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MAP **HOBBY MAGAZINE**

FRONT COVER

The Disneyland "Highway in the Sky" monorail railway, in California, U.S.A., is an extremely advanced transport system. Built on the Alweg principle the transit speed is 45 m.p.h. Electrically powered, this monorail went into service in 1959 and has carried over 17,000,000 passengers since then.

NEXT MONTH

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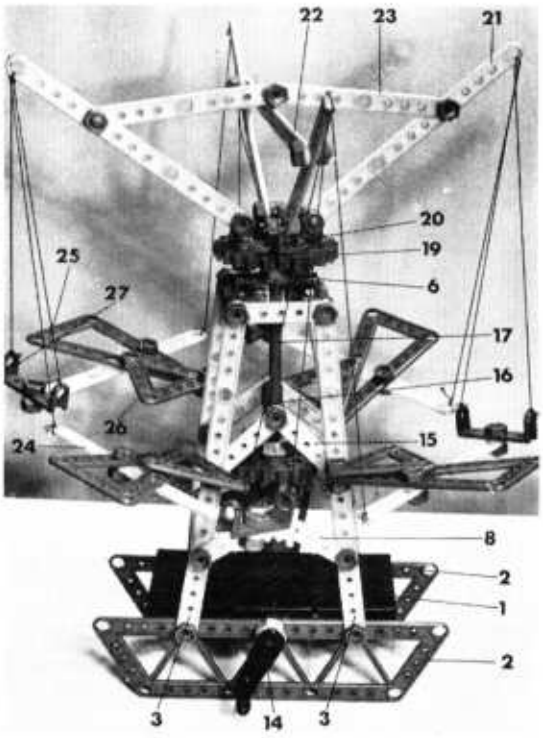


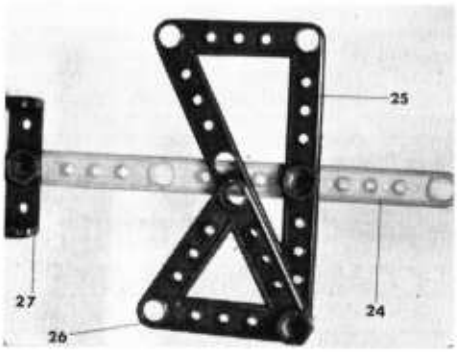
HIGH-FLYERS

by Spanner

A new Plastic Meccano model built from a Set C

This magnificent Aeroplane Roundabout, built with Plastic Meccano Set C, was specially designed for Meccano Magazine.

BOB MOY, experienced head of Meccano Limited's Model-building Department recently confirmed something which I have believed to be true for many years—namely, that models based on fairground amusements are highly popular with both young and old alike. In case you should be wondering why I regard Bob's opinion in the matter as reliable confirmation, I must explain that one of the main functions of the Model-building Department is to produce large special display models which have been chosen and ordered by Meccano dealers all over the country. The dealers naturally chose those models which they have found attract most attention and records prove beyond a shadow of a doubt that the majority of models ordered are fairground reproductions. The head of the Department concerned with building and supplying the models, therefore, certainly knows what he is talking about !



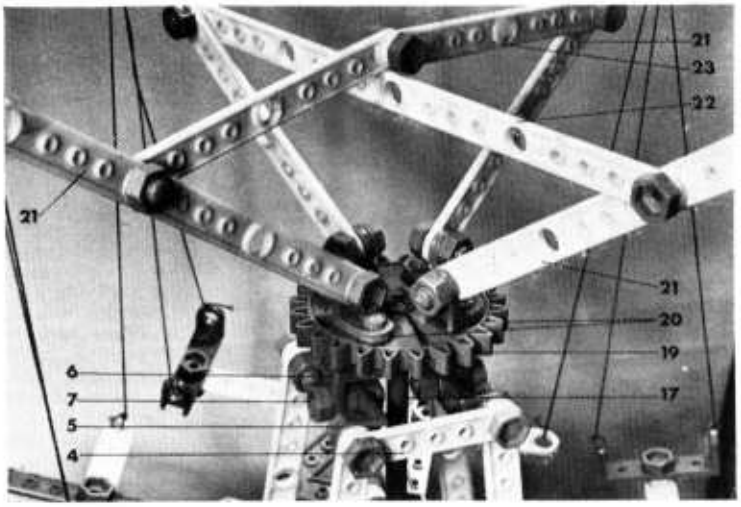
This picture of one of the aircraft fitted to the model shows how a few well-chosen parts can be used to produce a simple, easily-identifiable representation of an aircraft outline.

Over the years we have featured innumerable fairground models in the M.M., but these have virtually all been built with standard metal Meccano. Plastic Meccano has hardly entered into it, which isn't really surprising considering its comparatively recent introduction, so I felt it was about time something was done to rectify the situation. The outcome is the working Aeroplane Roundabout built with Plastic Meccano Set C.

To start with, a large baseplate is built up from three Bases 1 to each side of which a Bridge Girder 2 and two 5-hole Strips 3 are attached. At the top, Strips 3 are joined by a 2-hole Strip 4, the securing Bolts also fixing two Double Angle Strips 5 between Strips 3 at each side. The centre of these Double Angle Strips are joined by a third Double Angle Strip 6, its lugs spaced from the previous Double Angle Strips by an extra Nut on the shank of each securing 1 in. Bolt 7. To avoid difficulty, it is advisable to build this Double Angle Strip arrangement separately and fit it to the model when completed.

Two 2-hole Strips 8 are next bolted to the outside of Strips 3 at each side, the free holes in their overlapping ends providing bearings for a 6 in. Axle 9. Mounted on this Axle are a 20-teeth Sprocket Wheel and an 18-teeth Gear Wheel 11, the former connected by Chain Links to a 10-teeth Sprocket Wheel 12 on another 6 in. Axle 13 held in the centre Base by a Handle 14.

