Meccano Revolving Crane

An L Outfit Model

SPECIAL FEATURES

Luffing is effected by means of a simple but powerful screw gear. Luffing and hoisting movements are controlled by separate levers and may be operated separately or simultaneously. A reversing motion is fitted to the luffing gear, and the whole structure is capable of revolving upon the wheels mounted in the base. Much interest will be added to the model if the electro magnet is used in the manner described in this leaflet.

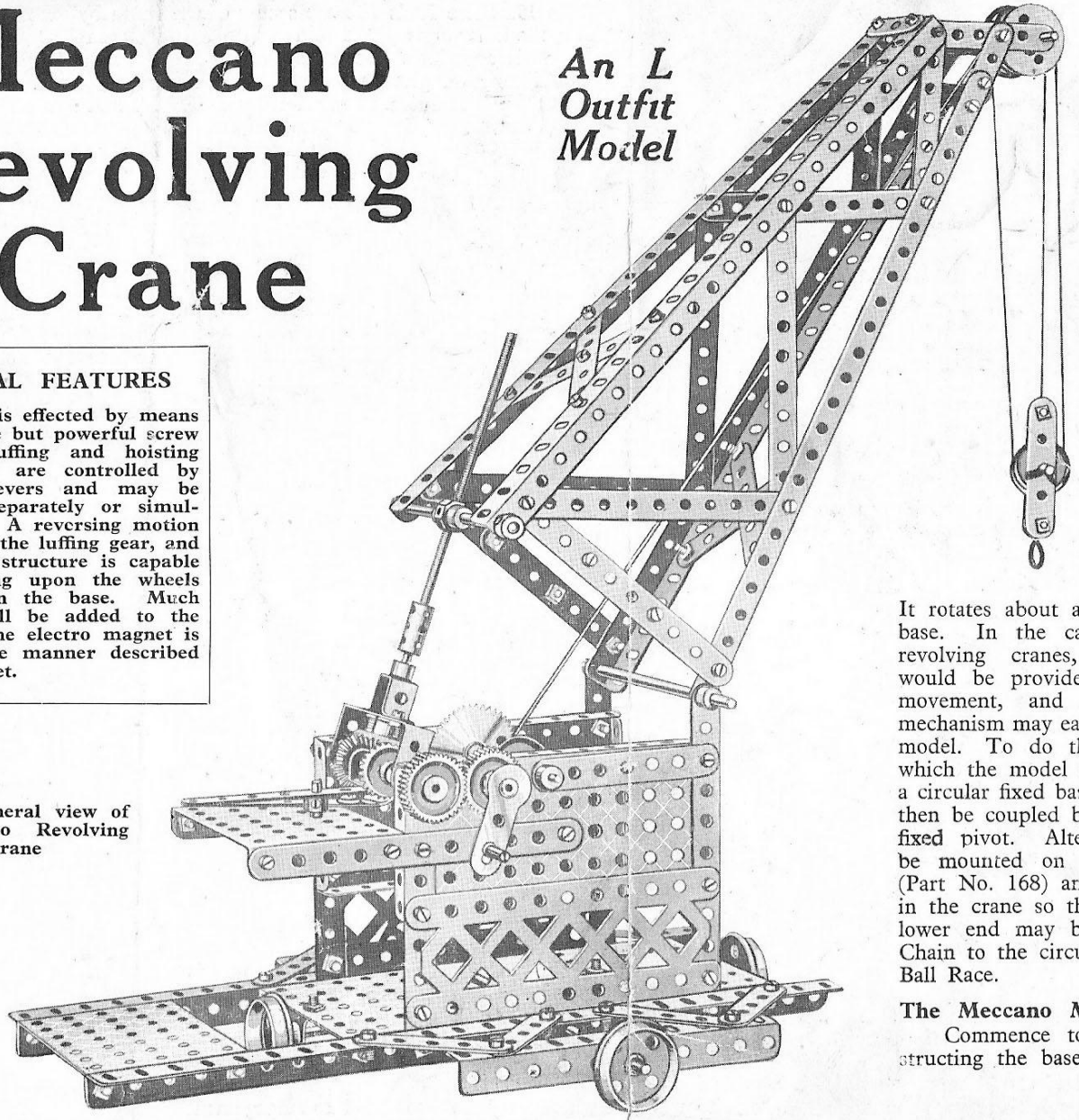

Fig. 1. General view of the Meccano Revolving Crane

MANY of the cranes in practical use, such as the giant block-setters and floating cranes, are so large and impressive that there is perhaps a danger of overlooking altogether the smaller but equally useful members of the crane family that are to be found in almost any large engineering works or railway siding.

