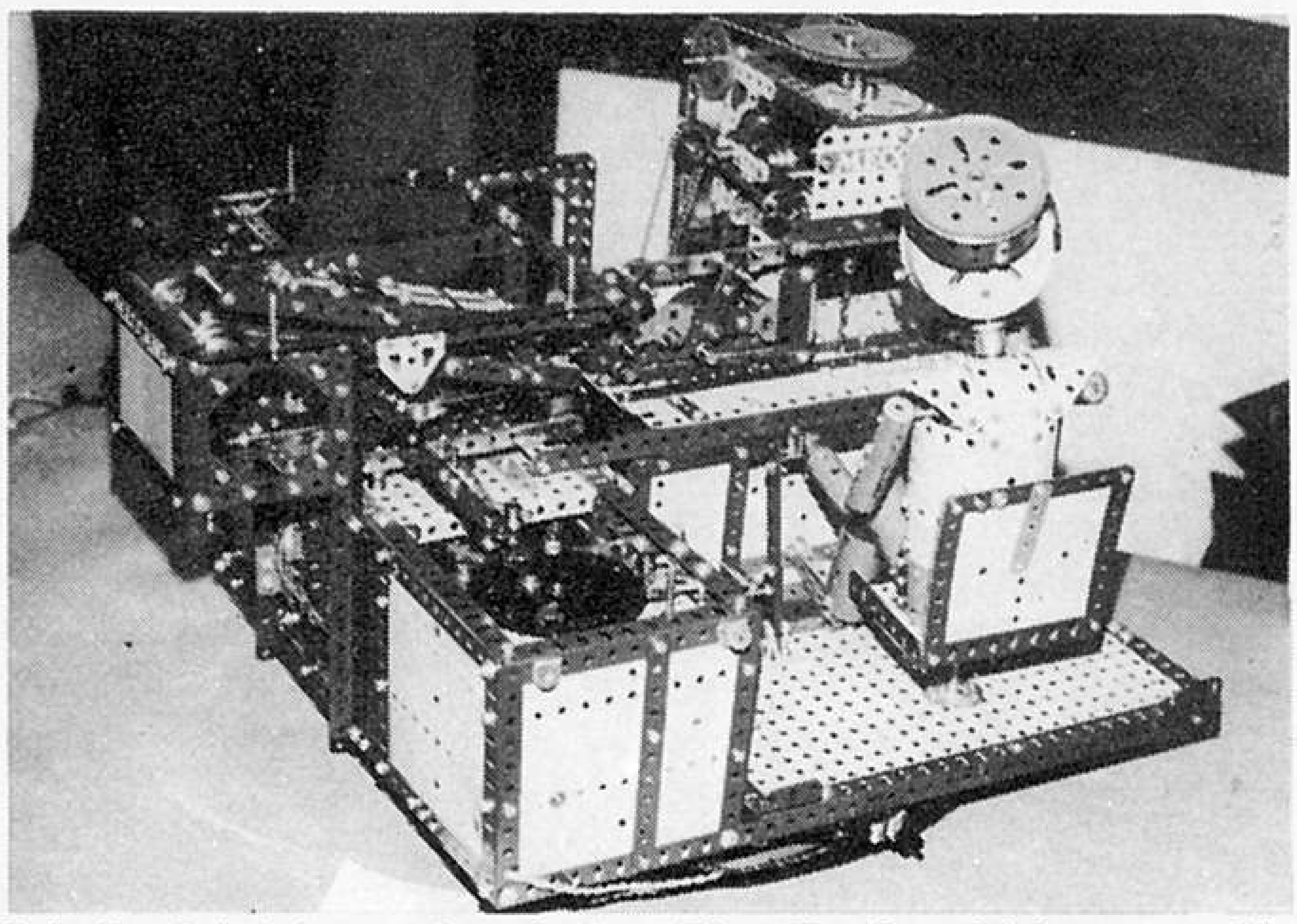
Close-up of the Astrolabe showing the Earth spinning inside a circle of almost eight feet in diameter. A lead goes to a Clock displaying all the signs of the Zodiac.



General view of one side of the Hall. In the background can be seen Claude Lerouge's Astronomical Clock, sixteen other models made by himself and his son also competed for attention.

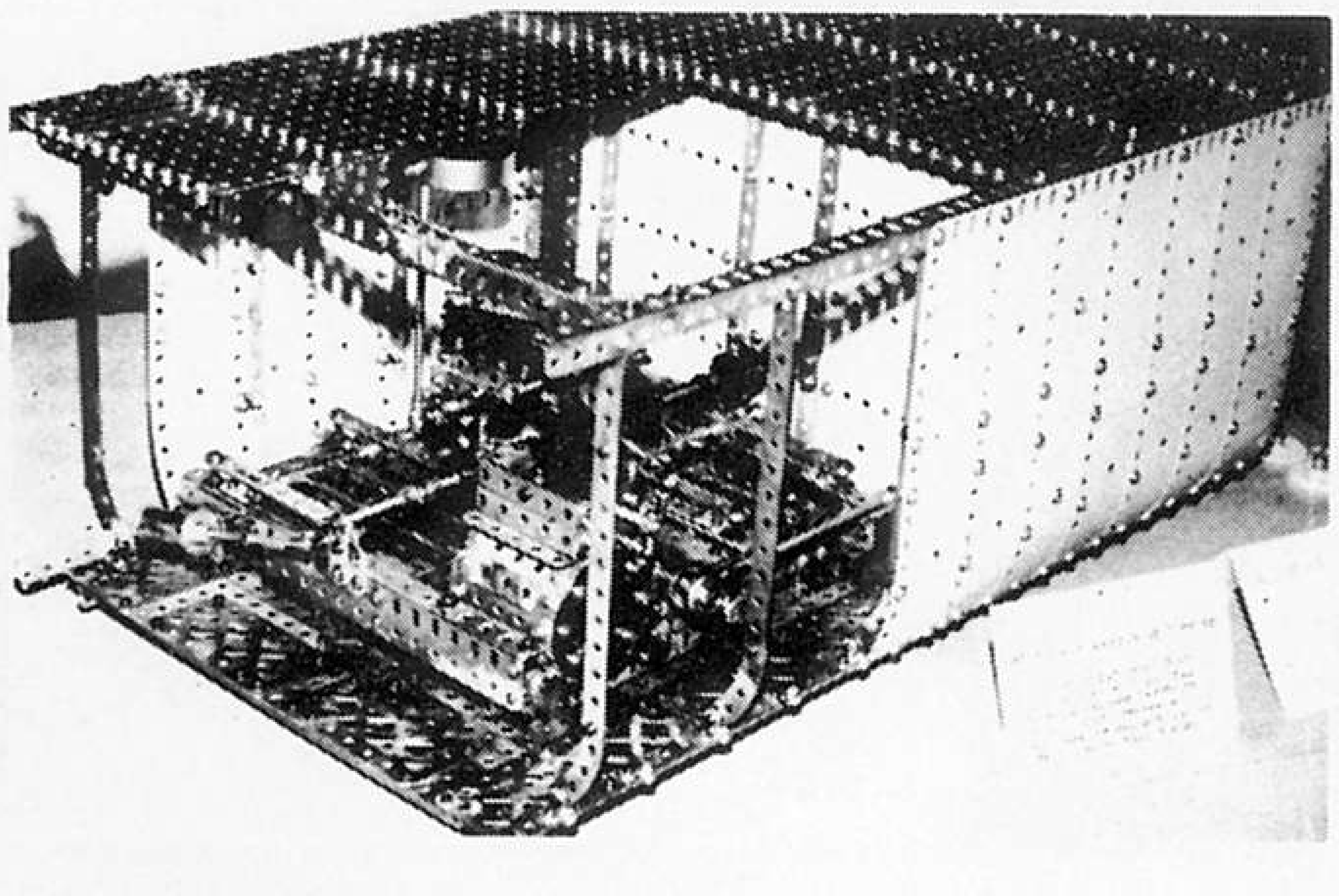


A 100-ton Scammell Lorry by G. Solal of Villers-les-Nancy. At 8 feet long and 12½'' wide, the model certainly conveys the original's impression of great strength and size.

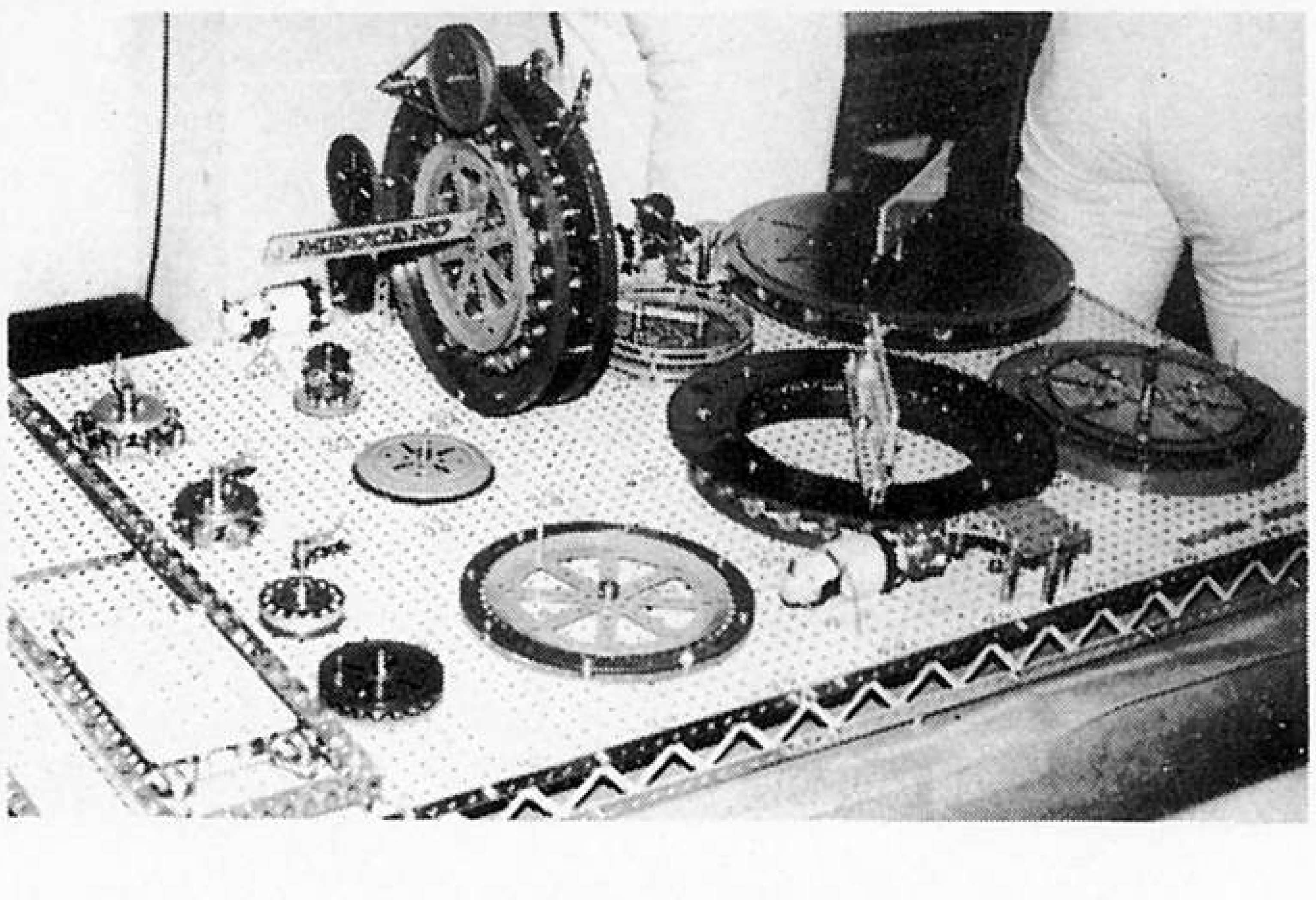


Chris Goodwin's impression of a busy Binns Road machinist, engaged in the production of 2½'' Strips.

