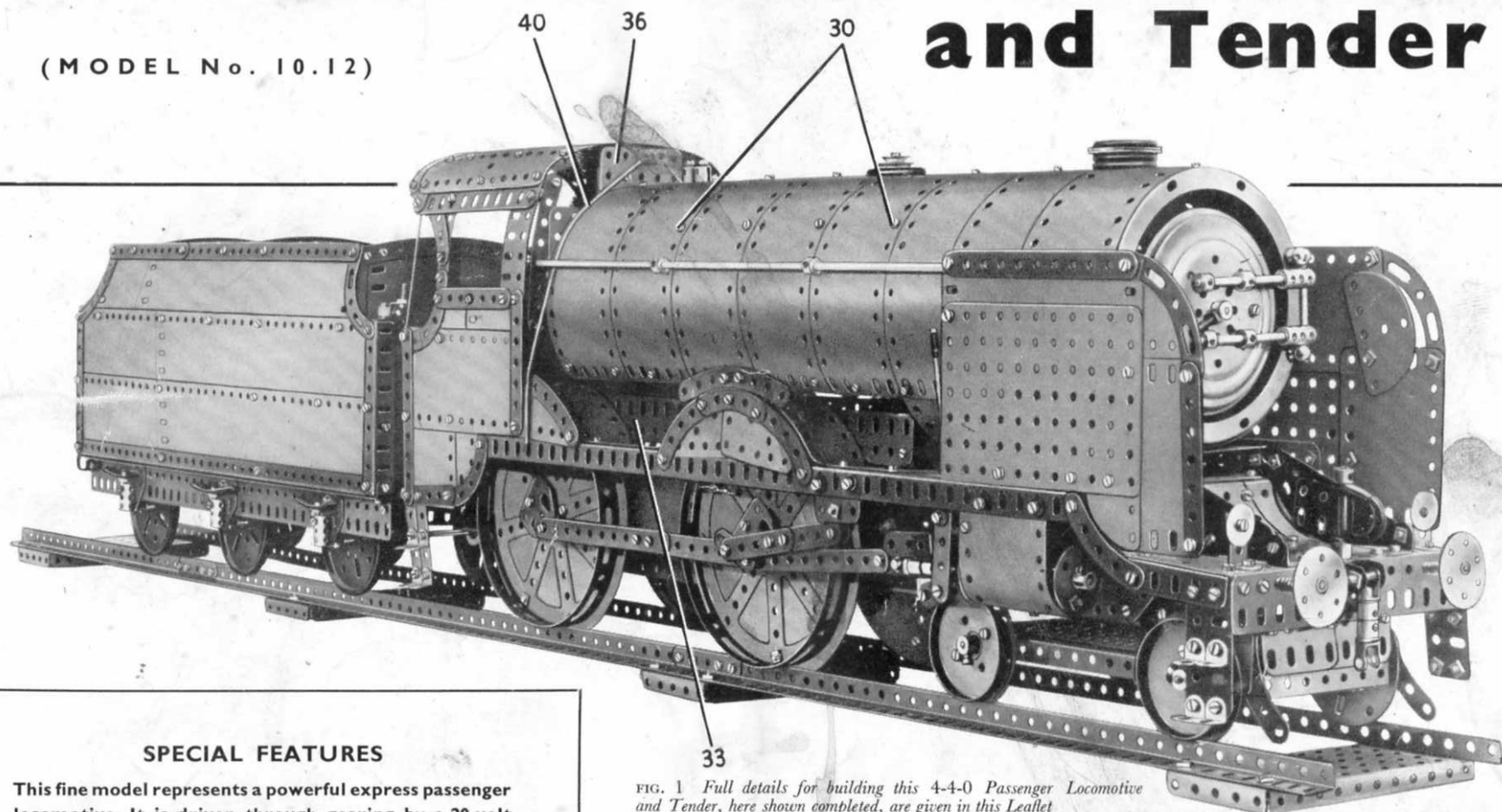


# MECCANO

## 4-4-0 Passenger Locomotive and Tender

(MODEL No. 10.12)



### SPECIAL FEATURES

This fine model represents a powerful express passenger locomotive. It is driven through gearing by a 20-volt Electric Motor controlled from the cab and includes valve gear and smoke deflectors in its constructional details.

FIG. 1 Full details for building this 4-4-0 Passenger Locomotive and Tender, here shown completed, are given in this Leaflet

The attractive Meccano model described in this Leaflet represents a type of locomotive in operation in Great Britain and abroad. The actual locomotive on which it is based is one of the most powerful of its type in Great Britain, and is used to haul fast passenger trains at high speeds in Kent, Sussex and other southern counties.

### Building the Model: The Main Frame and Running Plates (Figs. 2, 3 and 4)

Each side-member of the main frame consists of two  $24\frac{1}{2}$ " Angle Girders connected by a  $9\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plate at the front, a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flat Plate (1) (Fig. 6) and two  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates. The join between the Flexible Plates is strengthened on the inside by a Corner Gusset.

The side-members are joined together at each end by  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plates (2) (Fig. 2), the front one of which carries a built-up girder (3) made

Girder and a 2" Angle Girder overlapped two holes.

The running plate on each side is made by bolting a  $24\frac{1}{2}$ " Angle Girder (10) (Fig. 4) to the girder (3) and to  $2\frac{1}{2}$ " Flat Girders fixed to the Flat Plate (6). Two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates and three  $5\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates are attached as shown to the Girder (10), and are curved to form the wheel splashers. The sides of the splashers over the leading driving wheels are each made from two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Triangular Flexible Plates and three  $2\frac{1}{2}$ " Curved Strips. The nameplate is represented by a 4" Stepped Curved Strip bolted to a 1" Triangular

