

TICK TOCK TIME

Advanced modeller P. D. Briggs of Wollaton, Nottingham describes the construction of a magnificent clockwork-powered Mantel Clock he has designed and built. It keeps accurate time, runs for more than 30 hours on one winding and strikes every 15 minutes. Photographs by B. N. Love.

CLOCKS HAVE always held a particular fascination for me and, thinking back, it seems only natural that I should have combined this interest with my major hobby of Meccano model-building. I have not, of course, devoted all my modelling time to clocks, but over the years I have managed to produce quite a few workable time-pieces which, much to my delight, seemed to interest fellow Meccano hobbyists. I, myself, was particularly pleased with the 30-hour striking Mantel Clock featured in this article as it worked extremely well despite being built with comparatively few parts and with simplicity very much in mind. Although small in dimension, it includes several novel features that closely follow normal clock design, yet it is not difficult to make.

Casing

The front of the casing is built from three $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates 1 bolted to two $9\frac{1}{2}$ in. Angle Girders 2 with two $3 \times 1\frac{1}{2}$ in. Flat Plates 3 being added in the positions shown so as to leave a central winding slot. At the rear, a further two $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates 4 are bolted as shown to two $9\frac{1}{2}$ in. Angle Girders which are then fixed, along with Girders 2, to a base, constructed from $5\frac{1}{2}$ in. and $3\frac{1}{2}$ in. Angle Girders to which Flat Girders are bolted. Care should be taken with the base to ensure that the clock case does not rock on a flat surface. At the top, front Girders 2 are joined by a $4\frac{1}{2}$ in. Angle Girder 5, while $2\frac{1}{2}$ in. Flat Girders 6 are bolted between the side Girders.

A detachable hood is now produced from $5\frac{1}{2}$ in. and $3\frac{1}{2}$ in. Braced Girders bolted to Angle Girders which are themselves bolted to a $5\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. Flat Plate 7. Attached to the centre of this Plate is an ornate handle made from $\frac{1}{2}$ in. Pulleys 8 held on a Rod by Handrail Couplings. These Couplings are mounted on short Rods, each of which is held in the boss of a Double Arm Crank bolted to the underside of Plate 7. A $\frac{1}{2}$ in. Pulley with boss is fixed on each Rod above the Plate, then the completed hood is fixed into position by four $\frac{1}{2}$ in. Bolts secured to the top of the case and onto which four Threaded Bosses 9 are screwed.

Motor and gearing

Power for the clock comes from a Meccano No. 1 Clockwork Motor mounted on 2 in. Screwed Rods held

in the front Plates of the outer casing. Also mounted on the Rods to space the Motor from the Plates are two $\frac{1}{2}$ in. Pulleys with boss, between which a $\frac{1}{2}$ in. Pulley without boss is sandwiched. Note that the inner $\frac{1}{2}$ in. Pulley has been omitted from the top left-hand Screwed Rod to allow clearance for the 60-teeth Gear on the Motor output shaft. The Motor is attached to the rear of the case by four $\frac{3}{4}$ in. Bolts each carrying a $\frac{1}{2}$ in. Pulley with boss to act as a spacer. Use of Pulleys in this way results in a very rigid mounting but lock-nutting would suffice in the absence of sufficient Pulleys.

