

Automatic Ticket Machine

An "electronic" Model described by 'Spanner'

IT IS difficult to realise that not more than 40 years ago, the cigarette or chocolate machine was an extremely novel sight indeed and considered a symptom of our developing technological society. Nowadays, of course, these machines are as common as bus stops and sell virtually everything from chewing gum to hot meals!

Such commonplace objects may not appear very outstanding to the ordinary man-in-the-street, but to the Meccano enthusiast, they make challenging subjects for Meccano models. Featured here, for example, is a Ticket-issuing Machine which, although not a particularly complex piece of equipment, nonetheless illustrates some very interesting operations. It also illustrates the great value of the new Electronic Control Set, making use of the components in this Set to achieve operations simply, where mechanical control would be considerably more complicated. It is, as a matter of interest, the first ever "electronic" model to be featured in full in Meccano Magazine.

As far as construction is concerned, a rectangular base is first built up from two 7½ in. Angle Girders 1, connected together by three 5½ in. Angle Girders 2, a 5½ × 3½ in. Flat Plate 3 and a 5½ × 2½ in. Flat Plate 4. Attached to front Girder 2

is another 5½ × 3½ in. Flat Plate 5, the ends overlaid by 7½ in. Angle Girders 6, a further 5½ × 3½ in. Flat Plate 7 being bolted to Girders 6 above Plate 50. The upper ends of the Girders are connected by a 5½ in. Angle Girder, as shown.

Before proceeding any further with the framework, the electronic and drive sides of the model should be fitted while there is still plenty of room available. A 1 × ½ in. Angle Bracket, fixed by its short lug to left-hand Girder 1 (viewed from the front), is extended six holes upward by a 3½ in. Strip 8. The upper end of this Strip is connected to left-hand Girder 6 by a 5½ × ½ in. Double Angle Strip 9, the securing Bolt also holding a horizontal 3½ in. Strip 10 in place. The free end of this Strip is attached by an Angle Bracket to a 1½ in. Corner Bracket 11 which is, in turn, attached by a 1½ in. Angle Girder to a 2½ in. Flat Girder, secured to a 3½ in. Angle Girder 12, the Flat Girder projecting one hole above the top of the Angle Girder. The lower end of the Angle Girder is secured to a Trunnion, bolted to Flat Plate 4, while the upper end of the Flat Girder is secured by Nuts to a 4½ in. Screwed Rod 13, held by further Nuts in Flat Plate 7. Note that the Bolts fixing the 1½ in. Angle Girder to the Flat Girder also fix an Electronic

Set Lamp Holder 14 to the opposite side of the Flat Girder.

A 3-12 volt Motor with Gearbox, set in the 16:1 ratio, is next bolted to Flat Plate 4, in the position shown. A Worm Gear 15 fixed on the output shaft of this unit meshes with a ½ in. Pinion on a 5½ in. Rod held by Collars in two Trunnions, one bolted to rear Girder 2 and the other to Flat Plate 3. Also carried on the Rod is a fixed ⅞ in. Bevel Gear 16, a loose Coupling 17 and a Collar, the Rod passing through the centre transverse bore of the Coupling and the Collar serving as a "stop" to hold the Coupling in place.

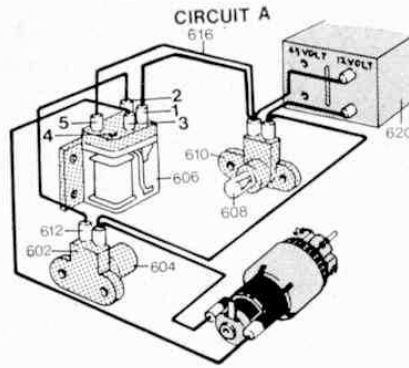
Now journalled in the upper centre hole in Corner Bracket 11 and in the corresponding hole in Double Angle Strip 9 is a 3½ in. Rod held in place by an electrical 1 in. Bush Wheel 18 and a Collar and carrying a 1 in. Sprocket Wheel 19, a ⅞ in. Bevel Gear 20, a Coupling and another Collar. As before, the Coupling is free, with the Rod passing through its centre transverse bore and the Collar holding it in place. Journalled, free, in the longitudinal bores of this Coupling and Coupling 17 is a 2½ in. Rod 21, on which two further ⅞ in. Bevel Gears are fixed, these Bevels meshing with Bevels 16 and 20.