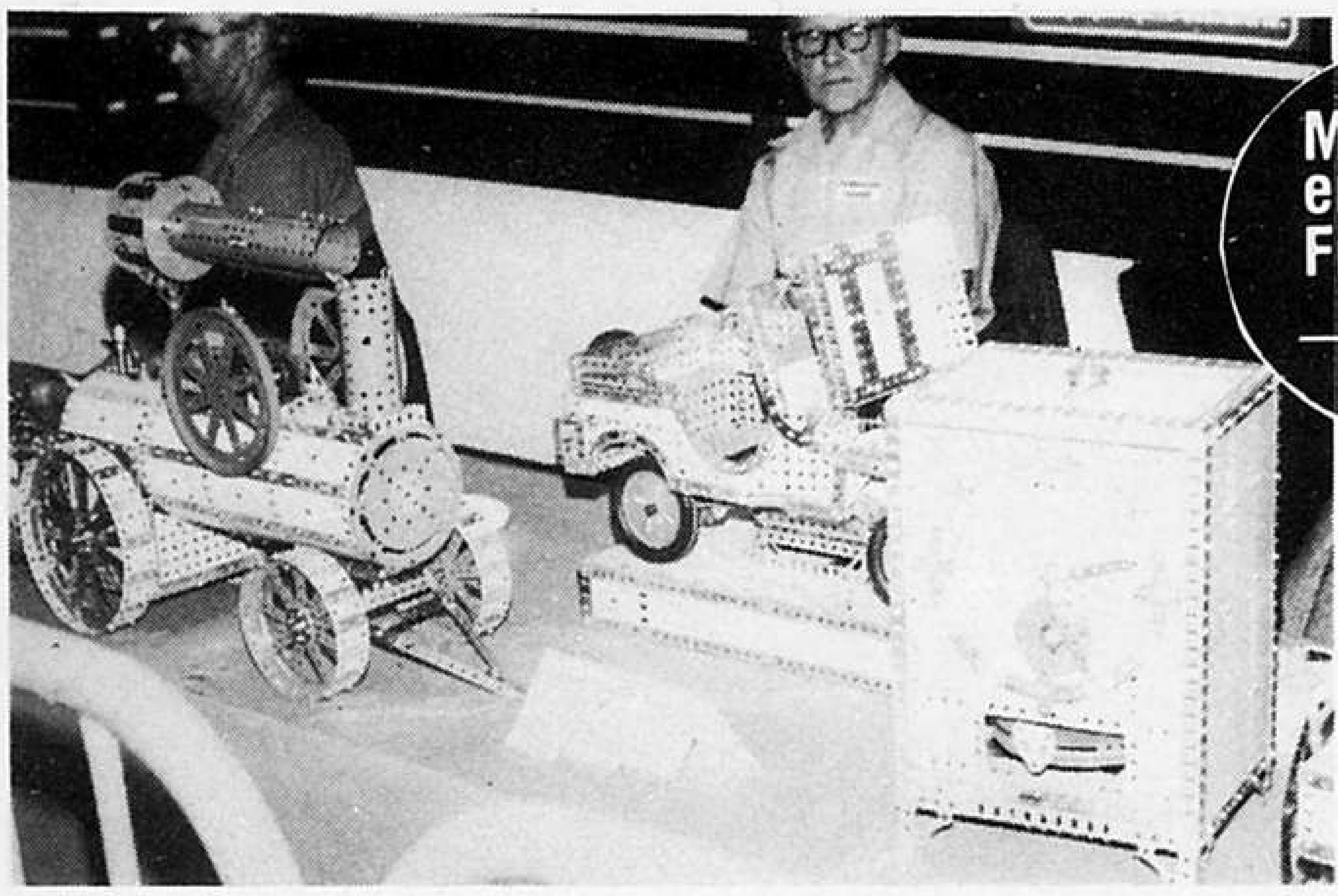
Tony Knowle's smooth-running Marine Engine with variable valve gear.



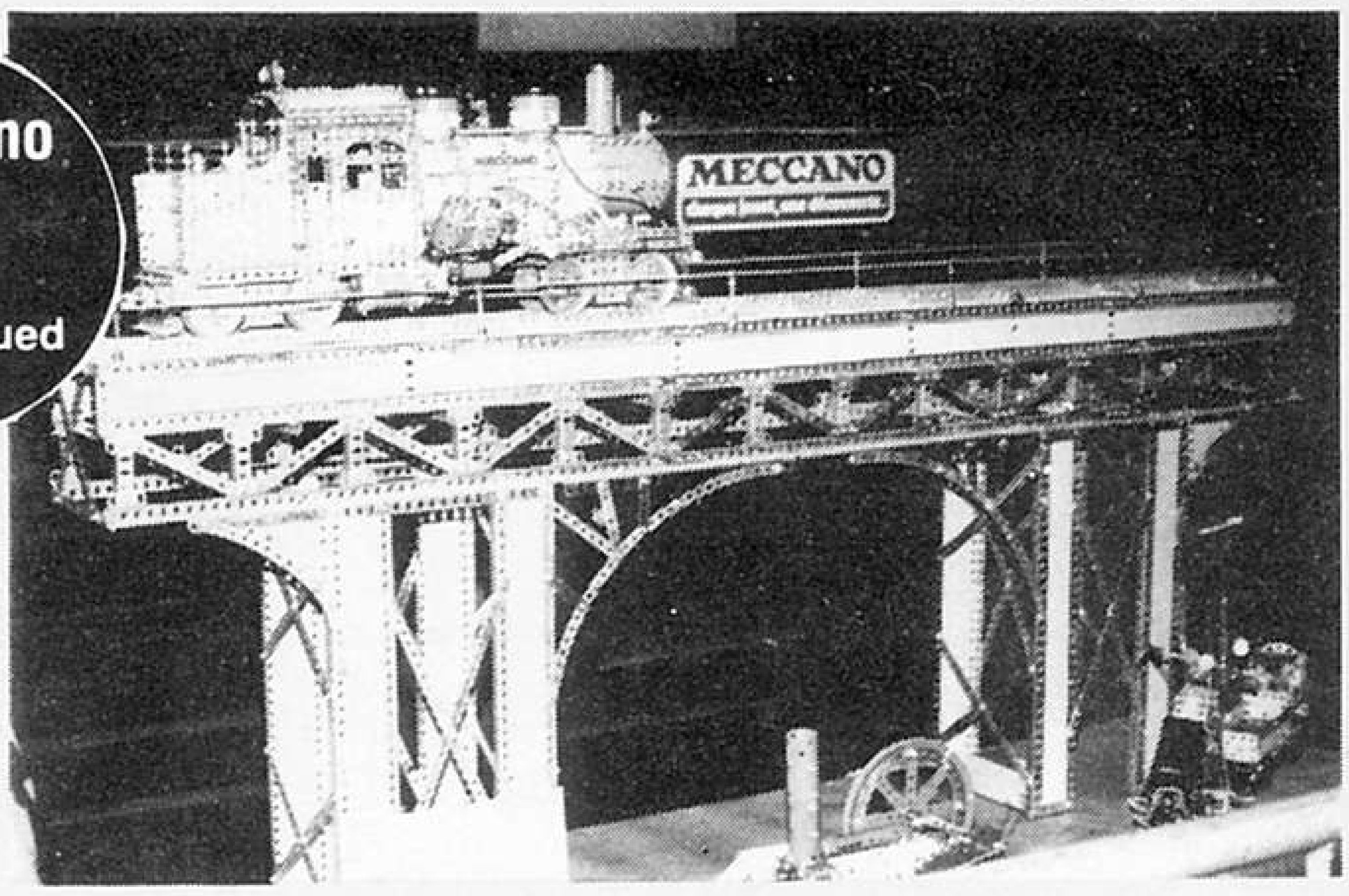
A display of many types of bearings, the left side showing a platform on rails and rollers, the work of Monsieur A. Jordan.



