MECCANO® Magazine

20p

QUARTERLY

Vol.58 No.1 MECCANO MAGAZINE FOUNDED 1916 April 1973

WELCOME !

"Welcome to the Meccano Magazine Quarterly" is the comment which springs unbidden to mind as I sit down to write – and I do mean welcome! I am delighted that Meccano Limited has decided to go ahead with the magazine and I have no doubt that every MMQ reader without exception echoes this sentiment.

The important thing to remember about the MMQ is that this is now very much the Meccano modellers' magazine. After something like nine years in other hands, it has once again come home to Meccano Limited – published by us and, for the first time, also printed by us. It is devoted almost completely to the Meccano hobby and is regarded by the company as the hobby's official organ. It is, therefore, **your** magazine and so we will always be pleased to hear from any reader who has anything of a Meccano nature which he feels might be of interest to other readers. We cannot of course guarantee publication, but we promise that everything will be very carefully studied and we will certainly use anything suitable when and if we have the space. In any case, we would like to have your opinion of the magazine, together with any ideas you might have for improving it.

EXTRA PAGES

Most modellers at present reading these words were notified by letter of the forthcoming publication of the MMQ. In the letter, we said that the magazine would have a minimum of 16 pages, including covers, and we fully expected that the first edition would be a 16-pager. Much to our delight, however, we have received such excellent advertising support from specialist Meccano dealers and others with a directly associated interest that we have been able to add an extra eight pages to this issue. They serve as an unexpected bonus, the thanks for which must go entirely to our advertisers and I am sure that, where possible, readers will reciprocate by supporting the advertisers. (Don't forget to say you saw them in the MMQ!).

This brings me to a very important point. The MMQ is regarded by Meccano Limited as a service to Meccano model-builders. As such, it is not required to make a profit for the company, but nor is it expected to make a loss. It is expected only to support itself and for this reason it has been costed on a break-even basis with the subscription rates being set accordingly. By receiving more advertising support than estimated, we raised a small cash surplus, and were able to pass this on to you in the form of extra pages. We will do the same thing at every opportunity, although, of course, it may not be possible to do so in every issue.

Editorial conference! Your Editor, seated, discusses details of the first issue of Meccano Magazine Quarterly with Editorial Director, Mr. J. D. McHard, right, and Assistant Editor Mr. M. K. Peddie.

CONTINUITY

Although this is the first MMQ, you will see from the imprint above that it is officially regarded as issue No. 1 **of the 58th volume!** The reason for this is that the magazine is not really a new publication, but rather a continuation of the "old" Meccano Magazine. The December 1972 MM was Volume 57, No. 12, therefore this issue is Volume 58, No. 1 – i.e. the first issue of 1973. Thus, continuity is preserved.

Anyway, here we are with the first MMQ. I hope you are happy with it!

The Editor

EDITORIAL DIRECTOR: J.D. McHard

EDITOR: C. J. Jelley

ASSISTANT EDITOR: M. K. Peddie

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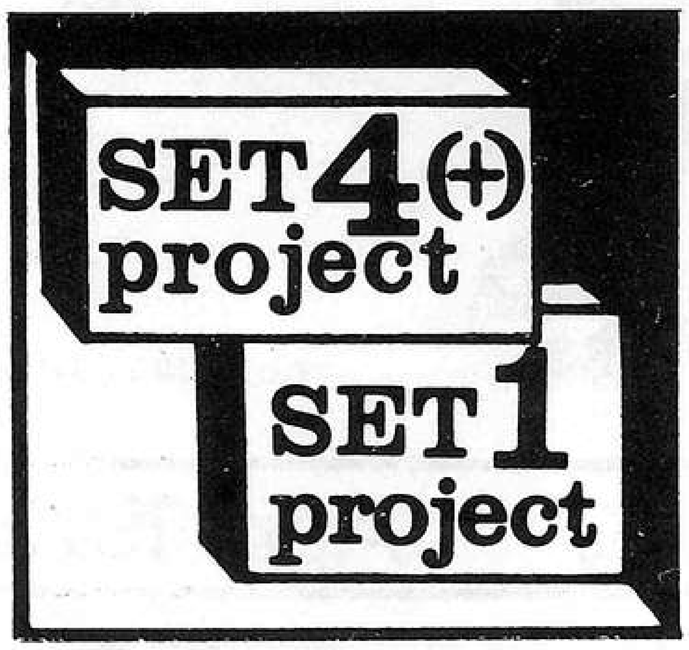
CONTENTS

2. Nice 'n Easy.
4. Live-Steam Loco.
7. Meccano Orrery.
10. Collector's Corner.
12. Meccano Multikits.
15. Among the Model-Builders.
18. Meccano Club Roundup.
19. Dinky Toys News.
21. Pocket Meccano Contest Results.



NICE 'N EASY

by "Spanner"

TWO SIMPLE MODELS

FOR YOUNGER MODELLERS we feature here two small, yet interesting offerings which are both built from specific Meccano Sets. Easy to assemble, they work well when finished and should give plenty of operating fun.

NO. 1 SET CRANE

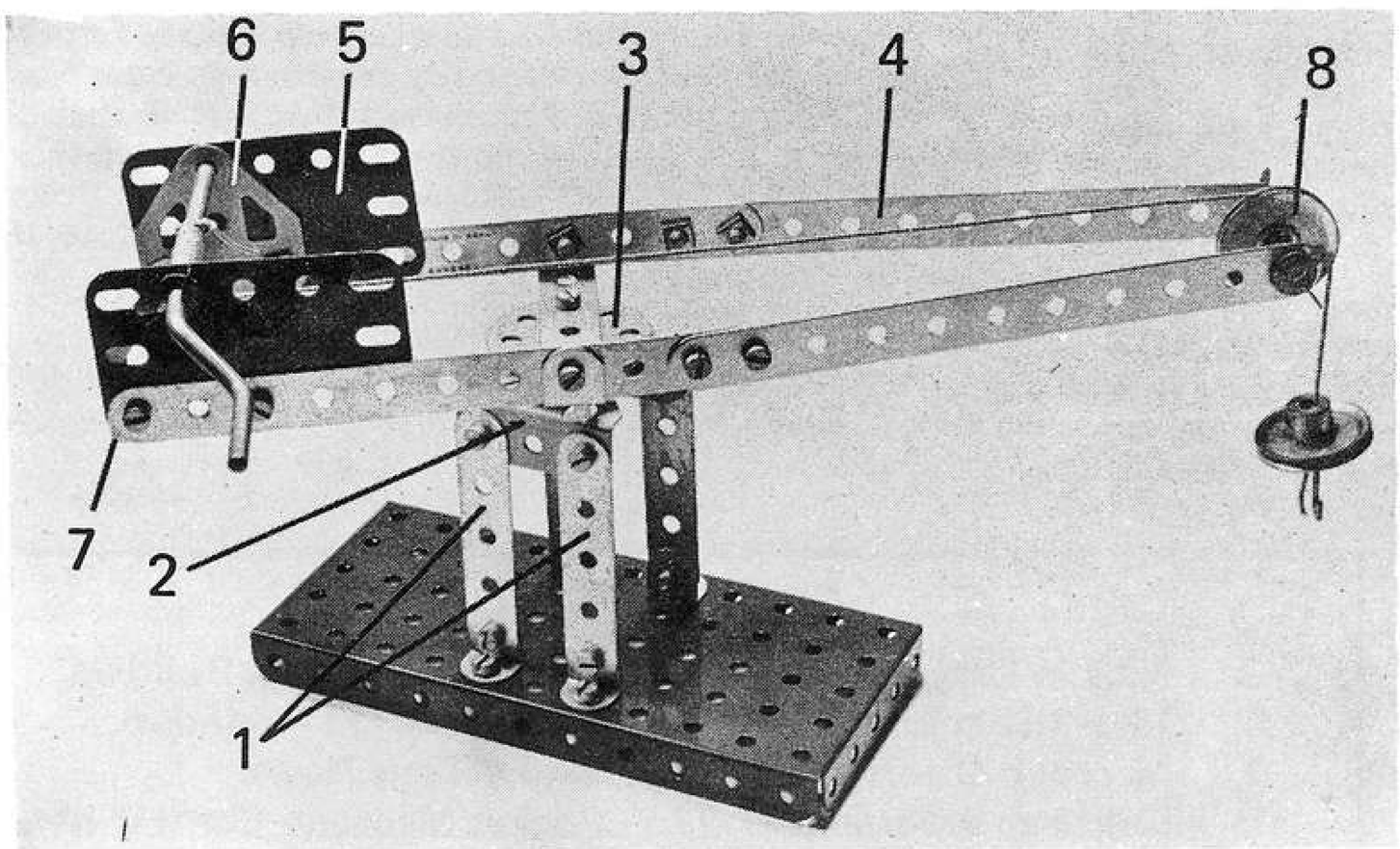
First in line is a simple Hammerhead Crane built with the No. 1 Set. The support tower is supplied by four 2½" Strips 1, attached by Angle Brackets to a 5½" x 2½" Flanged Plate. Bolted to the upper ends of the Strips are two Trunnions 2, their apexes overlapping so that the apex holes coincide. A 3/8" Bolt is passed up through these holes and into the boss of an 8-hole Bush Wheel 3 which is then locked onto the Bolt shank by its Set Screw. The Bush Wheel should turn on the Trunnions.

Bolted across the face of the Bush Wheel is a 2½" x ½" Double Angle Strip, to the lugs of which the arms of the jib are secured. Each arm is supplied by a 10" compound strip 4, built up from two 5½" Strips overlapped two holes, to the rear end of which a 2½" x 1½" Plastic Plate 5, overlayed by a Flat Trunnion 6, is fixed as shown. Note that the rear securing Bolt also fixes a 2½" x ½" Double Angle Strip 7 in place to connect the two arms together. A 3½" Crank Handle is journalled in the apex holes of the Flat Trunnions, being held in place by Spring Clips, each spaced from the nearby Plastic Plate by a Washer to prevent scratching.

Towards their forward ends, Strips 4 are curved inwards slightly to bring them closer together and in their end holes is journalled a 2" Rod, also held in place by Spring Clips spaced by Washers. A 1" Pulley 8 is fixed on the Rod, then the hoisting cord is wound round the Crank Handle and passed over this Pulley. Finally, a Wire Hook is tied to the end of the cord, with a 1" Pulley being added at the same time to serve as an extra weight for the Hook.

PARTS REQUIRED

4 - 2	2 - 22	24 - 37b	1 - 57d
4 - 5	1 - 24	4 - 38	1 - 111c
4 - 12	4 - 35	2 - 48a	2 - 126
1 - 17	24 - 37a	1 - 52	2 - 126a
1 - 19s			2 - 194



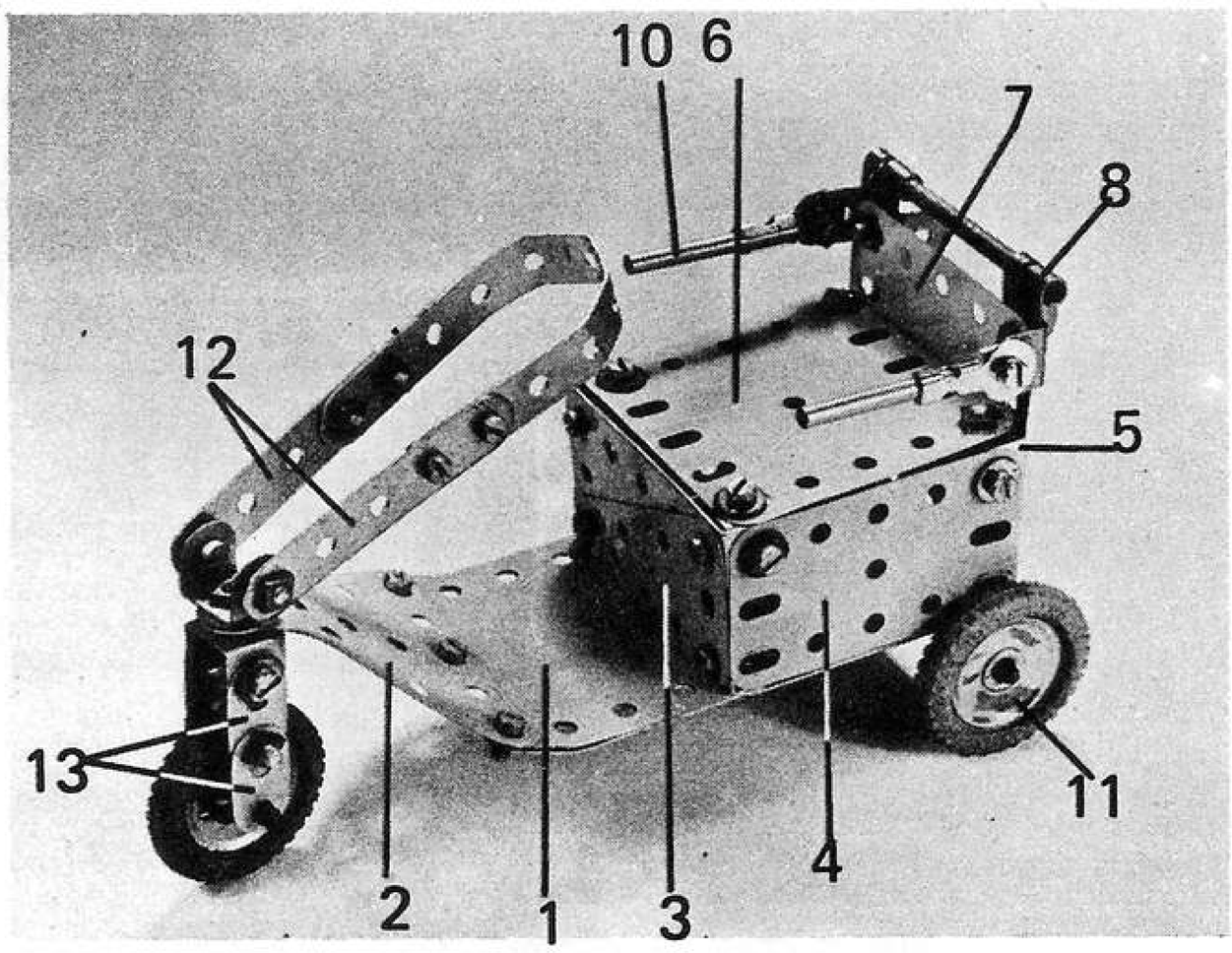
This simple Hammerhead Crane is built from a No. 1 Meccano Set.

POWER CHAIR

Our second model is built from a No. 4 Set – with the addition of two right-angled Rod and Strip Connectors, Part No. 212a. These extra parts are not vital, however, simply serving to hold a handrail which could be dispensed with, if necessary. Inspiration for the model came from the Batric Power Chair – a small electric motor-driven mobile chair suitable for elderly or disabled people. The model illustrated is not motorised, incidentally, but a Magic Motor could be fitted without difficulty.

The chassis consists of a 4½" x 2½" Flexible Plate 1, underlayed along the side edges by two compound 4½" strips each built up from two 2½" Strips overlapped one hole. The Plate and strips are curved upwards slightly at the front and are extended forwards by two 2½" x 1½" Triangular Flexible Plates 2, arranged as shown to form a larger triangle. The centre join is underlayed by a 2½" Strip. The seat, itself, is produced from two further 2½" x 1½" Triangular Flexible Plates 3, arranged to form a compound rectangular plate and attached to the chassis by Angle Brackets. Bolted to the upper edge of this plate is a 2½" x ½" Double Angle Strip, to each lug of which a 2½" x 1½" Flexible Plate 4 and an Angle Bracket are secured. Another Angle Bracket 5 is bolted to the upper rear corner of Plate 4. This Plate serves as the seat side, while a 2½" x 2½" Flexible Plate 6 is bolted to the spare lug of the first Angle Bracket.

At the back, the seat is enclosed by another 2½" x 2½" Flexible Plate 7, edged by 2½" Strips. It is attached to the chassis by further Angle Brackets and to Angle Brackets 5 also by Angle Brackets. Note that the latter securing Bolts pass up through the



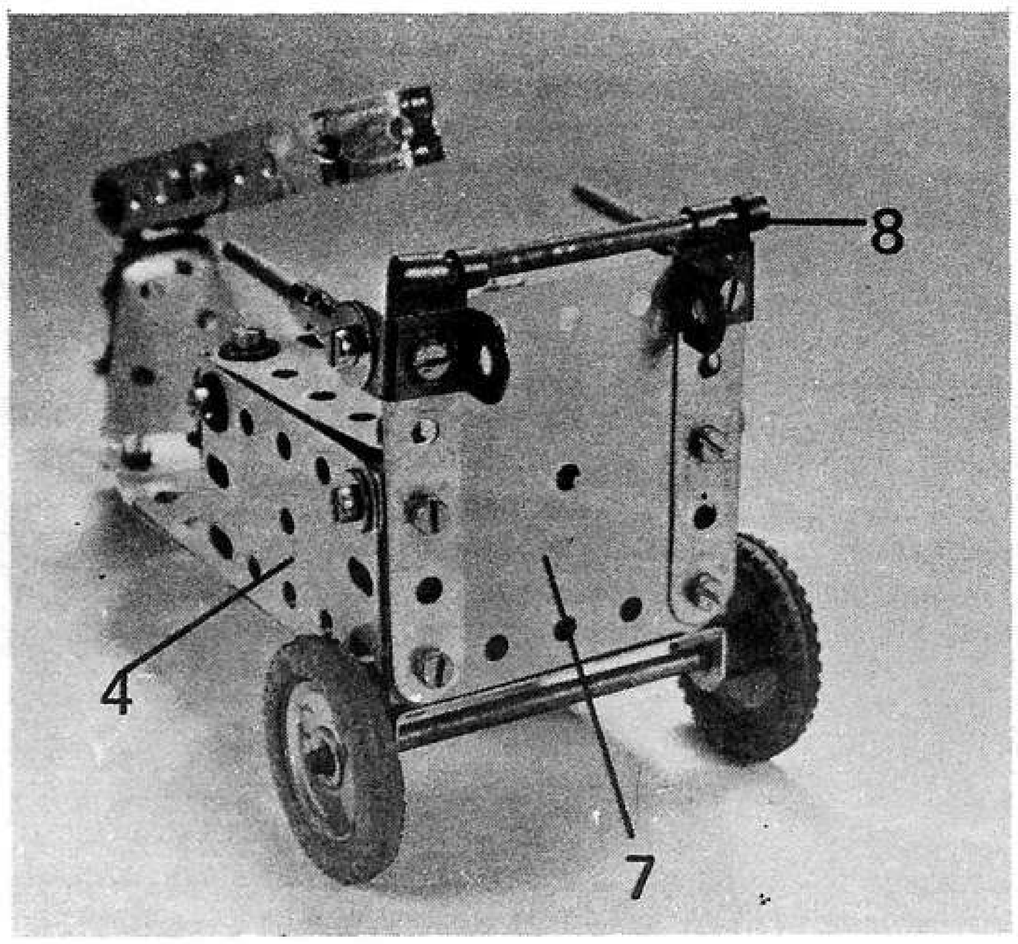
Bracket lugs, are fitted with a Nut, and are then passed through the rear corner holes of Plate 6 when a final Nut is added.

Bolted to each upper corner of Plate 7 and its edging Strip are a ½" Reversed Angle Bracket and a right-angled Rod and Strip Connector 8. The Connectors at each side are joined by a 2" Rod, while an ordinary Rod and Strip Connector, carrying a 1½" Rod 10, is bolted to the forward lug of the Reversed Angle Brackets to provide an arm rest. The rear wheels 11 are 1" Pulleys with Motor Tyres fixed on a 3½" Rod journalled in the lugs of a 2½" x ½" Double Angle Strip bolted to the chassis.

Last, but not least, the front fork arrangement is supplied by two Double Brackets lock-nutted to the apexes of Plates 2, one above and one below the Plates. Lock-nutted to the lugs of the upper Bracket are two 2½" Strips 12, connected by a 5½" Strip, curved as shown to provide the steering handle. The lugs of the lower Bracket are each extended by two Fishplates 13 and, finally, a 1" Rod, carrying a 1" loose Pulley with Motor Tyre, is held by Spring Clips in the round holes of the lower Fishplates.

PARTS REQUIRED

1 - 2	1 - 17	47 - 37a	3 - 142c
9 - 5	1 - 18a	37 - 37b	2 - 188
5 - 10	1 - 18b	9 - 38	2 - 190
2 - 11	2 - 22	2 - 48a	1 - 191
10 - 12	1 - 22a	1 - 111c	1 - 212
1 - 16	2 - 35	22 - 125	2 - 212a
			2 - 221



Pictured at the top of the page is an Invalid Carriage, based on the real-life Batric Power Chair. The model is built from a No. 4 Set, plus two right-angled Rod and Strip Connectors. Right, a rear view showing the back of the model.

THE EDITORIAL DIRECTOR says...

Meccano is over 65 years old. Now, read this oft-repeated statement once again – slowly, and then try to think of another toy which can claim even half of that active life. Ask yourself **why** Meccano should be the sole survivor and, more important, how it is that, with today's fierce competition,it remains the world's leading constructional system.

Such exceptional situations are never accidental; they are brought about by continuous hard work, forward planning and a tenacious belief in the product on the part of those responsible for its development.

Of course, in this case, the basis for continued success remains the fundamental soundness of Frank Hornby's brilliant concept, but although a Meccano boy of 1908 would still easily identify the 1973 product, the subtle and continuous changes that have taken place over the years are more extensive than is generally realized. It is to the credit of the various people whose successive responsibility it has been to perpetuate the system, that they have subtly adapted it, without basic distortion, to suit the market requirements of the time.

In the process, Meccano Magazine has, since its inception in 1916, been of enormous value in maintaining an essential contact with Meccano users around the world and it has enabled Management, with the assistance of three generations of readers, to identify changing product requirements. It is with great satisfaction, therefore, that we are able, with your help, to continue Meccano Magazine – a publication which, like the system it represents, has continually adapted itself to a changing market.

There is also a very personal pleasure in seeing the new magazine firmly established, for I first became associated with the MM eight years ago. Our new Editor, however, has been connected with the magazine for even longer than I and he is already very well-known to many of you. To adapt a current catchphrase, I am sure he will provide for you "The magazine you've always wanted".

J. D. McHard.

BRINGING A TOUCH of undisguised beauty to the cover of last December's MM was a striking picture of an early American railway locomotive modelled in Meccano. It was, as mentioned in the cover caption, the winning model from the 1972 Meccano Globe-trotter Competition and the same model is now illustrated here, in sectional detail, for the benefit of readers interested in reproducing it.

However, although full building instructions have been prepared, we have been unable to include them in these pages. They, alone, would have filled-up nearly the whole magazine! We have therefore printed the instructions separately and will be delighted to supply a copy to any reader wishing to build the loco. Just drop a line to Meccano Magazine Quarterly, Binns Road, Liverpool L13 1DA, enclosing a stamped addressed envelope (minimum length 8½").

We regret that we can supply only one free copy to each interested reader. Additional copies will be supplied on request, but will be charged for at a rate of 12½p each, plus 2½p postage.

DUPLICATE MODEL

In actual fact, the model illustrated is a duplicate of the original prize-winning loco, built by our Model Department for display purposes. The original remained the property of its builder and was available to us for a limited time only.

The original, itself, was the handywork of 11 year-old Mark Knowles of Laverstock, Salisbury, Wilts. Despite his tender years, Mark is a very competent modeller, as witnessed by the fact that he built his model almost entirely by himself. He did receive a certain amount of assistance from his father, but this was primarily in the form of advice, rather than actual model-building aid, and was permitted within the contest rules.

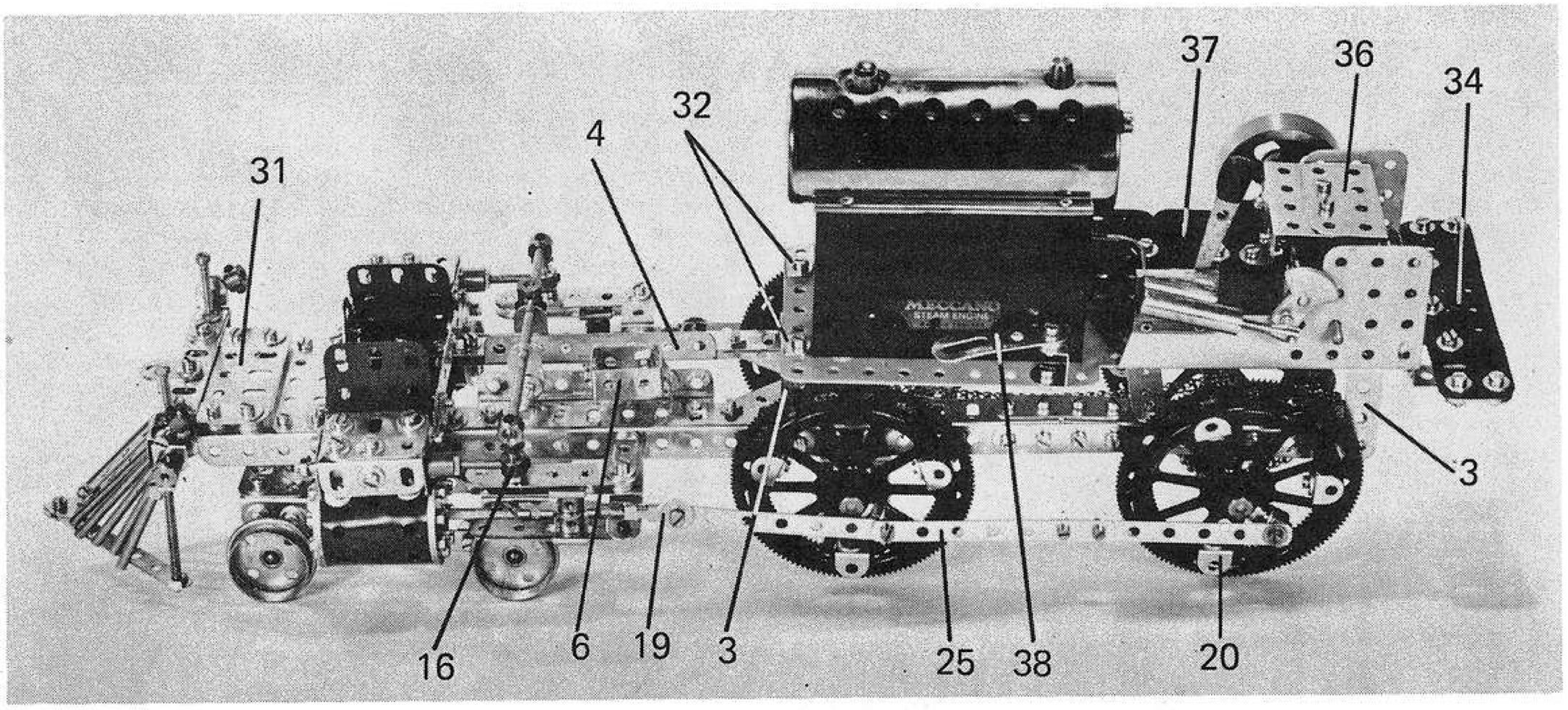
JUDGING

The Globe-trotter Competition closed early last summer and the winner was subsequently selected by a distinguished panel of judges, headed by Sir Alec Issigonis, designer of the famous British Leyland Mini Car and himself a Meccano modeller of long-standing. Sir Alec's co-judges were Mr. H. J. Fallmann, Managing Director of Meccano Ltd., Mr. Michael Riddle, B.O.A.C. Passenger Manager for the Midlands, and Mr. Frank Casey, Managing Director of Brunnings Advertising and Marketing (Liverpool) Ltd., Meccano's co-advertising agents and the people who first devised the Globe-trotter contest. Judging was difficult, to say the least, but we can truthfully report that all four judges – quite independently of each other – selected Mark's model as the winner. The choice was unanimous.