The prototype of the Meccano model described in this leaflet is used, amongst other purposes, for loading and unloading railway wagons, lorries, etc. It rotates about a pivot mounted on a fixed base. In the case of the larger types of revolving cranes, some mechanical means would be provided to effect the swivelling movement, and if desired the necessary mechanism may easily be added to the Meccano model. To do this the Flanged Wheels on which the model rests should be mounted on a circular fixed base. The swivelling gear may then be coupled by any suitable means to the fixed pivot. Alternatively, the model could be mounted on the Meccano Ball Bearing (Part No. 168) and a shaft inserted vertically in the crane so that a Sprocket Wheel on its lower end may be connected by a Sprocket Chain to the circumference of the lower fixed Ball Race.

The Meccano Model

Commence to build the crane by constructing the base platform (Fig. 2) mounted

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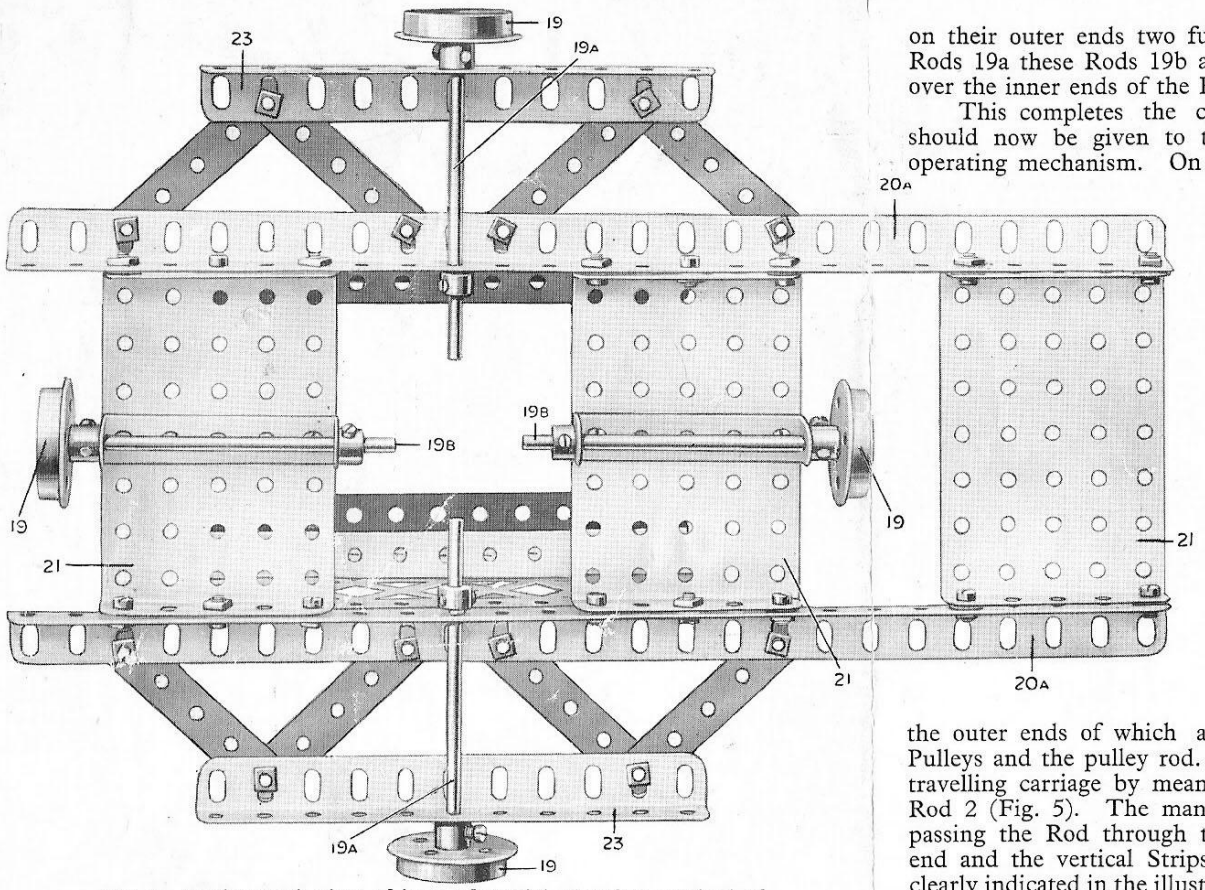

