A New Super-Model Mobile Crane

Castor Steering and Electric Drive

MANY devices have been invented in an endeavour to solve the problem of high speed handling and transportation of materials and merchandise. One of the most popular and interesting of these is the mobile crane that forms the subject of the fine Meccano model shown in Fig. 1. The actual crane is entirely self-contained, with its own power unit, and combines the stability and efficiency of a stationary crane with extreme mobility. Its travel is not confined to a set of rails, or hindered by trailing cables from an external power supply, so that it can be used for transporting goods over a wide area.

The power unit in the model is an Electric Motor, and the luffing, hoisting and travelling operations can each be brought into play by the movement of levers within easy reach of the operator. The crane is slewed by rotation of a pivoted rear castor controlled from the operator's cab.

Construction of the model should be commenced by building the chassis. This consists of two channel section girders 1, Fig. 2, formed from two $9\frac{1}{2}$" Angle Girders. These are bridged by two $3\frac{1}{2}$" Angle Girders, and are connected at their rear ends by a $4\frac{1}{2}$" Angle Girder, to which is bolted a $4\frac{1}{2}$" Flat Girder and two $4\frac{1}{2}$" × $2\frac{1}{2}$" Flat Plates 3.

The front axle 4 is journalled in Handrail Supports secured to built up semi-elliptic springs attached to the chassis, and it carries two 2" Pulleys fitted with Tyres. The front of the driving cab is a $4\frac{1}{2}$"×$2\frac{1}{2}$" Flexible Plate bent as shown and attached to the ends of the girders 1 by two 3" Formed Slotted Strips. At its upper corners it is bolted to $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates fixed to the girders 1 by Obtuse Angle Brackets.

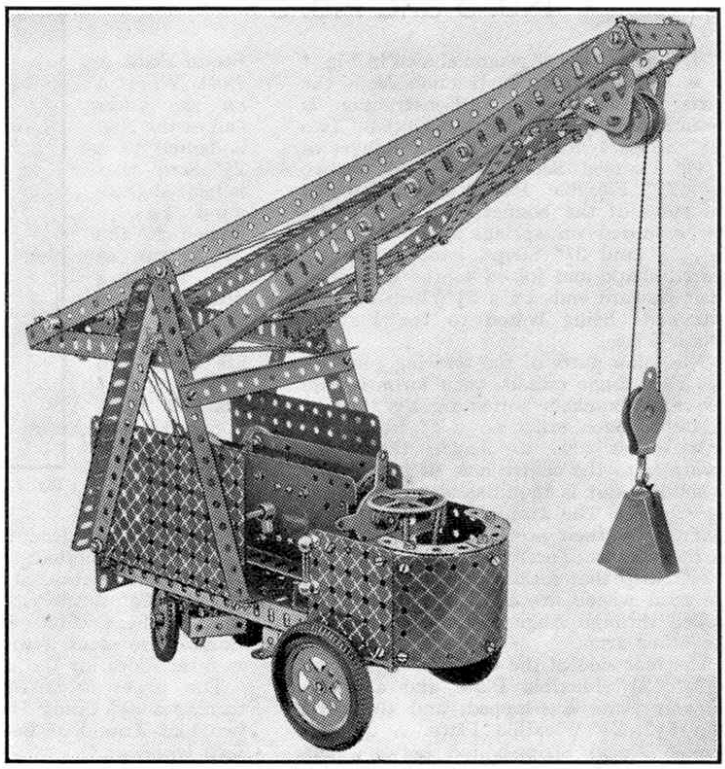

Fig. 1. A general view of the new Super Model Electric Mobile Crane.

