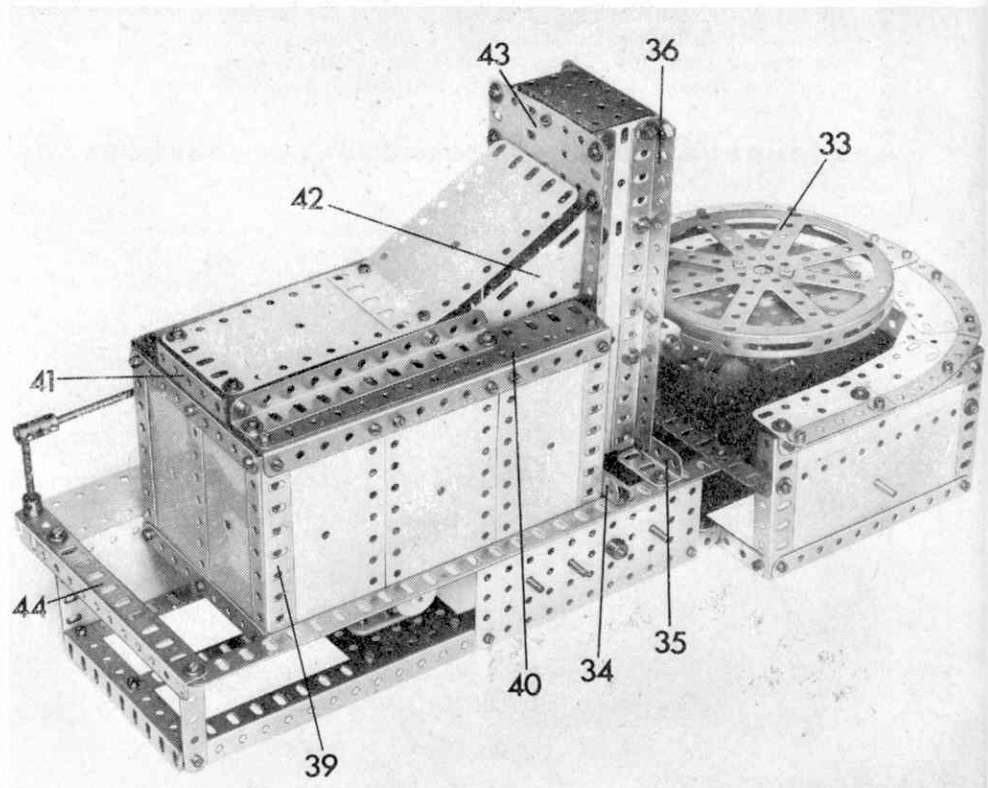
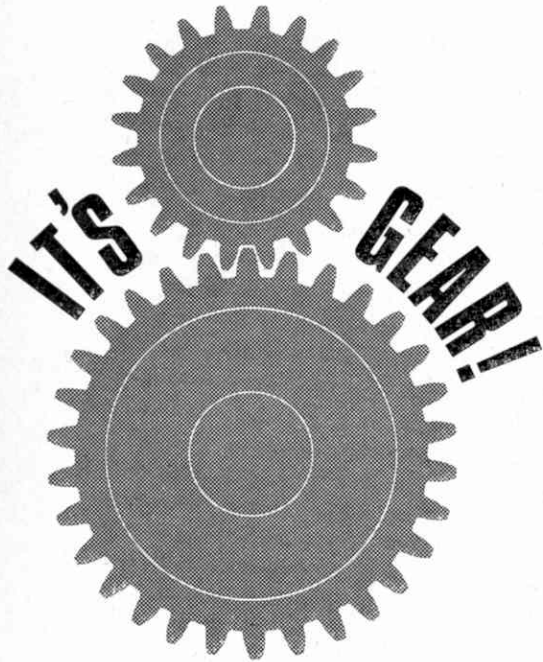
