

# MECCANO Eiffel Tower

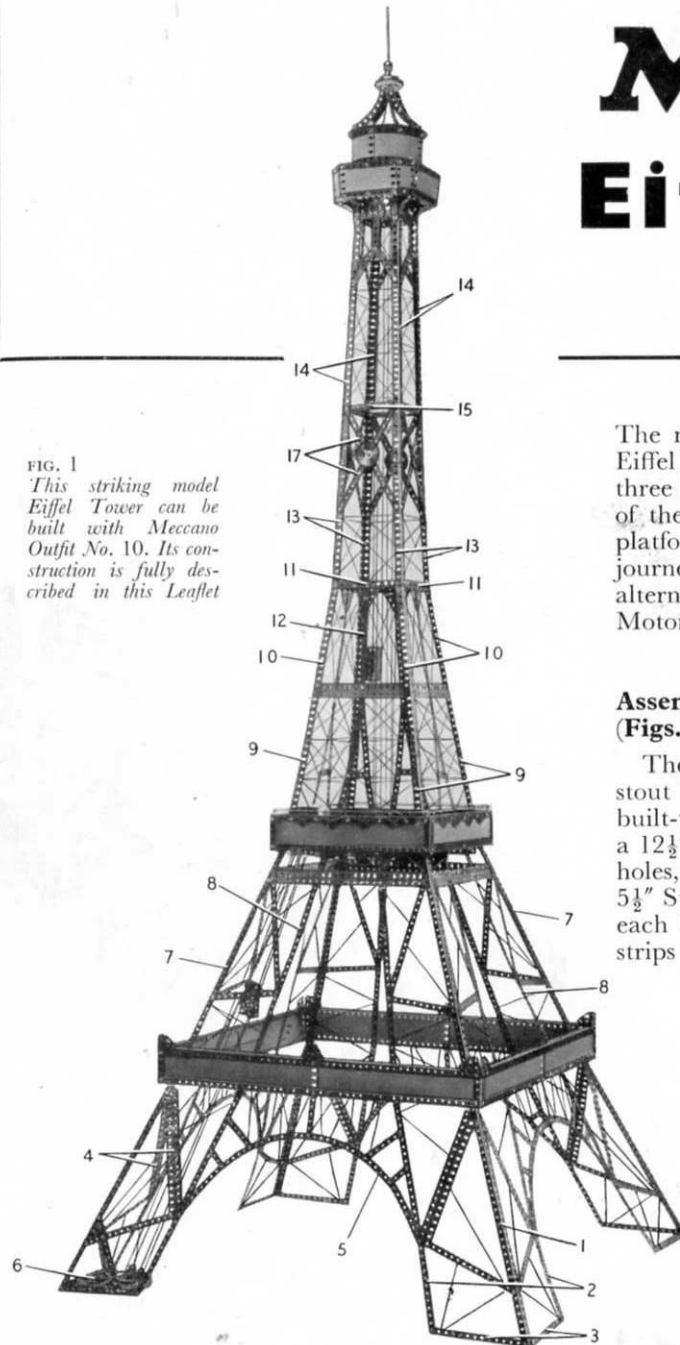
(MODEL No. 10.14)

## SPECIAL FEATURES

This imposing model of the famous Eiffel Tower in Paris is over 7 ft. in height. It is fitted with three lifts, which are operated by a Meccano E20R(S) type Electric Motor.

FIG. 1

This striking model Eiffel Tower can be built with Meccano Outfit No. 10. Its construction is fully described in this Leaflet



The model described in this Leaflet is based on the famous Eiffel Tower in Paris. It is over 7 ft. in height, and is fitted with three lifts. One of the lifts operates inside one of the main legs of the tower, between ground level and the centre landing platform, from which point the other two lifts continue the journey to the top of the tower, ascending and descending alternately. The power is provided by an E20R(S) Electric Motor.

