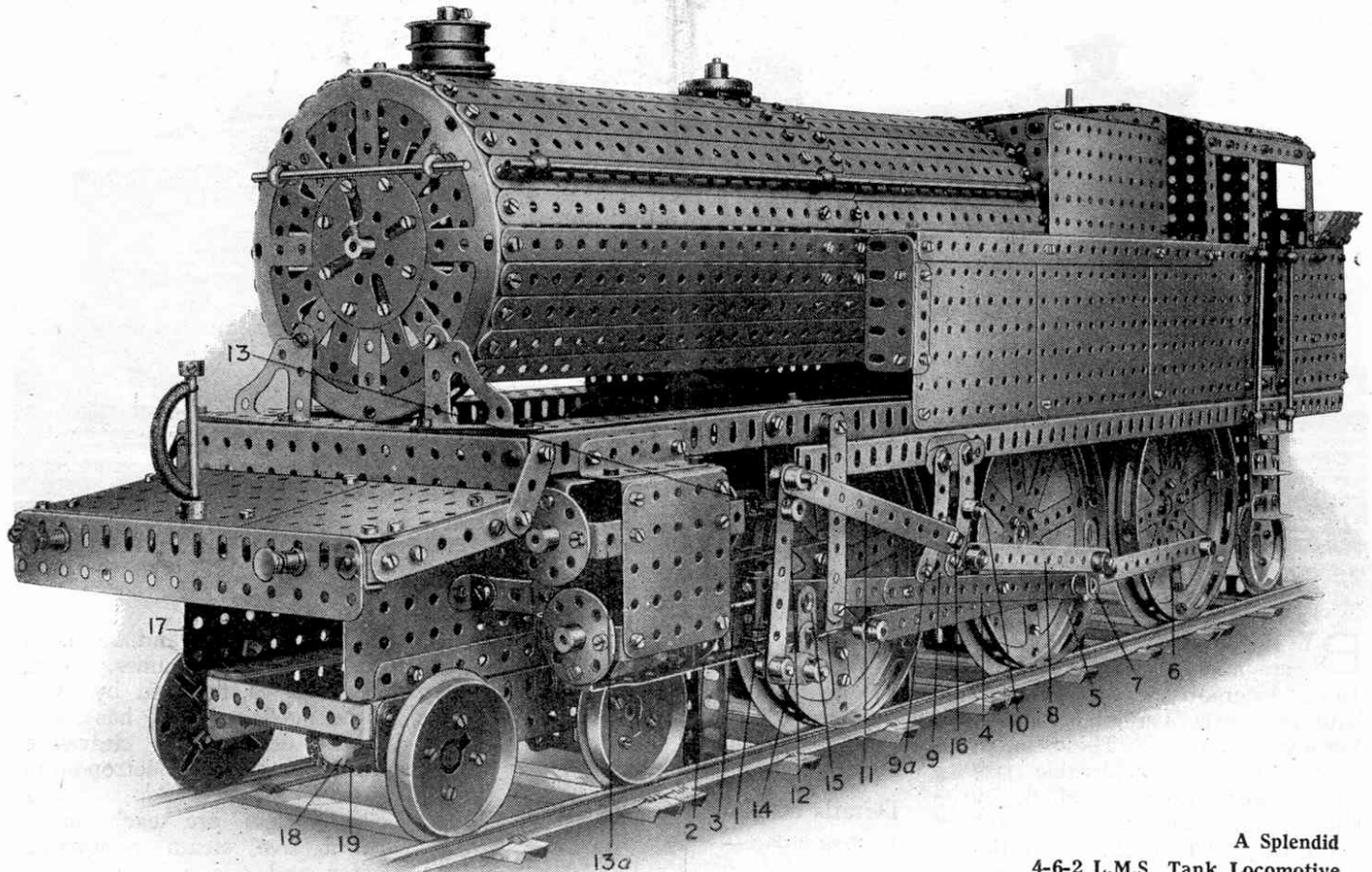


# Loco-Building with Meccano

## A New Meccano Loco fitted with Walschaerts Valve Gear



A Splendid  
4-6-2 L.M.S. Tank Locomotive  
constructed entirely with Meccano

THE construction of a locomotive in Meccano not only provides an exacting test as to the adaptability of the system, but also requires no little ingenuity on the builder's part to make the model a working success. Several of the recently designed Meccano parts lend themselves more readily to this type of model-construction, however, and we are pleased to note the increased number of Meccano boys who are busy designing models of locos and other railway subjects. It would appear that new parts proving most valuable in this connection are Face Plates, Wheel Flanges, Circular Girders, Circular Plates, and Hub Discs. These are supported, of course, by such old friends as Flat Plates, Cranks and Couplings.

Our Model Department, also, have been very busy loco-building, and the result of their efforts appears on this page in the form of a "super" model of an L.M.S. Tank Engine. This is a very complete and realistic model, which is a delight to see in motion. Boys who are the fortunate possessors of a sufficiently-elaborate Outfit would do well to copy it as closely as possible.

The cylinder and valve mechanism—undoubtedly the

most striking feature of the model—affords an opportunity of a very interesting study of Walschaerts valve gear. All the essential elements are faithfully reproduced, and the Meccano boy who builds this model will thereafter be in possession of a thorough knowledge of the operation of this intricate valve gear. The following brief explanation should help to make clear any details in its construction not fully shown in the illustrations.

### How to Build the Model

The piston, connecting, and coupling rods should be placed in position first. The crosshead (1) is composed of a Coupling mounted between Eye Pieces sliding on guide strips (or slide bars) (2), and an additional Strip Coupling, mounted on the end of the piston rod (3) carries the connecting rod (4). The latter is pivoted to the crank pin on the centre driving wheel (5). The coupling rod (6) is also journalled on this crank pin and on the crank pins of the leading and trailing driving wheels, thus imparting the motion of the piston over the three wheels.