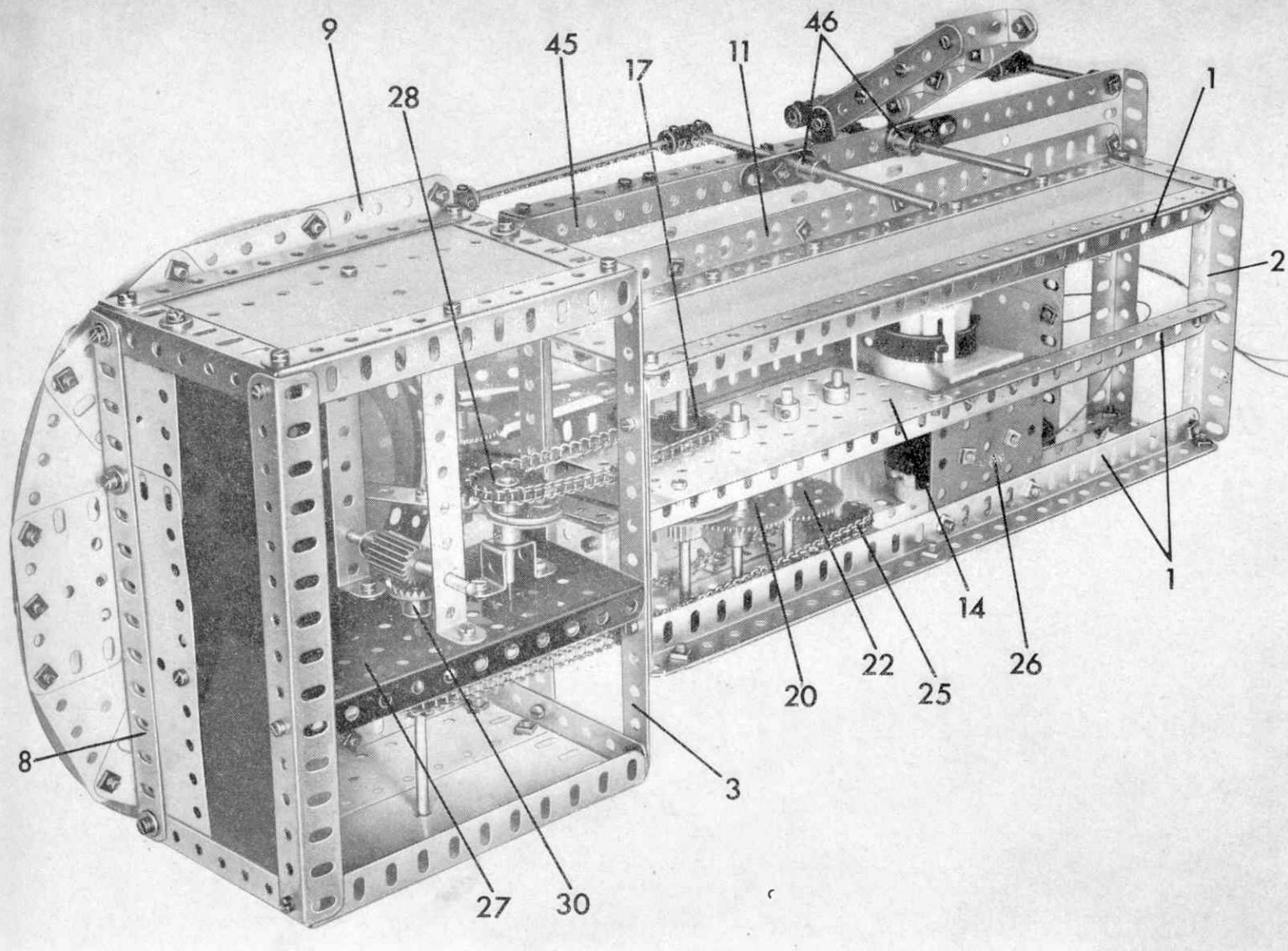