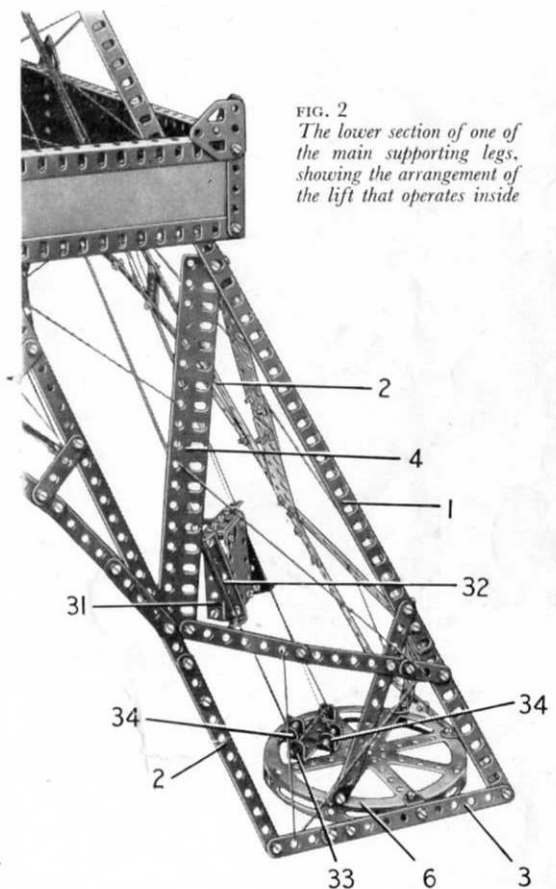
## Assembly of the Lower Section of the Tower (Figs. 1 and 2)

The lower section of the tower consists essentially of four stout legs, each made from a built-up girder (1) and two built-up strips (2) (Figs. 1 and 2). The girder (1) is formed by a  $12\frac{1}{2}$ " Angle Girder and a  $5\frac{1}{2}$ " Angle Girder overlapped two holes, and each of the strips (2) consists of a  $12\frac{1}{2}$ " Strip and a  $5\frac{1}{2}$ " Strip overlapped three holes. The girder and the strips of each leg are connected at their lower ends by two built-up strips (3), each made from a  $5\frac{1}{2}$ " and a  $2\frac{1}{2}$ " Strip overlapped two holes. The upper ends of the girder (1) and the strips (2) are attached by Angle Brackets to a  $24\frac{1}{2}$ " Angle Girder that forms the lower member of each side of the lower balcony. Each side of the balcony is completed by two  $12\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plates and a further  $24\frac{1}{2}$ " Angle Girder, and the sides are connected at the corners by  $2\frac{1}{2}$ " Angle Girders.

The legs of the tower are strengthened by built-up strips and by bracing pieces (4). Four of these bracing pieces are  $9\frac{1}{2}$ " Flat Girders, two others are made from  $5\frac{1}{2}$ " and  $4\frac{1}{2}$ " Flat Girders and each of the remaining two consists of a  $5\frac{1}{2}$ ", a  $3\frac{1}{2}$ " and a 2" Flat Girder. The legs are joined across by arched structures (5), each of which is formed by four  $2\frac{1}{2}$ " Strips and three  $5\frac{1}{2}$ "

FIG. 2

The lower section of one of the main supporting legs, showing the arrangement of the lift that operates inside



Curved Strips. Each arch is connected to the balcony by  $3\frac{1}{2}$ " Strips, and to the legs by  $3\frac{1}{2}$ " and 2" Strips.

A Hub Disc (6) is attached by Angle Brackets to the strips (3) of one leg, and is braced to the girder (1) by  $5\frac{1}{2}$ " Strips, which are connected to the Hub Disc by Angle Brackets.

### Construction of the Tower: Centre Section (Figs. 1, 5 and 7)

The centre section is made by extending the girders (1) and the strips (2) of each leg of the lower part of the tower. Each of the girders (1) is lengthened by an  $18\frac{1}{2}$ " Angle Girder (7) (Fig. 1), and each strip (2) is extended upward by a strip (8), made from two  $12\frac{1}{2}$ " Strips overlapped two

