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## Two Speed and Reverse Gear Box

IN order to provide variable speeds for working Meccano Models, below are given details of a gearbox which, besides giving one reverse and two forward speeds, also incorporates a simple clutch. However, a glance at the photograph will show that no gear-change or clutch lever is fitted. I have purposely omitted these as I should like builders to design these features themselves. I will be glad to receive details of suitable arrangements from readers, and will try to include one or two of them in a future issue. No prizes are offered as this is an exercise rather than a competition. The framework is built up from two 3½ in. by ½ in. Double Angle Strips 1, connected at one end by an eight-hole Wheel Disc 2 and, at the other end, by a 1½ in. Flat Girder 3, overlaid by a 1½ in. Strip 4. The Flat Girder is spaced from the lugs of the Double Angle Strips by three Washers on one of the Bolts and by three Washers and a Fishplate 5 on the other Bolt. Through the centre holes of the Double Angle Strips a 1½ in. by ½ in. Double Angle Strip 6 is secured, being spaced by a Washer on each Bolt. Another 1½ in. Flat Girder is bolted to this Double Angle Strip.

A 2 in. Rod carrying a ¾ in. Pinion 7, a ½ in. Pinion 8, a Compression Spring 9 and a 1½ in. Flanged Wheel 10 is passed through the centre hole of Double Angle Strip 6.

The Rod extends only approximately half-way into the boss of Pinion 7, and the Flanged Wheel is free, being held in place by a Collar hidden inside the Flanged Wheel. In this case also the Rod fits only half-way into the Collar. Bolts in the transversed tapped bores of the Collar engage with Bolts secured through the Flanged Wheel. Another 2½ in. Rod 11, carrying a 1 in. Pulley and a 1 in. Pulley with Rubber Ring 12, fits into the other side of the Collar.

### Movable Lay-shaft

The 2 in. Rod 13 that serves as the output shaft fits into the other side of Pinion 7. Mounted on this Rod are a further two ¾ in. Pinions 14 and 15. Care should be taken to see that Pinion 14 is almost touching Pinion 7, and that the two sets of teeth are in line. Pinion 15 is in constant mesh with Pinion 14 give first gear, and second gear is mounted in Fishplate 5.

A 3 in. Rod 17, carrying a Collar, a ½ in. Pinion 18 and a ¾ in. Pinion 19, forms the movable lay-shaft. Neutral is obtained when Pinion 18 is out of mesh with all other gears. When Pinion 18 is in mesh with Pinion 16, reverse is engaged. Pinion 19 in mesh with Pinion 8 and Pinion 18 in mesh with Pinion 14 give first gear, and second gear is obtained when Pinion 18 is in mesh with both Pinions 7 and 14, provided that Pinion 19 is out of mesh. Finally, clutch guards are provided by two 1½ in. Flat Girders.

**Parts required:**—1 of No. 6a; 1 of No. 10; 1 or No. 16; 1 of No. 16a; 2 of No. 17; 1 of No. 20; 2 of No. 22; 1 of No. 24a; 4 of No. 25; 3 of No. 26; 15 of No. 37a; 10 of No. 37b; 9 of No. 38; 1 of No. 48; 2 of No. 48b; 1 of No. 59; 4 of No. 103h; 1 of No. 111; 2 of No. 111c; 1 of No. 120b; 1 of No. 155.