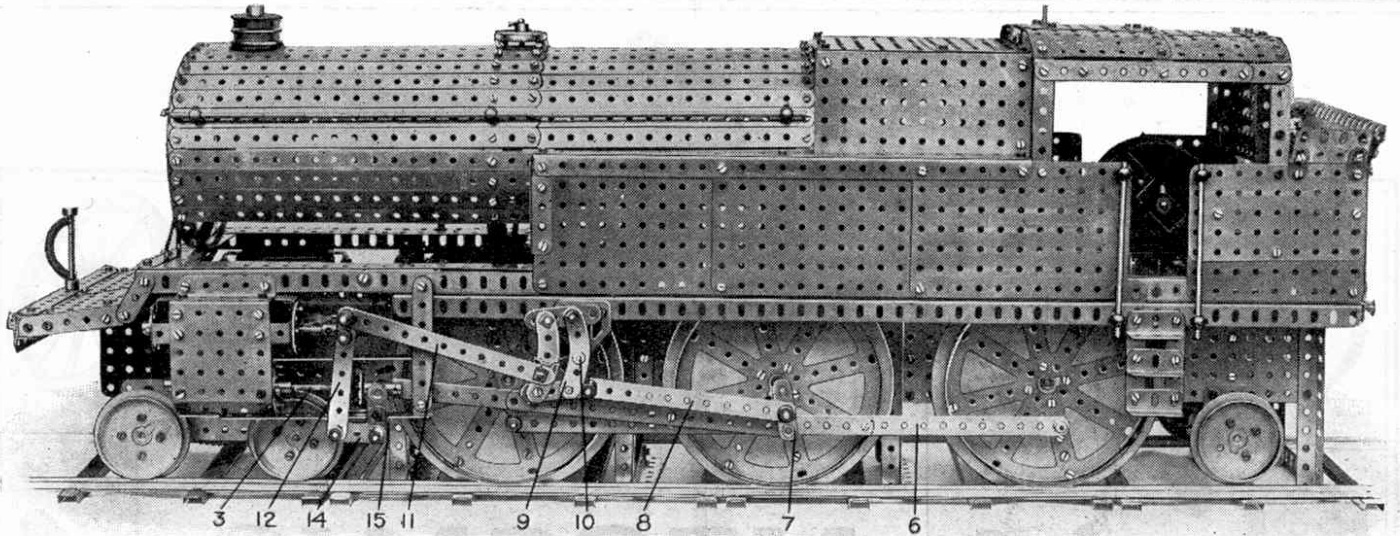


Fig. B. Another view of the New 4-6-2 Tank Loco

The crank pins consist of short Rods passed through the driving wheels and secured in Cranks bolted to their inner sides. A Crank (7), rigidly secured to the pin of the centre driving wheel (5), pivotally carries the return crank rod (8), and the latter, in turn, is pivoted to the outer end of a short Slotted Strip forming the base of the link (9), which is constructed from  $2\frac{1}{2}$ " Curved Strips. The link rocks about a pivot (10) and pushes to and fro the radius rod (11), which is pivoted to the upper hole of the combining lever (12). This lever (12) is journalled on a short Rod secured in a Coupling (13) mounted on the end of the piston valve rod sliding in the valve chest (13A), and is connected pivotally to a guiding link (14). The latter is pivoted to a Crank (15) secured to a short Rod mounted in the Strip Coupling on the end of the piston rod.

It will now be seen that, as the piston (3) moves to and fro, the combining lever (12) is rocked in different directions by the radius rod (11) and guiding link (14), and imparts a sliding movement to the valve rod (13). The radius rod (11) is pivoted at (16), by means of bolt and lock-nuts, to an Eye Piece, representing the link block, sliding on the strip (9A) of the link (9), and by moving this link block up or down the strip (9A), the direction and "throw" of the piston valve is altered. In actual practice the link block is connected to a lever in the cab, so that the driver may move the link block to any position in the link that he may desire. For example, by moving the block (16) towards the pivot (10), the throw of the radius rod (11) is diminished, until it reaches its minimum when the block (16) is at the centre of the link (9). Further movement of the block to any point above the pivot (10) reverses the direction of the valve rod (13), and consequently reverses the order in which the cylinder valves open, so causing the locomotive to run in an opposite direction.

