BUILT WITH OUTFIT L.

Meccano Travelling Gantry Crane

The illustrations to this leaflet show the model built in Red - Green Meccano parts. Its construction in the Blue-Gold Meccano parts is exactly the same, except that Strip Plates should be used wherever Braced Girders are shown, as the latter parts have been withdrawn from the Meccano Outfits. If preferred, Braced Girders can still be purchased separately.

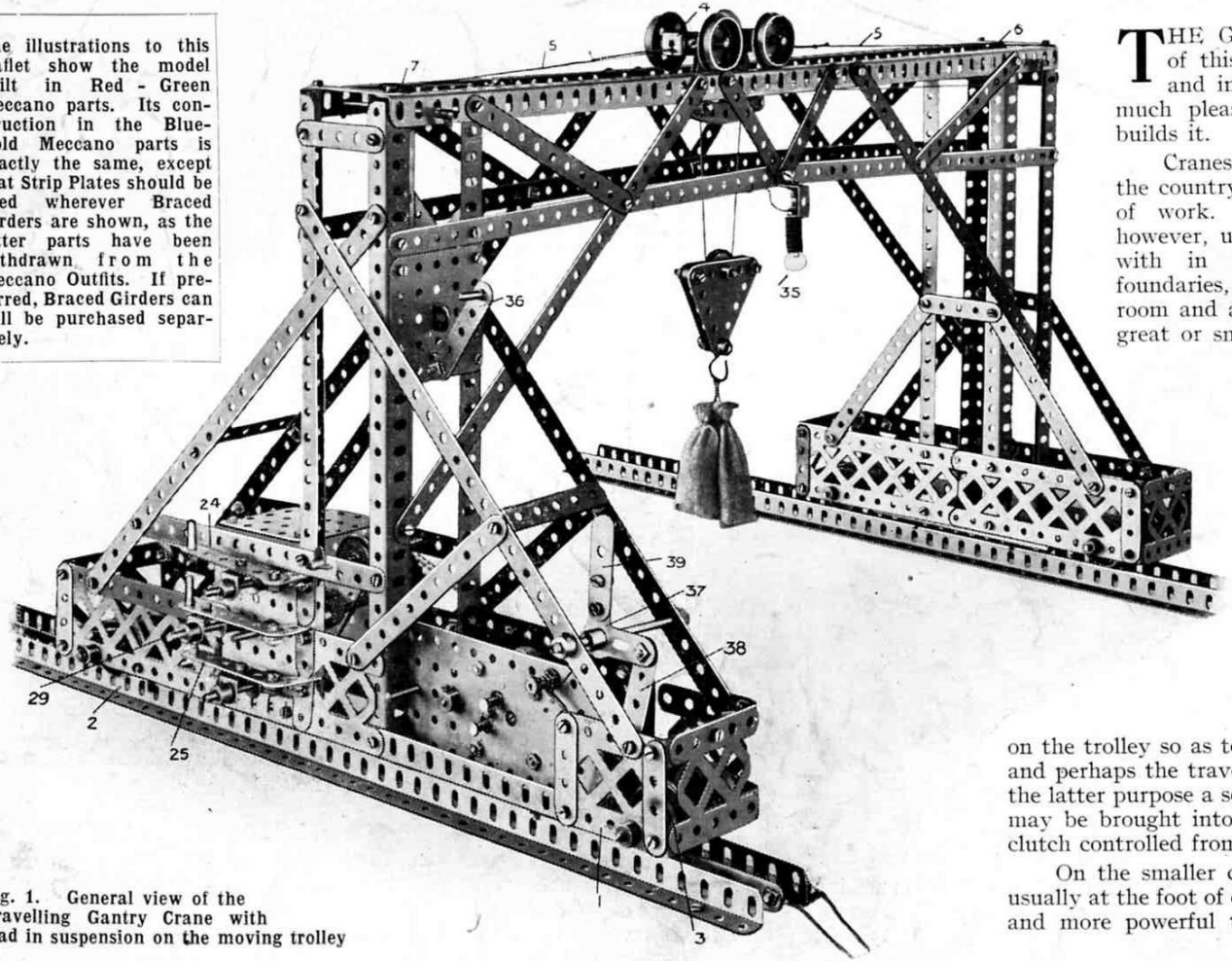

Fig. 1. General view of the Travelling Gantry Crane with load in suspension on the moving trolley

THE Gantry Crane that is the subject of this leaflet forms a very interesting and instructive model that will afford much pleasure to any Meccano boy who builds it.

