MECCANO® Magazine

JULY 1968 VOLUME 53 NUMBER 7

Meccano Magazine, founded 1916.

Editorial Director
D. J. LAIDLAW-DICKSON

Editor
JOHN FRANKLIN

Consulting Editor for Meccano Ltd.
J. D. McHARD

Advertisement Manager
ROLAND SUTTON

MAP **HOBBY MAGAZINE**

FRONT COVER

Area Patrol Car, Delta 3, based in Hemel Hempstead the home of Meccano Magazine, speeds on its way to the scene of a crime. Read "On Patrol" for details of this car and other interesting facts on Police Life. Cover painting by Laurie Bagley.

NEXT MONTH

Have you ever wanted to go to sea and work on aircraft? If you have, the next issue is for you. The Editor describes the training of a Fleet Air Arm Naval Mechanic, and other features describe the latest Navy 'planes and give details of the Fleet Air Arm in general. Meccano models include a Steeple Chaser, Plastic Meccano Punching Machine and a novel Woodworking Machine. Dinky Toy News, Among the Model Builders, Workbench, Battle, Have You Seen and Stamps, make this an issue you must not miss. Look out for the Naval Aircraft and Aircraft Carrier cover painting on your bookstall. As usual we will present a large railway coverage for all our enthusiastic readers.

Advertisement and Subscription Offices: Model & Allied Publications Ltd., 13-35 Bridge Street, Hemel Hempstead, Hertfordshire. Tel.: Hemel Hempstead 2501-2-3.

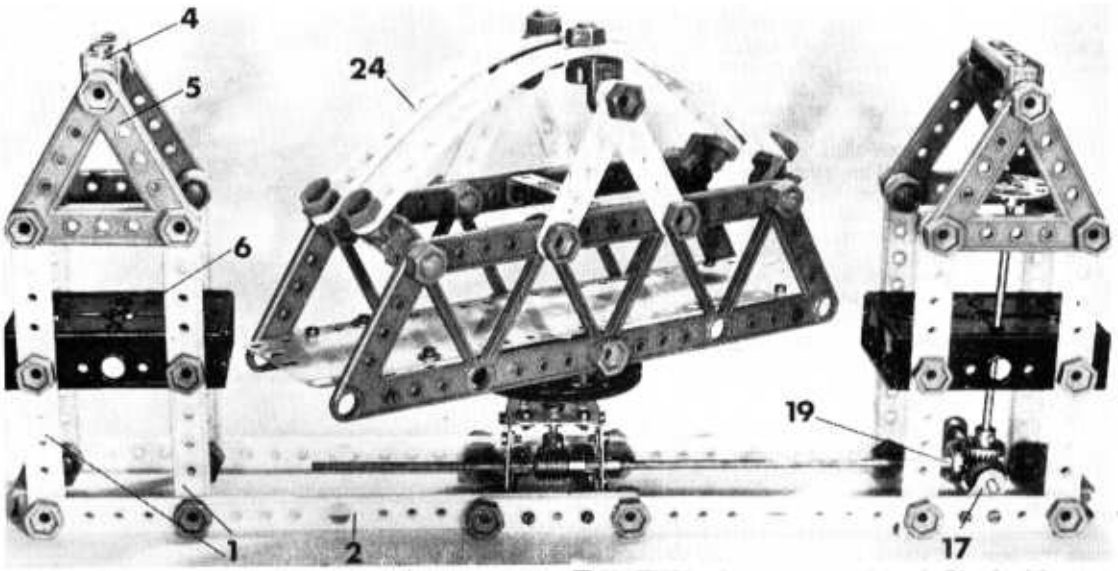
Direct Subscription rate 35/- per annum. U.S.A. and Canada direct subscription rate $5 including current index.

Publishers of Aeromodeller, Model Boats, Model Cars, Model Engineer, Radio Control Models, Model Railway News.

MODEL & ALLIED PUBLICATIONS LTD.