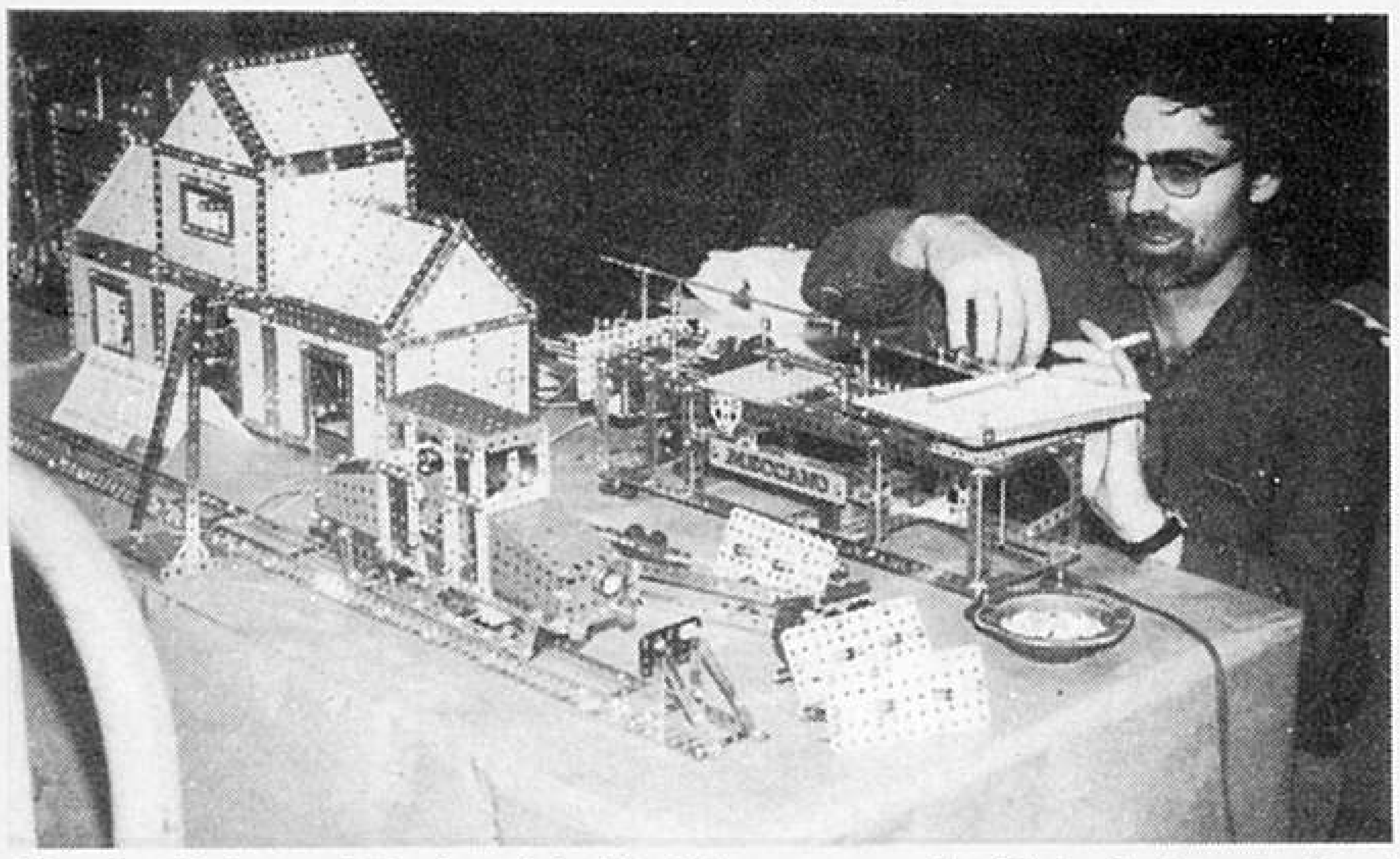
Meccano en France —continued



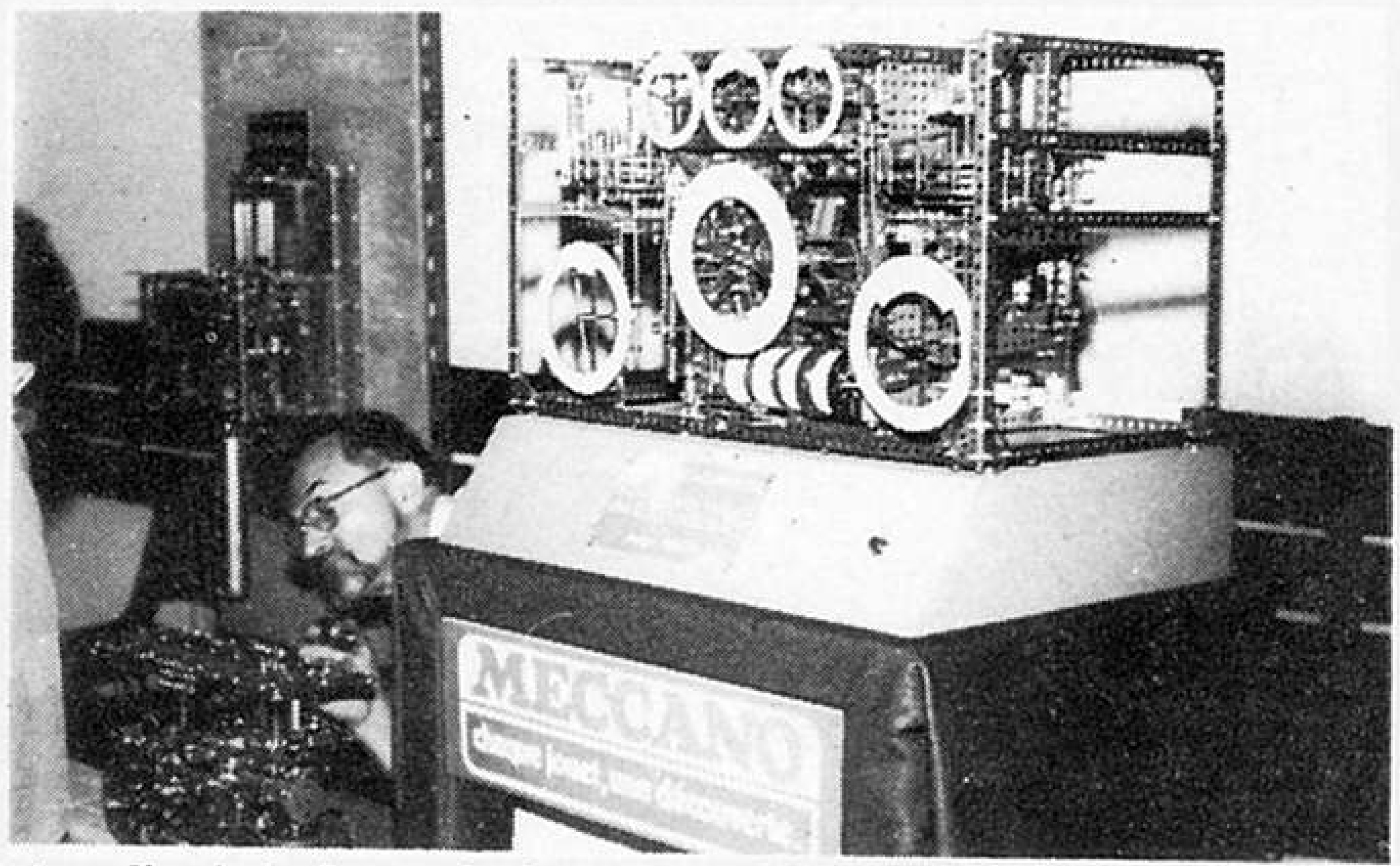
All the work of Paul Eynard of St. Hilaire-du-Rosier; from left to right; portable Steam Engine with novel switch-on mechanism activated by pressing the governor down, a 4-wheel drive Jeep, and a Clock utilising large Circular Plates suspended on a twisting spring in its mechanism.



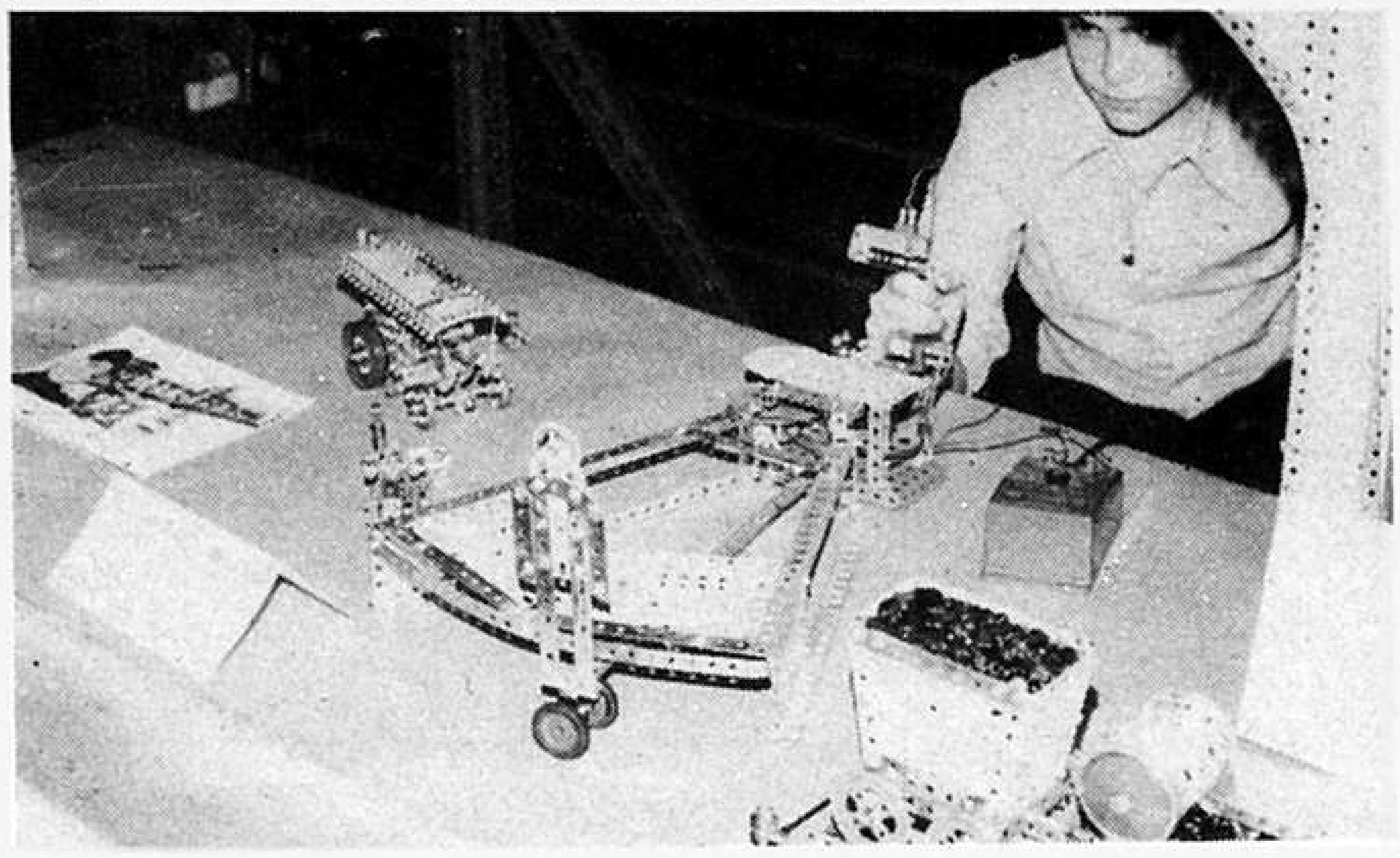
An American Shay Engine, travelling on a 5 feet long bridge, by Claude Lerouge. It used 2 PDU's to provide full automation of drive.



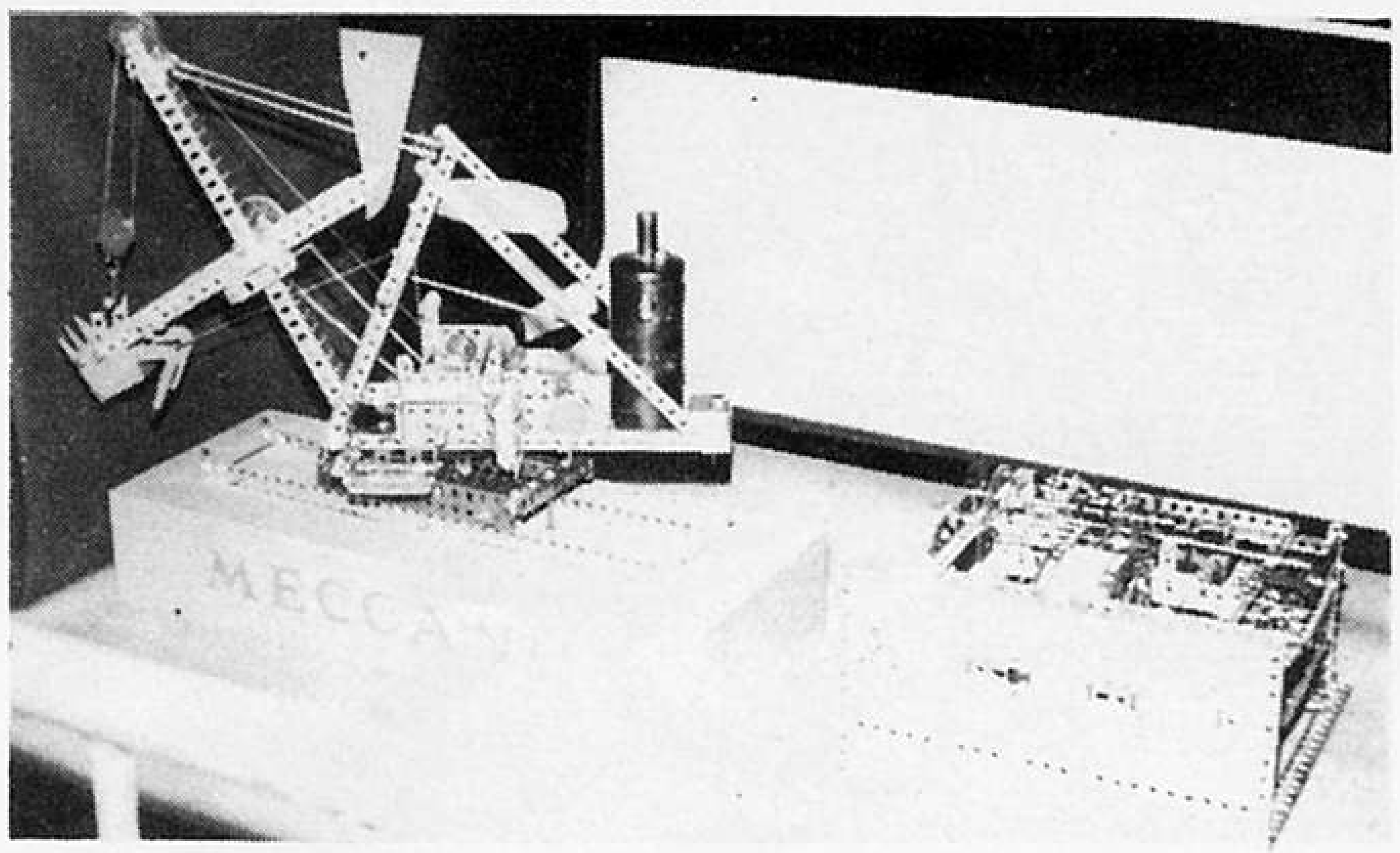
Claude Gobez of Paris with his Meccanograph. This featured plug-in gearing modules to effect the variation of designs with the minimum of wasted time. With over 40 modules to hand, the machine had an impressive capability! In the foreground, Claude's Railway Station complete with pre-programmed locomotive that traversed to and fro on its 8-foot track.



Astounding in both complexity and capability, George Gombert's Comput Ecclesiatique which can work out on which day a certain religious holiday or Holy day will fall in the next century. A reference book has been used to prove the device is 100% accurate, despite the fact that leap years and other factors have to be taken into account.