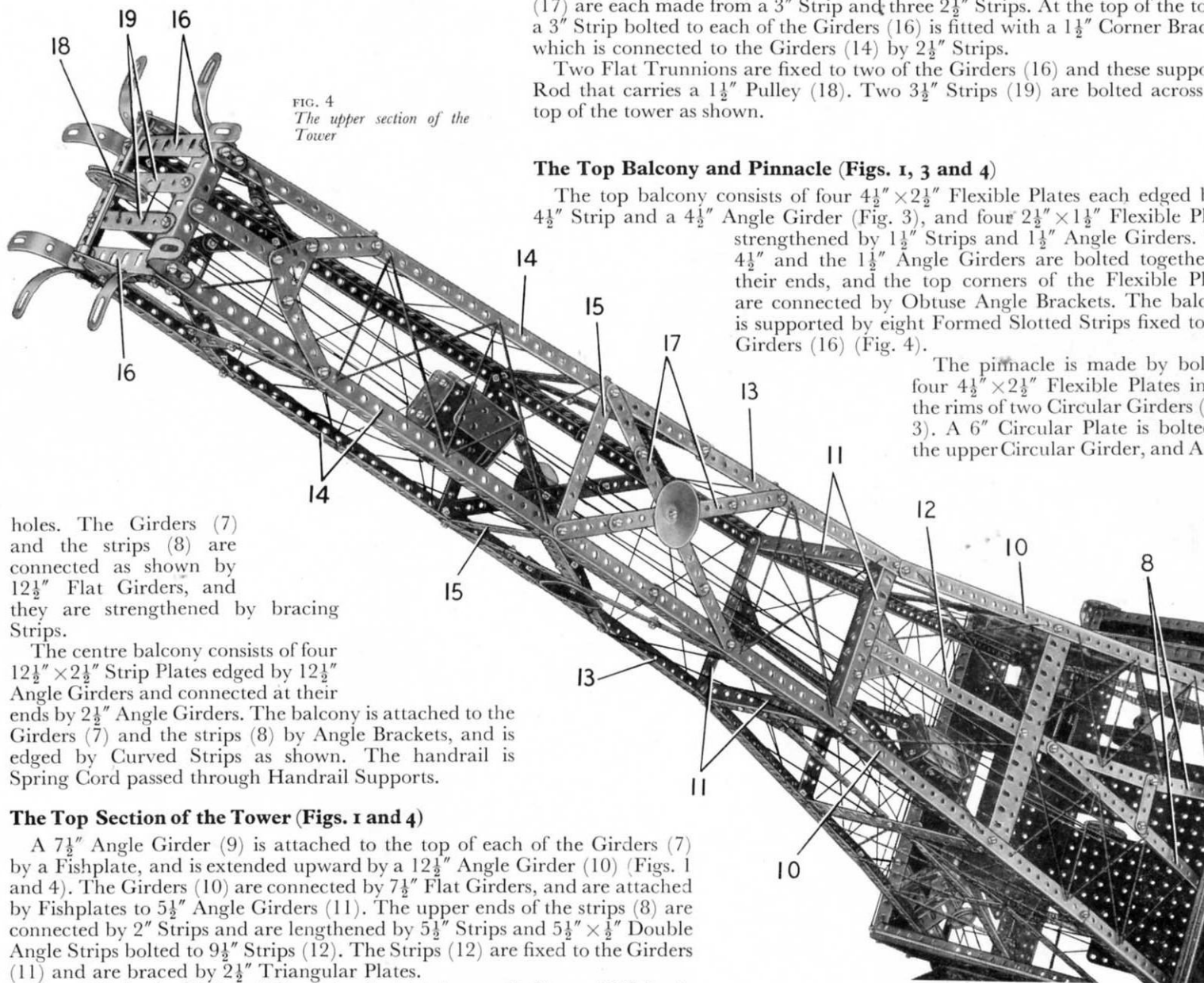


FIG. 4  
The upper section of the Tower

Girder (14), are bolted to the ends of the Girders (11). The Girders (14) are joined together by  $4\frac{1}{2}$ " Strips (15) and  $3\frac{1}{2}$ " Angle Girders (16). The bracing strips (17) are each made from a 3" Strip and three  $2\frac{1}{2}$ " Strips. At the top of the tower a 3" Strip bolted to each of the Girders (16) is fitted with a  $1\frac{1}{2}$ " Corner Bracket, which is connected to the Girders (14) by  $2\frac{1}{2}$ " Strips.