Spanner builds a Meccano Gear-cutting machine





AS I have often said, working models of almost every piece of real-life mechanical apparatus can be produced in Meccano. Indeed, we have featured thousands of examples, ourselves, in the 'M.M.', but one which I do not ever remember seeing before is this month's advanced construction—a Gear-Cutting Machine.

Gears, of course, are produced in hundreds of different sizes, and not all of them, by any means, are cut on the same machine. The prototype on which our model is based, in fact, turns out the 'monster' parts often used in huge plant machinery and hydro-electric generating stations, etc.

The basic actions of the machine are reproduced in our model. The gear to be cut is fixed on the circular work table which then moves up and down while the cutting tool shapes one tooth. When completed, the work table automatically revolves a short distance and again moves up and down until the second tooth is cut, and so on.

When constructing the model, it is best to first build the main framework before completing the less-important 'super-structure'. Three 12½ in. Angle Girders 1 are connected at each end by a 4½ in. Angle Girder 2, one of which is extended

by a 7½ in. Strip 3. Bolted to the ends of Strip 3 is a 3½ in. Angle Girder 4, to which a 5½ in. Angle Girder 5 is fixed. Girders 5 are then joined by a 7½ in. Angle Girder 6, at the same time bolting another two 3½ in. Angle Girders 7 in place. At their upper ends Girders 4 and 7 are joined on three sides by one 7½ in. Angle Girder 8 and two 5½ in. Angle Girders 9, while lower down on the fourth side, Girders 4 are joined by another 7½ in. Angle Girder 10.

Fixed to Angle Girder 10 are two 12½ in. Angle Girders 11, connected by a 5½ in. Angle Girder 12 and joined to Angle Girders 1 on one side by 2½ in. Strips and on the other side by a 5½ in. by 2½ in. Flat Plate 13 and a 2½ in. Strip. Another 5½ in. by 2½ in. Flat Plate 14 is bolted to the centre Angle Girder 1.

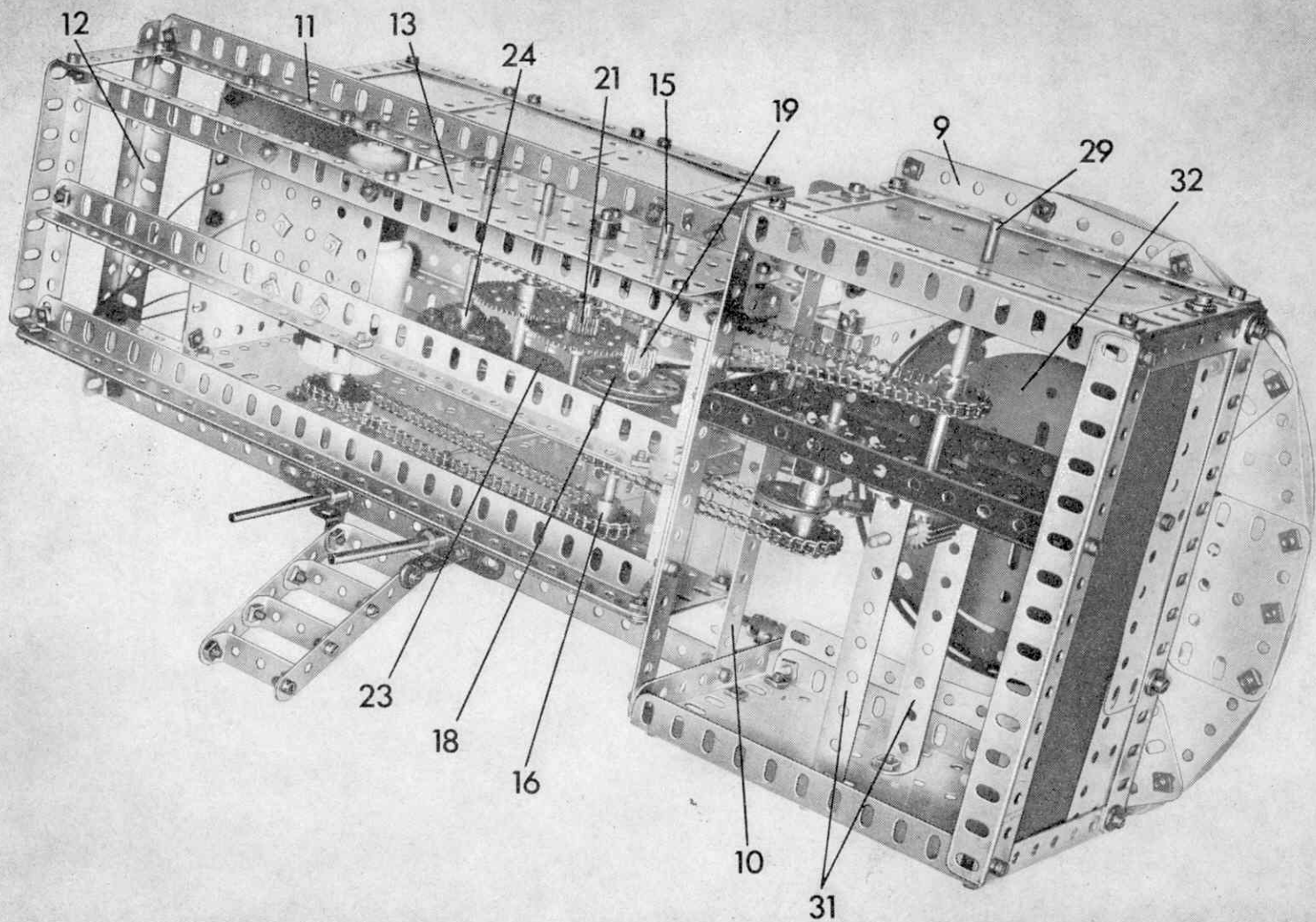
Journalled in Flat Plates 13 and 14 is a 5 in. Rod 15, carrying two 1 in. Sprocket Wheels 16 and 17, a 1½ in. Pulley 18 and a ⅞ in. Pinion 19. Pinion 19 is in mesh with a 60-teeth Gear Wheel 20 on a 3½ in. Rod held in the Flat Plates by Collars. Also mounted on this Rod is a second ⅞ in. Pinion 21 in mesh with a second 60-teeth Gear Wheel 22 on another 3½ in. Rod, which also carries an eight-hole Bush Wheel 23, that has a Nut and Bolt fixed in one of