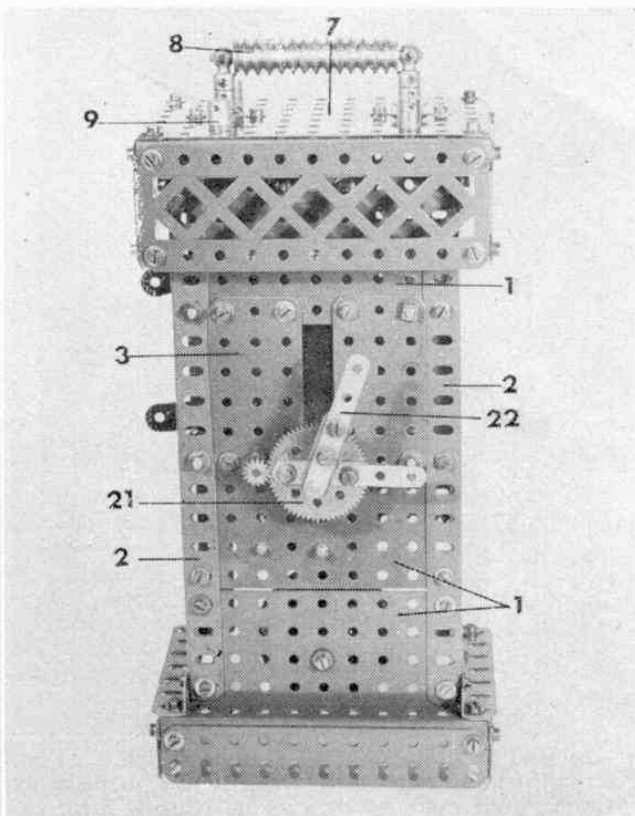
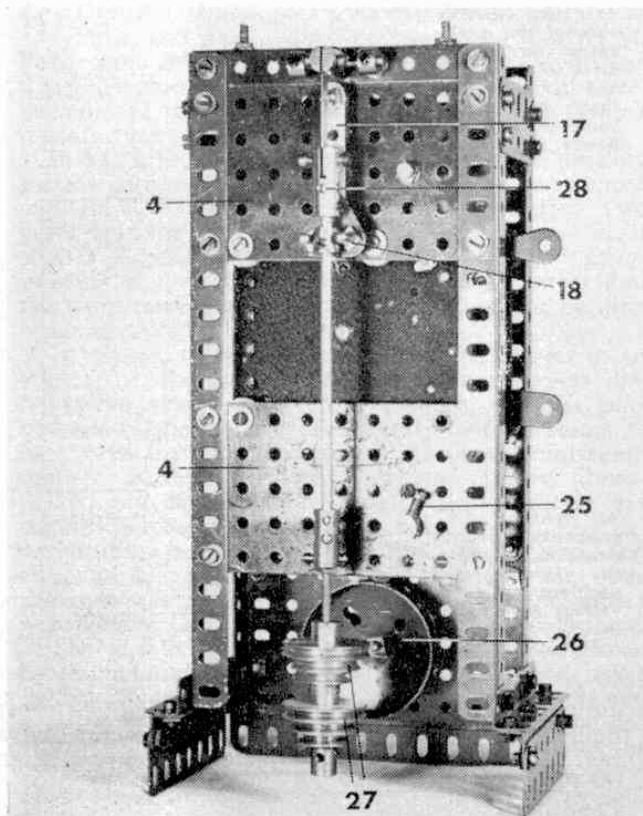
Fixed on the Motor output shaft is a 60-teeth Gear Wheel 11 which meshes with a $\frac{1}{16}$ in. Pinion mounted above it on an Elektrikit 2 in. Pivot Rod. Fixed on this Rod in turn is another 60-teeth Gear which meshes with a second $\frac{1}{16}$ in. Pinion on another 2 in. Elektrikit Pivot Rod 12 serving as the escapement rod. The escape wheel, mounted on this Rod, is a $1\frac{1}{2}$ in. Sprocket Wheel 13. The Pivot Rods, incidentally, are mounted in the special recessed Elektrikit Pivot Bolts and it is the low friction bearings provided by this combination that is largely responsible for the long-running properties of the clock.

An "anchor" escapement is produced from a $1\frac{1}{2}$ in. Corner Bracket 14, to the apex of which a Double Arm Crank is bolted through its elongated hole, the boss of the Crank coinciding with the vertical slotted hole of the Corner Bracket. Two Angle Brackets 15, at right-angles to each other, are bolted to the Corner Bracket to serve as the pallets and great care must be taken in setting these up as shown in the illustration. The finished unit is mounted on a $3\frac{1}{2}$ in. Rod 16 journalled in the upper Flat Plates forming the front and back of the casing. The Rod is held in the boss of the Double Arm Crank and it will be appreciated that critical adjustment of the "anchor" height is made possible by the slotted hole in the centre of the Corner Bracket.