Another set of 2-hole Strips 15 are bolted to Strips 3, on the inside, this time, and further up than Strips 8. The overlapping ends of these Strips, at each side,



A close-up view of the top of the Roundabout showing the method of fixing and bracing the radiating support arms.

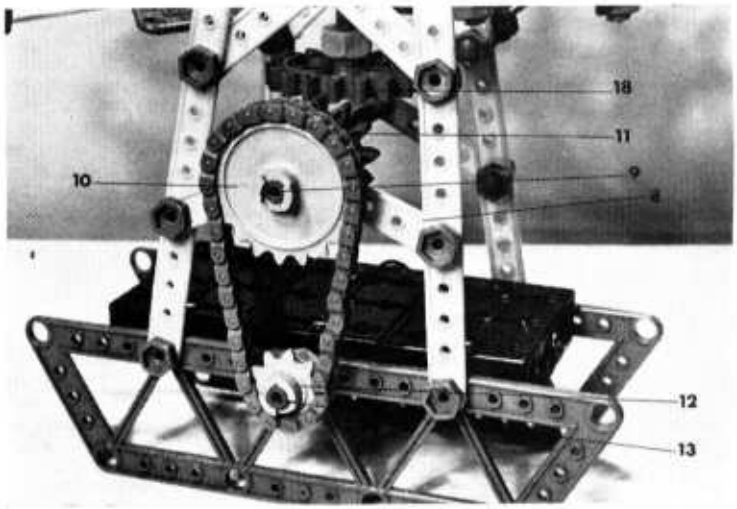
are joined by a Double Angle Strip 16, as shown. Journalled in this Double Angle Strip and Double Angle Strip 6 is a third 6 in. Axle 17 which carries an 18-teeth Gear Wheel 18 on its lower end and a 24-teeth gear 19 on its upper end. Gear 18 engages at right-angles with Gear 11 on Axle 9. Where necessary, incidentally, Axle Clips are used to hold the Rods in position.

Now fixed, by Bolts only, to the upper face of Gear Wheel 19 are four Angle Brackets 20, to each of which a 4-hole Strip 21 is bolted. Opposite Strips 21 are joined, for strengthening purposes, by a 5-hole Strip 22 in one case and by a 5-hole compound strip 23, obtained from two 3-hole Strips, in the other.

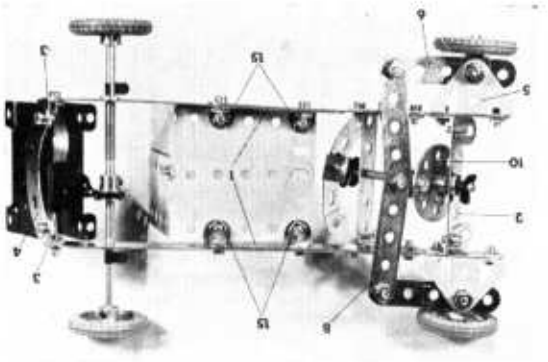
This leaves only the four aeroplanes to be built, all of which are identical. A 4-hole Strip 24 acts as the fuselage with the wings being supplied by one 3-hole Triangular Girder 25 and one 2-hole Triangular Girder 26, the latter bolted to the apex hole of the former which, in turn, is bolted to Strip 24. The tail assembly is represented by a Double Angle Strip 27. Each aircraft is attached by lengths of cord to two adjacent Strips 21, one length being tied between one Strip and the "nose" of the aircraft, while the remaining two lengths are tied between the other Strip and the 'plane's "fins."

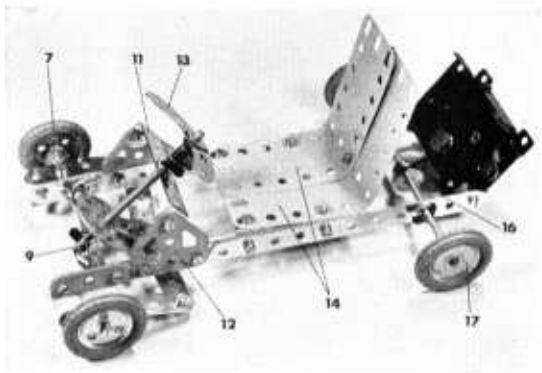
PARTS REQUIRED

10—2-hole Strips	2—Axle Clips
2—3-hole Strips	4—2-hole Triangular Girders
8—4-hole Strips	3—6in. Axles
5—5-hole Strips	1—Handle
3—Bases	1—24-teeth Gear Wheel
43—Bolts	2—18-teeth Gear Wheel
2—1in. Bolts	1—20-teeth Sprocket Wheel
43—Nuts	1—10-teeth Sprocket Wheel
4—Angle Brackets	34—Chain Links
8—Double Angle Strips	2—Bridge Girders
	4—3-hole Triangular Girders



In this close-up view of the lower section of the model, the method used to transfer the drive to the vertical Axle is clearly shown. Note the simple construction.





The Go-Kart above is built with Outfit No. 1 plus a Magic Motor and the ½ in. Pulley packed with the Motor. Left: the underside view showing chassis and steering mechanism.

Let's Go Karting

says Spanner

A delightful little model built with an Outfit No. 1 and powered by a Meccano Magic Motor

A SPORT we do not seem to hear very much about these days, but which is still highly popular with its followers is Go-Kart racing. Only recently I visited a Kart Meeting at a local track and thrilled to the high-pitched roars from the engines of these great little machines as they screamed around a tight circuit at speeds of anything up to 100 m.p.h. It's a sight to warm the heart of any motor sportsman, and it reminded me that it is quite some time since we featured a Kart in the M.M. The situation is therefore rectified with the model featured here.

One of the best things about Go-Karts is that their simple design enables a pretty good Meccano reproduction to be produced out of a small Outfit. This model, in fact, is built with the No. 1 Set plus a Magic Clockwork Motor and the ½ in. Pulley that goes with it. The two main chassis members 1, each consisting of two 5½ in. Strips overlapped five holes, are joined through their third holes by a 2½ × ½ in. Double Angle Strip 2. The Magic Motor is attached to the rear end of the chassis by two Angle Brackets 3, joined together by a 2½ in. Stepped Curved Strip 4.