the holes. A second eight-hole Bush Wheel 24 on a 3½ in. Rod has a Nut and Bolt fixed in all eight holes, and this is positioned on the Rod so that, with each revolution of Bush Wheel 23, the single Bolt catches each of the eight Bolts in turn, thus causing Bush Wheel 24 to revolve intermittently. A 1 in. Sprocket Wheel 25 is also mounted on the last Rod.

A 2½ in. by 2½ in. Flat Plate 26 is bolted between two Angle Girders 1, at the same time fixing a Power Drive Unit in position. A 1 in. Sprocket Wheel on the output shaft of this Unit is connected to Sprocket Wheel 16 by Chain.

Bolted to Angle Girders 6 and 10 and to Strip 3 is a 5½ in. by 2½ in. Flanged Plate 27, to which a Double Bent Strip is secured. A 2 in. Rod, journalled in this Double Bent Strip and the Plate, carries a 1 in. Sprocket Wheel 28 and a single-throw Eccentric. Sprocket Wheel 28 is connected to Sprocket Wheel 17 by Chain. Also, Sprocket Wheel 25 is connected by Chain to another 1 in. Sprocket Wheel on a 4 in. Rod 29, journalled in Flanged Plate 27 and a 5½ in. by 2½ in. Flexible Plate, bolted to Angle Girders 4 and 7 at one side. The Rod is held in place by a ¼ in. Contrate Wheel 30.

A 5½ in. by 1½ in. Flexible Plate is also



bolted between Girders 4 and 7 at the side in question, while a $5\frac{1}{2}$ in. by $2\frac{1}{2}$ in. and another $5\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate is bolted between Girders 4 and 7 at the opposite side. Secured between these Plates and Flanged Plate 27 are two $4\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strips 31, in which a $4\frac{1}{2}$ in. Rod is mounted. This Rod carries a $\frac{1}{2}$ in. Pinion with a $\frac{1}{2}$ in. face in mesh with Contrate 30, three Collars and an eight-hole Bush Wheel, to which a 4 in. Circular Plate 32 is fixed by two $\frac{1}{2}$ in. Bolts, the shanks of the Bolts pointing upwards. A Collar is then fixed on the shank of each Bolt, after which a Hub Disc 33 is fixed in place by Nuts. This Hub Disc represents the gear to be cut.

A $\frac{3}{8}$ in. Bolt is held in one transverse tapped bore of the Collar immediately below the Circular Plate by a Nut. Loose on the shank of this Bolt is a 3 in. Strip that is bolted to the arm of the above-mentioned Single Throw Eccentric.