Cranes of this type are in use all over the country, and are applicable to all kinds of work. They prove their value best, however, under such conditions as are met with in warehouses, coaling yards or foundaries, etc., for they require little head room and are capable of dealing with either great or small loads. Moreover, they work rapidly and are handled easily. They frequently are to be seen travelling from end to end of the long warehouses that line quaysides and docks.

The photograph of the Meccano model, Fig. 1, shows very clearly the structural design of a typical gantry crane. Strongly built end towers support the gantry rails on which run the hoisting trolley, or traveller. In practice, power is supplied usually by electric motors, one of which may be mounted on the trolley so as to operate the hoisting mechanism, and perhaps the travelling motion of the trolley. For the latter purpose a separate gear train is provided that may be brought into operation at will by means of a clutch controlled from the driver's cabin or platform.

On the smaller cranes the driver's cabin is placed usually at the foot of one of the end towers, but in larger and more powerful types, the driver is located in a

21/1034/7-5 *Published by* MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13. Printed in England

box-like arrangement situated on or beneath the gantry trolley. This position enables him to see all that is taking place on the site over which the crane is working, an advantage that is very important when handling a heavy load.

The Electrical System

Sometimes the electric current is fed to the motors by a shoe that runs on a special rail placed alongside the ordinary metals on which the gantry runs, and is returned through the travelling wheels to the ordinary rails. In other cases only two rails are provided and the current is picked up by the wheels running on one rail, passes through the motors and completes the circuit via the wheels running on the other rail. It is, of course, necessary to insulate each set of road wheels from the framework of the crane in order to prevent short circuiting of the current.

As is the case with almost every other machine, there are several types of gantry cranes that, although the same in principle, differ in constructional details. If the crane is to be employed in a long high building such as a warehouse or foundry, it is preferable to dispense with the end towers and ground rails as these would occupy valuable floor space. To do this the gantry is mounted on rails attached to and arranged parallel with the walls of the building and placed high up near the roof. This arrangement brings the whole of the floor space within the range of the hoisting hook, and loads can be picked up or deposited anywhere in the building.