Now bolted to the front of each chassis member is a Trunnion 5, to the apex of which an Angle Bracket is lock-nutted, at the same time fixing a 2½ in. Strip 6 to the Bracket. A ⅜ in. Bolt, carrying a 1 in. loose Pulley with Motor Tyre 7, is held by Nuts in the vertical lug of the Bracket, while lock-nutted between Strips 6 is a 4½ in. compound strip 8 obtained from two 2½ in. Strips. The Bolt joining the Strips also holds a bent Fishplate 9 in position, the Fishplate engaging with the shank of a Bolt held by a Nut in the face of a Bush Wheel 10. This Bush Wheel is mounted as shown on a 3½ in. Rod held by Spring Clips in Double Angle Strip 2 and in a similar Double Angle Strip 11 bolted to two Flat Trunnions 12 fixed to the chassis members. A steering handle is represented by a 2½ in. Stepped Curved Strip 13 mounted inside one lug of a Double Bracket held by Spring Clips on the Rod.

A seat is next provided by two shaped 5½ × 1½ in. Flexible Plates 14 fixed to the chassis by four Angle Brackets 15. Held by Spring Clips in the chassis members are a 3½ in. Rod and a 2 in. Rod joined by a Rod Connector to serve as the rear axle. A ½ in. Pulley with boss 16 is mounted on the 3½ in. Rod to be connected to the Pulley on the output shaft of the Motor by a 2½ in. Driving Band. A 1 in. Pulley with Motor Tyre 17 is fixed on the axle to act as the rear road wheels, then the model is finished by bolting two Fishplates to Double Angle Strip 2 to represent control pedals.

PARTS REQUIRED

4—2	2—22a	2—90a
4—5	1—23a	4—111c
3—10	1—24	2—126
1—11	6—35	2—126a
8—12	42—37a	4—142c
2—16	30—37b	1—186
1—17	8—38	2—189
2—22	1—48a	1—213

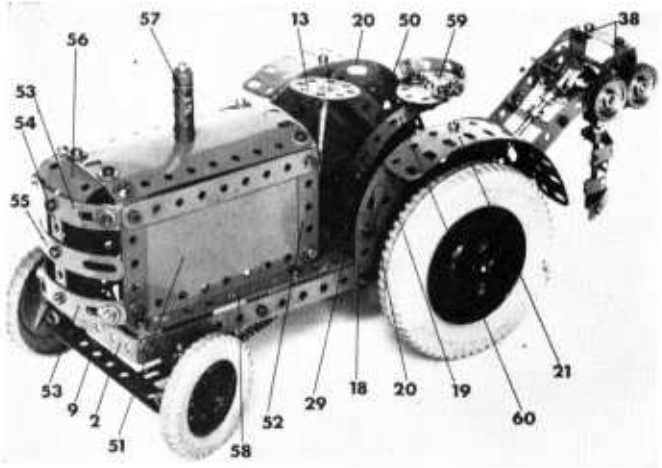
1—Magic Clockwork Motor.

The Olympic Games on Stamps—*Continued*

while Sweden had three stamps showing a classical horseman.

Italy's nine stamps for the Rome Olympics of 1960 featured classical statues of athletes, while America released a single stamp showing a snowflake for the Winter Games at Sun Valley, California. For the Tokio Games in 1964 Japan released no fewer than six advance publicity stamp sets, plus five stamps during the actual games. Austria's set of seven stamps for the Winter Olympics at Innsbruck was the most ambitious released up to that time for this event, but it was over-shadowed by the stamps issued by numerous other countries, from Russia to Burundi (in equatorial Africa !). So many other countries have now climbed on the bandwagon, even when they have little or no connection with the Olympics, that it is difficult to keep up with all the new stamps.

This year's Olympic Games has already witnessed issues for the Grenoble winter sports from such unlikely places as the sheikhdoms of the Persian Gulf and several countries in Central Africa, while many of the sixty-odd countries competing at Mexico City this month will also have released special stamps before the year is out.



At left: Tractors a-plenty have been built in Meccano, but it is unusual to find one, like this model, fitted with an attachment for boring post-holes.

Below: In this underside view of the rear section of the model, the method of securing the boring attachment to the main section is clearly shown.

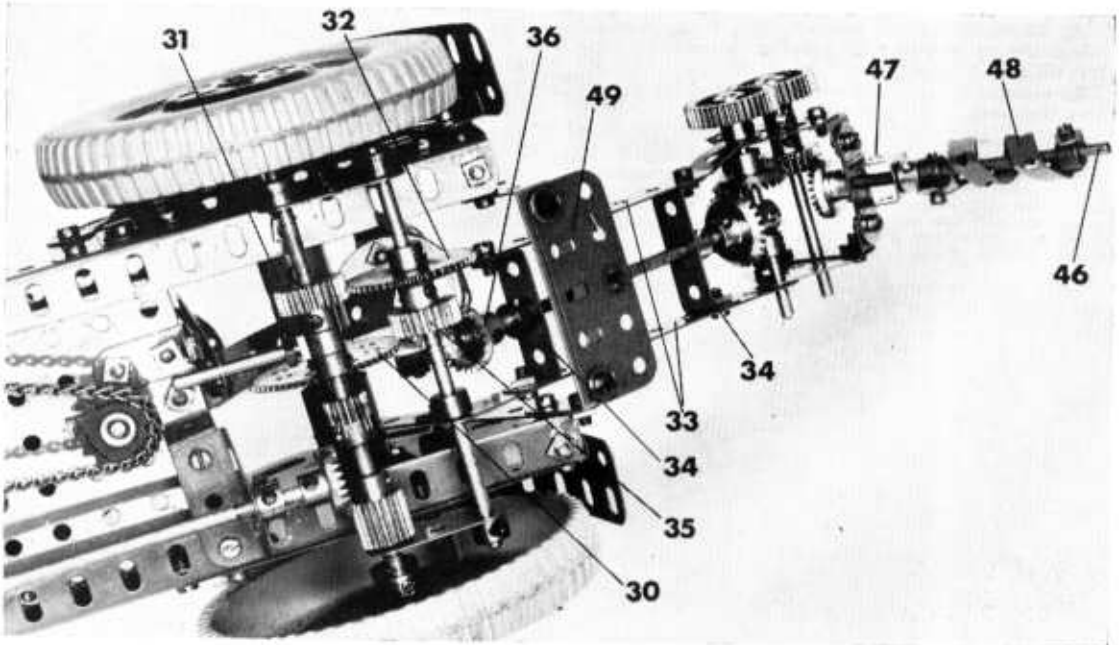
At right, top: A close up view of the transfer drive mechanism, as seen from beneath the model. If it is to work well gears must be positioned accurately.