Mark based his model on a real-life locomotive preserved in Walt Disney World, Florida, U.S.A. It was not of course intended as an exact reproduction, but

Continued on page 20.

Illustrated above, Globe-trotter winner Mark Knowles with his prize loco. Opposite page: top, side view of chassis; centre, underside view of chassis; bottom, bodywork removed from chassis. More photos on page 6.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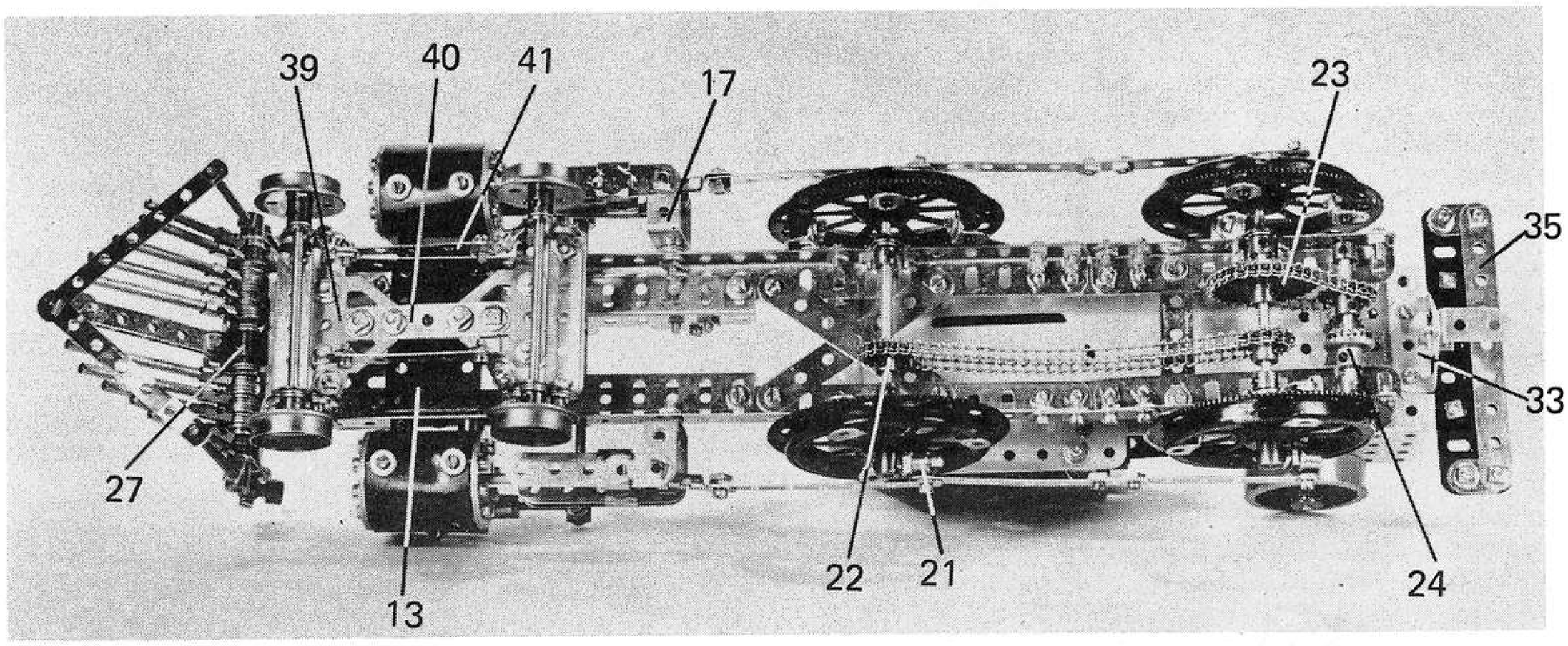
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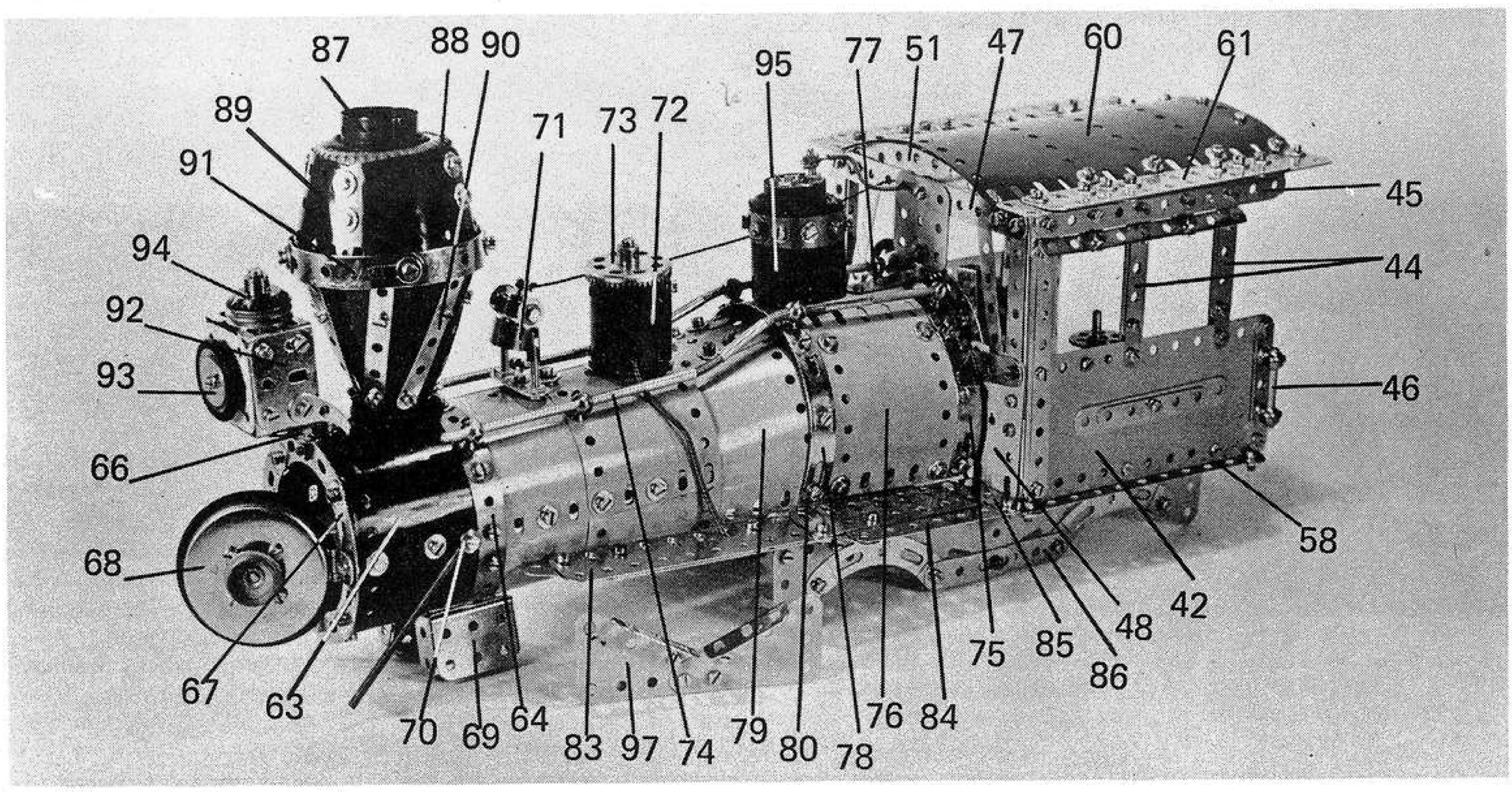
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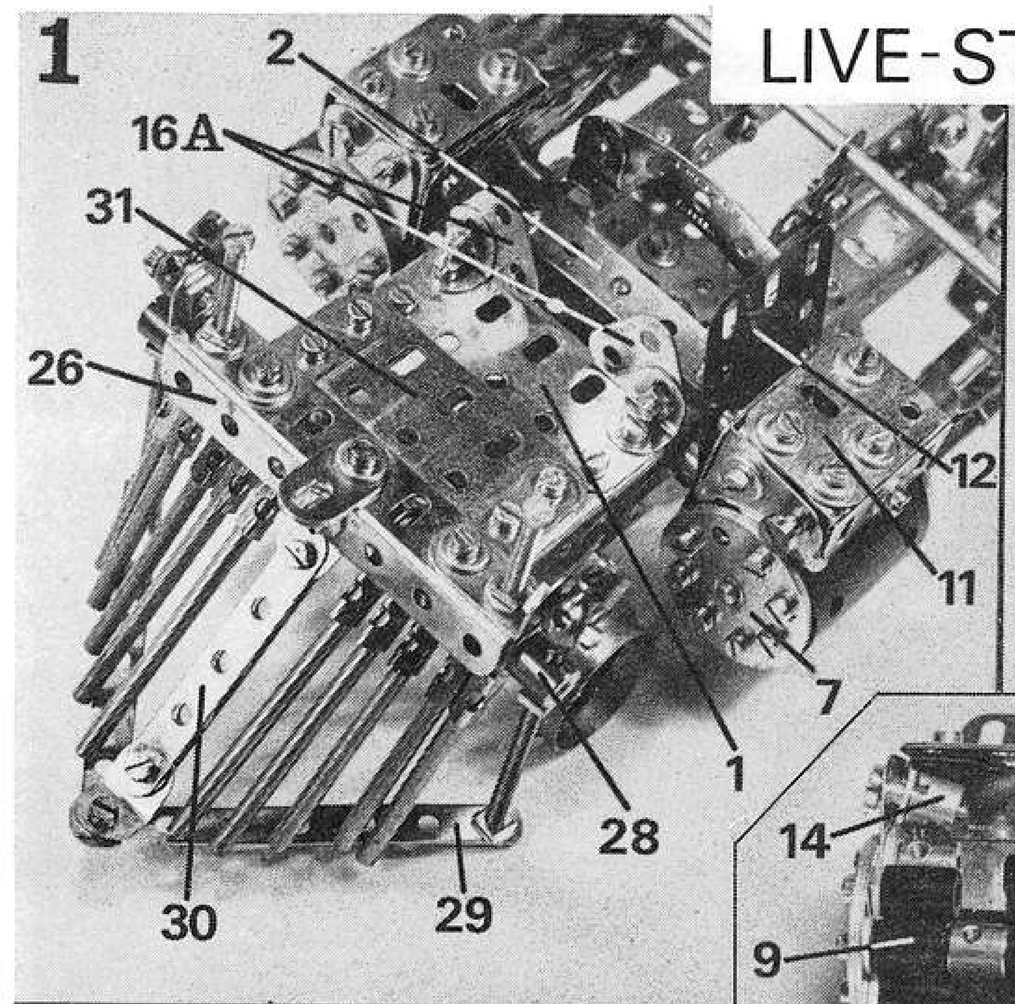
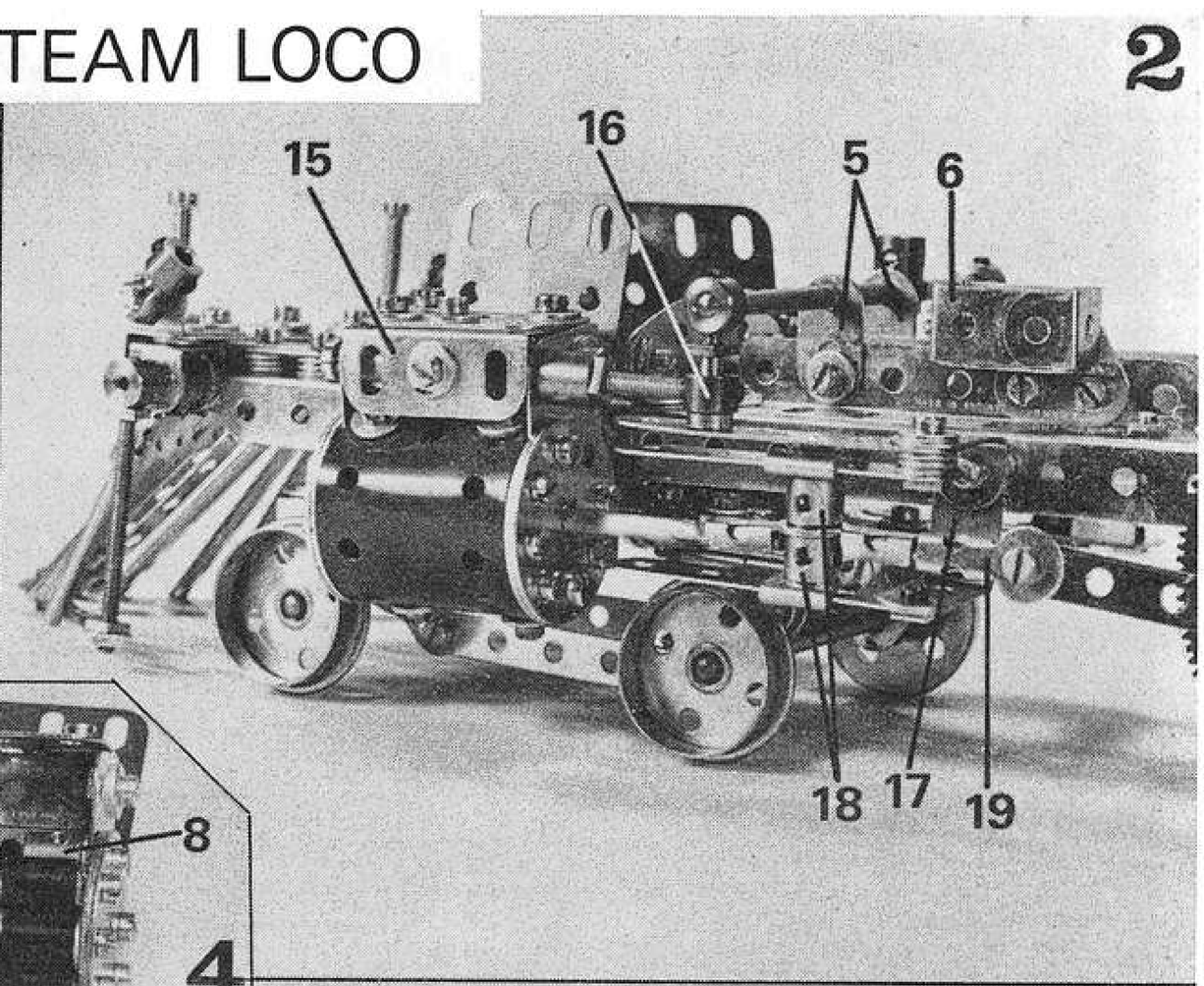
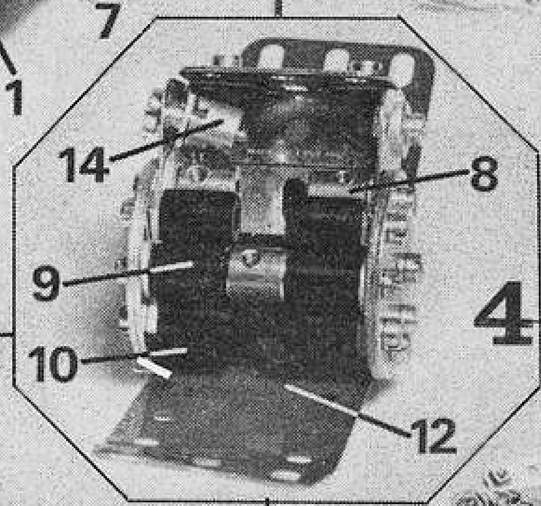
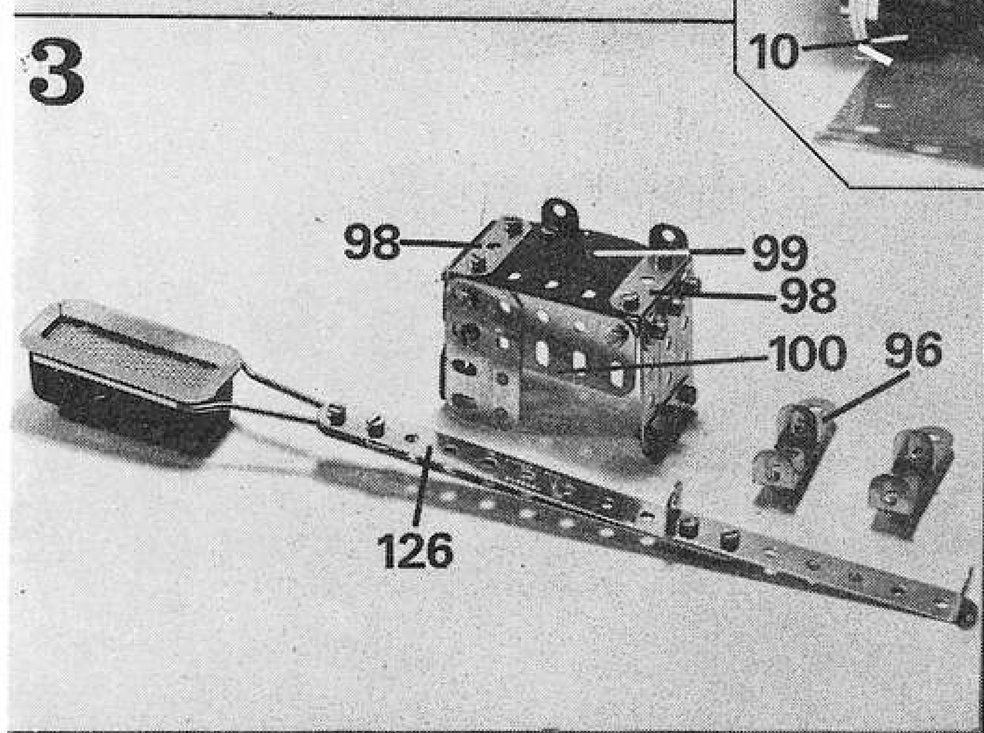
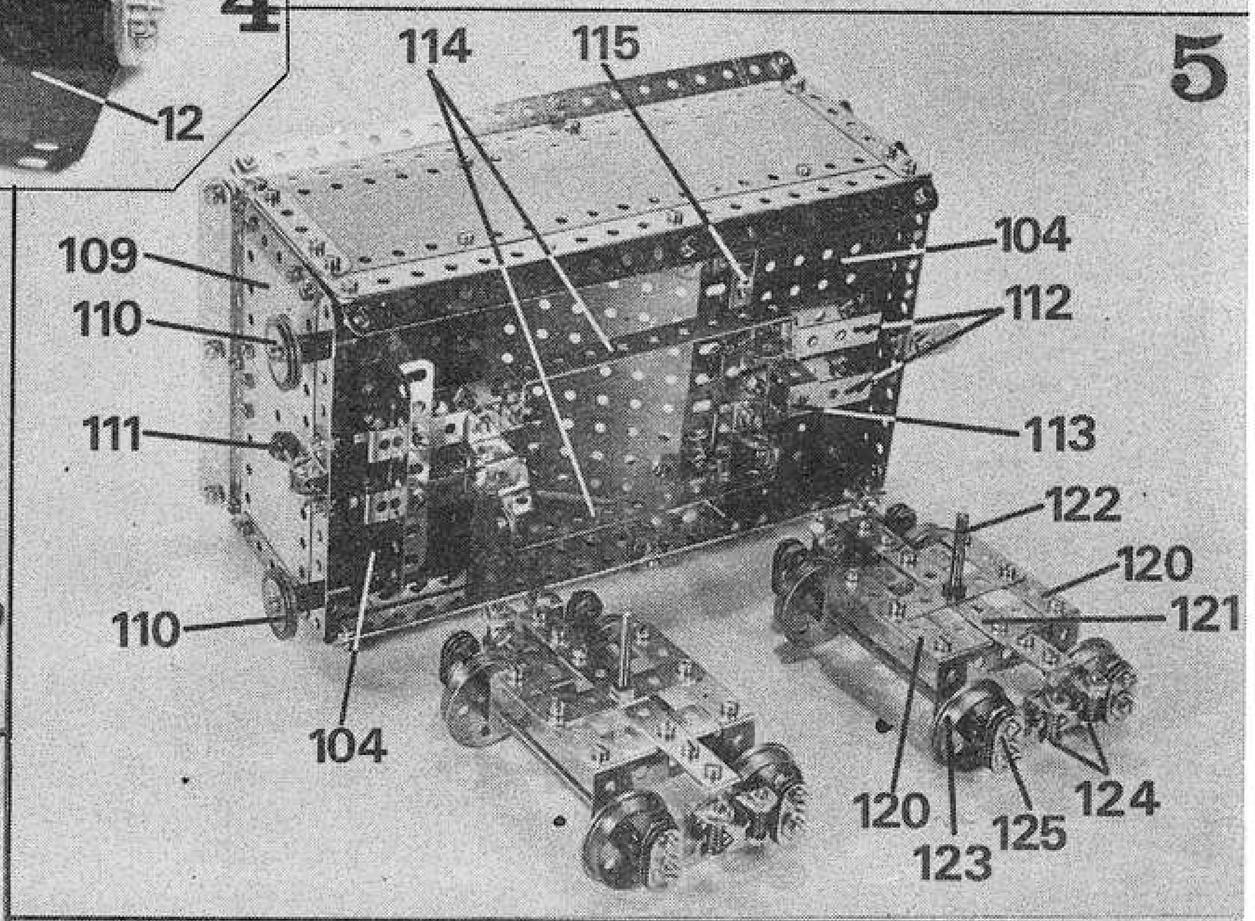
LIVE-STEAM LOCO