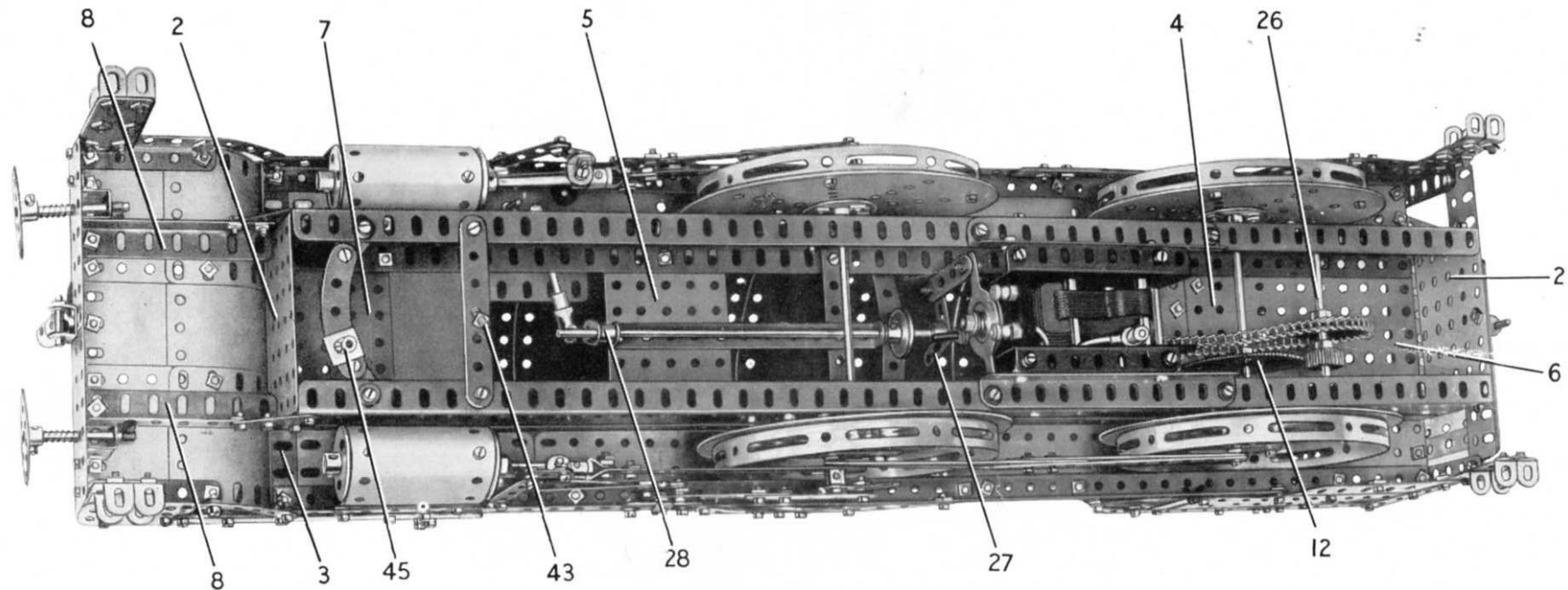


FIG. 2. Underneath view of the Locomotive showing details of the main frame and the driving arrangement

from a  $5\frac{1}{2}$ " and a 2" Angle Girder overlapped two holes. Two further  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plates (4) and (5) are fixed across the main frame (Fig. 2), and a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flat Plate (6) is bolted across the rear end. A  $5\frac{1}{2}$ "  $\times$   $3\frac{1}{2}$ " Flat Plate fixed to the Flanged Plate (4) and the Flat Plate (6), forms the footplate. A  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate (7) (Fig. 3) is attached to the front end of the main frame by Angle Brackets and a  $3\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip.

At the front the main frame is extended forward by two  $3\frac{1}{2}$ " Angle Girders (8) (Fig. 2), which are fixed to  $1\frac{1}{2}$ " Corner Brackets. The front ends of the Girders (8) are connected by a built-up girder (9) (Fig. 3) made from a  $5\frac{1}{2}$ " Angle

Plate. The side of each rear splashers consists of a  $3\frac{1}{2}$ "  $\times$  2" Triangular Flexible Plate and a 4" Stepped Curved Strip, but these should not be fitted until the cab has been assembled.

The dropped section of the frame at the front (Fig. 3) is plated by three  $1\frac{1}{8}$ " radius Curved Plates and three  $2\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates bolted between the girders (3) (Fig. 2) and (9) (Fig. 3). The outer  $2\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates are edged by  $2\frac{1}{2}$ " Angle Girders, and these are connected to the Girders (10) (Fig. 4) by  $2\frac{1}{2}$ " Curved Strips. The steps are Angle Brackets fixed to  $2\frac{1}{2}$ " Flat Girders, which are supported by the  $2\frac{1}{2}$ " Angle Girders.

Two  $2\frac{1}{2}$ " Stepped Curved Strips, each extended forward by a 2" Strip, are connected by Fishplates to the flanges of the Flanged Plate (7), and the 2" Strips are bolted to the lugs of a  $3\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip (11) (Fig. 3). A  $3\frac{1}{2}$ " Strip is arranged between each Curved Strip and the Double Angle Strip and a  $1\frac{1}{2}$ " Flat Girder is attached to the assembly as shown in Fig. 3.

The buffer beam consists of two  $3\frac{1}{2}$ " Flat Girders bolted to the girder (9), and the buffers are Bush Wheels on 2" Rods. These Rods are mounted in the buffer beam and in  $\frac{1}{2}$ " Reversed Angle Brackets bolted behind it, with a Compression Spring on each Rod between the beam and the Bush Wheel. The Rods are retained in their mountings by Spring Clips.

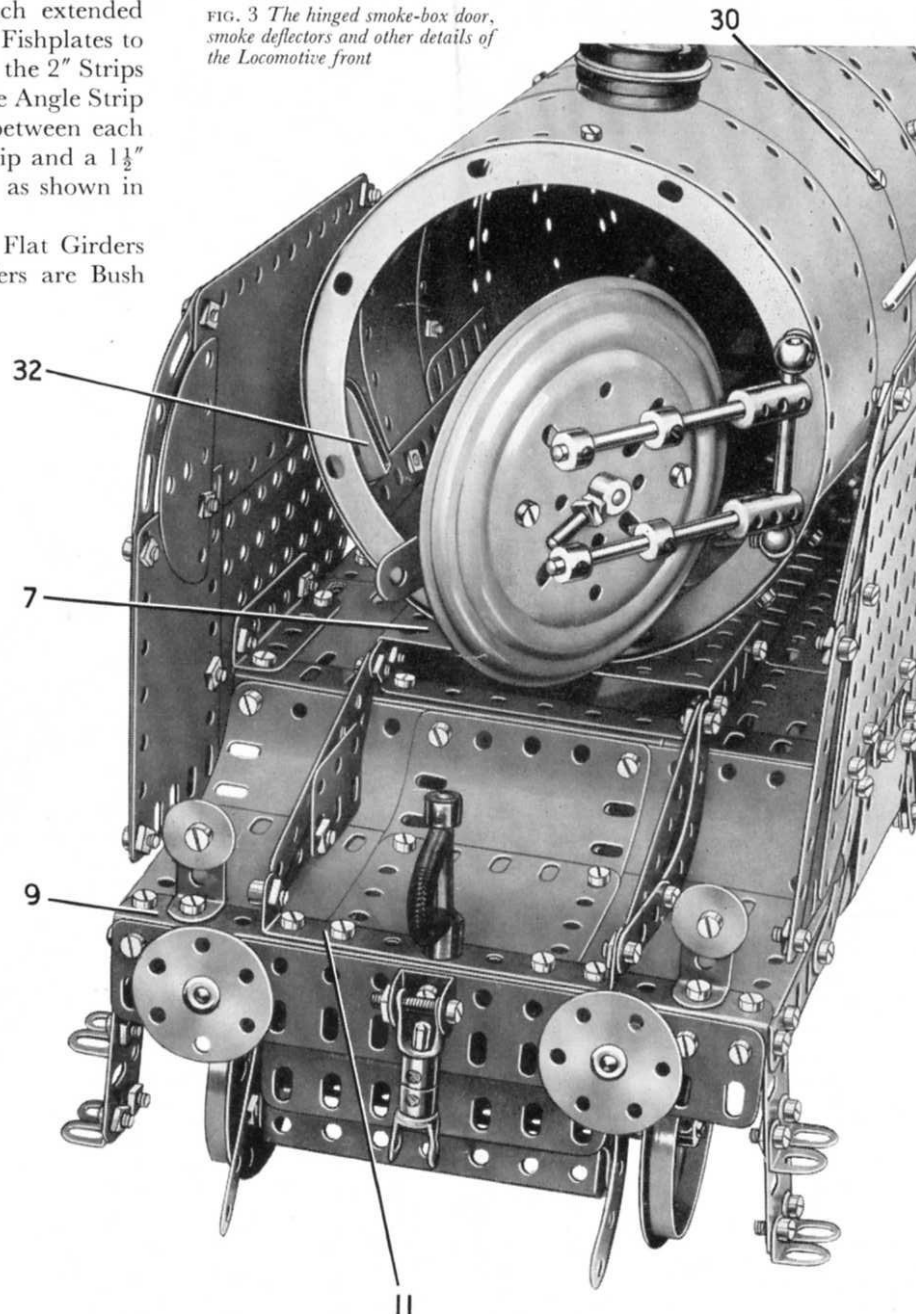
A vacuum brake pipe, route indicators and a coupling are assembled and fixed in position as shown in Fig. 3.

