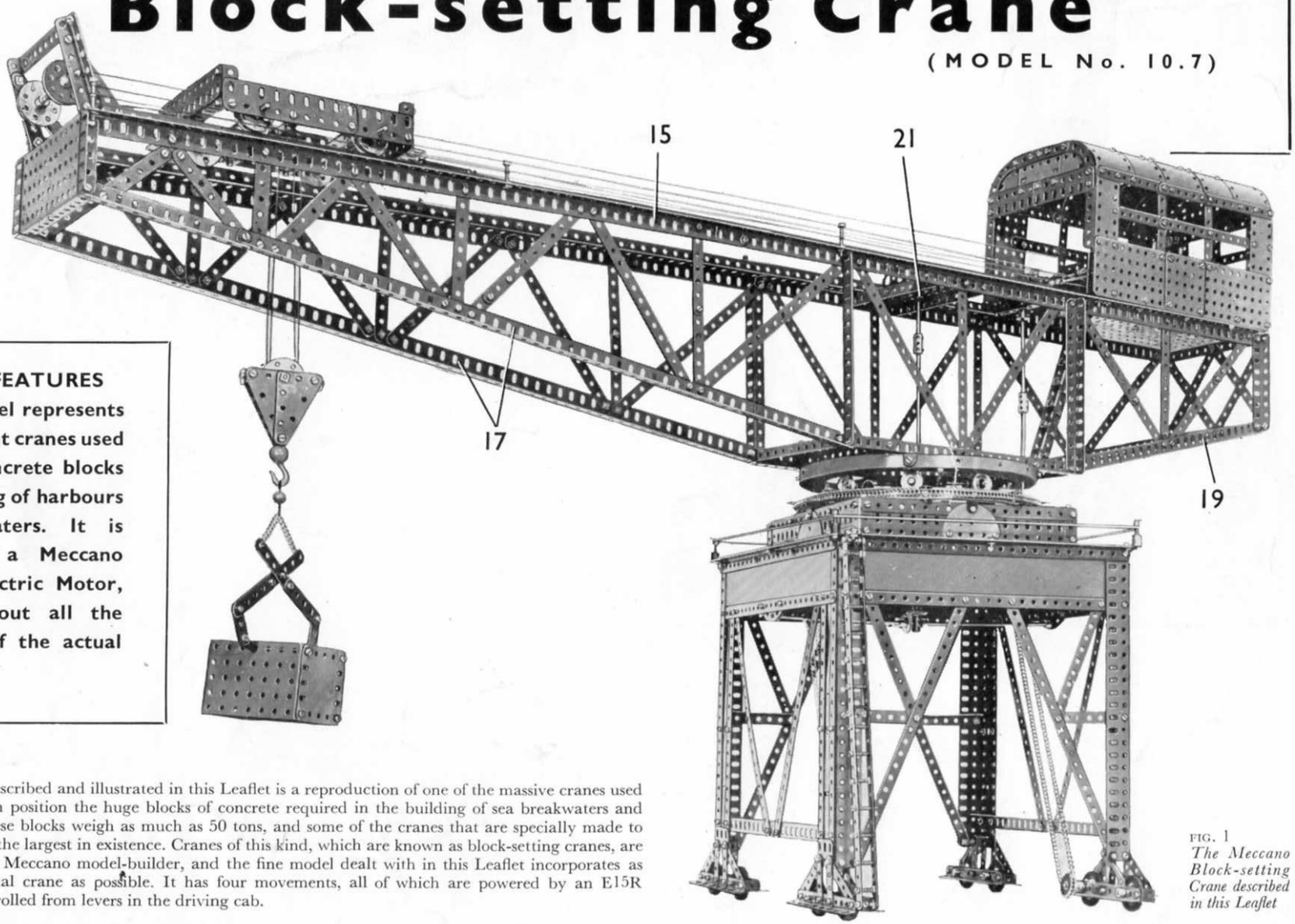
MECCANO
Block-setting Crane
(MODEL No. 10.7)



SPECIAL FEATURES

This fine model represents one of the giant cranes used for laying concrete blocks in the building of harbours and breakwaters. It is powered by a Meccano E15R type Electric Motor, and carries out all the movements of the actual crane.

The impressive model described and illustrated in this Leaflet is a reproduction of one of the massive cranes used for lifting and placing in position the huge blocks of concrete required in the building of sea breakwaters and harbour walls. Often these blocks weigh as much as 50 tons, and some of the cranes that are specially made to handle them are among the largest in existence. Cranes of this kind, which are known as block-setting cranes, are splendid subjects for the Meccano model-builder, and the fine model dealt with in this Leaflet incorporates as many details of an actual crane as possible. It has four movements, all of which are powered by an E15R Electric Motor and controlled from levers in the driving cab.

