

## MODEL OF THE MONTH

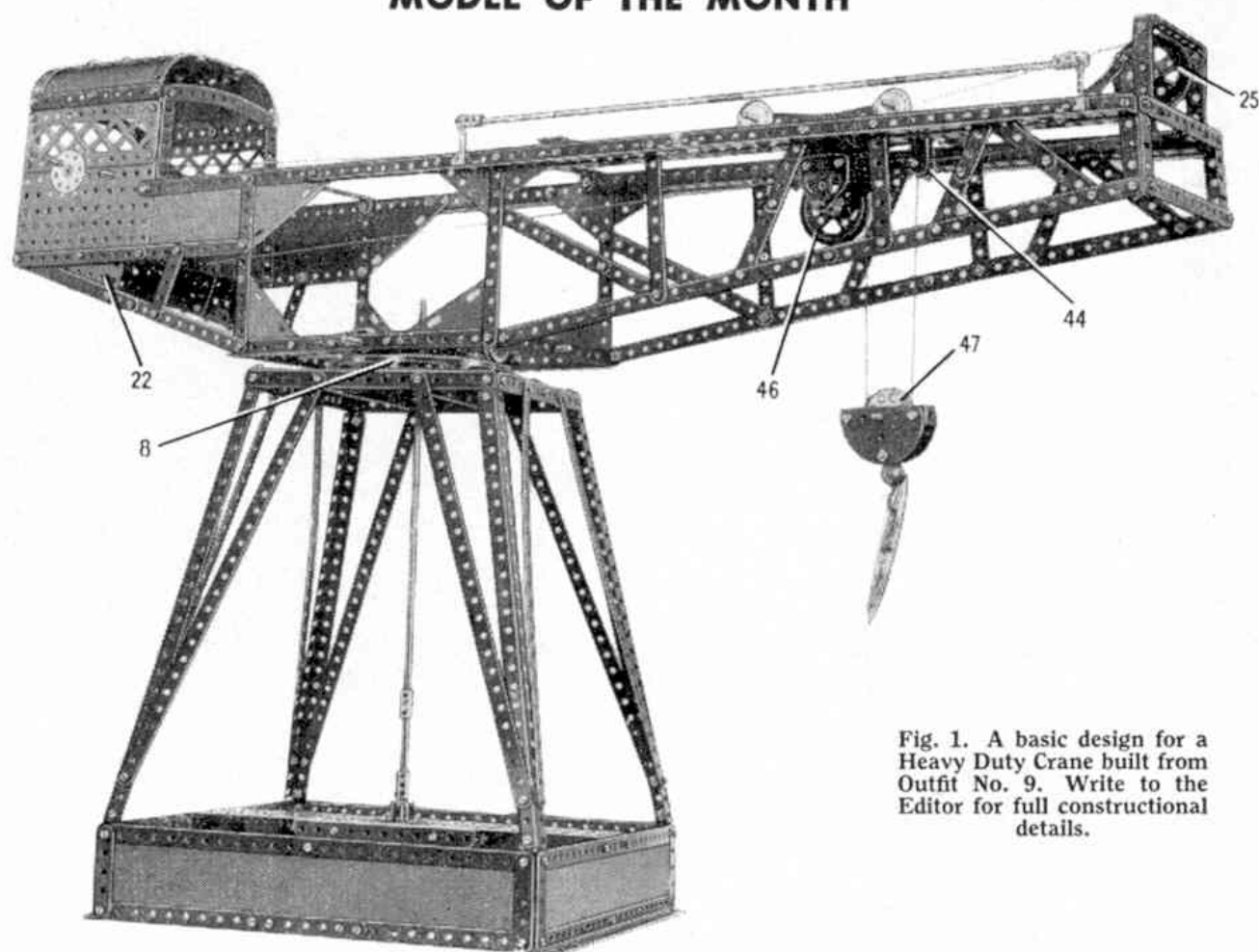


Fig. 1. A basic design for a Heavy Duty Crane built from Outfit No. 9. Write to the Editor for full constructional details.

## HEAVY DUTY CRANE

CRANES are wonderful subjects for Meccano models for there are so many different kinds of both large and small types that a model-builder has no difficulty in selecting one that he can build with the parts available to him. The crane that we have chosen as the subject of our "Model of the Month" is one of the larger cranes capable of lifting really big loads. They are sometimes to be seen on dock-sides and in shipyards, and some of them are mounted on wheeled bases running on rails so that they can be travelled from place to place along the quay wall.