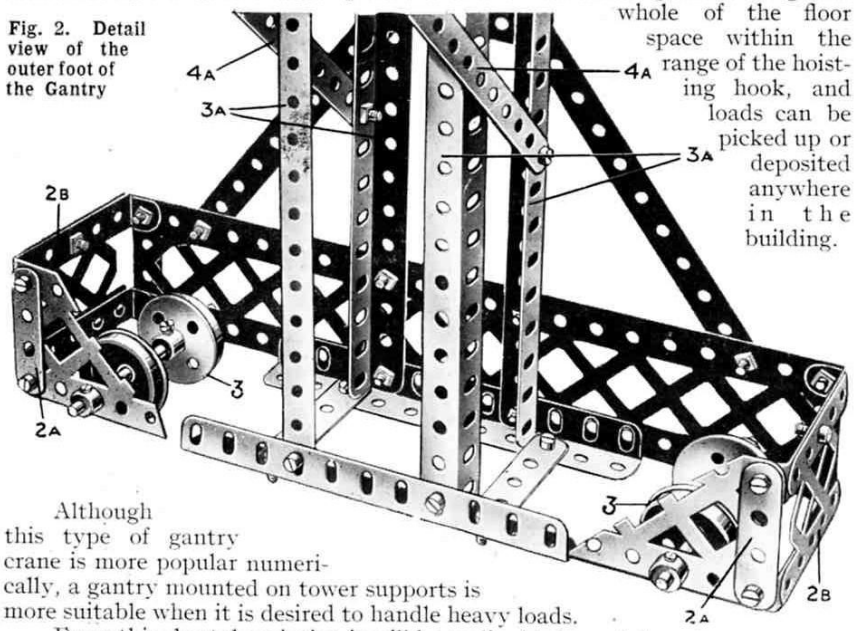

Fig. 2. Detail view of the outer foot of the Gantry

Although this type of gantry crane is more popular numerically, a gantry mounted on tower supports is more suitable when it is desired to handle heavy loads.

From this short description it will be realised how useful this class of crane is. It may safely be stated that, given suitable conditions of working, there is no other class of crane that can handle with the same rapidity and ease either great or small loads.

The foregoing remarks on gantry cranes in general will add interest, it is hoped, to the Meccano model, the construction of which is described in detail below. With the aid of the various illustrations any Meccano boy should be able to build the model successfully.

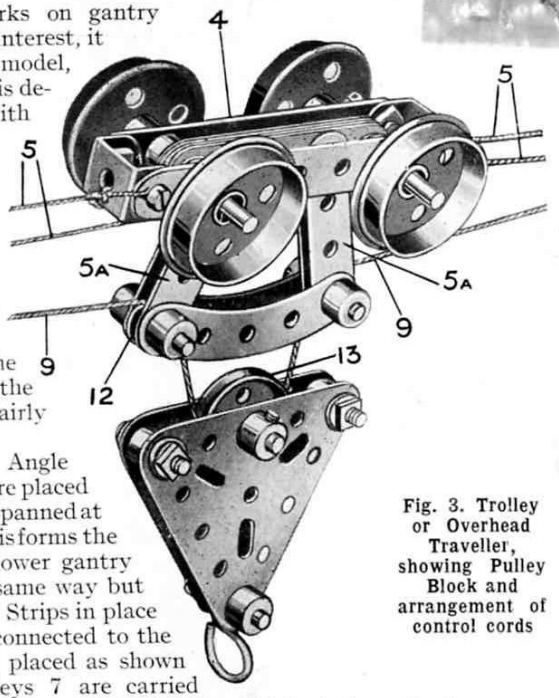

Fig. 3. Trolley or Overhead Traveller, showing Pulley Block and arrangement of control cords

The Meccano Model

The construction of the model should be commenced by building the gantry or upper part of the framework. This will be fairly clear from Fig. 1.

Two pairs of 12½" Angle Girders joined end to end are placed parallel to each other and spanned at each end by 2½" Strips. This forms the top of the gantry; the lower gantry members are built in the same way but are constructed from 12½" Strips in place of Angle Girders and are connected to the upper Girders by Strips placed as shown in Fig. 1. Three 1" Pulleys 7 are carried loosely on a 3½" Rod journalled in the third holes of the upper Girders.

Construction of the End Towers

It should be noted that in the base of the tower that carries the Electric Motor, Fig. 1, the centre portion is composed of 12½" Angle Girders at the lower edge, extended at one end by 2½" by 2½" Strip Plates 1 overhanging four holes and at the other end by 5½" by 2½" Strip Plates 2 overhanging five holes.

The shorter tower base is shown in Fig. 2 and it will be noticed that this differs from the tower base that carries the Electric Motor. 2½" by 2½" Strip Plates 2b, Fig. 2, form the ends of the tower bases, while additional support is given by means of the 2½" Strips 2a placed as shown. Four 12½" Angle Girders 3a are secured in position vertically and form the main structure of the towers. The outer pair of vertical Angle Girders on each tower are spanned near the top by 2½" Strips. The travelling wheels 3, Figs. 1 and 2, are carried on 3½" Rods journalled in holes in the Strip Plates forming the sides of the tower bases.