FIG. 1
The Meccano Block-setting Crane described in this Leaflet

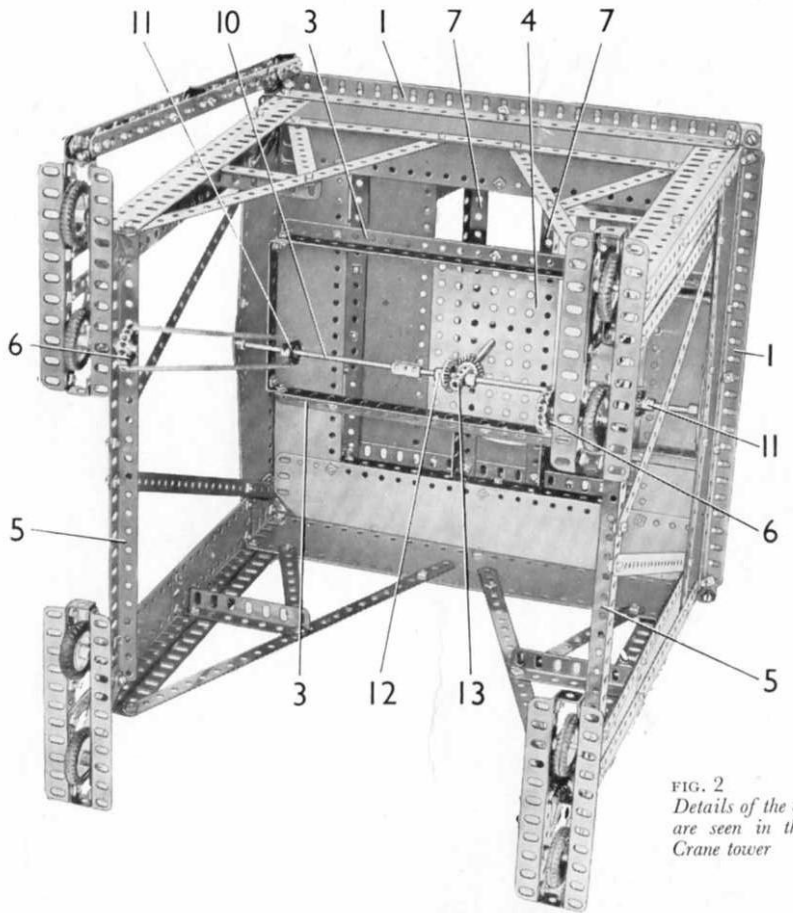


FIG. 2
Details of the drive to the travelling motion are seen in this underneath view of the Crane tower

Constructional Details: The Tower (Figs. 2, 3 and 8)

Each leg of the tower consists of a 12½" Angle Girder with a 12½" Flat Girder bolted to one of its flanges. To the other flange two 5½" × 1½" Flexible Plates are fixed and these are strengthened along their inner edges by a 12½" Strip. A 1½" Flat Girder is bolted between the lower ends of the 12½" Angle Girder and the 12½" Strip.

The legs are connected at their upper ends by 12½" × 2½" Strip Plates, which are edged by 12½" Angle Girders (1) and 12½" Strips (2). The joins between the ends of the Girders (1) are strengthened by 1½" Corner Brackets bolted to the Girders, and a 12½" × 2½" Strip Plate is fixed to each of the Girders (1) as shown (Fig. 3). These Strip Plates are supported by 12½" Angle Girders (3) bolted to the lugs of 4½" × ½" Double Angle Strips fastened to two of the Girders (1). A 5½" × 3½" Flat Plate (4) is attached to the Girders (3).

The pairs of legs on each side are connected by a 12½" Angle Girder (5), and each leg is braced by two 12½" Strips, a 5½" Strip and a 3½" Angle Girder.

Each wheel unit consists of two 5½" Angle Girders connected at their ends by Double Brackets. Two vertical 2" Strips and two diagonal 3" Strips are fixed to one of the 5½" Angle Girders, and a Corner Gusset is bolted to the other Girder. The 2" and 3" Strips are fixed direct to one of the legs of the tower, and the Corner Gusset is attached to a Double Bent Strip bolted to the leg. The wheels are 1" Pulleys fitted with Motor Tyres. One of the Pulleys of each unit is fixed on a 1" Rod, and the other is mounted on a 1½" Rod. The Rods are held in the 5½" Angle Girders by Collars, and 1" Sprockets (6) are fixed to two of the 1½" Rods.

Each side of the raised platform at the top of the tower is formed by a 9½" Angle Girder and a 9½" Flat Girder. These parts are connected at their ends by 1½" Angle Girders, and two 9½" × 2½" Strip Plates and two 9½" Angle Girders (7) (Fig. 3) are bolted across the square structure thus formed. The 9½" Angle Girders of two of the sides are fixed to the top of the tower, and the 9½" Flat Girders of the other two sides are connected to the top by 3½" Angle Girders.

A Flanged Ring (8) is attached to the raised platform by four Fishplates. Eight built-up double brackets (9), each consisting of two Angle Brackets, are bolted round the Flanged Ring.

The guard rail round the top of the tower is a length of Spring Cord. It is held by Cord Anchoring Springs on two Adaptors for Screwed Rods and on Threaded Pins fixed in two Threaded Bosses.