Unfortunately, space does not permit a detailed

explanation of the steam "cut-off," which is effected by the alteration to the throw of the radius rod (11). It must suffice to remark that the inlet valve of the cylinder is held open for a period varying with the throw of the radius rod. Thus when the combining lever (12) is rocked to its fullest extent, the maximum amount of steam is admitted to the cylinder; as the loco increases in speed, however, the radius rod is moved towards the centre of the link, so admitting a much smaller amount of steam to the cylinder.

#### Constructional Details

An interesting feature in the construction of the model will be noticed in the boiler assembly; this is built up from a series of  $9\frac{1}{2}$ " Strips bolted together with five holes overlapped and secured at either end, and in the centre, to Hub Discs. The front of the boiler is composed of eight Flat Trunnions, bolted from the inner side of the Hub Disc to a Face Plate on the outer side. The side water tanks, fire box, coal bunker and cab roof are constructed from Flat Plates, and the sides of the wheel base, through which the driving axles are journalled, are built up from a number of  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates (17) bolted to Angle Girders. The large driving wheels consist of Hub Discs and Circular Plates bolted together, while the bogie and trailing wheels are made from

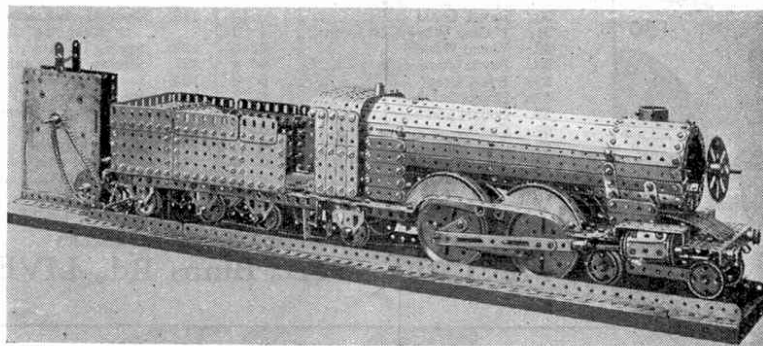


Fig. C. A Meccano "Atlantic" loco by W. Kendrick, of Warrington

Face Plates and Wheel Flanges.