Fig. 2. Underneath view of base of model, showing method of mounting the wheel axles.

on Flanged Wheels 19. It is formed by bolting three $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 21 between the two $12\frac{1}{2}''$ Angle Girders 20a. Before the Plates are finally secured, however, two $5\frac{1}{2}''$ Strips 2a (Figs. 4 and 5) and two $3\frac{1}{2}''$ Strips should be bolted in a vertical position ready to hold the sides of the gear box. These Strips are shown more clearly in Fig. 1.

The "outrigger" arrangements carrying the Axle Rods 19a (Fig. 2) are made up from pairs of $2\frac{1}{2}''$ Strips bolted to the Angle Girders 20a and to $5\frac{1}{2}''$ Angle Girders 23. The Rods 19a, which are $4\frac{1}{2}''$ long, are passed through the centre holes of the Girders 23 and through the Girders 20a. They are held in position by Collars and grub-screws secured to their inner ends against the inner sides of the Girders 20a. The outer ends of the Rods 19a carry the Flanged Wheels 19.

To the centre of two Flanged Plates 21 now bolt $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips as shown in Fig. 2 and through these pass the Rods 19b, which carry on their outer ends two further Flanged Wheels 19. As in the case of the Rods 19a these Rods 19b are secured in position by means of Collars slipped over the inner ends of the Rods and placed against the Double Angle Strips.

This completes the construction of the base platform and attention should now be given to the construction of the supporting frame for the operating mechanism. On referring to Figs. 4 and 5 the method of building this part should be fairly clear. The $5\frac{1}{2}''$ Braced Girders shown in Fig. 1 are bolted to the $5\frac{1}{2}''$ vertical Strips 2a (Fig. 5) and to vertical $3\frac{1}{2}''$ Strips. Attached also to these Strips are two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates forming the gear-box.

It should be noted that the two $5\frac{1}{2}''$ Braced Girders used in this model must be replaced by $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates, if Blue/Gold parts are used. This change will not necessitate any alteration other than that of overlapping the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates and Strip Plates two holes.

Construction of the Jib

The jib is formed by $12\frac{1}{2}''$ Angle Girders, braced at the sides by the $5\frac{1}{2}''$ and $3\frac{1}{2}''$ Strips shown in Fig. 1. The upper and lower sides of the jib are braced by $3\frac{1}{2}''$ Strips placed crosswise and the Girders are spanned at the top by $1\frac{1}{2}''$ Strips.

Attached to the upper ends of the Angle Girders forming the underside of the jib are extension pieces consisting of 2" Strips (see Fig. 1) the outer ends of which are attached to the 3" Strips carrying the two jib Pulleys and the pulley rod. When completed the jib may be attached to the travelling carriage by means of a Rod 2 (Fig. 5). The manner of passing the Rod through the jib end and the vertical Strips 2a is clearly indicated in the illustration. Collars are slipped over the Rod and secured at either end, thus holding the jib securely yet loosely pivoted in position.