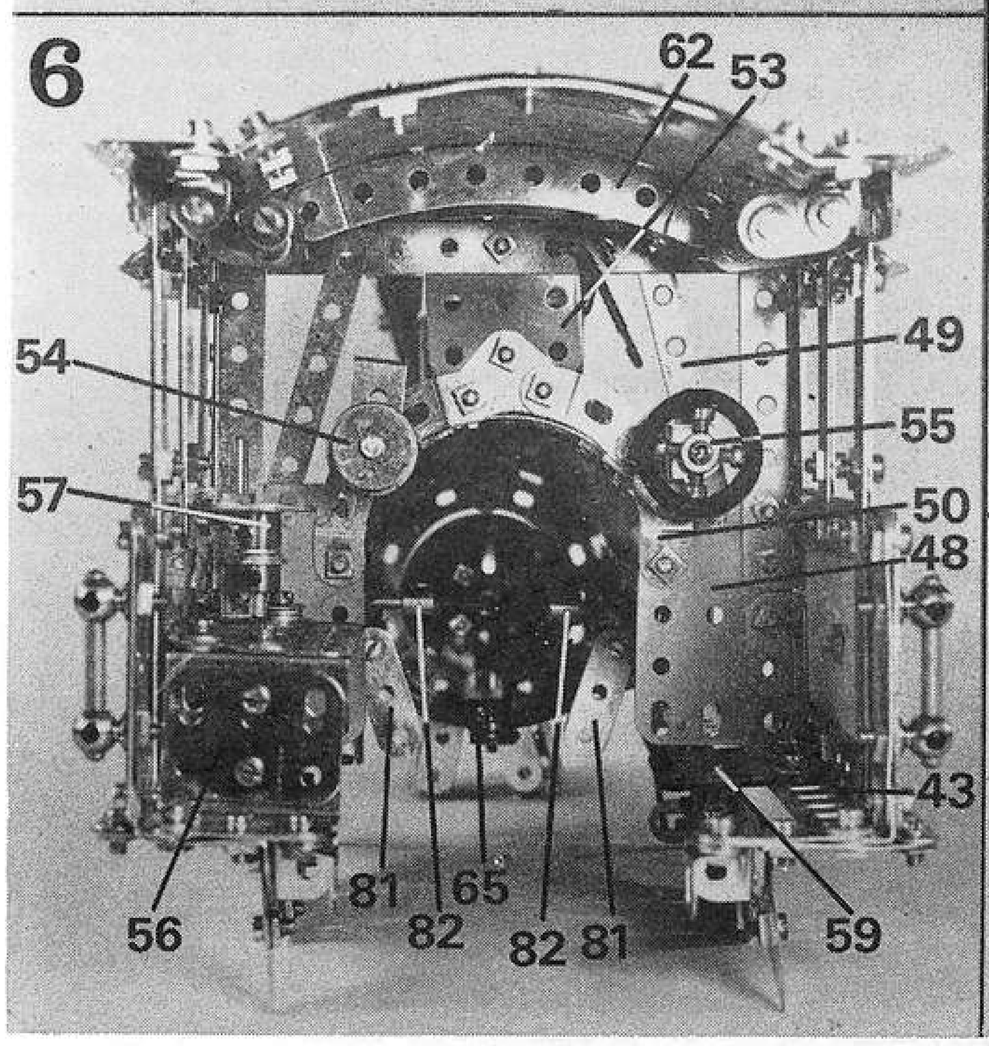


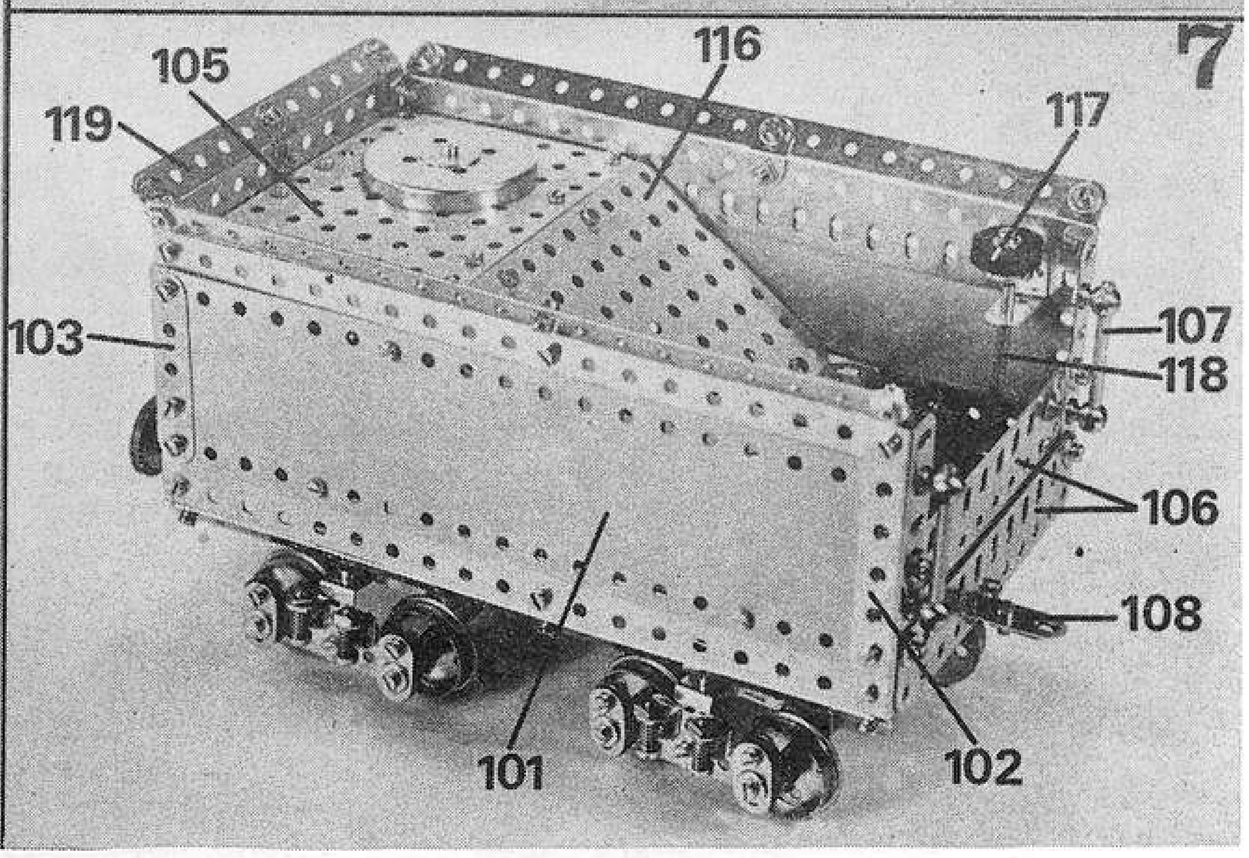










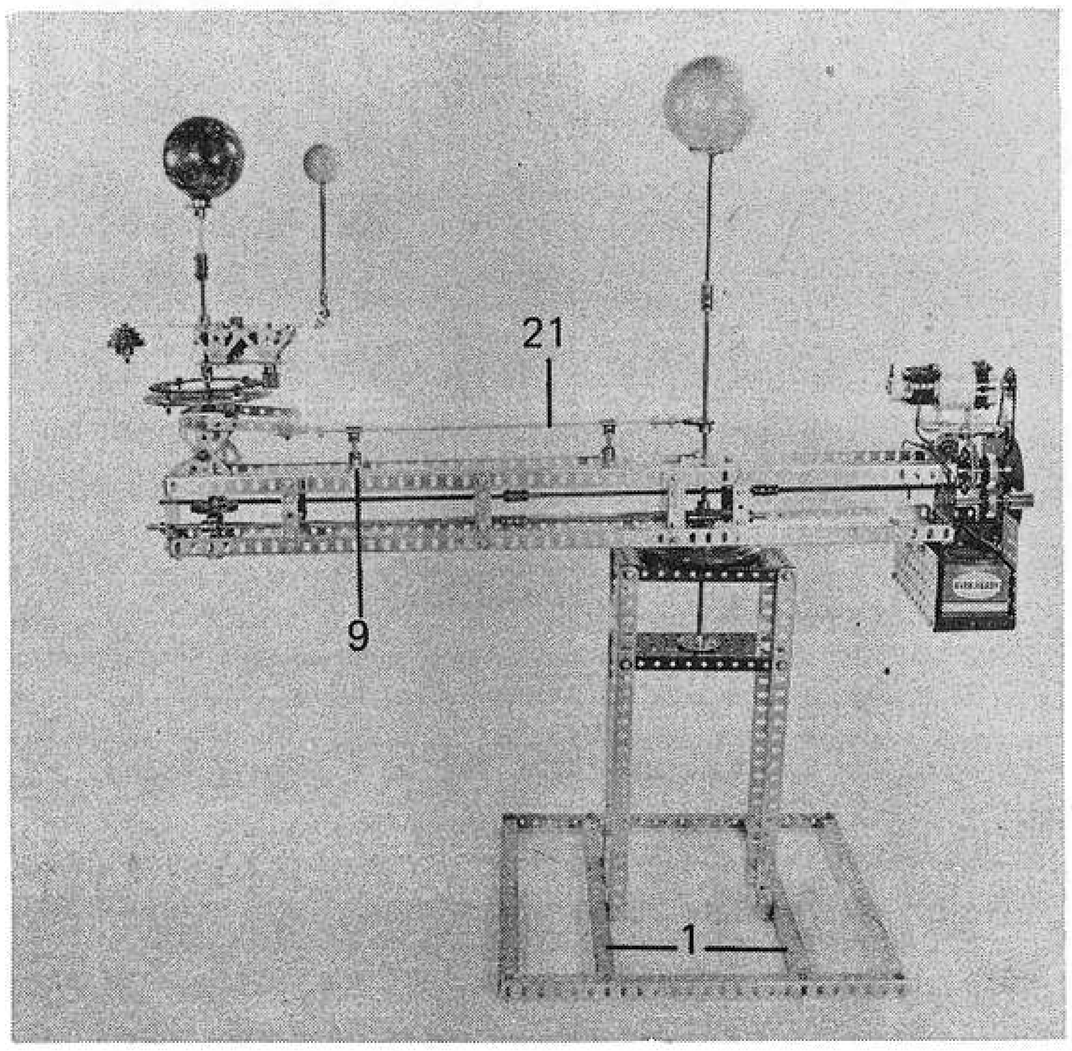


1. A close-up view of the front end of the chassis, with the cow-catcher. 2. Side view of chassis front showing the driving cylinder. 3. The flywheel cover, cab-access steps and methylated spirit burner. Note the extension to the burner handle. 4. A close-up view of the driving cylinder, partially opened to show the internal use of Threaded Bosses and Insulating Spacers. 5. An underside view of the tender, with its bogies. 6. A rear view looking into the cab. 7. A general view of the tender.

MECCANO ORRERY

Designed by W. Gomme

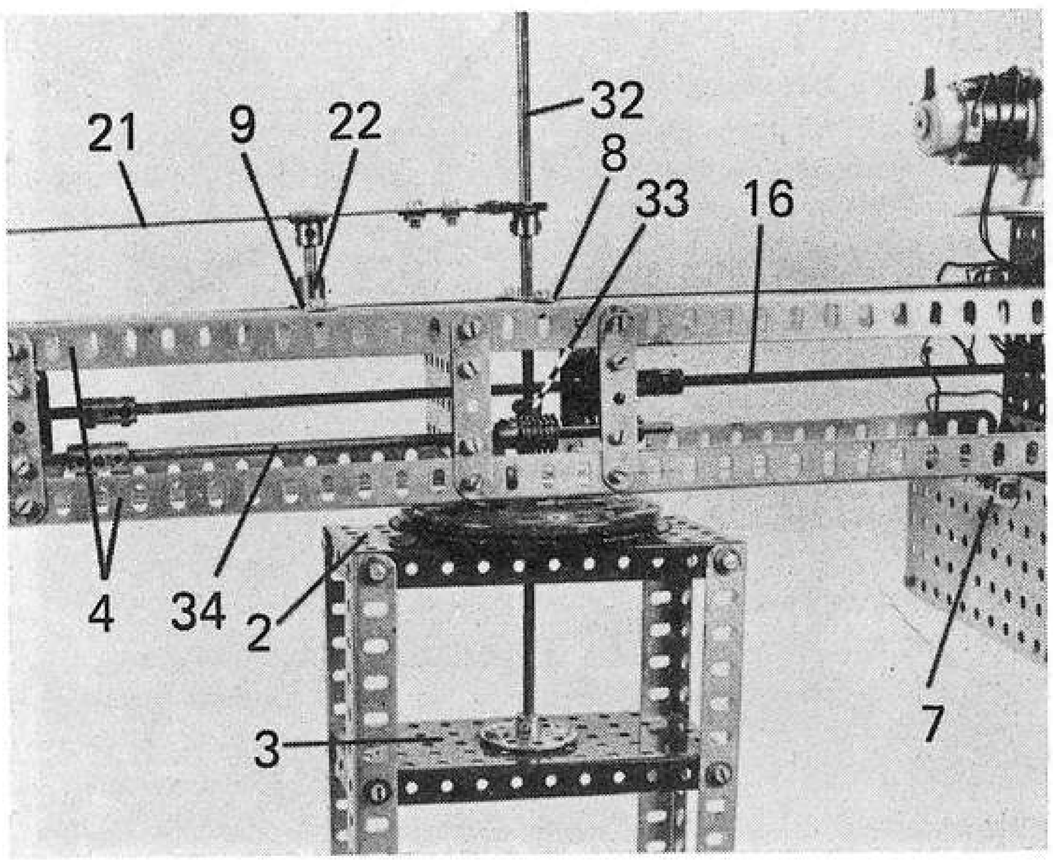
Described by "Spanner"



ONE OF THE most significant events in history must surely have been the discovery of the true relationship between the earth, sun and moon.

Today, it seems strange to think that, for many centuries, man believed the earth was flat and that the sun and moon were two light-sources which passed overhead, one during the day and one at night. We know the true situation, but it would have been a terribly difficult task persuading our ancestors not only that the earth was a globe around which the moon revoled, but that it was the earth, with the moon, which revolved around the sun! Imagine trying to explain even further that, as the earth revolved, it tilted on its axis and thus gave the four seasons of the year by moving the two halves of the earth alternately nearer to and further from the sun. Imagine, too, explaining that the moon was not actually a light-source after all, but a spherical planet illuminated by the sun – and it did not change shape every month, really; it was just partly illuminated!

Above, an overall view of the Meccano Orrery designed by William Gomme of Toronto, Canada. Below, a close-up view of the main beam/support tower connection.



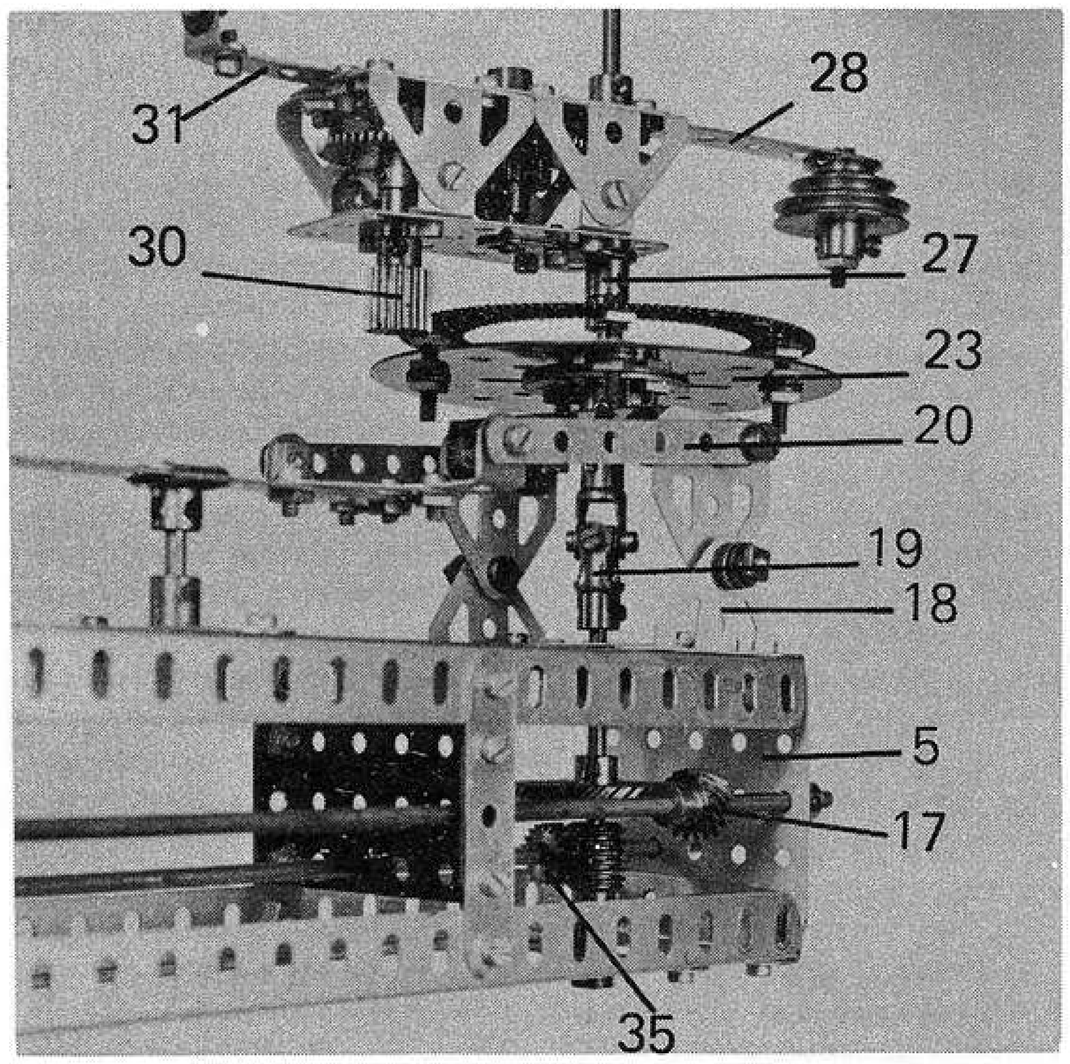
The fact is that anybody in those days would have found the truth almost impossible to grasp. Even today it can be a difficult subject to understand, but the modern world does at least have the benefit of the Orrery, i.e. a model which demonstrates the positions and movements of earth, moon and sun relative to each other.

Featured here is a Meccano Orrery built in slightly modified form from an original design supplied by Mr. William Gomme of Toronto, Canada. It reproduces the major movements of the moon around the earth and both the earth and moon around the sun and also includes the seasonal tilting of the earth. The changing phases of the moon are not directly indicated, however, but the theory is evident from the relative positions of the globes at any given time. We have altered Mr. Gomme's original gearing in one or two places to speed up sequence slightly, but the model as a whole is close to the original specifications.

CONSTRUCTION

Beginning construction with the support tower, a square base is simply built up from four 12½" Angle Girders bolted together at the corners. Two more 12½" Girders 1 are bolted between two opposite sides of the square, seven holes in from the corners, and to each of these, two vertical 12½" Angle Girders are bolted, 2½" apart. One of these Girders is braced by a 3" Strip secured through the fifth hole of the Girder and the eighth hole of the horizontal Girder. Fixed to the tops of the vertical Girders is a 5½" x 2½" Flanged Plate 2, another similar Plate 3 also being fixed to the Girders seven holes down. A Ball Thrust Race Toothed Disc is bolted to the top centre of the upper Flanged Plate, while an 8-hole Bush Wheel is secured to the top centre of the lower Plate.

Locating on the Toothed Disc – along with a Ball Cage, of course – is the Flanged Disc section of the Ball Thrust Race, this being bolted to the underside of the main beam of the model. The main beam itself, consists of four 24½" Angle Girders 4, the top two of which are joined at the ends by 2½" Angle Girders, as also are the lower two, then the upper and lower 2½" Girders are themselves



A low-level view of the earth/moon support assembly, including the Helical drive transmission system.

connected at one end of the beam by a 2½" x 2½" Flat Plate 5 and, at the other end, by a 3½" x 2½" Flanged Plate 6 projecting two holes upward. Lower Girders 4 are further connected three holes from Plate 6 by another 2½" Angle Girder 7, while upper Girders 4 are further connected by a 2½" Strip 8, bolted through their sixteenth holes, and two more 2½" Strips 9, bolted through their twenty-second and thirty-eighth holes. Four more 2½" Strips are secured in the positions shown, between upper and lower Girders 4 at each side and to each of these is bolted a 2½" x 1½" Flanged Plate which further serves to connect the two sides.

The upper flange of Plate 6 is now extended two additional holes by a 2½" x 2½" Flat Plate 10, while the lower flange is extended a similar two holes by a 2½" x 1½" Flanged Plate. Bolted between the outer edges of these Plates is a second 3½" x 2½" Flanged Plate 11 which together with Plate 6, serves as one of the gearbox support plates.

A 6-ratio Gearbox-and-Motor unit, set in the 3:1 ratio, is next secured to the top of Flat Plate 10. A 1" Pulley on the output shaft is linked by a 6" Driving Band to a 1½" Pulley 12 on a 2" Rod journalled in the upper row centre hole of Plates 6 and 11. Also fixed on this Rod, between the Plates, is a 7/16" Pinion which meshes with a 60-teeth Gear Wheel vertically beneath it on another 2" Rod. This Rod also carries a ½" Pinion, which in this case meshes with a 57-teeth Gear 13 off to the side on a further 2" Rod journalled in Plates 6 and 11. A 1" Gear on the same Rod meshes with a second 1" Gear 14 below it on a final 2" Rod, on the outside end of which a ½" x ¾" Pinion 15 is also fixed.

Pinion 15 meshes with a 3½" Gear Wheel on the end of an 8" Rod 16 journalled in Plates 6 and 11. This Rod is extended the full length of the main beam by another 8" Rod and an 11½" Rod, connected by Couplings and mounted in the 2½" x 1½" Flanged Plates joining the sides of the beam and in Flat Plate 5. Mounted on the Rod between this Flat Plate and the nearby Flanged Plate is a ½" Helical Gear 17, which meshes with a 1½" Helical Gear on a vertical 3½" Rod journalled in two 2½" Strips bolted to upper and lower Girders 4 of the beam. Note that the bolts securing the upper Strip also fix two Trunnions 18 to the Girders, and that a Universal Coupling 19 is secured on the upper end of the 3½" Rod.

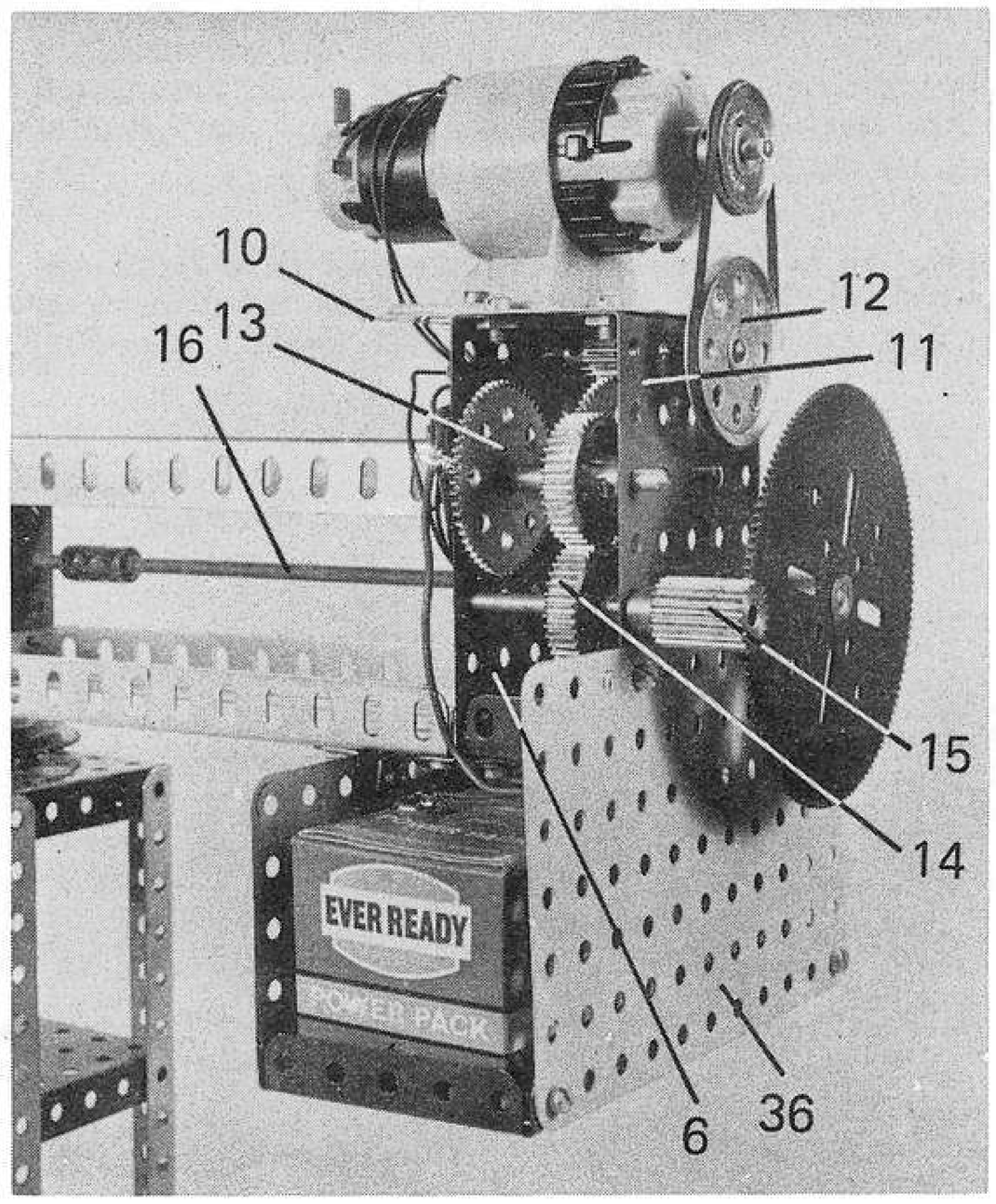
Pivotally connected to the apexes of the Trunnions by Pivot Bolts, suitably packed with Washers, are two Flat Trunnions which are, in turn, secured by their bases to the flanges of a 2½" x 1½" Flanged Plate. Locked in the base centre holes of these Flat Trunnions and in the corresponding holes of the Plate flanges are two more Pivot Bolts on which two 3" Narrow Strips 20 are carried. The free ends of these Strips are lock-nutted to the lugs of a 2½" x ½" Double Angle Strip, to the back of which a Flat Trunnion, extended by a 12½" Strip 21, is bolted. Strip 21 slides in two Slide Pieces, fixed on 1" Rods which are held in Threaded Bosses 22 bolted to Strips 9 in the main beam. A Single-throw Eccentric is bolted to the end of Strip 21.

EARTH AND MOON

The earth/moon support assembly is now built up from a 8-hole Bush Wheel, to which a 4" Circular Plate 23 is bolted. Secured in turn to this Plate by ¾" Bolts is a Gear Ring 24, the Gear Ring being locked by Nuts on the shanks of the Bolts so that it is spaced approximately 5/16" from the Plate.

Tightly fixed on the boss of the Bush Wheel is a 6½" Rod on which a Collar 25 is secured. This Collar acts as the lower stop for the moon assembly which is constructed from two 3" x 1½" Flat Plates 26 connected together by four Trunnions (attached to the upper Plate)

The Orrery is driven by a Motor-with-Gearbox, mounted on top of the main gearbox as shown here. Note that the batteries (two Ever Ready PP1's wired in series) for the motor also serve as the main beam counterweight.



bolted to the lugs of two 1½" x ½" Double Angle Strips (attached to the lower Plate). Two Cranks 27 are bolted, one to each Plate, their bosses coinciding with the end row centre holes of the Plates and thus serving as bearings for the 6½" Rod which passes through them. Note that the Cranks are free on the Rod and note also that the Bolt fixing the upper Crank to Plate 26 also fixes a 3½" Strip 28 in position projecting five holes beyond the edge of the Plate. A Cone Pulley is secured to the end of the Strip to serve as a counterweight.

Mounted on the 6½" Rod, between Plates 26, is a ¾" Pinion 29, which meshes with a 50-teeth Gear Wheel on a 1½" Rod held in Plates 26. Fixed on the same Rod is a second ¾" Pinion, this meshing with a second 50-teeth Gear on a 2" Rod journalled in the Plates. Fixed on the lower end of this Rod, beneath the Plates, is a ½" x ½" Pinion 30 which meshes with the outer teeth of Gear Ring 24.

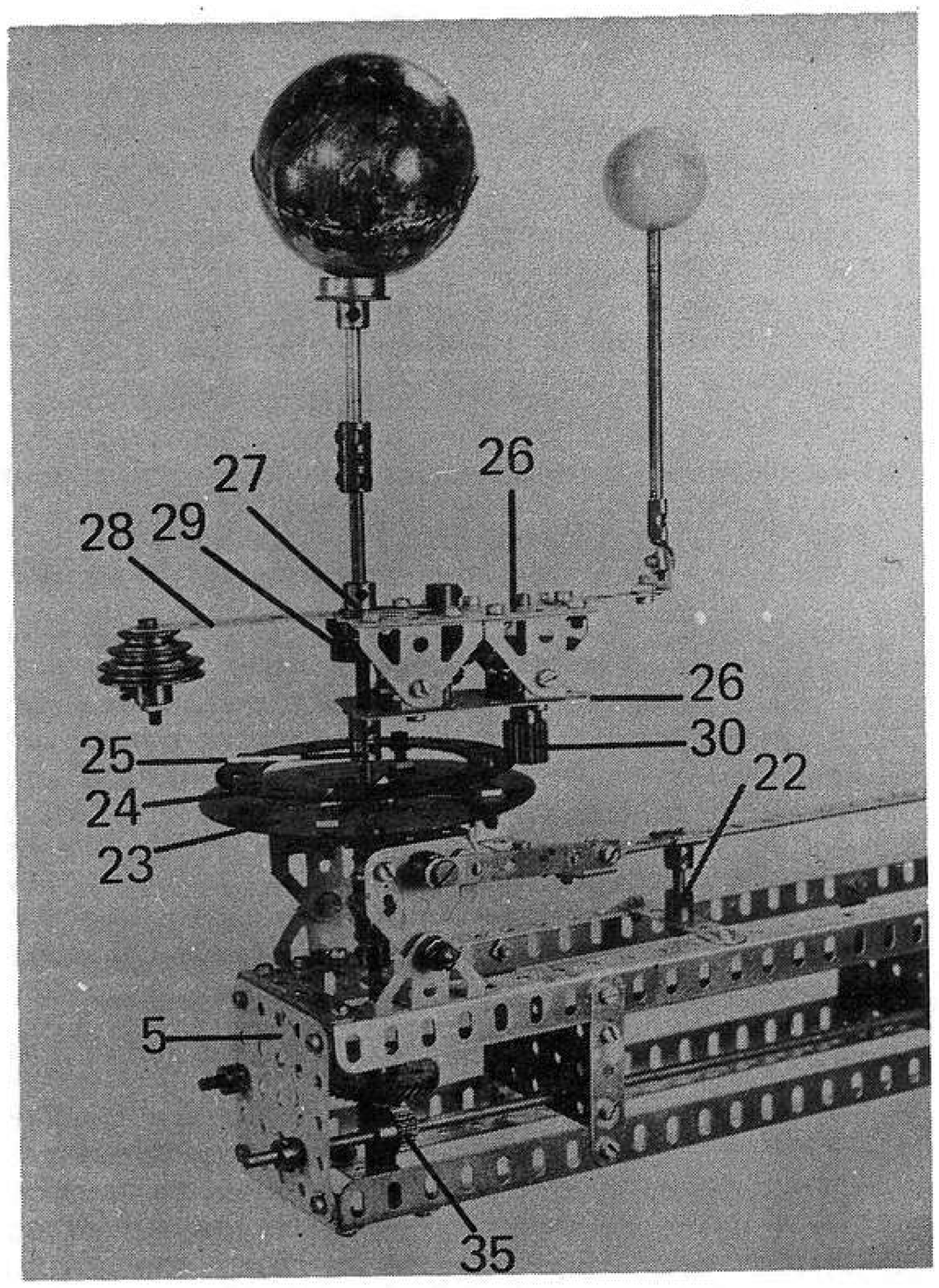
The moon on our model is supplied by a small wooden ball wedged on a 4" Rod, the lower end of which is held in a Rod and Strip Connector attached by an Angle Bracket to a 1½" Strip 31 bolted to upper Flat Plate 26. The earth is represented by a somewhat larger rubber ball, suitably painted and wedged on a 3" Rod connected to the 6½" Rod of the support assembly by a Coupling. A ¾" Flanged Wheel on the Rod provides additional support for the ball. The lower end of the 6½" Rod is passed through the centre hole in the Flanged Plate carrying Narrow Strips 20 and is tightly fixed in the upper section of Universal Coupling 19.

