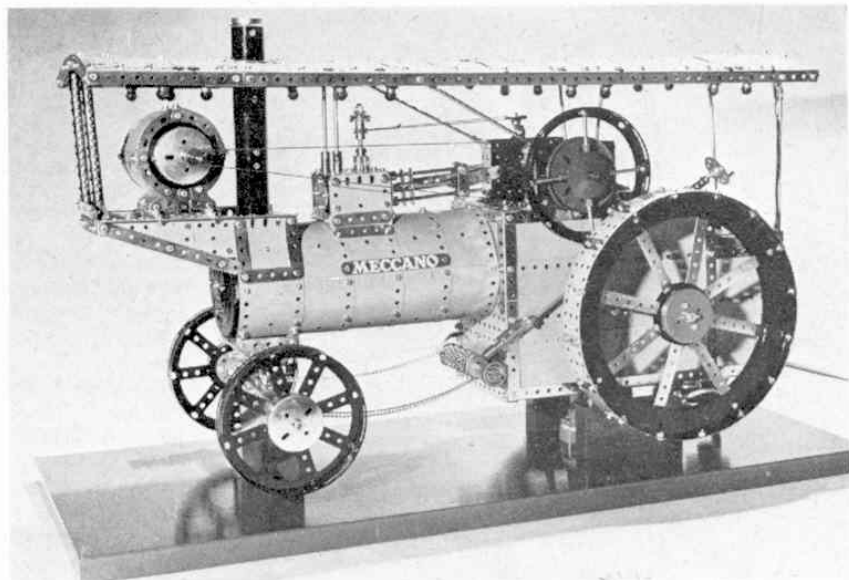


AT LAST!
Meccano Ltd's
much requested
display model
described for
readers by
' SPANNER '



THE SHOWMAN'S ENGINE

EVER SINCE we showed it on the front cover of the very first issue of the new M.M. way back in January, 1968, readers have asked for details. Modellers at large have seen it in dealers' windows and have asked for details. Even people who have not seen it have asked for details. Details of what? The large Showman's Traction Engine produced for display by Meccano Limited in Liverpool.

Meccano Limited, at their factory in Liverpool, have a special Model-building Department with a small but expert staff whose primary function is to produce a set range of interesting models exclusively for dealer display purposes. The Traction Engine is one of the models in the range—one of the most successful, which is no doubt why we have had so many requests for building instructions, but we have been unable to oblige. The problem is that all the display models are copied direct from original models used as patterns, and because of this, printed building instructions or plans are unnecessary therefore none have ever been prepared—until now, that is. In view of the continued interest in the Traction Engine we have at last written building instructions specially for Meccano Magazine and the first part of these appears here. Lack of space prohibits us from printing the complete instructions in one issue, however, and so they will be concluded next month.

The model, itself, is big—some 2½ ft. long by 1¼ ft. high by 1 ft. wide—but it is not really complicated. In fact, if built in the sections produced by Meccano's Model Department staff, it is not difficult at all.