Their main features are a strong and sturdy tower, and an equally

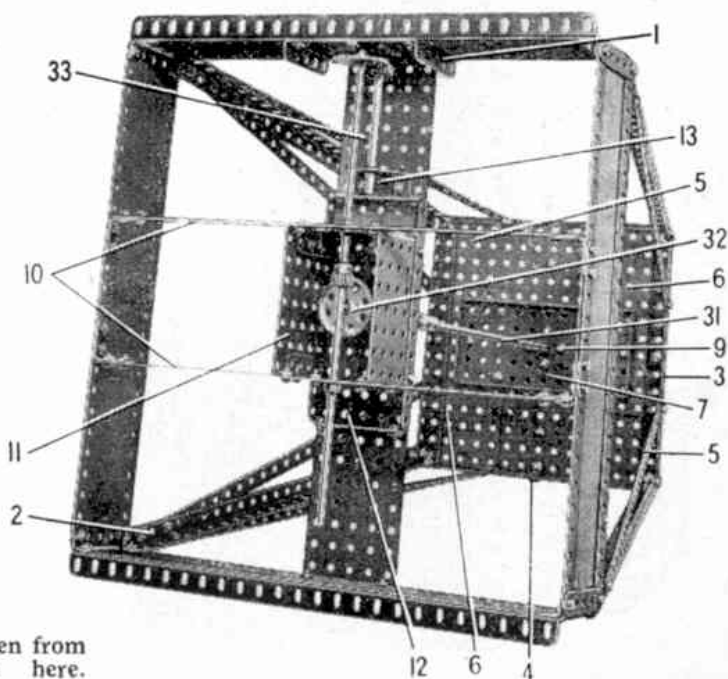


Fig. 2. The Crane Tower, seen from the base end, is shown here.