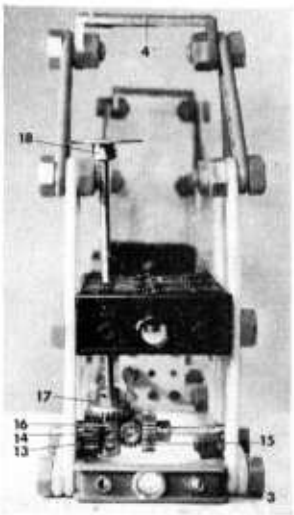
13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTFORDSHIRE

CONTENTS



SWING... ...AROUND

... with this operating Swing Bridge built from a well-chosen combination of standard and Plastic Meccano Parts



Heading photo. Built with a combination of standard and Plastic Meccano, this model Swing Bridge illustrates how standard Meccano can be used to give realistic movement to a predominately Plastic model. At left, an end view of the control tower showing the main operating mechanism.

BY THIS time, the metal and Plastic Meccano models we have featured in the M.M. since January have proved to everybody's satisfaction that parts in both systems can be used together to good advantage in no end of cases. The combination models presented so far, however, have really only just scratched the surface of the situation. Generally speaking, we have used a mixture of parts simply to improve the appearance of a model—rarely have we used them to give realistic movement to a model that would otherwise be either static or, at best, unwieldy in working trim. The fact is, however, that a mixture of parts can result in realistic movement although I must admit the "service" is a little one-sided in that it is standard Meccano which can easily give movement to a Plastic model rather than the other way round. I think you will agree, that the model featured here bears out my argument.

It is, as is obvious from the illustrations, a Swing Bridge, the main structure of which is built predominately from Plastic Meccano. The actual bridging section does rotate—slowly, but easily—controlled by a wheel, built into one of the end towers. This controlling mechanism is produced entirely from standard Meccano parts and it is only by using standard parts that it has been possible to give motion to such a comparatively small (for Plastic Meccano) model. Thanks to the small size as well as variety of standard Gears, etc., a compact drive system has been produced and one that would have been impossible with Plastic Meccano.

Before the mechanism can be produced, the towers must be built. Each tower consists of four 3-hole Strips 1, bolted in pairs to two 5-hole Strips 2, the end securing Bolts also fixing a Double Angle Strip 3 between Strips 2. Another Double Angle Strip 4 is bolted to the apexes of two 2-hole Triangular Girders 5 which are in turn fixed to the tops of Strips 1. A Base 6 is fixed to the centre of Strips 1.

Strips 2 are now overlapped two large holes and are bolted together to form two 8-hole compound strips which are joined in the centre by two metal $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 7, secured by $\frac{1}{2}$ in. Bolts. Fixed to these Double Angle Strips are two $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plates 8, the centre securing Bolts also fixing

a $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 9 between Double Angle Strips 7. Attached by $1\frac{1}{2}$ in. Angle Girders to the top of Plates 8 is another $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plate which, along with Double Angle Strip 9, provides the bearings for a 2 in. Rod carrying a $\frac{1}{2}$ in. Pinion 10 and held in place by Collars. Mounted on the upper end of this Rod is a 3 in. Pulley 11.

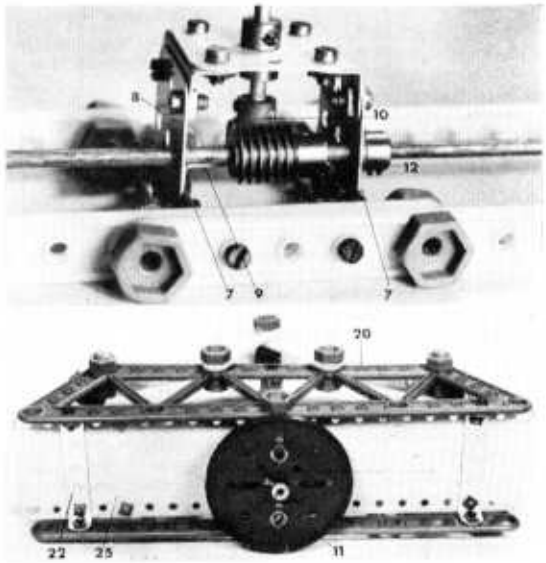
In mesh with Pinion 10 is a Worm 12 fixed on an $11\frac{1}{2}$ in. Rod held by a Collar in Flat Plates 8. One end of this Rod is journalled in the longitudinal bore of a Short Coupling 13 mounted, along with two $\frac{3}{4}$ in. Pinions 14 and 15, and an ordinary Coupling 16, on a $3\frac{1}{2}$ in. Rod held by Pinion 15 and a Collar in two 1 in. Corner Brackets 17 bolted one to each Strip 2. Note that Pinions 14 and 15 are fixed in place while Couplings 13 and 16 are loose on the Rod which, incidentally, passes through the central transverse smooth bore of Coupling 16.

