

# A Useful Reversing Mechanism

## Designed for Continuous Operation

By "Spanner"

I EXPECT most Meccano enthusiasts are familiar with the colourful display models that are centres of attraction at the premises of many Meccano Dealers. One of the most popular of these is a replica of Blackpool Tower, which is shown in Fig. 2 on this page.

The construction of the Tower itself presents no great difficulty. The main feature of the model is the automatic mechanism that operates the two lifts, which rise and descend alternately, although they are driven by a Motor that runs continually in *one* direction. It is the automatic reversing movement that intrigues most of the model-builders who write to me.

I must first make clear one point, in regard to the motor. Display models have to work continuously day after day for long periods and to meet the heavy strain involved they are fitted with high-voltage motors. The automatic mechanism used is just as suitable for use with an E20R Motor, however, which is the type most model-builders will have available. This should be fitted with three stage reduction gearing, however, as shown in Fig. 1. The bearings for the shafts are provided by bolting  $1\frac{1}{2}$ " Corner Brackets 1

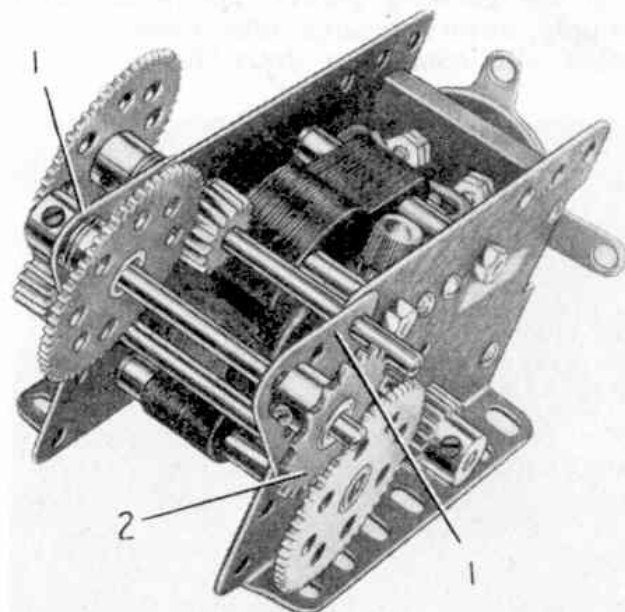


Fig. 1. This view of the power unit of the Tower shows how the speed reduction gearing is fitted to the E20R Electric Motor.

to the side-plates of the Motor. The gearing gives a total reduction ratio of 27:1, and the final shaft in the gear train is fitted with a 1" Sprocket 2.

The automatic reversing mechanism that controls the movement of the lifts is shown removed from the model in Fig. 4. The housing consists of two  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plates, connected at their ends by two  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plates. Bolted to one end of the housing are four face-to-face 3" Strips, three clear holes of which project above the Flat Plate. To these Strips is fixed a Crank 3.

The input shaft is a 4" Rod fitted with a 2" Sprocket 4, a  $\frac{1}{2}$ " Pinion 5, a Worm 6 and a 1" Gear 7. An intermediate shaft 8, which is free to slide endways in its bearings, is a  $4\frac{1}{2}$ " Rod. It carries a  $\frac{1}{2}$ " Pinion 9, a Collar and a 1" Gear 10. A  $\frac{1}{2}$ " Pinion 11 is free to rotate on a  $1\frac{1}{8}$ " Bolt attached to one side of the housing