### Driving Wheels and Motion (Figs. 2, 4 and 6)

Each of the main driving wheels consists of a Hub Disc bolted to a 6" Circular Plate, at the centre of which a Bush Wheel is bolted. The wheels are fixed in pairs on 5" Rods supported in the main frame (see Fig. 2), and at each end of each Rod a Double Arm Crank is held by its grub screw. A Flat Trunnion is fixed to each Double Arm Crank by a  $\frac{1}{2}$ " Bolt, which passes also through a hole in the wheel (see Fig. 4). The Flat Trunnions form the crank assemblies. A  $2\frac{1}{2}$ " Gear (12) (Fig. 2), is fixed on the rear 5" Rod.

The cylinder and valve assembly on each side is made by bolting one end of a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate to the main frame. The Flexible Plate is

FIG. 3 The hinged smoke-box door, smoke deflectors and other details of the Locomotive front



then curved to U-shape and its other end is attached to one of the Girders (10). The cylinder is a  $2\frac{1}{2}$ " Cylinder bolted to the Flexible Plate, and fitted at each end with a  $1\frac{1}{8}$ " Flanged Wheel. The Flanged Wheels are held in place by nuts on a 3" Screwed Rod, and to the rear Flanged Wheel a  $1"$   $\times$   $\frac{1}{2}"$  Angle Bracket is bolted. A  $2\frac{1}{2}"$  Strip (13) (Fig. 6) fixed to this Angle Bracket forms the slide bar for the piston rod. A Chimney Adaptor is attached to the Flexible Plate by a bolt (14).

The driving wheels on each side are connected by a coupling rod formed by two  $5\frac{1}{2}"$  Strips placed face-to-face and arranged to overlap another  $5\frac{1}{2}"$  Strip by four holes. At its rear end the coupling rod is *lock-nutted* by a  $\frac{1}{2}"$  Bolt to the Flat Trunnion forming the crank of the rear wheel. At its front end the coupling rod is *lock-nutted*, together with a  $4\frac{1}{2}"$  Strip (15), to the crank of the leading driving wheel. A  $\frac{3}{4}"$  Bolt is used at the front and a Crank (16) is fixed by its grub screw to this Bolt on one side. A Threaded Crank is fixed to the corresponding Bolt on the other side. The  $\frac{3}{4}"$  Bolts are fixed tightly in the crank assemblies by two nuts each.

The Strip (15) is extended by a Fishplate that is *lock-nutted* to an End Bearing (17) (Fig. 4) on a  $3\frac{1}{2}"$  Rod. This Rod slides freely in the Flanged Wheel forming the rear cover of the cylinder, and on it a Collar (18) is fixed. A  $\frac{3}{4}"$  Bolt is then passed through the lugs of a Double Bracket (19) and is screwed into a hole in the Collar, so that the Double Bracket is able to slide freely on the slide bar (13).