At right, bottom: The boring attachment as it appears when removed from the model. The boring tool itself, can be driven at any angle.

HOLE BORING TRACTOR

by SPANNER

The real thing may be used for boring holes, but this appealing and working model won't bore you as you construct it.



AGRICULTURAL IMPLEMENTS hold considerable appeal for Meccano model-builders no matter whether they live in town or country. Our designer has, therefore, produced the appealing model pictured in the accompanying illustrations. At first glance you will recognise it as a tractor, but on closer inspection you will see that it is rather more than "just an ordinary tractor". What makes it so special?—The fact that it incorporates an ingenious working attachment intended for boring post-holes!

A single Power Drive Unit provides the operating power for both the Tractor and its attachment, although both cannot be driven simultaneously. Movement of a gear lever in the driver's position determines which is to be used and it is interesting to note that the boring attachment will continue to operate even while its working position and angle are being changed.

Chassis and steering

Dealing first with the chassis, the vertical flanges of two 9½ in. Angle Girders 1 are joined by two 3½ × ½ in. Double Angle Strips 2 and 3, and a 3½ × 2½ in. Flanged Plate 4. Bolted between the horizontal flanges of the Girders, on the other hand, are two 3½ in. Strips 5 and 6, Strip 5 being extended one hole at each end by a Crank 7. Free in the boss of this Crank is a 1½ in. Rod held in place by a Collar above the Crank and a Coupling 8 beneath it. Note that the Rod passes through one end transverse bore of the Coupling to leave room for a 4½ in. Strip 9 to be pivotally attached to it, the attachment being made by a ⅜ in. Bolt held in the other end transverse bore of the Coupling. Strip 9, of course, is used to connect the Couplings at each side of the model. The front 2½ in. Road Wheels are mounted loose on 1½ in. Bolts, screwed into the central transverse tapped bores of the Couplings.

Journalled in Strip 6 and in a Double Bent Strip bolted to the top of the Strip is a 2 in. Rod on which a 1½ in. Sprocket Wheel 10 and an 8-hole Bush Wheel are fixed. Bolted to the Bush Wheel is a 2 in. Slotted Strip 11, a Bolt held by a Nut in Strip 9 engaging in its slotted hole. Sprocket Wheel 10 is connected by Chain to a ¾ in. Sprocket Wheel on a 4 in. Rod 12 held by Collars in Flanged Plate 4 and in a Reversed Angle Bracket bolted to the top of the Flanged Plate. An 8-hole Bush Wheel 13 is mounted on the upper end of the Rod to act as a steering wheel.

Motor and drive

At this stage, it is advisable to fit the power-plant and drive mechanism to the model. A Power Drive Unit 14 is bolted to Strip 3 and Flanged Plate 4, the output shaft of the unit pointing forwards. A ½ in. Pulley on this output shaft is connected by a 6 in. Driving Band to a 1 in. Pulley 15 on a 5½ in. Rod journalled in the apex holes of two Trunnions 16, one bolted to Strip 6 and one Angle Girder 1, and the other bolted to a Double Bracket, attached to Flanged Plate 4, as well as to the same Angle Girder 1. Fixed on the end of the Rod, which is held in place by a Collar, is a ¾ in. Contrate 17.

Before going any further, the rear mudguards should each be built up from two 2½ × 1½ in. Triangular Flexible Plates 18 and a 3½ × 2½ in. Flexible Plate 19, all rounded off by two 3 in. Stepped Curved Strips 20. These Curved Strips are only bolted direct to the

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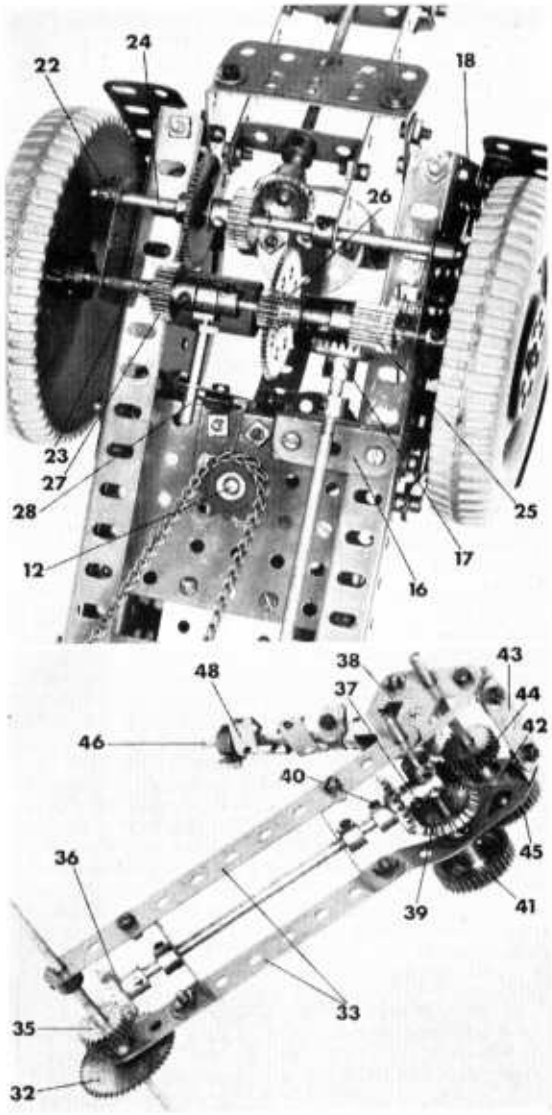