Mounted on the rear end of Rod 16, outside the casing, is a Rod Socket to which the crutch arm is fixed. This consists of a $2\frac{1}{2}$ in. Narrow Strip 17 to the lower end of which a 1 in. Triangular Plate, carrying two Threaded Pins 18 as shown, is bolted. Note that extended bearings are given to Rod 16 by $1\frac{1}{2}$ in. Strips bolted to the Plates in which the Rod is mounted.

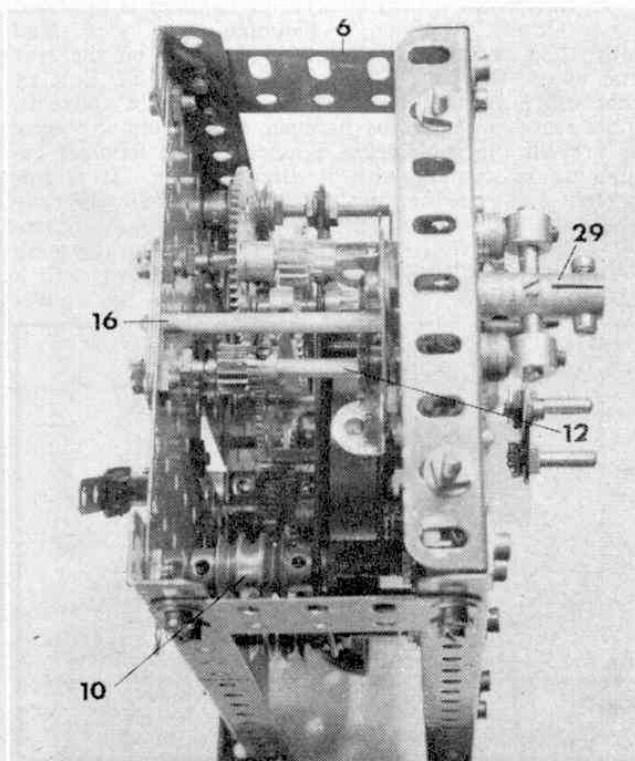
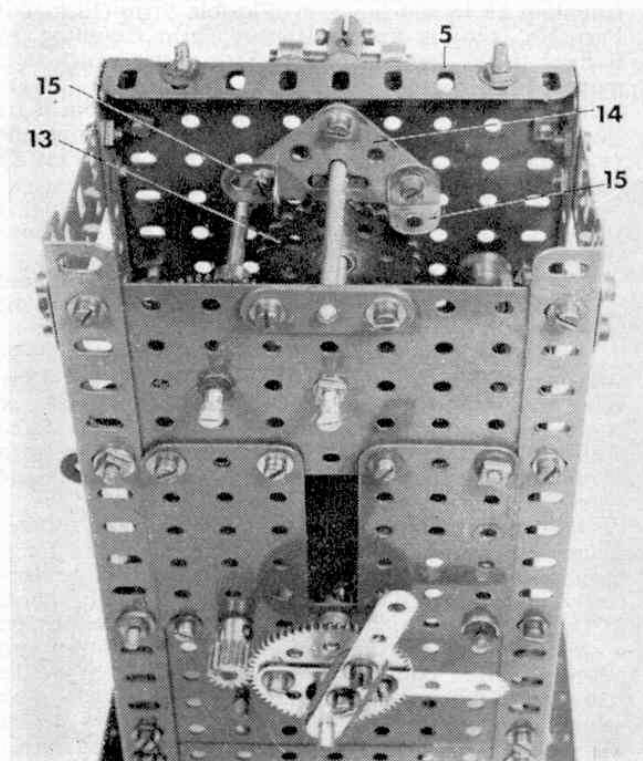
The drive to the hands is taken from the mainspring gear wheel of the Clockwork Motor by means of a 57-teeth Gear 19 which meshes directly with it. This Gear is mounted on a $1\frac{1}{2}$ in. Rod, one end of which is journalled in the rear casing Plate, the other end being journalled in a 2 in. Flat Girder bolted through its elongated holes to the sideplates of the Motor. This permits critical adjustment of Gear 19, to give accurate meshing. The drive continues to a $\frac{1}{2}$ in. Pinion 20 mounted below Gear 19 on a 3 in. Rod that also carries a second, loose, 57-teeth Gear which is held by a Compression Spring against a 1 in. fixed Pulley, fitted with a Motor Tyre, also mounted on the Rod. This forms a slipping clutch for hand setting.