A strip (20), made from two  $2\frac{1}{2}"$  Strips overlapped two holes, is



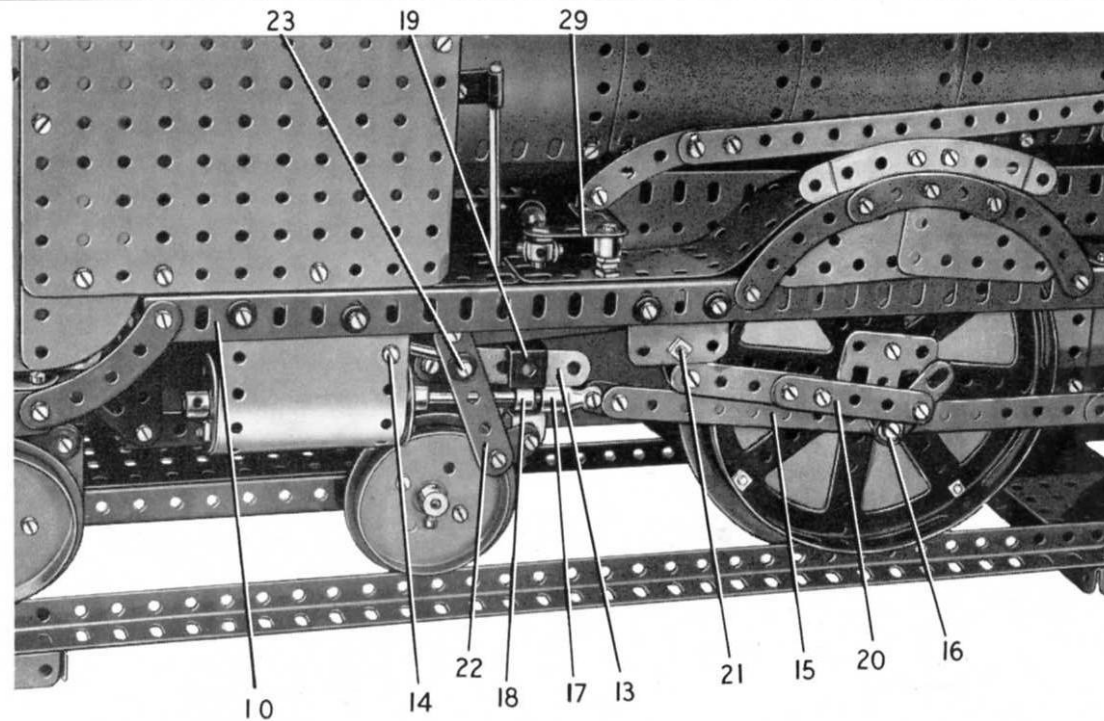


FIG. 4 A close-up picture of the valve motion and cylinder assembly

lock-nutted to the Crank (16) and to the lower end of a  $1\frac{1}{2}$ " Strip. The  $1\frac{1}{2}$ " Strip is lock-nutted through its centre hole on a bolt (21), so that it is free to pivot. This bolt is carried in a  $1\frac{1}{2}$ " Flat Girder bolted to the Girder (10). The  $1\frac{1}{2}$ " Strip is spaced from the Flat Girder by three Washers, and to its upper end a  $3\frac{1}{2}$ " Strip is lock-nutted. This Strip is lock-nutted also to a  $2\frac{1}{2}$ " Strip (22), which is pivoted on a bolt (23) screwed into a hole in a Collar fixed on a  $3\frac{1}{2}$ " Rod that forms the valve rod. This Rod is passed through the Chimney Adaptor held by the bolt (14).

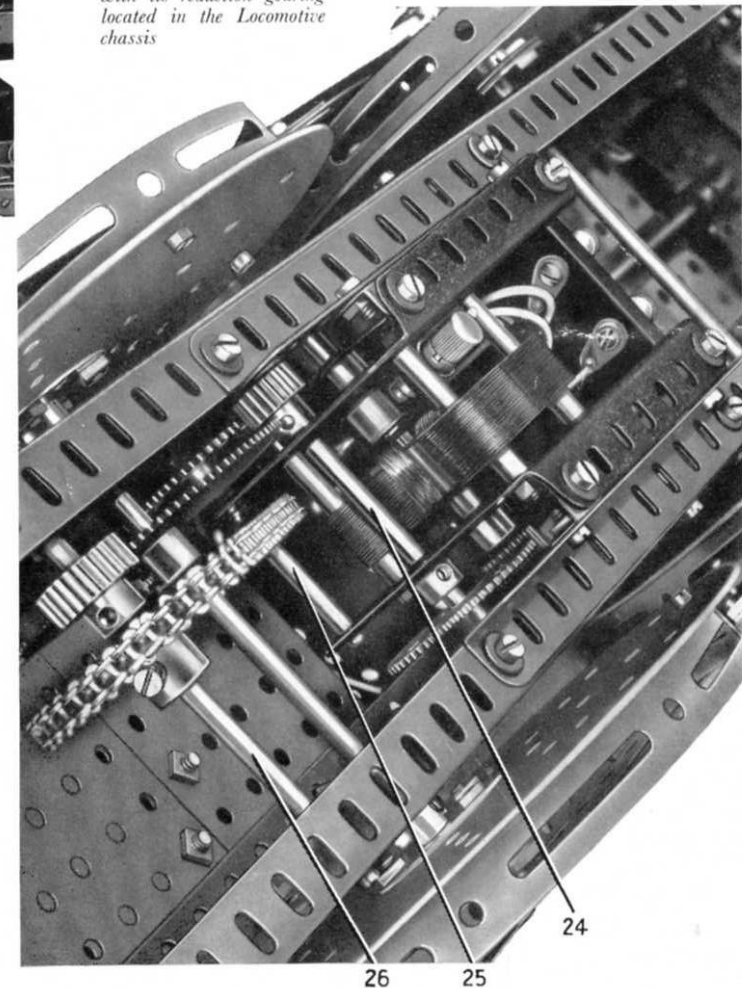
A Fishplate is lock-nutted to the lower end of Strip (22), and also to an Angle Bracket that is fixed by a nut and bolt screwed into the Collar (18). The nut is tightened against the Angle Bracket to hold it firmly on the bolt.

#### Arrangement of the Motor and Reduction Gearing (Figs. 2, 4, 5 and 6)

The E20R Electric Motor used to drive the model is attached by Angle Brackets to two  $5\frac{1}{2}$ " Angle Girders bolted underneath the main frame (Fig. 5). A  $\frac{1}{2}$ " Pinion on the Motor shaft drives a 57-tooth Gear on a  $2\frac{1}{2}$ " Rod (24), which is passed through the Motor side-plates. A  $\frac{1}{2}$ " Pinion on Rod (24) is meshed with another 57-tooth Gear on a 2" Rod (25). This Rod also is supported in the side-plates, above Rod (24), and it carries a  $\frac{3}{4}$ " Sprocket connected by Chain to a 2" Sprocket on a 4" Rod (26). A  $\frac{3}{4}$ " Pinion on Rod (26) engages the  $2\frac{1}{2}$ " Gear (12) (Fig. 2) on the rear driving axle.

A 2" Strip is lock-nutted to one arm of the Motor switch and to a Bell Crank (27) (Fig. 2). The Bell Crank is fixed on an 8" Rod supported in a  $5\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip bolted to the Flanged Plate (5) and to a  $3\frac{1}{2}$ " Strip placed across the main frame. The Rod carries a Crank (28), and a Swivel Bearing is pivoted on a  $\frac{1}{2}$ " Bolt fixed in this Crank by two nuts. The Swivel Bearing is mounted on a 2" Rod fitted at its other end with a second Swivel Bearing, and this is pivotally attached to a Bell Crank (29) (Fig. 6) by a  $\frac{1}{2}$ " Bolt that is fixed by two nuts. The Bell Crank is freely mounted on a  $\frac{3}{4}$ " Bolt, and

FIG. 5  
The electric driving Motor  
with its reduction gearing  
located in the Locomotive  
chassis



is held against the head of the Bolt by two nuts screwed against each other (see Fig. 4). The Bolt is then fixed in the running plate by two nuts.

### Assembly of the Boiler and Smoke Deflectors

(Figs. 1, 2, 3 and 6)

The boiler consists of eight curved  $12\frac{1}{2}" \times 2\frac{1}{2}"$  Strip Plates arranged as shown in Figs. 1 and 6, and bolted to three built-up strips placed inside the Plates. Each of these strips is made from a  $12\frac{1}{2}"$  and a  $9\frac{1}{2}"$  Strip, and one of them is bolted to the edges of the Plates on each side. The third strip is fixed along the centres of the Plates, so that it comes at the top of the boiler when the Plates are curved to shape. A  $12\frac{1}{2}"$  Strip is attached to each side of the boiler by the bolts (30).