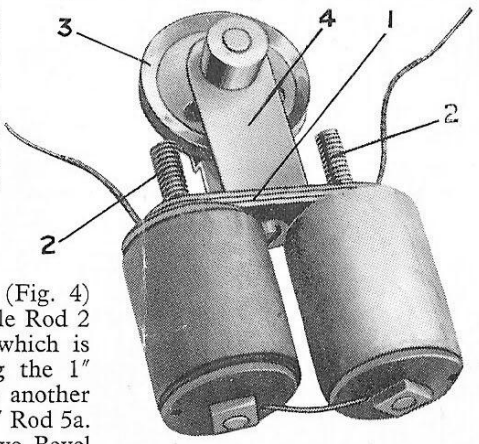

Fig. 3
The Meccano Electro Magnet.

Luffing Gear

The movement of the jib 1 (Fig. 4) about the pivot formed by the Axle Rod 2 is obtained from the handle 3, which is secured to a short Rod carrying the 1" Gear Wheel 4 that engages with another 1" Gear Wheel 4 carried on the $4\frac{1}{2}''$ Rod 5a. Also carried on the Rod 5a are two Bevel Wheels 5 and 6 (see Fig. 5), either of which may be brought into engagement

with the Bevel Wheel 9. The Rod 5a is arranged to slide longitudinally in its bearings and is controlled in this movement by the Strip 7. The latter is pivoted at 5 on a Threaded Pin, and on its inner end a Double Bracket is mounted pivotally by means of a bolt and two nuts (see Standard Mechanism No. 1). This Double Bracket engages Rod 5a and is spaced between the Bevels 5 and 6 by means of Washers.

The Bevel Wheel 9 is carried on the end of a 2″ Rod 10 that is connected by the Coupling 11 to a 5″ Screwed Rod 12. The Rod 10 is journalled in a 2½″ × 1″ Double Angle Strip carrying a Double Bent Strip and placed as shown in Fig. 5, the whole arrangement being loosely pivoted on the Rod 5a (see Fig. 4).

The 5″ Screwed Rod 12 engages the transverse threaded hole in a Coupling 13, which is carried pivotally on two 2″ Rods 14 so as to give a clear way for the Screwed Rod 12. When the Screwed Rod 12 is set in motion, the Coupling 13 travels up or down—according to the direction of rotation —and carries the jib with it.

When the lever 7 is in the central position all three Bevels 5, 6 and 9 are disengaged. A slight movement of the lever to one side or the other, however, brings one of the Bevels 5 and 6 into mesh with the Bevel 9, thus actuating the luffing mechanism.

Hence it will be seen that the jib may be raised or lowered without altering the direction of rotation of the handle 3, and the load may be moved simultaneously, but in a different direction, to the jib.

Hoisting and Lowering Gear

The Rod of the handle 3 also carries a ½″ Pinion 15 which is adapted to engage and drive a 57-teeth Gear Wheel 16, round the spindle of which is wound the cord 17 (Fig. 4) by means of which the load is raised or lowered. The spindle is caused to slide in its bearings, and so engage the Gear 16 with the Pinion 15, by means of the 3½″ Strip 18 (Fig. 5) pivoted at 19 on a bolt lock-nutted to the Flanged Plate. The other end of the Strip 18 is bent up to engage between the boss of the Gear Wheel 16 and a Collar carried on the Rod of the latter.