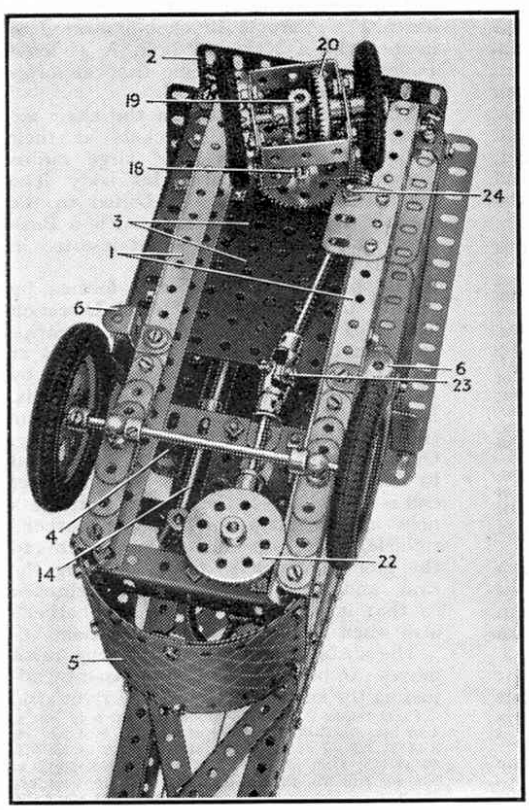

Fig. 2. An underneath view of the Electric Mobile Crane, showing the castor and steering mechanism.

An E6 or E20B Electric Motor is attached to one of the $3\frac{1}{2}$" Angle Girders at the forward end of the chassis by $\frac{1}{2}$"×$\frac{1}{2}$" Angle Brackets, and its sideplates are extended by two $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates that are secured to them by two 1" Corner Brackets but are spaced from them by Washers. The $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates are bolted to two $2\frac{1}{2}$" Angle Girders fixed to the Flat Plates 3.

A Worm on the armature shaft of the Motor meshes with a $\frac{1}{2}$" Pinion 8 mounted on a 2" Rod that carries a $\frac{7}{8}$" Bevel Gear and a Collar. This Rod is journalled in a Channel Bearing 9 bolted to one of the Motor sideplates. The Bevel drives a similar Bevel mounted on a $2\frac{1}{2}$" Rod that carries also a $\frac{1}{2}$" diam. $\frac{1}{2}$" face Pinion 10. The Pinion is in constant mesh with a 57-teeth Gear 11 on a $2\frac{1}{2}$" Rod, which also carries a $\frac{3}{4}$" Pinion 12, Fig. 4, and two Collars. This Rod forms the layshaft and can be moved sideways in its bearings by moving the control lever 13, Fig. 3. The latter is a 2" Rod inserted in a Coupling attached to one end of an 8" Rod 14, which carries at its rear end a Crank 15. A $\frac{3}{8}$" Bolt is fixed in the end hole of the Crank and its head engages between a Collar on the layshaft and the Pinion 12.

At this point it is advisable to assemble the automatic brake that maintains the load when the drive is transferred to operate the other movements of the crane. On the left-hand end of the layshaft is a Collar, and when the layshaft is moved the Collar pushes against the end of a 1" Rod that is fixed in a Coupling held on a 2" horizontal Rod 17. The 1" Rod is kept in close contact with the Collar on the layshaft by a short length of Spring

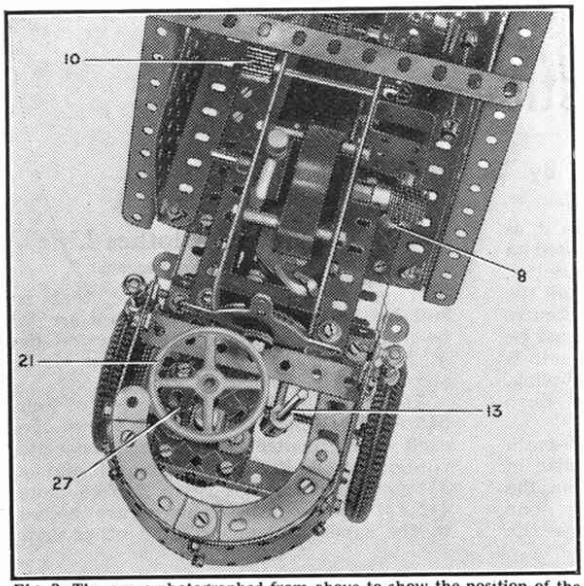

Fig. 3. The crane photographed from above to show the position of the Electric Motor and the control lever.