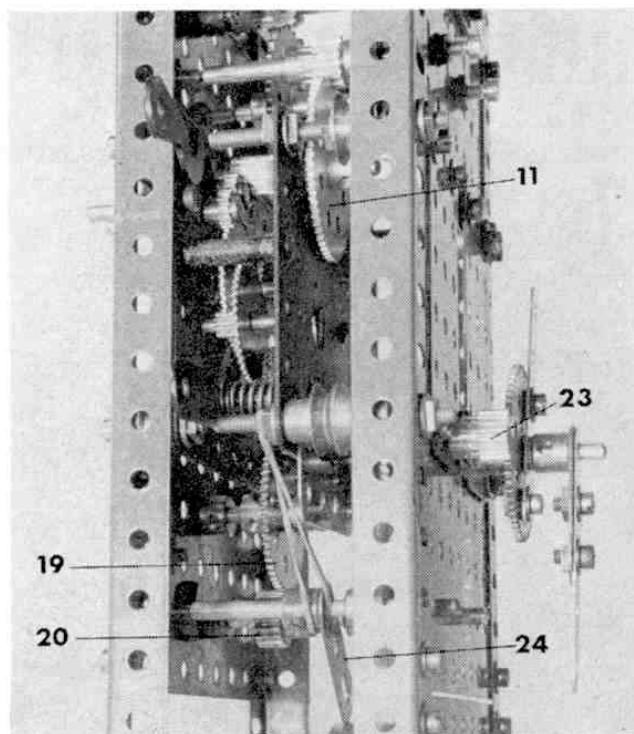
In the mesh with the "loose" gear is a further 57-teeth Gear mounted directly above it, this Gear also acting as the strike wheel, being mounted on the minute hand shaft and carrying in its face four $\frac{1}{2}$ in. Bolts, the Nuts of which trip the striking lever every fifteen minutes. (The corners of the Nuts should be set radially.) The minute hand shaft, itself, is journalled at one end in the Motor sideplates and, at the other end, in the top centre hole of middle Plate 1 where it is held in place by a Collar. Fixed on the Rod just inside the Plate is a $\frac{1}{2}$ in. Pinion, while loose on the outside end



Above left, in this view of the Clock, construction of the pendulum is clearly shown. Below left, a close-up view of the Clock's escapement mechanism. The position of Angle Brackets 18 is critical.

Above right, this superb Mantel Clock is powered by a No. 1 Clockwork Motor. One winding allows it to run for more than 30 hours. Below right, a top view with the upper section removed to show motor mounting.



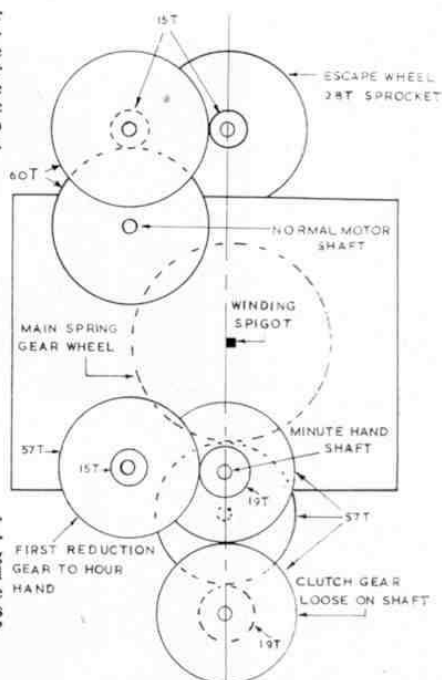


of the Rod is a 60-teeth Gear 21 to which a $2\frac{1}{2}$ in. Narrow Strip is bolted and which is held in place by a Crank, itself extended by a $2\frac{1}{2}$ in. Narrow Strip 22. The $\frac{1}{2}$ in. Pinion inside the Plate meshes with a 57-teeth Gear on another Rod also journalled in the Motor sideplates and Plate 1. A $\frac{1}{16}$ in. Pinion 23 fixed on the outside end of this Rod meshes with Gear 21, to give the correct ratio between the minute and hour hands.