Body

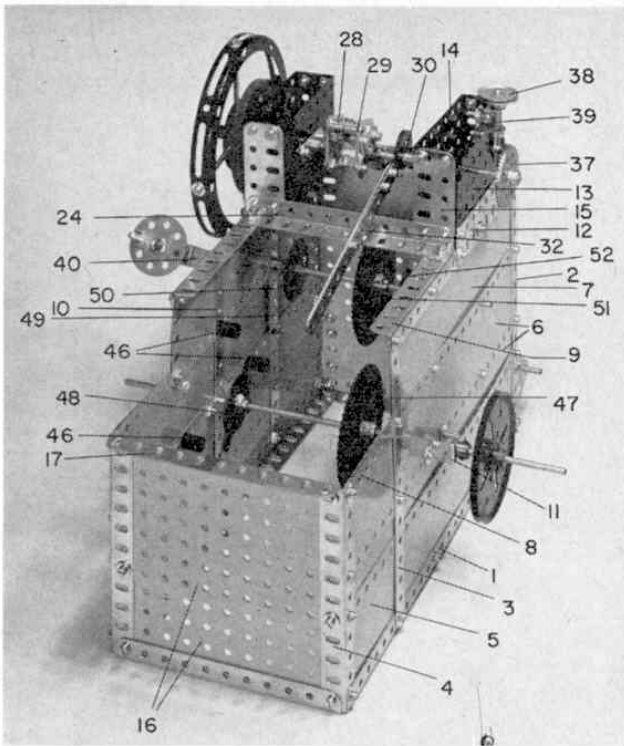
The body section is perhaps the most complex part of the whole Traction Engine to build as it incorporates the crankshaft, but it still does not qualify as being particularly difficult. Each side consists of a 12½ in. Angle Girder 1, to which are bolted in the positions shown, a 7½ in. Angle Girder 2, a 7½ in. Strip 3 and a 5½ in. Angle Girder 4, the securing Bolts fixing a

12½ × 2½ in. Strip Plate 5 in place. Two similar Strip Plates 6 and a 9½ × 2½ in. Strip Plate 7 are added to enclose the side then a 3½ in. Strip 8 is bolted between Strip 3 and the top of Girder 4, while a 9½ in. Angle Girder 9 is bolted between the top of Strip 3 and the top of Girder 2.

Inside the Plates, another 7½ in. Strip 10 is secured between the sixth hole from the rear end of Girder 9 and the corresponding hole of Girder 1. The ninth hole from the top of this Strip will later serve as one of the bearings for the main axle of the model, an additional bearing being supplied by a Double Bent Strip 11, bolted to the outside of upper Plate 6.

Attached by a 3½ in. Flat Girder 12 to Girder 9 is a 3½ × 2½ in. Flanged Plate 13, to the flanges of which a similar Flanged Plate 14 is secured by 2½ in. Flat Girders 15. Both sides of the body are then joined together, this being effected at the rear by two 5½ × 3½ in. Flat Plates 16, overlapped three holes, and a 5½ in. Angle Girder 17, all bolted between Angle Girders 4. At the front, the sides are joined by another 5½ in. Angle Girder 18, a 5½ × 2½ in. Flexible Plate, a 5½ × 3½ in. Flat Plate 19, another 5½ × 2½ in. Flexible Plate, to the lower edge of which a 4½ in. Strip 20 is attached by Rod Sockets 21, and a 5½ in. Angle Girder 22 to the centre of the vertical flange of which another Rod Socket is secured. Angle Girder 22 is also bolted between the forward ends of Girders 9, these being further connected by a 5½ × 1½ in. Flexible Plate, overlaid by a 5½ in. Strip 23, and by another 5½ in. Angle Girder 24, this Girder also being bolted to rear Flat Girders 15. A 1½ in. Strip is attached, as shown, to the front of Flat Plate 19 by a Bolt and a Rod Socket 25.

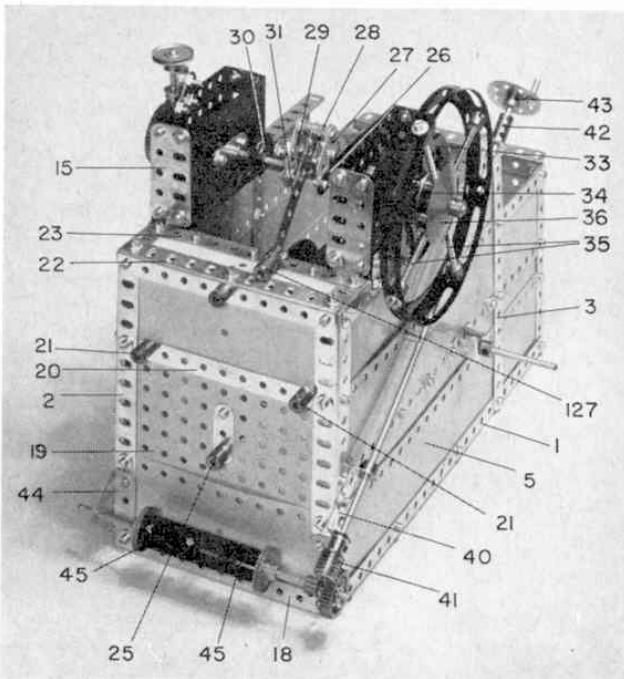
At this stage, the crankshaft can be added. This consists of two separate 4 in. Rods, each journalled in one set of Flanged Plates 13 and 14, two 1½ in. Strips first being bolted to each Plate 14 to provide extended bearings for the Rod. Mounted on the inside end of the left-hand Rod is a Collar followed by a Double