Cord. Rod 17 is journalled in a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted to the chassis, and is retained loosely in place by Collars at each end. The brake band is a belt of Cord, which passes around a Bolt and around a 1" Pulley on a $2\frac{1}{2}''$ Rod that carries also a 50-teeth Gear 16 and a Cord Anchoring Spring.

The castor unit and its gears are constructed as follows. Two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips and two $1\frac{1}{2}''$ Flat Girders are bolted together to form a cage as shown in Fig. 2. Two $1\frac{1}{2}''$ Angle Girders are then bolted to the Flat Girders, and they in turn are attached by means of two $\frac{3}{4}''$ Bolts to a 57-teeth Gear mounted on a Rod 18. The Angle Girders are spaced from the Gear by the length of the Bolts. The lower end of Rod 18 is inserted in the longitudinal bore of a Coupling 19, which is mounted on a $2\frac{1}{2}''$ Rod pushed through its centre transverse bore. Rod 18 carries also a $\frac{1}{2}''$ Pinion that meshes with a $1\frac{1}{2}''$ Contrate 20 on the Rod of Coupling 19. At its upper end Rod 18 carries a $\frac{3}{4}''$ Contrate and is journalled in the Flat Plate of the chassis and a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted above the Plate.

The castor is steered from the operator's cab. The Steering Wheel 21 is fixed on a $3\frac{1}{2}''$ Rod journalled in a $3'' \times 1\frac{1}{2}''$ Flat Plate bolted to the chassis framework and in a Double Bent Strip bolted above the Plate. A $1\frac{1}{2}''$ Bevel mounted on the lower end of this Rod meshes with a $\frac{1}{2}''$ Bevel fixed on a 2" Rod journalled in $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets, and is connected to a 4" Rod by a Universal Coupling 23. A Worm on the rear end of the 4" Rod meshes with the 57-teeth Gear of the castor unit, and a bearing for this Rod is provided by a Handrail Support 24.

The Pinion 12 on the layshaft meshes with a 50-teeth Gear mounted on a 2" Rod 25 that carries also two Cord Anchoring Springs. A 2" Rod 26 carries two 1" Pulleys, over which the cord for raising and lowering the jib is passed, and also a Flat Bracket that is free to pivot and is held in place by Collars. The shaft 25 is controlled by a foot-brake that consists of a length of cord fastened at one end to the side of the gear-box, then passed around a 1" Pulley fixed on the Rod 25 and finally tied to a foot pedal 27 in the cab. This foot pedal is made up of a Flat Bracket bolted to the centre hole of a Double Bracket, which in turn is pivoted on a Double Bracket fixed to the floor of the cab. The brake cord is attached to the rear of the Flat Bracket.

Each side of the body is a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate bolted to $5\frac{1}{2}''$ Angle Girders fixed to the girders 1. Two $7\frac{1}{2}''$ Angle Girders are arranged to form an "A" frame, as shown, and at their upper ends are bolted to the end hole in the arm of a Crank.

The construction of the jib is quite simple and its details are clear from the illustrations. The jib head pulleys are mounted on a $1\frac{1}{2}''$ Rod journalled in Trunnions A 5" Rod 28 journalled at the rear end of the jib carries four 1" loose Pulleys spaced from each other by Collars. Two Flat Brackets are placed on the Rod between the Collars and the outer Pulleys.

The cord for raising and lowering the load is fastened to a Cord Anchoring Spring on the Rod of Gear 16 and then passed around the two centre Pulleys on the Rod 28, over the jib head Pulleys and around the Pulley of the Single Sheave Pulley Block. Finally the cord is tied to the Flat Bracket on the Rod 26.

Two equal lengths of cord for raising and lowering the jib are fastened at one of their ends to the Cord Anchoring Springs on the Rod 25, and are then passed around the outer 1" Pulleys on the Rod 28 and around the 1" Pulleys on the Rod 26. Their other ends are fastened to the Flat Bracket mounted on the Rod 28.