PARTS REQUIRED

2—2	2—16a	2—48b	2—126a
4—2a	1—17	1—53	2—163
3—3	3—18a	18—59	1—179
3—5	1—22	2—62	1—186
2—6a	1—23	3—63	2—187
2—8a	3—24	1—63d	2—187b
2—9a	3—25	2—74	1—188
2—9d	1—26a	4—89a	2—190a
1—11	1—26c	1—94	2—191
8—12	1—27	1—95a	2—215
1—12a	1—27d	1—96a	4—221
11—12c	3—29	2—103	1—235
1—14	2—30	1—103f	1—235a
1—14a	114—37a	2—111	1—335f
1—15	106—37b	1—111a	1 Power
2—15a	24—38	1—115a	Drive
1—15b	2—45	1—125	Unit.
1—16	1—46	2—126	
	4—48		

Triangular Plates, being secured to the Flexible Plate by the "trapping" action of two Washers on Bolts held by Nuts in the Flexible Plate. A shaped 5½ in. Flat Girder 21 is attached by Angle Brackets to the Stepped Curved Strips, as shown.

The mudguards are bolted to Angle Girders 1 along with two 1½ × 1½ in. Flat Plates 22, in which a 5 in. Rod 23 and a 4½ in. Rod 24 are journalled. Rod 23 carries a ½ × ½ in. Pinion 25, in constant mesh with Contrate 17, a 7/16 in. Pinion 26 and a loose Collar trapped between a fixed Collar and a ¾ in. Pinion 27. A Long Threaded Pin 28 is screwed into one threaded bore of the loose Collar, care being taken to see that it does not foul the Rod which must be free to slide a short distance in its bearings. Collars on the ends of the Rod prevent it from sliding too far. The shank of the Long Threaded Pin engages in the lower end hole of a 3 in. Narrow Strip 29, lock-nutted to a 1 × 1 in. Angle Bracket bolted to the rear underside of Flanged Plate 4.

Acting as the rear axle is a 5½ in. Rod held in Angle Girders 1 by Collars. A 60-teeth Gear 30, centrally-mounted on the Rod, lies between two Sleeve Pieces 31 bolted one each to Girders 1 and through which the Rod passes. A 4¼ in. Road Wheel is fixed on each end of the Rod.

Boring attachment

Movement of Narrow Strip 29 should bring Pinion 26 in or out of mesh with Gear Wheel 30, at the same time bringing Pinion 27 out of or in mesh with a 50-teeth Gear Wheel 32 fixed on Rod 24. In addition to the Gear, this Rod also carries two 5½ in. Strips 33, joined together by two 1½ × ½ in. Double Angle Strips 34, a ¾ in. Pinion 35 and three Collars, two of which are used to hold the Rod in position in Flat Plates 22.

In mesh with Pinion 35 is a ¾ in. Contrate Wheel 36 on the end of a 4½ in. Rod held by Collars on Double Angle Strips 34. The other end of this Rod is inserted half-way into the longitudinal bore of a Coupling 37 mounted transversely on a 2½ in. Rod, journalled in the end holes of two Flat Trunnions 38. Also mounted on the 2½ in. Rod is a Collar, a ⅞ in. Bevel Gear 38, in mesh with a similar Bevel 40 on the 4½ in. Rod, and a 1 in. Gear Wheel 41.

Bolted one each to Flat Trunnions 38 are two 1½ × ½ in. Double Angle Strips 42, the lugs of which are joined by 1½ in. Strips 43. Journalled in the Double Angle Strips and Flat Trunnions is a second 2½ in. Rod carrying a ¾ in. Pinion 44 and a 1 in. Gear Wheel 45, the latter in mesh with Gear 41. In mesh with Pinion 44, however, is a ¾ in. Contrate Wheel on a 3½ in. Rod 46, held by a Collar in one Strip 43 and in a Double Bent Strip 47 bolted to the Strip. This Rod 46 acts as the boring tool, made more realistic by a 5½ in. Narrow strip 48 twisted to shape and attached to two Collars fixed on the Rod.

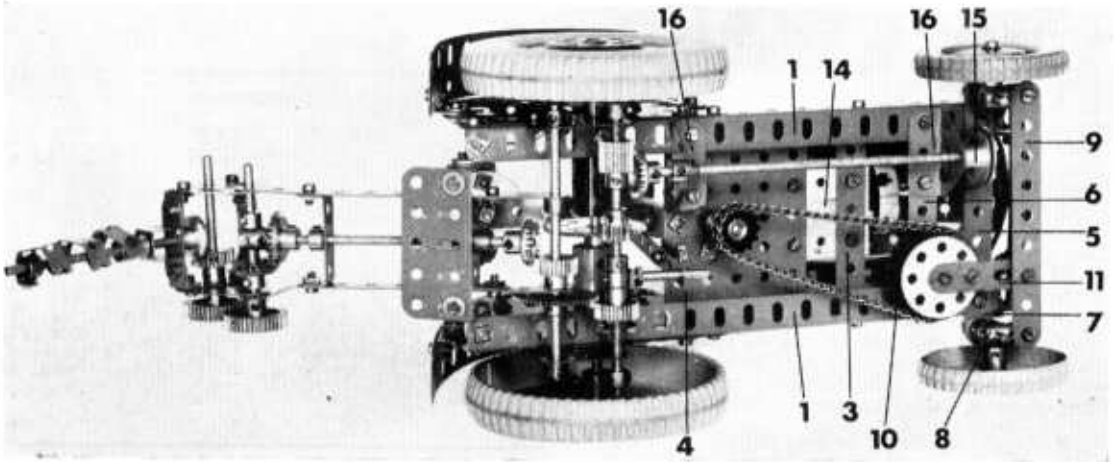
The position of the attachment is controlled by means of a handle built up from a 2½ × 1 in. Double Angle Strip to which a 2½ in. Flat Girder 49 is bolted and one lug of which is extended by a 4½ in. Strip 50.