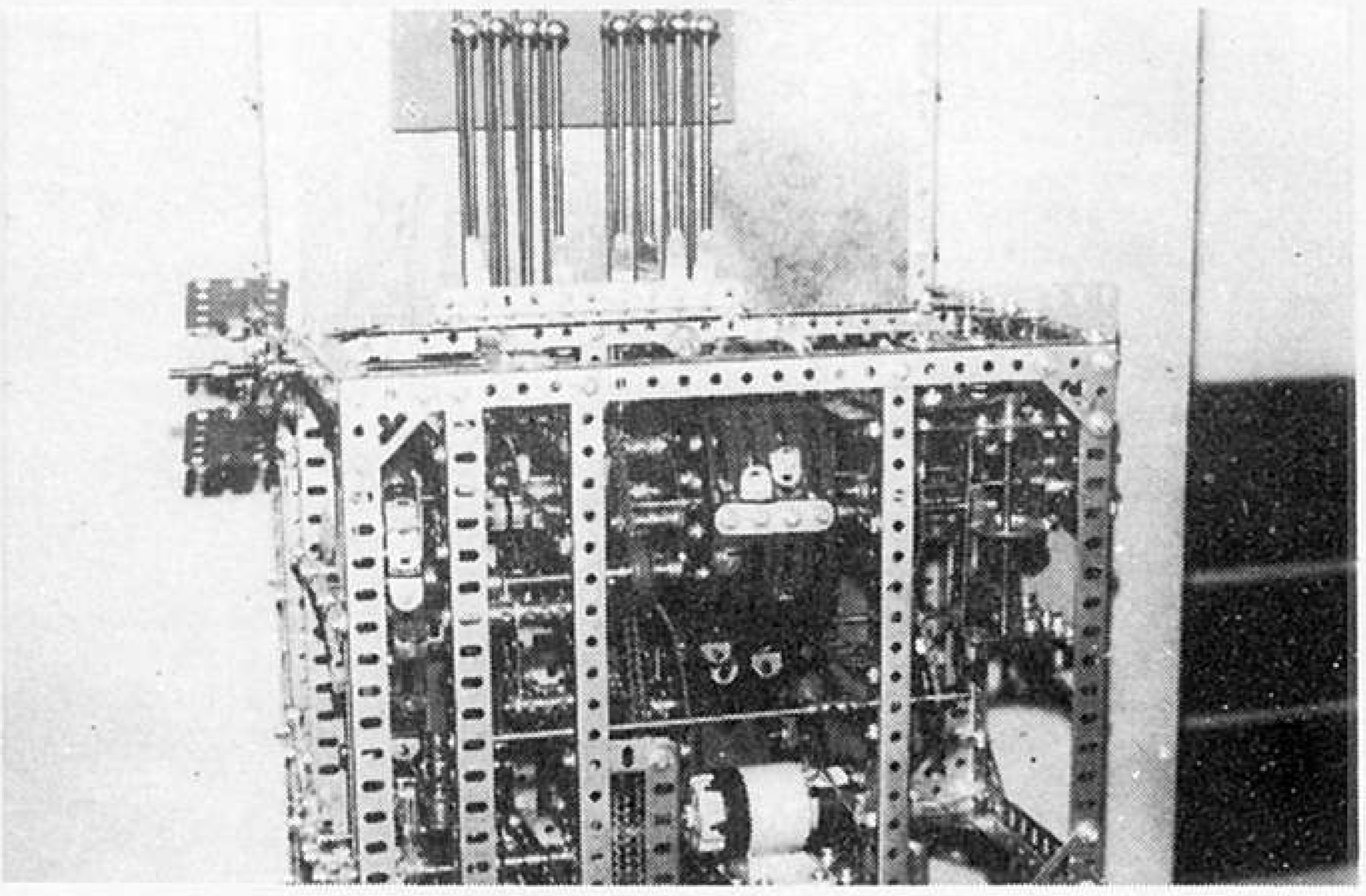


Claude Lerouge's son John with one of his many models, an electronic target game with hand-held 'light-beam' pistol.

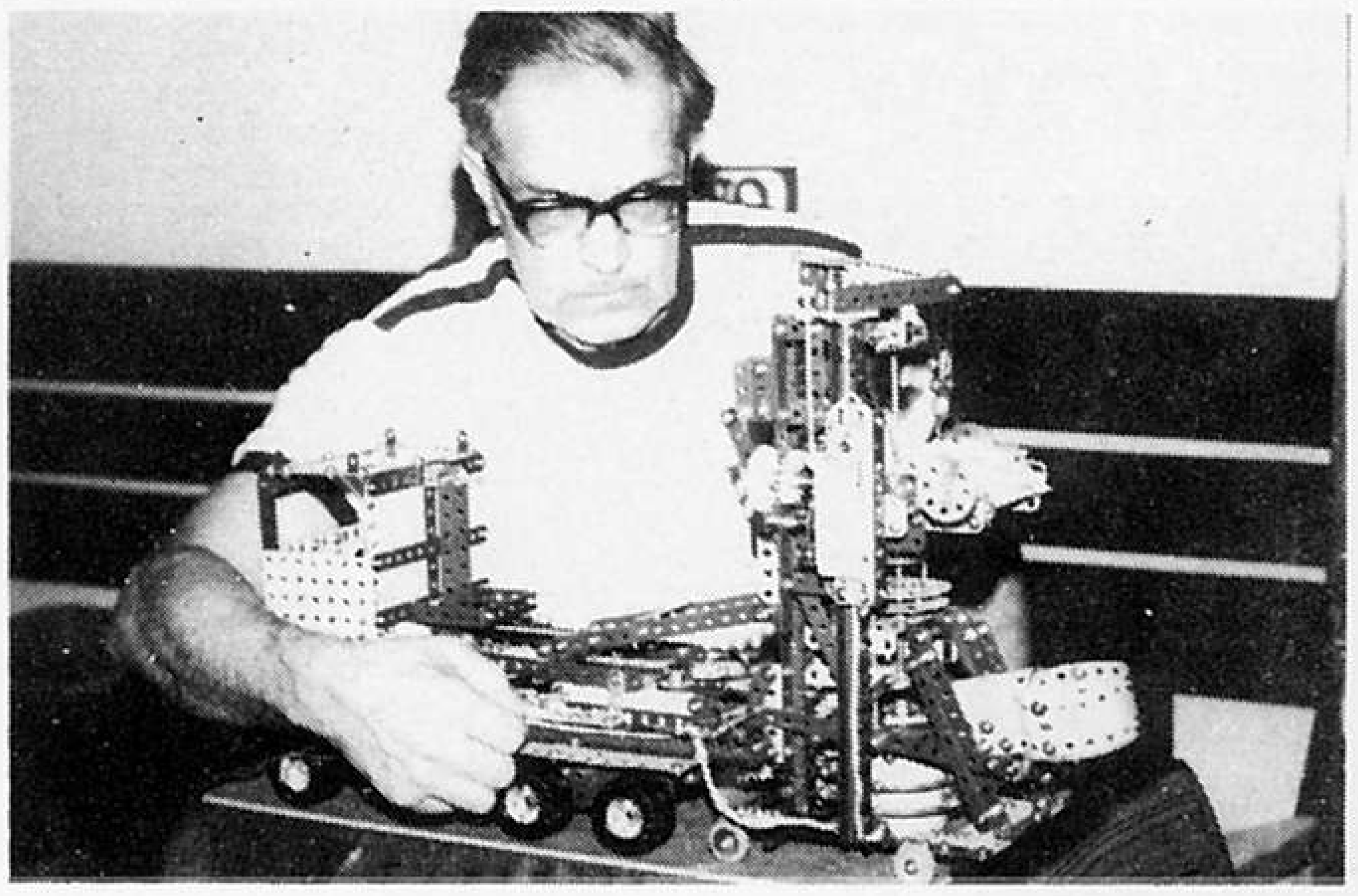


Georges Gombert's beautifully-presented Steam Excavator using the 1929-type Steam Engine, and a mechanical calendar recording days, dates and months.

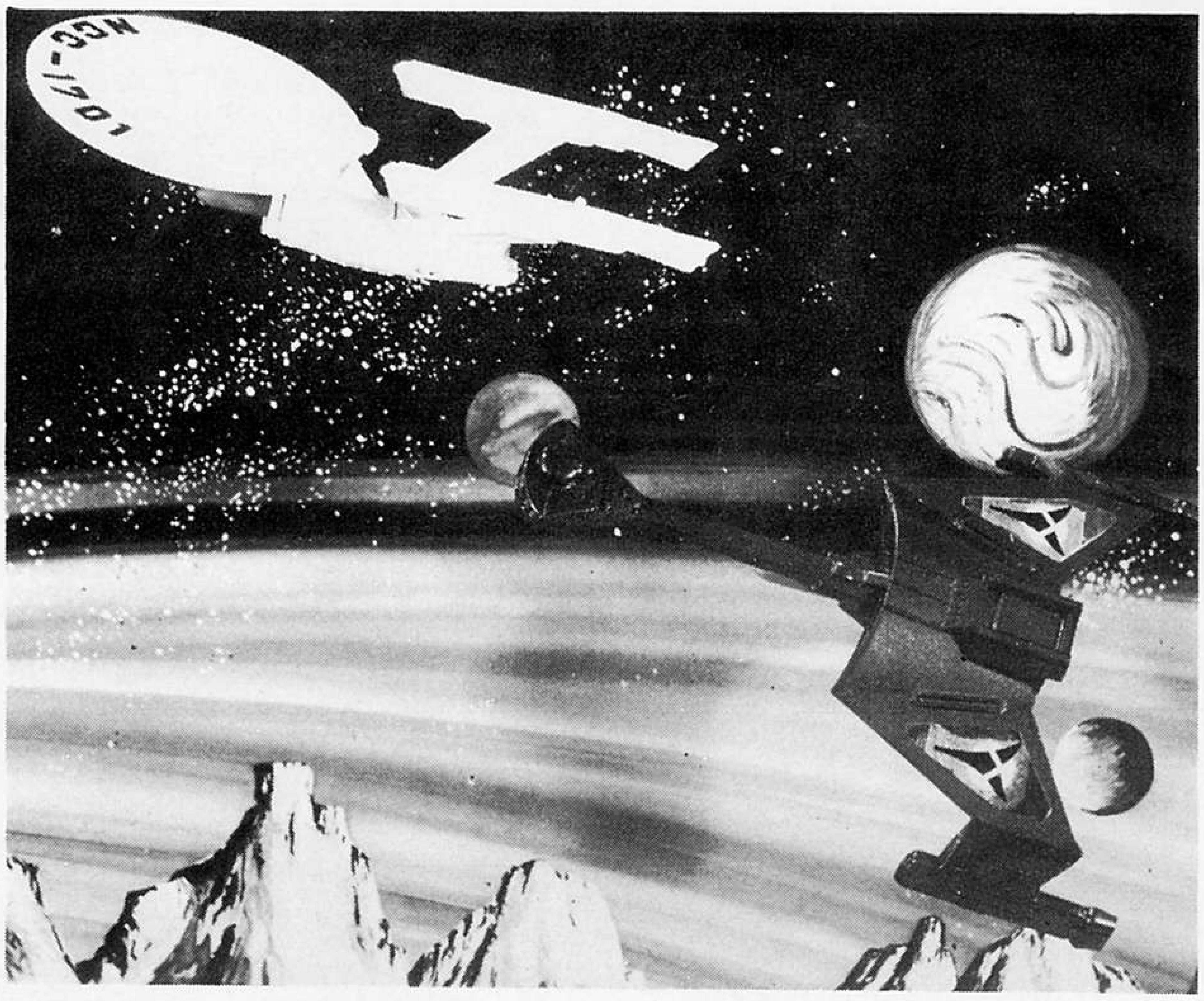
Again by Georges Gombert, his 'Carillon Westminster' sounded the familiar chimes by using eight different lengths of Axle Rod. Weight-driven by three loaded Boiler tubes, the model incorporated air brakes.



Monsieur U. Bachelard of Zurich used the new Meccano colour scheme in this Swiss Concrete Road-Repairing Machine. Note the very slim, compact French Meccano motor affixed vertically to the superstructure.



DINKY TOYS NEWS



NO. 371 POCKET SIZED U.S.S. ENTERPRISE
NO. 372 POCKET SIZED KLINGON CRUISER

The new film Star Trek is due for release in December and Dinky have tied-up with Paramount by producing two new space items from the film—Captain Kirk's U.S.S. Enterprise and the Klingon Starship. These are new versions of the Enterprise and Klingon ships already in the range, and are more compact in size. Both toys are produced on blister cards and will have firing plastic missiles.

NO. 364 SPACE SHUTTLE

From Space fantasy to Space Fact; the Dinky version of NASA's Space Shuttle is modelled on the real thing. The 'Enterprise' Space Shuttle comes with an independent shuttle craft, external tank and two solid fuel rocket boosters, all of which clip together but can be separated to simulate a real shuttle mission.

To further enhance the sense of realism about this 'toy'—there is included a self-assembly modular package of laboratory instruments (with instructions in English, German and French) and a pack design which details the stages of a real shuttle mission, with lots of information about the real shuttle characteristics, weight, wing span etc.