A rear view of the body section of the model showing the overall construction and the layout of the internally-mounted drive sprockets.

Arm Crank 26 to which a Flat Trunnion 27 is bolted. Bolted, in turn, to this Flat Trunnion is a Crank 28, the boss of the Crank coinciding with the apex hole of the Trunnion. Another Crank/Flat Trunnion/Double Arm Crank arrangement 29 is built up and mounted on the in-

A front view of the body section showing construction of the crankshaft and the first stage of the steering gear.



side end of the right-hand 4 in. Rod, along with a Single Throw Eccentric 30 and a Collar, then the bosses of the Crank and Crank 28 are connected by a 1 in. Rod, a 3 1/2 in. Strip 31 being mounted on the Rod between the Cranks. This Strip will later form part of the piston connecting rod, while two 5 1/2 in. Strips 32, placed one on top of the other and bolted to the arm of Eccentric 30, later serve as part of the valve gear linkage. The Collars on the 4 in. Rods, by the way, hold the crankshaft in place.

Now fixed on the left-hand end of the crankshaft is a 3 in. Pulley 33, followed by the flywheel. This latter is produced from an 8-hole Bush Wheel 34, to which four Threaded Bosses are attached, these being connected by 2 in. Screwed Rods 35 to four further Threaded Bosses bolted to the rim of a 5 1/2 in. Circular Girder. Clamped by a Collar against the flywheel is a Conical Disc 36.

Fixed on the opposite end of the crankshaft is a 1 1/2 in. Bevel Gear 37 which meshes with a 1/2 in. Bevel on a 2 in. Rod held by a 1 in. Pulley 38 in a Double Bracket, three Washers spacing the Bevel from the Double Bracket. The Double Bracket, itself, is spaced by another three Washers from a 1 in. Corner Bracket 39 to which it is attached by a 3/8 in. Bolt, the Corner Bracket being bolted to Flanged Plate 13.

Also mounted on the body section while still in its separate form is the first stage of the steering mechanism. Two 1 1/2 x 1/2 in. Double Angle Strips 40 are bolted one to left-hand Girder 2 and the other to Girder 9 to serve as bearings for an 11 1/2 in. Rod held in place by a Collar and a Worm 41, the upper end of the Rod being extended by a Coupling 42, carrying a 1 in. Rod on the end of which an 8-hole Bush Wheel 43 is fixed to serve as the steering wheel. A Threaded Pin is held in the face of the Bush Wheel.

In mesh with Worm 41, on the other hand, is a 1 in. Gear mounted on a 6 1/2 in. Rod, journaled in two Trunnions 44 bolted one to each Girder 2. Mounted on the Rod is the drum which later carries the steering chain. Because this particular Traction Engine is a special display model however this does not actually control the movement of the chain, but is simply allowed to revolve on its Rod, thus avoiding the danger of damage to the steering gear being caused by visitors "testing" the steering. It is produced simply from two Sleeve Pieces 45, on Chimney Adaptors, carried between two 1 in. Pulleys, but, if working steering is required, the 1 in. Pulleys could be replaced by 3/4 in. Flanged Wheels or, perhaps better still, the whole thing replaced by a Wood Roller.