The sun is also supplied by a rubber ball – larger than the earth-ball and painted yellow – wedged on a 4½" Screwed Rod which is connected by a Threaded Coupling to an 11½" Rod 32. This Rod is fixed in the boss of the Eccentric bolted to Strip 21 and passes down through the centre holes of Strip 8, the Ball Thrust Race and Flanged Plate 2, being finally fixed in the boss of the 8-hole Bush Wheel bolted to the centre of Flanged Plate 3. Secured on the Rod, above the Ball Thrust Race, is a ½" Pinion 33, which meshes with a Worm on a 8" Rod 34 journalled in two of the Flanged Plates joining the sides of the main beam. This Rod is extended, with a Coupling, by an 11½" Rod journalled in the remaining Flanged Plates of the beam and in Flat Plate 5. A ½" Pinion 35 is fixed on the Rod to mesh with a second Worm mounted on the vertical Rod carrying Universal Coupling 19. This linkage provides drive for the rotary motion of the main beam on its support tower.

ELECTRICS

This leaves only the electricity source to be provided and the model is finished. In his original model, Mr. Gomme used an external power source which was fed to the motor through a built-up commutator at the top of the support tower. To simplify matters, however, we used a built-in power source in the form of two PP1 batteries carried in a tray slung beneath the main beam of the model. The tray is supplied by a 5½" x 2½" Flanged Plate, to the side flanges of which one 5½" x 3½" Flat Plate 36 and one 5½" x 2½" Flat Plate are bolted. Plate 36 is secured to Flanged Plate 11 in the beam, while the other Plate is secured to a 2½" Angle Girder bolted to lower Girders 4 in the beam.

The batteries, with their tray, act as a counterweight for the earth/moon construction at the opposite end of the main beam. Note, therefore, that if the battery-drive system is not used, another suitable counterweight must be provided.



The complete earth/moon assembly set up ready for operation. Note the Cone Pulley which serves as a counterweight for the moon drive gearing.

PARTS REQUIRED

1 – 1	2 – 18b	141 – 37b	1 – 80b
1 – 3	1 – 20b	40 – 38	6 – 111
2 – 4	1 – 21	2 – 38d	1 – 111d
13 – 5	1 – 22	2 – 48	1 – 123
1 – 6a	2 – 24	1 – 48a	6 – 126
4 – 7	2 – 25	2 – 50	3 – 126a
10 – 8	2 – 26	6 – 51	1 – 130a
4 – 9d	1 – 26a	3 – 52	1 – 140
1 – 12	1 – 26b	1 – 52a	1 – 146a
3 – 13	1 – 26c	2 – 53	2 – 147b
3 – 13a	3 – 27	11 – 59	1 – 168
1 – 15	1 – 27a	2 – 62	2 – 179
2 – 15a	1 – 27b	4 – 63	1 – 180
1 – 16	1 – 27d	1 – 63c	1 – 186a
1 – 16a	2 – 31	1 – 70	1 – 211a
6 – 17	2 – 32	2 – 72	1 – 211b
1 – 18a	164 – 37a	2 – 73	1 – 212
			2 – 235a

1 Motor with Gearbox

2 PP1 Batteries

COLLECTORS' CORNER

by B. N. Love

SINCE COLLECTORS' CORNER is to be a regular feature of the new MMQ, readers may like to have some idea of what will be covered in future articles under this heading. Generally speaking, interesting items from Meccano history will be illustrated and described and these will include items such as the pre-war Meccano Steam Engine, the Motor Car Constructor Outfits and the Aeroplane Constructor Outfits. In this first article we will have a look at what is probably the most "glamorous" of all the obsolete Meccano spare parts – namely the Geared Roller Bearing, Part No. 167.

Most of the older generation of Meccano enthusiasts will be familiar with its general outlines, illustrated in Fig. 1. Introduced in 1928, Part 167 was described on page 684 of the Meccano Magazine for August 1928. It comprised the following units; two Roller Races, each 12" diameter and dished to form a rim near their peripheries; one Ring Frame, 10" dia.; one special Pinion, 16 teeth; sixteen ¾" Flanged Wheels; sixteen Pivot Bolts and Nuts; two Bush Wheels; one 9½" Strip (for centring the Ring Frame); one 1½" Axle Rod and ten Nuts & Bolts. The whole Geared Roller Bearing – familiarly called a G.R.B. – was offered in a strong cardboard box carrying a large reproduction picture of itself on the lid and was priced at £1. This may make younger readers gasp, but one must bear in mind that, in 1928, twenty shillings was a full week's wages for a labourer!

The G.R.B. was a major departure in the manufacture of Meccano parts, if only for its sheer physical size. Most Meccano parts, are known as pressings, since the raw material, which is mild steel strip, supplied in rolls, is fed to a power press which performs three operations. These are known as blanking, forming and punching. Blanking, as the name implies, consists of stamping out the

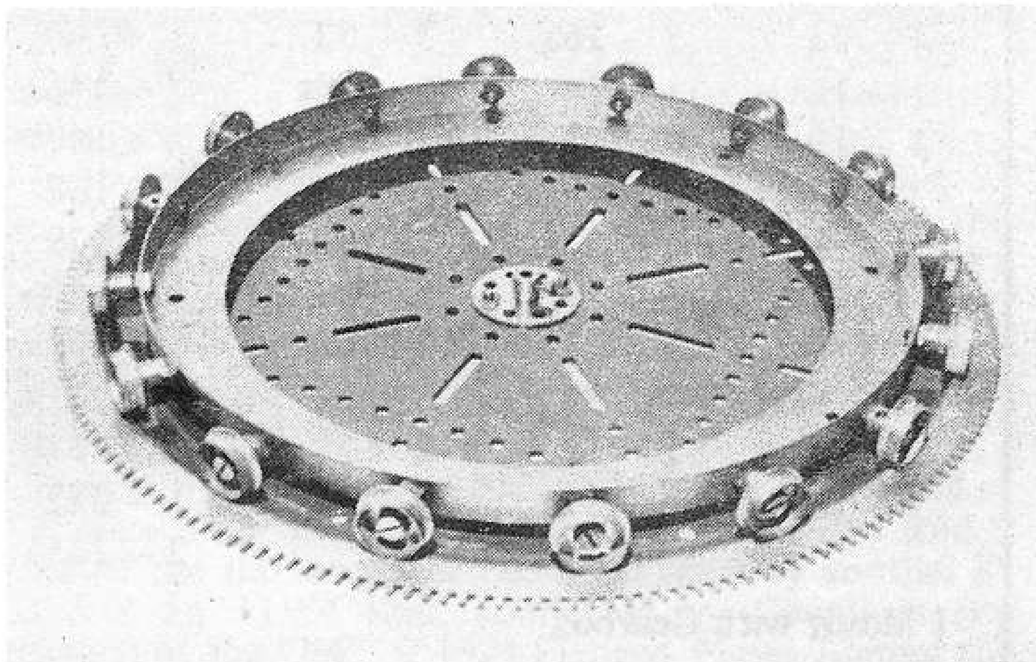


Fig. 2. The Geared Roller Bearing with the upper toothed race removed to show a Bush Wheel centring device.

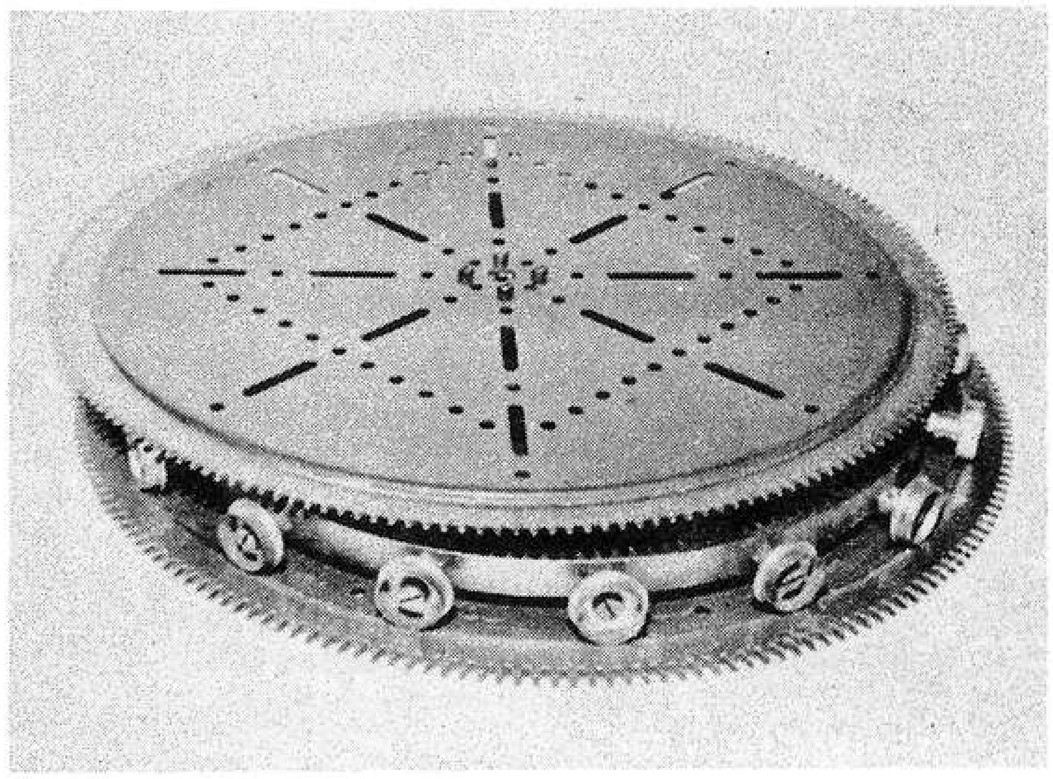


Fig. 1. One of the most famous Meccano Parts in history, the long-obsolete Geared Roller Bearing. Part No. 167.

general overall shape of the part. In the forming process, any flanges, grooves or bends are impressed on the blank which is then punched with the necessary holes or slots etc. If a part is small enough and of light gauge material, all three operations can be performed by one pair of mating press tools in one operation, or where strip steel is fed in, successive tools can carry out the three operations for continuous production. However, Part No. 167, the G.R.B., was made of a heavy gauge material. 0.055 in. gauge steel and, with a blank slightly in excess of 12 in. before finish, a very heavy and expensive press was required to make these "one off" spare parts.

As might be expected, the 167 was the highest priced Meccano spare, but at £1 it represented very good value during the twelve years of its production, during which time the price remained constant. Nonetheless, in the pre-war days of low wages and large families, very few boys were ever lucky enough to have such a treasure and it was generally the older enthusiast who had a G.R.B. in his collection of Meccano. Even the top sets of the period – the No. 7 of the early thirties and the 'L' outfit of the mid thirties – did not include the 167. As a result of this, a production run of 500 G.R.B's would have supplied most of the factory's orders for a period of several years. Consequently the Geared Roller Bearing does not turn up very frequently in boxes of old Meccano, but, because of their rugged design, G.R.B's have a high rate of survival and they re-circulate through the enthusiast fraternity quite frequently.

Basically, the 167 consists of two identical toothed discs known as geared, or toothed, roller races, each one having 192 teeth. These are quite different in form from any other type of teeth on Meccano parts and, as can be seen from the close-up in Fig. 3, the teeth tend to be very 'spiky'. The special Pinion with 16 large teeth also departed from the true tooth form which should be of involute curve profile. However, the meshing was satisfactory for model purposes.

Older hands may be horrified at any criticism of the hallowed "G.R.B." but it did have some poor design aspects. Although the dished toothed races permitted the Flanged Wheels to provide a degree of self-centring, smooth-running required the location of the three main parts of the G.R.B. by means of an Axle Rod at the centre passing through two Bush Wheels and a 9½" Strip. This meant that, if the same axle was used to pass on a

drive through the centre of the roller bearing, it was subject to the rubbing friction of the rotating roller races. Lack of centre access also made it very difficult to arrange electric supply leads passing up through the bearing which meant that the modeller was often left with a trailing lead to the superstructure which had to be carried round bodily by it. Suggestions do arise, from time to time, advocating the use of brass tubing and other plumbers' hardware bolted through enlarged holes in the centre of the toothed races, but this is hardly Meccano modelling! One major advantage of the old 167, however, was the sturdy nature of the toothed discs with their multiple holes and slots which made it very easy to attach superstructure.

Considering the original stable price of the 167, it was still very good value, but constructors who do not possess a G.R.B. may take heart in the knowledge that superior roller bearings can be built from current Meccano parts, thanks to the new Large Toothed Quadrant and the new 167c Pinion which meshes both with the new Quadrants and with the old G.R.B. races. There are several designs of excellent roller bearings in the author's two Meccano books, "Model Building in Meccano. . " and "Meccano Constructor's Guide", with all the advantages of self-centring, and auxiliary gearing.

If an original 167 comes the way of an enthusiast, it should be very carefully examined before purchase, or certainly before use. It is important that all three main sections are in no way distorted, otherwise the bearings will not run true, or smoothly. Beware of the Flanged Wheels. Special flanges were designed for the original 167 and oversize Flanged Wheels provided. If you have an "odd" set of Flanged Wheels, you will again be in

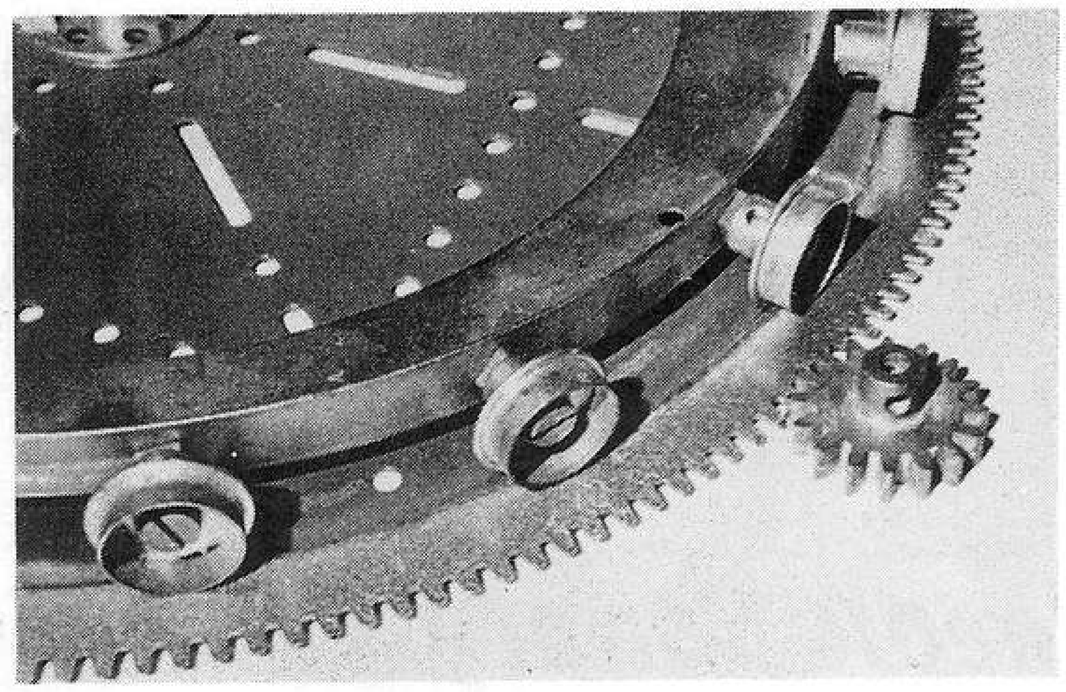


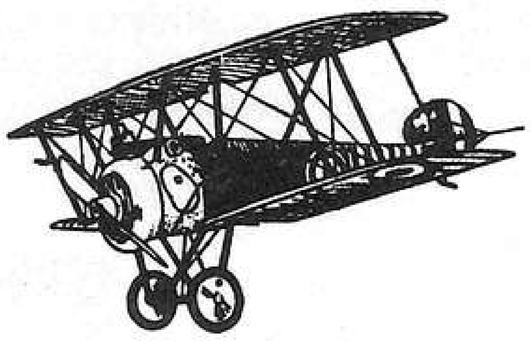
Fig. 3. A close-up of the G.R.B. tooth form showing its "spiky" profile which contrasts with the normal involute curved teeth found in engineering practice.

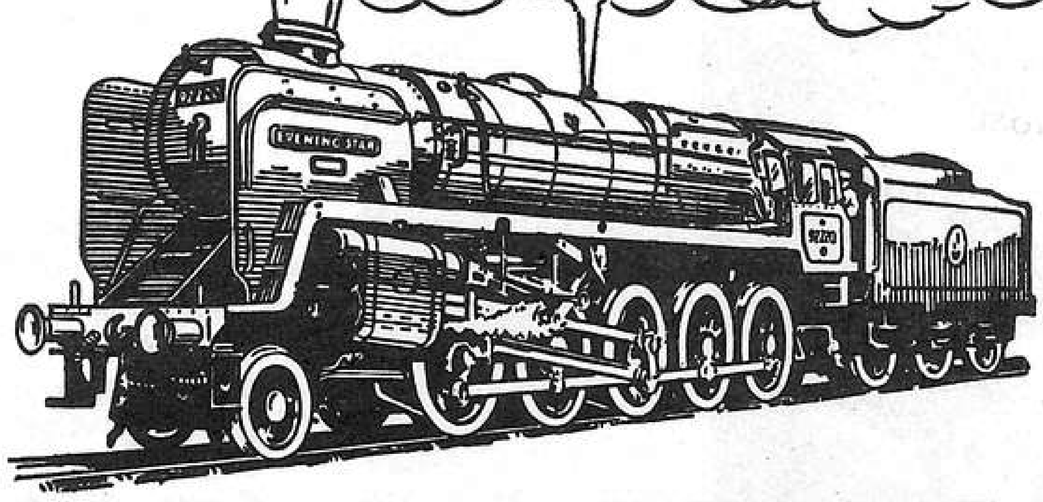
trouble. If a pair of toothed races in good condition can be found, the Ring Frame, Part No. 167b can still be bought today as can be Pivot Bolts with Nuts and Flanged Wheels. So long as they all match up, and run true, then a 167 can be put together from its component parts.

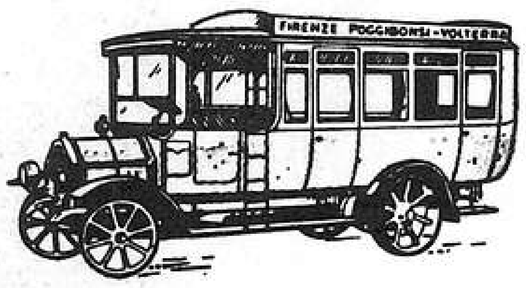
The pre-war G.R.B's came in various colours, the 1928 original being sprayed with grey enamel, the toothed edges of the races being nickelled. Later production runs in the 30's had various combinations of reds, greens and golds.

There we are, then – a glimpse at an old favourite – nice to have and to handle, but by no means essential.

BEATTIES







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SEE THE COMPLETE RANGE OF MECCANO SPARE PARTS AND SETS AT ANY BEATTIE SHOP ALL THE YEAR ROUND.

MECCANO® MULTIKITS

Revolutionary Extension to Meccano System!

WHENEVER A TOY MANUFACTURER has a new product in the pipeline, he will, if at all possible, release the first news of it at the big International Toy Trade Fairs held at the beginning of each year. Britain's biggest Fair takes place each January at Brighton, Sussex, and, this year, Meccano Limited unveiled there two brand new items which have already caused excited comment among Trade members – MECCANO MULTIKITS.

Multikits are this year's big news items for Meccano. In the words of company Marketing Director, Mr. Doug. McHard, "They represent probably the greatest single advance in Meccano thinking since the war and change the whole visual concept of Meccano modelling". To this, we would ourselves add that they are vitally important additions to the existing Meccano system which will bring the pleasures of Meccano to countless numbers of prospective young enthusiasts, at present unaware of the enjoyment to be obtained from the hobby.

What, then, are Multikits and why are they so significant?

In general terms Multikits are two new Meccano Sets which, like any other Meccano set, contain a selection of predominantly steel components designed to build up into a variety of different models. Unlike existing outfits, however, the Multikit models are all based on one or other of two distinct themes: either military vehicles and equipment, or road construction and operation. The military vehicles are built with one kit – the ARMY MULTIKIT – and the road vehicles are built with the other kit, aptly identified as the HIGHWAY MULTIKIT.

Beyond any shadow of doubt, the Multikit models are outstandingly realistic in appearance, looking more like ready-made toys than built-up constructions. Some of the military models even include spring-loaded guns which fire small plastic shells, yet both kits still consist of 95% existing Meccano parts. The remarkable visual effect has been achieved by four important means: (i) the introduction of a realistic formed-steel, take-apart cab with moulded windows and interior, (ii) the production of new, chunky roadwheels (iii) uniform, all-over colour-schemes – yellow with red cab for the Highway Multikit and olive green for

MECCANO MULTIKITS – "The greatest single advance in Meccano thinking since the war". Opposite page: putting the finishing touches to the Jumbo Crane, built with the Highway Multikit. Note the step-by-step photographs in the instructions book. Left: the Army Multikit, with two of the models which can be built from it – a Heavy Tank and a Load Carrier.

the Army – and (iv) sets of colourful, re-usable, self-adhesive stickers in vinyl to add the finishing touch to completed models. In addition, while retaining the existing thread form, the square nuts used since the inception of Meccano have been replaced by up-to-date hexagonal nuts which, together with the bolts, are black for the Army Multikit and brass-finished for the Highway Multikit.

It is interesting at this point to look at the reasons for these particular innovations. People with no personal experience of Meccano tend to criticise a Meccano-built truck or wheeled vehicle for a certain lack of visual realism. Research has shown that the main reasons for this centre round unrealistic wheels, cabs built up from a myriad of small components and the general camouflage effect caused by the mixture of different-coloured standard parts in any particular model. The new pressed-steel cab and new wheels dispose of the first two objections and the uniform colour-schemes effectively harden-up the outline of the models, making them appear remarkably solid and real. The vinyl stickers, which have an international flavour, increase this effect. The cab, incidentally, follows true Meccano tradition by itself breaking down into several separate components – upper and lower body sections, radiator-grille and bumper, window moulding, seat moulding and steering wheel.

NEW MODEL BOOKS

Specially produced for the Multikits are two brand new Books of Models which Meccano historians will mark as another "first" in company instructions literature. The suggested models featured are described, not by written building instructions, nor by "exploded" diagrams, but by means of abundant full-colour photographs covering the whole sequence of assembly in step-by-step detail. The Books are so attractive, in fact, that they serve as a selling-point in their own right, making a young modeller impatient to sit down and start building!

Ten suggested constructions are featured in the Army Book of Models, including two tanks, an armoured car, a field gun and limber, a searchlight, a half track, an anti-aircraft gun, a load carrier, an ambulance and a missile launcher. (Only one model can be built at a time, of course). In the Highway Book, eight suggested models are included, namely a jumbo crane, a breakdown wagon, an overhead inspection vehicle, a cattle truck, two tipping wagons, a road grader and a concrete-mixing wagon. None of the models is difficult to build, thanks to the progressive nature of the step-by-step photographs and, when built, all the models can be used for play – which is the important thing for the young modellers at whom the kits are aimed.

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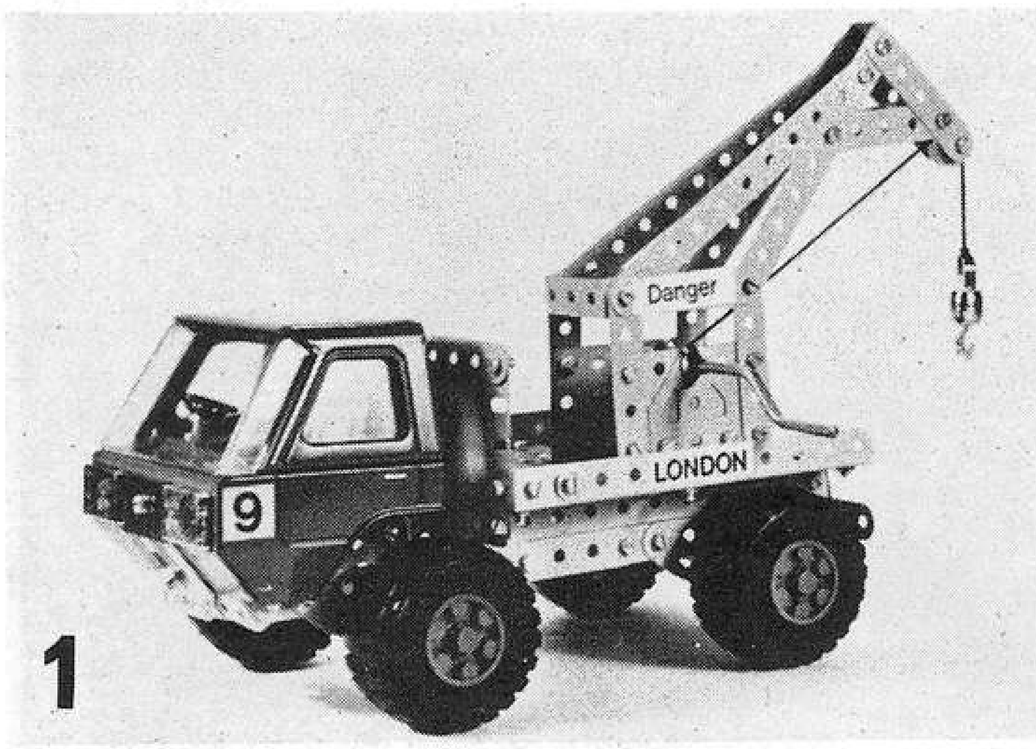

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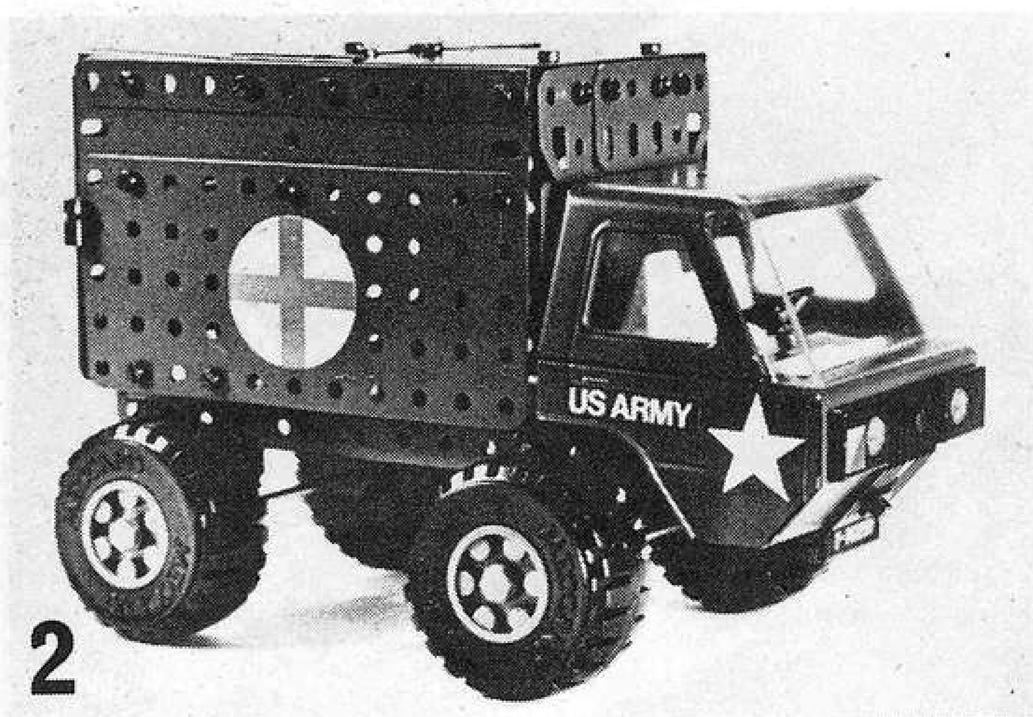

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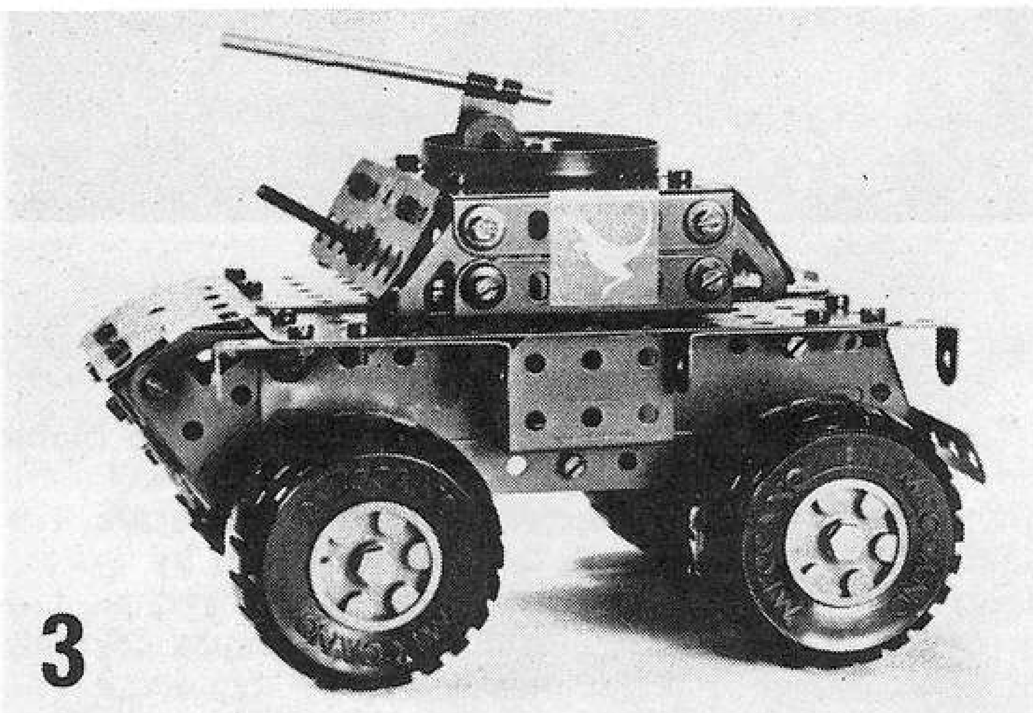

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MULTIKITS – *continued*

YOUNG APPEAL

This, in fact, brings us to the significance of Multikits, generally, and their importance to the Meccano system as a whole. To remain a viable product Meccano must continue to sell in worthwhile quantities and the largest prospective market is, of course, the younger market. Traditionally, however, Meccano is primarily an adult purchase, i.e. a father will buy it for his son, not necessarily because his son asks for it, but because he, himself, had Meccano as a child and he therefore knows its value as a hobby medium. Indeed, we know from detailed research that children with no previous Meccano experience are quite likely to be unattracted by Meccano: the immediate visual impact is insufficient to appeal to them. The same research, however, has proved beyond doubt that, once those children actually *try* Meccano, their interest is caught and held to a much greater extent than with most other toys, even those which might have initially attracted them where Meccano did not. The problem, therefore, lies in getting Meccano into the hands of the "uninitiated".

