are fixed in the outer holes of the Face Plate. The Bolts 10 are positioned centrally in two of the slotted holes and the three Bolts 11 are arranged in the inner holes of the Face Plate.

The cam is connected to the Rod 4 by a lever 12, made from a 2" Slotted Strip bolted to a Crank that pivots on a 1½" Rod held in a Double Arm Crank. The lever is connected to the Rod 4 by a Collar spaced from the Collar 6 by three Washers. A Bolt 13 is passed through the Crank and the Slotted Strip and is fitted with a nut and then screwed into the Collar. The nut is tightened against the Collar, but the Bolt 13 must not grip the Rod 4.

The mechanism is set so that when the lever 12 bears against one of the Bolts 10 the ¾" Pinions 5 are equally spaced inside the Contrate just clear of its teeth. This gives the neutral position of the mechanism. As the cam turns the Bolts 9 move the lever 12 and the Rod 4 to the right, Fig. 3, and bring one of the Pinions into mesh with the Contrate. As the movement of the cam continues the Compression Spring returns the Rod 4 to the left until when the lever 12 bears against the Bolts 11 the other Pinion engages the Contrate to reverse the direction of the drive.

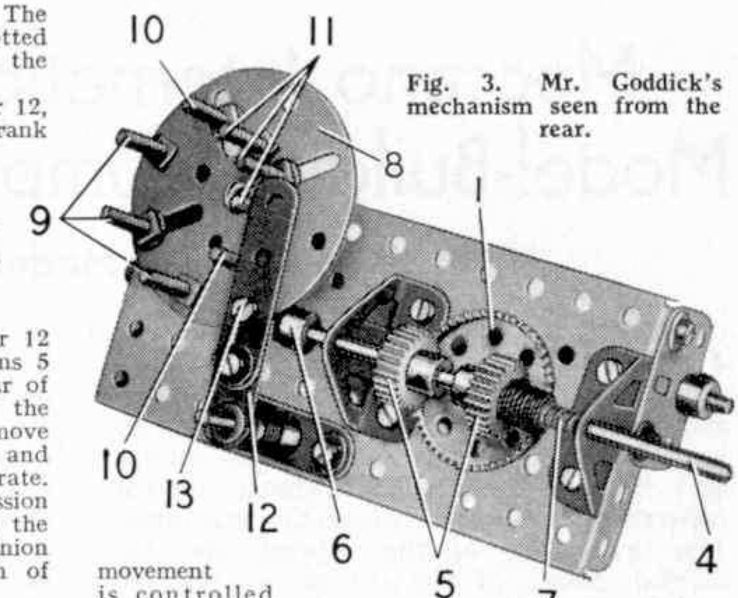

Fig. 3. Mr. Goddick's mechanism seen from the rear.

A DIFFERENTIAL CRANE WINDING DRUM

It is not always convenient to provide a forward and reverse drive to each winding drum of a model crane, to enable both the hoisting and lowering movements to be power-operated. The usual system is to disengage the drive from the Motor, while the load is lowered under the control of a brake. Mr. N. Gottlob, Hjortekaer, Denmark, has designed an interesting variation of this arrangement, incorporating a simple differential fitted inside the winding drum. It is shown in diagrammatic form in Fig. 4. One of the differential half-shafts is connected to the Motor, and the other is fitted with a strap brake. When the Motor is set working, with the brake applied, the drum is driven at half the speed of its driving shaft. This built-in reduction ratio results in a saving in the number of gears needed between the Motor and the drum. When the Motor is stopped and the brake is released, the drum turns freely under the weight of the load, and the lowering movement is controlled through the strap brake. The brake shaft turns at twice the speed of the drum.