NO. 206 CUSTOMISED STINGRAY
NO. 201 PLYMOUTH STOCK CAR

These two models herald the introduction of a new style of pack design for Dinky Toys.

Both carry an 'all-over' full colour visualisation of the vehicle in an exciting and appropriate setting. The toys themselves reflect the current popularity of customising standard cars with unusual and colourful decals. The Stock Car—has an all-over navy blue finish, carrying the number 34 on the boot and side panel.

The Stingray—has an all-over red finish, with 'gold' bumpers and exhausts to the side. The bonnet and roof top carry yellow, red and white 'flame' decals. Both passenger doors open, to reveal a yellow passenger interior.

Also coming in the series—are customised versions of the Land Rover, Range Rover and Transit Van.

NO. 361 ZYGON WAR CHARIOT

Not really a new release, but there have been significant improvements to the toy that warrant a mention. The rocket firing mechanism has been up-graded to allow for easier rotation. The wheels have been changed to those that look more appropriate for travel across alien territories—i.e. large, chunky with deep tread.

The space men will soon be seen to be wearing a red coloured space suit, and the vehicle will now be green and silver. The pack again carries an exciting colourful scene, of the Zygon War Chariot in aggressive action.

PICTURED ON THE FRONT COVER . . .

THE NEW MECCANO SETS: SPACE 2501 AND MECCANOIDS

THE new theme sets of which readers were informed in a previous edition of the Magazine are now on the market. Each set can boast of several features unique in the history of Meccano.

The Space 2501 set has strips and plates finished in white the most appropriate colour for Space Ships. The Company hopes the new colour will not be used exclusively for set models, but will result in a whole range of enthusiasts space super models. In fact our resident company model designer has built a Saturn 5 rocket and moving gantry (using White strips and plates) which is over 6 feet tall! Space 2501 manuals contain instructions for building pairs of models enabling modellers to stage space duels etc. Included in the set, for added realism, are mock-up rocket exhausts, two types of firing missiles, cockpits and an astronaut. Prefabricated parts have not been provided on this scale since the Meccano Aeroplane and Motor Car Constructor Sets.

At an R.R.P. of £9.95 Space 2501 is excellent value and obviously a very exciting introduction set for the enthusiasts of the future.

Meccanoids, a motorised theme set, at the slightly higher price of £11.50 must be Meccano's most unusual product launched this decade. The manual contains building instructions for 10 totally different robots, but there is always the potential for modellers to develop their own variations. Meccanoids, like Space 2501 has a new finish, in this case it is iridescent brass which in addition to it being appropriate for this type of model, also, as with the White finish gives more scope to the enthusiast.

Another novel feature of this set is a new 4½ volt battery box with a forward and reverse switch which can be easily operated with one hand. The extra power results in a faster and more animated movement which adds realism to the robots.

Both these new Meccano Sets reflect the products facility for being adapted to create all types of model in a realistic fashion without losing any of Meccano's construction emphasis.

Space 2501 and Meccanoids will be available at toy shops and departmental stores, and if the initial trade re-action can be used to gauge these products commercial potential they will be extremely successful.

The 'Cyclic Sidewinder'

by Steve Tonkin.

Photographs by Alan Partridge

THIS is rather an intriguing device in which a motor drives a trolley, but no road wheels are driven mechanically. The drive is obtained by steering the wheels, and making use of the side force thus obtained.

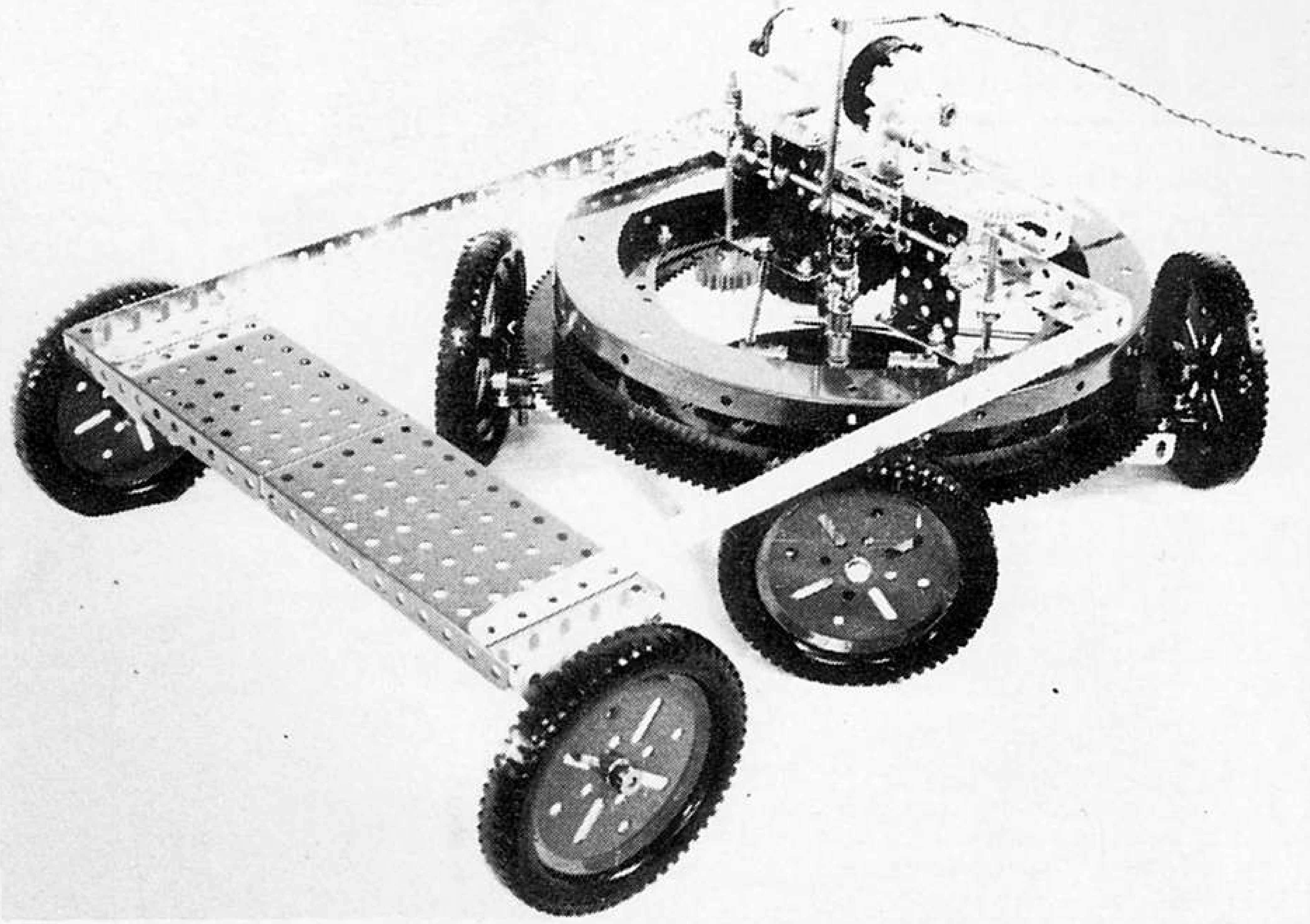


Fig 1. A general view of the cyclic sidewinder, described here by Mr. Steve Tonkin.

I should begin with a sort of apology. I read an article on this device in an engineering journal about fifteen years ago. Some ingenious chap, whose name escapes me so I can't give him the credit, had written this article on the device, which he may well have patented, and listed a number of possible uses. I have never seen it used, so perhaps it is just one more invention which bit the dust. Quite honestly, although it was most ingenious, I thought at the time it might run into a lot of sales resistance. For outdoor use it would be an efficient mud making machine. One indoor use suggested was to drive television cameras around the studio, but the tyres probably made an intolerable squeaking on a polished floor.

First, the basic scheme. Imagine a carousel resting on three wheels. If the wheels are mounted so that all their axles are radial, when the carousel is rotated the wheels will simply roll in a circle and the carousel will not go anywhere. Suppose the wheels are mounted on king-pins as in the front wheels of a car, and suppose they are now steered so that their axles all pass through a fixed point on the carousel, then as the carousel is rotated it will move in an eccentric circle. The trouble is that the carousel still does not go anywhere useful.

However, if we arrange that the axles of the wheels pass through a point fixed in space rather than fixed on the carousel, then the centre of the carousel will move continuously in a fixed direction. If we now consider each wheel, we realise that it is cyclically steered. One could do this with long axles extending inwards from each wheel, and arranging that they all pass through a point which is under our control. This method, whilst looking simple, presents problems in getting a number of crossing shafts to pass through the same point, and in the fact that the carousel moves at right angles to the displacement of the shafts.

Instead, we can use a mechanism which is not basically dissimilar from the mechanism in a helicopter hub, which controls the cyclic pitch on the blades.

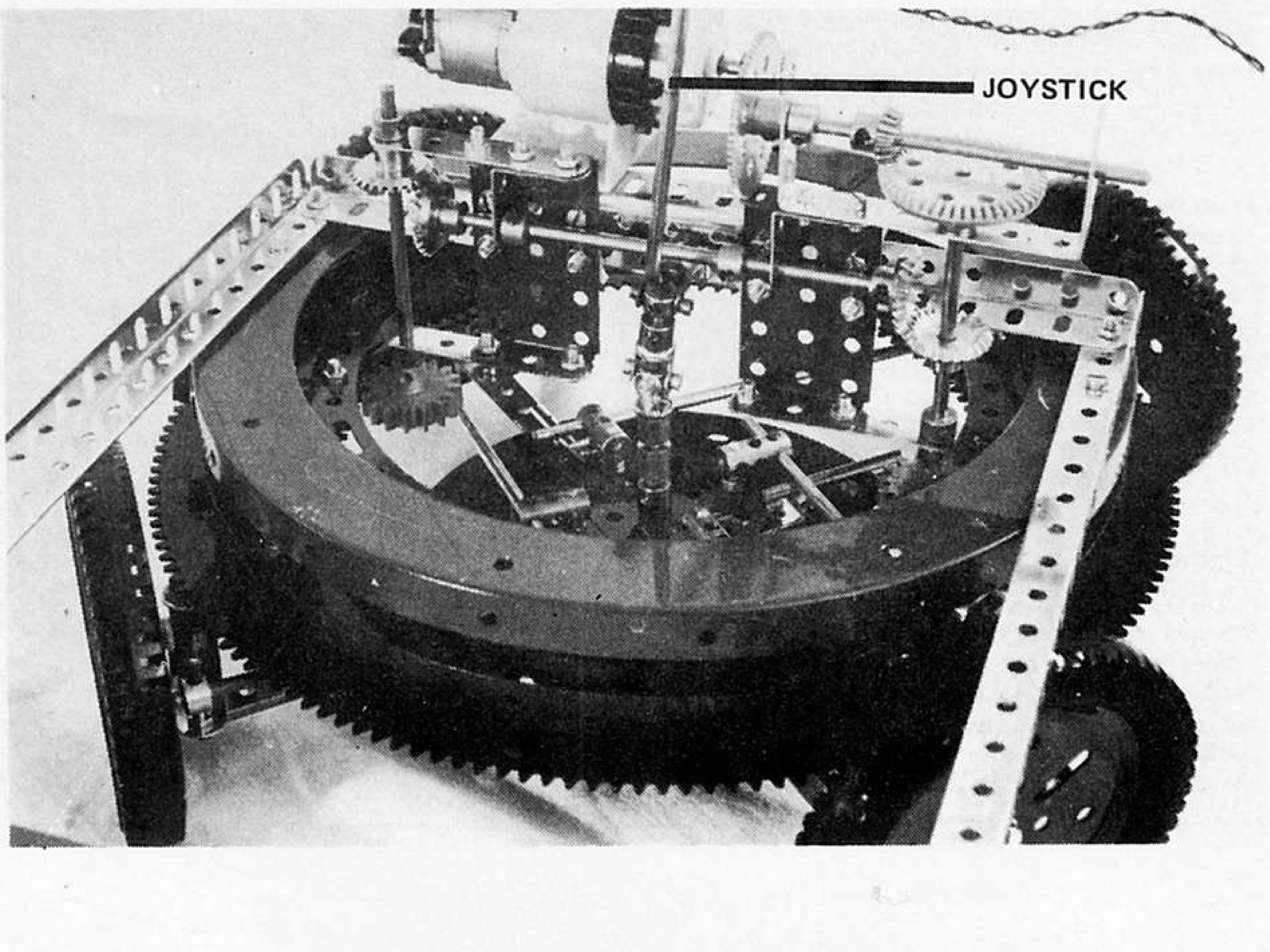
The carousel is of course driven round by a motor. At once a minor problem comes up. How is one to provide the reaction torque for the drive? The answer is very simple. One attaches the carousel, via its roller bearing, to a simple chassis having a couple of independent wheels, like the rear wheels of a front-wheel-drive car. The motor and gearbox which drives the carousel is then mounted on the chassis.