Two Flat Trunnions are fixed to two of the Girders (16) and these support a Rod that carries a  $1\frac{1}{2}$ " Pulley (18). Two  $3\frac{1}{2}$ " Strips (19) are bolted across the top of the tower as shown.

### The Top Balcony and Pinnacle (Figs. 1, 3 and 4)

The top balcony consists of four  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates each edged by a  $4\frac{1}{2}$ " Strip and a  $4\frac{1}{2}$ " Angle Girder (Fig. 3), and four  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates strengthened by  $1\frac{1}{2}$ " Strips and  $1\frac{1}{2}$ " Angle Girders. The  $4\frac{1}{2}$ " and the  $1\frac{1}{2}$ " Angle Girders are bolted together at their ends, and the top corners of the Flexible Plates are connected by Obtuse Angle Brackets. The balcony is supported by eight Formed Slotted Strips fixed to the Girders (16) (Fig. 4).

The pinnacle is made by bolting four  $4\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plates inside the rims of two Circular Girders (Fig. 3). A 6" Circular Plate is bolted to the upper Circular Girder, and Angle

holes. The Girders (7) and the strips (8) are connected as shown by  $12\frac{1}{2}$ " Flat Girders, and they are strengthened by bracing Strips.

The centre balcony consists of four  $12\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plates edged by  $12\frac{1}{2}$ " Angle Girders and connected at their ends by  $2\frac{1}{2}$ " Angle Girders. The balcony is attached to the Girders (7) and the strips (8) by Angle Brackets, and is edged by Curved Strips as shown. The handrail is Spring Cord passed through Handrail Supports.

### The Top Section of the Tower (Figs. 1 and 4)

A  $7\frac{1}{2}$ " Angle Girder (9) is attached to the top of each of the Girders (7) by a Fishplate, and is extended upward by a  $12\frac{1}{2}$ " Angle Girder (10) (Figs. 1 and 4). The Girders (10) are connected by  $7\frac{1}{2}$ " Flat Girders, and are attached by Fishplates to  $5\frac{1}{2}$ " Angle Girders (11). The upper ends of the strips (8) are connected by 2" Strips and are lengthened by  $5\frac{1}{2}$ " Strips and  $5\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips bolted to  $9\frac{1}{2}$ " Strips (12). The Strips (12) are fixed to the Girders (11) and are braced by  $2\frac{1}{2}$ " Triangular Plates.

Four  $9\frac{1}{2}$ " Angle Girders (13), each of which is extended by an  $18\frac{1}{2}$ " Angle



FIG. 3  
The top balcony and pinnacle of the Eiffel Tower

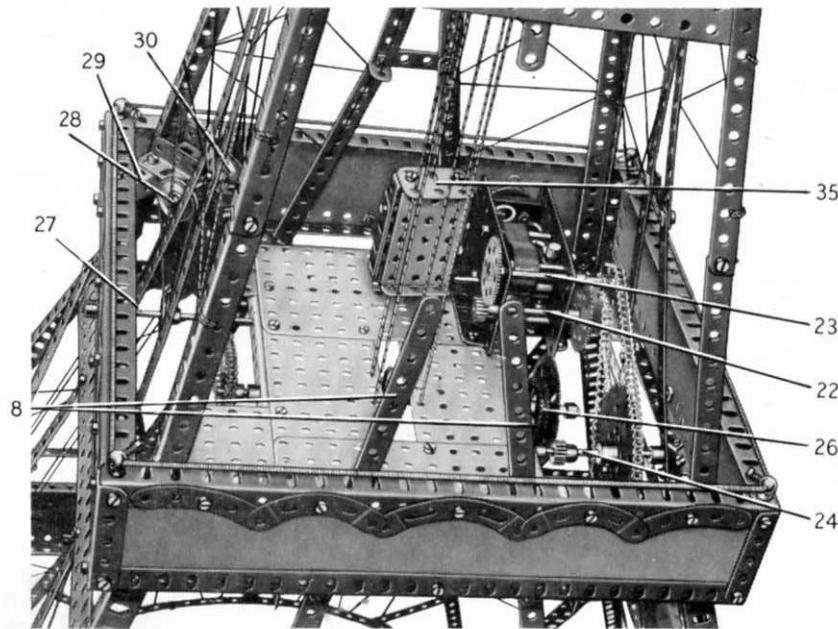


FIG. 5

*The centre landing platform, showing the E20R(S) Electric Motor in position and a lift ready to ascend*

Brackets fixed to the Circular Plate support eight 4" Stepped Curved Strips. The top ends of four of the Curved Strips are connected by Angle Brackets to a Bush Wheel in which an 8" Rod is fixed. A Wheel Flange, two 1 1/8" Flanged Wheels, a 3/4" Pinion and a 3/4" Flanged Wheel are fixed on the Rod. The pinnacle is supported by four Fishplates bolted to four Angle Brackets, which are attached to the top edges of the balcony.