Journalled in the longitudinal bore of this Coupling and in corresponding Base 6 is a 5 in. Rod carrying a $\frac{3}{4}$ in. Contrate Wheel 17 and an 8-hole Bush Wheel 18, the latter fixed on the upper end of the Rod. Contrate 17 meshes with Pinion 15, while Pinion 14 meshes with another $\frac{3}{4}$ in. Contrate 19 fixed on the $11\frac{1}{2}$ in. Rod as shown.

If all is correct then turning Bush Wheel 18 should cause Pulley 11 to revolve.

Having by this time completed the towers and controlling mechanism for the bridging section, all that remains to be built is the bridging section, itself. This consists of two plastic Bridge Girders 20, the lower edges of which are joined, in the centre, by a plastic Double Angle Strip 21 and, towards each end, by a metal $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 22. Their upper edges are connected in the centre by a metal $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip. Fixed next to the upper edge of each Bridge Girder are two 2-hole Strips 23 which are bolted together at the top, the securing Bolt also fixing a plastic Angle Bracket in place. Two further Angle Brackets are bolted one to each upper corner of the Girder, then a 5-hole Strip 24 is curved and attached to the free lugs of all three Angle Brackets.

To finish, an $11 \times 2\frac{1}{2}$ in. compound strip plate 25 obtained from a $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate and a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate, is bolted to Double Angle Strip 22. The complete assembly is then fixed to 3 in. Pulley 11 by $\frac{1}{2}$ in. Bolts secured to plastic Double Angle Strip 21.



Above, top, a close-up view of the central Worm and Pinion mechanism which actuates the swinging movement of the bridge span. Next, an underside view of the bridge span as it appears when removed from the rest of the model. Below, this general view of the model shows the bridge span in the closed position to allow road traffic to pass over it.