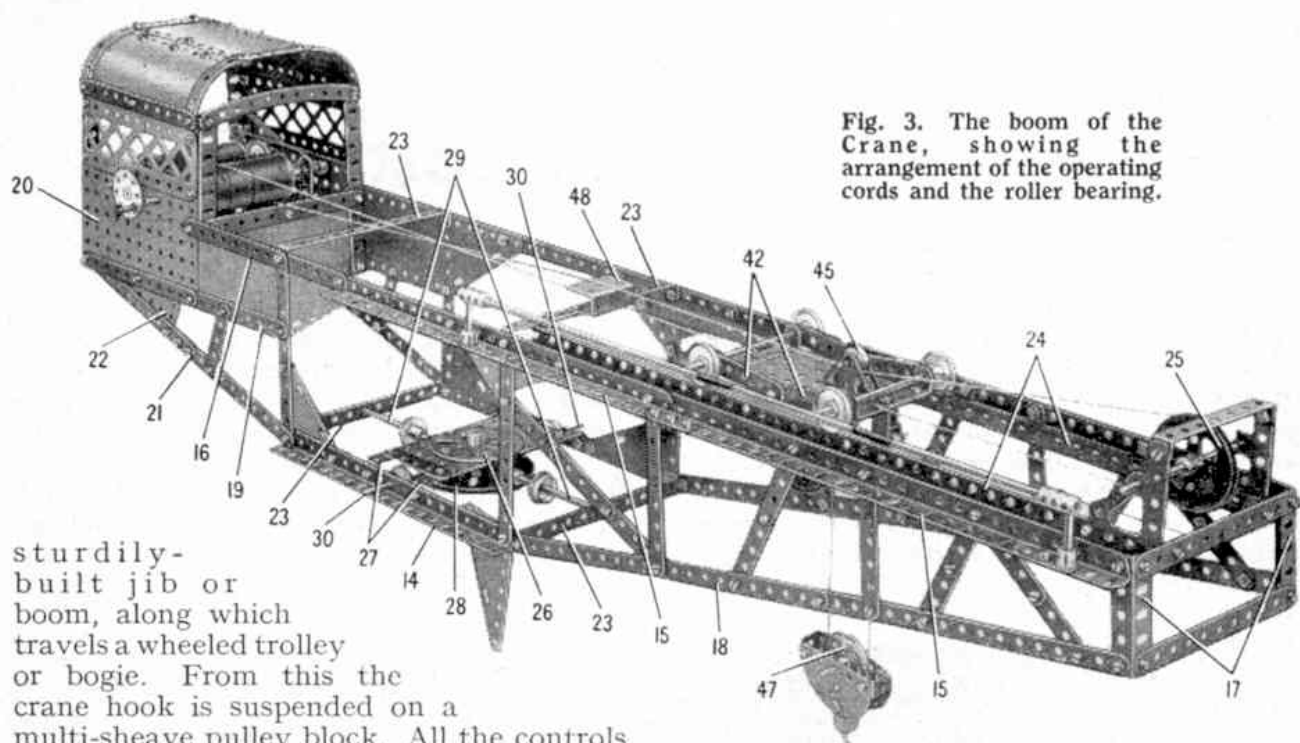


Fig. 3. The boom of the Crane, showing the arrangement of the operating cords and the roller bearing.

sturdily-built jib or boom, along which travels a wheeled trolley or bogie. From this the crane hook is suspended on a multi-sheave pulley block. All the controls are housed in the driver's cabin at the rear end of the boom. The boom itself pivots on a stout roller bearing mounted on top of the tower and can be swivelled through a full circle.

The Meccano model is a fine one both to build and operate, and in designing it we have tried to include as many as possible of the chief features of these cranes. It can be constructed from the parts in a Meccano Outfit No. 9 and is very strong and stable when completed.

The operations of the crane are carried out manually but readers who have suitable Motors available should be able to modify the model to take Motor drive if desired.

Full constructional details of the Heavy Duty Crane together with a list of parts required to build it, can be obtained by Home readers by writing to the Editor, enclosing a 2d. stamp for postage. Overseas readers in Canada, Australia, New Zealand, South Africa, Ceylon, Italy, Rhodesia and the United States of America should write to the main agents in those countries for their copies of the *current* "Model of the Month" instructions, enclosing suitable stamps for postage.

We advise readers who wish to build this model to apply for the instructions as soon as

possible because we cannot guarantee to supply "Model of the Month" instructions after the end of the month in which the model is illustrated in the *M.M.*

So if you wish to avoid disappointment write for your copy as soon as you receive this issue.

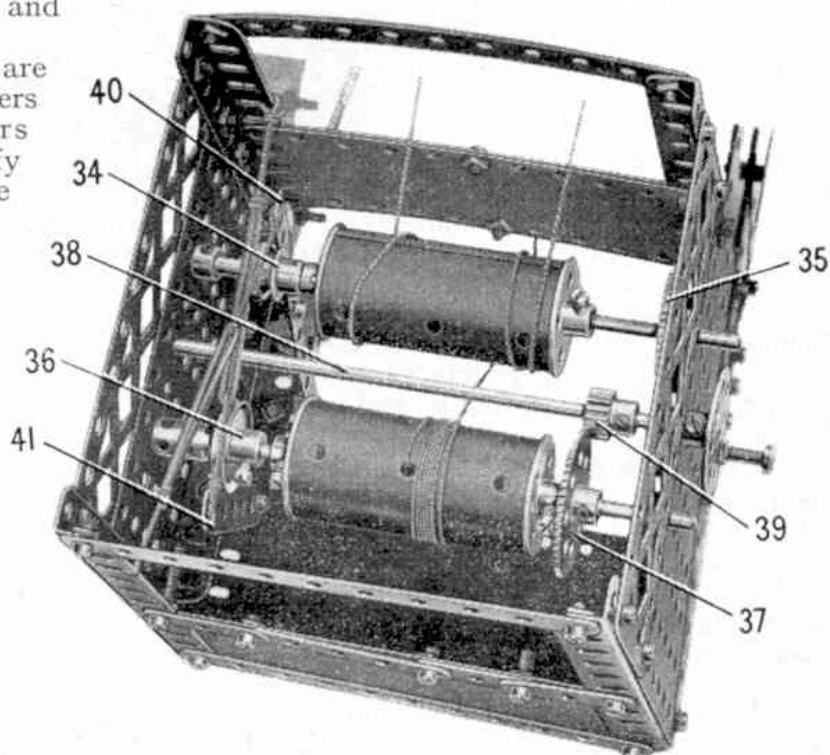


Fig. 4. The operating cabin with the roof removed to reveal the winding drums for traversing the trolley and for hoisting and lowering the load hook.

