

HERE is an example in Meccano of a type of crane that is perhaps less well known than most cranes in common use today. It's based on what is known as a 'Travelling Gantry Crane' and is usually found in heavy industries where really substantial loads are to be moved some distance. In the shipbuilding industry for example, gantry cranes are often used to carry whole prefabricated sections of ships from one location to another.

Generally speaking, cranes of the type in question consist basically of two towers connected at the top by a strong cross-beam or 'gantry', the whole assembly running on parallel rails. The actual load hook is slung from a small trolley or 'crab', which runs along the gantry itself. The Meccano model described here is a typical example of this type of machine and, although none are shown, it runs on rails that can be built up from suitable Angle Girders. It is powered by a Meccano E15R Electric Motor and is fitted with a particularly useful gearbox that controls movement not only of the crane as a whole, but also of the crab and load-hook.

### Towers and Gantry

Construction of the model should begin with the towers or, to be more specific, the tower bases, both of

which are different. The smaller of the two is built up from two 9½ in. Angle Girders to each of which a 9½ in. by 2½ in. Strip Plate 1, edged by two 9½ in. Strips 2 and two 2½ in. Strips 3, is bolted to complete the side. The sides are joined at each end by a 2½ in. by 2½ in. Flexible Plate 4, attached to the sides by Angle Brackets and edged by four 2½ in. Strips 5. Now bolted to each side are two 12½ in. Angle Girders 6 and 7, joined by a 2½ in. Strip 8 and braced as shown by two 5½ in. Strips 9.

The larger tower base holds the E15R Electric Motor as well as the gearbox and is therefore considerably more complicated. Two 12½ in. Angle Girders 10 are each extended at one end by a 5½ in. Strip 11 and at the other by a 3½ in. Strip 12, the former projecting five holes and the latter projecting four holes. Now bolted to each extended Angle Girder are a 5½ in. by 2½ in. Flexible Plate 13, a 5½ in. by 3½ in. Flanged Plate 14, two 12½ in. Angle Girders 15 and 16, separated by a 2½ in. by 2½ in. Flexible Plate 17 edged by a 2½ in. Strip, and another 2½ in. by 2½ in. Flexible Plate 18 edged by three 2½ in. Strips. Flexible Plate 13, incidentally, is edged by a 2½ in. Strip and a 5½ in. Strip which is connected to Angle Girder 16 by a 12½ in. Strip 19, then another 12½ in.

Strip 20 is bolted between Angle Girder 15 and Flexible Plate 18.

Strip 19 is connected to Flanged Plate 14 and Angle Girders 15 and 16 by a compound 8½ in. strip 21 obtained from two 5½ in. Strips. As in the case of the smaller tower base the sides are joined at each end by a 2½ in. by 2½ in. Flexible Plate 22 edged by 2½ in. Strips and attached by Angle Brackets. In addition a 2½ in. Strip is bolted