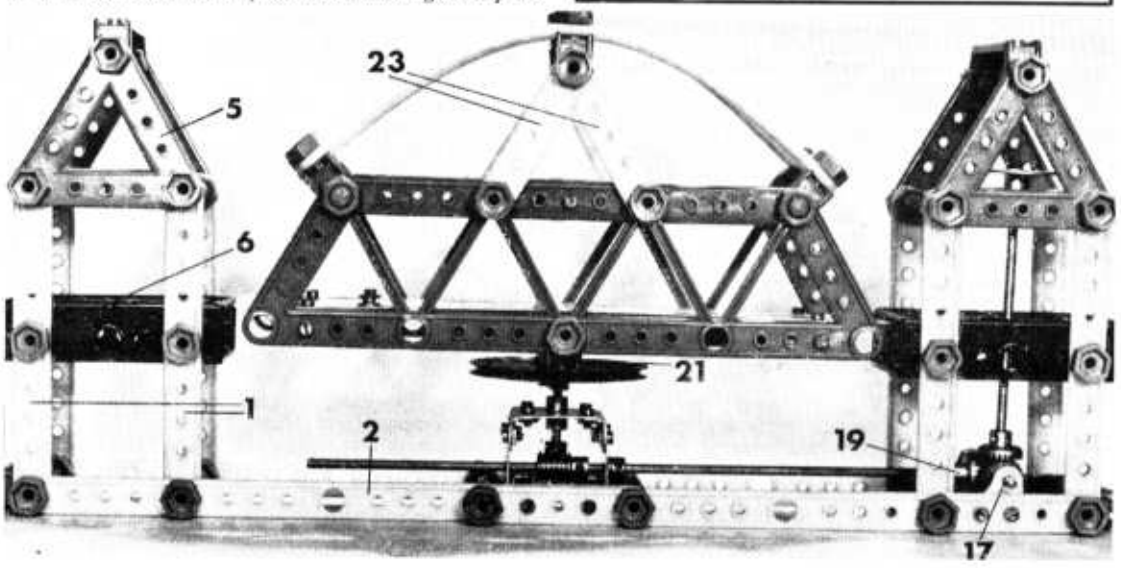
PARTS REQUIRED

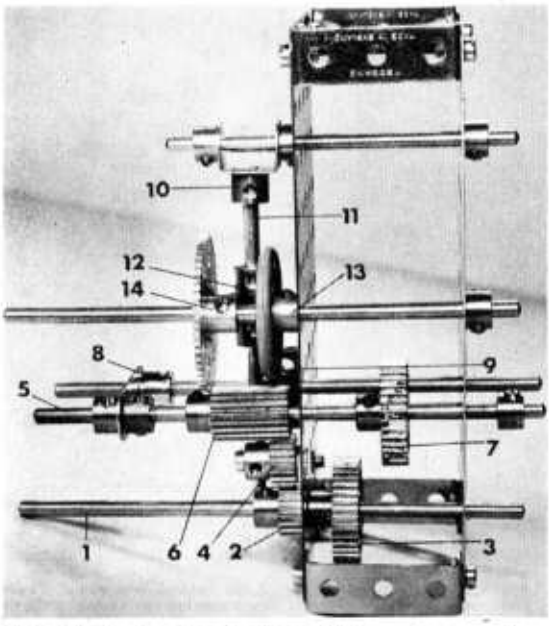
Plastic Meccano

4—2 hole Strips	2—Bridge Girders
8—3 hole Strips	4—2 hole Triangular Girders
6—5 hole Strips	2—Bases
6—Angle Brackets	50—Bolts
5—Double Angle Strips	44—Nuts

Standard Meccano

2—9f	1—24	18—37b	1—63
1—13a	2—25	7—38	1—63d
1—15	1—26	2—38d	3—74
1—16	2—29	1—48	2—111a
1—17	1—32	5—48a	14—111c
1—19b	34—37a	5—59	2—133a
			1—190





Above, Fig. 1. An automatic brake which comes into operation between forward and reverse movements of a central mechanism. The designer is L. R. Atkinson of Putney Heath, London.

AMONG THE MODEL BUILDERS

with Spanner

LAST MONTH, in a special article dedicated to simplicity in Meccano model-building, I featured a couple of extremely useful ideas supplied by Mr. L. R. Atkinson of Putney Heath, London. I would now like to begin this article with another, more complicated, but equally useful suggestion from Mr. Atkinson—an Automatic Brake between forward and reverse movements.

Perhaps the most advantageous use for this mechanism is in a model such as a motorised crane where it is necessary to constantly reverse the direction of drive of at least one of the operating movements. In a crane, for example, the load winding drum is forever required to turn first one way, then the other, and you will know from experience that, in certain circumstances, control of the load can be lost when the operating lever is in the neutral position between forward and reverse. Mr. Atkinson's mechanism completely overcomes the problem by automatically braking the important shaft.

Assuming that the model to which the brake is to be fitted already has a gearbox, then the only thing to ensure is that one sideplate of the gearbox incorporates a Flat Plate to act as one bearing for an input Rod 1 (fig. 1), to which the drive from the motor is taken. Fixed on this Rod, one each side of the Plate, are a ½ in. Pinion 2 and a 1 in. Gear 3. In mesh with Pinion 2 is an "idler" ½ in. Pinion 4 loose on a Bolt fixed in the Plate. Another Rod 5, free to slide in its bearings, carries a ½ × ¾ in. Pinion 6 on one side of the Plate and a second 1 in. Gear 7 on its other side. Movement of the Rod should bring either Gears 3 and 7 or Pinions 4 and 6 into mesh. The neutral space should be as small as possible. Held between Collars on Rod 5 is a Crank 8, the boss of which is fixed on a sliding control Rod also journalled in the gearbox sideplate and carrying a Coupling 9, as shown.

Yet another Rod, on which a Large Fork Piece 10 is firmly held by Collars, is mounted in the sideplates. Fixed in the boss of this Fork Piece is a further Rod 11 on which a Short Coupling 12 is secured, a suitable Dinky Toy tyre being wedged onto this Coupling. The output shaft which, in the case of a crane, would be connected to a winding drum, consists of a final Rod carrying a 1 in. Pulley with Rubber Ring 13 and a 57-teeth Gear 14, the latter in constant mesh with Pinion 6.

When the control Rod is moved laterally, Rod 11 is forced to slide up and over Coupling 9. As this happens, the tyre on Short Coupling 12, if it is correctly positioned, should bind on Rubber Ring 13. The parts, incidentally, should be so adjusted that Rod 11 is at its maximum height at the mid-point of disengagement of the Pinions and 1 in. Gears.