The ends of the front two  $12\frac{1}{2}" \times 2\frac{1}{2}"$  Strip Plates are connected by  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plates, and another  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plate is similarly bolted to the ends of the rear Strip Plate. A  $1\frac{1}{16}"$  radius Curved Plate is fixed to each end of the third Strip Plate counting from the front, and a curved  $5\frac{1}{2}"$  Strip is attached to one of the Strip Plates by a bolt (31) on each side. A Circular Girder is fixed inside each end of the boiler.

At its front end the boiler is bolted to the Flanged Plate (7) (Fig. 3) and at the rear is supported by a Double Bent Strip fixed to the Flanged Plate (4) (Fig. 2). The chimney consists of three  $1"$  loose Pulleys and two Wheel Discs held in place by a  $\frac{3}{4}"$  Bolt. A Rubber Ring is fitted to each Pulley.

The boiler dome is formed by a  $\frac{1}{2}"$  loose Pulley, a  $1"$  loose Pulley and a  $1"$  loose Pulley fitted with a Rubber Ring, and these also are fixed in place by a  $\frac{3}{4}"$  Bolt.

The safety valves are represented by Threaded Bosses.

Each handrail consists of an  $11\frac{1}{2}"$  and a  $5"$  Rod supported by Collars screwed on to bolts passed through the boiler. The join between the Rods is covered by one of the Collars, and the rear end of the  $5"$  Rod is supported in the cab.

The smoke-box door is made by bolting together a Ball Thrust Race Flanged Disc and a  $4"$  Circular Plate. Four Collars are screwed on to bolts passed through the Flanged Disc, and these support two  $2\frac{1}{2}"$  Rods, each of which is fitted with a Coupling. The Couplings pivot on a  $2"$  Rod fixed in Handrail Supports attached to the front Circular Girder (Fig. 3). A catch for the door is provided by a  $3"$  Strip bolted to a Crank. The Crank is fixed on a  $1"$  Rod supported in the Flanged Disc and in a  $2\frac{1}{2}"$  Strip bolted across the Circular

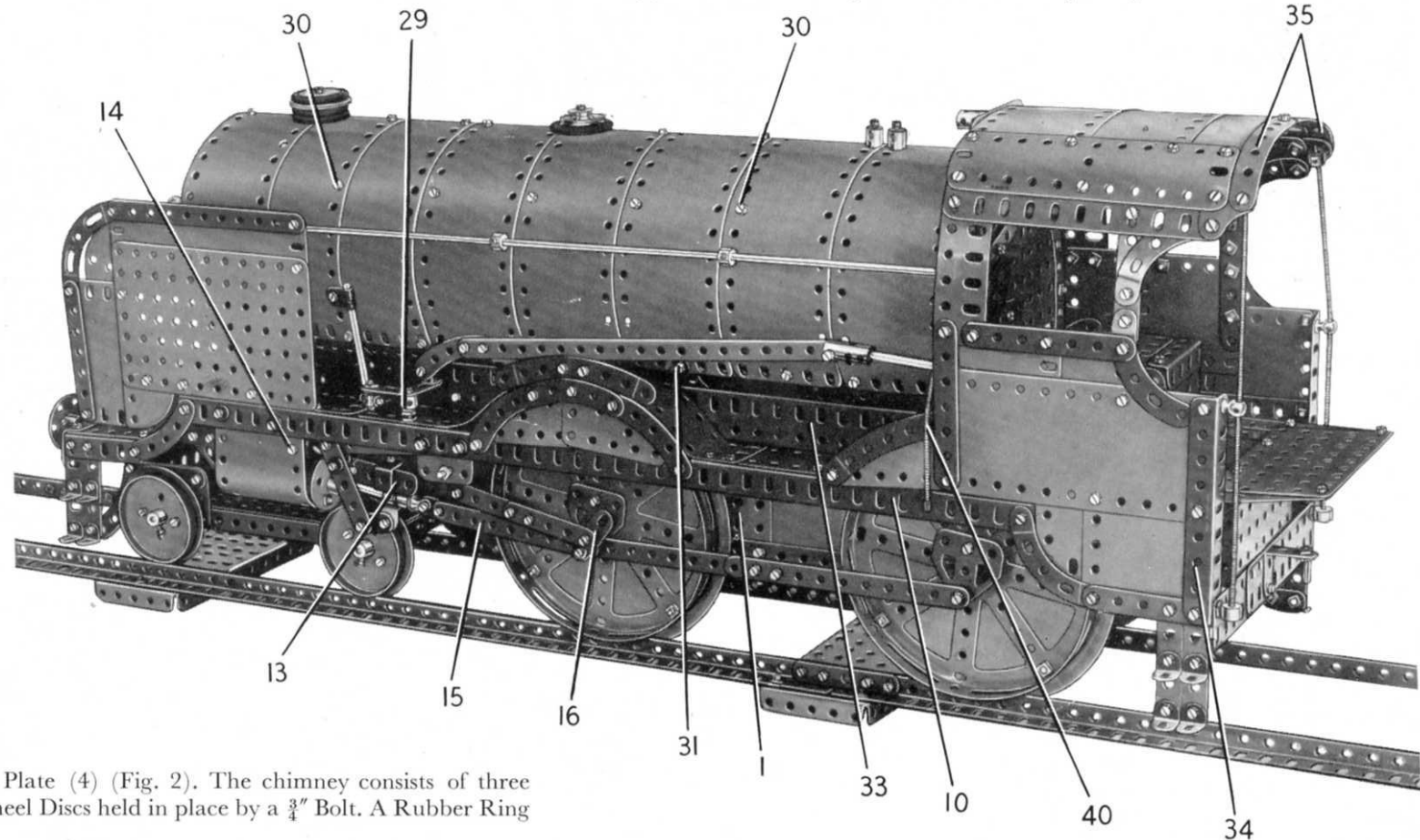


FIG. 6 Details of the connecting and coupling rods and the arrangement of the main wheel driving cranks are shown in this illustration of the completed Locomotive

Plate. A handle on the Rod is provided by a Threaded Pin screwed into a Collar. The end of the 3" Strip engages in a Single Bent Strip (32) attached to the boiler by an Angle Bracket.

A 12½" Flat Girder (33) (Fig. 1) on each side is fixed to the flanges of the Flanged Plates (5) and (4) (Fig. 2).