Two 2½" by 3½" Flanged Plates 30a, Fig. 5, should be bolted to the Strip Plates 2 of the tower base. These Flanged Plates are only to be fitted to the long base; they are not required on the shorter base. They may be secured further by means of 7½" Strips bolted to the Flanged Plates 30a and also to the upright Girders 3a and to the Girders of the base. The top edges of the Flanged

Plates 10a may be spanned by a 2½" by 2½" Flat Plate, but this should not be attached until the gears have been assembled. Any other constructional details of the towers and bases may easily be obtained from the various illustrations.

Constructional Details of the Trolley

The overhead trolley is built up as follows. Two 3½" Strips 4, Fig. 3, are joined by Double Brackets to form a box-like structure. The Axle Rods, carrying on their ends the travelling wheels, are journalled in these Strips. They also carry several 2½" Strips the weight of which serves to ensure the proper adhesion of the trolley wheels on the gantry rails. Four 2" Strips 5a are bolted to these 2½" Strips, and their lower ends are spaced apart by 2½" Curved Strips. The lower ends of the Strips 5a carry ½" Pulleys on 1" Rods. The construction of the pulley block will be evident from the illustration.

Assembling the Mechanism

The Rods 10 and 8 are slidably controlled by the clutch operating handles 24 and 25, which are bolted and lock-nutted to Double Brackets 26, engaging between Collars 27 nipped on the Rods. On the outer end of the Rod 10 is a 57-teeth Wheel 28 and a similar wheel is secured on the outer end of the Rod 8. By operating the clutch handles 24, 25 either or both of the Gear Wheels 28 or 28a may be brought into engagement with the ½" Pinion 23 and thus cause the load to be raised or lowered, or the trolley to be traversed.

The third clutch handle 29 similarly controls the sliding movement of a Rod 30, on which is secured a 57-teeth Gear Wheel 31 and a ½" Pinion 32. On the Rod 22 is secured another ½" Pinion 33, while on the Rod 14 is a further 57-teeth Gear Wheel 34.

By moving the handle 29 the Gear Wheel 31 and the Pinion 32 may be brought into engagement respectively with the Pinion 33 and the Gear Wheel 34, thus providing a reducing gear train from the driven Rod 22 to the Rod 14. The latter effects the travelling of the whole gantry upon the wheels 3 and carries a 1" Sprocket Wheel connected by a Chain 16 with a further 1" Sprocket Wheel 17 carried on the Rod 18 of a pair of travelling wheels 3.

In order that the 6-volt motor may be used, that illustrated being the old style 4-volt motor, slight alteration must be made to the switch operating lever. A ½" by ½" Angle Bracket should be attached pivotally by a lock-nutted bolt to the lower end of the Strip 38, Fig. 1, and then bolted to one of the horizontal members of the Motor switch.