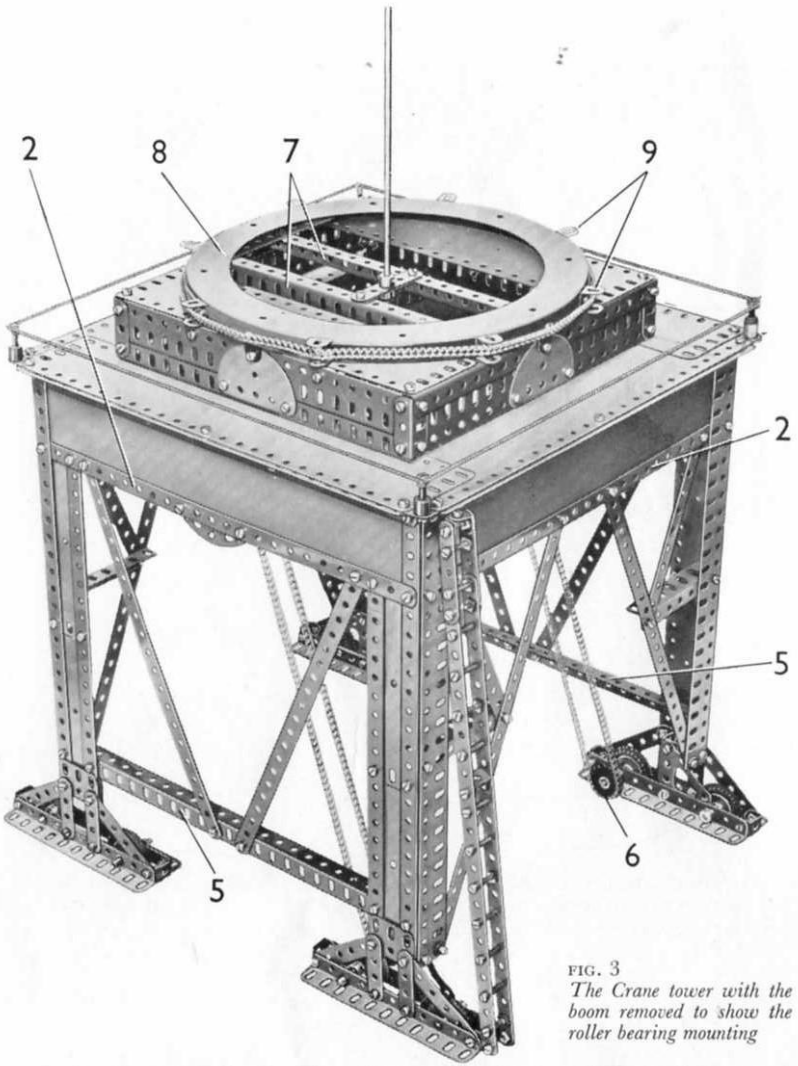


FIG. 3
The Crane tower with the boom removed to show the roller bearing mounting

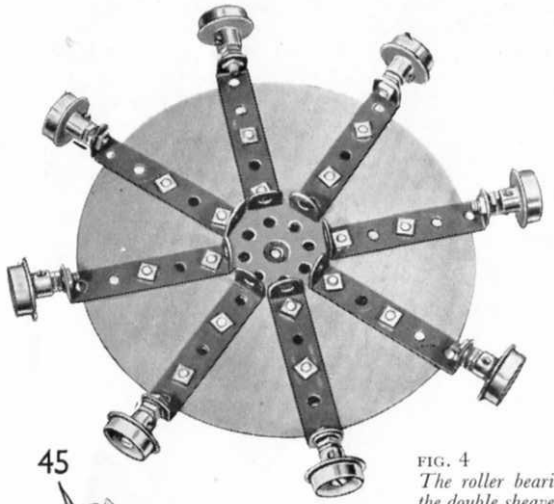


FIG. 4
The roller bearing wheel carrier, and the double sheave pulley block

A cross-shaft (10) is mounted across the tower in two 2½″ Stepped Curved Strips. This shaft consists of an 8″ and a 5″ Rod joined by a Coupling, and it carries two ¾″ Sprockets (11), a ⅞″ Bevel (12) and a Coupling (13) that is loose on the shaft but is held in position by a Collar. The Sprockets (11) are connected by Chain to the 1″ Sprockets (6).

Details of the Boom (Figs. 1, 5, 7 and 8)

The centre section of each main girder of the boom consists of a 12½″ Angle Girder (14) (Fig. 5) fitted at each end with a vertical 7½″ Angle Girder and at the centre with a 7½″ Strip. The 7½″ Girders and the 7½″ Strip are connected at the top by a built-up girder (15). The latter consists of a 24½″ Angle Girder that overlaps an 18½″ Angle Girder by three holes, with another 18½″ Angle Girder overlapping the first by 13 holes. At the front a 2½″ Angle Girder (16) (Fig. 7) is bolted to the girder (15), and is connected to the Angle Girder (14) by a built-up girder (17). Girder (17) consists of a 24½″ and a 5½″ Angle Girder overlapped one hole, and it is joined to the front of the Girder (14) by a Fishplate. A 4½″ Angle Girder (18) is fixed to the rear end of the girder (15) and to its lower end is bolted a 12½″ Angle Girder (19). The latter is connected to the rear end of the Girder (14) by a Fishplate.

The main boom girders are connected at the rear by two 5½″ × ½″ Double Angle Strips (20), and two 5½″ × 2½″ Flanged Plates are bolted between the ends of the Angle Girders (14). At the front a 5½″ × 2½″ Flanged Plate is fixed between the Angle Girders (16). Four 5½″ × 3½″ Flat Plates are fixed together in pairs by their longer sides, and are fixed to the rear ends of the girders (15) to form the floor of the cab.

A 5½″ × 2½″ Flanged Plate (21) (Fig. 8) is bolted between the girders (15), and a 12½″ Strip (22) is attached to the Flanged Plates fixed to the Girders (14).

The rails on which the trolley travels are each made from a 24½″ and an 18½″ Angle Girder, placed end to end and connected by a 2″ Strip. The rails are supported by Angle Brackets fixed to the girders (15). A 3″ Angle Girder (23) is bolted to the front end of each rail and is braced by a 3″ Strip. The top ends of these Girders are connected by a 5½″ Strip. A 5″ Rod is mounted in the Girders (23) and carries two built-up pulleys, each made from a 1″ loose Pulley clamped between two Bush Wheels.

The boom girders are braced by Strips and built-up strips as shown in Figs. 1, 5, 7 and 8. A Flanged Ring (24) is attached to the Angle Girders (14) by four 1″ × ½″ Reversed Angle Brackets.