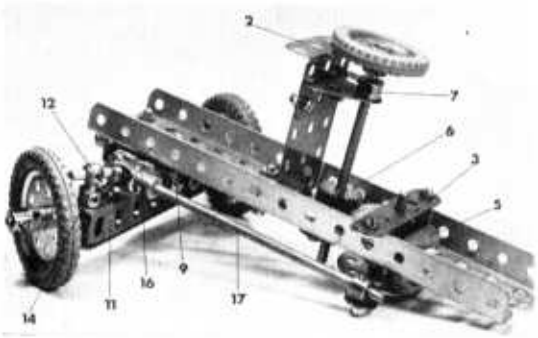
Engine cowling and seat

Turning to the engine cowling, this is best built separately and fitted to the model when completed. Each side consists of a 4½ × 2½ in. Flexible Plate 51, edged along the top by a 4½ in. Strip, along the forward side by a 2½ in. Strip and along the rear side by a 2½ in. Angle Girder 52. Angle Girders 52 are joined at the top by a 2½ in. Strip while, at the front, the sides are joined by two Formed Slotted Strips 53, attached by Obtuse Angle Brackets. A 2½ in. Narrow Strip 54, to which a third Formed Slotted Strip 55 is fixed, is bolted between Strips 53. The top consists of a second 4½ × 2½ in. Flexible Plate also attached by Obtuse Angle Brackets and extended by a 2½ × 1½ in. Flexible Plate 56 bolted to upper Strip 54. An exhaust pipe 57 is represented by a Collar and a Coupling, both mounted on a 1½ in. Rod in a Rod Socket fixed in the centre of the top Plate. The completed cowling is then bolted to two 4½ in. Angle Girders 58, secured to Flanged Plate 4, Double Angle Strip 3 and Angle Brackets bolted to the front ends of Girders 1.

Last, but by no means least, a seat is constructed from an 8-hole Bush Wheel 59, to which a shaped 3 in. Narrow Strip is attached by Obtuse Angle Brackets. The Bush Wheel is fixed by a ½ in. Bolt to a bent 3½ in. Strip 60 which is in turn fixed by a final Obtuse Angle Bracket to Flanged Plate 4.

A complete underside view of the model showing the layout of the chassis and the position of the attachment transfer-drive mechanism in relation to it.



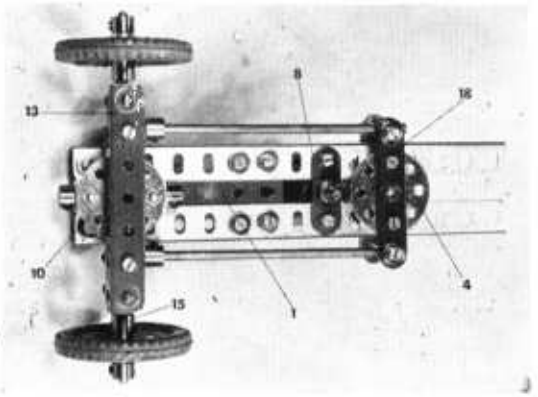


This Drag Link Steering System, designed and built by Pat Lewis of Formby, Lancashire, is intended for use in an agricultural tractor.

AMONG THE MODEL BUILDERS

with Spanner

ON PAGE 598 of this issue you will find full building instructions for an agricultural tractor fitted with an attachment for boring post-holes. Incorporated in the tractor is a working steering system—perfectly adequate for the model in question, but not what could be described as accurate from a realism point of view, as I will readily admit. Modern tractors often employ a drag-link steering system quite unlike the system fitted to the model and so I am giving first place in this article to a reasonably accurate drag-link method which is ideal for tractor models reproduced in Meccano. Strangely enough, it was designed by a member of Meccano's model-building staff, Pat Lewis of Formby, Lancashire, who built it up in his spare time at home for his son. (Meccano is also Pat's hobby, as you may have read in September's "Workbench"!)



An underside view of the Drag Link Steering mechanism showing construction of the chassis and drag link connections.

The following details apply to the mechanism as illustrated, although its design would vary depending on the model to which it was fitted. A 3 × 1½ in. Flat Plate 1, a 2½ × 1½ in. Flanged Plate 2 and a 2½ in. Strip 3 are fixed between two 7½ in. Angle Girders, the Strip being attached by Reversed Angle Brackets to the vertical flanges of the Girders. Bolted to the horizontal flanges of the Girders, in line with Strip 3, is a 1½ in. Strip which, along with the other Strip, provides bearings for a 1½ in. Rod on which an 8-hole Bush Wheel 4 and a 50-teeth Gear Wheel 5 are mounted. In mesh with Gear Wheel 5 is a ¾ in. Pinion 6 on a 3½ in. Rod held by Collars in a Trunnion 7, bolted to Flanged Plate 2, and in two 1½ in. Strips 8 fixed between Girders 1. A 1 in. Pulley with Motor Tyre is secured on the upper end of the Rod to serve as a steering wheel.

It is interesting to note, by the way, that this mechanism, like that fitted to a full-size tractor, is fitted with a "floating" front axle which is to say that the axle is centrally pivoted to move in the vertical plane. Bolted to the underside of Flat Plate 2 is a 1½ × ½ in. Double Angle Strip 9 to which another similar Double Angle Strip is pivotally attached by a 2 in. Rod held in place by Collars. Bolted to this second Strip is an 8-hole Wheel Disc 10 and to this, in turn, a 3½ in. Angle Girder 11 is bolted. Two Threaded Bosses are attached to this Girder, but are spaced from it by a Collar on the shank of each securing ⅜ in. Bolt 12. Fixed by ordinary Bolts to the lower ends of the Threaded Bosses is a second 3½ in. Angle Girder 13, the two Girders thus resulting in a "box" shape.