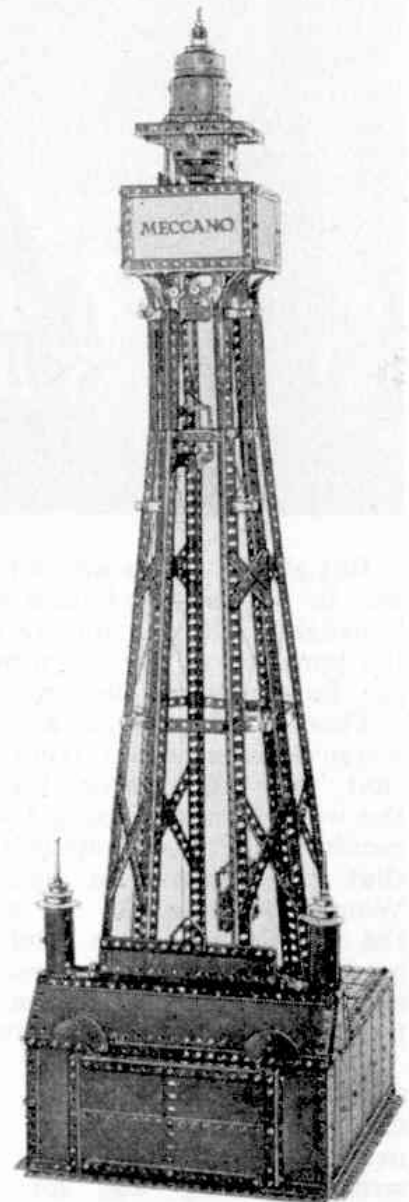


Fig. 2. The lifts in this effective model of Blackpool Tower are operated by the automatic reversing mechanism that forms the subject of this article.

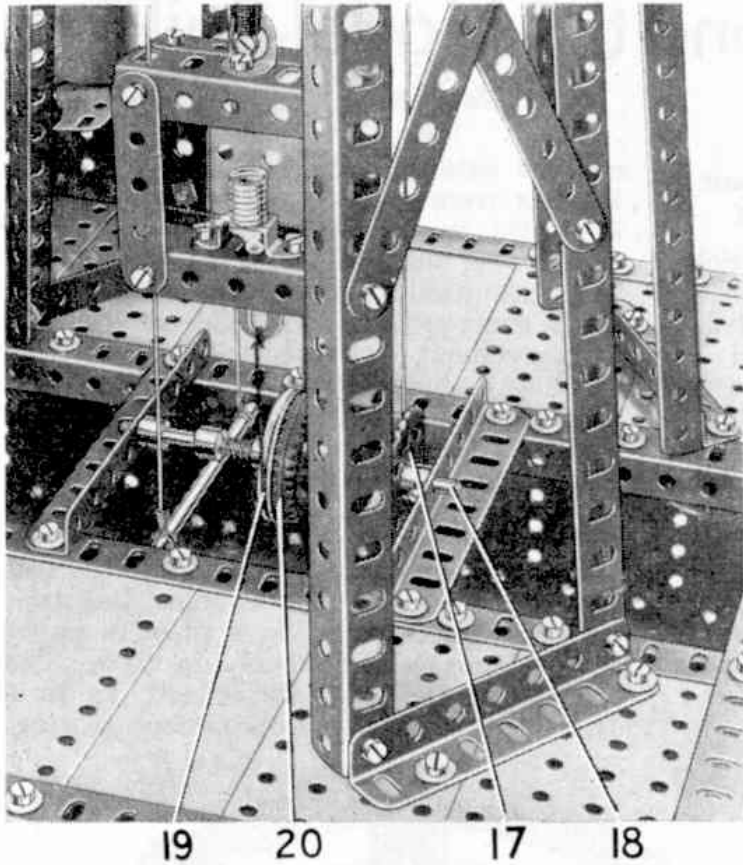


Fig. 3. A close-up of the friction drive arrangement fitted to the lift driving shaft.

movement of Rod 8 is controlled quite simply by a lever 14. This is a 3 1/2" Strip that pivots between two Collars on a 2" Rod, which is fixed in the Crank 3. A 3/8" Bolt 15 held in the Strip by two nuts is arranged so that its head is located between the 1" Gear and the Collar on Rod 8. The side-to-side movement of lever 14 is operated by a 57-tooth Gear that is in constant mesh with the Worm 6. The Gear is fixed on a 1 1/2" Rod mounted in the end of the housing and in a Double Bent Strip bolted to it, immediately below the 3" Strips that support the Crank 3. A Slide Piece 16 is passed over the end of Strip 14 and is fixed on a 3/8" Bolt located in one of the holes in the 57-tooth Gear.