Each smoke deflector consists of a 5½" × 3½" Flat Plate bolted to a 2½" Angle Girder fixed to one end of one of the Girders (10). It is extended upward by a 5½" × 2½" Flexible Plate and forward by two Semi-Circular Plates and a 3½" × 2½" Flexible Plate. These Plates are edged by a 3½" Strip, a 5½" Strip and a 3" Stepped Curved Strip.

#### Details of the Cab (Figs. 6 and 7)

Each side of the cab consists of a 5½" × 2½" Flexible Plate, three 2½" × 2½" Flexible Plates and a 2½" × 1½" Flexible Plate, edged by Strips and Curved Strips and a 4½" Angle Girder (34) (Fig. 6). The side is bolted to a 5½" Angle Girder fixed to the rear end of one of the Girders (10). Each window frame is formed by a 3" Flat Girder and a 4½" Strip, which are connected at their upper ends by a 5½" Flat Girder.

The roof consists of three 4½" × 2½" Flexible Plates bolted to 5½" × 1½" Flexible Plates, which are fixed to the 5½" Flat Girders. Two curved 3½" Strips (35) are connected to these Flat Girders by 1" Corner Brackets.

The front of the cab is filled in by a 4½" × 2½" Flat Plate bolted vertically to a 2½" Angle Girder that is fixed to the footplate. A 5½" × 3½" Flat Plate is bolted across the 4½" × 2½" Flat Plate (Fig. 7) and at each side a 5½" Curved Strip is bolted to the projecting end of a 3½" Strip bolted behind the 4½" × 2½" Flat Plate. The top ends of the Curved Strips are connected by Angle Brackets

to the sides of the cab. A 2½" × 2½" Flat Plate (36) completes the front of the cab and a Channel Bearing (59), and other fittings representing the controls, are arranged as shown.

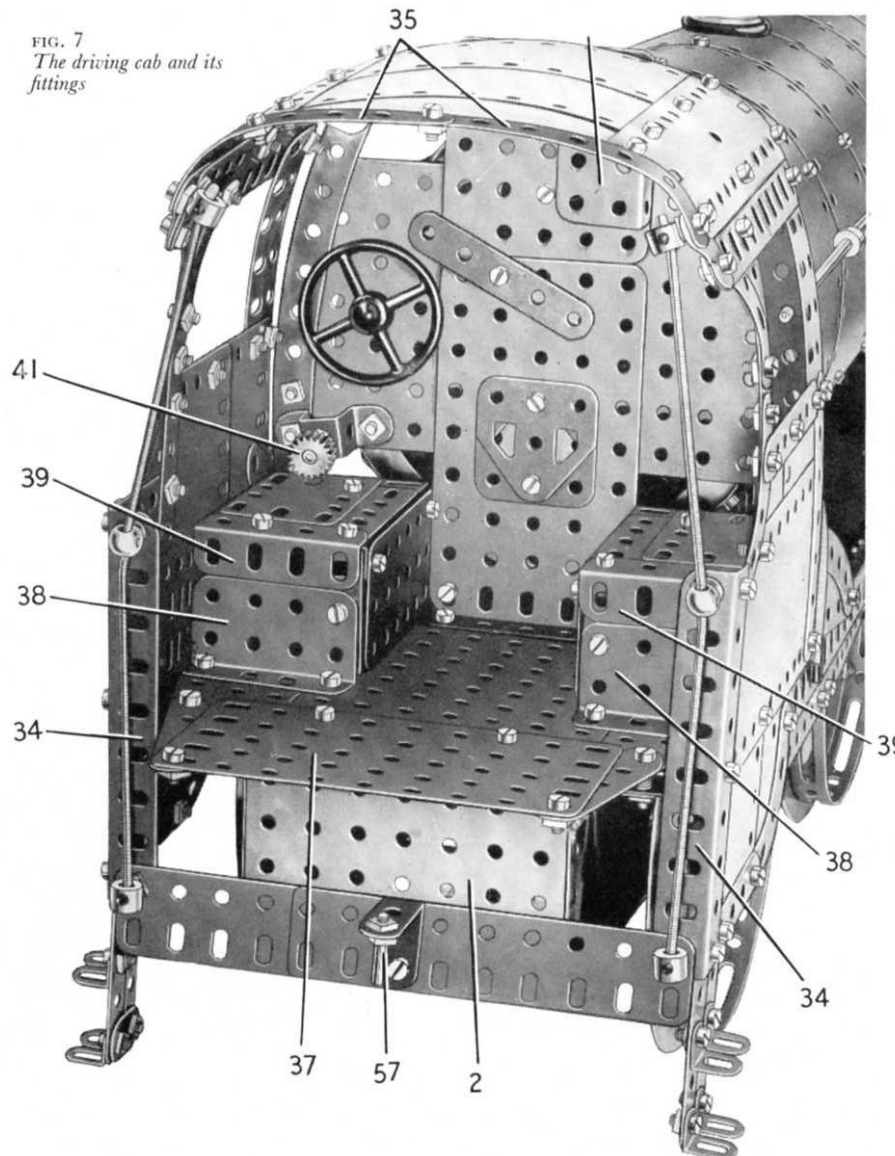
The footplate is extended by a 4½" × 2½" Flat Plate (37), fitted at each end with a 2½" Strip and at the back with a 5½" Strip. The 5½" Strip is connected to the Plate (6) (Fig. 2) by two ½" Bolts, but is spaced from the Plate by a Cord Anchoring Spring on each Bolt.

The boxes over the rear driving wheels are each made by bolting a Girder Bracket (38) (Fig. 7) to the footplate. A 1½" Angle Girder is fixed vertically to the inner edge of the Girder Bracket, and this supports a 3" × 1½" Flat Plate to which a 3" Angle Girder is fixed. A 2" Angle Girder (39) is bolted to the rear end of the 3" Angle Girder, and the top of the box is filled in by two 2½" × 1½" Flexible Plates attached to these Girders.

Two 4½" Flat Girders are bolted to the lower ends of the Girders (34) and to the Flanged Plate (2) (Fig. 7). Collars are screwed on to the bolts that connect the Angle Girders and the Flat Girders, and a length of Spring Cord is gripped in each Collar. The Spring Cord is passed through Handrail Supports as shown and is held in the 'spiders' from Universal Couplings, which are screwed on to bolts in the cab roof. The cab steps are Angle Brackets fixed to 2½" Strips.

A steam pipe (40) (Fig. 6) is represented by Spring Cord, which is held at each end in the rounded part of a Spring Clip that projects through a slotted hole in one of the Girders (10). The Spring Cord passes through a Threaded Coupling fixed on a bolt in the Flat Plate (36) (Fig. 1) at the front of the cab.