Three Elektrikit Insulating Spacers 46 are now bolted to the left-hand side of the body in the position shown, then the main axle, supplied by an 11 1/2 in. Rod, is mounted in place, being held by Collars. Fixed on the axle are a 3 in. Sprocket Wheel 47 and a Commutator 48, the latter situated about half an inch from the Insulating Spacers. Although not shown in the accompanying photographs, three 2 in. Wiper Arms are secured to the inside ends of the Spacers, the upper Wiper engaging with the continuous contact area of the Commutator and the two remaining Wipers both engaging with the outer half-contact area of the Commutator. The Wipers will later be wired to lamps fitted in due course to the model.

To complete the body section of the model, two additional vertically-positioned 7 1/2 in. Strips 49 are bolted one to each side, these Strips providing bearings for a 6 1/2 in. Rod held in place by Collars. Fixed on the Rod are a 1 1/2 in. Sprocket 50, a 3 in. Sprocket 51 and a 1 in. Sprocket 52.

Boiler Section

We come next to the boiler section of the Traction Engine, this also including the cylinders, chimney and generator. Four formers are first produced, the two side examples 53 each from two $9\frac{1}{2}$ in. Strips overlapped seventeen holes, the upper example 54 from two $9\frac{1}{2}$ in. Angle Girders overlapped seventeen holes and the lower example 55 from one $9\frac{1}{2}$ in. Angle Girder and one $9\frac{1}{2}$ in. Strip also overlapped seventeen holes. At the front, formers 53 are connected by a $4\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 56, a similar Double Angle Strip being bolted between formers 54 and 55, then twenty $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates, curved to shape, are bolted around all four formers, as shown, to form the main cladding.

The cylinder unit is built up from two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plates 57, to the flanges of which two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 58 are bolted, Threaded Bosses being used in place of Nuts with the upper Bolts. Note that the Bolts are screwed into the transverse bores of the Bosses, while fixed to the top of the unit by Bolts screwed into the longitudinal bores of the Bosses, is a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 59, to which two Threaded Couplings 60 and a Double Bent Strip 61 are bolted. Another Double Bent Strip, vertically-mounted, is secured to the inside of rear Flanged Plate 57, being held by Rod Sockets 62, these Sockets also fixing a 1 in. Corner Bracket and an 8-hole Wheel Disc 63 to the front of the Plate. The Corner Bracket, positioned beneath the Bush Wheel, is arranged so that its apex hole coincides with the centre hole in the Wheel Disc. Because of this, it is held only by upper Rod Socket 62, its other corner being fixed by a Bolt.

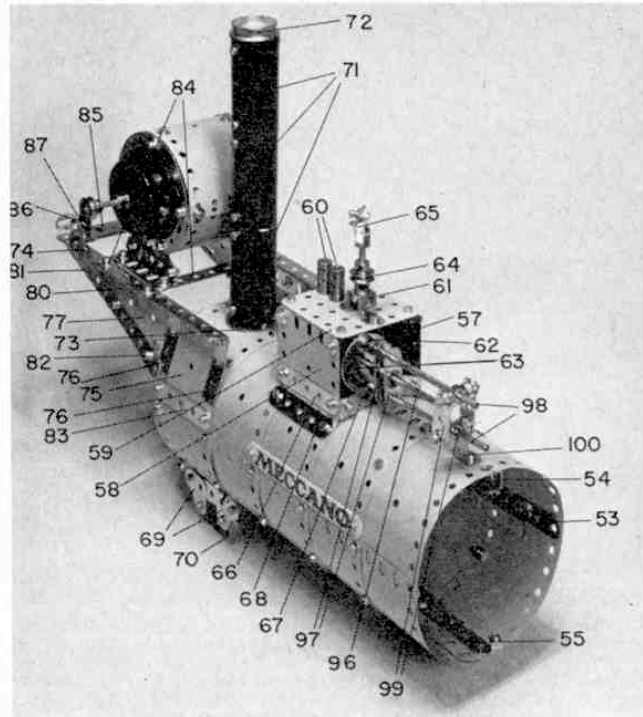
Another 8-hole Wheel Disc is bolted to the front of forward Flanged Plate 57, then a $2\frac{1}{2}$ in. Rod is held by Collars in Double Bent Strip 61 and Flat Plate 59. Fixed on the upper part of this Rod is a $\frac{1}{2}$ in. pulley 64 and an imitation governor 65, represented by an End Bearing to which two Rod and Strip Connectors are bolted.