When the Motor unit and the reversing mechanism are completed they are bolted to Angle Girders fixed across the base of the tower. The Sprockets 2 and 4 are connected

by nuts, and the Pinions 5 and 11 are in constant mesh. The drive between the sliding shaft 8 and the output shaft 12 is transmitted by a 1/2" diameter, 3/4" face Pinion and a 57-tooth Gear, arranged as shown in Fig. 4. A 1" Sprocket 13 is fixed on the output shaft.

by Chain, and another length of Chain transmits the drive from Sprocket 13 to a 2" Sprocket 17 (Fig. 3). Sprocket 17 is fixed on a Rod 18 supported in the base of the tower, and this Rod is the driving shaft for the (Continued on page 284)

It will be seen that when Rod 8 is moved to the left (Fig. 4), the Gears 7 and 10 are brought into mesh and complete the drive to the output shaft. When Rod 8 is moved to the right Gears 7 and 10 disengage, and Pinion 9 is meshed with the Pinion 11. This also completes the drive to the output shaft, but in the opposite direction to that when the 1" Gears are in mesh. Thus by sliding Rod 8 alternately from side to side the direction of the drive is reversed with each movement of the Rod.

The side-to-side

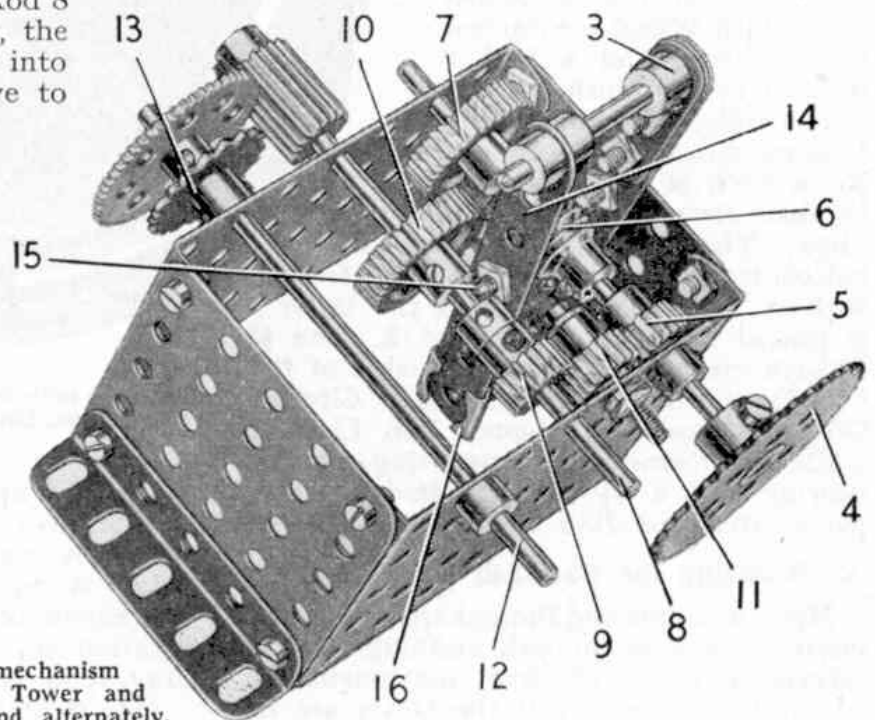


Fig. 4. This automatic reversing mechanism is concealed in the base of the Tower and causes the lifts to rise and descend alternately.

**Blondins of Industry**—(Continued from page 229)

also can be given by means of telephones connecting the operator with a signaller on the site.