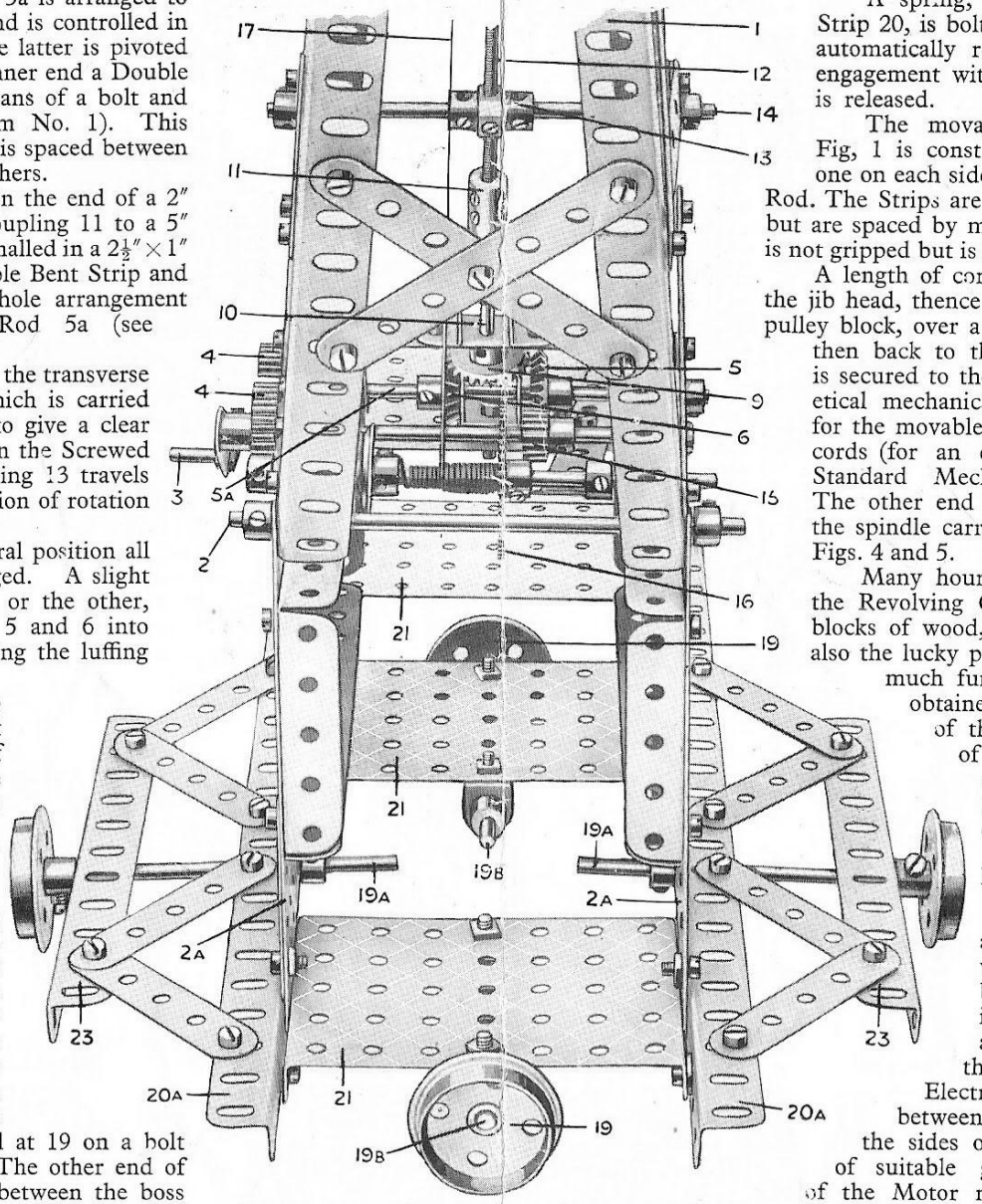

Fig. 4. Front view of Crane, showing hoisting mechanism, etc.

A spring, formed by slightly bending a 3½″ Strip 20, is bolted to the side of the frame and this automatically releases the winding spindle from engagement with the Pinion 15 when the lever 18 is released.

The movable hoisting pulley illustrated in Fig, 1 is constructed from two 2½″ Strips placed one on each side of a 1″ Pulley carried on a 1″ Axle Rod. The Strips are connected together at each end hole but are spaced by means of Washers, so that the Pulley is not gripped but is free to revolve on the Axle Rod.