The Roller Bearing (Figs. 2, 3, 4, 5 and 8)

A 5½″ Strip is bolted diametrically across a 6″ Circular Plate, and eight 2½″ × ½″ Double Angle Strips are fixed to the Circular Plate

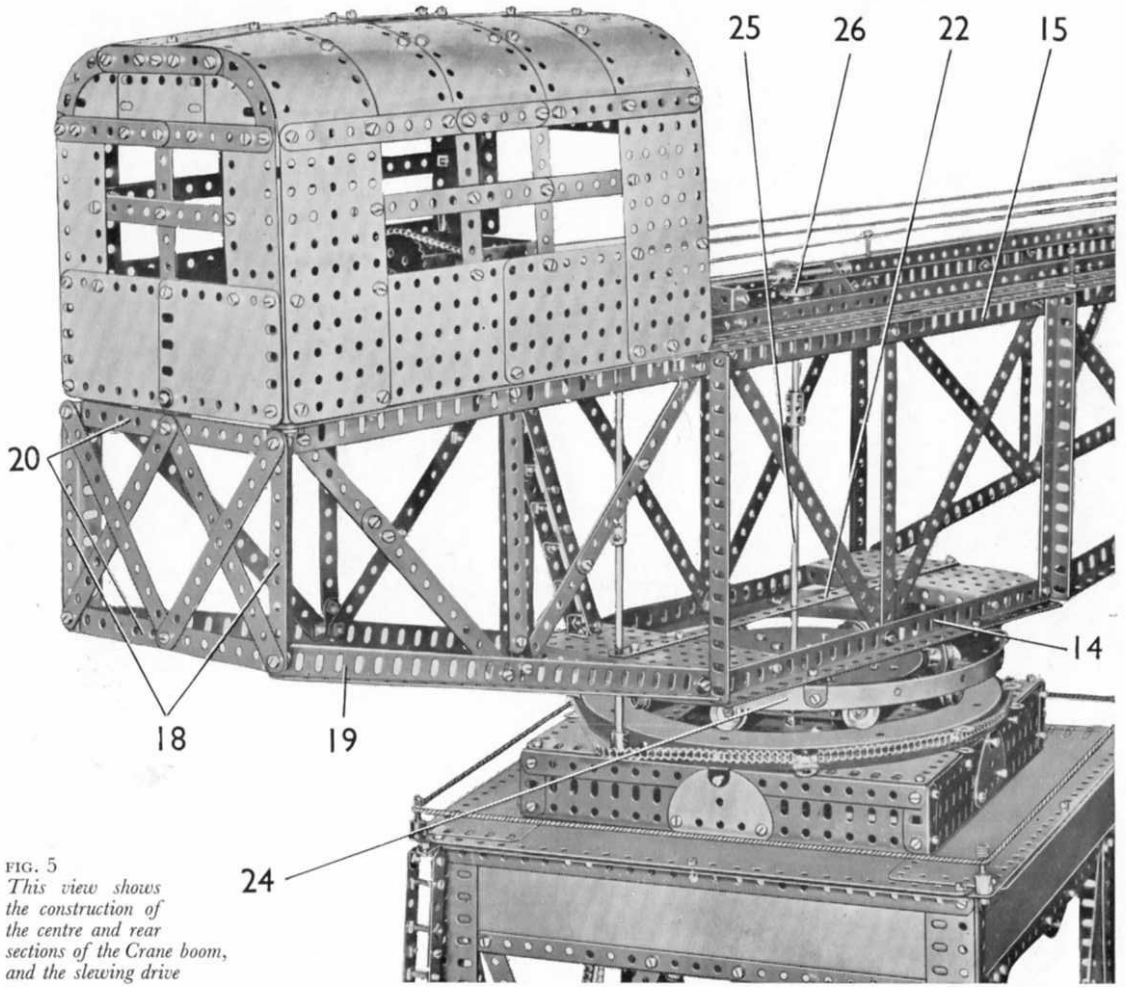


FIG. 5
This view shows the construction of the centre and rear sections of the Crane boom, and the slewing drive

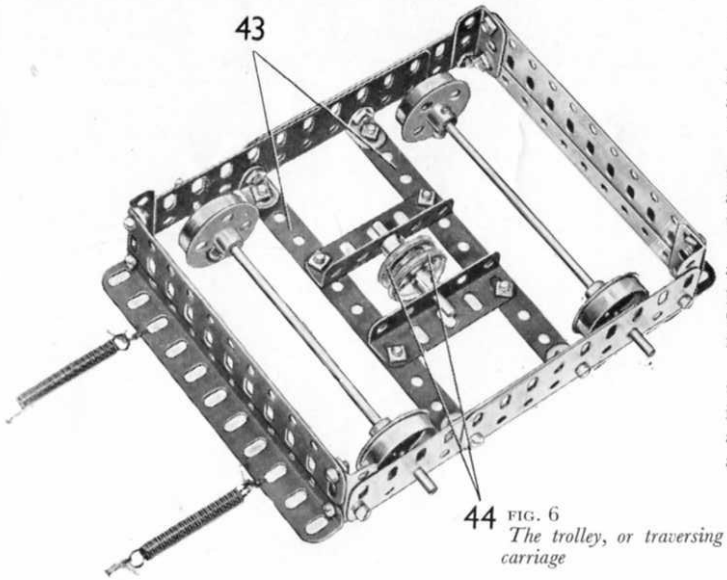


FIG. 6
The trolley, or traversing carriage

as shown (Fig. 4). Eight $\frac{3}{4}$" Flanged Wheels rotate freely on $\frac{3}{4}$" Bolts, each of which is fixed to the outer lug of a Double Angle Strip by two nuts. The Flanged Wheel is spaced from the lug by a Washer and a third nut on the Bolt. The Flanged Wheels are placed between the inner edges of the Flanged Rings (8) and (24) (Figs. 3 and 5).

