

# New Meccano Model

## Giant Walking Dragline

THE giant walking dragline which forms our new model this month is one of exceptional interest. It has been designed as a subject for older model-builders who have good supplies of Meccano parts at their disposal. It is shown complete in Fig. 1.

The cab base is made by bolting three  $5\frac{1}{2}$ "  $\times$   $3\frac{1}{4}$ " Flat Plates between two  $12\frac{1}{2}$ " Angle Girders 1 (Fig. 3). The assembly is strengthened by a  $5\frac{1}{2}$ " Angle Girder at the rear, and by a similar Girder 2 positioned as indicated in Fig. 2. A Flanged Disc from a Ball Thrust Race is bolted to the underside of the base, and the Ball Cage is carried between the Flanged Disc and a  $3\frac{1}{4}$ " Gear 3. Gear 3 is mounted between nuts on four  $\frac{3}{4}$ " Bolts that are held by nuts in a 4" Circular Plate. This Plate is bolted to two  $5\frac{1}{2}$ " Strips fixed across a Circular Girder 4, and a second Circular Girder is attached to the first by Fishplates. A  $1\frac{1}{2}$ " Rod fixed in Gear 3 is passed through the bearing unit and the cab is held in position by a Collar.

The framework that carries the walking shafts consists of two columns 5 and 6. Column 5 is made by bolting a  $5\frac{1}{2}$ " Angle Girder and a  $5\frac{1}{2}$ " Strip to the base, and column 6 consists of two  $5\frac{1}{2}$ " Angle Girders. A  $3" \times 1\frac{1}{2}"$  Flat Plate is fixed to each column, and they are connected at the top by  $5\frac{1}{2}"$  Strips.

An E20R Electric Motor is bolted to the rear of the base, and a  $\frac{3}{4}"$  Pinion on the armature shaft meshes with a 50-tooth Gear on a  $2\frac{1}{2}"$  Rod 7 (Fig. 4). A Worm on this Rod is in constant mesh with a 57-tooth Gear on a Rod 8, which is mounted in a  $1" \times 1"$  Angle Bracket bolted to the Motor, and in a  $2\frac{1}{2}"$  Flat Girder fixed to a  $2\frac{1}{2}"$  Angle Girder that is also bolted to the Motor side-plate. Rod 8 carries a  $\frac{1}{2}"$  Pinion 9 and a  $\frac{3}{4}"$  Sprocket 10.

The drive to the walking motion is taken from Pinion 9 to a 57-tooth Gear on a  $6\frac{1}{2}"$  Rod 11. This Rod is mounted in  $1\frac{1}{2}"$  Strips bolted to the columns 5 and 6, and it is arranged so that it can slide about  $\frac{1}{4}"$  in its bearings to bring the Gear into mesh with Pinion 9 when it is required to engage the drive. The sliding

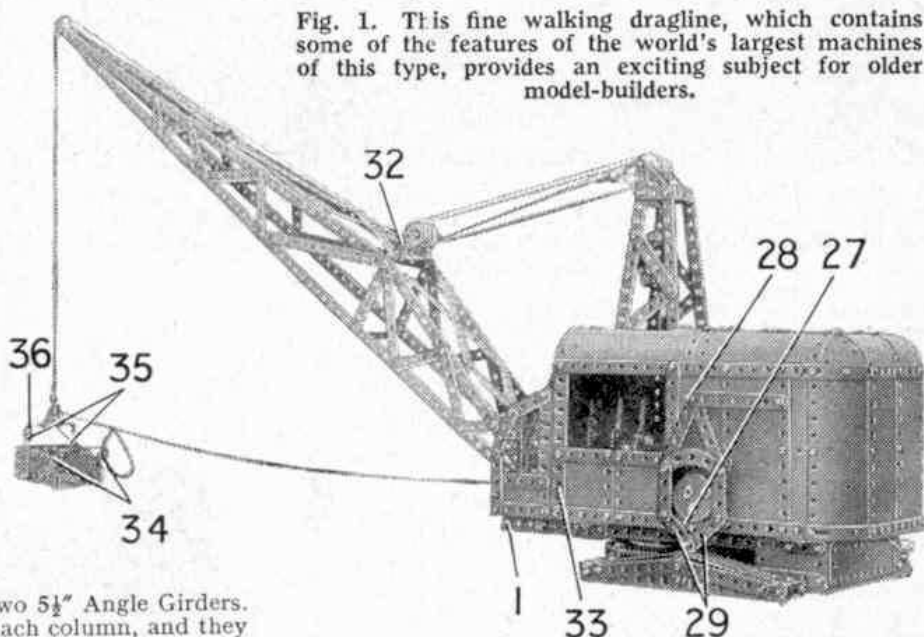


Fig. 1. This fine walking dragline, which contains some of the features of the world's largest machines of this type, provides an exciting subject for older model-builders.