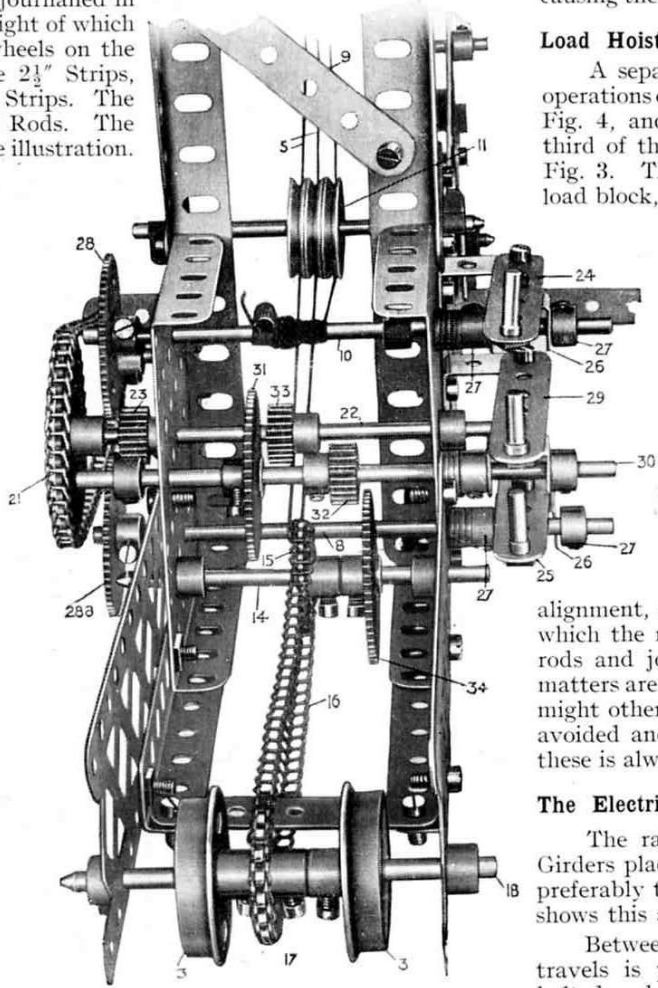

Fig. 4. Operating Mechanism and control levers.

Trolley Control Mechanism

The traversing of the trolley on the gantry rails is effected by a cord 5, which passes from the far end of the trolley, round a Pulley 6, Fig. 1, and is then returned and passed over one of the 1" Pulleys 7 down to the Rod 8, round which it is given three turns. The cord then passes up and around another of the Pulleys 7, and finally is connected to the near end of the trolley. In consequence of this arrangement rotation of the Rod 8 will wind up one end of the traversing cord and pay out the other end, so causing the trolley to travel to and fro along the gantry rails.

Load Hoisting Arrangement

A separate cord 9 controls the hoisting and lowering operations of the load. It is wound round the upper Rod 10, Fig. 4, and thence round the guide pulley 11, round the third of the Pulleys 7, Fig. 1, and over the ½" Pulley 12, Fig. 3. Thence it passes beneath the 1" Pulley 13 on the load block, then round another ½" Pulley, and is made fast on the far end of the gantry frame.

If Rod 10, Fig. 4, is not rotated the trolley travels to and fro without the load being either raised or lowered. So soon as the Rod 10 is rotated, however, the load is raised or lowered according to the direction of rotation of the Rod.

While every effort has been made to make the constructional details as clear as possible, considerable help can be obtained by studying the various illustrations carefully, thus gaining a correct idea as to the function each part has to perform. When completed, the model should be carefully adjusted and each shaft and gear wheel brought into perfect alignment, as much depends on the ease and freedom with which the model works. Apply a little oil to all rotating rods and journals and also to the gear wheels. If these matters are attended to, much trouble and annoyance which might otherwise result by the model working stiffly, will be avoided and the little extra attention given to details like these is always amply repaid.

The Electric Circuit

The rails on which the model runs are formed by Girders placed in pairs parallel to each other and secured preferably to a board or other suitable base. Fig. 1 clearly shows this arrangement.

Between the rails on which the longer tower base travels is placed a centre rail consisting of 12½" Strips bolted end to end and secured by Angle Brackets to the base board. These Strips form the conductor rail from

which the electric current is taken to the Motor by means of a 1½" Strip bolted to the end Girders of the base. The Strip is given a spring tension by bending it a little. It may then be arranged to make a good rubbing contact with the top of the centre rail.

The 1½" collector Strip must be insulated from the base of the model by means of Insulating Bushes and Washers placed between the bolt head and the Strip and between the Strip and the Girder, while further Insulating Washers should be placed between the securing nut and the Girder.

A length of insulated wire may now be joined to the 1½" Strip by means of a bolt and nut and the other end of the wire taken to one of the terminals on the Motor. The remaining terminal of the Motor is connected to the framework of the crane at any suitable point. The current supply is connected by one wire to the centre rail and by another to one of the outer rails.

Illuminating the Model

A 6-volt Electric Lamp may be mounted on the crane and controlled by a simple switch as illustrated in Fig. 1, but this is, of course, a matter for individual choice. The control switch for the Lamp is shown at 36, Fig. 1.