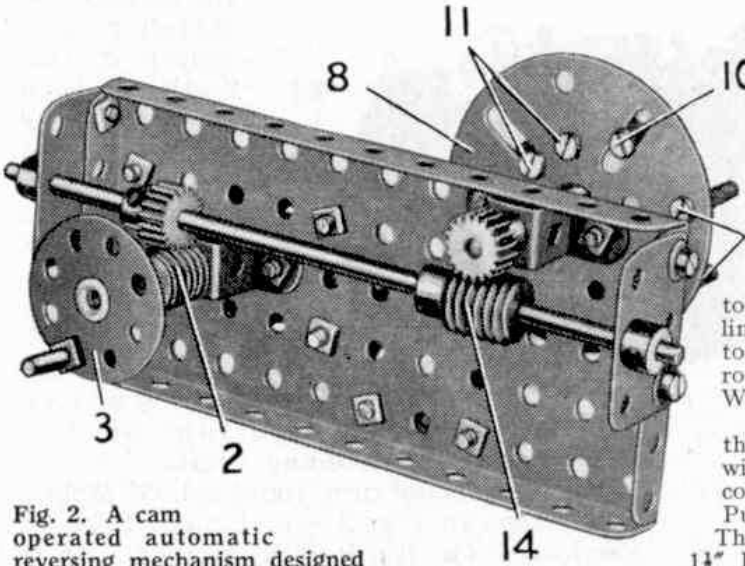

Fig. 2. A cam operated automatic reversing mechanism designed by Mr. G. Goddick, Vadbaek, Denmark.

The drum is a Cylinder 10 fitted at its centre with a Rod 2. The Rod is held in place by two Collars 8, and a ½" Pinion 5 is freely mounted on the Rod but is spaced from the Cylinder by two Washers. The half-shafts are 2½" Rods, each fitted with a ¾" Contrate 6 and a Collar. A 1⅛" Flanged Wheel 3 is pressed into each end of the Cylinder, and the positions of the Collars on the half-shafts are adjusted so that the Contrates 6 engage the Pinion 5.

The bosses of the Flanged Wheels 3 are free to turn in Socket Couplings 9, which are fixed to Bush Wheels 4 bolted to the mechanism framework. The parts must be lined up very carefully so that the drum is free to turn in the Socket Couplings, and the half-shafts rotate freely in the Bush Wheels and the Flanged Wheels.

One of the half-shafts is connected to the Motor through suitable gearing and the other is fitted with a Pulley to form the brake drum. The brake consists simply of a belt of Cord passed round the Pulley and connected to a lever.

The Pinion 5 and the Collars 8 are mounted on a 1½" Rod, and Mr. Gottlob suggests that it may be preferable to shorten the Rod slightly so that its ends flush with the walls of the Cylinder. This will ensure that the Cord winds evenly on the drum, but it is not really essential, as the Rod 2 does not rotate, and if the Cord winds over the end of the Rod it will not affect the working of the mechanism.

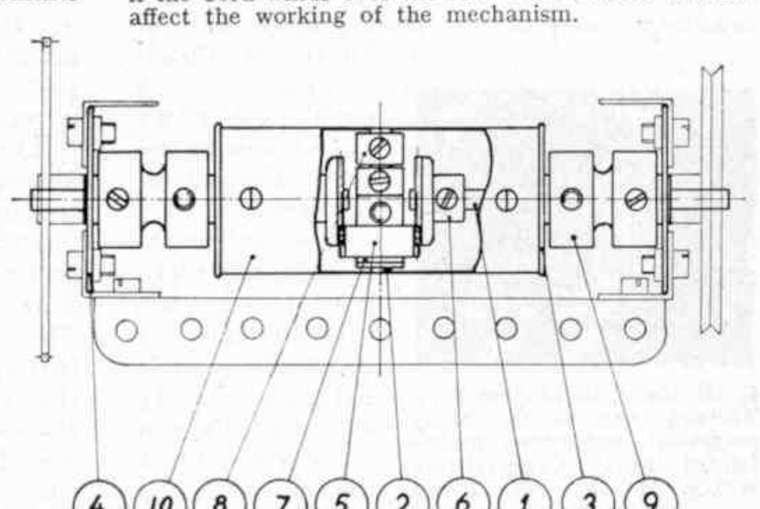

Fig. 4. A novel differential winding drum for cranes. It was designed by Mr. N. Gottlob, Hjortekaer, Denmark.