movement of Rod 11 is controlled by a lever 12. This consists of a Crank extended by a  $2\frac{1}{2}"$  Strip and fitted with a Rod and Strip Connector, and it is fixed on a  $2\frac{1}{2}"$  Rod mounted in  $1\frac{1}{2}"$  Flat Girders bolted to the column 6. A Coupling on the Rod, between the Flat Girders, is fitted with a  $\frac{3}{4}"$  Bolt, and the head of this Bolt engages between the boss of the 57-tooth Gear and a Collar on Rod 11. A  $\frac{1}{2}"$  Pinion 13 on Rod 11 is in constant mesh with a 57-tooth Gear on the main walking shaft, which is an 8" Rod 14 mounted in  $1\frac{1}{2}"$  Strips and Double Bent Strips bolted to columns 5 and 6.

The Electric Motor switch is operated by a lever 15.

The gear-box (see Fig. 5) is made by connecting two  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plates together at each end by a  $3\frac{1}{2}"$  Strip 16 and a  $2\frac{1}{2}"$  Strip. The  $2\frac{1}{2}"$  Strip is removed in Fig. 2, in order to show the gears clearly. The gear-box is attached to the cab base by two  $1" \times \frac{1}{2}"$  and two  $1" \times 1"$  Angle Brackets.

The drive from Sprocket 10 is taken by Chain to a  $\frac{3}{4}"$  Sprocket on a Rod 17 mounted centrally in the Flanged Plates. This Rod is fitted with a  $\frac{3}{4}"$  Pinion 18 and a  $\frac{1}{2}"$  Pinion 19. Pinion 19 is in constant mesh with a 57-tooth Gear on a Rod 20, which carries also a  $\frac{3}{4}"$  diam.  $\frac{3}{4}"$  face Pinion 21. The latter engages a 50-tooth Gear on a slidable Rod 22. The  $\frac{1}{2}"$  Pinion 23 is fixed on the Rod and is located centrally over a  $\frac{3}{4}"$  Contrate 24. The Contrate is fixed on a  $2"$  Rod mounted in the cab base and in a  $1\frac{1}{2}"$  Strip 25 that is attached to the base by  $\frac{1}{2}"$

Bolts, so that it is located beneath the Ball Thrust Race

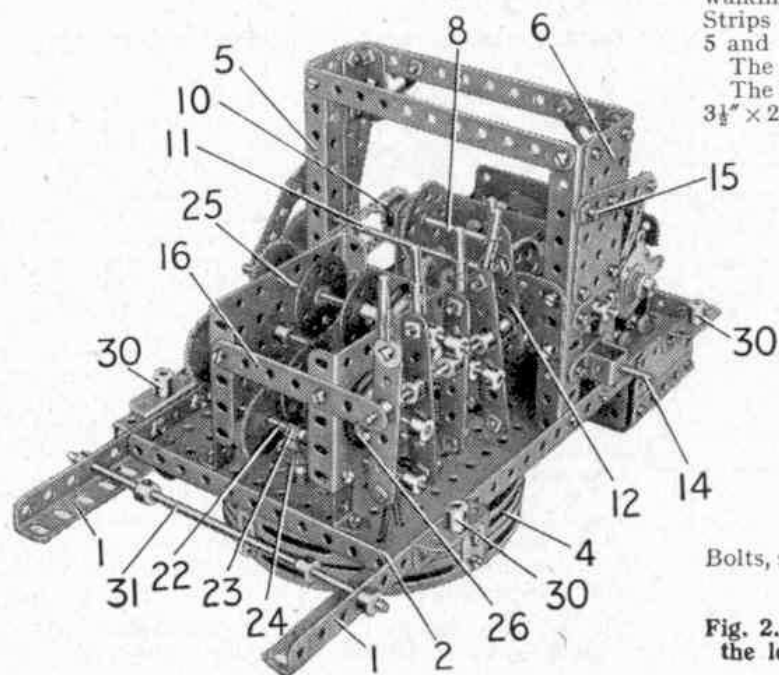


Fig. 2. The dragline with the body removed to reveal the levers controlling the four-movement gear-box.