#### How the Loco Works

The loco is shown lifted clear of the rails and resting upon short Girders secured to different points in the frame. The driving, bogie, and trailing wheels are all driven from an Electric Motor bolted to the footplate in the cab, and the piston, valve gear, and connecting rods are set in motion as the driving wheels revolve. The drive from the Motor is led through reduction gearing, consisting of three 57-teeth Gear Wheels and three  $\frac{1}{2}$ " Pinions, on to a shaft carrying a  $\frac{3}{4}$ " Sprocket



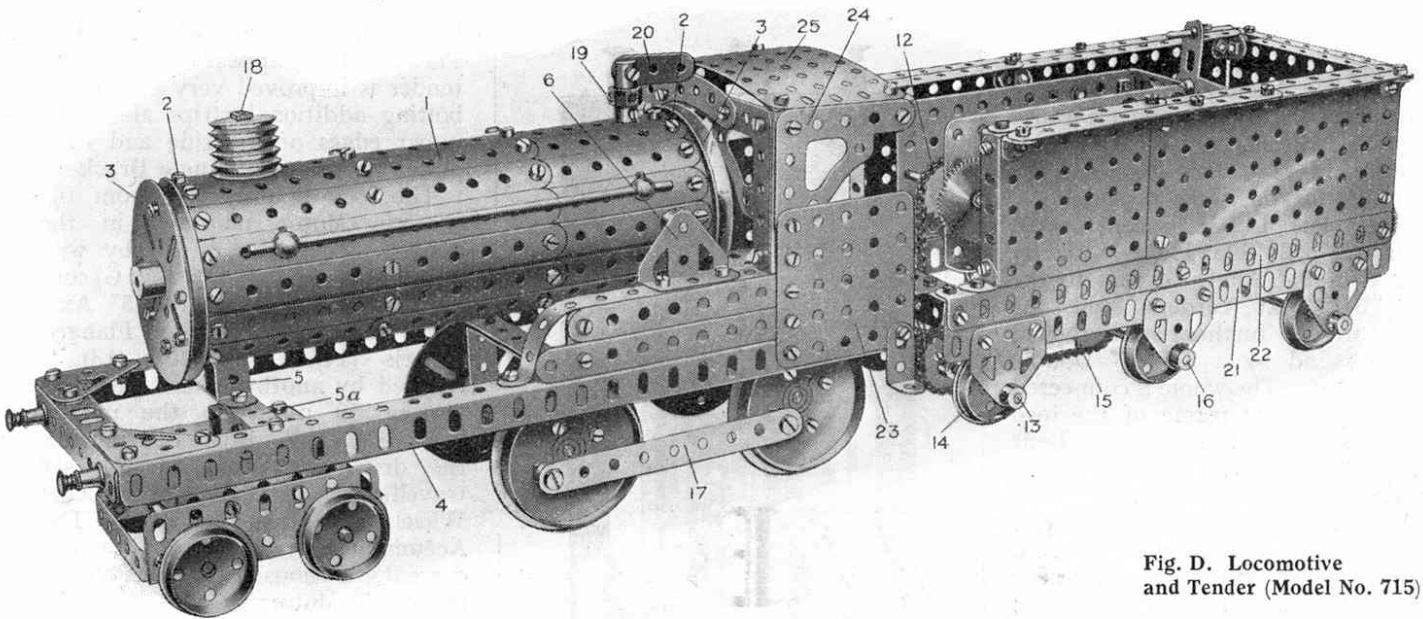


Fig. D. Locomotive and Tender (Model No. 715)

Wheel. The latter is connected by chain to a 2" Sprocket Wheel secured to the axle of the trailing driving wheels ; this axle also carries a 1" Sprocket Wheel gearing by chain with a similar Sprocket on the centre driving axle, which in turn is connected to the leading driving axle by the same method.

