# New Meccano Model

## Electric Derrick Crane

THE fine derrick crane shown in Fig. 1, which forms the subject for this month's new model, is operated by an E06 or E020 type Electric Motor, and is capable of lifting quite heavy loads. All its movements are driven by the Motor through a compact gear-box, and a neat reversing mechanism is fitted so that the jib and load can be lowered steadily under power.

The triangular base of the model is built first. The main members of this are 18½" Angle Girders bolted at one end to 5½"×2½" Flanged Plates, and at the other end to 3½"×2½" Flanged Plates. The 5½"×2½" Plates are joined by two 5½" Strips, and the 3½"×2½" Plates by a third 18½" Angle Girder. A 3" Pulley 1 is bolted at the centre of the 5½"×2½" Flanged Plates to form part of a built-up ball bearing as shown in Fig. 2.

The floor of the cab is made by joining two 9½" Angle Girders together by four 5½"×2½" Flat Plates. Each side consists of a 9½"×2½" Strip Plate, a 5½"×2½" Flexible Plate and two 9½" Strips. These are bolted at the rear to a vertical 5½" Angle Girder, and at the front to 7½" Angle Girders 2. The vertical Girders are joined across by 5½" Strips and by a 5½" Angle Girder at the rear. The Angle Girders 2 are extended upward by 4½" Angle Girders, and the latter are connected at their upper ends by a 3½" Angle Girder 3. The supporting tower of the cab is completed by attaching two 7½" Strips 4 to 3" Angle Girders bolted to the Angle Girder 3. A pivot is provided by a 2" Rod passed through a Double Bent Strip and a 3½" Angle Girder. The Rod is fitted at its upper end with a Bush Wheel 5, and is held in position by Collars.

The centre section of the jib consists of four 12½" Angle Girders joined together by 1½" Strips to form a box girder. This is filled in by 5½"×1½" and 2½"×1½" Flexible Plates held in place by nuts on Screwed Rods passed through the Girders and Plates. The jib is completed by a tapered section at each end consisting of four 9½" Strips. The Strips on each side are joined together nine holes from their ends by 1½"×½" Double Angle Strips. The jib is pivoted on a 3½" Rod held by Collars in a 2½"×1" Double Angle Strip bolted to the front of the cab.

The gear-box is shown removed from the cab in Fig. 3, and is built up as a separate unit and bolted to the cab floor when assembled. The sides of the unit are 5½"×2½" Flat Plates, and the bottom is two 3½"×2½" Flanged Plates. The sides are also joined by two 3½"×½" Double Angle Strips at each end. The input shaft 6 is a 6½" Rod mounted in a 2½"×1" Double Angle Strip bolted to the side of the housing. The Rod 6 is held in place by Collars, and carries a ½" Pinion 7. This Pinion meshes with a ½" diameter ¾" face Pinion fixed on a 4½" Rod 8, which is also mounted in a 2½"×1" Double Angle Strip. The Rod 8 is free to slide within limits, and is controlled by a lever 9, fixed on a transverse 4½" Rod. This Rod is journalled in 1" Corner Brackets and carries a Crank at one end. A ⅜" Bolt fixed to the Crank engages between Collars on the Rod 8 so that movement of the lever alters the position of the ½" diameter ¾" face Pinion. This Pinion is positioned so that it can be brought into engagement with either side of a 1½" Contrate, to reverse the direction of drive.