An axle (25) is passed through the Flanged Plate (21) and the Strip (22) (Fig. 8), through the $5\frac{1}{2}$" Strip bolted to the Circular Plate, through two $2\frac{1}{2}$" Strips bolted face-to-face to the Girders (7), and through the Flat Plate (4) (Fig. 2). The lower end of the axle turns freely in the Coupling (13), and a $\frac{7}{8}$" Bevel drives the Bevel (12) on the cross-shaft. A $\frac{3}{4}$" Contrate (26) is fixed on the top end of the axle, which is made from a 3" and a $11\frac{1}{2}$" Rod joined by a Coupling.

Power Unit and Gear-Box (Figs. 8 and 9)

The sides of the gear-box are $4\frac{1}{2}$" × $2\frac{1}{2}$" Flat Plates bolted to $4\frac{1}{2}$" Angle Girders fixed to the base of the cab. Each side is extended forward by a 3" × $1\frac{1}{2}$" Flat Plate, which is attached to the base at its front end by a 1" × $\frac{1}{2}$" Angle Bracket. An E15R Electric Motor is bolted by its flanges to the base as shown (Fig. 8), and to one side-plate two 2" Angle Girders are fastened by bolts through their slotted holes. A 2" Flat Girder is fixed to each Angle Girder to form a deep section channel girder.

A $\frac{7}{16}$" diameter Pinion on the Motor shaft drives a 60-tooth Gear on a $2\frac{1}{2}$" Rod supported in the side-plates. This Rod carries a Worm (27), which drives a 57-tooth Gear on a 2" Rod mounted in the 2" Flat Girders. A 2" Sprocket on this Rod is connected by Chain to a similar Sprocket on an axle (28) (Fig. 9) made from a $3\frac{1}{2}$" and a 2" Rod joined by a Coupling.

The axle (28) carries a $\frac{3}{4}$" Pinion, and the 50-tooth Gears (29) and (30) can be moved into mesh with this Pinion by sliding the Rods on which they are mounted. The Gear (29) is fixed on a 5" Rod that carries a winding drum (31) made from two Bush Wheels clamped at the ends of a Cylinder by nuts on two 3" Screwed Rods. A Compression Spring is fitted between the winding drum and one side of the gear-box as shown (Fig. 9). The Gear (30) is fixed on a 5" Rod fitted with two $1\frac{1}{2}$" Pulleys (32), with a Compression Spring placed between one of the Pulleys and the side of the gear-box. The Compression Springs normally hold the Gears (29) and (30) clear of the $\frac{3}{4}$" Pinion, but they can be moved into mesh by operating levers. Each lever is a $2\frac{1}{2}$" Rod in a Rod and Strip Connector, which is *lock-nutted* to a lug of a $1\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strip bolted to the base. The levers engage between Collars on the ends of the 5" Rods.

The Motor switch is controlled by a lever (33), made from a $1\frac{1}{2}$" Rod in a Rod and Strip Connector that is bolted to a Bell Crank. The Bell Crank is mounted on a Pivot Bolt, which is screwed tightly into a Threaded Coupling and is fixed by a nut. The Threaded Coupling is screwed on to a bolt passed through the base of the cab. A Crank (34) is mounted on a Pivot Bolt in the Bell Crank, and a Threaded Pin in the Crank engages a hole in the Motor switch.

A $1\frac{1}{2}$" Sprocket on axle (28) is connected by Chain to a similar Sprocket on a 5" Rod (35). This Rod is held by Collars in the 3" × $1\frac{1}{2}$" Flat Plates, and it carries a Worm (36). The Worm is in constant mesh with a $\frac{1}{2}$" diameter, $\frac{3}{4}$" face Pinion, on an axle (37) made from an 8" and a 4" Rod joined by a Coupling. Axle (37) is supported in Trunnions bolted to the base of the cab and to the Flanged Plate (21), and in a $4\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strip attached to the trolley rails by Fishplates.

Axle (37) is able to slide endways in its bearings and its movement is controlled by a lever (38). This is a $1\frac{1}{2}$" Rod held in a Coupling fixed on a $4\frac{1}{2}$" Rod supported in 1" Corner Brackets bolted to the 3" × $1\frac{1}{2}$" Flat Plates. A Compression Spring is placed on the Rod between one of the Corner Brackets and a Coupling, to prevent the Rod from turning too easily. A Crank (39) is fixed on the $4\frac{1}{2}$" Rod, and a Threaded Pin in the Crank engages the groove of a Socket Coupling (40), which is fixed to a Collar on the axle (37).

By sliding axle (37) to the left (Fig. 8) a $\frac{3}{4}$" Pinion is moved into mesh with the $\frac{3}{4}$" Contrate (26) to engage the drive to the travelling wheels. When axle (37) is moved to the right a $\frac{3}{4}$" Pinion is engaged with a $\frac{3}{4}$" Contrate (41). This Contrate is fixed on an axle made from a 5" and a $4\frac{1}{2}$" Rod joined by a Coupling. The axle is supported in a strip (42), made from a $5\frac{1}{2}$" and a $4\frac{1}{2}$" Strip bolted face-to-face, and in one of the $5\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates fixed between the Girders (14). The axle carries at its lower end a 1" Sprocket, and this is connected by Chain to the Flanged Ring (8) as shown in Fig. 5.