Flanged Disc. The Contrate is spaced from the base by Washers so that it engages accurately with Pinion 23, and a  $\frac{1}{2}$ " Pinion 24 is in constant mesh with the  $3\frac{1}{2}$ " Gear 3. Pinion 23 can be engaged with either side of the Contrate to provide a reversible drive for the slewing motion.

The remaining three drives of the gear-box are each engaged by sliding a Rod 25 so that a 50-tooth Gear on the end of the Rod engages with Pinion 18. Each of the Rods 25 is fitted with a 1" Pulley and Rubber Ring 26, two Bush Wheels that form the winding drum, and two Collars on the outer end of the Rod.

The sliding Rods are controlled by levers formed by 3" Strips extended by Rod and Strip Connectors. Each lever is pivoted between Collars on a Rod mounted in the end holes of Strips 16, and carries a Bolt held by two nuts in the 3" Strip. The bolt heads engage between the Collars at the ends of the Rods.

The lever controlling the slewing drive is held vertically by a  $2\frac{1}{2}$ " Driving Band looped over a bolt in the end hole of the lever and the base of the cab. Each of the levers operating the remaining three sliding shafts has a  $2\frac{1}{2}$ " Driving Band looped between the gear-box and a bolt in the lever, so that it forces the Rubber Ring on the Pulley against the side of the gear-box to act as a brake. First movement of the lever releases the brake and its Rod is free to rotate, but further movement brings the 50-tooth Gear into mesh with Pinion 18 to engage the drive.

Each walking shoe consists of two  $7\frac{1}{2}$ " Angle Girders joined at their ends and at the centre by  $1\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips. The central Double Angle Strip is connected to the Girders by Fishplates and  $3\frac{1}{2}$ " Strips, and the shoe is completed by two  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates attached to Fishplates bolted to the end Double Angle Strips. The shoes are operated by

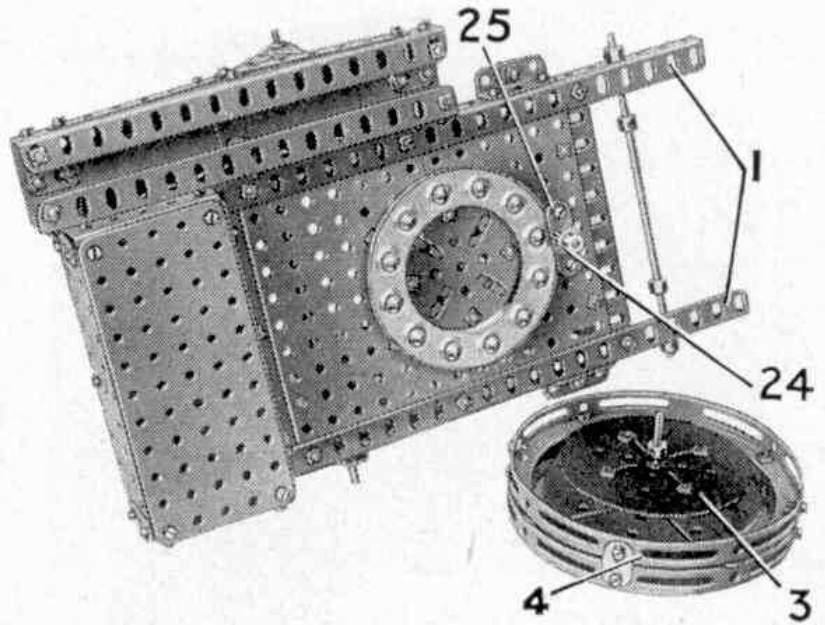


Fig. 3. The dragline seen from below, with the bearing and circular base partly dismantled.

Triple Throw Eccentrics fixed to the ends of Rod 14. A  $2\frac{1}{2}$ " Stepped Curved Strip 27 is bolted to the strap of each Eccentric, and is linked to a further Curved Strip by two 2" Strips. Two 3" Strips are connected at their upper ends by a  $\frac{3}{8}$ " Bolt 28, and two 2" Slotted Strips 29 are arranged so that a 1" Rod can be passed through their end holes and the Eccentric strap and through Angle Brackets bolted to the shoe.