Now fixed to the inside of each Flexible Plate 58 is a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip, the securing Bolts also fixing a $2\frac{1}{2}$ in. Strip 66 to the outside of the Plate. The lugs of the Double Angle Strips at each side are connected by a $2\frac{1}{2}$ in. Curved Strip 67, then the lower parts of Plates 58 are bent to shape, overlaid by a $2\frac{1}{2}$ in. Strip 68 and bolted to the top of the boiler.

Bolted beneath the boiler, at the front, are four Obtuse Angle Brackets forming the anchoring points for the perch bracket which later holds the front axle. The perch bracket, itself, is built up from a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plate to each flange of which two 1 in. Corner Brackets 69 are bolted, these Corner Brackets being joined by a $2\frac{1}{2}$ in. Strip. Two $2\frac{1}{2}$ in. Angle Girders 70 are then fixed one to the forward edge and one to the rear edge of the Flanged Plate, two Fishplates being bolted to opposite ends of the vertical flange of each of these Girders. A $2\frac{1}{2}$ in. Curved Strip is bolted between each pair of Fishplates.

The Bolts fixing Girders 70 to the Flanged Plate also secure a Double Arm Crank to the inside of the Flanged Plate, the boss of the Crank coinciding with the centre hole in the Plate. Held by Collars in this boss and projecting downwards through the Plate is a $1\frac{1}{2}$ in. Rod on which the front axle will in due course be pivoted.

In the case of the chimney, three Cylinders 71 are fixed together by two $7\frac{1}{2}$ in. Strips bolted down the inside of the Cylinders. The upper and lower pairs of securing Bolts each hold a $2\frac{1}{2}$ in. Strip, curved between them to allow it to fit, these Strips providing bearings for an $11\frac{1}{2}$ in. Rod fixed in a Collar secured inside the



The entire boiler section of the Traction Engine complete with the cylinders, chimney, generator and perch bracket. Construction is not as complicated as it looks.

middle Cylinder by two $\frac{1}{2}$ in. Bolts. A $1\frac{1}{2}$ in. Flanged Wheel 72 is secured on the upper end of the Rod, which is then mounted in an 8-hole Bush Wheel 73, bolted to the top of the boiler, and in the longitudinal bore of a Threaded Coupling bolted to former 55, but spaced from it by a Collar on the shank of the securing Bolt.

Generator and Bracket

Projecting forward from the front of the main boiler section is the generator bracket, each side of which consists of a $7\frac{1}{2}$ in. Angle Girder 74 to which are bolted a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 75, edged by two $2\frac{1}{2}$ in. Strips 76, a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 77, a $3\frac{1}{2} \times 1\frac{1}{2}$ in. Triangular Flexible Plate 80 and a $5\frac{1}{2}$ in. Strip 81, the last attached to Plate 77 by a Fishplate held by Bolts 82. The Plates and Strips are curved slightly to shape, as can be seen, then Strips 76, with Plate 75, are bolted to the boiler, the securing Bolts also fixing another $2\frac{1}{2}$ in. Strip 83 in place.