In years gone by – and even today – this initial sales barrier has been overcome for us by parents themselves, the vast majority of whom grew up with Meccano and instinctively regarded it as a necessary present for their sons. In the future, however, second and third generation parents will be coming along and not all of these will have the same knowledge of Meccano as in the past. Thus, we may not be able to rely on parental experience and so we must try to, in a sense, by-pass the parent and make Meccano appeal directly to the child. Multikits are designed to do precisely this; to attract the child so that he asks his parents for a kit rather than having it bought for him when, having no previous experience, he might not have any great personal interest in it. Once he has tried it, we know he will be happy with Meccano, provided, of course, he has a mechanical aptitude, as has always been the case.

Multikits, then, are an introduction to, and an extension of, the Meccano system. They are NOT designed to replace any part of it, nor are they intended to reflect on the serious hobby capabilities of the system. They are, in short, an insurance policy for the hobby's future.

POSTSCRIPT

It is possible – although not definite at this stage – that the new hexagonal nuts included in the Multikits will be added to the standard Meccano system in due course. The Multikits, themselves, should be on general sale during May, although there are no plans at present to make spare Multikit parts available for separate sale. As to prices, the Highway Kit is provisionally scheduled to retail in the U.K. at a recommended price of £4.75, with the larger Army Kit selling at £5.45.

1. **Breakdown Truck from the Highway Multikit.**
2. **Military Ambulance from the Army Multikit.**
3. **Armoured Car from the Army Multikit.**
4. **Photographed at the Nuremburg Toy Fair, West Germany, Mr. H. J. Fallmann (right), Managing Director of Meccano Limited, showing a Multikit Manual to Mr. Norman Statham, the British Minister (Economics) at Bonn when he visited the Meccano Stand at the Toy Fair.**

AMONG THE MODEL BUILDERS

with "Spanner"

I COULD, with no trouble at all, devote the whole of this article to a description of my boundless delight at the appearance of the MMQ – and my gratitude to all those people who have made it possible. This must be taken as read, however, as the purpose of this feature is to bring you model-building ideas from fellow enthusiasts; not to use up valuable space with my own sentimental feelings, however sincere they are. Simply let me say that I am delighted and grateful (which I certainly am!) and I will now get down to business.

MOTOR GOVERNOR

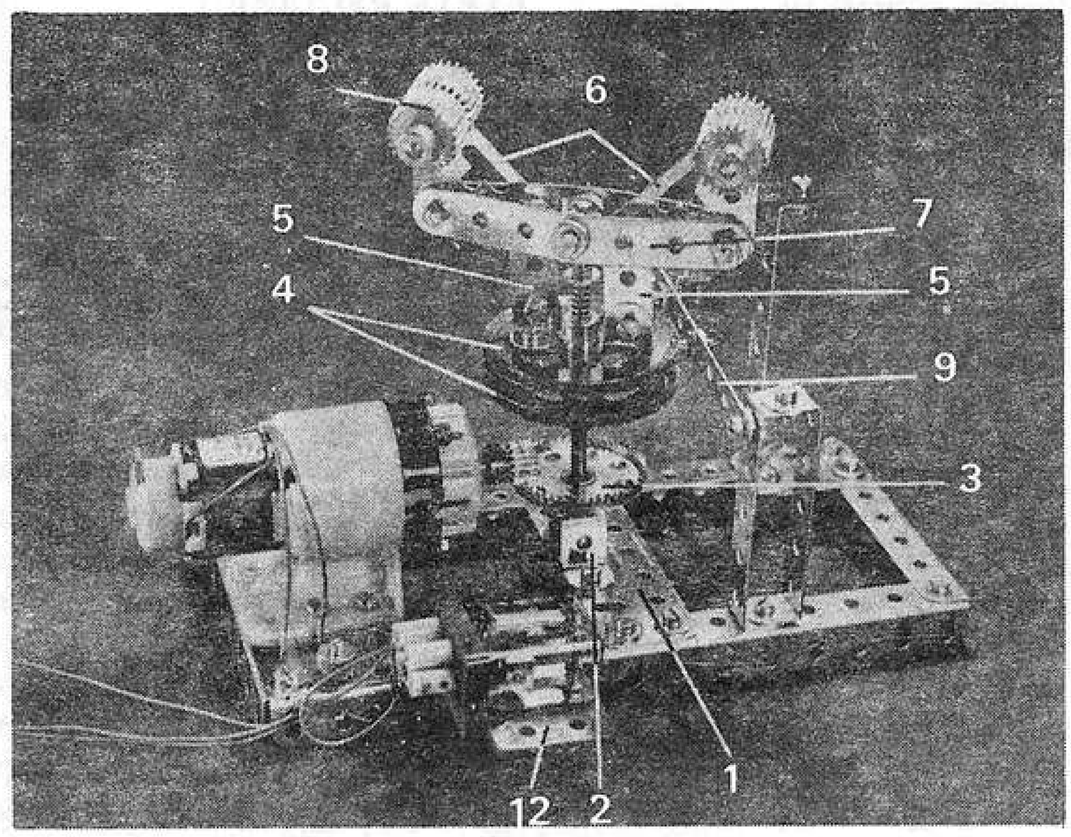
I received a letter towards the end of last year from a gentleman asking if we had any details of a speed governing mechanism he could use with his Meccano Motor. To the best of my knowledge we had no such details, and so I replied that unfortunately I could not help. Several weeks later, however, I was glancing through some early editions of the MM when, quite by accident, I spotted a mechanism which, if it was brought up to date, would very likely meet the bill. The trouble was I no longer had a record of my correspondent's name or address! (Here I was with the answer to the problem – but with nobody to give it to!) I determined there and then to rebuild the governor and publish it in the first edition of the MMQ, not only in the hope that my correspondent would see it, but also because it is an interesting mechanism which could be of use to many modellers. As can be seen from the accompanying photograph, this is precisely what I have done.

The base is supplied by two 7½" Angle Girders connected at the ends by 3½" Angle Girders and, centrally, by a 3½" Flat Girder 1. Secured to the centre of this Flat Girder is a Double Arm Crank overlayed by a Double Bent Strip 2, the boss of the Crank and the centre hole of the Bent Strip providing bearings for a vertical 4½" Rod held in place by a Collar beneath the Flat Girder. Fixed on the Rod above the Bent Strip is a 1½" Contrate Wheel 3, which receives the drive from the chosen motor. We used a 3-12 volt Motor-with-Gearbox, carrying a 7/16" Pinion on the output shaft and mounted on another 3½" Flat Girder bolted to the base 7½" Angle Girders.

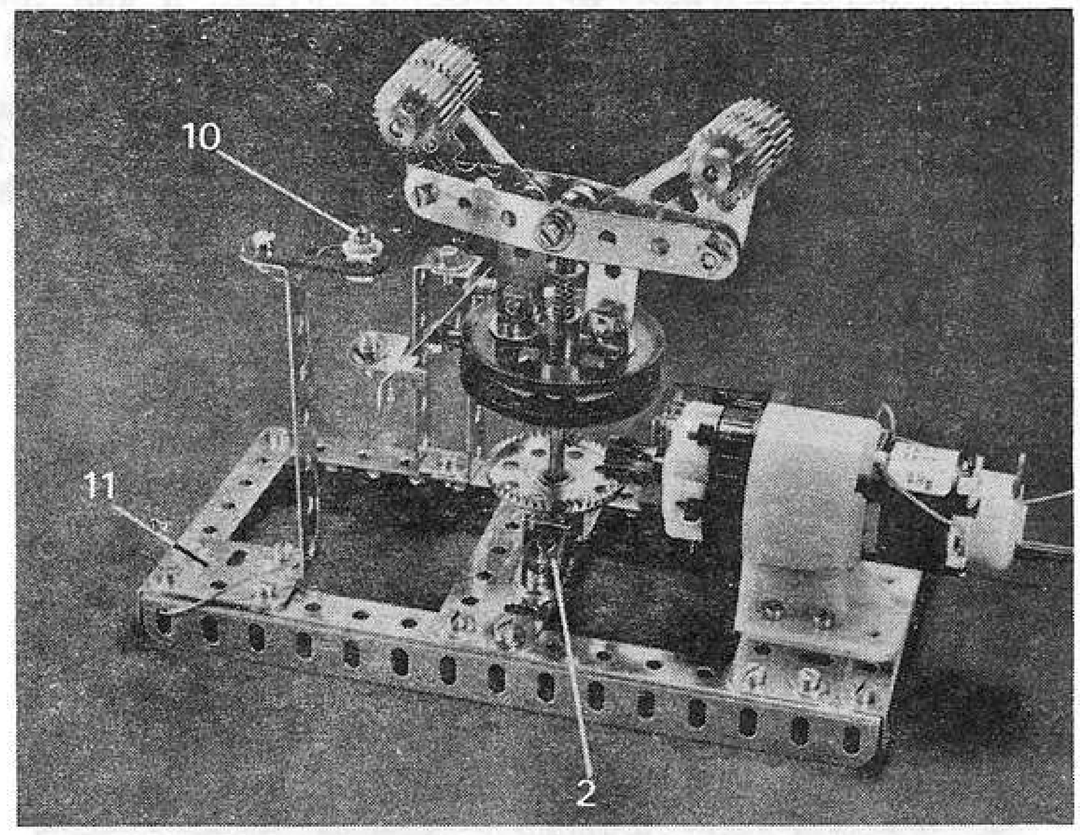
Also fixed on the vertical Rod are two 2" Pulleys 4 firmly fixed together by ½" Bolts, but separated from each other a distance of just under ¼" by Nuts on the Bolt shanks. The securing Bolts also fix two Angle Brackets in place and lock-nutted to the vertical lugs of these are two 1½" Strips 5. The upper ends of these Strips are in turn lock-nutted to 1½" Corner Brackets 6 which are themselves lock-nutted between two horizontal 3½" Strips 7 tightly fixed by 3/8" Bolts screwed into the transverse bores of a Collar secured on the upper end of the 4½" vertical Rod. Each Bolt carries five Washers, two between the Bolthead and the Strip and three between the Strip and the Collar. Note that two Compression Springs separated by another Washer, are carried on the Rod between the Collar and the boss of upper Pulley 4 and that a Collar on the Rod beneath the lower Pulley acts as a lower stop for the assembly. Two weights 8 – each supplied by two ¾" x ½" Pinions on a 1½" Rod – are mounted in the upper corner holes of Corner Brackets 6.

Two inter-connected 2½" x ½" Double Angle Strips are bolted to one 7½" base Girder and to one of these is lock-nutted a 3½" Narrow Strip 9, carrying a Threaded Pin in its centre hole. This pin engages between Pulley 4, Attached to the Strip through its second hole from the free end is an Angle Bracket, to the free lug of which a Contact Screw is secured. When the governor is operating this Screw makes contact with a Contact Stud 10, at one end of a 1½" Insulating Strip bolted to a 3½" x ½" Double Angle Strip fixed to a 1½" Flat Girder 11 which is in turn fixed to the base framework as shown.

Unlike the designer of the original pre-war mechanism, we have been able to take advantage of the Electronic Parts in the current Meccano system – notably the Relay, Part No. 606. The Relay 12 is bolted to one base Girder and is wired so that,



A Centrifugal Governor for limiting the speed of a Meccano Motor. Based on a pre-war mechanism, it has been modernised with Electronic Parts.



Another view of the Governor. The unit could be useful to many modellers, but it should be ideal for one particular reader! (see text).

when the Contact Screw touches Contact Stud 10, the motor is switched off until the Screw breaks contact with the Stud, when the motor starts again, and so on. In wiring the model, the Miniature Plugs (Part No. 612) included in the Electronic Set should be used with the Relay. The wiring is arranged as follows using insulated wire throughout:

Socket 1 connected to Socket 3 and to first terminal of power source.

Socket 2 earthed to metal of model.

Socket 5 connected to one motor lead

Other motor lead connected to second terminal of power source.

Second terminal of power source also connected to Contact Stud 10.

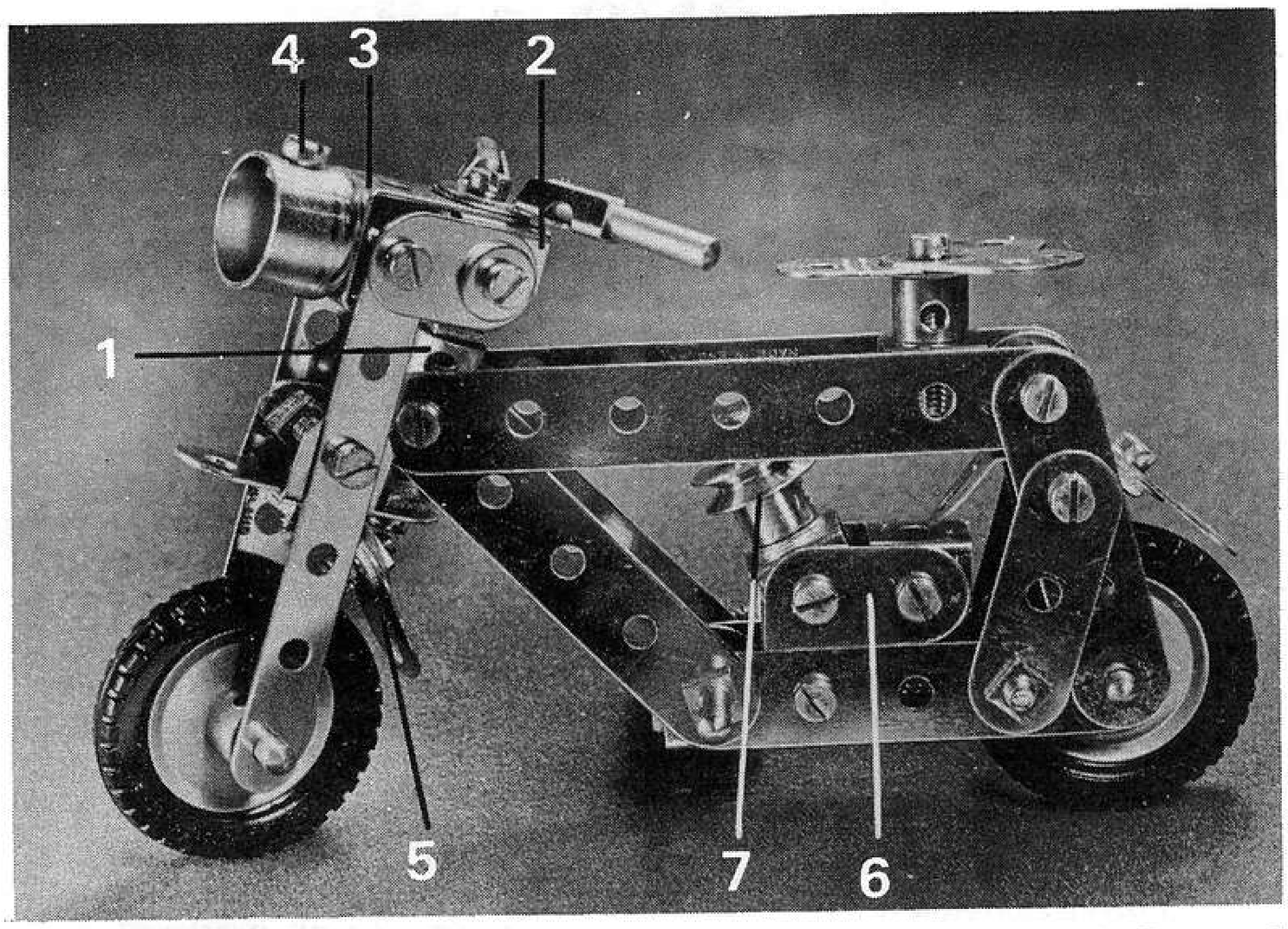
(Since writing the above I have discovered that the original mechanism was also featured in the pre-war Standard Mechanism Manual).

PARTS REQUIRED

2 - 3	1 - 25c	1 - 62b	1 - 542
2 - 6a	1 - 28	2 - 103d	1 - 543
2 - 8b	49 - 37a	1 - 103h	1 - 544
2 - 9b	31 - 37b	4 - 111a	1 - 606
3 - 12	24 - 38	3 - 111c	6 - 612
1 - 15a	1 - 45	1 - 115	
2 - 18a	2 - 48a	2 - 120b	Motor-with-Gearbox
2 - 20a	1 - 48b	2 - 133	
4 - 25a	3 - 59	1 - 235b	

AUSTRALIAN MINI BIKE

In no way a complex mechanism, but nonetheless perfectly delightful in its own way is the miniature motor cycle reproduced here. Copied from an original design by Mr. Desmond White of East Bendigo, Victoria, Australia, the model is remarkably realistic considering the small number of parts it uses and – quite frankly – it has captured my simplicity-model-loving heart!



This delightful "simplicity" model Motor Cycle was designed by Mr. Desmond White of East Bendigo, Victoria, Australia.

Each side of the frame is built up from one 3½", one 2" and two 2½" Strips, bolted together as shown and at the same time fixing the two sides of the frame together with Double Brackets and a Coupling 1, the latter secured by Bolts fitted with Nuts and screwed into its centre transverse bores.

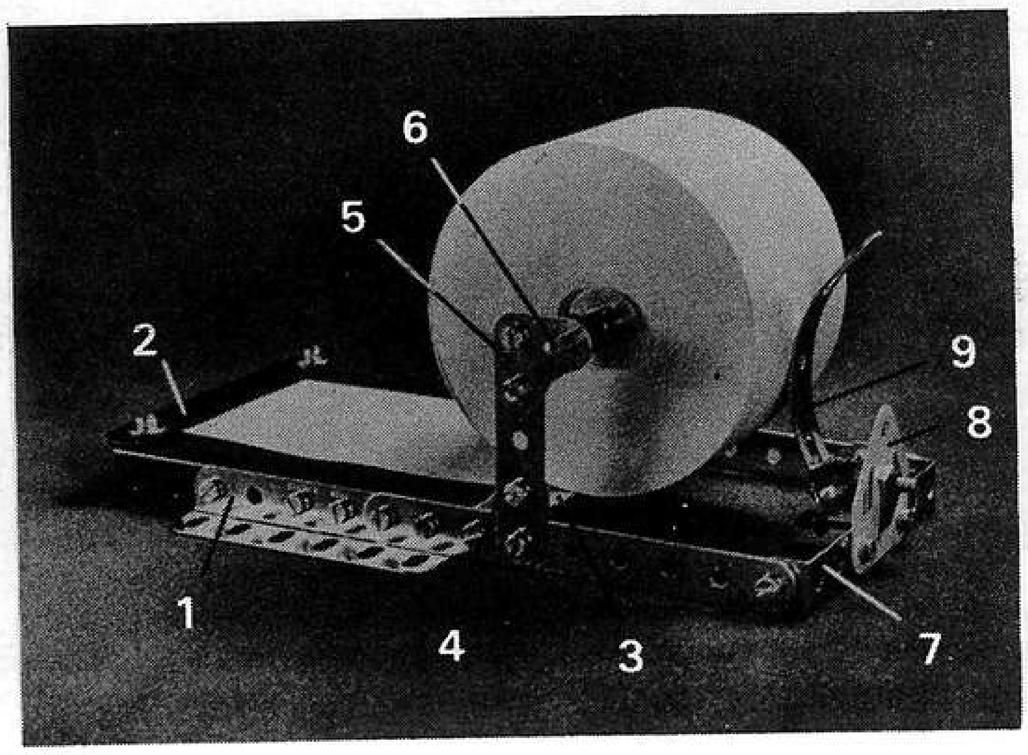
Two Rod and Strip Connectors and a Double Bracket 2 are now bolted to the upper lug of a 1" x ½" Double Bracket 3, the former to the top of the lug and the latter beneath it. The Rod and Strip Connectors are fitted with 1" Rods to serve as handlebars, while the headlamp is provided by a Chimney Adaptor fitted with a Bolt 4 and bolted to the centre of Double Bracket 2.

Fixed to the lugs of Double Bracket 2 are two Fishplates, to the free ends of which are bolted two 3" Narrow Strips, representing the front forks and connected through their third holes by another Double Bracket. Bolted to the centre of this Bracket is the front mudguard, provided by a 1½" Strip, to which a Fishplate 5 is attached by an Obtuse Angle Bracket. The complete front fork arrangement is attached to the frame by a Bolt, shank upwards, held by a Nut in this Strip and by another Bolt, shank downwards, held by a Nut in the lower lug of Double Bracket 3. The Bolt shanks simply locate in the longitudinal bore of Coupling 1.

PARTS REQUIRED

2 - 3	1 - 11a	30 - 37b	3 - 133a
4 - 5	3 - 12c	2 - 38	2 - 142c
2 - 6	4 - 18b	1 - 62b	1 - 164
2 - 6a	2 - 22	1 - 63	2 - 212
5 - 10	1 - 23a	2 - 111	2 - 235a
7 - 11	32 - 37a	2 - 115	

The rear mudguard consists of two Obtuse Angle Brackets, each extended by a Fishplate, the Obtuse Angle Brackets being bolted to a Double Bracket, The seat, provided by a 1" Corner Bracket and a Double Arm Crank, is bolted to another Double Bracket. As can be seen, the wheels are 1" Pulleys with Tyres on 1" Rods, and, finally, the crankcase and engine are provided by two further 1" Corner Brackets 6, bolted to the frame and connected by another Double Bracket to the centre of which a ½" Pulley with boss 7 is secured.



A useful note-pad designed by Mr. Andrew Cathie of Wellington, New Zealand. Building instructions are given on the next page.

NOTE PAD

In the course of a working day I find it necessary to jot down many little notes and, for this purpose, I keep a pile of scrap paper on my desk. I am not a particularly well-organised person, however, and the pile inevitably ends up all over the place. I was, therefore, particularly interested in details of a note pad received from Mr. Andrew Cathie of Wellington, New Zealand – not only as a possible item for the MMQ, but also as a valuable addition to my office equipment! The only non-Meccano part it used was a roll of adding machine paper (easily obtainable from most stationers) and so I built it up, modified it slightly to give myself a greater writing area, and found it was just what I needed. So useful is it that I am delighted to be able to feature it here – and I am indebted to you, Mr. Cathie!

The base, or writing area, is provided by two 3½" x 2½" Flanged Plates connected tightly together by two 3" Angle Girders 1. Bolted to the front edge of the forward Plate are two 3½" Rack Strips 2, one on top of the other, but separated from each other by two electrical Thin Washers on each securing 3/8" Bolt. To the edge of the rear Plate, a 3½" Strip 3 is bolted, this being spaced from the Plate by a standard Washer on each Bolt. Two 2½" Strips 4, strengthened by 1" Corner Brackets, are then bolted one to each side flange of the rear Plate, in the position shown. Another 1" Corner Bracket 5 is fixed to the upper end of each Strip and in the free corner hole of this Bracket is journalled a 4" Rod 6 to serve as the mounting for the roll of paper. The Rod is held in place by Collars.

In the unit illustrated, I used a standard roll of 2¼" wide adding machine paper, centrally held on Rod 6 with ¾" Washers and Collars. The rolls are available in various widths, however, and wider paper would of course allow more room for notes. Although not shown on my model, incidentally, it is advisable to cover the tops of the Flanged Plates with card, or something similar, to provide a hole-free writing surface. When in use, the paper is simply fed beneath Strip 3 and between Rack Strips 2.

As the Note Pad is used, the paper roll will naturally diminish in size and it may be necessary to fit a friction device to the roll to prevent it turning more than is required. In this event, I suggest the following simple, yet effective method: The side flanges of the Flanged Plate are extended five holes rearwards by two 4½" Strips, connected by a 3½" x ½" Double Angle Strip 7. Bolted to the centre of this Double Angle Strip is a Flat Trunnion 8 to the centre vertical hole of which a Double Bracket is tightly fixed by a 3/8" Bolt. Pivotally attached by a 1½" Rod (held by Spring Clips) to the lugs of this Double Bracket is a second Double Bracket, to the back of which a Formed Slotted Strip 9 and an Angle Bracket are bolted. A 2½" Driving Band is attached to the spare lug of the Double Bracket, is brought back and threaded through the centre hole of Double Angle Strip 7 and the Flat Trunnion and is finally looped over the protruding shank of the 3/8" Bolt securing the first Double Bracket.