A length of cord is led over one of the Pulleys in the jib head, thence around the sheave of the movable pulley block, over a second Pulley in the jib head, and then back to the movable pulley block, where it is secured to the 2½″ Strips. In this way a theoretical mechanical advantage of three is obtained, for the movable pulley block is supported by three cords (for an explanation of this, see Meccano Standard Mechanisms Manual, Section II.). The other end of the hoisting cord is secured to the spindle carrying the Gear Wheel 16, shown in Figs. 4 and 5.

Many hours can be passed happily by using the Revolving Crane to lift loads of sand, stone, blocks of wood, etc. Of course, if the builder is also the lucky possessor of a set of Hornby Trains, much further pleasure and realism may be obtained by employing the crane as part of the railway layout, for the purpose of unloading trains of trucks or assisting in the laying of the railway metals during repairs and extensions.

Electrifying the Model

Considerable interest will be added to the model if it is converted to the "all-electric" type by using a 6-volt Electric Motor in place of the operating handle 3 and an electro magnet in place of the hoisting hook. The Meccano Electric Motor should be bolted between the Flanged Plates forming the sides of the gear-box. Then by means of suitable gearing the armature spindle of the Motor may be brought into engagement with the Gear Wheels 4 (Fig. 5). A 6-volt accumulator or Meccano Transformer placed on the

rear Plate 21 (Fig. 2) and held in position by Angle Girders bolted to the Plate will supply the necessary current for both Motor and magnet.

Lifting Loads by Magnetism

The electro magnet will serve splendidly in place of the ordinary hoisting hook for lifting such objects as scrap pieces of iron or tin, Meccano Strips, Rods, and Girders, etc. The necessary magnet (see Fig. 3) is quite easily made and with the aid of the following description no difficulty should be experienced by any Meccano boy who decides to construct one.

Commence by winding two Bobbins to full capacity with 26 S.W.G. wire, and attach the completed Bobbins to the yoke 1, which is composed of three $1\frac{1}{2}$" Strips, by Threaded Rods 2. A wire protruding from one of the magnet coils should be connected to one of the wires of the second coil, and in order to select the proper wires for connection, it should be imagined that the electric current, starting from the input end (represented by the wire attached to the Transformer) of the first coil, flows round that coil in a clockwise direction. It then passes to the second coil and flows round it in an anti-clockwise direction. By connecting the two magnets in this way, one is given a north and the other a south polarity.

It is important that the two leads to the coils should be of sufficient length to permit the magnet being raised and lowered by the crane. The hoisting cord may be rove round the 1" Pulley 3, which turns upon a 1" Axle Rod journalled in a Cranked Bent Strip 4 bolted to the yoke 1.

The Bobbins when completed may be covered with brown paper; this improves their appearance and protects the insulation of the wire.

Parts required

9	of No.	2	2	of No.	15
17	„	3	2	„	15a
2	„	4	4	„	16
10	„	5	4	„	17
2	„	6	1	„	18a
2	„	6a	6	„	20
6	„	8	1	„	22
2	„	9	1	„	22a
1	„	11	1	„	23
4	„	12	1	„	26