Two Henderson aerial cableways were used during the construction of the Loch Sloy dam, in the north of Scotland, which is 1,200 ft. long and provides a reservoir storing 1,200 million cu. ft. of water. Thousands of tons of concrete were transported into position during the building of the dam by means of the cableways. These had a span of 1,350 ft., and the tail carriage of each machine could be travelled over a distance of 150 ft., by electric power. The two fixed headmasts were 125 ft. high, and the tail carriage 36 ft. The maximum load on the hook of each cableway was 10 tons, this including the weight of the skip and the slings, together with the contents. The skip contained four cubic yards of concrete, which could be placed at any point over an area of 8,700 square feet.

Other great engineering schemes on which these cableways have been employed include the building of the Otto Beit bridge in South Africa, the Conisborough Viaduct near Doncaster and the reconstruction of the Menai Bridge. Besides the building of innumerable dams in all parts of the world, cableways have been used in causeway construction, notably at Scapa Flow, the famous Fleet anchorage in the Orkneys.

**Road and Track**—(Continued from page 247)

the four-speed gearbox is developed from the three-speed Vanguard box, while the rear axle and front suspension are Triumph Mayflower units. With a maximum speed of 107 m.p.h., nearly 80 m.p.h. in third gear, a petrol consumption figure of 34 m.p.g., when driven hard, and a 0-60 acceleration figure of 12 sec., the TR2 is remarkable value at £900 including Purchase Tax. A special high speed version of the car attained a mean speed of 124 over the measured mile at Jabbeke in Belgium during the development period. Having seen Edgar Wadworth's privately owned TR2 average 74.71 for 1,793 miles at Le Mans last year, I expect great things from the Coventry pair this year.

There are two other major races in June, both World Championship events. Round 4, the Belgian Grand Prix, is on 5th June; Round 5, the Dutch Grand Prix, is on 19th June.

**On the W.R. "Inter-City"**—(Continued from page 250)

80 m.p.h. again approaching Denham Golf Club halt. Then came a gentle easing of the regulator and after the troughs at Ruislip the engine was opened up again to bring us rapidly to yet another flying junction.

This was Northolt, where the joint line that we had followed from Ashendon Junction comes to an end, the Marylebone line cutting across to Neasden and the Paddington line heading for its junction with the main Western line at Old Oak Common. So we came through Greenford and with brakes slightly on at Park Royal Signal Box we were already slowing when the A.T.C. warning siren once more gave its message. There is a restriction between Old Oak Lane and Old Oak Common West Junction, but green lights ushered us on to the real main line again and we cruised in past Westbourne Park, and on to Paddington.

There No. 11 platform was our berth and the brakes eased us before we whistled twice, and then applied the brakes again after the regulator had been opened and shut once more to bring us alongside the platform. Engineman Roden had more than kept his promise; the time was just 7.1 p.m.—we were four minutes early!

**Stamp Collectors' Corner**—(Continued from page 281)

"First Day" covers were prepared by the Australian Post Office, and these were postmarked at Macquarie Island, Heard Island and Mawson. The three covers are quite inexpensive, and they will set off a collection. The 3½d. stamp itself, with its map of the Antarctic and its frame of marine creatures, is very interesting. So if you cannot get the covers, a stamp will be available for a copper or two.

**A Useful Reversing Mechanism**—

(Continued from page 267)

lifts. A 1½" Pulley 19 is placed on Rod 18 and round it is passed a length of Cord, with each end tied to the base of one of the lifts. A second Cord is fastened at each end to a Spring bolted to the top of each lift, and is passed round a Pulley at the top of the tower.

It is preferable to allow a slight over-run so that the lifts reach the limits of their travel slightly before the reversing mechanism changes the direction of the drive. This is accomplished by a simple friction drive, which 'slips' when the lifts reach stops that prevent further movement. Instead of the Pulley 19 being fixed on Rod 18, it is mounted freely, and is pressed by a Compression Spring against a Motor Tyre 20 on a 1" Pulley fixed on the Rod.