The cab base is completed by fitting a box at the rear to house counterbalance weights, and the body bearer brackets. The sides of the box are  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates, fitted at their lower edges with  $2\frac{1}{2}$ " Angle Girders, and the bottom is a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate. The front is a  $5\frac{1}{2}$ " Flat Girder bolted to a  $5\frac{1}{2}$ " Angle Girder, and the rear is a  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate. The body bearer brackets are  $1\frac{1}{2}$ " Angle Girders and each is fitted with a Rod Socket 30.

The sides of the jib are each made from six  $12\frac{1}{2}$ " Strips bolted together as shown in Fig. 1. A vertical  $3\frac{1}{2}$ " Strip is fixed between the apex and the base, and bracing Strips of various lengths are fitted. The sides are connected together by a Double Bracket at the jib head, by two  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips at the ends of the vertical  $3\frac{1}{2}$ " Strips, and by a  $3$ " x  $1\frac{1}{2}$ " Double Angle Strip at the base of the jib. The complete jib pivots between Collars on a Rod 31 seen in Fig. 2. Three 1" Pulleys are mounted on a 2" Rod that passes through  $1$ " x  $\frac{1}{2}$ " Angle Brackets 32.

The side of the cab seen in Fig. 1 is made by bolting two  $9\frac{1}{2}$ " Strips to a  $5\frac{1}{2}$ " Angle Girder 33. This side is filled by two  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ ", one  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " and two  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates, arranged to leave a gap to allow access to the control levers. The edges of the Plates are braced by Strips. The other side is constructed similarly, but the  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Plates are replaced by  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates to fill the side in completely.

A vertical  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate is attached to each of the Angle Girders 33, and these Plates are connected at their upper ends by a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate. The front is completed by two Semi-Circular Plates and two  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates. The sides are connected at the rear by Formed Slotted Strips joined by  $4\frac{1}{2}$ " Strips, and the space between these parts is filled by four  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates. The curved sides of the roof are made from  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " and  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ "

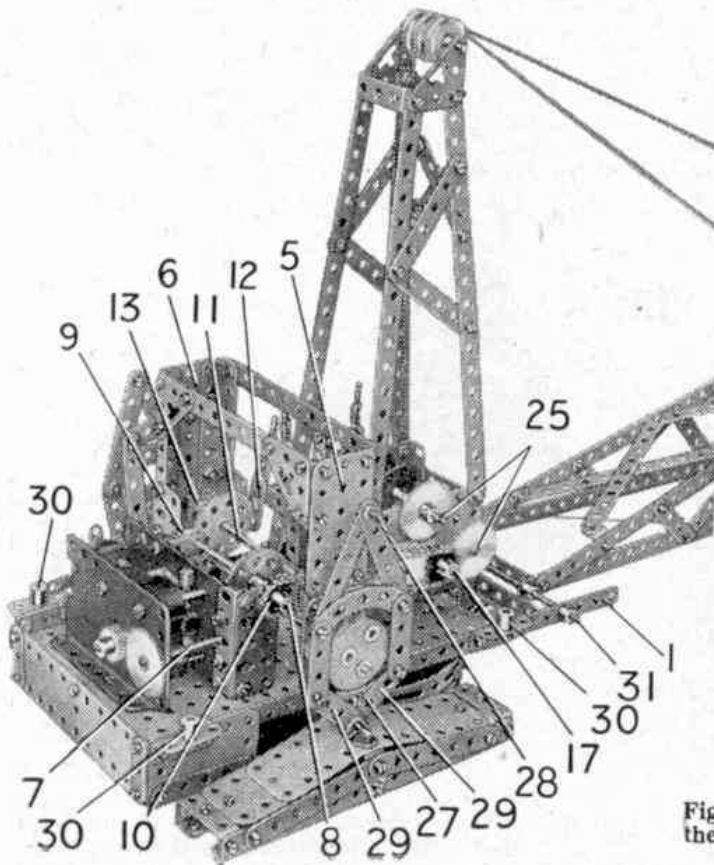


Fig. 4. The position of the E20R Electric Motor and the construction of the walking shoe and eccentric are shown clearly in this view.