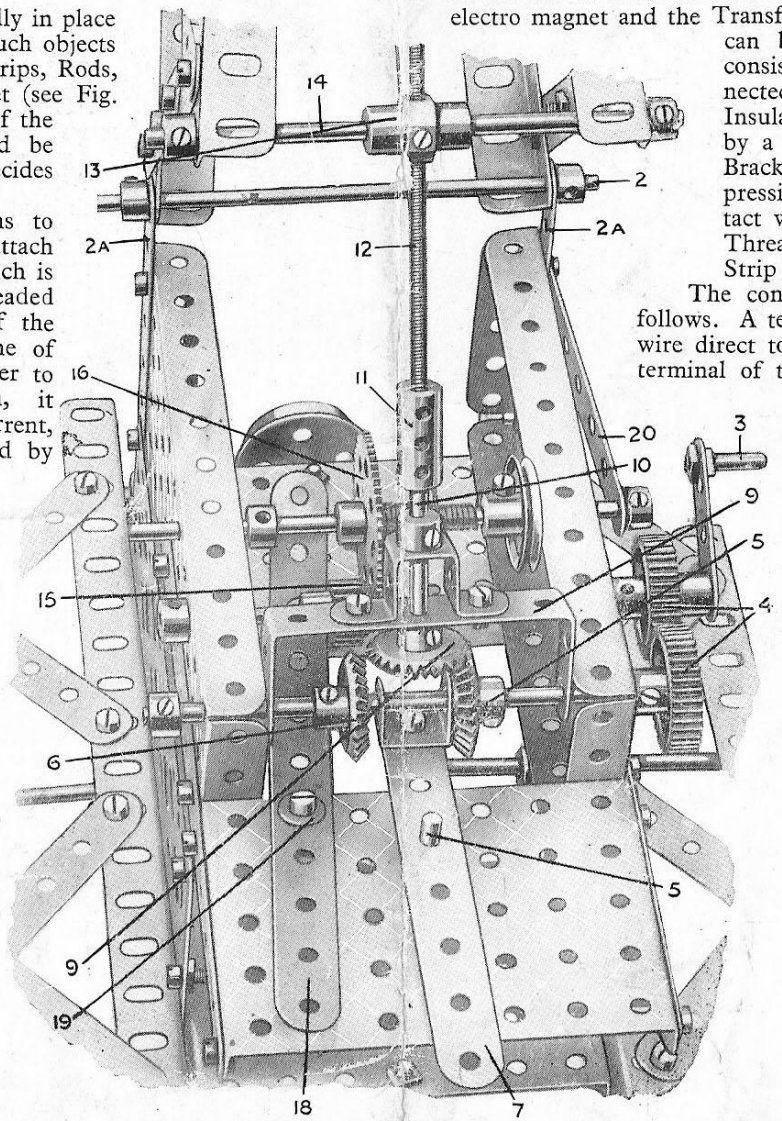

Fig. 5. Gear Box, viewed from the rear, showing luffing mechanism with reversing gear, etc.

The Wiring Circuit

In order to drop the load whenever desired it is necessary to de-magnetise the electro magnet momentarily by cutting off the current supply. A switch or cut-out of some suitable form is therefore required in circuit with the electro magnet and the Transformer. A knife switch suitable for the purpose can be constructed in the following manner. It consists of a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flat Plate to which are connected two Angle Brackets insulated from the Plate by Insulating Washers. The knife of the switch is formed by a $2\frac{1}{2}"$ Strip that is pivoted to one of the Angle Brackets. This Strip should be so arranged that on pressing it down toward the Flat Plate rubbing contact will be made with the other Angle Bracket. A Threaded Pin may be secured to the end of the $2\frac{1}{2}"$ Strip to form a convenient operating handle.

The connections for the electro magnet circuit are as follows. A terminal of the magnet should be connected by a wire direct to a terminal of the Transformer, and the other terminal of the magnet should be joined by wire to one of the Angle Brackets of the switch. The remaining Angle Bracket of the switch is connected to the other terminal of the Transformer. It is important to note that separate switches will be required for controlling the Motor and the magnet, but one Transformer will supply all the necessary current.

As an "all-electric" crane the model will be found exceptionally interesting and well worth constructing. The electro magnet may be fitted to almost any Meccano crane, of course, and much fun and interest can be gained by using it in place of the hoisting hook. The load is dropped whenever required by switching off the current.

Many powerful cranes fitted for electro magnetic hoisting are to be found in various iron and steel works throughout the country, where they prove very useful in conveying castings, etc. Their use saves the time that would be required fixing hoisting hooks.

Parts required (continued)

1	of No.	27a	1	of No.	57
3	„	30	14	„	59
2	„	31	1	„	62
2	„	35	1	„	63
83	„	37	1	„	63a
18	„	38	1	„	80
1	„	45	2	„	100
1	„	46	1	„	111
2	„	52	2	„	115
4	„	53			