The following is a list of the parts required to build the Motor unit and the automatic reversing mechanism: 1 of No. 3; 4 of No. 4; 2 of No. 9d; 2 of No. 15a; 1 of No. 15b; 3 of No. 16a; 1 of No. 17; 1 of No. 18a; 6 of No. 26; 1 of No. 26b; 5 of No. 27a; 2 of No. 31; 1 of No. 32; 21 of No. 37a; 12 of No. 37b; 10 of No. 38; 1 of No. 50; 2 of No. 53; 7 of No. 59; 1 of No. 62; 2 of No. 72; 1 of No. 94; 1 of No. 95; 2 of No. 96; 5 of No. 111c; 2 of No. 133; 1 E20R Electric Motor.

**Among the Model-Builders**—(Continued from page 269)

of 1" Triangular Plates 16 using Washers for spacing purposes. Now place the rocking member horizontally on a table with the Wheel Flange uppermost, and insert into the Wheel Flange a 1½" Pulley 8, with 22 steel balls ¼" dia. between the groove of the Pulley and the inner face of the Wheel Flange.

The assembly consisting of the rocking arm and the ball bearing is slipped on to the Rod 6 and held in place by a Collar; the Pulley 8 is clamped to the Rod. The rocking arm is guided at its upper end by two 2½" Strips bent as shown in the inset illustration in Fig. 3. Pivot Bolts connect these Strips to the rocking arm and the frame; the one at the top of the rocking arm has its threaded end outward.

The walking shoe is constructed from 9½" Angle Girders 24 and Strips 22, held together by 2" Angle Girders 27. The sides are 5½" Flat Girders 29, and the bottom is shaped from four 2½" Angle Girders 26 and two 4½" Angle Girders 25. The shoe pivot is a 1" Rod 7 held in Collars fixed to the Strips 22. A 2" Strip 23 strengthens the assembly.

**A Meccano Fork Lift Truck**—

(Continued from page 271)

Plate a Semi-Circular Plate 24 is fixed to Angle Brackets bolted to the sides and the back of the body. A 2½" Stepped Curved Strip and a 2½" Strip are bolted together and are supported by Angle Brackets fixed to each Semi-Circular Plate. A 1" Corner Bracket 25 on each side also is supported by an Angle Bracket.

Attach the body to the chassis by bolting the Flanged Plate 22 to the top ends of two slightly curved 1" Triangular Plates 26. At the rear two ½" Bolts 27 are fixed by nuts in the body, and each Bolt is held by two nuts in a Fishplate 28 bolted to the chassis.

A 3½" x 2½" Flanged Plate can be used as a pallet for the model as shown in Fig. 1.

Parts required to build the Fork Lift Truck: 2 of No. 1a; 1 of No. 2; 5 of No. 3; 6 of No. 4; 6 of No. 5; 5 of No. 6; 5 of No. 6a; 2 of No. 8b; 1 of No. 9c; 2 of No. 9d; 6 of No. 10; 4 of No. 11; 15 of No. 12; 4 of No. 12a; 2 of No. 12b; 1 of No. 15b; 4 of No. 16; 2 of No. 16a; 2 of No. 17; 2 of No. 20b; 2 of No. 21; 3 of No. 22; 1 of No. 24; 1 of No. 25; 2 of No. 26; 2 of No. 27a; 1 of No. 28; 9 of No. 35; 177 of No. 37a; 160 of No. 37b; 40 of No. 38; 2 of No. 38d; 1 of No. 40; 1 of No. 48b; 2 of No. 50; 1 of No. 103d; 2 of No. 111a; 4 of No. 111c; 1 of No. 124; 2 of No. 125; 1 of No. 126; 2 of No. 126a; 4 of No. 133a; 2 of No. 142d; 2 of No. 155; 1 of No. 160; 1 of No. 185; 1 of No. 186a; 3 of No. 188; 1 of No. 189; 3 of No. 191; 2 of No. 214; 4 of No. 215; 1 No. 1 Clockwork Motor.