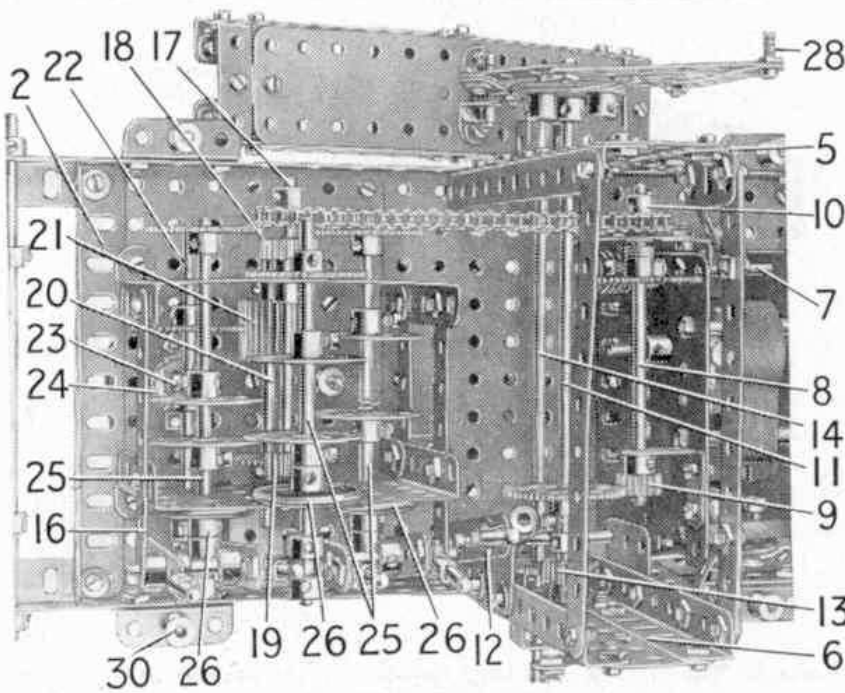


Fig. 5. An overhead view of the cab base that shows the arrangement of the winding drums in the gear-box.

Flexible Plates, and they are connected across by  $4\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plates. The curved end is filled by two  $1\frac{1}{8}''$  radius Curved Plates and two  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates bent to shape.

A control cabin is fitted on either side of the jib, and each is assembled on two  $4\frac{1}{2}''$  Angle Girders bolted  $1\frac{1}{2}''$  apart at the front of the cab. Each side of the control cabin is assembled from a  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plate, three  $2\frac{1}{2}''$  and two  $2''$  Strips arranged as shown, and the roof is a  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plate attached to a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip. The lower section of the front is filled by three  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips. When the cab is in position on the base a  $3\frac{1}{2}''$  Strip is lock-nutted to each of the Bolts 28 and to the cab side.

The bucket (Fig. 6) is made by bolting  $3\frac{1}{2}''$  Angle Girders to the edges of a  $3\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate, and the sides are  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plates edged by Strips, and connected at the rear by a  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flanged Plate. Two  $2\frac{1}{2}''$  Strips 34 are bolted tightly to the sides and are joined by a  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip. Two further  $2\frac{1}{2}''$  Strips 35 are pivoted on lock-nutted bolts and these are linked by a  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip 36. The pulley assembly is attached to this Double Angle Strip, and consists of two  $1''$  Triangular Plates fixed to Angle Brackets with a  $\frac{1}{2}''$  loose Pulley freely mounted on a lock-nutted  $\frac{1}{2}''$  Bolt.

The jib luffing Cord is tied to the rear winding drum and is led over the outer pair of Pulleys at the top of the tower and the outer ones on the jib. The end of the Cord is fitted with a small Hook and this is attached to a Fishplate on the tower. The hoisting Cord is fastened to the upper winding drum and is led round the central Pulleys in the tower and the jib, and a small Hook is then slipped over a  $\frac{1}{2}''$  Bolt in the  $1''$  Triangular Plates.

The drag Cord is tied to the front winding drum, is led out through the base of the jib and round the  $\frac{1}{2}''$  Pulley in the block. The end of the Cord is tied to the Double Angle Strip between Strips 34. A length of plaited Cord is fastened at each end to Strips 34, and is tied at the centre to the drag Cord.

The box at the rear of the base should be filled with suitable counterbalance weights, so that the machine remains stable when the bucket and its load is hoisted with the jib in its lowest working position.

The walking motion of the dragline is arranged so that the machine always steps backwards. Steering, and travel in the reverse direction, are controlled by turning the cab and jib bodily on the circular base.