PARTS REQUIRED

Basic Unit		Modification	
1 - 3	2 - 38d	2 - 22a	4 - 38
2 - 5	2 - 53	2 - 11	1 - 48a
2 - 9c	4 - 59	1 - 12	1 - 111c
1 - 15b	2 - 110	1 - 18a	1 - 126a
22 - 37a	2 - 111c	2 - 35	1 - 186
20 - 37b	4 - 133a	8 - 37a	1 - 125
4 - 38	4 - 561	7 - 37b	

1 - Roll Adding Machine paper.

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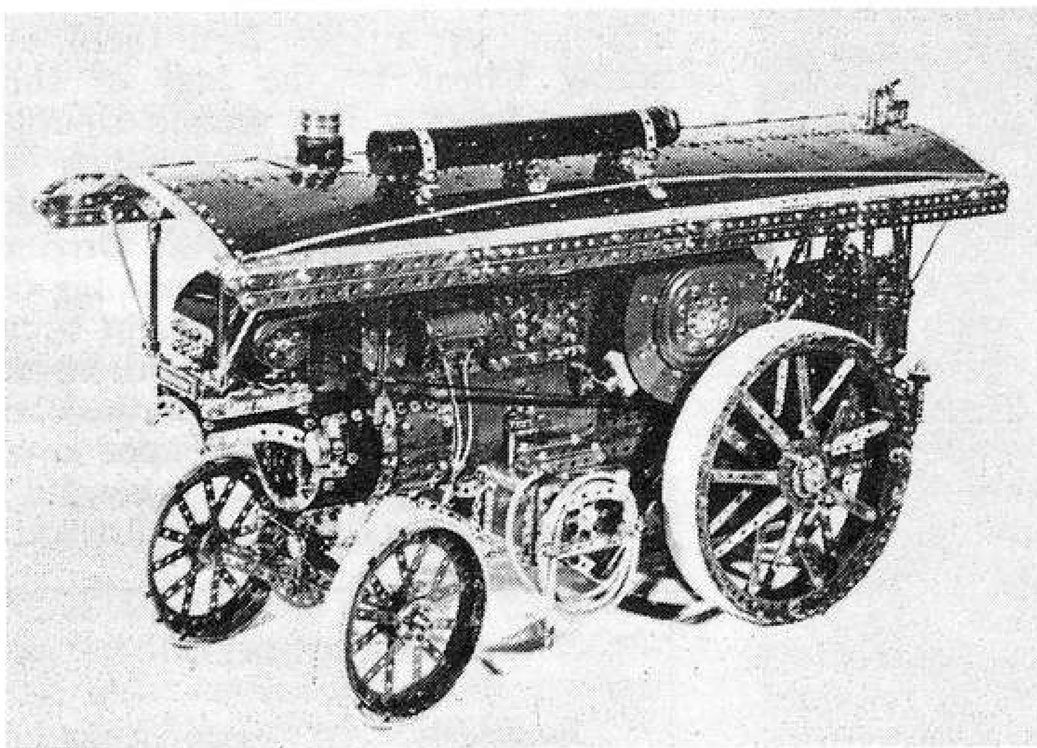


DESPITE THE TEMPORARY hibernation of Meccano Magazine during the winter, Meccano Clubs at home and overseas have continued to flourish, with expanding membership and bigger and better meetings. Model-building standards improve all the time and become steadily more ambitious at each meeting.

The Christchurch Meccano Club in New Zealand is an active group which has both adult and young members and they are always keen to join with other hobby groups featuring in public exhibitions and model-building competitions. Bob Boundy, the Club leader, is in touch with a number of U.K. enthusiasts and always writes a very cheerful letter.

Still "Down Under", Vic Malmgreen, leader of the Maylands Meccano and Hobbies Club in Western Australia writes to report on their general activities and in particular on their younger group where they organise a 'Model of the Year' competition. A twelve year-old member has held the championship for three years, his latest winner being a four-wheel-drive truck chassis with twin diffs., transfer box, etc.

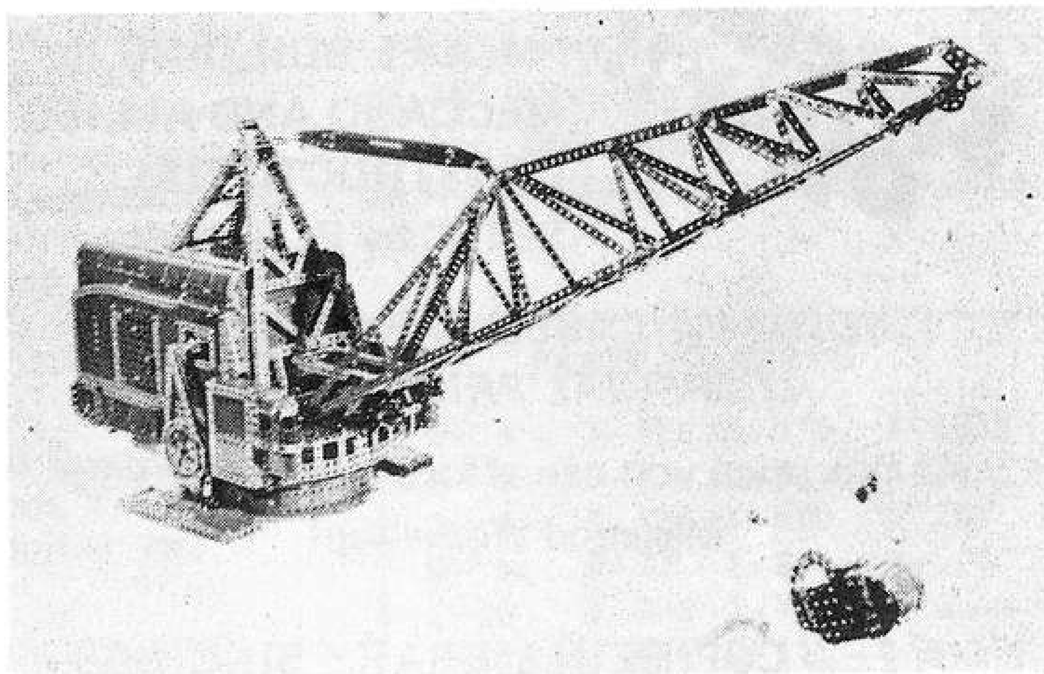
Since his move overseas from U.K. to Johannesburg, Peter Matthews, founder of the Hurstpierpoint Meccano Museum, has founded an adult Meccano Club in a hitherto Meccano wilderness. He has already re-established his museum overseas and brings in genuine Meccano enthusiasts, often from hundreds of miles away, who have formed the new Transvaal Meccano Guild. They take part in local exhibitions apart from their own meetings and have already done much to show how much more than a "toy" is Meccano – greatly to the surprise of the local population!

Tony Homden, who took over the Holy Trinity Meccano Club from Peter Matthews, has the club well organised from its new Hildenborough base in Kent. Holy Trinity meet three times a year in the Hildenborough parish church hall and they put on a varied programme of model demonstrations and slide shows. At their autumn meeting Dennis Higginson of the Stevenage Meccano Club brought up a minibus full of youngsters and the joint meeting was very successful. Dennis recruits young enthusiasts with the help of some supporting adults and the club runs a fairly wide general programme.

The leaders of all these clubs keep in regular touch with Bert Love, Hon. Sec. of the Midlands Meccano Guild which has now completely outgrown its Stratford-on-Avon headquarters. New premises have been found a few miles away at Alcester in Warwickshire where the Guild held its March meeting. Turn-out of Guild models and members is now so extensive that the St. John Ambulance Hall at Stratford was beginning to bulge with the crush!

Model-building at an advanced level goes on all through the year and some very fine models have been displayed at the various meetings. Only two of them are illustrated here but they merit special mention. The beautiful showman's engine by Bert Halliday won the Model Engineer award of the Meccano Cup at the Seymour Hall exhibition at Christmas. This is a finely detailed model making exceptional use of standard Meccano parts for decorative purposes. The second model shown here is a walking dragline by Michael Martin which is remarkable since it was built from an illustration on the front cover of a Meccano manual, but for which no instructions have ever been published. Michael is to be congratulated on his achievement.

New Meccano clubs are being started in the U.K. and, while the younger generation will still be Meccano's biggest customer, there is no doubt that adults are returning to the fold in ever increasing numbers. In January, for instance, some 30 modellers met in Henley-on-Thames to consider the possibilities of forming a new club for that part of the country. The meeting was very successful and, although it was decided not to set up a firm, official structure at this stage, the "members" agreed to hold further informal meetings at periodic intervals. It all highlights the fact that Meccano modelling, as a hobby, is very much alive!



The following is a list of club contacts,

Christchurch Meccano Club; Mr. Bob Boundy, 53 Greendale Avenue, Avonhead, Christchurch 4, New Zealand.

Maylands Meccano & Hobby Club; Mr. Vic. Malmgreen, 16 Kennedy Street, Maylands, W. Australia 6051.

Transvaal Meccano Guild; Mr. Peter Matthews, 19 Joan Road, Glenanda South, Johannesburg, S. Africa.

Holy Trinity Meccano Club; Mr. Tony Homden, 58 Leigh Road, Hildenbrough, Kent, England.

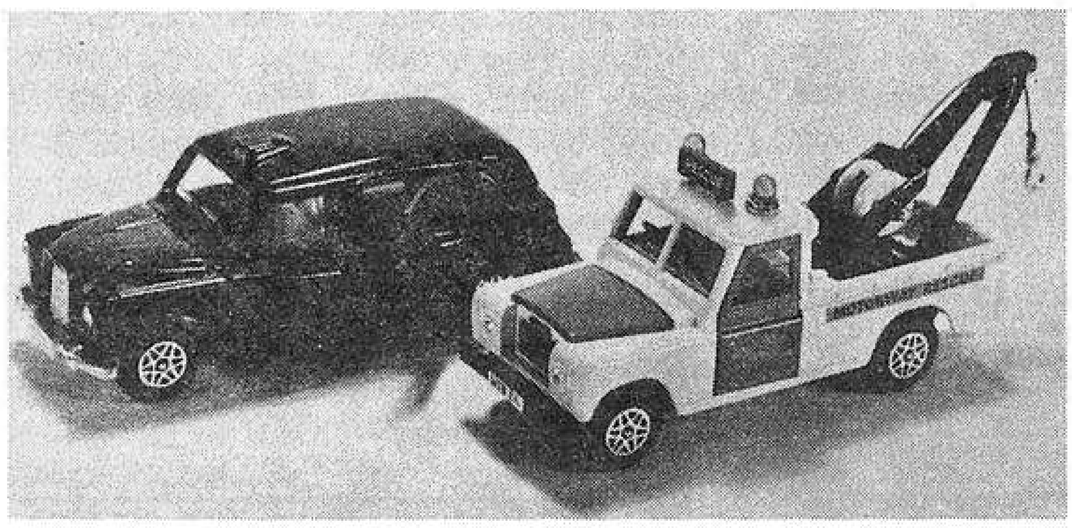
Stevenage Meccano Club; Mr. Dennis Higginson, 7 Buckthorn Avenue, Stevenage, Herts. SG1 1TT, England.

Midlands Meccano Guild; Mr. B. N. Love, 61 Southam Road, Hall Green, Birmingham 28, England.

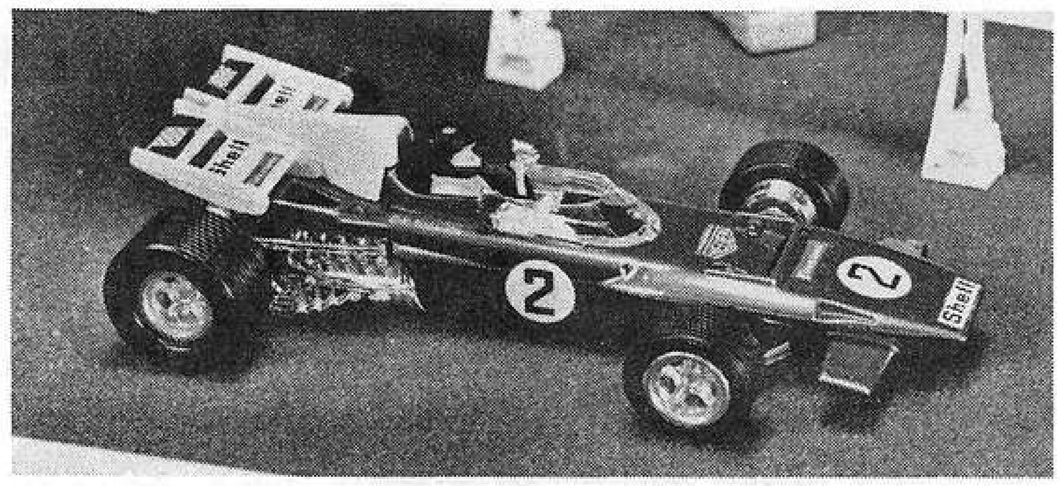
Henley Group; (as yet un-named); Mr. Geoff Wright, 165 Reading Road, Henley-on-Thames, Oxon, RG9 1DP,

DINKY TOYS NEWS

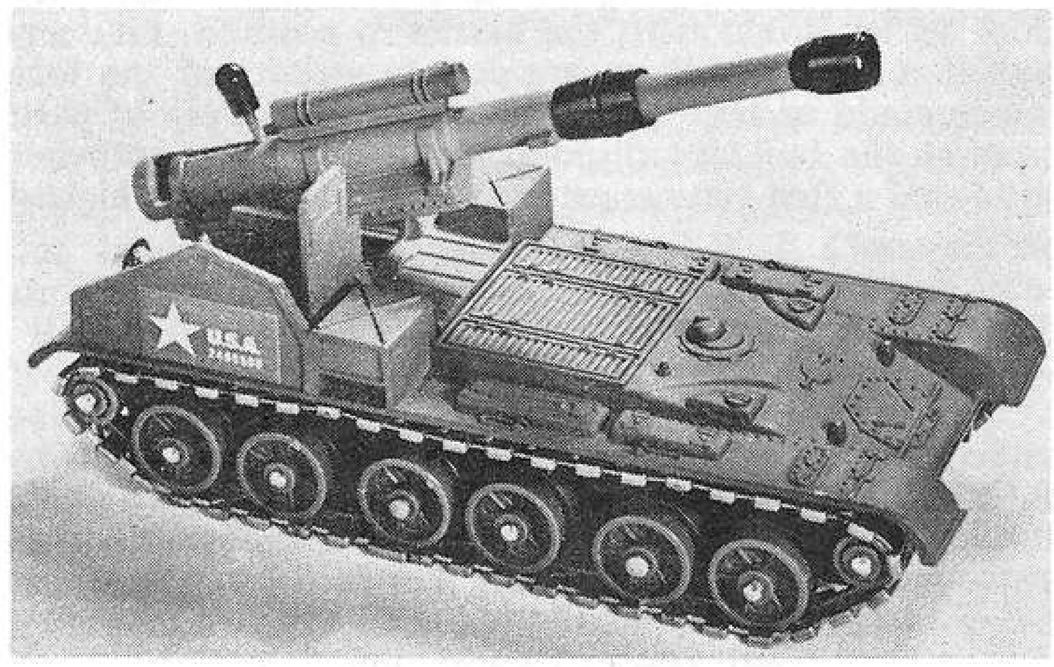
MECCANO LIMITED, famous for the Meccano model-building system, are also famous as makers of Dinky Toys die-cast models. On average, at least one and usually two new Dinky Toys are released every month, and it has long been Meccano Magazine practice to review these models as they have appeared. However, no less than eight new Dinkys have been released since the last edition of the MM was published and we clearly do not have the space available to review them all in detail. We therefore illustrate them on this page and trust that the information accompanying the illustrations is sufficient to enable the main features of the models to be appreciated.



Above, No. 284 London Taxi and No. 442 Land Rover Breakdown Crane, both produced to a scale of 1:42. Taxi fitted with opening passenger doors, windows, fully-detailed interior and driver. Finish is in dark blue. Breakdown Crane fitted with working finger-operated winch, opening cab bonnet and doors, interior fittings and a cab-mounted "RESCUE" headboard flanked by simulated amber roof lights. Overall finish is white with red bonnet and doors and black crane jib.

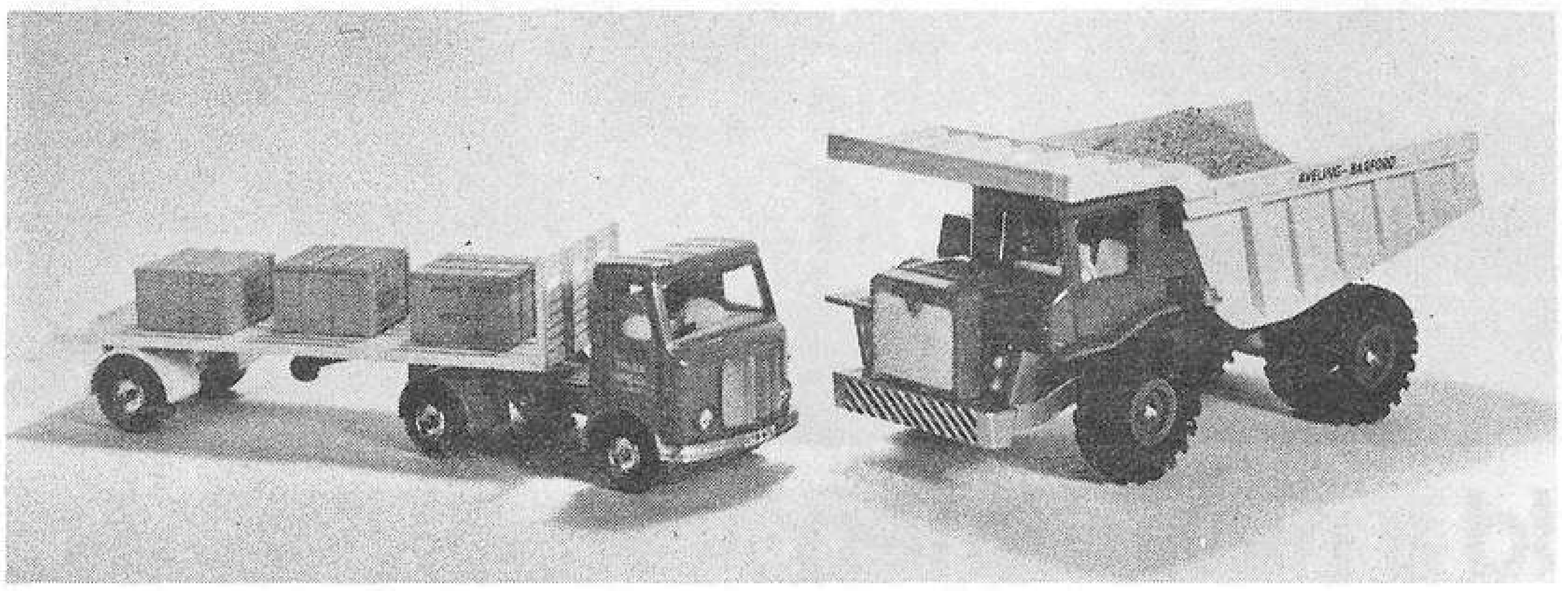


Above, No. 226 Ferrari 312/B2, produced to a scale of 1:32. Features include wide-selection racing tyres, an aerofoil and ready-mounted racing numbers and stickers. A separate sheet of advertising transfers is also supplied. Overall finish is red with white aerofoil. Below, No. 654 155mm. Mobile Gun, produced to a scale of 1:50. Features include elevating gun barrel, spring-loaded firing gun and working caterpillar tracks. Finish is in military matt green.

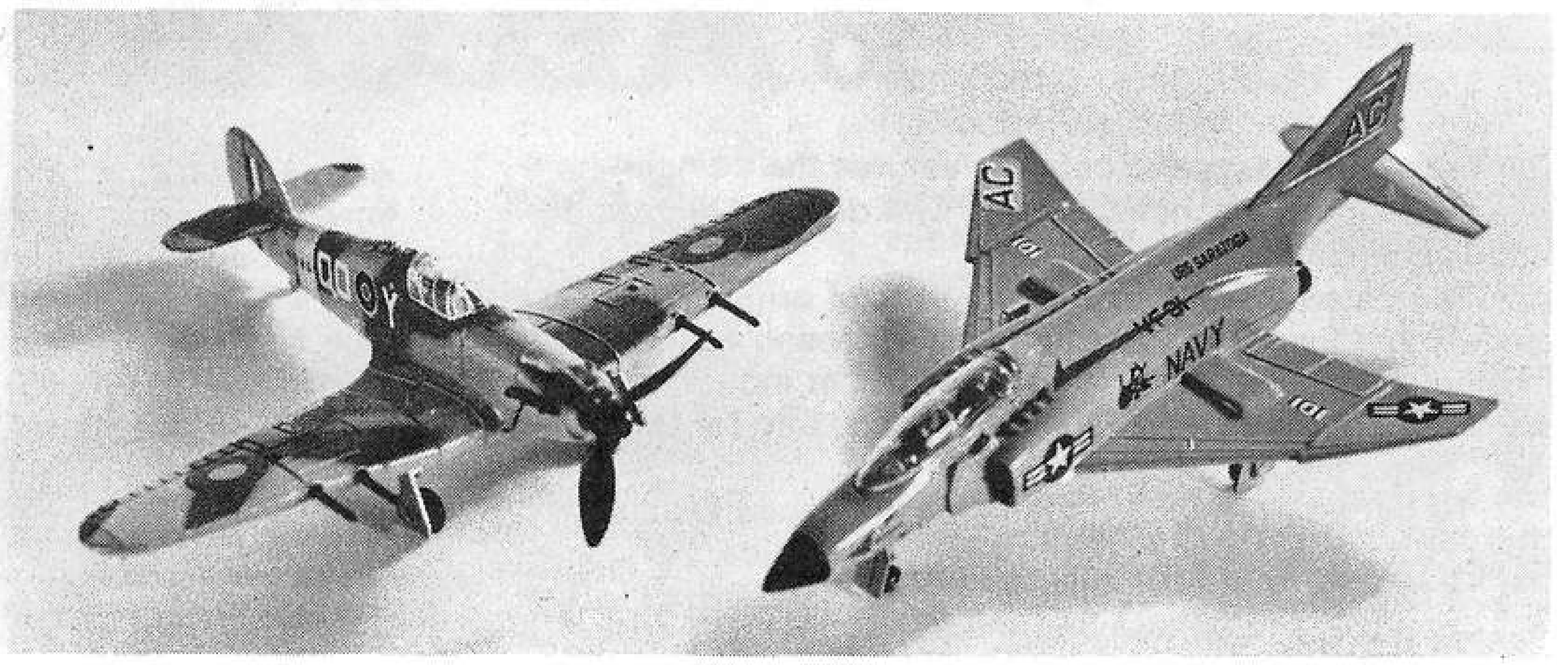


Dinky TOYS

Left, No. 915 A.E.C. with Flat Trailer and No. 924 Aveling Barford 'Centaur' Dump Truck, both produced to 1/42nd scale. The A.E.C. is an articulated model with removable trailer uncoupled by pressing a simulated hydraulic tank on the tractor chassis. Trailer fitted with retractable jockey wheels and cab fitted with windows and seats, etc. (The load illustrated is not supplied). The Centaur features a spring-loaded simulated hydraulic ram action, which automatically tips the load body at the touch of a lever. Fully glazed and upholstered cab. A giant model more than 7" long.



Right, No. 718 Hawker Hurricane (1/65th scale) and No. 730 US Navy Phantom (1/90th scale). Hurricane features "firing cannon noise" by turning small wheel in fuselage and is fitted with four simulated wing-mounted cannons. Finish is in camouflage grey and olive drab and it comes complete with aircraft marking transfers. The Phantom includes a retractable undercarriage and a firing "stand-off" missile. Overall finish is dove grey and it again comes complete with a set of aircraft marking transfers.



LIVE-STEAM LOCO *continued from page 4.*

more a representation of the type of loco and it undoubtedly achieves its desired aim. It certainly captures the feeling and atmosphere of the subject. The crowning feature of the model, however, is the fact that it is a live-steam locomotive. It incorporates the Meccano Steam Engine and will actually run under its own power; hissing, chuffing and bubbling away like a living thing! Speed is slow – but the effect is splendid!

As can be seen from the accompanying photographs, the model carries plenty of intricate detail. Equipped with a 4-4-0 wheel arrangement. It measures almost 3 feet from cow-catcher to tender rear buffers, has an overall height of 1 foot and a maximum width of 7 inches. Drive from the Steam Engine crankshaft is geared down between the Engine sideplates and transferred to the rear main driving wheels by Sprockets and Chain. The Steam Engine spirit burner is fed to its heating position through the smokebox door at the front of the built-up loco boiler and the boiler is sufficiently large to enable the door to be closed with the burner in position. Like any model, of course, there are certain aspects of the loco which could be improved if an unlimited supply of parts were at the builder's disposal, but Mark has nonetheless produced a first-class construction, worthy of the highest praise.

TRIP TO AMERICA

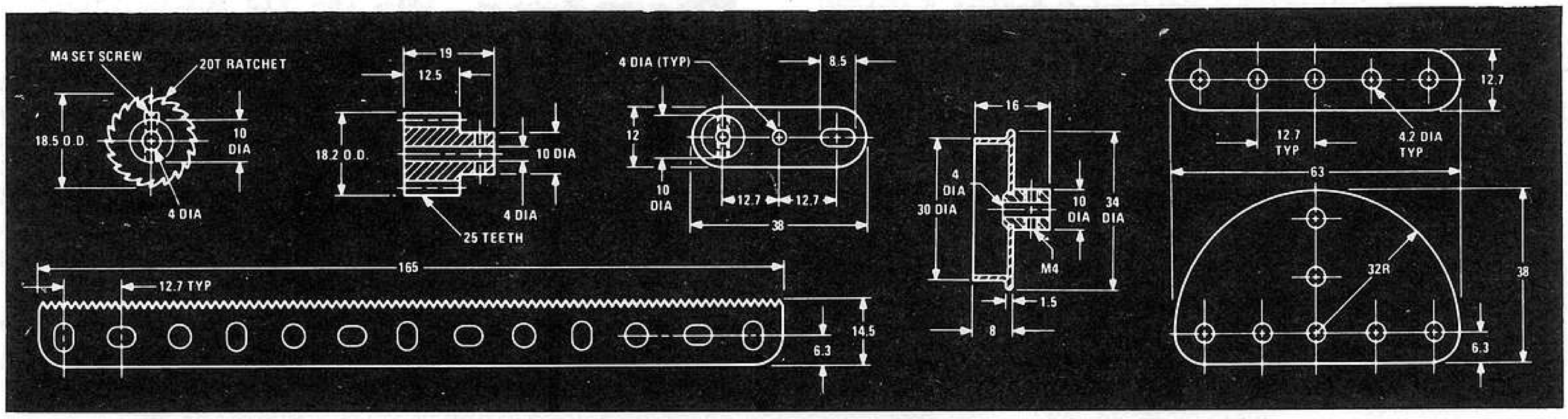
As first prize in the Globe-trotter competition, Meccano undertook to fly out the winner and a companion by B.O.A.C. Earthshrinker jet to see the real thing on which the model was based. Accordingly, on 30th November last year, Mark and his father left London Airport for an 8-day luxury holiday in Florida, U.S.A. During the trip they visited Walt Disney World and saw the original locomotive in operation at the giant pleasure park. They also witnessed the blast-off from Cape Kennedy of the Apollo 17 moonshot, had a flight in a helicopter and generally enjoyed the holiday of a life-time. No doubt Mark came back with plenty of ideas for new Meccano models!