The base of the switch is composed of a 2½" by 2½" Flat Plate and the arm is formed by two 2½" Strips pivoted on a bolt passed through an Angle Bracket secured to the Flat Plate.

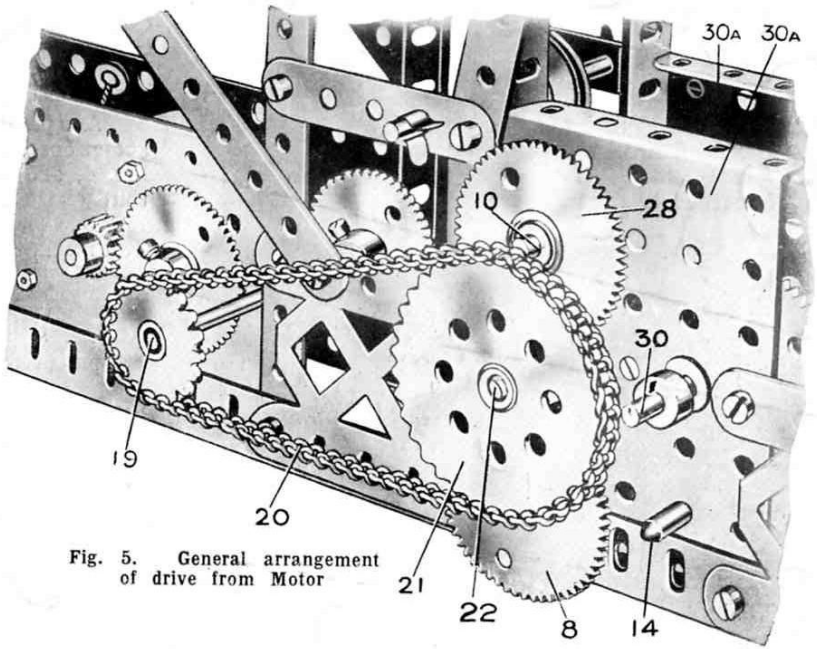

Fig. 5. General arrangement of drive from Motor

When closed, the switch arm makes contact with an Angle Bracket secured to the Flat Plate, the vertical edge of the Bracket passing between the two Strips forming the arm. The Angle Bracket on which the arm pivots must be insulated from the Flat Plate by means of Insulating Bushes and Washers.

The Lamp Holder, Meccano Part No. 183, is secured to a Double Bent Strip attached to a Girder of the gantry as shown in Fig. 1. The electrical connections are as follows: a wire from one terminal of the source of supply is taken direct to the Angle Bracket on which the switch arm pivots, while the other Angle Bracket of the switch is connected to the outer casing of the Lamp Holder. The contact screw in the Lamp Holder is connected directly to the other terminal of the source of supply.

The Electrical connections are as follows: The Lamp Holder should be in electrical contact with the frame of the model. As in the circuit already described, the collector shoe is connected to one terminal of the Motor, but the other Motor terminal is connected by an insulated wire to the Angle Bracket on which the switch arm pivots. The other Angle Bracket, which makes contact with the arm, is connected to the contact screw in the Lamp Holder.

List of Parts Required to Build the Travelling Gantry Crane

12	of No.	1	6	of No.	7	11	of No.	16	3	of No.	26	9	of No.	48a	1	of No.	95	8	of No.	193
12	,,	2	10	,,	8	1	,,	16a	3	,,	27	2	,,	53	3	,,	96	6	,,	195
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3	,,	4	6	,,	11	4	,,	18a	11	,,	35	30	,,	59	1	,,	128	4	,,	1575
17	,,	5	4	,,	12a	12	,,	20	149	,,	37	1	,,	72	5	,,	182	8	,,	1583
6	,,	6	2	,,	15	8	,,	22a	10	,,	37a	2	,,	76	1	,,	183	E.6. Electric Motor		
9	,,	6a	2	,,	15a	2	,,	23	38	,,	38	2	,,	90	1	,,	184			
						2	,,	25	3	,,	44	26"	,,	94						