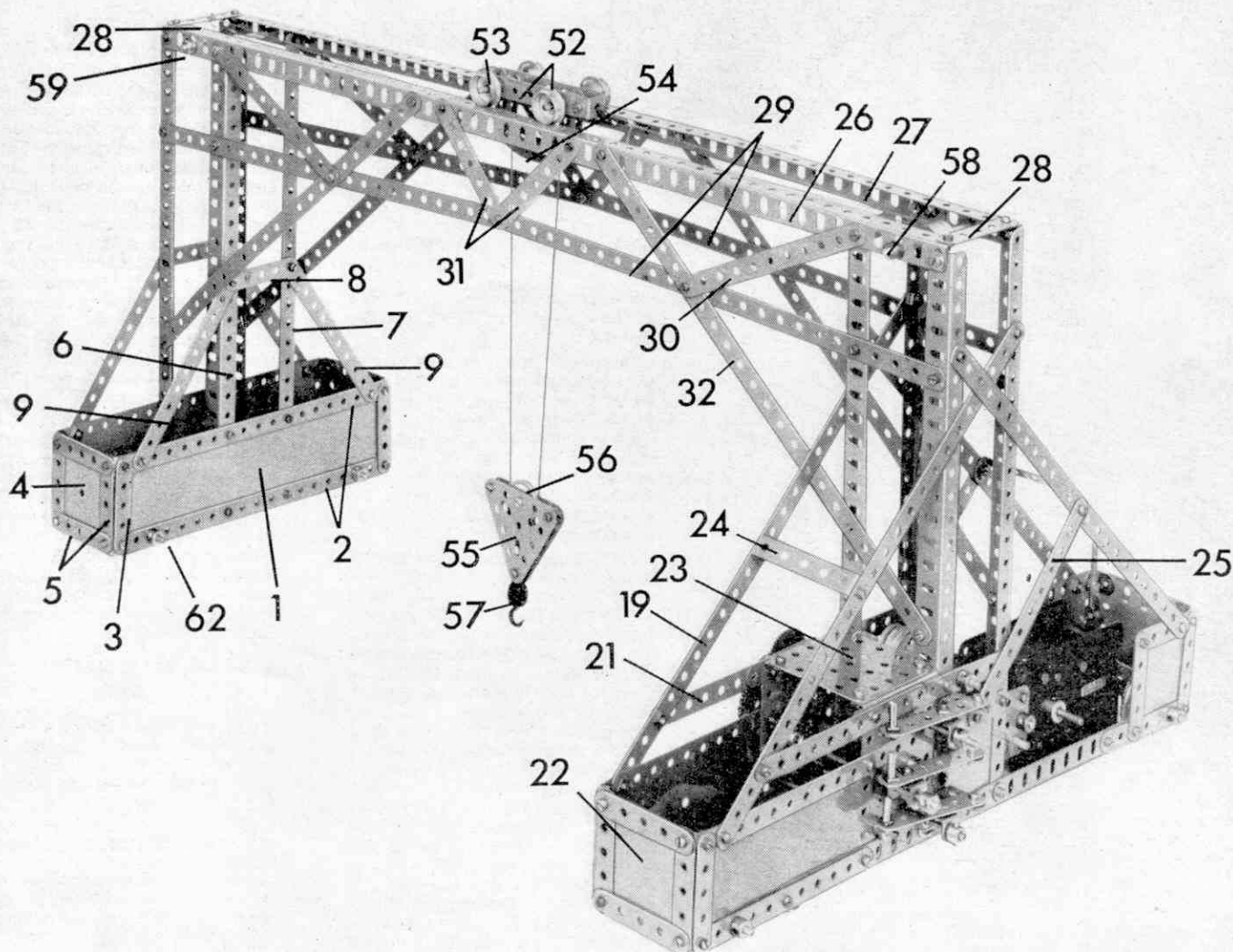
between Girders 10 while a 2½ in. by 2½ in. Flat Plate 23 is bolted between Flanged Plates 14. Also, Strips 19 are joined by a 2½ in. by ½ in. Double Angle Strip 24, as also are Strips 20, further bracing being supplied in both cases by 5½ in. Strips 25.

The gantry itself can now be built up. Girders 6 in the smaller tower are connected together and to Girders 15 in the larger tower by a 24½ in. Angle Girder 26, while a similar Angle Girder 27 is fixed between Angle Girders 7 and 16. Girders 26 and 27 are themselves joined at their ends by 2½ in. Strips 28. Two 24½ in. compound strips 29 are each built up from two 12½ in. Strips, to be bolted between Angle Girders 6 and 15 and 7 and 16, respectively. Bracers are then provided by two 5½ in. Strips 30, two 3½ in. Strips 31 and two 12½ in. Strips 32, the last also bolted to the towers.