#### **The Centre Landing Platform and Operating Mechanism (Figs. 5, 6 and 7)**

Two built-up girders (20) (Fig. 6) are bolted underneath the centre balcony and to them are bolted Flat Plates as shown in Figs. 5 and 6. These Plates comprise two 5 1/2" x 3 1/2" Flat Plates and four 4 1/2" x 2 1/2" Flat Plates. A 2 1/2" x 1 1/2" Triangular Flexible Plate (21) is arranged as shown at one corner of the platform.

An E20R(S) Electric Motor is bolted to the platform and a 7/16" diameter Pinion on its armature shaft drives a 60-tooth Gear on a 2 1/2" Rod (22) (Fig. 5). A 1/2" Pinion on this Rod engages a 57-tooth Gear on a 3 1/2" Rod (23), which carries also a 3/4" Sprocket. This Sprocket is connected by Chain to a 3" Sprocket on a Rod (24) mounted in one of the girders (20) and in an Angle Bracket bolted underneath the balcony. A 1/2" Pinion on Rod (24) drives a 2 1/2" Gear that is loosely mounted on a 6 1/2" Rod (25). A Compression Spring is placed on this Rod between the Gear and a Collar, and it forces the Gear against a Motor Tyre (26) on a 1" Pulley fixed on the Rod. This arrangement forms a

friction drive, and if the lifts reach the limits of their travel before the Motor is reversed it allows the drive to slip.

A 1 1/2" Sprocket on Rod (25) is connected by Chain to a 3/4" Sprocket on a 5" Rod (27) (Fig. 6). This Rod is mounted in one of the girders (20) and in an Angle Bracket bolted underneath the balcony. A Driving Band is passed round