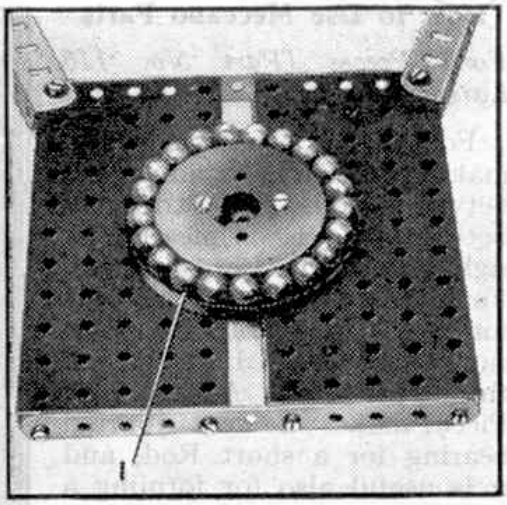


**Fig. 2. The ball bearing unit on which the control cab is mounted.**

The 1½" Contrate is fixed on a 4" Rod 10, which is mounted in the side-plates. The bearings in which this Rod rotates are strengthened by 2½" Strips. The Rod is fitted between the Plates with a ½" Pinion 11 and a Worm Gear. Movement of the load and luffing of the jib are controlled by the 4½" Rods 12 and 13. Each of these carries a 57-teeth Gear and two 1" Pulleys. A Cord Anchoring Spring is placed between the 1" Pulleys on each Rod. The Rods are allowed approximately ½" sliding movement in their bearings, so that either of the 57-teeth Gears can be brought into mesh with the Pinion 11.

The Rods 12 and 13 are controlled by a lever 14. This is fixed in a Coupling locked on a 6½" Rod mounted in the lower pair of 3½"×½" Double Angle Strips joining the sides of the mechanism. The 6½" Rod carries two Couplings 15 and 16, fitted with 2" Rods that engage between the 1" Pulleys and Collars on the Rods 12

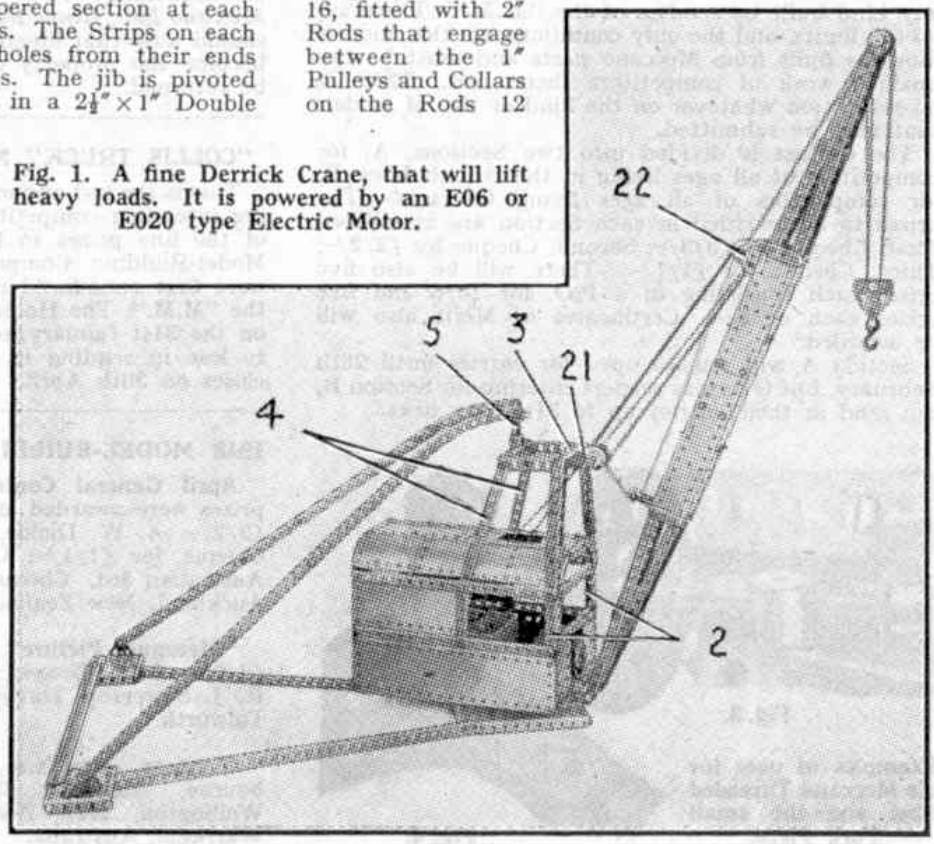


**Fig. 1. A fine Derrick Crane, that will lift heavy loads. It is powered by an E06 or E020 type Electric Motor.**

and 13. The Collar on Rod 12 is fitted with a $\frac{3}{8}$" Bolt, so that when the drive to this Rod is disengaged the Bolt contacts a second Bolt 17 and prevents the Rod from turning. The Rod 13 is fitted with a similar automatic brake, but in this case the $\frac{3}{8}$" Bolt is screwed into the boss of the 57-teeth Gear.