### Motor and Gearbox

The sideplates of an E15R Motor are extended by two 1½ in. by 1½ in. Flat Plates in which a 4 in. Rod is held by Angle Brackets. Mounted on this Rod is a ½ in. Sprocket Wheel 33 and a 57-teeth Gear Wheel 34, the latter in mesh with a ½ in. Pinion on a 2½ in. Rod journalled in the Motor sideplates. Also fixed on this Rod is another 57-teeth Gear

# A Travelling Gantry Crane by Spanner



35 in mesh, in turn, with a  $\frac{1}{2}$  in. Pinion on the Motor output shaft. The complete unit is then bolted to Girders 10 having first extended the Motor switch with a Rod and Strip Connector in which a  $\frac{1}{2}$  in. Rod is fixed.

Moving on to the gearbox, this controls movement not only of the gantry as a whole, but also of the load hook and the small travelling trolley or 'crab' on top of the gantry. Flanged Plates 14 provide the bearings for all the Rods featured in the unit. To begin with, Sprocket Wheel 33 is connected by Chain to a 2 in. Sprocket Wheel 36 on a 4 in. Rod, held in place by a  $\frac{1}{2}$  in. Pinion 37 and a Collar outside the Plates, and carrying a  $\frac{1}{2}$  in. Pinion 38 inside the Plates. This Rod is actually one of the only two fixed Rods used in the gearbox, the other being a  $3\frac{1}{2}$  in. Rod 39, carrying a 57-teeth Gear 40 and a 1 in. Sprocket Wheel 41 and held in place by Collars.

The remaining three gearbox Rods are all sliding, being controlled by levers at the side. The uppermost of the three is a 5 in. Rod 42 carrying a 50-teeth Gear Wheel 43 on its end and a Cord Anchoring Spring between the Flanged Plates. The centre of the three is also a 5 in. Rod 44 that carries a 57-teeth Gear 45 and a  $\frac{1}{2}$  in. Pinion 46 between

the plates while the last of the three is a  $4\frac{1}{2}$  in. Rod carrying another 50-teeth Gear 47 on its end and a  $\frac{1}{2}$  in. Pulley with boss 48 between the Plates. All three Rods are controlled in a similar manner by a Double Bracket 49 held between Collars on the free ends of the Rods. A 3 in. Strip, with a Threaded Pin 50 fixed at one end, is lock-nutted to the Double Bracket and to a 1 in. by 1 in. Angle Bracket 51 bolted to outside Angle Girder 15.

By moving Rod 42 Gear Wheel 43 can be brought into mesh with Pinion 37, whereas partial movement of Rod 44 should bring Gear 45 in mesh with Pinion 38. Further movement of Rod 44 should bring Pinion 46 in mesh with Gear Wheel 40, Gear 45 remaining in mesh with Pinion 38. Movement of the third sliding Rod should bring Gear Wheel 47 in mesh with Pinion 37.

### Crab and Hook

Two  $3\frac{1}{2}$  in. Strips 52, joined at each end by a Double Bracket, provide the chassis for the 'crab'. Journalled in the Strips are two 2 in. Rods each held in place by two  $\frac{1}{2}$  in. Flanged Wheels 53, and carrying between the Strips, in order, two Washers, a  $1\frac{1}{2}$  in. Strip, a Collar, another  $1\frac{1}{2}$  in. Strip and two Washers. A  $\frac{1}{2}$  in. loose Pulley is mounted on a  $\frac{1}{2}$  in. Bolt held by two

Nuts in the lower end holes of the  $1\frac{1}{2}$  in. Strips, at the same time fixing two  $2\frac{1}{2}$  in. Stepped Curved Strips 54 between the  $1\frac{1}{2}$  in. Strips on each Rod.

In the case of the load hook, two  $2\frac{1}{2}$  in. Triangular Plates 55 are joined together by two  $\frac{1}{2}$  in. Bolts, but are spaced apart by a Collar on the shank of each Bolt. Mounted between the Plates on another  $\frac{1}{2}$  in. Bolt is a 1 in. loose Pulley 56, which must be free to turn, while a Loaded Hook 57 is fixed at the apex on a  $\frac{1}{2}$  in. Bolt held by two Nuts.