The trailing wheels are rotated by means of Sprocket Chain engaging between a  $\frac{3}{4}$ " Sprocket Wheel on their axle and a  $1\frac{1}{2}$ " Sprocket secured to the axle of the trailing drivers. The rear axle of the bogie is driven in the same way from the leading driving axle, while the front bogie wheels are caused to rotate by means of a 1" Sprocket Wheel (18) engaging a length of chain (19) gearing with a similar Sprocket on the rear bogie axle.

The Sprocket Chains driving the trailing and bogie wheels should be disconnected if the loco is required to run upon the rails. A suitable length of track for this model may be constructed from Angle Girders, bolted down to shorter Girders representing the sleepers.

**Another Fine Model (No. 715)**

The 4-4-0 engine and tender shown in Fig. D will be included in the new 1925 Manual of Instructions, and is built with Outfit No. 7. Directions for its construction are given below, and Meccano boys will find this splendid model quite simple to build. A length of suitable Meccano track may be formed from Angle Girders, as already described, and many hours of enjoyment may

be obtained by running the loco on this.

Each end of the boiler is formed from a  $5\frac{1}{2}$ " Strip bent to the curvature of a 3" Pulley (3) and bolted to the latter by means of Angle Brackets. The shell of the boiler, built up from a series of  $5\frac{1}{2}$ " Strips (1) overlapped six holes, is bolted at each end round the bent  $5\frac{1}{2}$ " Strips attached to the Pulleys 3. It will be seen from the underside view of the loco shown in Fig. F that the ends of the bent  $5\frac{1}{2}$ " Strips do not meet below the boiler, but two further  $5\frac{1}{2}$ " Strips, bolted together and overlapped six holes, are secured to Angle Brackets carried from the lowest holes of the 3" Pulleys (3).

The base frame of the loco consists of  $12\frac{1}{2}$ " and  $4\frac{1}{2}$ " Angle Girders, and supports the boiler on two Double Bent Strips (5) bolted to transverse  $4\frac{1}{2}$ " Strips (5A, Fig. F).

Two Trunnions (6, Fig. D), one on either side of the boiler, are bolted to the wheel guards, and support the ends of a  $3\frac{1}{2}$ " Rod which, passing through the  $5\frac{1}{2}$ " Strips (1) and secured at either side by a Collar and set-screw, rigidly holds the

boiler in position on the Double Bent Strips.

**Cab, Bogie and Connecting Rods**

The foot-plate of the cab is formed by bolting a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate to the frame, and to the underside of this is bolted a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Double Angle Strip (7), which forms a bearing for one of the driving axles, while the forward driving wheels are carried from a similar Double Angle Strip (8) bolted to a  $4\frac{1}{2}$ " Strip secured to the frame.

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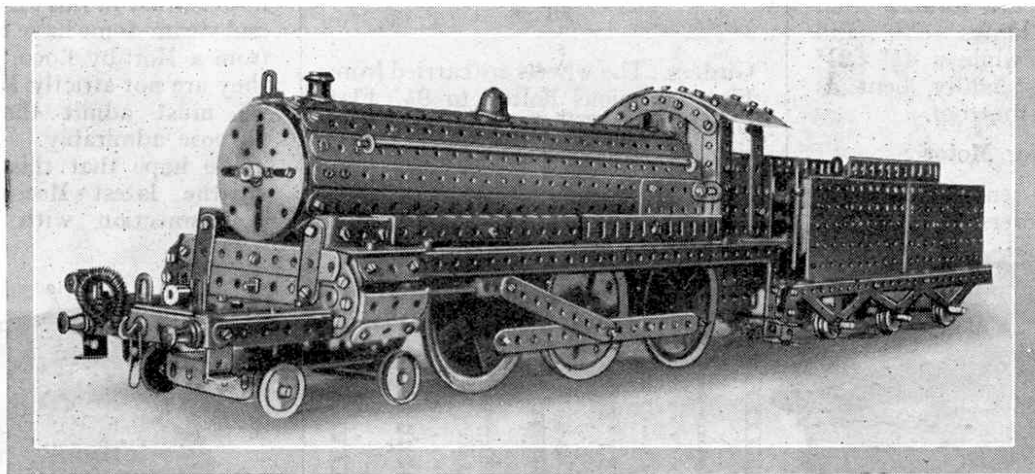