The slewing motion of the cab is operated by a $6\frac{1}{2}$" Rod 18, mounted in Flat Trunnions bolted to the lower $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips. This Rod carries a 57-teeth Gear 19 and a $\frac{1}{2}$" Pinion 20. The 57-teeth Gear is positioned so that by sliding the Rod 18 it can be meshed with a Worm on Rod 10. Movement of Rod 18 is controlled by a lever 21, which is fixed in a Coupling. The Coupling is locked on a 4" Rod that carries also a Crank, and a Threaded Pin attached to the Crank engages between Collars on the Rod 18. The 4" Rod is prevented from moving freely by a 1" Pulley fitted with a Rubber Ring arranged so that it presses against the mechanism side plate.

The complete gear-box unit is bolted to the floor of the cab, and an E06 type Electric Motor is also bolted in position. A $\frac{3}{4}$" Sprocket on the Motor armature shaft is connected by Sprocket Chain to a $1\frac{1}{2}$" Sprocket on Rod 6.

The cab is pivoted on a built-up bearing formed by a Wheel Flange bolted to the Pulley 1, and by 21 Metal Balls arranged in the groove between the rim of the Pulley and the Wheel Flange. A $1\frac{1}{2}$" Rod is fixed in the Pulley 1, and passed through a second 3" Pulley bolted to the base of the cab. A $1\frac{1}{2}$"

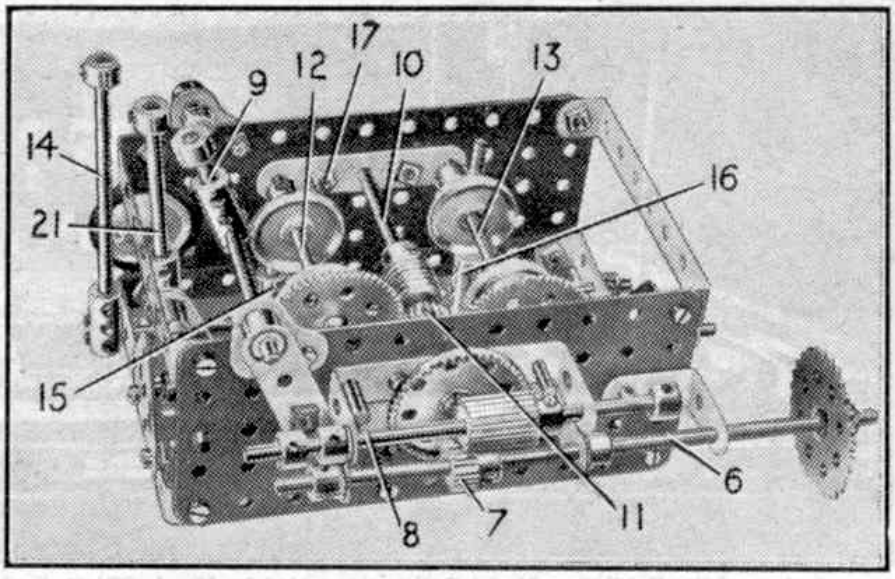


**Fig. 3. The gear-box removed from the control cab.**

Contrate is fixed on the upper end of the $1\frac{1}{2}$" Rod so that it meshes with the $\frac{1}{2}$" Pinion 20.

The cab is braced by stays extending from the $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates of the base and attached by Angle Brackets to the Bush Wheel 5. Each of these stays is built up from $12\frac{1}{2}$" Strips and $5\frac{1}{2}$" Curved Strips.

The arrangement of the jib luffing Cords is as follows. A length of Cord is tied to the Rod 13, and passed over 1" Pulleys on Rods 21 and 22. It then passes around two further sets of 1" Pulleys on Rods 21 and 22, and is tied finally to Rod 21. Rod 21 is mounted in a $2\frac{1}{2}$" × 1" Double Angle Strip, and Rod 22 in Trunnions fixed to the jib.

The hoisting Cord is tied to Rod 12, and passed over a $\frac{1}{2}$" loose Pulley on Rod 21. It is then taken round a $\frac{1}{2}$" Pulley mounted between the jaws of a Fork Piece fixed to the jib, and over a 1" loose Pulley at the jib head. It is passed round a 1" loose Pulley in the pulley block, and again round similar Pulleys in the jib head and pulley block. It is then tied to the jib head.