Now to execute the device in Meccano. The first problem to be solved is no mean problem. One has to devise a carousel bearing which leaves the centre free and unoccupied. One could base such a bearing on parts 143 or 145. To get the maximum room available, a pair of Flanged Rings (167b) was used, and a set of four Large-Toothed Quadrants (167a) with two Large Toothed Quadrant Pinions (167c) used for the drive.

The rollers used were ½" Pulleys. A Circular Strip was fitted with a number of radial spindles using Rod and Strip Connectors. Two of these spindles carried ½" Pulleys with boss, to give as much radial positioning as possible. The rest of the rollers are ½" Pulleys without boss so that they may tilt to comply with any slight non-circularity in the Flanged Rings.

As most Meccano parts have sets of holes in lines at 90° rather than 120° it was convenient to use 4 wheels instead of 3. Incidentally, one could actually use 2 wheels or even a single wheel, as long as one does not have to push against any resistance.

Fig 2. Close-up of the drive gearing and joystick control lever.



In the centre of the carousel is a Faceplate (see Fig. 3) the centre of which is controlled by the joystick. This Faceplate is made to rotate with the carousel by means of an Oldham coupling, which consists of two 3½" Double Angle Strips, one on the Faceplate and one on the carousel, coupled by a shaped arrangment of Rods and a Coupling.

Four Bolts in the outer holes of the faceplate are coupled by four 'Track' Rods to Bolts on Cranks which steer the wheels. At the inner end the track rod pivots are Couplings pivoting on their threaded bores on ⅜" Bolts. At the outer end, Collars are used in the same way with short Bolts, not quite screwed in far enough to touch the track rod. The road wheels run on Pivot Bolts which are locked to the bosses of the steering Cranks.

The drive to the carousel is by two diametrically opposite Large Tooth Quadant Pinions. Two are used instead of one, to help the somewhat imperfect carousel roller bearing. The motor was run on reduced voltage for a reason which is irrelevant to the present discussion, and with the gearbox at 60:1, so some further gear reduction to that shown is probably necessary.

If the carousel is driven in the correct direction, the device will creep in any direction at any rate according to the joystick deflection. If it were not for the noise it would undoubtedly make, one can see that it would be ideal for a TV camera trolley. As the basis of a fork lift truck for tricky positioning jobs, like fitting aircraft engines into wing pylons, it looks useful. It would be possible to have a carousel at each end of the trolley (with suitable joystick coupling for fore and aft control) so that the trolley itself can be steered as well as the motion of one end.

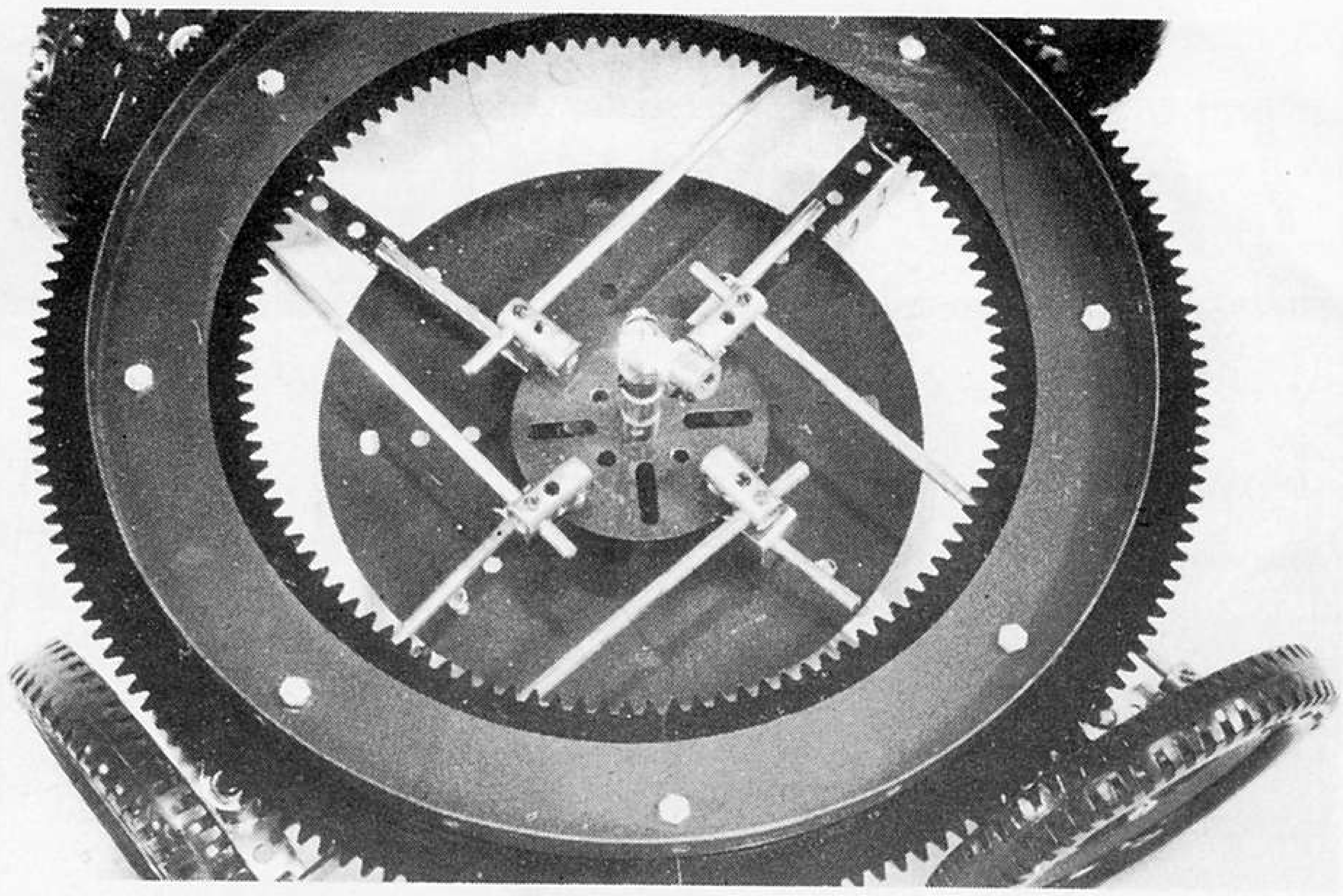


Fig 3.
The cyclic steering mechanism. The slide Rods and 3½" x ½" Double Angle Strips comprising the Oldham's coupling are visible beneath the four track Rods. Note the central 6" Circular Plate to the underside of which are bolted four 5½" Angle Girders.

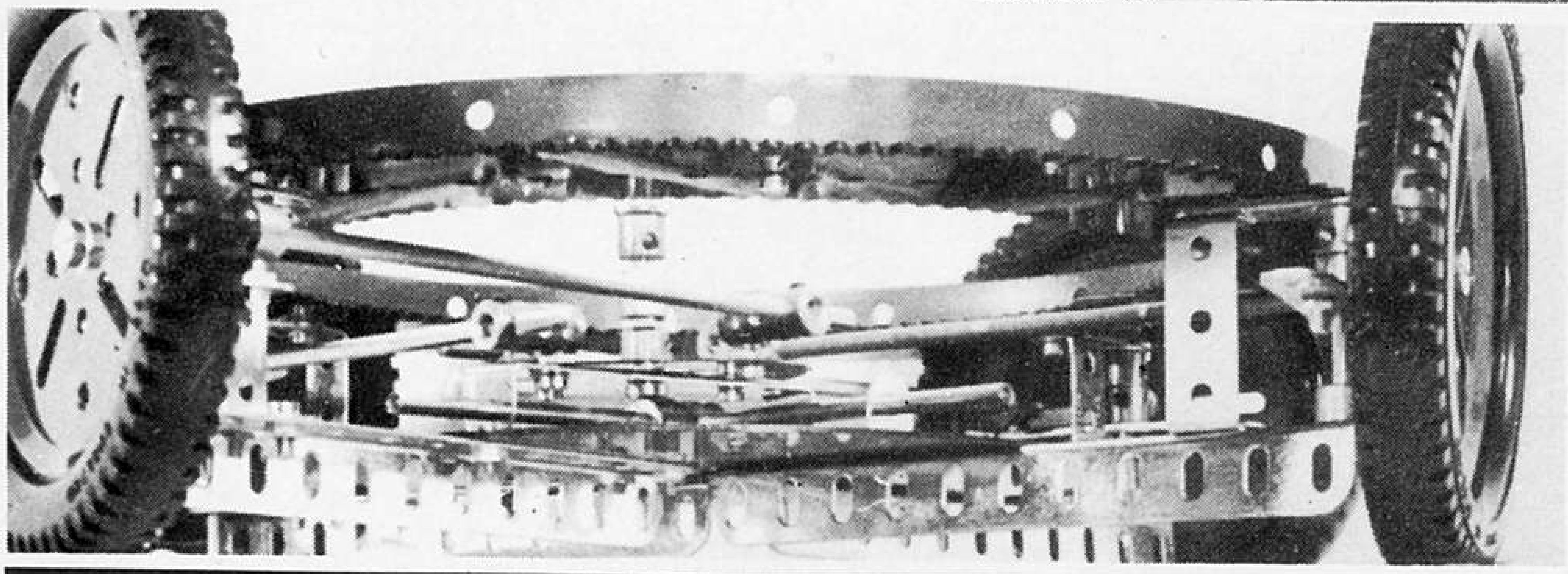


Fig 4.
Edge-on underside view showing the right-hand king-pin supported in the end hole of a 5½" Angle Girder by a Collar, (bottom), and a Crank, (top). All four steering axles are supported in this manner.

MECCANO CLUB ROUNDUP

All Meccano Clubs are invited to submit reports for these pages. Report should be approx. 350–400 words long and should reach us by the end of the second month before the month of publication.

MIDLANDS MECCANO GUILD

The Midlands Meccano Guild meeting on the 31st March, 1979 got off to the usual start with a cuppa plus the formal welcome, followed by the traditional wander round for a while. After some discussions, the Committee decided to devote a limited amount of time to specific demonstrations, which commenced at about 3:15.

First away was Roger Wallis with a truly novel Juke Box, designed to play 45 RPM records with the aid of a stylus, amplifier and very little else non-Meccano. The model still required a lot of work to complete it but nevertheless Roger has broken the back of this formidable task. Next to bat was Ken Wright who built his own version of Dr. Keith Cameron's 'Little Joe & Tricky Track'. Ken modified the design so that it splits into 4 modules for ease of transportation. David Neilson from Solihull described his space-frame chassis for a one-man, battery-powered vehicle, and explained how his 'model' fitted in with his mechanical engineering degree project at Lancaster University, which is to design a car for maximum distance in 2 hours around a 3/4 mile oval course.

Hon. Secretary Ernest Chandler followed by demonstrating his large-scale model of a Sperry New-Holland 1545 Combine Harvester which was sectioned to show the workings within. These included a 3-speed and reverse gearbox, clutch, differential, front (cutting) reel rake-up auger, 3 threshing drums and two 'straw' walkers. Charles Catt's Showman's Engine was some 2 feet long with 9-7/8ths' drivers. A PDU was positioned where one would normally find the dynamo, so the model was back-driven via Spring Cord and the flywheel. John Bridger's Octopus fairground ride was a very interesting lesson in near-perfection, the latest Mark 3 version reaches a new 'high' in realism and authentic operation, and has in fact received the seal of approval from Phipps, the owners of the prototype.