Bolted to Flat Plate 3, in the position shown, is a Trunnion, ex-

Opposite, this Automatic Ticket Machine is the first Meccano model featured in the M.M. to make use of the Electronic Control Set. In the right-hand photo the sides are removed to show drive and electronic systems.

tended five holes upward by a $3\frac{1}{2}$ in. Strip 22. Free to slide in the upper end hole in this Strip and in the corresponding hole in Angle Girder 12 is a $3\frac{1}{2}$ in. Rod 23 carrying a Collar and two Compression Springs between the Strip and Girder and two more Collars, approximately $\frac{3}{5}$ in. separating them, on the other side of the Girder. The Collar and Compression Springs should be arranged so that the Springs tend to force the Rod towards the front of the model, the centre Collar acting as a "stop" to prevent the Rod from projecting more than $\frac{1}{2}$ in. beyond Strip 22. The final Collar serves as the snatch point for a Threaded Pin fixed in the face of Bush Wheel 18. As the Bush Wheel revolves, the Pin catches on the Collar, drawing Rod 23 inwards a short distance, the Compression Springs returning it to its normal position when the Pin comes free.

Bolted to the inside of Plates 5 and 7, exactly opposite Lamp Holder 14, is the Photo Cell from the Electronic Set 24, this being fitted with the Hood to cut out excess light. The Relay 25 is also bolted to the inside of Plate 5 in a suitable position and a Lamp is of course fitted to Lamp Holder 14.



Wiring

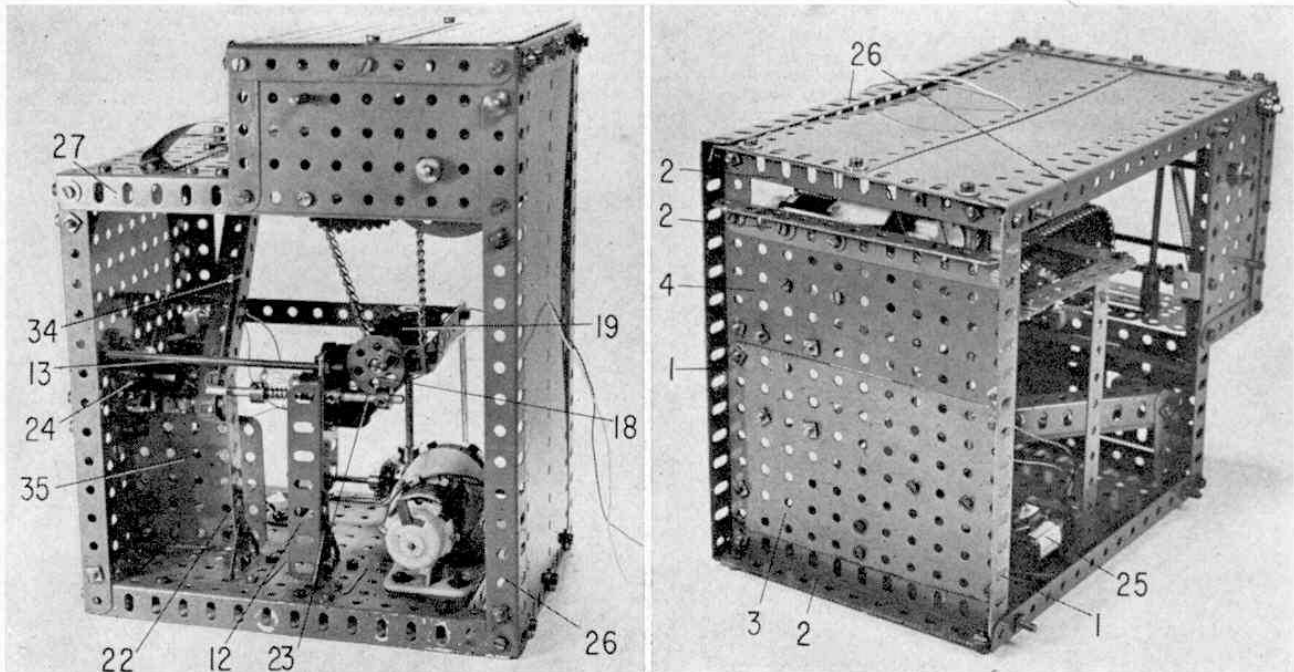
It is advisable to wire up the model at this stage while the components can be easily reached. Using the Miniature Plugs contained in the Electronic Set, one Motor lead is connected to the lower terminal of the Photo Cell, this terminal also being connected to the upper terminal of the Lamp Holder. The lower terminal of the Lamp Holder is connected to sockets 1 and 5 of the Relay, while socket No. 2 of the Relay is connected to the upper terminal of the Photo Cell. The other Motor lead is connected to socket No. 2 of the Relay and, finally, the leads from the power source—which must give 12 volts D.C.—are connected to the two terminals of the Lamp Holder. This layout is Circuit A in the Electronic Set Booklet.