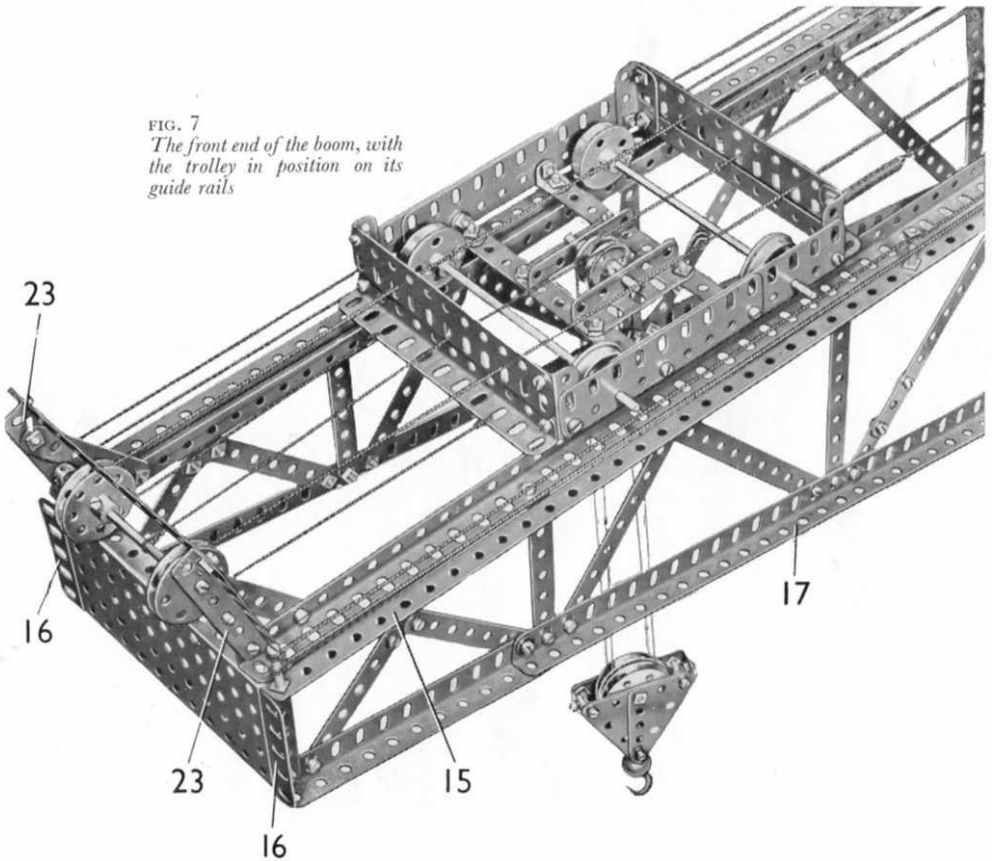


FIG. 7
The front end of the boom, with the trolley in position on its guide rails

The Trolley and the Pulley Block (Figs. 1, 4, 6 and 7)

The sides of the trolley are each made from a 5½″ Flat Girder and a 4½″ Flat Girder overlapped seven holes and fitted at each end with a 1½″ Angle Girder. The sides are connected at each end by a 5½″ Flat Girder and a 5½″ Angle Girder. Two 5½″ Strips (43) are supported by Angle Brackets, and two 2½″ Angle Girders are bolted to them. These Girders support a 2″ Rod that carries two 1″ loose Pulleys (44) with a ½″ loose Pulley between them. The trolley axles are 6½″ Rods.

Each side of the pulley block is formed by two 2½″ × 1½″ Triangular Flexible Plates bolted together. A 2½″ × ½″ Double Angle Strip is fixed to the top of one side, and two Angle Brackets are attached to the other side. The Angle Brackets and the lugs of the Double Angle Strip are used to connect the sides together. A Strip Coupling (Fig. 4) is held by a ½″ Bolt that secures also a large Loaded Hook placed in the slot of the Strip Coupling. Two 1″ loose Pulleys (45), each with a Wheel Disc (6 holes) on one side and a Wheel Disc (8 holes) on the other side, are freely mounted on a ¾″ Bolt, which is held in place by a nut.