Journalled in the holes in each end of the Girders is a 1 in. Rod held in place by a Handrail Coupling 14 and a Collar positioned respectively above and below the upper Girder. A Rod Socket 15, carrying a 1 in. Rod, is screwed into one tapped bore of the Collar, then a 1½ in. Pulley with Motor Tyre is mounted loose on the Rod to be secured by a Collar. The Pulley must turn freely.

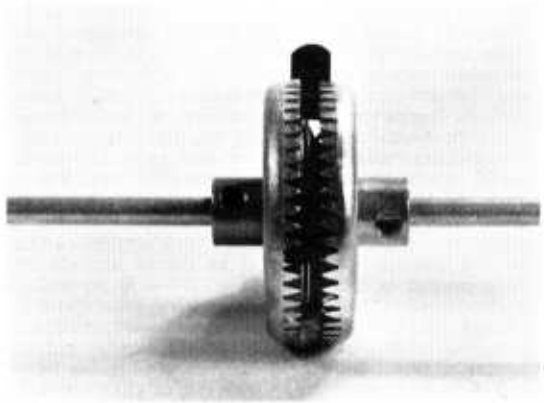
A further 1 in. Rod is now fixed in the head of Handrail Coupling 14. Mounted on this Rod is the "spider" of a Swivel Bearing 16 fixed on one end of a 4½ in. Rod 17, on the other end of which a Collar is mounted. This collar is pivotally connected to a 2½ in. Strip 18 bolted across the centre of Bush Wheel 4. Rod 17 at each side, of course, acts as the drag link.

The following Parts List applies to the unit as illustrated.

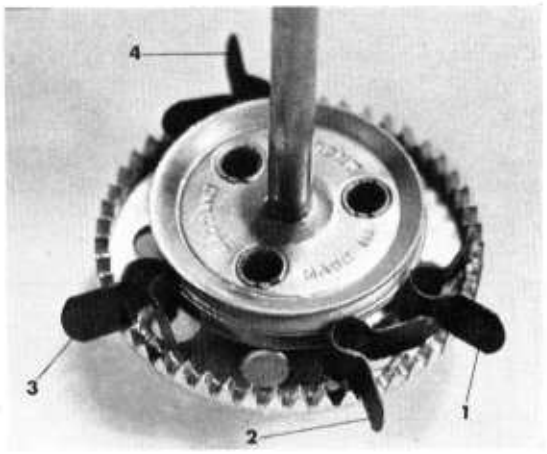
PARTS REQUIRED

2—5	2—21	1—51
3—6a	1—22	12—59
2—8b	1—24	2—64
2—9b	1—24a	1—73
2—12	1—25	2—111c
2—15a	1—27	1—126
1—16	22—37a	2—136a
1—17	26—37b	1—142c
1—18a	14—38	2—142d
6—18b	2—48	2—165
		2—179

Below: A simple, compact but extremely useful Adjustable Trip Mechanism designed by R. R. Hauton of Lincoln.



At right: In this view of Mr. Hauton's Trip Mechanism, one of the Contrate Wheels has been removed to show how basically simple the construction and layout of the mechanism is.



Below right: A 2 : 1 ratio Epicyclic Transmission Gear which has been re-built from the old pre-war Meccanno Standard Mechanisms Manual, mentioned last month.

Adjustable trip mechanism

In some models it can be necessary for a particular operation to take place, not continuously, but at specified intervals. The chimes of a clock, for example, do not ring out incessently, but only on the hour, half-hour or quarter-hour, as the case may be. In models such as this, where a particular operation is required to be brought into effect while the model as a whole is in motion, a trip mechanism is used to actuate the required operation, the trip usually being in constant motion along with the model.

M.M. reader R. R. Hauton of Lincoln, a man of many ideas, has sent me details of an extremely simple yet highly successful Trip Mechanism he has designed and which is shown in one of the accompanying illustrations. It consists of nothing more than a number of Spring Clips trapped between two 1½ in. Contrate Wheels, two 1 in. loose pulleys, also trapped between the Contrates, holding the Spring Clips in position.

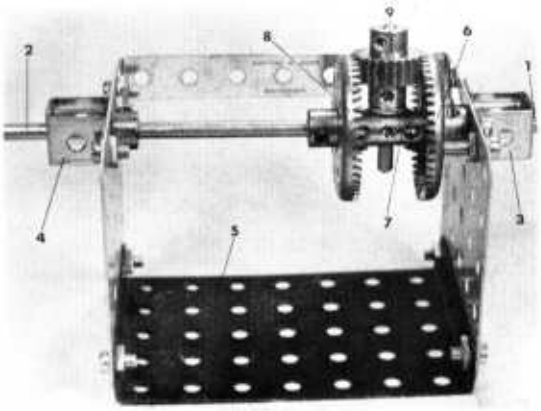
The beauty of this mechanism is that the positions of the Spring Clips can be easily altered to change the timing of the "trips". This timing can be very accurately set by counting the number of teeth between any two adjacent Spring Clips. In the example illustrated, for instance, we have used four Clips numbered 1, 2, 3 and 4. Clips 1 and 2 are separated by five teeth, Clips 2 and 3 by ten teeth and Clips 3 and 4 by 15 teeth, leaving 20 teeth between Clips 4 and 1. Taking the time between the first and second "trips" as the norm, therefore, the time between the second and third will be double, that between the third and fourth, treble, and between the fourth and the first again, quadruple. This proves the accuracy of Mr. Hauton's method.