The final word on this mechanism comes from Mr. Atkinson who writes, "For maximum braking effect, the pull (of load or jib) on the output shaft should be so arranged that it tends to turn Pulley with Rubber Ring 13 in a clockwise direction when looking at the Pulley face.

Epicyclic winding drum

As already explained, the above mechanism is ideal for controlling a crane's winding gear and, strangely enough, the next offering is also concerned with winding gear although not specifically for a crane. It is a Heavy Duty Epicyclic Winding Drum designed by B. N. Love of Hall Green, Birmingham as an improvement on the original winding drum fitted to a famous Grandfather Clock produced before the last war and is suitable for inclusion in any weight-driven mechanism requiring a rugged winding drum.

Two 3 in. Sprocket Wheels 1 (figs 2 and 3), bosses inward, form the end "checks". Each Sprocket carries six Threaded Bosses secured to its inside face by ⅜ in. Bolts passed through the outside ring of holes in the Sprockets. Four of these Bosses are spaced at 90° round the Sprocket and act as securing points for the drum surface. The other two Threaded Bosses on each Sprocket are also set in the outside ring of holes, diametrically opposite each other, and act as bearers to assist in keeping the drum surface cylindrical in form. This leaves the remaining two holes free to carry the epicyclic gear Rods.

Before the gear Rods are fitted, however, the drum surface is produced from four 2½ × 2½ in. Flexible Plates 2, curved to shape, overlayed at their slotted ends by four 2½ in. Strips 3. The Bolts securing these Strips and thus the curved Plates, are screwed into the transverse bores of the four Threaded Bosses set at 90° in each end cheek, but note that the remaining "bearer" Threaded Bosses do not receive securing Bolts. It is important to remember, also, that Threaded Bosses do not have their transverse holes drilled centrally, but closer to one end. When bolting them to the end cheeks, they must be arranged with the transverse holes *furthest away* from the Sprocket face. When assembled, the drum must rotate freely on the

central 6½ in. Rod forming the winding spindle.

Next, the epicyclic gear ring is made up using a 3½ in. diameter Gear Ring 4, Part No. 180, which is fixed to a 3½ in. Gear Wheel 5. In the actual unit illustrated, Mr. Love drilled four additional 5/32 in. holes in the Gear Wheel and bolted the Ring direct to the Gear with a Collar on the shank of each securing Bolt to serve as a spacer. As an alternative, however, he explains that, "For those constructors who prefer not to drill the large Gear Wheel or who have no facilities for so doing, it is a simple matter to turn the Gear Wheel with its boss outward and then to bolt suitable Strips across its face, stood off with Washers, to form spokes to which the Gear Ring may be bolted." Whichever method is used, it is most important that the bore in the boss of the Gear Wheel is exactly central in relation to the Gear Ring.

This combination gear ring must be free to revolve on the central winding spindle, but all other gears in the system are locked onto their respective shafts by Grub Screws.

At this stage the items usually referred to as "sun and planet" gears are added to the drum. A ¾ in. Pinion 6 serves as the sun wheel, while the orbiting planet wheels are 50-teeth Gears 7 fixed on 3½ in. Rods journalled in the free outside holes in the end cheeks. Mounted on the other end of each Rod is a ½ in. Pinion 8 which meshes with the inner teeth of Gear Ring 4, when the latter is fixed in position. The drum is held in position on the central winding shaft by Pinion 6 at one end and a Collar 9 at the other end, then the combination gear ring is spaced by Washers and held in place by a further Collar to ensure smooth engagement with Pinions 8.

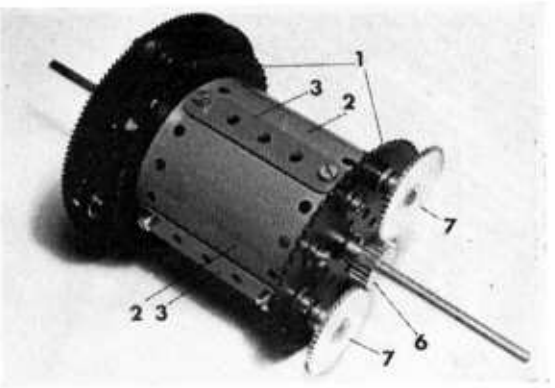
Under working conditions, the complete Drum is mounted with its central shaft located in strong bearings made of double-thickness Strips or Plates. A Ratchet Wheel is fixed to the shaft and a winding Crank mounted on a convenient end. The large combination gear will be driving a small Pinion in the clock movement and will appear to be stationary as the Drum is wound. As the winding shaft is turned, the main Drum will be seen to revolve at one eleventh of the winding speed, due to the step-down arrangement of the epicyclic gearing and the balanced nature of the system ensures a very smooth wind up of the heavy clock weight attached by wire or nylon cord to the main Drum.