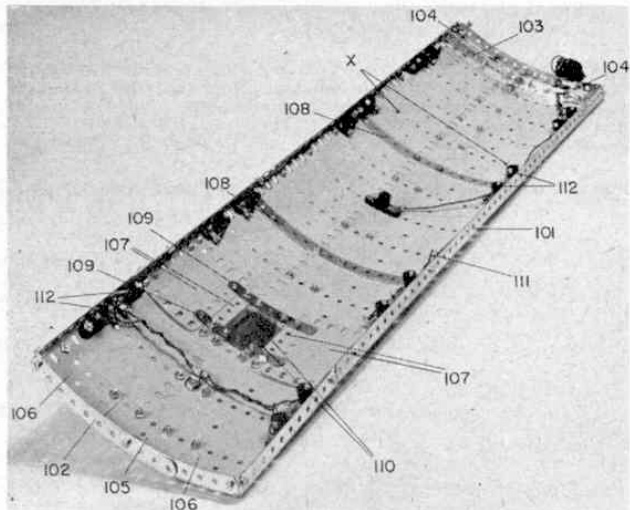
Girders 74 at each side are connected through their fifth and ninth holes from the front by two $4\frac{1}{2}$ in. Strips 84 and, at the front, by a $3\frac{1}{2}$ in. Angle Girder 85, secured to Girders 74 by $1 \times \frac{1}{2}$ in. Angle Brackets. Fixed to each end of Girder 85 is a right or left-hand Corner Angle Bracket 86, depending on the end, and a Threaded Coupling 87, the latter holding the Corner Angle Bracket in place.

The generator, itself, is built up from two circular arrangements consisting of four $2\frac{1}{2}$ in. Stepped Curved Strips 88, bolted together, the securing Bolts also fixing four 1×1 in. Angle Brackets in place. Bolted to the horizontal lugs of these Angle Brackets are two $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 89, while fixed by a Nut in the end hole of the protruding vertical lug of each bracket at one side is an ordinary Bolt, shank pointing

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outwards, this Bolt at the other side being replaced by a $\frac{1}{2}$ in. Bolt. Two 1 in. Corner Brackets 90, joined by a $2\frac{1}{2}$ in. Angle Girder 91 are bolted to each Curved Strip assembly, then a Face Plate is fixed by Nuts on the protruding shanks of the four ordinary Bolts held in one set of 1×1 in. Angle Brackets. At the other side, another Face Plate 92 is mounted on the shanks of the protruding $\frac{1}{2}$ in. Bolts, but note that, in this case, it is secured only by two Threaded Bosses on horizontally opposite Bolts. A Boiler End 93 is slipped over these Bosses and secured by Universal Coupling Studs screwed into the transverse bores of the Bosses. Journalled, free, in the centre hole of this Boiler End and in the bosses of the Face Plates is a 5 in. Rod held in place by Collars. A $\frac{1}{2}$ in. Pulley 94 is fixed on the protruding end of the Rod.



An underside view of the canopy removed from the model. Great care must be taken when mounting and wiring the Elek-trikit Lamp Holders.

Once completed, the generator can be secured to the generator bracket by bolting Angle Girders 91 to Strips 84. Before this is done, however, a Ball Thrust Race Toothed Disc 95 is fixed by $\frac{3}{8}$ in. Bolts to Double Angle Strips 56 at the front of the boiler. A Rod and Strip Connector is bolted to the centre of the Toothed Disc to represent the smokebox door handle.

Now is also an opportune moment for fitting the piston rod and its slide bars. The piston rod, sliding in Wheel Disc 63 and Flanged Plate 57, is supplied by a $5\frac{1}{2}$ in. Rod 96 on which two Double Arm Cranks 97 are fixed. Passed through the holes in the arms of these Cranks are two 4 in. Rods 98 secured in Rod Sockets 62. Mounted towards the opposite ends of these Rods are two 4-hole Collars between which two pairs of $1\frac{1}{2}$ in. Strips 99 are fixed, the Strips being spaced from the Collars by three Washers on the shank of each securing Bolt. Fixed, in addition, on the lower right-hand securing Bolt is a $1 \times \frac{1}{2}$ in. Angle Bracket 100, the short lug of which is bolted to the top of the boiler.