The pulley block consists of two Flat Trunnions joined by Double Brackets, and a Large Hook is attached by a $\frac{3}{4}$" Bolt. The roof of the cab is built up from Flexible Plates and is connected to the sides by Obtuse Angle Brackets.

If required the completed model may be fixed by screws to some form of baseboard. The model is well-balanced however, and will remain stable even with the jib lowered to its maximum radius under normal loads. If exceptionally heavy loads are raised the $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates of the base can be weighted to increase the stability.

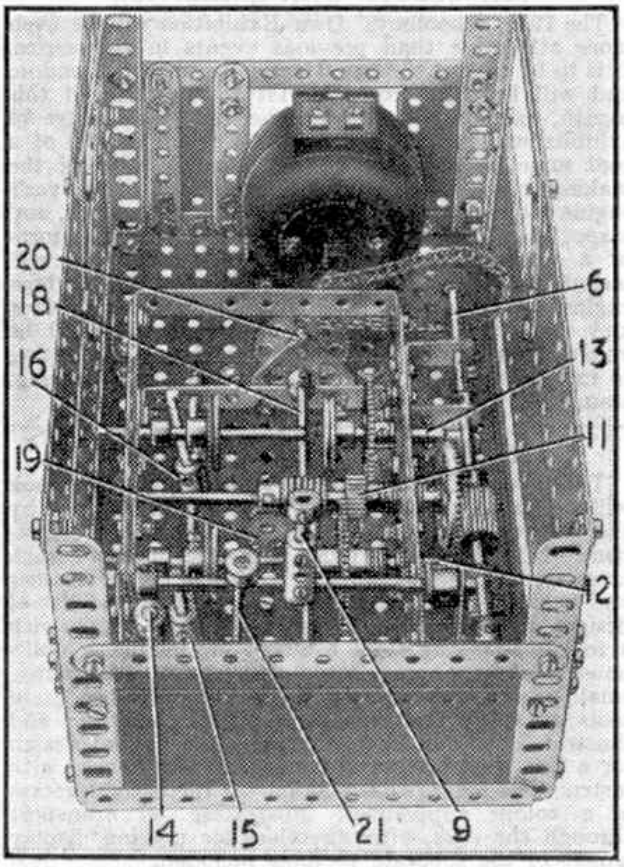


**Fig. 4. The cab with the roof removed to show the mechanism.**

Parts required to build the Electric Derrick Crane: 6 of No. 1; 12 of No. 1a; 2 of No. 1b; 6 of No. 2; 2 of No. 3; 2 of No. 4; 8 of No. 5; 8 of No. 6a; 3 of No. 7a; 4 of No. 8; 2 of No. 8a; 2 of No. 8b; 4 of No. 9; 2 of No. 9a; 2 of No. 9b; 2 of No. 9c; 2 of No. 11; 1 of No. 12; 3 of No. 12a; 3 of No. 14; 4 of No. 15a; 2 of No. 15b; 3 of No. 16; 1 of No. 16a; 3 of No. 17; 4 of No. 18a; 1 of No. 18b; 20 of No. 19b; 11 of No. 22; 4 of No. 23; 2 of No. 22a; 1 of No. 24; 3 of No. 26; 1 of No. 26b; 3 of No. 27a; 2 of No. 28; 1 of No. 32; 170 of No. 37; 22 of No. 37a; 85 of No. 38; 1 of No. 45; 3 of No. 46; 5 of No. 48; 4 of No. 48b; 2 of No. 52; 4 of No. 53; 1 of No. 57b; 32 of No. 59; 2 of No. 62; 5 of No. 63; 6 of No. 70; 8 of No. 81; 2 of No. 89; 4 of No. 90a; 1 of No. 94; 1 of No. 95a; 1 of No. 96a; 3 of No. 111; 15 of No. 111c; 2 of No. 115; 21 of No. 117; 1 of No. 116a; 1 of No. 120b; 4 of No. 126; 2 of No. 133a; 1 of No. 137; 1 of No. 155; 1 of No. 147b; 2 of No. 176; 2 of No. 188; 12 of No. 189; 4 of No. 192; 2 of No. 196; 1 E06 or E020 Electric Motor.