HEAVY DUTY CRANE (Outfit No. 9)

Illustrated in the February 1958 issue of the Meccano Magazine

Details of the Tower

Two sides of the base of the tower are each formed by a  $12\frac{1}{2}$ " x  $2\frac{1}{2}$ " Strip Plate edged by a  $12\frac{1}{2}$ " Strip, and a built-up strip made from a  $3\frac{1}{2}$ " and two  $5\frac{1}{2}$ " Strips. A third side consists of a  $12\frac{1}{2}$ " x  $2\frac{1}{2}$ " Strip Plate strengthened by a  $12\frac{1}{2}$ " Strip and a  $12\frac{1}{2}$ " Angle Girder. The fourth side is made by bolting two  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates and a  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate 1 to a  $12\frac{1}{2}$ " Strip and a  $12\frac{1}{2}$ " Angle Girder. The ends of the four sides are strengthened by  $2\frac{1}{2}$ " Strips and the sides are connected together by two Angle Brackets at each corner.

A  $12\frac{1}{2}$ " Angle Girder 2 is attached to each corner by a Fishplate, and these Girders are connected also to  $7\frac{1}{2}$ " Angle Girders 3 by Fishplates. Two  $7\frac{1}{2}$ " Strips 4 are attached to the Girders 3 by Angle Brackets. Each leg of the tower is braced as shown by two  $12\frac{1}{2}$ " Strips. The top of the tower is filled in by two  $5\frac{1}{2}$ " x  $3\frac{1}{2}$ " Flat Plates 5 and two  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates 6, and to these Plates is bolted a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate 7. A 3" Pulley is arranged with its boss through the centre hole of a Wheel Flange, and these parts are fixed to the top of the tower by four bolts, one of which is indicated at 9. A Circular Girder 8 is bolted to the top of the tower.

Two  $12\frac{1}{2}$ " Strips 10 are fixed to 1" x 1" Angle Brackets bolted between the sides of the tower. Two  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plates 11 are fixed to the Strips 10. The Plates 11 are joined at each end by  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plates, and at the top by a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate 12. The Plate 12 is connected to the sides of the tower by two  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plates. A Trunnion 13 is bolted to one of these Flanged Plates, and a Double Bent Strip is fixed to the centre of the Plate 12.

Assembly of the Boom

The centre section of each side of the boom consists of a  $9\frac{1}{2}$ " Angle Girder 14 fitted at each end with a vertical  $5\frac{1}{2}$ " Strip. The joins are strengthened by  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " and  $3\frac{1}{2}$ " x 2" Triangular Flexible Plates. One of these Triangular Flexible Plates is swung clear in one of the pictures to show details of the boom bearing. The upper main girder of each side of the boom consists of two  $12\frac{1}{2}$ " Angle Girders 15 joined by a  $1\frac{1}{2}$ " Strip, and extended at the rear by a 3" Strip and a  $4\frac{1}{2}$ " Strip 16. The joins between the main girder and the vertical  $5\frac{1}{2}$ " Strips are strengthened by  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ ",  $2\frac{1}{2}$ " x 2" and  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Triangular Flexible Plates.

At the front a  $2\frac{1}{2}$ " Angle Girder 17 is bolted to each main girder, and this supports the outer end of a strip 18 made from a  $3\frac{1}{2}$ " and three  $5\frac{1}{2}$ " Strips. The rear end of the strip 18 is joined to the front of Girder 14 by a Fishplate.

A  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate is bolted to the Strip 16, and is strengthened along its lower edge by another  $4\frac{1}{2}$ " Strip 19. A  $5\frac{1}{2}$ " x  $3\frac{1}{2}$ " Flat Plate 20 is bolted to the Strips 16 and 19. The side of the boom is completed by a strip 21, made from two  $5\frac{1}{2}$ " Strips overlapped two holes. A Flanged Sector Plate 22 is bolted to this strip and to the Plate 20.

The sides of the boom are connected by two  $5\frac{1}{2}$ " Strips bolted to the Girders 17, by four  $5\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips 23, and by four  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates placed face to face and bolted to the lower flanges of the Flanged Sector Plates 22.