The Motor starting and control lever is a ½" Pinion (41) (Fig. 7) on a 3½" Rod mounted in the front of the cab and in a Double Bent Strip. A Strip Coupling on the Rod is connected by a ⅜" Bolt to a





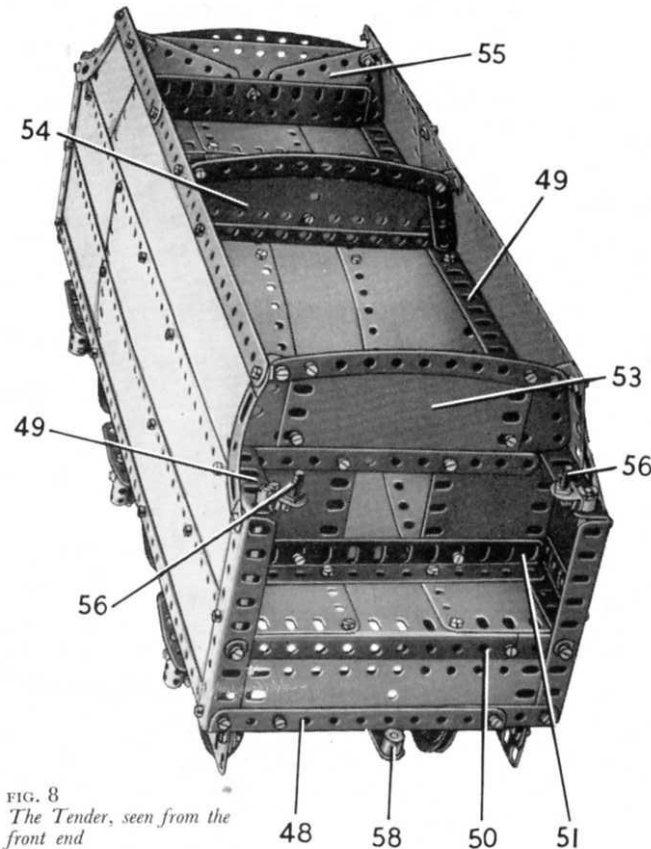


FIG. 8  
The Tender, seen from the  
front end

$9\frac{1}{2}$ " Strip, and this is extended by a  $2\frac{1}{2}$ " Curved Strip (Fig. 6). The Curved Strip is *lock-nutted* to an Angle Bracket, which in turn is *lock-nutted* to the Bell Crank (29).

#### Construction of the Bogie (Fig. 10)

The bogie is made by bolting a  $5\frac{1}{2}$ "  $\times$   $3\frac{1}{2}$ " Flat Plate and a  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate (42) (Fig. 10) to a  $7\frac{1}{2}$ " Angle Girder on each side. A  $3\frac{1}{2}$ " Angle Girder is bolted to one end and a  $3\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip is fixed to the other end. A  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plate is attached to each flange of the Plate (42) and is edged by a  $2\frac{1}{2}$ " Strip and fitted with a  $2\frac{1}{2}$ " Curved Strip arranged as shown. At the front two 2" Flat Girders are bolted together and are attached to the Flexible Plate by Angle Brackets. The bogie wheels are Wheel Flanges and Face Plates bolted together, and they are fixed on 5" Rods. Each of the Rods is held in place by two Collars.

The bogie is *lock-nutted* on a  $1\frac{1}{8}$ " Bolt (43) (Fig. 2), which passes through a  $3\frac{1}{2}$ " Strip bolted across the main frame. A  $\frac{3}{4}$ " Bolt (44) (Fig. 10) is passed through the bogie and on it is placed a Compression Spring. The Bolt is then fixed in a Slide Piece (45) (Fig. 2), which is carried on a  $2\frac{1}{2}$ " Curved Strip attached to the main frame by Fishplates.

#### Building the Tender (Figs. 8 and 9)

Each side of the underframe is made by bolting a  $12\frac{1}{2}$ " Flat Girder and a  $9\frac{1}{2}$ " Flat Girder to an  $18\frac{1}{2}$ " Angle Girder (46) (Fig. 9). A further  $18\frac{1}{2}$ " Angle Girder (47) is fixed to the Girder (46), and the sides are connected at each end by built-up girders (48), each made from a  $5\frac{1}{2}$ " and a  $2\frac{1}{2}$ " Angle Girder overlapped three holes. The wheels are free to turn between Spring Clips and 1" Pulleys on  $6\frac{1}{2}$ " Rods, which are mounted in Flat Trunnions and in Couplings fixed to the Flat Trunnions by  $\frac{3}{4}$ " Bolts. The leafspring above each Coupling is formed by a  $2\frac{1}{2}$ " Strip and a  $1\frac{1}{2}$ " Strip supported by an Angle Bracket.

A  $4\frac{1}{2}$ " Angle Girder is bolted vertically to each end of each of the Girders (47), and these are connected at their upper ends by an  $18\frac{1}{2}$ " Angle Girder (49). The side between these Girders is filled in by Strip Plates as shown. One side is extended upward by a  $12\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plate that overlaps a  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate by three holes. The other side is similar, but a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate is used in place of the  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate. The Plates are edged by two 3" Stepped Curved Strips, a  $12\frac{1}{2}$ " Strip and a  $5\frac{1}{2}$ " Strip.