The walking shoes are first raised clear of the ground and the drive is thrown out of gear. The slewing motion can then be engaged until the cab and jib are in line with the desired direction of travel.

In practice the jib is seldom luffed when the machine is working. It is usually set at the most convenient angle to suit the particular type of excavation required, and this arrangement can be followed with the model.

The sequence of excavating operations is as follows. The bucket is lowered to ground level and the drag Cord is hauled in to make the required length of "cut." The bucket is then raised, paying out the drag Cord as necessary, and the cab is slewed to the position where the spoil is to be unloaded. The drag Cord is then released completely, so that the bucket tilts to unload the excavated material.

With practice all the movements of an actual dragline can be carried out with the model, and it can be used to handle material such as sand. The bucket should be lined with thin cardboard when it is used for excavating.

Parts required to build the model Walking Dragline: 12 of No. 1; 6 of No. 1a; 6 of No. 1b; 14 of No. 2;

10 of No. 2a; 23 of No. 3; 20 of No. 4; 37 of No. 5; 16 of No. 6; 9 of No. 6a; 2 of No. 8; 4 of No. 8b; 8 of No. 9; 5 of No. 9a; 3 of No. 9d; 5 of No. 9f; 13 of No. 10; 1 of No. 11; 22 of No. 12; 3 of No. 12a; 4 of No. 12b; 1 of No. 13a; 2 of No. 14; 4 of No. 15a; 3 of No. 15b; 1 of No. 16; 3 of No. 16a; 1 of No. 17; 3 of No. 18a; 7 of No. 18b; 9 of No. 22; 1 of No. 22a; 1 of No. 23; 6 of No. 24; 2 of No. 25; 1 of No. 25b; 5 of No. 26; 5 of No. 27; 4 of No. 27a; 1 of No. 27b; 1 of No. 29; 1 of No. 32; 6 of No. 35; 394 of No. 37; 70 of No. 37a; 112 of No. 38; 2 of No. 40; 2 of No. 45; 1 of No. 47a; 18 of No. 48; 4 of No. 48a; 1 of No. 51; 3 of No. 52a; 2 of No. 53; 4 of No. 55a; 2 of No. 57c; 26 of No. 59; 1 of No. 62; 1 of No. 63; 4 of No. 64; 1 of No. 70; 2 of No. 73; 2 of No. 77; 4 of No. 90a; 1 of No. 94; 2 of No. 96a; 1 of No. 103; 1 of No. 103f; 2 of No. 103h; 5 of No. 111; 5 of No. 111a; 19 of No. 111c; 2 of No. 130; 4 of No. 133; 2 of No. 143; 1 of No. 146a; 3 of No. 155; 1 of No. 168a; 1 of No. 168c; 4 of No. 186; 15 of No. 188; 8 of No. 189; 3 of No. 190; 3 of No. 190a; 5 of No. 191; 11 of No. 192; 2 of No. 200; 5 of No. 212; 2 of No. 214; 4 of No. 215; 1 E20R Electric Motor.

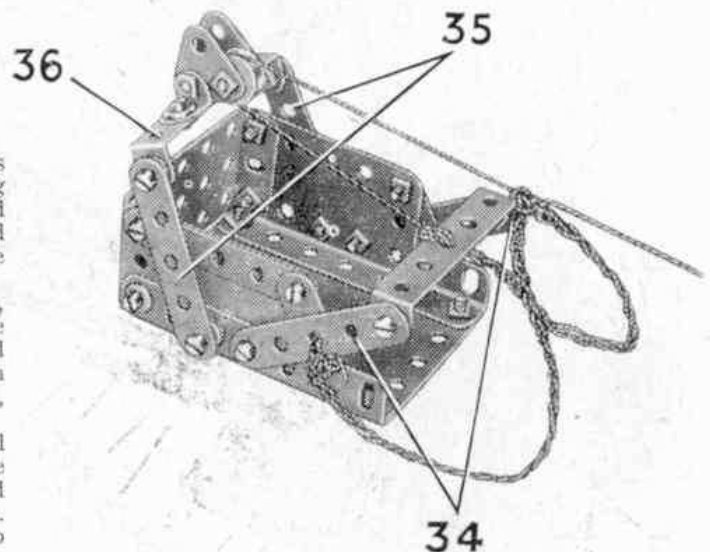


Fig. 6. This view shows the position of the Cords that control the dragline bucket.