



## AMONG THE MODEL BUILDERS

**A**UTOMATIC gear boxes as fitted to motor cars are highly complex pieces of apparatus, but the basic principles of automatic gear-changing are not particularly complicated. With Meccano, it is quite easy to build a simple automatic gearbox and, in fact, the subject that I am covering this month is such a mechanism which has been designed and built by Messrs. C. and P. L. Woods, of Oadby, Leicestershire. The actual unit illustrated is one which I have built up from details kindly supplied by the designers, slightly modified, and I am pleased to say that they have come up with a very well-produced unit. Controlled by a simple governor, it is not only easy to build, but it is also extremely positive in operation.

A framework is built up from four 7 in. compound strips 1, obtained from 5½ in. Strips extended by 2½ in. Strips, bolted two to each end flange of a 5½ in. by 2½ in. Flanged Plate 2. The two strips at each end are brought together at the top, then the two pairs of strips are connected by a 5½ in. by ½ in. Double Angle Strip 3. A Double Bent Strip 4 is fixed to the centre of this Double Angle Strip, while a Flat Trunnion is bolted to the centre of each side flange of Plate 2. These serve as a firm base for 2½ in. Strips 5, to the top of which 1 in. by 1 in. Angle Brackets are attached. These Angle Brackets are joined by another 2½ in. Strip 6, in the centre of which a third Flat Trunnion 7 is bolted.

Once the framework has been finished, the gearing can be added. A 4 in. Rod 8, carrying a Collar, a ¼ in. Pinion 9, a ½ in. Pinion 10 and several Washers, is journalled in Flanged Plate 2 and Strip 3. The number of Washers determines the proportionate length of time the gearbox remains in first gear. The designers used five, but if a smaller number is used, first gear will remain engaged longer.

The actual method of finding the position of the Pinions and Collar is as follows:

Place the framework on a flat surface and arrange the Rod so that its end does not quite touch the surface. Holding the Rod in this position, move Pinion 10 against the Washers with its boss uppermost and fix in place. Pinion 9, also with its boss uppermost, is fixed against Pinion 10. Now raise the Rod as far as possible without its lower end leaving the hole in the Flanged Plate, and tighten the Collar against the underside of 2½ in. Strip 6. This should give the Rod maximum movement without allowing it to leave its bearings.

Journalled in the apex hole of Flat Trunnion 7 and Flanged Plate 2 is a 3 in. Rod 11, carrying a 50-teeth Gear 12, a 57-teeth Gear 13 and a Collar, the latter beneath the Plate. Gear 13 is in contact with the Plate, while Gear 12 should be positioned so that it meshes with Pinion 9 a fraction after Pinion 10 disengages with Gear 13 when Rod 8 is raised.

All that now remains to be built is the governor. Two Angle Brackets are bolted through diametrically opposite holes of an eight-hole Bush Wheel 14, then a 2 in. Strip is lock-nutted to the free lug of each of these Angle Brackets. A Pivot Bolt, carrying a 1 in. Pulley without boss, is now passed through the third hole in each of these Strips. A 1½ in. Strip 15 is added, followed by a second 1 in. Pulley without boss 16, after which the lock-nuts are fixed in place. The 1½ in. Strips 15 are lock-nutted to further Angle Brackets bolted through diametrically opposite holes of a second eight-hole Bush Wheel 17. This Bush Wheel is mounted on the upper end of Rod 8, while Bush Wheel 14 is mounted on the lower end of a 3 in. Rod 18, journalled in Double Angle Strip 3 and Double Bent Strip 4, and held in position by Collars. Rod 18 serves as the input shaft, with Rod 11 acting

as the output shaft. Suitable Pulleys or Pinions must, of course, be mounted on these Rods to take the drives.

I should mention that the designers of the gearbox fitted a tensioning spring between the two 2 in. Strips in the governor. This is not essential, but is certainly advisable as it increases the speed (r.p.m.) required to raise Rod 8, thus ensuring that first gear remains in operation for a reasonable length of time. The tensioning spring was provided by a Meccano Tension Spring with 12 of the coils removed, but an elastic band should do just as well. The speed necessary to raise Rod 8 can be varied by altering the tensioning spring.

Messrs. Woods stress that an electric motor with variable speed should always be used to drive the gearbox. They used a Meccano Power Drive Unit operated from a model railway mains controller, with the Power Drive Unit in the 16:1 ratio. In this way, they were able to boost the power just as first gear was about to disengage, thereby causing the gearbox to change into second gear with a positive action. Incidentally, the box can be fitted with a third gear by mounting two 1 in. Gears, one above Pinion 9 and the other above Gear Wheel 12 on the respective Rods. The following parts list, however, applies only to the unit as it appears here.

### Parts required

4 of No. 2	4 of No. 22a	5 of No. 38
7 of No. 5	2 of No. 24	1 of No. 45
2 of No. 6	1 of No. 25	1 of No. 48d
2 of No. 6a	1 of No. 26	1 of No. 52
4 of No. 12	1 of No. 27	3 of No. 59
2 of No. 12a	1 of No. 27a	3 of No. 126a
1 of No. 15b	40 of No. 37a	2 of No. 147b
2 of No. 16b	36 of No. 37b	