This completes the assembly of the model, but before it is set in operation it is advisable to oil the gearing and bearings, and to see that all the Rods run freely.

Parts required to build model electric mobile crane: 4 of No. 2; 2 of No. 2a; 3 of No. 3; 3 of No. 5; 2 of No. 6a; 2 of No. 7a; 6 of No. 8a; 5 of No. 9; 2 of No. 9a; 2 of No. 9b; 2 of No. 9d; 1 of No. 9e; 2 of No. 9f; 4 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 12c; 1 of No. 13a; 2 of No. 15; 1 of No. 15a; 1 of No. 15b; 1 of No. 16; 5 of No. 16a; 6 of No. 17; 1 of No. 18a; 3 of No. 18b; 2 of No. 20a; 2 of No. 21; 4 of No. 22; 6 of No. 22a; 1 of No. 25; 2 of No. 26; 1 of No. 26a; 2 of No. 27; 2 of No. 27a; 1 of No. 28; 1 of No. 29; 2 of No. 30; 1 of No. 30a; 1 of No. 30c; 2 of No. 32; 156 of No. 37;af

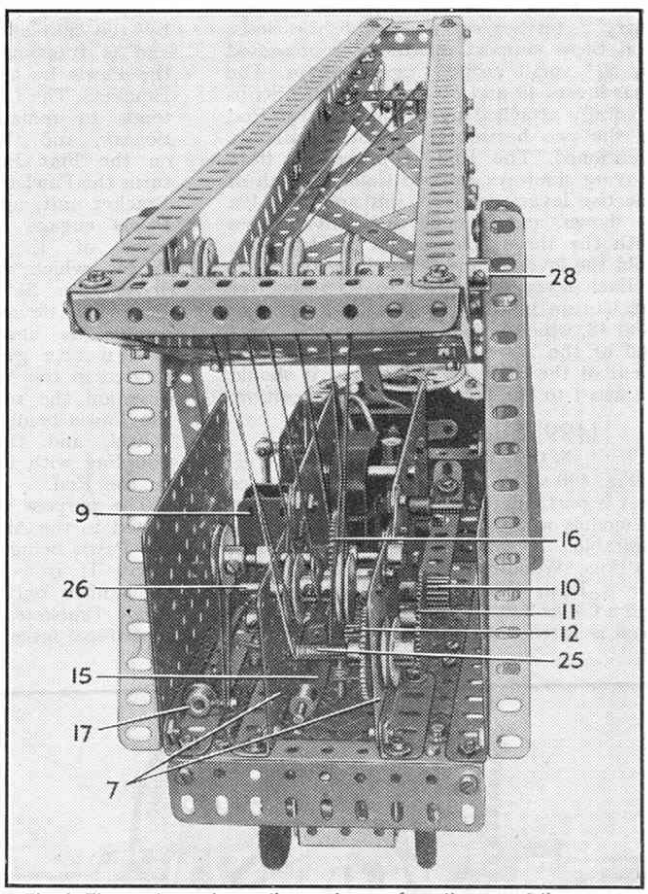

Fig. 4. The gearing and operating cords seen from the rear of the crane.

136 of No. 37bf; 63 of No. 38; 1 of No. 40; 1 of No. 45; 4 of No. 48; 1 of No. 48b; 2 of No. 52a; 2 of No. 53a; 3" of No. 58; 1 of No. 58b; 28 of No. 59; 3 of No. 62; 3 of No. 63; 4 of No. 72; 1 of No. 73; 1 of No. 82; 2 of No. 90a; 1 of No. 103c; 2 of No. 103f; 3 of No. 103h; 2 of No. 111; 4 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 133a; 7 of No. 136; 1 of No. 140; 2 of No. 142a; 2 of No. 142d; 1 of No. 151; 1 of No. 160; 3 of No. 176; 1 of No. 185; 1 of No. 191; 2 of No. 215. 1 E20B or E6 Electric Motor.