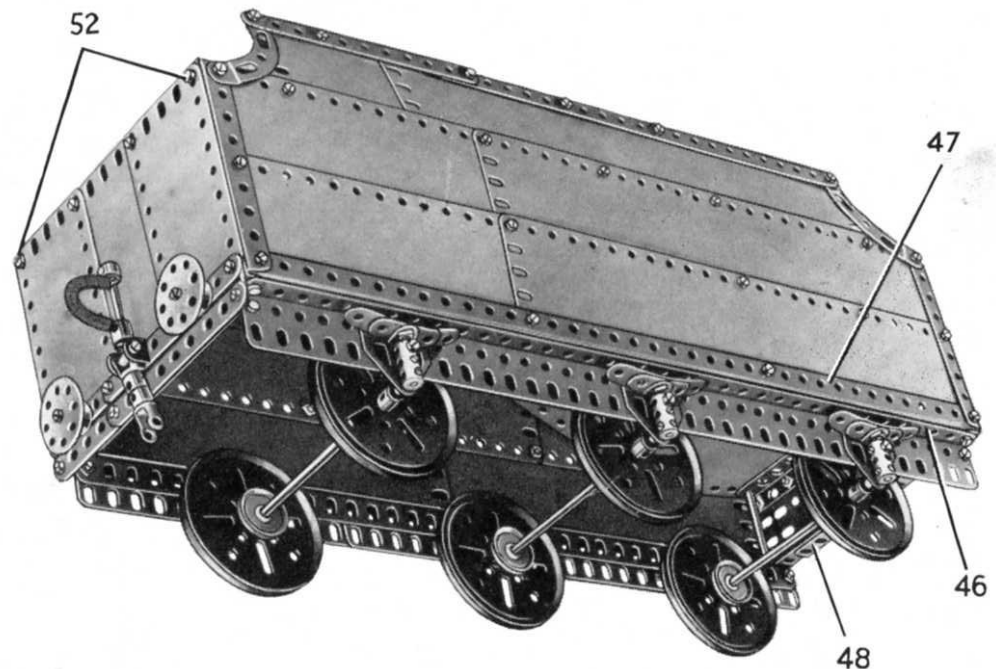


FIG. 9 Another view of the Tender

The front pair of  $4\frac{1}{2}$ " Angle Girders is connected by a built-up girder (50), made from a  $5\frac{1}{2}$ " and a  $2\frac{1}{2}$ " Angle Girder. A  $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate is fixed between this and the girder (48). A further built-up girder (51), made in the same way as the girder (50), is fixed in position, and to these girders are bolted three  $12\frac{1}{2} \times 2\frac{1}{2}$ " Strip Plates. The Strip Plates are curved as shown and are attached to the Girders (49). Each Strip Plate is extended by two  $4\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates. These are supported at their rear ends by a built-up girder held by bolts (52) (Fig. 9), and made from a  $5\frac{1}{2}$ " and a  $1\frac{1}{2}$ " Angle Girder. A Boiler End is attached to this girder by an Angle Bracket.

The back of the tender is filled in by three  $4\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates, edged at their lower ends by two built-up strips each made from two  $4\frac{1}{2}$ " Strips. The buffers are Wheel Discs and  $\frac{1}{2}$ " fixed Pulleys on  $\frac{3}{4}$ " Bolts. The tender coupling and the brake pipe are arranged as shown in Fig. 9.

The partition (53) (Fig. 8) is made by bolting two  $2\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates to the

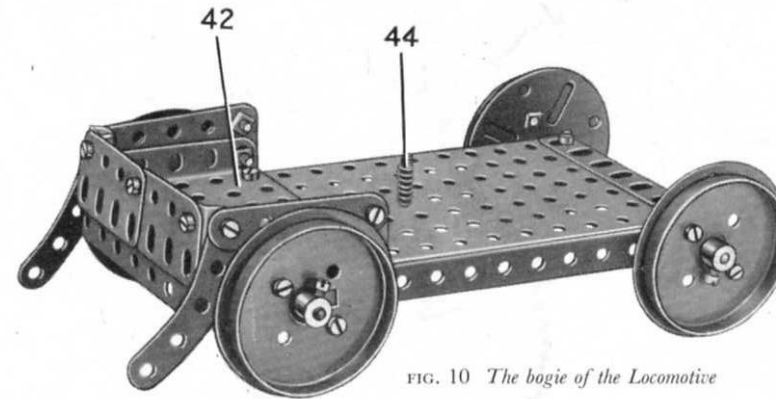


FIG. 10 The bogie of the Locomotive

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girder (51). The Flexible Plates are connected by a  $5\frac{1}{2}$ " Strip and a  $4\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plate, which is extended at each side by a  $3\frac{1}{2} \times 1\frac{1}{2}$ " Triangular Flexible Plate. A  $5\frac{1}{2}$ " Curved Strip attached to the Plates is connected to the sides of the tender by Angle Brackets.

The partition (54) is formed by a  $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate and a  $5\frac{1}{2}$ " Flat Girder, with a 2" Strip at each side and a  $5\frac{1}{2}$ " Curved Strip along the top. This partition also is attached to the sides by Angle Brackets. The partition (55) is similar to (54), except that  $2\frac{1}{2} \times 2$ " Triangular Flexible Plates are used in place of the 2" Strips.

The handles (56) are made by fixing  $\frac{3}{8}$ " Bolts in Angle Brackets, each of which is then attached to one half of a Dog Clutch by a nut and bolt. The halves of the Dog Clutch are fitted on Rods as shown.

The coupling for attaching the tender to the locomotive consists of a Threaded Pin (57) (Fig. 7), supported by a  $1 \times 1$ " Angle Bracket. The Threaded Pin engages a Crank (58) (Fig. 8) that is lock-nutted to the front of the tender.

### Parts Required to Build the Meccano 4-4-0 Passenger Locomotive and Tender

8 of No.	1	4 of No.	9c	5 of No.	16	2 of No.	24c	5 of No.	52a	2 of No.	77	2 of No.	103d	12 of No.	126a	1 of No.	162a	19 of No.	197
3 "	1a	8 "	9d	2 "	16a	1 "	25	6 "	53	2 "	80c	2 "	103e	2 "	128	2 "	164	4 "	200
13 "	2	4 "	9e	3 "	16b	3 "	26	2 "	53a	5 "	89	4 "	103f	2 "	133	2 "	165	2 "	212a
8 "	2a	3 "	9f	5 "	17	2 "	27a	1 "	58	6 "	89a	2 "	103g	2 "	133a	2 "	166	4 "	214
16 "	3	12 "	10	2 "	18a	1 "	27c	24 "	59	4 "	89b	4 "	103h	4 "	136	1 "	168a	2 "	216
1 "	4	4 "	11	3 "	18b	10 "	35	3 "	62	12 "	90	2 "	108	4 "	137	2 "	176	4 "	221
26 "	5	48 "	12	4 "	20	595 "	37a	1 "	62a	8 "	90a	4 "	109	2 "	140	2 "	179	2 "	222
4 "	6	1 "	12a	6 "	19b	518 "	37b	4 "	62b	1 "	94	18 "	111	2 "	143	1 "	185	2 "	224
9 "	6a	4 "	12b	7 "	22	80 "	38	8 "	63	1 "	95	15 "	111a	1 "	144	12 "	188	2 "	225
6 "	7	2 "	13	5 "	22a	3 "	38d	1 "	63b	1 "	96a	23 "	111c	4 "	146	11 "	189		
6 "	7a	1 "	13a	1 "	23	2 "	43	1 "	63c	1 "	102	1 "	111d	1 "	146a	12 "	190		
2 "	8b	3 "	14	2 "	23a	2 "	45	2 "	64	4 "	103	4 "	115	1 "	147b	2 "	190a		
12 "	9	6 "	15	4 "	24	3 "	48b	3 "	70	2 "	103a	4 "	118	4 "	155	14 "	191		
6 "	9a	1 "	15a	2 "	24a	1 "	48d	2 "	72	4 "	103b	3 "	120b	1 "	160	14 "	192		
3 "	9b	2 "	15b	2 "	24b	1 "	50	2 "	73	2 "	103c	2 "	125	2 "	161	4 "	196		
																		1 E20R	
																		Electric Motor	
																		(not included	
																		in Outfit)	