MECCANO PARTS CHECKLIST

M.W. Publications, based at 165 Reading Road, Henley-on-Thames, Oxfordshire, have just published a 56-page manual entitled "Meccano Parts Checklist" which will undoubtedly be of considerable value to Meccano enthusiasts, especially those who possess a comprehensive selection of current, obsolete and 'odd' Meccano parts.

The manual was compiled by Mike Nicholls and its primary aim is to enable the Meccano enthusiast to record the contents of his outfit in the form of an inventory. Apart from this however, it contains a wealth of interesting, enlightening and extremely valuable detailed information. For example, it lists each and every current and obsolete Meccano part ever produced, including Plastic Meccano parts, electric parts, electronic parts, Clock Kit parts and Multikit parts. It also gives supplementary information on clockwork motors, electric motors, steam engines, tools, oilcans and even paint!

The Checklist has been produced in a 'landscape', A4 (11¾" x 8½") format, and has removable pages which are held together by a strong, plastic clip – binder. It is available direct from M.W. Publications at a cost of 75p.



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POCKET MECCANO CONTEST RESULTS

THE OUTSTANDING INGENUITY and imagination of today's young modeller never fails to amaze us here at Binns Road and it was very much in evidence during the 1972 Pocket Meccano Competition which closed at the end of last summer. It was an unqualified success, attracting a remarkable variety of intriguing entries.

JUDGING

Owing to circumstances beyond our control, the judging of the competition was set back and, unfortunately, results could not be published in either the November or the December issue of the Meccano Magazine as promised. All the winners have already been notified by post, but we would like to extend our sincere apologies to the many other entrants who have undoubtedly been patiently awaiting the results.

As regards the actual judging, the models entered were divided into three clear-cut Sections: 8 years and under, 9–12 years and 13–15 years. The first prize in each Section was a Raleigh bicycle with ten runners-up each receiving a consolation prize of a No. 5 Meccano Set, or other goods to an equivalent value. Judging was extremely difficult owing to the exceedingly high standard of most of the entries, but the judges eventually chose the following as overall winners in each Section:

Section 1 (8 years and under), Francis Pays of Waltham Abbey, Essex for his "Bird Catching a Worm". Francis' prize was a Raleigh Tomahawk.

Section 2 (9–12 years), Jonathan Rickards of Leagrave, Luton for his "Letter Balance". Jonathan's prize was a Raleigh Chopper.

Section 3 (13–15 years), Mark Hollamby of Tonbridge, Kent for his "Racing Go-kart". Mark's prize was a Raleigh Olympus Racer.

The ten runners-up in each Section were as follows:

SECTION 1: David Riley of Marple, Cheshire; Clive Allen of Tunbridge Wells, Kent; Christopher Yearsley of Westlands, Newcastle; Kevin Talbot of Saltash, Cornwall; Andrew Greenwood of New Mills, Nr. Stockport, Cheshire; David Watson of Inverurie, Aberdeenshire; Timothy Evison of Styvechale, Coventry; Nigel Yule of Hareham, Hants; John Porter of Gravesend, Kent; Andrew Bond of Basingstoke, Hants.

SECTION 2: R. Copeland of Basingstoke, Hants; Edward McHardy of Mannofield, Aberdeen; D. Rowe of Wootton, Isle of Wight; Andrew Kingham of Anglesey, N. Wales; Marcus Nason of Whitchurch, Hants; J. S. Kershaw of Sale, Cheshire; Michael Willicombe of Kingston, Surrey; Adrian Hutton of Peterborough, Northants; Jeremy Babstock of Coventry, Warks; Iain Corbyn of Warrington, Lancs.

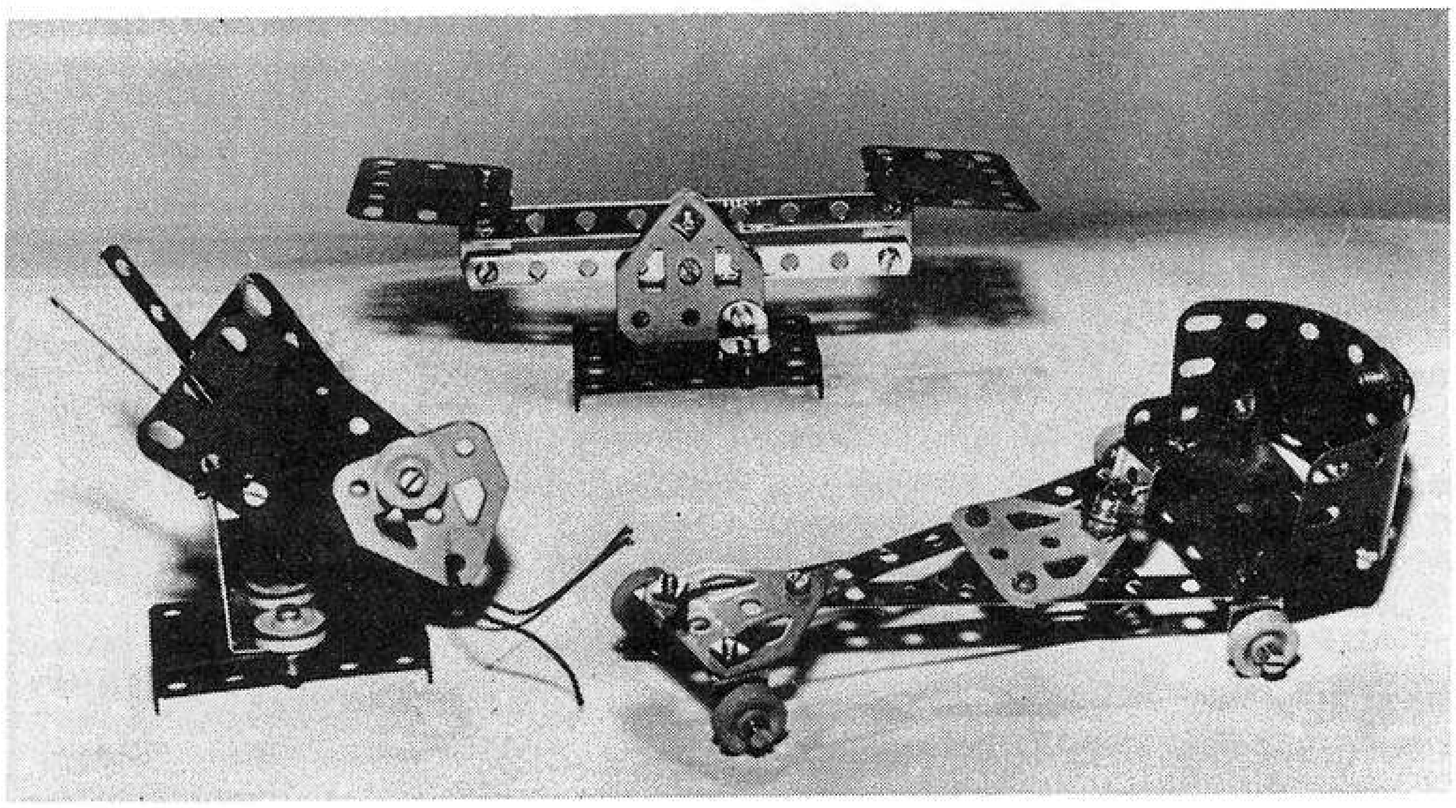
SECTION 3: Nigel Scarf of Kippax, Leeds; James McDaid of Londonderry, N. Ireland; Richard Oakes of Grimsby, Lincs; Peter Norbury of Stockton, Teeside; Martyn Brown of Leyland, Lancs; Timothy Snell of Tonbridge, Kent; R. J. Chambers of Co. Antrim, N. Ireland; Robert Bennett of Wareham, Dorset; Jon Knowles of Salisbury, Wilts; Stephen Manthorp of Keighley, Yorks.

PRIZE GIVING

I think for the first time in Meccano competition history, the three first prize-winners were invited to the Meccano Stand at this year's British International Toy Fair, Brighton, to receive their prizes. The Brighton Toy Fair is actually a Trade Exhibition, not open to the general public, and it was felt at Binns Road that the winners might like to look around the Fair – it really is a toy "paradise" with hundreds of manufacturers exhibiting between them literally thousands of toys and models of every conceivable type.

All the winners accepted our invitation and were duly presented with their bicycle by company Marketing Director, Mr. J. D. McHard. We were delighted that they could make it and feel sure that they had an interesting time – although I understand that things were a bit hectic on the Stand!

Congratulations to the winners and runners-up, and best wishes for future success to the losers.



Above, the winners receive their prizes at the Brighton Toy Fair. From left to right, Mark Hollamby, Jonathan Rickards, Mr. McHard and Francis Pays. Left, the winning models: Bird Catching Worm, Letter Balance and Go-kart.

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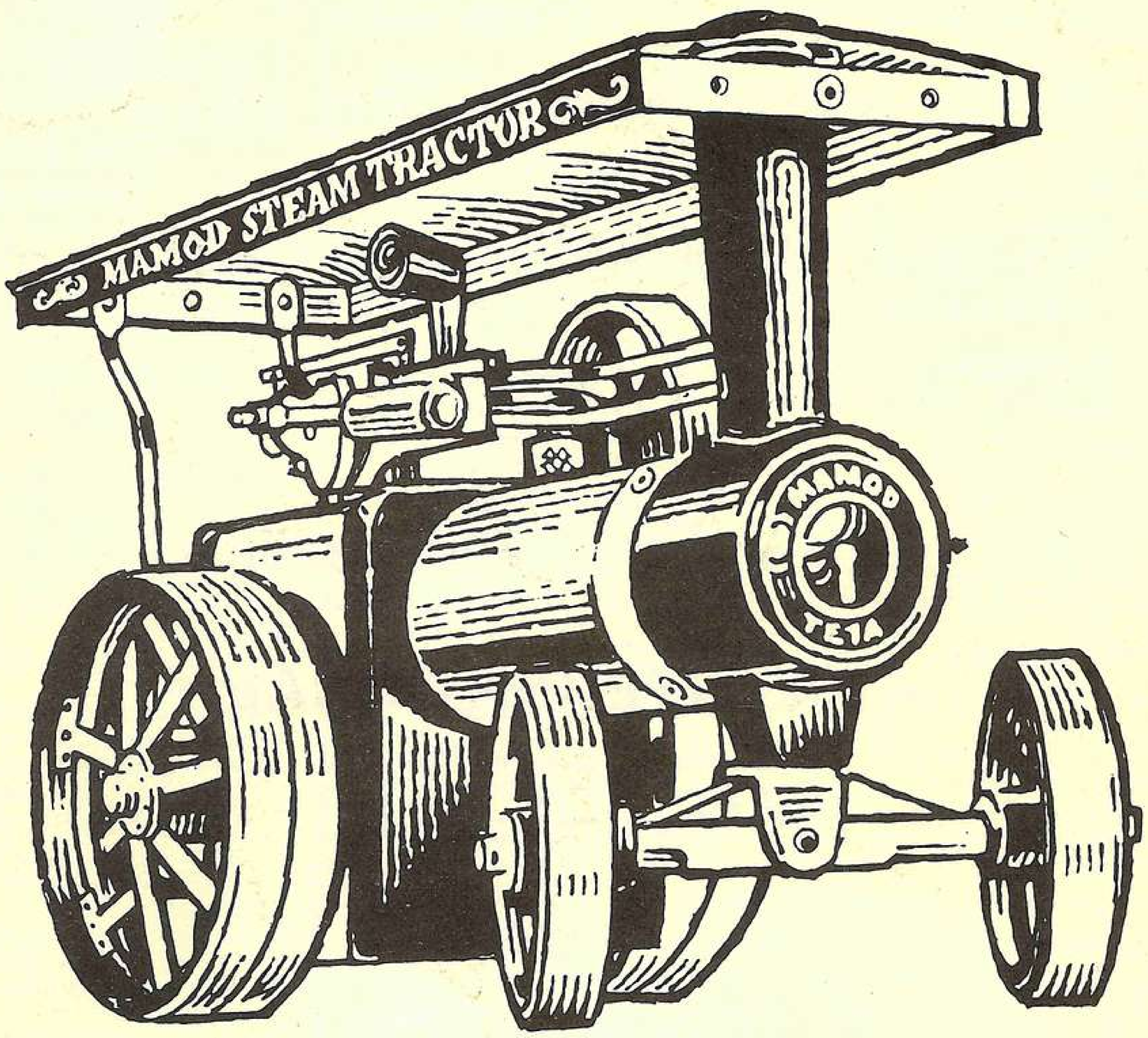

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MECCANO

LIVE-STEAM LOCO

The following building instructions apply to the historic American Steam Locomotive model which won 1st Prize in the 1972 Meccano Globe-trotter Competition. The detailed illustrations, to which the numbers in the instructions refer, appear on pages 5 and 6 of the April 1973 issue of "Meccano Magazine Quarterly".

CHASSIS

The main chassis members are each provided by a 12½" Angle Girder extended by a 4½" Angle Girder, butt-joined by two 2" Strips. The members are connected together through their third and fourth holes by a 2½" Flat Girder 1; through their sixth holes by a 2½" Strip 2; through their 15th and 21st holes by two crossed 3½" Strips and through their 28th holes by another 2½" Strip. Two 2½" x 1½" Double Angle Strips 3 are bolted to the chassis members in the positions shown, the Meccano Steam Engine later being fixed to these.

Also bolted to each chassis member through its 9th and 15th holes is a 3½" Angle Girder 4 to which a Fishplate 5 is fixed by its slotted hole. A 1" Triangular Plate is also fixed to the left-hand only of these Girders, a 1" x ½" and a ½" x ½" Double Bracket 6, arranged to form a rectangle, being bolted to the apex hole of this plate.

The imitation driving cylinders are now each built up from two pairs, each of two 8-hole Wheel Discs 7, one on top of the other for strength. Attached to the inside of each pair of Discs through their top-most (12 o'clock) holes are two 1½" Corner Brackets arranged to form a 1" square compound plate. A Washer and an Electrical Brass Washer are added to the securing ⅜" Bolt, then the Bolt is screwed into the longitudinal bore of a Threaded Boss 8. A ¾" Bolt is next passed through the "3 o'clock" holes in the front pair of Wheel Discs, a Washer is added then the bolt is screwed through an electrical Insulating Spacer 9 and part-way into the longitudinal bore of another Threaded Boss. Correspondingly, another ¾" Bolt is passed through the "9 o'clock" holes in the rear pair of Wheel Discs, a Washer is added, then the Bolt is

also screwed through an Insulating Spacer and part-way into the longitudinal bore of the same Threaded Boss. The same procedure is carried out through the diagonally opposite holes in the Wheel Discs and thus the two pairs of Discs are effectively locked together with approximately 1½" separating them.

Fixed by a Nut in the 2nd, 4th and 6th holes (counting from 12 o'clock) is a ⅜" Bolt onto the shank of which an Insulating Spacer is screwed. Inserted into the 5th holes, without the Nut, is an ordinary Bolt which is screwed into the longitudinal bore of another Threaded Boss 10 in each case.

Attached between the inner top corners of the 1" plates formed by the Corner Brackets is a 1½" x ½" Double Angle Strip, the securing Bolts also fixing two Angle Brackets in place. Bolted to the spare lugs of these Angle Brackets is a 1½" Flat Girder 11 while another 1½" Flat Girder is bolted to the body of the Double Angle Strip. Using two ½" Bolts, the whole assembly is now secured by the rear Flat Girder to the appropriate chassis member, but is spaced from it by a Collar on the shank of each Bolt. At the same time a 5½" x 1½" Plastic Plate 12 is secured by its fourth holes to the back of the Flat Girder. The Bolts pass through the elongated lower end holes of the Flat Girder, through the 4th holes of the Plastic Plate, are fitted with the Collars and are then fixed in the 5th and 7th holes of the chassis members, at the same time fixing a 2½" x 1½" Flanged Plate 13 between the chassis members. The Plastic Plate is now curved under the cylinder and is secured to it by Bolts passed through the 7th holes of the Plastic Plate and screwed into the Transverse Bores of the lower Threaded Bosses secured to Wheel Discs 7. The Plate is then curved further round the cylinder and its end fixed by Set Screws, each fitted with a Washer and an electrical Brass Washer, screwed into the Transverse Bores of Threaded Bosses 8.

Returning to the forward 1" square compound plate, a Pivot Bolt is passed through the outer top corner hole of this plate, is fitted with a Washer and is inserted into the female half of a Dog Clutch 14 which is locked onto the Pivot Bolt by one Grub Screw only. At this stage the Pivot Bolt should be loose in the plate, a distance of 3/16" lying between the bolthead and the Dog Clutch. A Threaded Boss is secured by one transverse bore to the centre of a 1½" Angle Girder 15, the securing Bolt passing through the elongated hole of the Girder and being fitted with two Washers, one each side of the Girder flange. The Angle Girder is then secured to Flat Girder 11 by means of a Bolt screwed down through the Flat Girder and into the transverse bore of the Threaded Boss. Another Bolt is screwed through the Girder into the free threaded bore of Dog Clutch 14. When this is tightened, it will be found that the Pivot Bolt head projects clear of the 1" plate and this is intentional.

Located in the outer top corner hole of the rear 1" compound plate is an Adaptor for Screwed Rod in which a 1" Screwed Rod is locked by a Nut. The other end of this Rod is screwed into one transverse bore of a Collar 16, in the longitudinal bore of which

a Pivot Bolt is fixed, shank upwards. The Pivot Bolt carries a Nut and is screwed into one transverse bore of another Collar fixed on the end of a 5" Rod journalled in Fishplates 5. The Nut on the Pivot Bolt is locked against the Collar and note that the Rod is common to the Collars at both sides of the model. A Short Coupling is also fixed on the Rod, in contact with right-hand Fishplate 5. Attached by Angle Brackets to the rear corners of Flat Girder 1 are two 1" Triangular Plates 16A while two further Angle Brackets are bolted to the chassis members through their 8th holes. A 2½" Curved Strip is bolted between the spare lugs of these Angle Brackets.

Now bolted to the side of each chassis member, through its 13th hole - and spaced from it by three Washers on the shank of the securing ½" Bolt are a 1" x ½" and a 1" x 1" Angle Bracket, arranged to form a 1" x 1" compound double bracket 17. Tightly fixed to the upper lug of this compound double bracket are two parallel 2½" Strips, spaced apart by three Washers on the securing Bolt. Another 2½" Strip is fixed to the lower lug. Sliding on this Strip and on the lower of the top two Strips are two Slide Pieces 18 fixed on a 1" Rod and carrying between their bosses two Rod and Strip Connectors, one projecting forwards and the other pointing rearwards. Held in the forward Connector is a 3½" Rod which slides freely in the centre holes of the cylinder Wheel Discs. The rear Rod and Strip Connector is extended, via a 1" Rod, by another Rod and Strip Connector 19.

The four driving wheels are next each built up quite easily from a Gear Ring and a Spoked Wheel which are locked tightly together by three compound double brackets 20, supplied by ½" Angle Brackets, connected by their slotted-holed lugs. Carried in one tapped bore in the boss of the Spoked Wheel is a Threaded Pin, locked in place by a Nut so that it does not foul the centre bore of the boss. A Washer and a Collar 21 are carried on the shank of the Pin. The driving wheels are mounted on two 4½" Rods held by Collars in 1" Triangular Plates bolted to the chassis members in the positions shown. A ¾" Sprocket Wheel 22 is carried on the forward Rod, while another ¾" Sprocket and a 1½" Sprocket 23 is carried on the rear Rod. The two ¾" Sprockets are connected together by Chain, while the 1½" Sprocket is connected to a third ¾" Sprocket on a 3" Rod, held by Collars in the second holes from the rear ends of the chassis members. A ¾" Contrate Wheel 24 is also fixed on the Rod.

The side rods linking the driving wheels are each provided by a 6" compound narrow strip 25, built up from two 3½" Narrow Strips overlapped two holes. They are loosely held in place by Bolts screwed into the transverse bores of Collars 21 on the Threaded Pins in the bosses of the driving wheels. The front holding Bolt also secures one end of the main driving rod - again supplied by a 3½" Narrow Strip - the forward end of which is lock-nutted to Rod and Strip Connector 19.

At this stage the cow-catcher may conveniently be assembled. Attached by a 1⅛" Bolt and Nuts to each end of a 3½" Angle Girder 26 is a 1" x ½" Angle Bracket (fixed by its long lug to the top of the

Girder flange) and a Double Bracket, fixed to the underside of the flange. Carried in the lugs of the Double Brackets are two 2" Screwed Rods connected together by a central Threaded Boss 27. Working outwards from this central Boss are, in order, two Washers, a Nut, a Rod and Strip Connector, five Washers, another Rod and Strip Connector, five more Washers, a third Rod and Strip Connector, then four Washers. Next comes the inner lug of the Double Bracket, followed by two electrical Thin Washers and an ordinary Washer, another Rod and Strip Connector, eighteen Thin Washers and an ordinary Washer and then the outer lug of the Double Bracket. A Threaded Boss 28 is screwed onto the outer end of the Rod by its longitudinal bore. Locked by a Nut in the lower Transverse Bore of this Boss is another 2" Screwed Rod, on the lower end of which a 3½" Narrow Strip 29 is fixed by two further Nuts. The inner ends of the Narrow Strips at each side are brought together to form a point and are bolted together, at the same time fixing an Obtuse Angle Bracket in position. A second Obtuse Angle Bracket is bolted to the centre of the Vertical Flange of Angle Girder 26, then the spare lugs of the two Angle Brackets are connected by two 2½" Narrow Strips 30, one each side of the lugs and further spaced by two Washers on each Securing Bolt. Rods of appropriate lengths (2½" and 2") are fixed in the Rod and Strip Connectors to complete the familiar cow-catcher lattice-work.

Bolted to the centre top Flange of Angle Girder 26 are two Fishplates, one on top of the other, representing the front coupling point of the locomotive. Two 1½" Strips are then bolted through the second holes of each end of the Angle Girder, these Strips being connected by a 2½" Flat Girder 31, the securing ⅜" Bolts also fixing the complete assembly to the chassis members. Note, however, that the Flat Girder is spaced from the chassis members by three Washers on the shank of each securing Bolt.

STEAM ENGINE

Mounting points for the Meccano Steam Engine are supplied by the two 2½" x 1½" Double Angle Strips 3 which are bolted to the main chassis members through their first and 17th holes counting from the rear of the chassis. The Steam Engine, boiler forward, is bolted to the backs of the Double Angle Strips, the front securing bolts also fixing two Angle Brackets 32 in position. Note that each securing ⅜" Bolt also carries a Washer between the Angle Bracket and the engine baseplate and another Washer between the engine baseplate and the Double Angle Strip. The rear Double Angle Strip mounting is bolted direct to the Steam Engine baseplate through its second row of holes.

Fixed to the underside of the baseplate through its third row of holes is a Double Bent Strip. Journalled in this and in the baseplate is a 1¼" Rod on the lower end of which a ½" Pinion is fixed, with a 1½" Contrate Wheel being fixed on the upper end of the Rod. The Pinion meshes with ¾" Contrate 24, while the 1½" Contrate meshes with a 7/16" Pinion on a 3" Rod journalled in the engine sideplates. A 1" Gear is also fixed on this Rod, this meshing with a second 7/16" Pinion fixed on the engine crankshaft.

Now bolted underneath the rear end of the engine baseplate is a Trunnion 33, the securing Bolts also fixing a 1½" Insulating Flat Girder to the top of the baseplate. A 1" x 1" Angle Bracket is bolted to the vertical Flange of the Trunnion to provide the loco's rear coupling point, while bolted to the Insulating Flat Girder is a 4½" compound insulating flat girder 34, built up from two 1½" Insulating Flat Girders and a 2½" Insulating Flat Girder, all edged by a 4½" Strip 35. Each end of the compound girder is edged by three Fishplates, one on top of the other to provide packing between the 4½" Strip and the compound girder.

A cover to fit over the reduction gearing between the Engine sideplates is built up from two Girder Brackets 36, connected together by their 1" flanges. Bolted to the ½" flange of the rear Bracket are two Fishplates, connected by a latest-style 2" Strip with the additional hole in the centre. Fixed to the Strip through this central hole is an Angle Bracket, to the spare lug of which a 2½" Insulating Strip is bolted. Further Angle Brackets are bolted to the ends of the Insulating Strip.

Bolted to the ½" flange of the front Girder Bracket through its second hole from the right-hand end is a 1" Triangular Plate attached by its apex hole. Fixed to this Plate through its inner base hole is an Angle Bracket, to the spare lug of which a lateral 2½" Insulating Strip and a forward-running 2½" Strip are bolted. Two 2½" Insulating Flat Girders 37 are bolted across the 2½" Strip, the frontmost Girder being secured by a ¾" Bolt carrying two Washers between the head of the Bolt and the Girder. The completed cover fits over the initial drive mechanism between the Engine sideplates with the shank of the ¾" Bolt resting on the baseplate. The two Angle Brackets at the rear corners of the cover will later be fixed through the rear row second hole up in the engine sideplates by the appropriate body-fixing Bolts, but at this stage the cover is not anchored in position. Additional anchoring points for the body are provided at each side of the boiler housing by a 2" Slotted Strip 38 attached to the upper lug of a Double Bracket (but spaced from it by three Washers) fixed by its other lug to the Engine baseplate through its 8th hole from the front.

To complete the chassis a 1½" Rod is held by Collars in the centre hole of Strip 2 and the corresponding centre hole of Flanged Plate 13. Note that the Collars are positioned between the Strip and Plate. A Compression Spring is added to the Rod, which provides a modicum of suspension for the front bogey which locates on the Rod. The bogey itself, is built up from two pairs of two 2½" x ½" Double Angle Strips connected together by a 2½" Flat Girder, the inner securing Bolts in each case also fixing two Flat Trunnions 39 in position, one above the Flat Girder and the other below the Double Angle Strip. The Flat Trunnions in each arrangement are connected by four 2½" Strips 40, suitably positioned on, between, and under the Flat Trunnions. Bolted to the lugs of each pair of Double Angle Strips are two 1" Triangular Plates, the inner securing Bolt in each case also holding an Obtuse Angle Bracket in position. These Angle Brackets are extended by further Obtuse Angle Brackets in a "zig-zag", the spare lugs of which are connected by a 2½" Narrow Strip 41 at each side. Journalled in the apex holes of the Triangular Plates are

two $3\frac{1}{2}$" Rods fitted with $1\frac{1}{8}$" Flanged Wheels, each of which is spaced from its Triangular Plate by two Washers. The $1\frac{1}{2}$" Rod in the chassis locates in the centre holes of Strips 40.

CAB

Moving on to the bodywork, it is advisable to build the cab and the boiler casing separately. In the case of the cab, each front corner upright is supplied by a 5" compound angle girder, consisting of a $3\frac{1}{2}$" Angle Girder and a $1\frac{1}{2}$" Angle Girder butt-joined together by one edge of a $5\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate 42, overlaid by a $4\frac{1}{2}$" Strip and a $4\frac{1}{2}$" Narrow Strip, one on top of the other. The lower securing Bolt also fixes a $5\frac{1}{2}$" Angle Girder 43 at right-angles to the upright, the lower edge of Plate 42 also being bolted to this, while the Bolt through the 5th hole of the upright also holds a horizontal $5\frac{1}{2}$" Strip in place. This Strip is further bolted to the upper edge of Plate 42, the securing Bolts in this case also fixing two vertical window pillars 44 in place. The foremost of these consists of a 3" Strip, bolted to the inside of the $5\frac{1}{2}$" Strip, and a $2\frac{1}{2}$" Narrow Strip, bolted to the front of Plate 42, with a $2\frac{1}{2}$" Strip packed between them. The rear pillar consists of a $4\frac{1}{2}$" Strip, bolted to the inside of the $5\frac{1}{2}$" Strip, and a $2\frac{1}{2}$" Narrow Strip bolted to the front of the Plate, with a $2\frac{1}{2}$" Strip again being sandwiched between them. The lower end of the $4\frac{1}{2}$" Strip is also bolted to Angle Girder 43.