Fig. E. Another excellent Meccano Loco sent in by a reader of the "M.M."

(Continued from page 451)

Two  $2\frac{1}{2}$ " Strips are placed between the Double Angle Strip (7) and the foot-plate, in order to give clearance to the wheels, and a Washer is placed on each bolt beneath the strip (8) for the same reason.

The bogie, Fig H, is constructed from a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate, bolted by means of  $2\frac{1}{2}$ " Angle Girders to the side  $3\frac{1}{2}$ " Flat Girders, and the structure is further strengthened at each end by a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip. The whole is connected pivotally to the frame of the loco by means of the Double Bent Strip (9), into the hole of which is entered the end of a 1" Rod (10, Fig. F) and retained by two Collars (11) on the end of the rod.

Two  $4\frac{1}{2}$ " Strips (17) represent the coupling-rods of the loco; these are carried on Pivot Bolts, secured by a nut on each side of the driving-wheels. A Collar is slipped on the bolts immediately behind the coupling-rods to enable the latter to clear the flanges of the wheels. It will be seen from the illustration that the driving wheels consist of Face Plates and Wheel Flanges bolted together.

The smoke-stack is represented by five 1" loose Pulleys bolted to the boiler by means of a short Threaded Rod (18), while the safety-valve consists of a Strip Coupling (19) and  $1\frac{1}{2}$ " Strip (20).

The cab sides are formed from  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates (23) and Architraves (24), while a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate (25), slightly bent as shown, serves as the roof.

**Accommodation for Motor**

The base of the tender is built up from two  $9\frac{1}{2}$ " Girders and two  $4\frac{1}{2}$ "

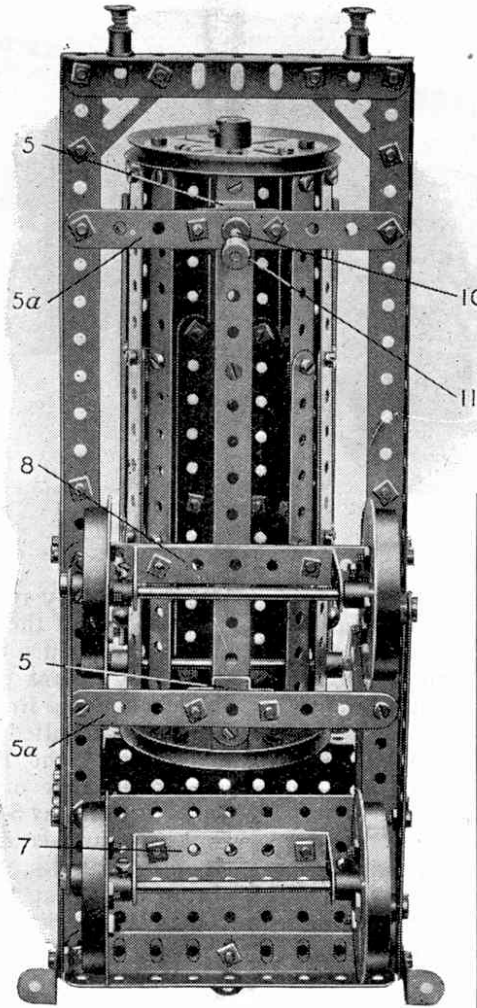


Fig. F

Girders. The wheels are carried from Flat Trunnions bolted to  $9\frac{1}{2}$ " Flat Girders (21, Fig. D) secured to the side  $9\frac{1}{2}$ " Angle Girders (22) of the base frame. The sides of the tender are constructed from  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " and  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plates, while the

back consists of one  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate. The appearance of the tender is improved very greatly by bolting additional strips along the upper edges of the side and back plates by means of Angle Brackets.