Framework and Ticket Section

Construction of the framework of the model can now continue. Bolted to the rear corners of the base are two $9\frac{1}{2}$ in. Angle Girders 26, these being connected through their fifth holes to the top of Angle Girders 6 by two $7\frac{1}{2}$ in. Angle Girders 27, the securing Bolts helping to hold a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 28 in position at each side, as shown. The forward edge of this Plate is overlaid by a $2\frac{1}{2}$ in. Strip, while a $4\frac{1}{2}$ in. Angle Girder 29 is bolted to the top edge of the Plate. The upper ends of Girders 26 are connected by a $5\frac{1}{2}$ in. Angle Girder, the space between this Girder and rear Girder 2 being enclosed by two $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plates completing the back of the model.

Towards the front of the model Girders 27 are connected by a $5\frac{1}{2}$ in. Flat Girder 30, a $5\frac{1}{2}$ in. Angle Girder 31 and a $5\frac{1}{2}$ in. Strip 32, a space being left between the Flat and Angle Girders. Part of this space is enclosed by a 3 in. Flat Girder bolted to Flat Girder 30, the remainder of the space being edged by two $1\frac{1}{2}$ in. Angle Girders 33 forming the entrance slot for the operating coin. A $\frac{3}{8}$ in. Bolt is secured through the inner end holes of the vertical flanges of these Girders to act as an improved guide. Immediately below the Girders a channel guide for the coin is supplied by two $5\frac{1}{2}$ in. Angle Girders 34, placed one inside the other and secured together through their

Below, another view of the machine with the sides removed, and an underside view showing construction of the base.



elongated holes, with full advantage being taken of the elongated holes to leave a narrow space between the vertical flanges of the Girders wide enough to receive the coin.

The upper ends of the Girders are bolted to a 2 in. Slotted Strip, attached by an Obtuse Angle Bracket to the underside of left-hand Girder 27 through its second hole. The Girders are angled downwards to deposit the coins in the right-hand forward corner of the model, in a compartment bordered by Strip 22, with its Trunnion, and by a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 35, attached to Flat Plate 5 by a $2\frac{1}{2}$ in. Angle Girder.

Up at the top of the model, a $5\frac{1}{2}$ in. Strip 36 is attached by Angle Brackets to the upper forward corners of Flat Plates 28, the securing Bolts also holding two 2 in. Slotted Strips 37 in place, one at each end of Strip 36. Two 2 in. Strips are also bolted to Strip 36, adjacent to left-hand Strip 37, then a $3\frac{1}{2}$ in. Rack Strip 38, backed by a $2\frac{1}{2}$ in. Angle Girder 39, is attached by further Angle Brackets to Strip 32. Another $3\frac{1}{2}$ in. Rack Strip 40, positioned free above the first Rack Strip, is secured through its end holes to two Threaded Couplings, each fixed on the end of a $3\frac{1}{2}$ in. Rod. The other end of this Rod is fixed in the longitudinal bore of an ordinary Coupling 41, mounted on a $6\frac{1}{2}$ in. Rod held by Collars in the second holes of Angle Girders 26. Also mounted on the Rod is a Crank 42, to the end of which a Tension Spring is fixed, the other end of this Spring being stretched and attached to nearby Angle

Girder 27. The action of the Spring raises Rack Strip 40 away from Rack Strip 38.