Fixed at right-angles to the top of the upright compound angle girder is another $5\frac{1}{2}$" Angle Girder, overlaid along its side flange by a $5\frac{1}{2}$" Narrow Strip 45. The upper ends of the window pillars are bolted to this Girder, as also are two Obtuse Angle Brackets, to the spare lugs of which a $4\frac{1}{2}$" Narrow Strip is secured to represent "eaves" over the side windows.

The rear edge of Plate 42 is overlaid on the inside by a $2\frac{1}{2}$" Strip and on the outside by a $2\frac{1}{2}$" Strip, itself overlaid by a $2\frac{1}{2}$" Narrow Strip. Two Handrail Supports carrying a $1\frac{1}{2}$" Rod 46 are fixed in the Strips to represent the cab-access handrail, while a $3\frac{1}{2}$" Strip overlaid by a $2\frac{1}{2}$" Narrow Strip is bolted horizontally to the centre of Plate 42 to represent the locomotive nameplate.

At the front of the cab, the upper ends of the corner uprights at each side are connected by a $5\frac{1}{2}$" Strip 47, the securing Bolt at each end also fixing in place a 3" Narrow Strip overlaying the flange of the relevant upright. The Bolt fixing the lower end of the Narrow Strip to the upright also helps to secure a vertical $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate 48, the upper edge of which is overlaid by a $1\frac{1}{2}$" Strip. Sandwiched between this Strip and the Plate is a 3" Narrow Strip 49, the upper end of which is sandwiched between $5\frac{1}{2}$" Strip 47 and a $4\frac{1}{2}$" Strip 50 bolted to the inside of Strip 47. Also sandwiched between these two Strips is a $4\frac{1}{2}$" Stepped Curved Strip 51. Note that the 3" Narrow Strip is angled slightly to represent the angled window pillar of the original.

Bolted to the inside of Flexible Plate 48 through its second inner-edge hole is a 2½" Stepped Curved Strip 52, which is connected to its corresponding Curved Strip at the opposite side by a 1" Corner Bracket. A 1½" x 1½" Flat Plate 53 is bolted between the apex of this Corner Bracket and the centre of Strip 47. Fixed to left-hand Curved Strip 52 inside the cab, is a Single Bent Strip, the securing Bolt also fixing an Angle Bracket to the outside of the Curved Strip. A "gauge" is fixed to the free lug of this Bent Strip, this being represented by a ¾" Washer 54 over the face of a ¾" Flanged Wheel, both fixed to the Single Bent Strip by a ¾" Bolt. Fixed to right-hand Curved Strip 52 inside the cab, is a ½" Reversed Angle Bracket, the securing Bolt again also fixing an Angle Bracket to the outside of the Curved Strip. Attached to the spare lug of the Reversed Angle Bracket is a handwheel (not a steering wheel!), built up from a 1" Rubber Ring located on the heads of four Bolts screwed into the transverse bores of a 4-holed Collar 55 (electrical part No.500). The Collar is carried on a Contact Stud locked by Nuts in the Bracket lug.

At the left-hand side of the cab, a 1½" Angle Girder is bolted to Angle Girder 43 through its second hole from the rear end. The vertical flange is extended by a 1½" Flat Girder 56, to the upper edge of which another 1½" Angle Girder is secured. Bolted, in turn, to the top flange of this Girder is a 3½" x 1½" compound flat girder, built up from two overlapping 3½" Flat Girders, the forward end of which is attached to the cab sides by a 1" x 1" Angle Bracket. Note that this Bracket is spaced from the compound flat girder by two Washers on the shanks of the remaining Bolts. Bolted to the compound girder, beside this Bracket, is a ½" Reversed Angle Bracket, in the free lug of which another handwheel is mounted. Supplied by an electrical 1" Bush Wheel 57, fitted with a Threaded Pin, this handwheel is mounted on a 1" Rod held by a Collar in the lug of the Reversed Angle Bracket. The Bush Wheel is spaced from the lug by two Washers.

Bolted to the rear end of each Angle Girder 43 is an outward-pointing Fishplate and two inward-pointing 1½" Strips, one on top of the other. Two Angle Brackets are fixed to the underside of the Strips, the end securing Bolt also holding a Corner Angle Bracket in place. Bolted to the spare lug of the Fishplate, outside the cab, is a 5½" Narrow Strip 58, the forward end of which is bolted to another Fishplate secured to the forward end of Angle Girder 43. Fixed to the right-hand Angle Girder, inside the cab, are two 1½" Insulating Flat Girders 59, while a 1½" Insulating Strip, angled rearwards slightly is fixed to the left-hand Girder through its second hole from the forward end. When the body is mounted on the chassis, these Insulating components are attached to the Steam Engine mechanism cover which, of course, also serves as the cab floor, or "footplate".

The cab roof is simply built up from four curved 4½" x 2½" Flexible Plates, completely overlaid by four 4½" x 2½" Plastic Plates 60, attached by Obtuse Angle Brackets to two 7" compound flat girders 61 fixed to the Angle Girders carrying Strips 45. Each compound girder consists of one 3" and two 2" Flat Girders, butt-joined by a 5½" Flat Girder.

Attached by an Angle Bracket to the underside of the top flange of each Girder carrying Strips 45 through its 5th hole from the front, are two Fishplates. Clamped between these Fishplates at each side of the cab is a 4" Stepped Curved Strip 62. Attached by an Angle Bracket to each Angle Girder through its third hole from the rear end are two more Fishplates, but these do not support a Curved Strip.

BOILER HOUSING

Coming next to the boiler housing, it is best to begin construction with the front, or smokebox end. A 6½" long cylinder, with a 10" (20 holes) diameter, is produced from six 5½" x 2½" Flexible Plates, curved to shape and suitably overlapped. Note that the front pair of Plates is completely overlaid by two 5½" x 2½" Plastic Plates 63, and that the joint with the second pair of Flexible Plates is overlapped by a band supplied by six electrical 2" Flexible Strips 64 connected together to form a 9½" compound flexible strip. The lowest hole in the cylinder is left clear to receive the Bolt which secures inside the cylinder an Angle Bracket and the forward end of a 5½" Strip which runs back down the cylinder to act as a bracing strip for the Flexible Plates. The rear end of the Strip is extended two holes by a 2" Strip 65.

Fixed to the top of the cylinder, inside, is a 5½" Narrow Strip, the forward securing Bolt passing through the second hole of the Strip and into the hole in the cylinder diametrically opposite the hole through which the lower Angle Bracket is fixed. This Bolt also secures an Angle Bracket in place, inside the cylinder, as well as fixing a Threaded Crank by its arm to the top outside of the cylinder at the Flexible Strip bands. Also secured inside the cylinder, running back from the Flexible Strip band position, are two 3½" Strips, bolted one to each side of the cylinder where the Flexible Plates join. Bolted round the inside front edge of the cylinder are four Formed Slotted Strips, overlapped as necessary, but with the lowest pair of overlapping holes being left clear. The upper pair of Formed Strips are connected together at their highest point by a ⅜" Bolt which also carries above the cylinder a 1½" Corner Bracket 66, four Washers, a 1½" Strip, two Fishplates, one on top of the other, and a final Washer.

Tightly fixed by Nuts in the spare lugs of the two Angle Brackets inside the cylinder are two forward-pointing 3" Screwed Rods. A circular ring 67 is built up from four 2½" Stepped Curved Strips, then this, in turn, is fixed by Nuts on the forward ends of the Screwed Rods. Attached to the ring by a Hinge is the smokebox door, supplied by a Face Plate to which a Wheel Flange 68 and a ¾" Flanged Wheel are secured, the latter by a ¾" Bolt held in the boss of the Face Plate.

Turning to the outside of the cylinder, attached to the underside in the positions shown are two similar assemblies, each built up from two 1" x 1" Angle Brackets and a Channel Bearing 69. Fixed to the sides of the cylinder, four holes from the front, are two Collars 70, while fixed lower down the side, nine holes from the front,

are two Obtuse Angle Brackets which are each straightened slightly and extended by another Obtuse Angle Bracket, also straightened. This Bracket will later provide an anchoring point for the side catwalk.

Secured to the top of the cylinder is the bell (non-ringing in our case) and what, I believe, is a steamchest.

The bell is built up from a Chimney Adaptor 71 locked, with a Collar, on the shank of a ¾" Bolt. Two ½" Bolts, each carrying an electrical Thin Washer and a Rod and Strip Connector, are screwed into the transverse bores of the Collar. The Rod and Strip Connectors locate on the shanks of two ¾" Bolts locked by Nuts in the end holes of a 1½" Strip, to the centre of which a Fishplate is bolted. The assembly is attached to the cylinder by the free lug of this Fishplate, two Washers on the securing Bolt shank acting as spacers.

The steam chest consists of a Double Arm Crank bolted to the top of the cylinder through the centre hole of the appropriate Flexible Plate. Fixed in the boss of the Crank is a 1" Screwed Rod on which are fitted, in order, three Washers, a 1" Pulley with Rubber Ring, boss downwards, six Washers and a Collar, the latter screwed tightly on to the Rod by its transverse bore to serve as a locking nut. A 5½" x 1½" Flexible Plate completely overlaid by a 5½" x 1½" Plastic Plate 72, is formed into a small cylinder gripping the 1" Pulley with Rubber Ring and the overlap is overlaid by a 1½" Strip. A Handrail Support is fixed to the upper right-hand side of the cylinder thus formed, then a top is provided by a 1½" Contrate Wheel 73 fixed by a ½" Bolt screwed into the transverse bore of the "locking" Collar.

The smokestack (chimney) and headlamp are still to be fitted, but these should be left until later. Before leaving the section, however, two 4" Rods 74 are secured, one to each side of the main cylinder by Handrail Supports, positioned as shown.

Now bolted to the spare lugs of the Angle Brackets attached to Stepped Curved Strips 50 in the cab are three Formed Slotted Strips 75, the securing Bolts also fixing two forward-running 3½" Strips in place. Two further 3½" Strips are bolted, one to the lower end of each outer Formed Strip, while two 3½" Narrow Strips are bolted to the centre of each outer Formed Strip. Secured to all these straight Strips, as shown, are two shaped 3½" x 2½" Flexible Plates 76 connected at the top by a 5½" x 1½" Flexible Plate, the latter positioned closest to the cab so as to leave a gap at the top forward section of the assembly. This gap is essential as the filler cap/safety valve of the Meccano Steam Engine protrudes through it when the body is mounted on the chassis. An electrical Core Holder for Rectangular Coil 77 is bolted to the centre of the 5½" x 1½" Plate, the lip resting on the centre Formed Slotted Strip.

Bolted to the forward ends of the 3½" Strips and Narrow Strips are another three Formed Slotted Strips 78, the lower end securing Bolt at each side also fixing in position an Angle Bracket, a 2½" Strip, a curved 3½" x 2½" Flexible Plate 79 and another Angle

Bracket 80. The first Angle Bracket and the 2½" Strip are situated inside the boiler, while the second Angle Bracket is on the outside and will later provide a chassis anchoring point. Bolted to the first Bracket at each side are two downward-pointing 1½" Strips 81, one on top of the other, which will also serve as a chassis anchoring point. The Flexible Plates at each side are connected at the top by a 2½" x 1½" Flexible Plate and full use must be made of the slotted holes in all these Plates to produce a slight funnel shape, the forward section of the boiler being of smaller diameter than the rear section. The 2½" Strips inside the boiler are angled upwards slightly and are also slightly bent inwards so that their forward ends are approximately ⅜" from the nearby Plate. Journalled in the end holes of the Strips are two Adaptors for Screwed Rod 82 connected by a 2" Screwed Rod. The tips of the Adaptors make contact with the Flexible Plates and the assembly thus acts as an adjustable brace for this section of the boiler.

Four Handrail Supports are next fixed, two to each Formed Slotted Strip arrangement 75 and 78 in the positions show, then the two boiler sections can be mated together. The forward cylinder locates just over the funnel-shaped section, to which it is fixed by two Bolts which pass through the forward lower corner holes of Flexible Plates 76. The top 5½" Narrow Strip inside the cylinder locates under the 2½" x 1½" Flexible Plate in the funnel-shaped section and is bent upwards to follow the slope of the funnel. Rod 74 at each side is then extended rearwards, via a Rod Connector, by a Flexible Coupling Unit which is curved upwards and attached by another Rod Connector to another Flexible Coupling Unit fixed in the Handrail Support in the forward Formed Slotted Strip band 78. This unit is itself connected by a third Rod Connector to a 2" Rod held in the Handrail Support secured to Formed Slotted Strip band 75.

Each side catwalk is now built up from a 3½" Flat Girder and a 4½" Flat Girder 83, butt-joined by a 7½" Flat Girder, the rear joining Bolts also fixing a second 3½" Flat Girder 84 in place to extend the first 3½" Girder ½" outwards and rearwards. The forward angle between the two 3½" Girders is rounded-off with a 1" Corner Bracket, while the rear angle is enclosed by a 1½" Strip 85 bolted to the rear end of Flat Girder 84. The forward end of Girder 83 is also rounded-off with a 1" Corner Bracket, then the finished catwalk is bolted to the Obtuse Angle Bracket connected to the underside of the boiler.

Attached to the underside of the catwalk through its inner tenth hole from the rear is a Corner Angle Bracket, spaced from the catwalk by a Washer, Fishplate and two more Washers on the shank of the securing ⅜" Bolt. The free lug of this Corner Angle Bracket is connected to the free lug of the Corner Angle Bracket at the rear underside of the cab by a 9½" Strip. Bolted to this Strip in the order shown are a 2½" x 1½" Triangular Flexible Plate, two 3½" x 1½" and another 2½" x 1½" Triangular Flexible Plate. The wheel arches thus supplied are edged by two 5" Stepped Curved Strips connected by two overlapping 2" Slotted Strips 86.

The chimney can now be built up. Fixed in the boss of the Threaded Crank at the smokebox end of the boiler is a $3\frac{1}{2}$" Screwed Rod on which a $1\frac{1}{2}$" Pulley fitted with a Motor Tyre is locked by Nuts approximately half way up the Rod. Held by Nuts on the upper end of the Rod is a Threaded Coupling, the Rod passing through the centre tapped bore of the Coupling. Located over the Rod and Coupling, its lower end resting on the face of the $1\frac{1}{2}$" Pulley, is a $2\frac{1}{2}$" Cylinder 87 held in place by a $\frac{1}{2}$" and a $\frac{3}{4}$" Bolt screwed into the longitudinal bores of the Coupling. A 1" Rubber Ring and a $1\frac{1}{2}$" Motor Tyre 88 are wedged onto the Cylinder near its upper end. Clamped round this Tyre and that on the $1\frac{1}{2}$" Pulley is the outside cladding which reproduces the distinctive shape of the typical western-style loco smokestack. This is built in two sections from $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates. (On our duplicate model illustrated, these were specially painted blue to blend with the blue tip to the boiler.) In the upper section, four Plates 89 are bolted horizontally, with full use being made of the slotted holes to result in the chimney tapering towards the top. In the lower section, seven vertical Plates are used, each edged by a $2\frac{1}{2}$" Narrow Strip 90 and each overlapping the next by two holes <u>at the lower edge only</u>. This overlap results in the sections tapering towards the base of the chimney where it locates in a 1" Motor Tyre. In the centre of the chimney, the two sections are clamped inside a ring 91 made up of four Formed Slotted Strips.

Turning to the headlamp, the base consists of two $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips, the rear one bolted to Corner Bracket 66. Bolted to the lugs of the Angle Strips at each side is a $1\frac{1}{2}$" Flat Girder 92, the rear securing Bolt also fixing a Pawl without boss in position to provide a bit of added ornamentation. Bolted to the centre of the Angle Strips is a 1" x 1" Angle Bracket, to the vertical lug of which a $1\frac{1}{2}$" x $1\frac{1}{2}$" Flat Plate is fixed to serve as the back of the lamp. Secured to the centre inside of the Plate is an electrical 1" Core for Cylindrical Coil, to the other end of which a second $1\frac{1}{2}$" x $1\frac{1}{2}$" Flat Plate is bolted to provide the front of the lamp, the securing Bolt also holding in position a $\frac{3}{4}$" Washer 93 and two 1" Pulleys without boss, the foremost of which is fitted with a 1" Rubber Ring. The lamp top is enclosed by four Angle Brackets, bolted two to each Flat Girder. Mounted on top of the spare lugs of these Brackets are a $\frac{7}{8}$" Bevel Gear 94 and two more 1" Pulleys without boss, all located on a $1\frac{1}{8}$" Bolted and clamped tightly in position by a $\frac{3}{4}$" Washer and Nut beneath the Angle Bracket lugs.

To enclose the gap in the boiler, through which the Meccano Steam Engine filler protrudes, a removable steam chest is simply produced from a $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate 95 bolted round two 1" Motor Tyres wedged on a Ship's Funnel. The upper edge of the Plate is overlaid by four overlapping electrical Flexible Strips, while the join between the ends of the Plate is overlaid by a vertical $1\frac{1}{2}$" Strip. The completed unit is positioned on the loco by wedging the lugs of the Ship's Funnel, one beneath the nearby Formed Slotted Strip 78 and the other beneath electrical Core Holder 77. A top for the unit is provided by an electrical 1" Bush Wheel in the boss of which a $1\frac{1}{8}$" Bolt is held by a Nut. Two ordinary Bolts, shanks upwards, are held

in two of the face holes, while an imitation whistle or safety valve is represented by a ¾" Bolt, held by Nuts in another face hole. Clamped by electrical Thin Washers between Nuts on the upper end of the shank of this Bolt is a short length of thin wire fitted with Spring Cord to represent piping. This disappears inside the cab, where the end is fitted with a Hook for Spring Cord, presumably acting as a whistle handle. As the Bush Wheel must be removed while the Meccano Steam Engine is filled, it is simply wedged in the top of the Ship's Funnel.

At long last the body may now be mated to the chassis. Angle Brackets 80 are bolted through the catwalk to Slotted Strips 38; Strips 81 inside the boiler body are bolted to Angle Brackets 32 on the front of the Meccano Steam Engine; Strip 65 is bolted to the Steam Engine baseplate; the appropriate Angle Brackets at the rear of the cab are bolted through the rear row, second from bottom holes in the Steam Engine sideplates and, finally, Collars 70 are connected to Threaded Bosses 28 by 3" Screwed Rods.

Before leaving the loco, a step allowing access to the cab is provided at each side of the model by a 2" Strip 96, to which two Angle Brackets are bolted. The upper end of the Strip is fixed to the lower rear corner of the Steam Engine sideplates. Also, the front of the boiler support between the body and chassis is completed by two 2½" x 1½" Triangular Flexible Plates 97, bolted apex to apex and overlapped two holes. Two 1½" Angle Girders are secured to the angled upper edges of the Plates, then the assembly is attached to the forward edges of the wheelarch Triangular Flexible Plates by Angle Brackets.

Inside the cab, a cover for the Steam Engine flywheel is built up from a 2½" Angle Girder and a 2½" Strip connected together at the ends by 1½" Angle Girders 98, at the same time fixing a 2½" x 1½" Plastic Plate 99 in position. Bolted to the vertical flange of the forward 1½" Girder are two Flat Trunnions, secured apex to apex and overlapping two holes. Bolted to the rear 1½" Girder are three 2" Strips, connected together at the lower ends by a 1½" Strip. Bolted to the 2½" Strip are two Angle Brackets, while, bolted to the vertical flange of the 2½" Angle Girder is a 2½" Flat Girder 100 extended downwards at the forward end by a 2" Flat Girder. The completed cover fits over the flywheel and is attached to the side of the cab by the Angle Brackets.

The loco is nicely finished off with a bell-rope supplied by a length of Cord running from the cab, through the Handrail Support on the forward steam chest and tied to the Bolt protruding from the top of the "bell". Also, a length of "pipe" - thin wire covered with Spring Cord - runs from each side of the forward steam chest, down the boiler and through the catwalk, to disappear inside the boiler support.

TENDER

This, then, completes the locomotive. Next, we have the tender. Each side consists of a 9½" x 2½" Strip Plate 101, extended

one hole upwards and downwards by a 9½" Flat Girder and edged at the front by a 3½" Angle Girder 102 and at the rear by a 2½" Angle Girder overlaid by a 2½" Strip 103. The appropriate lower securing Bolts also fix two horizontal 5½" x 2½" Flanged Plates 104, flanges upwards, between the sides, one at each end, while the upper rear Bolts also fix two Angle Brackets in place. A 5½" x 3½" Flat Plate 105 is bolted to these Angle Brackets, a Wheel Flange overlaid by a ¾" Washer being bolted in turn to the Plate.

At the front of the tender, two 5½" Flat Girders 106 are secured between Angle Girders 102 and a Handrail 107 is also fixed to each Girder 102. This consists quite simply of a 2" Rod held in two Handrail Supports. Secured to the centre of the lower Flat Girder is a 1" x ½" Angle Bracket 108 underlaid by a Fishplate, which serves as the loco coupling point.

Bolted between the 2½" Angle Girders at the rear of the tender is a 5½" x 2½" Flexible Plate 109 edged by 2½" Strips and extended one hole upwards and downwards by 5½" Flat Girders. Fixed to the lower Flat Girder are two buffers 110, each supplied by a ¾" Washer and a 1" Pulley without boss fixed by a 1⅛" Bolt to an electrical Insulating Spacer which is, in turn, fixed to the Flat Girder. Also secured to the Flat Girder, in the central position, are two Angle Brackets between the spare lugs of which a Collar is held on a Pivot Bolt. Locked by a Nut in the transverse bore of this Collar is a 1" Screwed Rod, on the shank of which a second Collar 111 is screwed by its transverse bore. This whole unit represents the rear coupling.

Now bolted as shown to the underside of each Flanged Plate are two 2½" x ½" Double Angle Strips, to the lugs of which two similar Double Angle Strips 112 are bolted to result in two box arrangements. A 1½" Strip overlaid by a Double Bent Strip 113 is fixed between each pair of boxes, then the boxes on each Plate are connected by two 4½" x ½" Double Angle Strips 114, attached by Corner Angle Brackets. A 3½" Angle Girder is also bolted between the two rear boxes, while a 5½" Angle Girder 115 is bolted to the inner flange of the front Flanged Plate. Attached by Obtuse Angle Brackets to the spare flange of this latter Girder is a 5½" x 3½" Flat Plate 116 which is also attached by Obtuse Angle Brackets to the forward edge of Flat Plate 105.

A handwheel 117 is next provided by a Dinky Toy Tyre No.021 located on a 4-holed Collar, fixed by four 7/32" Grub Screws on a ½" Bolt held by Nuts in the upper lug of a 1" x ½" Double Bracket bolted inside the left-hand side of the tender one hole from the top and one hole from the front. Journalled in the lower lug of the Bracket and in the corresponding hole in the Flanged Plate is a 3" Rod 118, held in place by a Collar. A lip round the tender sides and back is supplied by two 9½" Strips and one 5½" Strip 119, attached to the respective Flat Girders by Obtuse Angle Brackets.

Each tender bogie is similarly built up from two $2\frac{1}{2}$" Angle Girders joined at each end by a $2\frac{1}{2}$" x 1" Double Angle Strip 120 and in the centre by a $4\frac{1}{2}$" Strip 121. Secured to the centre of this Strip by a Long Threaded Pin 122 is a $2\frac{1}{2}$" Strip which is also bolted to the centres of the Double Angle Strips. Two 4" Rods are journalled in the lugs of the Double Angle Strips, being held in place by $1\frac{1}{8}$" Flanged Wheels, 123, each spaced from its lug by a Washer. A Collar is secured on each end of each Rod.

Bolted to each end of Strip 121 is a 1" x 1" Angle Bracket, to the spare lug of which a $2\frac{1}{2}$" Strip overlaid by a 1" Corner Bracket, apex downwards, is fixed. Two Angle Brackets are bolted to the remaining corners of the Corner Bracket, a Pivot Bolt 124 fitted with a Compression Spring, being locked in the spare lug of each of these. Bolted finally to each end of the $2\frac{1}{2}$" Strip are two Insulating Fishplates sandwiched between three standard Fishplates 125.

It will, of course, be realised that the suspension units just described are non-operational. They are included purely for appearance.

The completed bogies are mounted in the tender with the Long Threaded Pins locating in the Double Bent Strips beneath the tender.

At this stage the model is finished. When operating it, however, it will be found that the Meccano Steam Engine firebox is situated too far inside the loco boiler for the burner to reach in its normal form. The burner handle, therefore, is extended by two $5\frac{1}{2}$" Strips 126, clamped over the handle and themselves extended by a $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip. The track, incidentally, is built up from long Angle Girders connected by $7\frac{1}{2}$" Strips and $7\frac{1}{2}$" Angle Girders, suitably interspaced.

- end -

PARTS REQUIRED

6	-	1a	2	-	26c	2	-	89b	1	-	164
7	-	2	2	-	28	6	-	90a	4	-	173a
8	-	2a	1	-	29	1	-	94	4	-	175
10	-	3	1	-	30	1	-	95a	4	-	180
2	-	4	1	-	31	3	-	96a	12	-	188
29	-	5	1	-	35	6	-	103	3	-	189
11	-	6	720	-	37a	4	-	103a	4	-	190a
17	-	6a	560	-	37b	6	-	103d	4	-	191
2	-	8	246	-	38	2	-	103e	6	-	192
5	-	9	6	-	38d	3	-	103f	1	-	194
2	-	9a	1	-	40	5	-	103g	4	-	194c
8	-	9b	3	-	45	7	-	103h	3	-	194d
4	-	9d	4	-	46	2	-	103k	2	-	194e
2	-	9e	2	-	47	1	-	109	2	-	196
10	-	9f	4	-	48	5	-	111	12	-	212
53	-	10	12	-	48a	19	-	111a	6	-	213
5	-	11	1	-	48b	34	-	111c	14	-	215
3	-	11a	2	-	48c	5	-	111d	1	-	216
66	-	12	4	-	50	1	-	114	6	-	221
12	-	12a	1	-	51	5	-	115	4	-	224
5	-	12b	2	-	52	2	-	115a	15	-	235
41	-	12c	2	-	52a	8	-	120b	4	-	235a
1	-	15	6	-	55a	2	-	125	8	-	235b
2	-	15a	1	-	58	1	-	126	2	-	235d
6	-	15b	1	-	58b	4	-	126a	5	-	235f
4	-	16	36	-	59	1	-	133	1	-	500
5	-	16a	1	-	62a	12	-	133a	2	-	502
1	-	16b	1	-	63c	17	-	136	1	-	503
10	-	17	1	-	63d	2	-	137	3	-	507
2	-	18a	13	-	64	1	-	138	5	-	508
1	-	18b	4	-	69	2	-	142c	16	-	513
4	-	19a	4	-	69b	2	-	142d	2	-	518
12	-	20	3	-	74	2	-	144	1	-	525
2	-	20b	13	-	77	9	-	147b	1	-	528
1	-	21	1	-	80a	4	-	154a	9	-	530
1	-	22	1	-	80c	4	-	154b	1	-	543
6	-	22a	3	-	81	4	-	155	80	-	561
8	-	24a	3	-	82	2	-	160	22	-	564
1	-	26	4	-	89a	2	-	161			

1 Meccano Steam Engine
1 Dinky Toy Tyre No. 021

Please note that Nuts, Bolts and Washers are in approximate quantities only.