Canopy

Coming, next, to the canopy, two 30 in. compound angle girders 101 are each produced from one $24\frac{1}{2}$ in. and one $5\frac{1}{2}$ in. Angle Girder, butt-jointed together by a $2\frac{1}{2}$ in. Angle Girder, then the girders are connected at each end by a $7\frac{1}{2}$ in. compound curved strip 102, attached to the girders by Angle Brackets, the compound

curved strip consisting of two $5\frac{1}{2}$ in. Curved Strips overlapped seven holes. Another similar compound curved strip 103 is also attached by Angle Brackets to girders 101, through their fourth holes from the rear end, two 1 in. Corner Brackets 104 being bolted to this strip. A Rod and Strip Connector is secured to each Corner Bracket. The canopy is then covered mainly by twenty-six overlapping $4\frac{1}{2}$ in. \times $2\frac{1}{2}$ in. Flexible Plates arranged as shown, but also by one $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 105, two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates 106 and four $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 107. Strengtheners are provided by two curved $7\frac{1}{2}$ in. Strips 108 bolted between girders 101 beneath the canopy and another two similar Strips on top of the canopy, these being bolted between the ends of girders 101.

A study of the appropriate accompanying photograph will show that the Flexible Plates in the canopy are so arranged that a gap is left for the chimney. This gap is edged, on the underside of the canopy, by two $3\frac{1}{2}$ in. Strips 109 and, on the top of the canopy, by two $1\frac{1}{2}$ in. Strips between which two $2\frac{1}{2}$ in. Stepped Curved Strips 110 are bolted. Two further Rod and Strip Connectors 111 are bolted one to each compound girder 101 through its twenty-fifth hole from the front.

Fixed to the underside of the canopy in the positions shown are seventeen Elektrikit Lamp Holders 112. Care must be taken with these, however, as one terminal of each must be properly earthed while the other must be insulated. The earthed side is simply secured in place with a standard Meccano Nut and Bolt, but, for the insulated side a thin non-Meccano 6 BA bolt is used in conjunction with a fibre washer, great care being taken to ensure that no part of the bolt touches any metal part of the model. (The Meccano Bolt must, of course, make good contact with the metal of the model to ensure proper earthing).

The Lamp Holders are wired together in two separate circuits, the insulated terminals of the first, third, fifth, etc., Holders being connected in one circuit and the insulated terminals of the second, fourth, sixth, etc., Holders in the other circuit. Insulated Wire is used in both cases, of course.

PARTS REQUIRED

5-1a	4-15b	3-52a	1-118
13-1b	2-16	4-53	2-126
7-2	2-16a	35-59	2-126a
18-2a	1-17	4-62	1-130a
8-3	1-18a	6-62b	12-133a
14-5	1-18b	13-63	2-136
45-6a	2-19b	1-63b	2-137
2-7	1-20	5-63c	1-143
2-8	4-22	10-64	1-154a
4-8a	2-23a	1-72	1-154b
6-8b	8-24	4-81	3-162a
7-9	2-24a	6-89	2-163
1-9b	1-30a	4-90	4-164
6-9d	1-30c	10-90a	1-166
2-10	1-31	2-94	4-167b
2-11	1-32	3-95a	1-168b
16-12	574-37a	2-95b	8-179
8-12a	545-37b	1-96	1-187a
2-12b	187-38	2-103d	38-188
4-12c	1-40	4-103f	2-189
4-13	2-45	6-109	4-190
6-14	2-48	32-111a	4-190a
5-14a	2-48c	5-111c	46-191
1-15a	3-51	1-115	4-192
2-196	1-212a	3-533	3-564
6-197	3-216	17-539	17- $\frac{1}{16}$ 6 BA bolts
10-212	2-224	1-551	17-fibre washers
			1-electric motor

TO BE CONCLUDED NEXT MONTH