Two  $18\frac{1}{2}$ " Angle Girders 24 are bolted to the lugs of  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips fixed to one of the Double Angle Strips 23 and to one of the  $5\frac{1}{2}$ "



Strips bolted to the Girders 17. A Corner Gusset is bolted to each of the Girders 24, and these are connected by a  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip. A 2" Pulley 25 is fixed on a  $4\frac{1}{2}$ " Rod mounted in the Corner Gussets.

### The Boom Bearing and Slewing Motion

A  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate, fitted with a Face Plate 26, is bolted to two  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips 27 attached by their lugs to each of the Angle Girders 14. Four Double Brackets are bolted to a 3" Pulley 28. Two 5" Rods 29 are held in two of the Double Brackets by Collars and are supported at their outer ends in two of the Double Angle Strips 23. A  $\frac{3}{4}$ " Flanged Wheel is fixed on each Rod, and the outer Collar in each case is spaced from its Double Bracket by four Washers. Two  $3\frac{1}{2}$ " Rods 30 are similarly fitted and are supported in the other two Double Brackets and in the Angle Girders 14.

An  $11\frac{1}{2}$ " Rod 31 is extended by two  $2\frac{1}{2}$ " Rods joined by Couplings and is mounted as shown. The upper end of Rod 31 is fixed in the Face Plate 26. The Flanged Wheels on the Rods 29 and 30 run on the rim of the Circular Girder 8, and the Pulley 28 rests on 21 Balls placed between the Wheel Flange and the rim of the Pulley held by the bolts 9.

The lower  $2\frac{1}{2}$ " Rod is fitted with a  $1\frac{1}{2}$ " Contrate 32 that engages a  $\frac{1}{2}$ " Pinion on an  $11\frac{1}{2}$ " Rod. The  $11\frac{1}{2}$ " Rod is supported in the Flanged Plate 1 and the  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plates, and a 50-tooth Gear on the Rod is driven by a  $\frac{3}{4}$ " Pinion on a  $4\frac{1}{2}$ " Rod 33. Rod 33 is mounted in the Flanged Plate 1 and a Trunnion 13, and it carries handles formed by two Pivot Bolts in a Bush Wheel.

### Construction of the Cab

The sides of the cab are made by bolting  $5\frac{1}{2}$ " Angle Girders to the ends of each of the Flat Plates 20. A  $5\frac{1}{2}$ " Braced Girder is fitted to each side as shown. The front pair of  $5\frac{1}{2}$ " Angle Girders is connected across by a  $5\frac{1}{2}$ " Curved Strip and by a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate edged by two  $5\frac{1}{2}$ " Strips. The rear pair of  $5\frac{1}{2}$ " Angle Girders is similarly connected, but one of the  $5\frac{1}{2}$ " Strips is replaced by a built-up strip made from a  $2\frac{1}{2}$ " and three  $1\frac{1}{2}$ " Strips.

### Details of the Winding Mechanism

Each of the two winding drums consists of a Cylinder fitted with two  $1\frac{1}{2}$ " Flanged Wheels. Each drum is fixed on a  $6\frac{1}{2}$ " Rod supported in the sides of the cab. One of the Rods carries a Collar, a  $\frac{1}{2}$ " fixed Pulley 34, and a 57-tooth Gear 35. The other Rod is fitted with a Coupling, a 1" fixed Pulley 36, a 57-tooth Gear 37, and a Collar placed against the side of the cab. The operating handle is a Pivot Bolt fixed in a Bush Wheel on a  $6\frac{1}{2}$ " Rod 38. This Rod is able to slide endways in its bearings, so that a  $\frac{1}{2}$ " Pinion 39 can be moved into mesh with either one of the Gears 35 and 37, to engage the drive to the corresponding winding drum.

A brake on the Pulley 34 is provided by a built-up strip 40, made from a 3" and a  $2\frac{1}{2}$ " Strip overlapped two holes. This strip is lock-nutted to a  $1\frac{1}{2}$ " Angle Girder bolted to the lower flange of one of the Flanged Sector Plates 22. The strip is held against the Pulley 34 by a Driving Band stretched between short lengths of Cord tied to the strip and to the back of the cab.

A similar brake on Pulley 36 is provided by a 3" Strip 41, which is lock-nutted to an Angle Bracket bolted to the top flange of the Flanged Sector Plate. This Strip also is held against its Pulley by a Driving Band stretched between lengths of Cord.