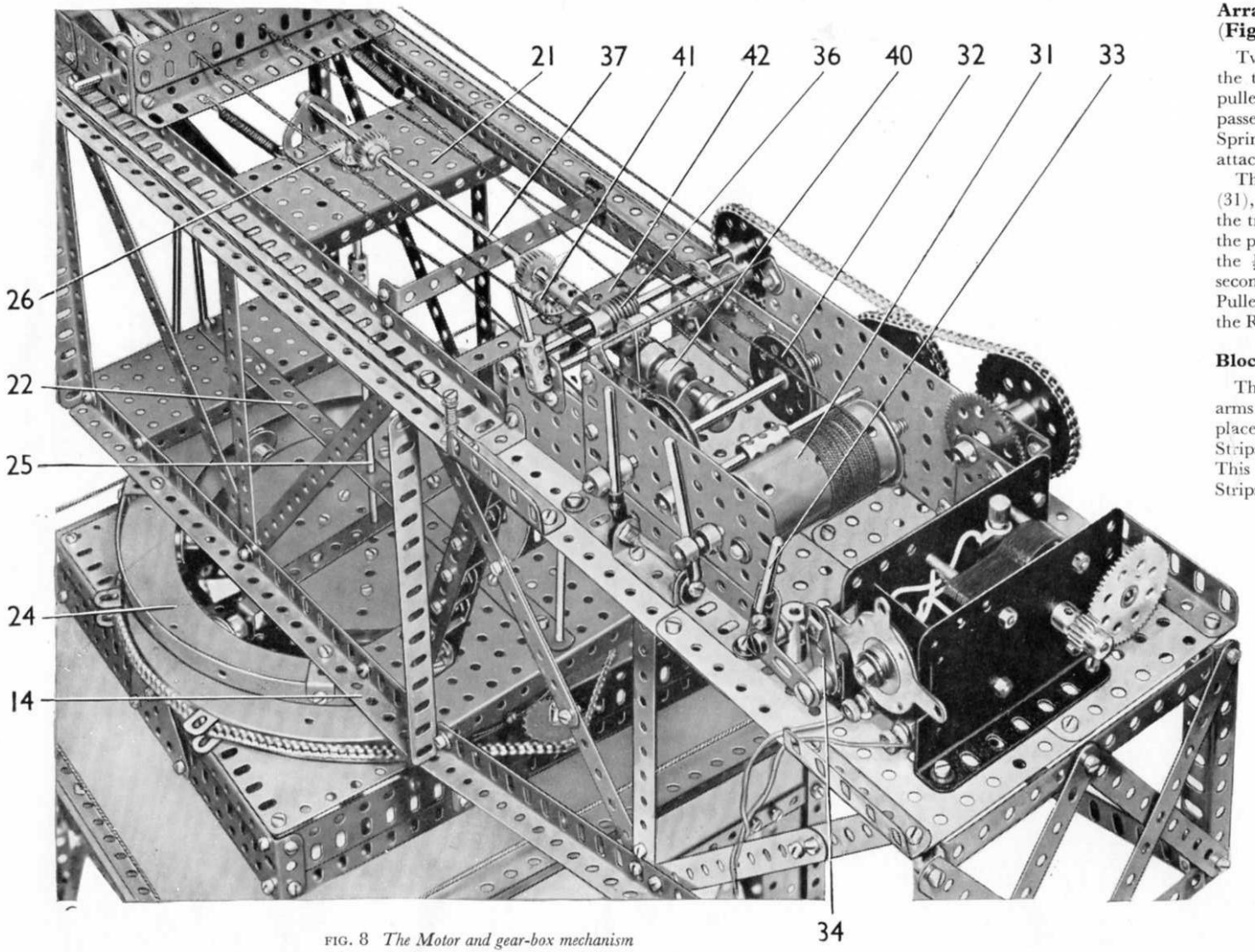


FIG. 8 *The Motor and gear-box mechanism*

Arrangement of the Cords (Figs. 1, 7, 8 and 9)

Two lengths of Cord are tied to the front of the trolley and are taken round the made-up pulleys at the front of the boom. The Cords are passed round the 1½″ Pulleys (32) and are tied to Springs, which are stretched slightly and are attached by Cord to the rear of the trolley.

The hoisting Cord is fastened to the drum (31), then taken over one of the Pulleys (44) of the trolley and round one of the Pulleys (45) in the pulley block. Then the Cord is passed round the ½″ loose Pulley of the trolley, round the second of the Pulleys (45) and over the second Pulley (44). The end of the Cord is then tied to the Rod at the front of the boom.

Block-Lifting Tackle (Fig. 1)

The block-lifting tackle consists of two pivoted arms (Fig. 1), each made from a 2½″ Strip that is placed between the ends of two face-to-face 2½″ Strips so that they form a made-up 4½″ strip. This is extended at its lower end by two 1½″ Strips, with a Pawl without boss bolted between them. The points of the Pawls engage holes in the block, which consists of three 3½″ × 2½″ Flanged Plates and two 2½″ × 2½″ Flexible Plates. A short length of Chain is tied to the upper ends of the arms, and a small Loaded Hook passed through the Chain is used to attach the lifting tackle to the Hook of the pulley block.

The Cab, Ladders, etc. (Figs. 1, 3 and 5)

The lower part of the side of the cab seen in Fig. 5 consists of two 4½″ × 2½″ Flat Plates, with a 5½″ × 2½″ Flat Plate placed vertically at each end. The vertical Plates are connected at the top by two 5½″ Strips and a 2½″ Strip. The side shown in Fig. 1 consists of two 5½″ × 2½″ Flat Plates and a 2½″ × 2½″ Flat Plate, with a vertical 5½″ × 1½″ Flexible Plate at each end. The top

ends of the Flexible Plates are connected by two $5\frac{1}{2}$" Strips and a $3\frac{1}{2}$" Strip. The roof is formed by five $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates along each side. These are curved and bolted together along the centre of the cab, with two $5\frac{1}{2}$" Strips and a $2\frac{1}{2}$" Strip covering the joins. The cab is bolted to $2\frac{1}{2}$" Angle Girders fixed to the girders (15) of the boom.

The handrails along the boom are represented by Cord passed round six $1\frac{1}{8}$" Bolts and two 1" Screwed Rods, each of which is fixed to the boom by two nuts.

The ladder between the cab and the lower part of the boom is formed by two $7\frac{1}{2}$" Strips connected by six $\frac{1}{2}$" Reversed Angle Brackets that form the rungs. An Angle Bracket at the top is bolted to a Fishplate fixed to the base of the cab, and two Angle Brackets at the lower end of the ladder are bolted to one of the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plates between the Girders (14).

The ladder giving access to the top of the tower consists of two $12\frac{1}{2}$" Strips, each extended by a $2\frac{1}{2}$" Strip overlapped two holes. The Strips are connected by three Double Brackets, the lower one of which is bolted to the Double Bracket between the $5\frac{1}{2}$" Angle Girders of one of the wheel units. The upper Double Bracket is attached to the top of the tower by a Fishplate. The rungs are formed by nine $\frac{3}{4}$" Bolts, each fixed in place by a nut, and four $\frac{3}{8}$" Bolts, placed opposite to $\frac{7}{32}$" bolts passed through the opposite side of the ladder.