Strike mechanism

In this model the strike lever or hammer is provided by a Crank 24 which is mounted on a 3 in. Rod journalled in the casing plates. Mounted on the rear end of the Rod is a Collar fitted with a $\frac{1}{2}$ in. Bolt 25 that bears against the bolthead in the hole above it. This serves to hold the hammer away from the gong to prevent the gong being damped by the hammer remaining in contact with it after striking. It is important however that it should hold the hammer only a fraction of a millimetre away from the gong otherwise it will prevent the hammer from striking the gong at all. The strike Rod carries a Collar fitted with a Long Threaded Pin which is tripped by the above-

At left, another view of the mechanism showing the drive to the striker and hands. Note that an elastic band is used to power the striker.



At right, a diagrammatical representation showing the layout and positions of the various gear trains in P. D. Briggs' Mantel Clock.

mentioned trip gear on the minute hand shaft. A Boiler End 26 acts as the gong, being mounted on a Bolt held by a Nut in lower Plate 1 and spaced from the Plate by a Collar.

Pendulum

Lastly the pendulum is built up from a 5 in. Rod, extended, via a Threaded Coupling, by a 3 in. Screwed Rod. The weight, or bob, consists of two Cone Pulleys 27 held on the Screwed Rod by a Threaded Boss which also enables them to be adjusted to the correct height. Mounted on the upper end of the 5 in. Rod is a Collar, which locates between Threaded Pins 18, and a Strip Coupling 28 to which a 2 in. Flexible Strip (Elektrikit Part No. 530) is fixed. Another Strip Coupling 29 is fixed to the top end of this Strip, after which it is mounted horizontally on a short Rod held in Collars bolted to the top of the casing, but spaced from it by Washers. Impulses to the pendulum, coming from the escapement crutch, are imparted by Threaded Pins 18 to the Collar mounted on the 5 in. Rod.

This completes the model but, before finishing, I should like to give the following general hints on construction :

(1) Before installing the Clockwork Motor, it should be lubricated, including the mainspring coils, to prevent sticking.

(2) Care must be taken in setting the recessed Elektrikit Pivot Bolts at both ends of the Pivot Rods. They must neither be too tight nor too sloppy and the Pivot Rods should spin freely for some time when fitted with a Gear Wheel. Aim for accurate alignment with minimum friction, the latter helped by moderate lubrication.

(3) The escapement is the heart of the clock and requires very careful adjustment for accurate and long-term working. It is essential that the pallets be correctly positioned and this should preferably be done, in the first instance, by making up the escapement on a simple jig so that the movement can be studied and adjusted before building it into the model. When the "anchor" is placed in the clock, the boss of the Crank should not be fully locked until it is adjusted so that the "tick" is even on both swings of the pendulum.

PARTS REQUIRED

2-6a	82-37	2-103d
4-8a	41-37a	2-103f
2-9	64-38	1-103g
2-9a	1-52a	5-111
6-9b	5-53a	7-111c
4-12	13-59	2-115
1-15	2-62	1-115a
1-16	3-62b	1-120b
3-16b	2-63b	2-123
1-16a	1-63c	1-133
4-18a	5-64	2-136a
2-18b	2-73	1-142c
1-22	1-77	1-179
18-23	1-80c	3-235
13-23a	4-81	
2-26	1-95a	
3-26c	4-97	Elektrikit Parts
4-27a	2-100	1-530
3-27d	1-103	4-545
		2-549

No. 1 Clockwork Motor