### The Travelling Carriage and Pulley Block

The crab, or travelling carriage, is made by bolting a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ "

Double Angle Strip to each end of a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate. The wheels are 1" Pulleys fixed on  $4\frac{1}{2}$ " Rods, which are supported in the lugs of the Double Angle Strips. Two  $2\frac{1}{2}$ " Strips 42, bolted together at a slight angle, are passed over the axles at each side, and to them is fixed a 1" x  $\frac{1}{2}$ " Angle Bracket. The wheels travel on the edges of the Girders 24 and the short Bracket. The wheels travel on the edges of the Girders 24 and the short lugs of the Angle Brackets 43 slide underneath these Girders.

A Stopped Bent Strip is bolted to one end of the crab, and in it is supported a  $1\frac{1}{2}$ " Rod that carries a  $\frac{1}{2}$ " loose Pulley 44. Another  $\frac{1}{2}$ " loose Pulley is free to turn on a 1" Rod supported in two Trunnions. A 2" Pulley 46 is fixed on a 2" Rod, which is held by Spring Clips in two Flat Trunnions. Each of these is attached to a Girder Bracket bolted underneath the  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate.

The pulley block consists of two Semi-Circular Plates connected by two Double Brackets. A  $1\frac{1}{2}$ " Pulley 47 is fixed on a  $1\frac{1}{2}$ " Rod, and a large Loaded Hook is suspended from a  $\frac{3}{4}$ " Bolt.

#### Arrangement of the cords

A length of Cord is tied to the rear end of the crab, is passed through a Channel Bearing 48 and is wound several times round the winding drum at the front of the cab. The Cord is then taken over the Channel Bearing 48, under the crab and round Pulley 25, and is tied to the front of the crab.

A length of Cord fastened to the rear winding drum is taken through a hole in the lower edge of the  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate at the front of the cab. The Cord is taken over the Pulley 46 of the cab and round the Pulley 47 in the pulley block. The Cord is then passed over the Pulley 44, and is tied finally to the upper  $5\frac{1}{2}$ " Strip at the front of the boom.

#### The parts required to build the Heavy Duty Crane are as follows:-

14 of No. 1	4 of No. 15	40 of No. 38	6 of No. 111a
2 of No. 1b	4 of No. 15a	2 of No. 38d	12 of No. 111c
24 of No. 2	1 of No. 15b	1 of No. 40	3 of No. 126
6 of No. 2a	2 of No. 16	1 of No. 44	2 of No. 126a
6 of No. 3	1 of No. 16a	1 of No. 45	1 of No. 137
8 of No. 4	1 of No. 17	6 of No. 48a	1 of No. 143
36 of No. 5	4 of No. 18a	4 of No. 48b	1 of No. 146a
4 of No. 6	1 of No. 18b	4 of No. 48d	3 of No. 147b
5 of No. 6a	2 of No. 19b	2 of No. 51	1 of No. 160
2 of No. 7a	4 of No. 20	2 of No. 52	2 of No. 161
10 of No. 8	4 of No. 20a	4 of No. 52a	21 of No. 168d
2 of No. 8a	4 of No. 20b	5 of No. 53	2 of No. 186
2 of No. 8b	1 of No. 21	2 of No. 53a	2 of No. 189
4 of No. 9	5 of No. 22	2 of No. 54	2 of No. 191
2 of No. 9d	2 of No. 23	1 of No. 57b	12 of No. 192
1 of No. 9f	1 of No. 23a	12 of No. 59	3 of No. 197
3 of No. 10	2 of no. 24	2 of No. 62	2 of No. 213
6 of No. 11	1 of No. 25	6 of No. 63	2 of No. 214
15 of No. 12	2 of No. 26	2 of No. 70	4 of No. 215
4 of No. 12a	1 of No. 27	2 of No. 89	2 of No. 216
2 of No. 12b	2 of No. 27a	1 of No. 95b	2 of No. 221
8 of No. 12c	1 of No. 28	2 of No. 100	2 of No. 222
2 of No. 13	8 of No. 35	2 of No. 108	2 of No. 223
1 of No. 13a	327 of No. 37a	1 of No. 109	2 of No. 225
3 of No. 14	303 of No. 37b	3 of No. 111	2 of No. 226