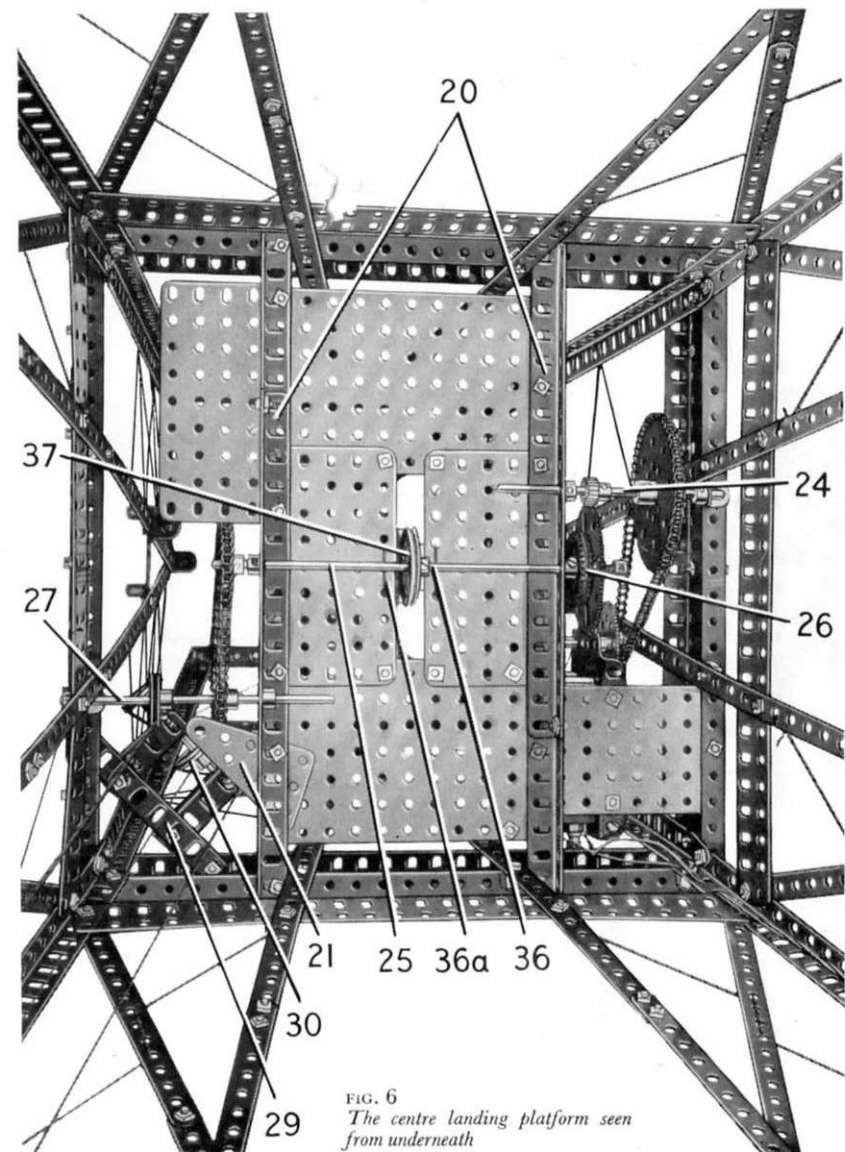


FIG. 6

*The centre landing platform seen from underneath*



a 1" Pulley on Rod (27) and round a similar Pulley on a  $2\frac{1}{2}$ " Rod (28) (Fig. 5). Rod (28) is supported in two 2" Angle Girders bolted to a built-up girder (29). The girder (29) consists of a 3" Angle Girder and a  $1\frac{1}{2}$ " Angle Girder bolted together. A 1" Pulley (30) is fixed on Rod (28).

#### Details of the Lifts (Figs. 2, 5, 6 and 7)

The lift working to the centre platform is made by bolting  $1\frac{1}{2}$ " Angle Girders to each end of a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate. A  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip (31) (Fig. 2) on each side is fixed between the Angle Girders, and a further  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip (32) is arranged on each side. The Double Angle Strips (31) and (32) are bolted together at the top and are connected by a Fishplate at their lower ends. The guides for this lift are provided by a length of Cord tied to one of the 2" Angle Girders bolted to girder (29) (Fig. 7). The Cord is passed through the lugs of one of the Double Angle Strips (32), through a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip (33) (Fig. 2) bolted to the Hub Disc (6), and through the lugs of the other Double Angle Strip (32). The Cord is pulled tight and is tied to the second 2" Angle Girder. The lift-operating Cord is tied to a Fishplate bolted to the top  $1\frac{1}{2}$ " Angle Girder of the lift and to a Tension Spring placed between the two Angle Girders; it is then taken over Pulley (30) (Fig. 7) and round two 1" Rods held by Spring Clips in Double Brackets (34) (Fig. 2). The Cord is then passed through the lower  $1\frac{1}{2}$ " Angle Girder of the lift and is tied to the bottom loop of the Tension Spring so that the Spring is stretched slightly.