A small Hornby 'O' Gauge railway layout provided Meccano historian Jim Gamble with the excuse he needed to exhibit a small Meccano sequencer, which provided power to the layout for a pre-set time for a payment of 2p. Michael Edward's nicely-proportioned 1895 Benz car was equipped with fully representative steering and suspension, and the delightful feature of authentically operating 'cylinders' and 'pistons' formed from Elektrikit coils and cores. Mike Cuff's 'Roundup' amusement machine models a prototype in which the customers stand on the inside wall of a rotating drum, which is then accelerated and turned on a pivot through an angle of some 70 degrees.

Guest member Mr. Bright brought a couple of fine, antique-style Carriage Clocks, each powered by a 1 RPM mains motor. Another Clock, this time a 'flying pendulum' or bob-weight escapement type, was demonstrated by Brian Walker who used a design by Mr. Konkoly of Hungary, for inspiration. Mike Cotterill's collection of yellow Plates much have been stretched to the limit to finalise his Gantry Crane, and this was augmented by a large-scale Grasshopper-type Beam Engine. Another round of free roaming followed the formal demonstrations, this being followed in turn by a short business meeting and welcome refreshments.

This account has been taken from a meeting report by Phil Ashworth.

Ernest Chandler
Secretary

NORTH MIDLANDS MECCANO GROUP

Saturday and Sunday the 30th June and 1st of July brought with them the second rally organised by the Newark & Notts. Yesteryear Group. There was really no comparison to be drawn with the first in the sequence which had taken place the previous year. For a start, this year's event could reasonably be described as a Summer function, whereas 1978's, despite being held on the corresponding weekend, was virtually Winter! Further-more there was generally a much better attendance of both visitors and exhibitors than in 1978 and as a result it looks much more certain that this event will be a continuing feature of the olde-worlde scene. Fourteen Group members put their work on show, and it was good to see Reg Hall and Richard Bingham coming along to lend moral support. The organisers seemed well pleased with the display, so there'll probably be even more space allocated next year! Details of a few of the models are given below; and many thanks are proferred to those who came along and made it such a fine occasion.

Martyn Dowen showed a slightly-changed version of Alan Partridge's Automatic Reversing Mechanism which had a lot of goggle-eyed visitors around it. Mike Pashley had his latest masterpiece on show in the shape of his Liebherr 500-ton Crawler Crane 'Big Boy' with its 6' jib, 10-fall block, rail-mounted heavy-duty lifting gear and all the trimmings including motorised jacks for adjusting the load-handling characteristics; sideways-sliding cab and a full set of control levers. Chris Wilson's neat, small Lorry-Mounted Crane used a JPDU for load hoisting on a 6-fall rope, and a complex of military equipment comprising a twin-barrelled self-propelled gun and a Tank Transporter & trailer, the tractor unit having a nicely-simulated V8 engine down in the basement area. Mike Cotterill produced a Baltic Tank Locomotive built to roughly ½ Supermodel scale. This featured a top section built as a self-contained unit, easily detachable to view the 'works', powered by an E15R, motivating an auto-reverse sequence on about 6' of track—a splendid show model.

Barry Jessop had lots of time problems due to the onset of 'O' levels, but managed to come up with a novel Meccano version of the Electric Ray Game in which one slides a ring along an electrified wire shape, if possible without the two touching. Bert Shaw also had time problems, having been away on holiday until the very last minute but nobly turned up on the Sunday with his splendid Dockside Grabbing Crane, making a spectacular end-piece to a most imposing display, and a simple but effective Meccanograph which attracted the visitors as these devices always do. Geoff Coles reproduced a Roger Le-Rolland model of a mini-dragster, using the contents of a new set 5 plus two 1½" Motor Tyres.

Finally we welcomed two junior visitors David and Andrew Ferreday who brought with them a partly-constructed Showman's Engine to indicate they're moving off along the right lines; and also Robert Jessop, Barry and Malcolm's younger brother who brought a neat little three-wheeler Sports Car. Thanks for coming along!

Geoff Coles
Hon. Secretary,
'Little Court',
Bleasby, Notts.

SOLENT MECCANO CLUB

Our most important event recently was the Club's third Exhibition, which was held at the Assembly Rooms, Chichester, on Saturday 19th May. The Exhibition proved to be reasonably successful as the Club made a small profit on the day, but the number of visitors was lower than at our 1978 exhibition.

The models on display however, were numerous and fascinating, and the Club extends its grateful thanks to all exhibitors, particularly those from other Clubs who travelled considerable distances to be with us. It would be difficult to pick out any particular model as the most outstanding of those exhibited, but amongst those which spring to mind are Eddie Oatley's 15 ton Level Luffing Grabbing Crane in 1/24th scale and weighing 86 lbs, varying in size and interest with Harry Gower's Stothert & Pitt 'Goliath' Container Crane.

Both cranes towered over the heads of visitors and exhibitors. Harry also exhibited a Paper-folding machine and a Log-sawing machine, a modified S.M.L. 10, which by means of its padsaw blade sawed easily through a polystyrene 'log'.

Geoff and Julian Coles travelled down from Nottingham and brought a splendid display of models, including Geoff's Middleton Top beam engine, a very striking model, the original of which was built in 1829 and was used for hauling wagons on the inclines of the Cromford & High Peak Railway in Derbyshire.

Tony Knowles brought an interesting display of vintage Meccano motors, Manuals, and parts, and also a most attractive model Return Connecting rod Marine Engine, in gleaming nickel parts, the original of which was built in 1844 for the frigate 'Amphion'. Another marine model, generally agreed to be the 'star' of the show, and certainly a great attraction, was Brian Gulley's most unusual model of a 52-gun square-rigged warship, circa 1640, which was excellently modelled and fully-detailed, with clever use of yellow flexible plates for the sails. Brian's son David brought along a modified No. 9 Set Fork Lift Truck with power steering, and also a Marine Engine.

Marine Engines were well represented, as in addition to those mentioned, Charles Harrison exhibited an excellent two-cylinder marine engine based on the 1954 No. 5 set model, but much improved and detailed and powered by a mains motor. Also mains powered were his single-cylinder Mill Engine and a splendidly-detailed Beam Engine. All three engines were notable for their silent running. The Club Chairman, Chris Goodwin, brought his 'Meccano Factory'—two work-bench models consisting of 'Mr. R. T. Zahn' busily drilling holes in 2½" Strips, and his colleague, equally busy at his task of peening bosses in Pulleys and Gear wheels. Chris also displayed his fine Fowler BB1 Ploughing Engine.

Another noteworthy model was Eric and Michael Dormer's tracked Rock Drill, a model loosely based on an Italian machine used for tunnel boring. Armed with a Meccano high-speed drill with a bit consisting of a 1" Triangular Plate, it drilled its way easily through a polystyrene 'rock face', covering itself and its surroundings in polystyrene 'rubble'.

John Kinchen exhibited a large range of vintage and current Dinky Toys vehicles from his vast selection, nicely displayed in original Dinky Toys glass cases; and also a large-scale Portsmouth Corporation trolleybus. David Lewis, who made most of the arrangements for the Exhibition, brought a 58-seater Double Decker Bus similar to the model in the current No. 10 set leaflet but with improved transmission and full decking and seating. He also showed a 1/8th scale Burrell Agricultural Traction Engine with full working details.

Amongst other models, Tony Rednall showed portions of his latest model, in the early stages of construction—the Eaton Yale 6000 Articulated Tractor Shovel, based on Dinky Toys No. 973. Construction so far includes a six-speed heavy duty automatic Gear Box, still in the development stage.

The writer exhibited several models, including a much-modified version of S.M.L. 27, the Dragline Excavator, driven by a P.D.U. Although the various movements worked well, I really must learn how to drive the thing!

Report by
Brian Williams.

Club Secretary:
Charles Harrison,
64 Dutton Lane,
Eastleigh, Hants.

SOUTH EAST LONDON MECCANO CLUB

The South East London Meccano Club held its twelfth meeting on 5 May, 1979 at Welling. Attendance is fairly regular and this time we had eleven out of sixteen members present with a good selection of models, some of which are described here.

A grasshopper beam engine, the beam of which was shown at our ninth meeting, was brought by David Whitmore. It is built in yellow/silver/blue colours and is driven by a mains motor. The flywheel used in the model has been built up from 7½" Circular Strips and spokes from stacks of strips. A very small governor is driven from a built up crank shaft via contrate and spur gearing. Neil Bedford's model was originally going to be a large tracked crane but this was scrapped in favour of a smaller tracked grab crane built onto the existing chassis. To give the idea of size a cab was built onto the body with a dummy control panel. All movements are remote controlled from a panel of double pole reversing switches. A separate motor-with-gearbox powers each track via a chain drive and the slewing motion is powered by a similar unit mounted on the chassis.

Adrian Ashford showed a model of a London Fire Brigade AEC/Merryweather pump-escape dating from 1954. When complete the model will carry the wheeled escape shown at a previous meeting. Also brought was a realistic built up wheel for use with the tyre for 3" pulley. This is constructed from three bent 3" Curved Strips, Obtuse Angle Brackets, Wheel Flanges and a large Contrate forming the hub. David Smithers demonstrated a model of a 100 ton monotower crane used for shipyard work. It is about 1/40 full size standing 7'-6" (2.3m) high and weighing over 50 lb (22.5 Kg). It rotates at its lower end on six ½" pulleys but, unlike the 'Standard Mechanism', Pulleys with boss are used, pivoting on ¾" Bolts inside a circle of six Formed Slotted Strips. This arrangement gives less horizontal play and works extremely smoothly. The crane will easily lift 6 lb, which is a scale load of 100 tons.

Apart from our own exhibition on 29 September (to which everyone is invited to display their own models) we are now also looking forward to exhibiting some models at the Woolwich Memorial Hospital fete. Last year was the first time we had put on a show there and just a few weeks ago the organiser asked if we could return; apparently they had received requests from members of the public asking if our club would be there which is very encouraging not only for the SELMC but also for Meccano in general. If anyone would like more details of the club please write to the secretary.

Christopher Warrell
Secretary
41 Beechill Road,
Eltham,
London

STEVENAGE MECCANO CLUB

As will have been deduced from recent reports, 1978 was a fractured year for the Stevenage Meccano Club, because of the long illness of the Secretary, Dennis Higginson. This year, however, we have returned to a routine of regular meetings, our Secretary and the Club are growing in strength. Five new members have joined since the last report and the first display of the season is now behind us.

This display was on the 19th of May at the Pin Green School, Stevenage, where the annual fete is a well-attended and well-organised event with everything from keep-fit demonstrations to live snakes to delight the curious. The Meccano room that afternoon contained about 50 models with origins ranging from Plastic Meccano sets to metal Meccano set 10's. Stephen Kuc and Adrian Ogden deserve special mention for their preparatory work on the day; and Peter Brown, as usual, was there in advance with his own range of models including a Ship Coaler. Most of the regular members brought along their models and, on this, the 9th visit of the club to the Pin Green School, about 500 visitors came to look at us.

On July 14th, the club had two fixtures: a display of models at the Catholic Church hall at Knebworth and participation in the 4th Hornby/Meccano Exhibition at North Avenue Church at Letchworth. Neil Alston supervised the Letchworth end of the operation, and the Secretary, Dennis Higginson, again aided by the indomitable Adrian Ogden and Stephen Kuc, presided at the Knebworth affair, a completely new area for the club.

It's a revelation to watch Adrian and Stephen wire a hall for power within minutes of arriving and finding a couple of 3-pin sockets. Then the publicity machine goes into action; telegraph poles, trees, buildings etc. in the neighbourhood are soon festooned with banners calling attention to the Meccano event. We were most grateful for material from Meccano Ltd. which was used to decorate the hall and set the Meccano theme.

At the time of writing we were getting ready for Henley and for an exhibition planned to take place in September at Walkern, another village near Stevenage.

Outside members and those who cannot get along to our meetings are doing well in their own areas. Brian Slade at Lowestoft is constantly in touch with HQ at Stevenage about his numerous models, and Roger Le-Rolland at Stoke-On-Trent continues to supply models for shop windows in his locality. Wally Hinson at Dunstable recently received a visit from Dennis Higginson and new member Norman Dowd. Rumour has it that no-one managed to prise the subject of conversation away from the eternal theme of Meccano.

Several of the SMC members are now working on new designs for the current Meccano sets 1-5, a most enjoyable duty in aid of the parent firm.

Now for our list of new members:—Adults; Norman Dowd of Clifton, Beds; and Roland Jaggard of Welwyn Garden City. Boys joining us recently were Mark Roane, (13), Jason Hope (10) and Dean McKweth (9), all of Stevenage.