### Stringing

Before stringing can actually begin, two  $3\frac{1}{2}$  in. Rods 58 and 59 are journalled in Girders 26 and 27, being held in place by Collars. Rod 58 carries three  $\frac{1}{2}$  in. loose Pulleys between the Girders while Rod 59 carries only one  $\frac{1}{2}$  in. loose Pulley. Another  $3\frac{1}{2}$  in. Rod 60, carrying three 1 in. loose Pulleys 61, is journalled in compound strips 21.

A length of Cord is now tied to the Double Bracket in the crab that is nearest to the smaller of the two tower bases. This length of Cord is then taken round the Pulley on Rod 59, is threaded between the  $1\frac{1}{2}$  in. Strips in the crab, is passed round one of the outside Pulleys on Rod 58, is brought down and is passed round the corresponding end

Pulley 61. It is then taken one and a half turns around Pulley 48, is brought back and passed over centre Pulley 61, is taken up and around the centre Pulley on Rod 58 and is finally attached to the other Double Bracket in the crab by a  $2\frac{1}{2}$  in. Driving Band.

Another length of Cord is tied to the Cord Anchoring Spring on Rod 42, and is wrapped a good many times around the Rod to obtain plenty of 'spare'. It is then taken around unused Pulley 61, is brought up and around the unused Pulley on Rod 58, is passed around the first  $\frac{1}{2}$  in. Pulley in the crab, is taken round the 1 in. Pulley 56 in the hook, is passed over the other  $\frac{1}{2}$  in. Pulley in the crab and is finally tied to Strip 28.

All that now remains to be fitted are the main wheels in the tower bases. Each tower has four wheels, all provided by  $1\frac{1}{2}$  in. Flanged Wheels. In the smaller tower the wheels are mounted in pairs on two  $3\frac{1}{2}$  in. Rods 62, held by Collars in the  $9\frac{1}{2}$  in. Angle Girders of the base. In the larger tower the wheels are also mounted in pairs on  $3\frac{1}{2}$  in. Rods 63 and 64, but Rod 64 carries in addition, a 1 in. Sprocket Wheel between the Flanged Wheels. This Sprocket Wheel is connected to Sprocket Wheel 41 by a length of Sprocket Chain.

### Parts required

- |             |              |              |
|-------------|--------------|--------------|
| 12 of No. 1 | 2 of No. 7   | 2 of No. 15a |
| 2 of No. 1a | 10 of No. 8  | 18 of No. 16 |
| 18 of No. 2 | 2 of No. 8a  | 1 of No. 16b |
| 8 of No. 3  | 5 of No. 11  | 2 of No. 17  |
| 3 of No. 4  | 16 of No. 12 | 1 of No. 18a |
| 33 of No. 5 | 3 of No. 12a | 8 of No. 20  |
| 4 of No. 6a | 2 of No. 15  | 4 of No. 20b |

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|----------------|--------------|---------------|
| 4 of No. 22a   | 2 of No. 48a | 2 of No. 96   |
| 6 of No. 23    | 2 of No. 53  | 1 of No. 96a  |
| 1 of No. 23a   | 1 of No. 57c | 1 of No. 111c |
| 1 of No. 25    | 32 of No. 59 | 3 of No. 115  |
| 4 of No. 26    | 1 of No. 72  | 1 of No. 176  |
| 2 of No. 27    | 2 of No. 74  | 8 of No. 190  |
| 4 of No. 27a   | 2 of No. 76  | 2 of No. 192  |
| 170 of No. 37a | 2 of No. 90a | 2 of No. 196  |
| 155 of No. 37b | 1 of No. 94  | 1 of No. 212  |
| 30 of No. 38   | 1 of No. 95  | 1 E15R Motor  |