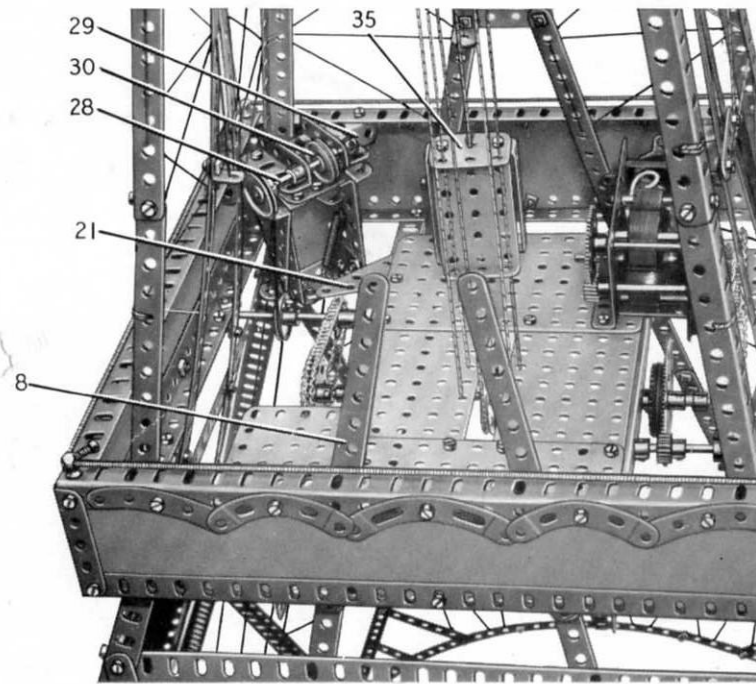


FIG. 7 Another view of the centre landing platform

The two lifts that operate between the centre platform and the top of the tower are each made by bolting two  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips between the flanges of a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate. A Girder Bracket is fixed to one Double Angle Strip, and a  $1\frac{1}{2}$ " Flat Girder (35) (Fig. 5) is bolted to each flange of the Flanged Plate. The guide Cord for the lifts is tied to one of the Strips (19) (Fig. 4), is passed through the Flat Girders (35) of one lift, and through the second stage platform as indicated at (36) (Fig. 6). The Cord is passed through the Flat Girders (35) of the second lift and is taken through holes in the Strips (19) before it is again passed through the Flat Girders of the second lift. The Cord is then taken through the centre platform at (36a) (Fig. 6) and is tied to one of the Strips (19).

The operating Cord for these lifts is tied at one end to a Tension Spring placed inside one of the lifts. The Cord is passed through the top  $1\frac{1}{2}$ " Flat Girder of this lift, round the Pulley (18) and through the top  $1\frac{1}{2}$ " Flat Girder of the second lift, where it is tied to another Tension Spring. A length of Cord fastened to the lower end of this Spring is passed through the bottom  $1\frac{1}{2}$ " Flat Girder, is taken round a  $1\frac{1}{2}$ " Pulley (37) (Fig. 6) on Rod (25), through the bottom of the second lift and is tied to the lower end of the Spring in this lift.

The Cord must be pulled tight so that the two Tension Springs are stretched as fully as possible. The lengths of Cord must also be adjusted so that as one lift reaches the top of the tower the other lift is at the level of the centre platform.

#### Parts Required to Build the Meccano Eiffel Tower

24 of No. 1	8 of No. 7	2 of No. 9e	2 of No. 16a	1 of No. 26c	9 of No. 48a	8 of No. 89b	2 of No. 103c	4 of No. 133	8 of No. 191
6 " " 1a	8 " " 7a	7 " " 9f	1 " " 16b	1 " " 27a	4 " " 48d	8 " " 90	2 " " 103d	4 " " 136	12 " " 197
6 " " 1b	16 " " 8	19 " " 10	2 " " 18b	1 " " 27c	2 " " 51	8 " " 90a	2 " " 103g	1 " " 137	8 " " 215
36 " " 2	6 " " 8a	2 " " 11	2 " " 20	1 " " 27d	2 " " 52a	1 " " 94	4 " " 103h	1 " " 142c	1 " " 221
8 " " 2a	4 " " 8b	44 " " 12	1 " " 20b	4 " " 35	4 " " 53a	1 " " 95a	4 " " 103k	2 " " 143	
18 " " 3	8 " " 9	10 " " 12c	2 " " 21	688 " " 37a	1 " " 58	1 " " 95b	8 " " 111c	1 " " 146	
12 " " 4	4 " " 9a	2 " " 13a	4 " " 22	684 " " 37b	11 " " 59	2 " " 96a	1 " " 118	2 " " 161	
68 " " 5	6 " " 9b	1 " " 15	1 " " 24	8 " " 38	4 " " 76	4 " " 103	1 " " 120b	1 " " 186a	1 E20R(S)
12 " " 6	1 " " 9c	1 " " 15a	1 " " 25	6 " " 40	12 " " 89	4 " " 103a	4 " " 126	4 " " 187a	Electric Motor
6 " " 6a	8 " " 9d	1 " " 15b	3 " " 26	2 " " 43	4 " " 89a	4 " " 103b	10 " " 126a	5 " " 188	(not included in Outfit)