Parts Required to Build the Meccano Block-setting Crane

21	of No.	1	6	of No.	7
6	" "	1a	6	" "	7a
6	" "	1b	16	" "	8
36	" "	2	6	" "	8a
8	" "	2a	4	" "	8b
18	" "	3	12	" "	9
12	" "	4	8	" "	9a
21	" "	5	8	" "	9b
12	" "	6	2	" "	9c
5	" "	6a	8	" "	9d

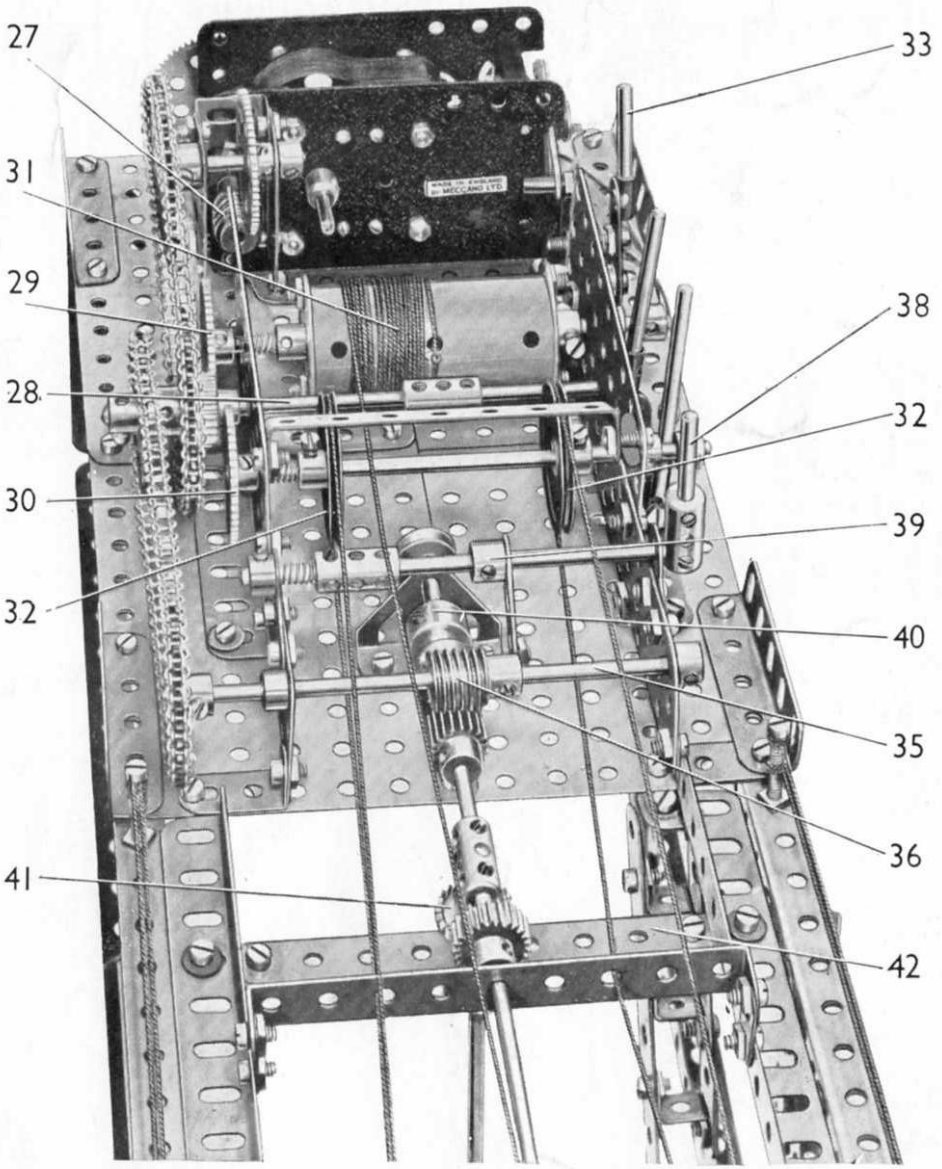


FIG. 9
The gear-box seen from the front and showing the layout of the drives to the slewing and travelling movements

Parts Required (continued)

2	of No.	9e	1	of No.	63b
8	" "	9f	1	" "	63c
18	" "	10	2	" "	64
11	" "	11	4	" "	70
38	" "	12	1	" "	72
6	" "	12b	2	" "	73
1	" "	13	2	" "	77
2	" "	13a	2	" "	80c
2	" "	14	2	" "	82
6	" "	15	6	" "	90a
2	" "	15a	3	" "	94
1	" "	15b	2	" "	95
1	" "	16	2	" "	95a
3	" "	16a	3	" "	96
1	" "	16b	2	" "	96
4	" "	17	4	" "	103
5	" "	18a	4	" "	103a
4	" "	18b	4	" "	103b
4	" "	20	2	" "	103c
8	" "	20b	2	" "	103d
2	" "	21	2	" "	103g
8	" "	22	4	" "	103h
6	" "	22a	4	" "	108
1	" "	23	18	" "	111
2	" "	23a	1	" "	111a
4	" "	24	19	" "	111c
2	" "	24a	6	" "	111d
2	" "	24b	4	" "	115
2	" "	24c	3	" "	120b
3	" "	25	6	" "	125
1	" "	26b	2	" "	126
1	" "	26c	1	" "	128
2	" "	27	4	" "	133
1	" "	27a	2	" "	133a
1	" "	27d	8	" "	142c
2	" "	29	1	" "	144
2	" "	30	1	" "	146
2	" "	32	2	" "	147b
5	" "	35	2	" "	147c
657	" "	37a	2	" "	165
588	" "	37b	2	" "	167b
74	" "	38	1	" "	171
2	" "	40	2	" "	173a
2	" "	43	4	" "	176
4	" "	45	2	" "	186d
1	" "	48	6	" "	188
9	" "	48a	12	" "	189
1	" "	48b	2	" "	190
3	" "	48c	2	" "	190a
2	" "	48d	10	" "	191
4	" "	52	2	" "	196
5	" "	52a	8	" "	197
3	" "	53	3	" "	212
4	" "	53a	4	" "	214
1	" "	57b	1	" "	216
1	" "	57c	4	" "	221
1	" "	58	1 E15R Electric Motor (not included in Outfit)		
24	" "	59			
2	" "	62			
8	" "	63			

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