Attached between Angle Girders 11 is a $5\frac{1}{2}$ in. Angle Girder 34, and separated from this by a distance of one hole are two $1\frac{1}{2}$ in. Angle Girders 35, bolted one to each Girder 11. Bolted to Angle Girders 35, in turn, are two $7\frac{1}{2}$ in. Angle Girders 36, while another two corresponding Angle Girders are fixed to Girder 34. The intervening space is then enclosed at each side by a $5\frac{1}{2}$ in. by $1\frac{1}{2}$ in. and a $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate, at the same time bolting a $2\frac{1}{2}$ in. Angle Girder 37 in position. A 3 in. Rod, carrying a 50-teeth Gear 38 and a $\frac{1}{2}$ in. fixed Pulley, is held in Girders 37 by

Collars. The Pulley is connected to Pulley 18 by a Driving Band, and Gear 38, incidentally, represents the actual cutting tool.

Four $4\frac{1}{2}$ in. Angle Girders 39 are bolted to Girders 11, being joined at the top by two $7\frac{1}{2}$ in. Angle Girders each overlaid by a $7\frac{1}{2}$ in. Flat Girder 40. Each side is then filled in by three $4\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flexible Plates, and the back by two $4\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flexible Plates, edged at the top and bottom by a $4\frac{1}{2}$ in. Strip. Two $5\frac{1}{2}$ in. Angle Brackets, connected by a $2\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strip 41, are fixed to Flat Girders 40, and the top is then covered by another two $4\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flexible Plates, attached to the Angle Girders by Angle Brackets. The forward Plate is bent upwards, the resulting space at each side being enclosed by a $3\frac{1}{2}$ in. by 2 in. Triangular Flexible Plate 42, bolted to the respective Angle Girder 35.

The space between front Angle Girders 35 is filled in by two $4\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flexible Plates, while rear Girders 35 are joined by a $3\frac{1}{2}$ in. by $1\frac{1}{2}$ in. compound Flexible Plate 43 made up from two $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plates. A $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flanged Plate encloses the top.

At the back of the model, Girder 12 is extended by a $1\frac{1}{2}$ in. Angle Girder 44 which is then connected to Girder 10 by a $12\frac{1}{2}$ in. by $1\frac{1}{2}$ in. compound Flexible Plate, obtained from a $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. and two $5\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plates. This compound plate is edged on its underside by a $12\frac{1}{2}$ in. Strip 45, fixed in place by a Rod Socket at each end.

Two-inch Rods are mounted in the Rod Sockets and these are extended, via Couplings, by $4\frac{1}{2}$ in. Rods. At their other ends, these Rods are connected, again via Couplings, to 5 in. Rods held in Cranks 46 fixed to Strip 45. A ladder is built up from two $3\frac{1}{2}$ in. Strips joined by four $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strips, and it is secured to Strip 45 by Corner Angle Brackets.

A platform is built round the 'gear' from nine $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plates edged by four 4 in. Stepped Curved Strips and two $2\frac{1}{2}$ in. Strips. A 2 in. Strip 47 is added for strength and, finally, the front of the model is completed with a $7\frac{1}{2}$ in. Strip Plate 48, a $5\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate and a $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate.

Parts required

1 of No. 1	1 of No. 21	4 of No. 89b
1 of No. 1b	1 of No. 23a	1 of No. 94
2 of No. 2a	3 of No. 24	5 of No. 96
2 of No. 3	1 of No. 26b	1 of No. 96a
6 of No. 5	2 of No. 26c	2 of No. 103k
1 of No. 6	1 of No. 27	2 of No. 111a
5 of No. 8	2 of No. 27d	1 of No. 111c
9 of No. 8b	1 of No. 29	1 of No. 130a
8 of No. 9	166 of No. 37a	1 of No. 154a
6 of No. 9a	162 of No. 37b	1 of No. 154b
4 of No. 9b	60 of No. 38	2 of No. 179
2 of No. 9d	1 of No. 45	15 of No. 188
3 of No. 9f	1 of No. 48	7 of No. 189
4 of No. 12	1 of No. 48a	12 of No. 191
3 of No. 15	2 of No. 48c	2 of No. 192
3 of No. 15a	1 of No. 51	1 of No. 195
1 of No. 15b	1 of No. 52	1 of No. 197
3 of No. 16	12 of No. 59	2 pf No. 225
1 of No. 16b	4 of No. 63	1 Power Drive
3 of No. 17	2 of No. 70	Electric Motor