The loco is propelled from the Electric Motor mounted in the tender. The drive is led by way of a Sprocket Chain (12, Fig. G) containing 52 links and the 5" Axle Rod (13) carrying the Flanged Wheels (14). The Rod (13) is coupled by another chain (15) containing 59 links, to the middle Axle Rod (16), thus distributing the drive over four of the six travelling wheels. The four Sprocket Wheels are 1" in diameter. The Accumulator, which supplies the current, is housed in the tender behind the Motor.

**Meccano Boys' Efforts**

We have included in this article illustrations of two very fine locos built by Meccano boys. It will be recalled that the model illustrated in Fig. C was described in the "M.M." some months ago, but its merits are such that it must not be omitted from this article dealing with Meccano locomotive construction.

Fig. E, another very fine effort sent in by a reader, represents a 4-6-0 express passenger engine with six-wheel tender. It will be noticed that in this case the chimney and steam-dome have been borrowed from a Hornby Loco, and although they are not strictly Meccano parts, we must admit they serve the purpose admirably.

We hope that this short review of the latest Meccano activities in connection with loco-building

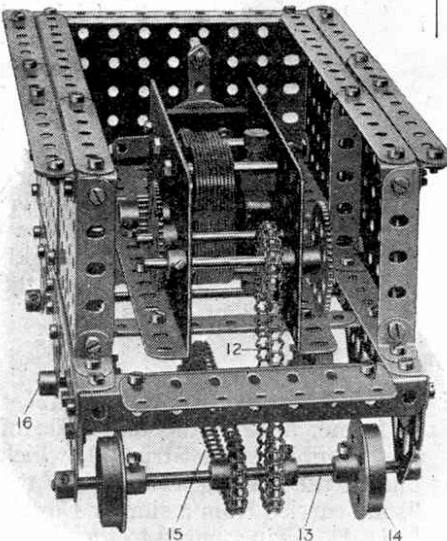


Fig. G

**Parts required for Model No. 715 :**

37 of No. 2	2 of No. 47
10 " " 2A	1 " " 48
2 " " 3	2 " " 48A
2 " " 5	2 " " 52
1 " " 6A	1 " " 52A
2 " " 8	2 " " 53
2 " " 8A	3 " " 53A
4 " " 9A	16 " " 59
4 " " 9D	1 " " 63B
1 " " 10	3 " " 72
31 " " 12	1 " " 82
4 " " 12B	1 " " 90
2 " " 14	1 " " 94
3 " " 15	4 " " 96
4 " " 16	2 " " 103A
2 " " 16A	3 " " 103D
1 " " 18A	4 " " 108
2 " " 18B	4 " " 109
2 " " 19B	1 " " 115
10 " " 20	4 " " 120A
5 " " 22A	2 " " 126
1 " " 25	6 " " 126A
1 " " 27	1 " " 128
1 " " 27A	2 " " 133
4 " " 33A	4 " " 136
12 " " 37	4 " " 137
3 " " 38	
3 " " 45	

Electric Motor

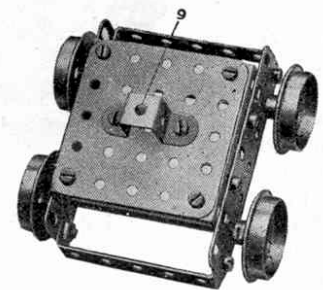


Fig. H

will bring forth still further models from our readers. This subject offers a very wide scope to the inventive Meccano boy, and we shall endeavour to publish in the Magazine particulars of any models received of special interest.