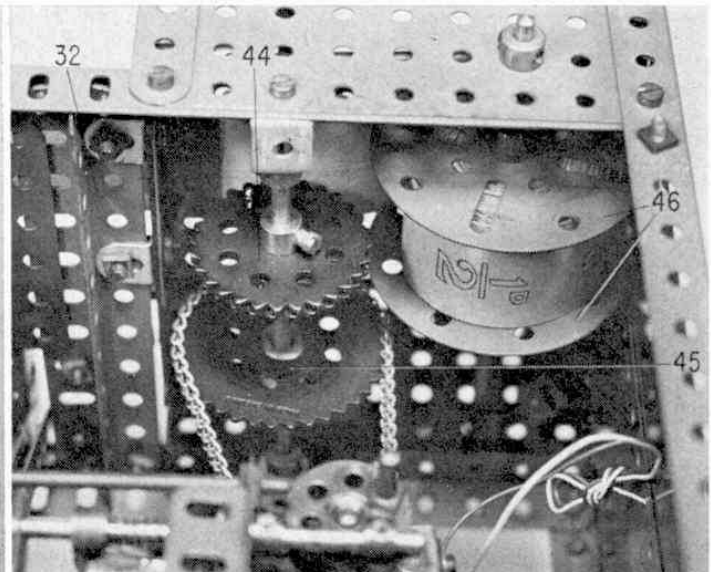
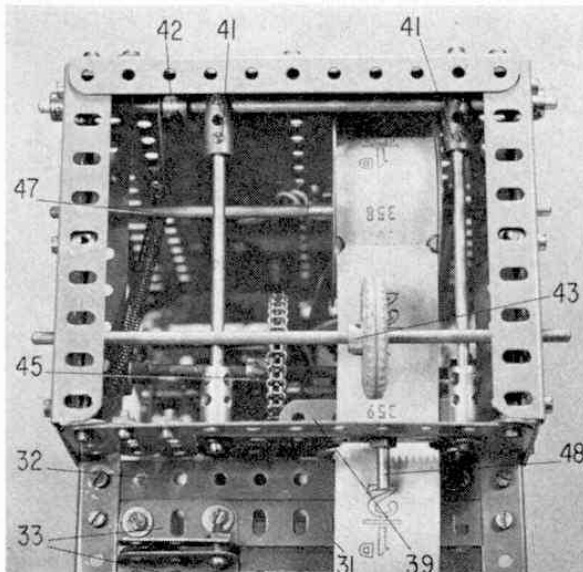
Preventing the Rack Strip from rising too far, however, is another $6\frac{1}{2}$ in. Rod held by Collars in the third holes from the front in the second row of holes down from the tops of Flat Plates 28. Fixed on this Rod is a 1 in. Pulley with Motor Tyre 43, immediately below which—and touching it—are two $1\frac{1}{2}$ in. Sprocket Wheels 44 mounted face to face on a 5 in. Rod journalled in the inner lugs of two Double Brackets bolted one to each Angle Girder 27. Also mounted on the Rod is a 2 in. Sprocket Wheel 45 which is connected by Chain to Sprocket Wheel 19.

A $1\frac{1}{2}$ in. wide roll of perforated "tear-off" tickets, each ticket $2\frac{1}{2}$ in. long (obtainable from most good stationery suppliers), is mounted between two Face Plates 46 on a final $6\frac{1}{2}$ in. Rod 47 held by Collars in Flat Plates 28. The end of the roll

is threaded between Pulley with Motor Tyre 43 and Sprocket Wheels 44 and is brought out between the teeth of the two Rack Strips. With the power and Motor switched on, when a suitable coin is inserted in the "slot", it runs down the guide formed by Angle Girders 34 until stopped by Rod 23, at which point it should break the beam of light falling on the Photo Cell. This sets the Motor working to push the end of the ticket roll out between the Rack Strips until, after one ticket has been issued, the Threaded Pin in Bush Wheel 18 catches on the inner Collar on Rod 23, moving the Rod inward to release the coin. The coin drops into its "box", restoring the light beam to the Photo Cell which stops the Motor. The ticket can then be ripped off after pressing down Rack Strip 40 on to Rack Strip 38 with the aid of a Threaded Pin 48 fixed in Rack Strip 40 to prevent the

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Below left, a close-up view of the top of the model with the upper Plates removed to show the ticket-roll layout. The tickets on our model were marked in "old" pence, but current tickets can be obtained from most good stationery suppliers. Below right, another view of the ticket issuing equipment, as seen from below. Note the two $1\frac{1}{2}$ in. Sprocket Wheels 44, mounted face to face, which actually push the tickets out.



PARTS REQUIRED

2-2	4-16	5-63	2-115
4-3	1-16a	2-63c	2-120b
2-6	1-22	10-64	4-126
6-8b	1-26	3-70	1-133
8-9	4-30	1-72	1-142c
1-9b	1-32	1-80b	6-195
2-9d	121-37a	1-94	2-196
3-9f	120-37b	1-95	1-518
2-11	44-38	2-95a	1-602
6-12	1-43	1-96	1-604
1-12a	1-48d	1-103	1-606
1-12b	3-52a	1-103e	1-608
1-12c	2-53a	1-103f	1-610
3-14	2-55a	2-109	11-612
1-15	18-59	2-110	2 yds-616
1-15a	1-62	12-111c	1-3-12v. DC Motor with Gearbox
			1-Roll of $2\frac{1}{2} \times 1\frac{1}{2}$ Tickets