Keep us in mind if you'd like to join in our national and worldwide activities. Our membership is global and we can still accept a few more. Write to Dennis Higginson, SMC Secretary, at 7 Buckthorn Avenue, Stevenage, Herts.

Bernard Dunkley

NORTH STAFFS. MECCANO CLUB

ON the 18th to the 23rd July 1979 members of the NSMC staged a mini-display which occupied the entire frontage of the Britannia Building Society in the centre of Newcastle, Staffs. Many interesting Meccano models were on show, some twenty in all. They included a Spitfire in a display hangar by Roger Le Rolland, this model being a replica of the exhibit in the Spitfire museum in Hanley. Further models by Roger included a Showman's Traction Engine and a Vintage Rolls Royce Motor Car.

Philip Wooliscroft loaned a twisting and knotting machine for the display, Doug Ross produced his Set 10 Gantry Crane, and also a South Seeking Chariot. Paul Lippie, a very keen young new member of the club made a very smart Windmill in nickel/yellow, plus a variety of smaller models. Joe Rawlinson, one of our recently-enrolled members displayed several very solidly constructed models in the popular red/green colour scheme. Joe says his modelling has advanced in great strides since he has been in the NSMC.

Doug Ross, residing close at hand to the Building Society office, had the pleasure of listening to comments from many members of the public and he reports that in every case they were most favourable. Due to my car being temporarily out of action following a long holiday trip involving much wear and tear, I personally wasn't able to attend the display but would like to give credit at this point to Doug, whose unstinting efforts as Publicity Officer kept the wheels turning at his end. Thanks to Doug and the many other participants the NSMC managed to put on a fine show and give the name of Meccano a good deal of publicity.

On the 15th August Doug Ross and myself were invited to participate in the BBC Radio Stoke 'First Edition' programme, sent out live in the morning. Our efforts at gaining publicity were further rewarded by the attendance of a reporter from the Evening Sentinel at our 15th August meeting, who took photographs during the model demonstrations and made a report for the newspaper.

After all the exciting events of recent months, it can safely be considered that the NSMC is 'going great guns' and we certainly look forward to a similarly full calendar of events in the future.

George Cartlidge
Hon. Secretary, NSMC

NORTH EASTERN MECCANO SOCIETY

MEETINGS during the Spring and Summer have been well attended, each bringing its own crop of Junior and Adult models.

The April meeting entailed the judging of the Junior Model Building Contest to a design brief given to each member, of a simplified version of a Beam Engine, omitting such parts as the eccentric to bring it within the scope of the average Junior's Meccano set.

First prize was won by Tony Cains of Stockton-on-Tees for a very creditable effort of sound mechanical design. Second prize was awarded to Neil Birket of Darlington for his successful work. It is hoped to have at least one Junior Model contest each year, as we were delighted with these fine results in our first competition.

Bryan Reay brought a massive Kenworth Articulated Tractor unit to the meeting. (His first appearance after months of being snowed up!) The model had full suspension, featured large ash tray tyres and a tilting cab.

Raymond Stephens showed a six cylinder diesel engine and gearbox unit incorporating an E15R motor inside the cylinder block. Joe Etheridge brought along a well-built factory lift driven by six separate motors and fitted with automatic gates.

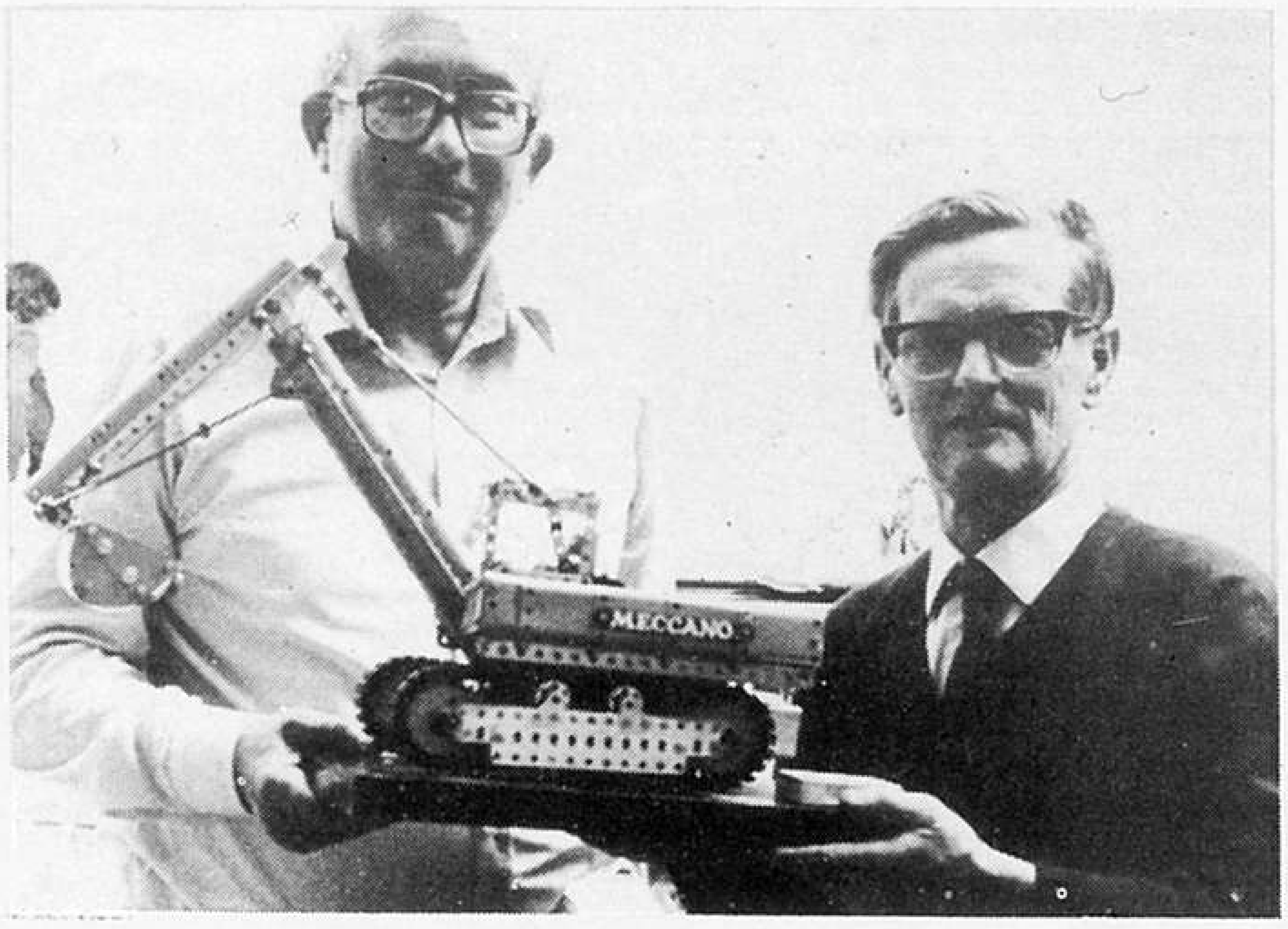
The May and July Meetings brought many more models from adults, among them David Dalton showed a fascinating Radio-Controlled and power steered Ford 'A' Series chassis which thrilled everyone with its lifelike realism. He also displayed an unusual freelance model of a Wickham Diaphram Sludge Pump, built from an illustration in a trade manual, and driven by a mains motor.

Joe Etheridge invariably turns up at each meeting with different models; he put on show an Army Scammel Truck with spur gear differential drive and a fine model of the Konkoly Steam Engine. One of the highlights of the meeting was enjoyed by all in the form of Joe's birthday cake, provided by his wife Sally and finely decorated with icing Strips, Gears and Trunnions all in appropriate colours—other Meccano wives could take a hint here!

During the late summer and early autumn the N.E.M.S. had several prominent window displays to stage, with a direct view to attracting a few more members who may have gone undetected in recent years. These displays took place in the larger towns in the area.

By the time this is read, arrangements should be well in hand for our Fourth Annual Exhibition, at Borrdgate Hall in Darlington, on Saturday November 17th, when we look forward to yet another interesting Meccano day.

Frank Beadle (Secretary)
Greytyles,
33 Yoredale Avenue,
Darlington, Co. Durham DL3 9AN.



Mr. Geoffrey Bull, President of the Society for Standard Gauge Railways and Chairman of the Yorkshire Dales Railway Museum Trust, is seen here (on the left), examining a plinth-mounted Meccano model of a crawler excavator with advanced Meccano constructor Alan Grimshaw of Yeadon, at the Trust's second Model Railway Show at Ilkley. The Yorkshire Dales Railway Museum Trust is a voluntary organisation which ultimately aims to purchase the old Midland Railway site at Embsay Station, Skipton. Funds are raised by means of sales, rides on preserved trains and the annual Model Railway Exhibition. A feature of both shows to date has been a comprehensive Meccano display by Alan Grimshaw, who is a member of three Meccano Clubs and organises displays at other events throughout the year.

SOUTHERN CALIFORNIA MECCANO CLUB

SINCE the last SCMC report appeared in these pages we have welcomed as new members Harry H. Packer of Red Deer, Alberta and Gersham J. Thompson Jr. of Santa Rosa, California.

At the Summer 1979 meeting of the SCMC, held at the residence of Anton Calleia in Northbridge, California, Keith La Bar was elected President and Clyde Suttle as corresponding Secretary, both for a term of two years.

Models on display included an Airplane Ride by Anton Calleia, plus a revolving Derrick Crane and Meccanograph by Clyde Suttle. Also on display was a 'White City Flip-Flap' based on a 1913 American Model Builder plan and used by Clyde Suttle to demonstrate the action of the A.M.B. Eccentric Rack and Wheel. This was for a talk given by Clyde to the Southern California Toy Collectors Club, on the subject of pre WW 1 construction sets available at that time in the United States.

Clyde T. Suttle Jr.
Corresponding Secretary
6062 Cerulean Avenue
Garden Grove 92645 Ca. USA.

CAPE TOWN MECCANO CLUB

Since our last report we have held an exhibition in conjunction with the Cape Town Society of Model and Experimental Engineers and we produced some thirty models. Trevor Hawtrey's Horse and Chariot was very popular—a horse pulling a chariot by moving its legs in a most realistic manner, driven by a clockwork motor mounted in the chariot. He also made a fine job of a Military Tank constructed chiefly from the Army Kit and making novel use of the lower section of the Highway Kit's Driver's Cab moulded beautifully onto the rear.

The Hon. Secretary displayed a Synchronous Clock, novel in the use of a 9-pole rotor rotating between Elektrikit Pivot Bolts. Only one (or three) field magnets can be used to drive this of course. As the first reduction is a 50:1 worm drive, the motor must be started by flicking the rotor with the finger. There was the all-essential Meccanograph churning out its infinite variety of designs, and also displayed, a 3-strand Plaiting Machine using three different coloured threads, as well as several other models.

Membership has increased by two—Otti Bock and Don Parker. Due to pressure of work Don's outfit has remained packed away for many years, but now that he has retired he is working his screwdriver red hot to make up for lost time and brings a new model to each meeting. He likes mechanisms and has produced several Meccanographs and I made an extensive writeup of his latest. Also, a combination type padlock inspired him to make his own and he did an excellent job without seeing the innards of the original.

Michael Adler is busy on the magnificent Automatic Loom (Meccanoman's Club Supermodel 49) and this incorporates some excellent ideas. We are all eagerly waiting to see it produce some material. He is a steam fan and has produced a delightful little loco with a current steam engine positioned where its boiler should be and the drive transmission in the cab. Michael is also busy on a Bulldozer powered by nickel-cadmium cells and this should prove to be a very attractive model.

I reproduced Patt Briggs Orrery depicting Mars and her two satellites. A fine model, Pat; this is an excellent example of learning from Meccano! George's Gombert's Perpetual Calendar Unit proved to be popular here, both Michael Adler and I reproducing it. I altered the layout to make it more of a demonstration model and also greatly simplified much of the mechanism. It is presently on loan to the Transvaal Meccano Guild for use at their exhibitions.

Caryl Hodgson has resigned her post as Treasurer and my wife Marion is now custodian to the club funds—an ideal task for the wives whilst the men get on with the more important task of model building.

Colin Cohen,
(Hon. Secretary).

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