PARTS REQUIRED		
2—22a	2—28	4—35

Transmission gear

I would like to finish this month with a further two simple mechanisms taken from the pre-war Standard Mechanisms manual mentioned in these pages last month. The first is an Epicyclic Transmission Gear designed to give a ratio of 2 : 1 between two shafts. Two Rods 1 and 2 are mounted in Double Bent Strips 3 and 4 bolted to suitable Flat Plates joined together by a 3½ × 2½ in. Flanged Plate 5. Double Bent Strip 3 is fixed by ½ in. Bolts. The input shaft 1 is free to turn in the boss of a 1½ in. Contrate Wheel 6, but is secured part-way in the longitudinal bore of a Coupling 7. Free to turn in the other end of this Coupling is the output shaft 2, on which a second 1½ in. Contrate Wheel 8 is fixed. Note, incidentally, that Contrate Wheel 6 is prevented from turning by the ½ in. Bolts securing Double Bent Strip 3, the Bolts fitting into holes in the face of the Contrate.

Continued on next page.



AMONG THE MODEL BUILDERS

Continued from page 605

Now secured in the centre transverse bore of Coupling 7 is a 1½ in. Rod on which a free-running ¾ in. Pinion 9 is held by a Collar. This Pinion meshes with both Contrates 6 and 8 so that, when the input shaft is turned, the Pinion travels round fixed Contrate 6, revolving as it does so. This, in turn, causes Contrate 8 to revolve, but at twice the speed thus resulting in a 2 : 1 ratio.

PARTS REQUIRED

1—15a	2—28	2—45	2—59
1—16	10—37a	1—48b	1—63
1—18a	8—37b	1—53	2—72
1—25	3—38		

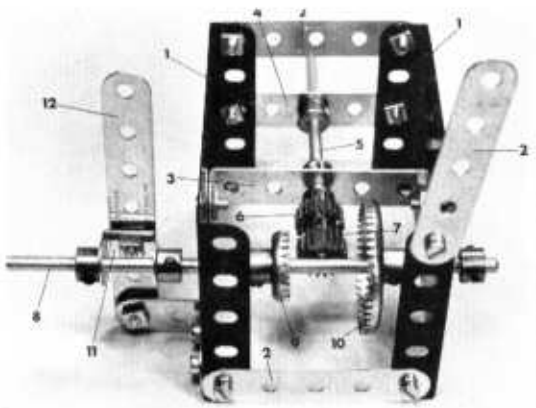
Reverse Gearbox

Finally we have our other pre-war mechanism which is a Two-speed Reverse Gearbox. A framework is built up from two 3½ × 2½ in. Flanged Plates 1 joined by four 2½ in. Strips 2, one at each corner. The centres of the Plates are joined by a 2½ × ½ in. Double Angle Strip 3 which, together with another 2½ in. Strip 4 positioned as shown, provides the bearings for a Rod 5 on which two ¾ in. Pinions 6 and 7 are mounted. A second Rod 8, free to slide in its bearings, is mounted in Plates 1. A ¾ in. Contrate 9 and a 1½ in. Contrate 10 are fixed on the Rod, movement of which should bring Contrate 9 into mesh with Pinion 6 or Contrate 10 into mesh with Pinion 7. The Rod is actuated by a Double Bracket 11, held between two Collars and lock-nutted to a 3½ Strip 12. This Strip is itself lock-nutted to a 1 × 1 in. Angle Bracket bolted to one Plate 1.

PARTS REQUIRED

1—3	1—14a	1—29	1—48a
5—5	1—15b	18—37a	2—53
1—11	2—26	16—37b	5—59
1—12a	1—28		

This Two-speed Reverse Gear-box is yet another example of a mechanism, first featured in the pre-war Standard Mechanisms Manual, which is just as useful today.



BATTLE

Part VII—The Use of Dice

by Charles Grant

HAVING TAKEN care of the Defence Value in respect to tanks, etc., the obvious thing to do is to follow up with a consideration of Attack Value of armoured fighting vehicles and to draw up a comparative table of the powers of the anti-tank guns whose ranges we have already discussed.

However, it might not come amiss at this stage before doing so, if we digress a little in favour of one very important point in "Battle". This concerns dice —how and in what circumstances we use them, and what effect they can have on the progress of the game.

First of all, the novice beginner in the study of the military art—of whatever period you like—quickly comes to the pretty obvious conclusion that, to control the actions of a unit or even of a few individuals in any sort of engagement is a very chancy and uncertain business. Someone once wrote that the conduct of military operations is an art rather than an exact science (or words to that effect) and nothing is truer at every stage and in every section thereof. It is believed that Napoleon was pretty off-colour on the day of Waterloo, and, because he was not feeling over perky, allowed his less competent generals to commit some dreadful boobs he would never have permitted had he been a hundred-per-cent fit. This is one end of the scale, when, on one occasion, a man's physical condition may have the most far-reaching effects on the conduct of great armies and the result of important battles. At the other extreme you might have a tank gunner, peering through his sights at an enemy and about to draw a bead on him, when a trickle of perspiration—it's hot inside a tank—rolls down his forehead and into his eye just at the psychological moment, causing his lining up of the target to be just a little out and converting a direct hit into a near miss when he lets fly before he was really ready. What I'm getting at is the fact that nothing—absolutely nothing—is dead certain in a battle or a campaign and always one must allow for what might be called the 'imponderable' (an impressive word, is it not?) which we can translate as plain, down to earth luck, good or bad. If "Battle" is to be a reflection of the conditions of the 'real thing', then, the rules must give proper allowance for this factor of uncertainty.

What it comes down to is that warfare is far from being as mathematically accurate as a game of chess, where the player moves his pieces in predetermined patterns. In "Battle" the pieces can move in all sorts of surprising ways, and not infrequently even refuse to obey the dictates of the player (although the latter can 'in extremis' decide to heave the table over—and it has indeed been done, but only by the more emotional type of battlegamer). So in "Battle" we attempt to simulate the 'imponderable' that obtains in 'the real thing' by having recourse to the use of those time-honoured cubes—the dice. Or if I may be pedantic, in the singular—the die. (These are, in passing, the ordin-