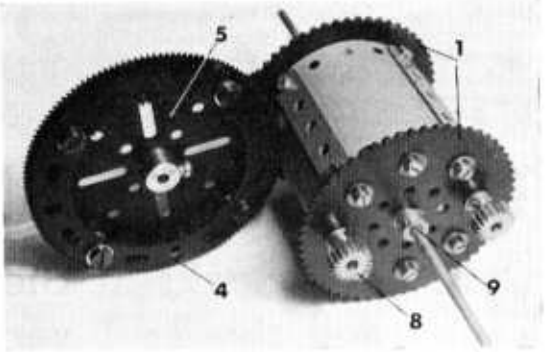
"This type of drum," writes Mr. Love, "Is known as a "maintaining drum" since the clock will continue to be driven while the weight is being wound—a great advantage of the epicyclic system. Since the principal sun and planet gears can quickly be altered, a wide range of gear ratios is obtainable without major changes to the construction."

PARTS REQUIRED			
4—5	1—25	1—27b	5—59
1—14	2—26	24—37b	16—64
2—16	2—27	26—38	2—95b
	1—180	4—190	4—147b

Small gantry trolley

Illustrated in figure 4 is a very interesting idea from Mr. A. Palmer of Flixton, Manchester, who also featured in last month's "simplicity" article. The diagram shows a trolley suitable for use with small Gantry Cranes, and is so self-explanatory as to require no written description. I need only explain that the gantry rails locate between the pairs of Collars on the ends of the 2 in. Rods, while the travel operating cords



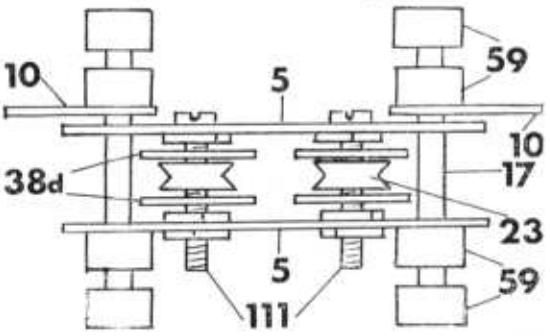


Above top, Fig. 2. A heavy-duty epicyclic winding drum for weight-driven clocks, designed and built by B. N. Love of Hall Green, Birmingham. Next, Fig. 3. Another view of the winding drum showing the built-up epicyclic gear ring removed from the central winding shaft.

are attached to the Fishplates mounted on the Rods. Also, the ½ in. Pulleys must turn freely on their ¾ in. Bolts and, of course, the space between the Collars in each above-mentioned pair should be sufficient to allow the trolley free movement on its rails without being so great that the trolley can slew about on the rails.

PARTS REQUIRED			
2—5	2—17	6—37a	2—111
2—10	2—23	8—59	

Below, Fig. 4. Designed by A. Palmer of Flixton, Manchester, this trolley is ideal for use with small gantry cranes.



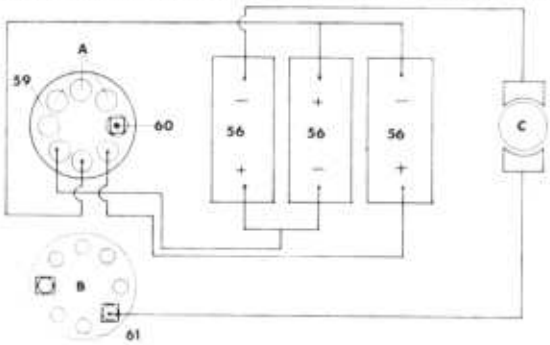
BONE SHAKER

by Spanner

The conclusion of the advanced tramcar model featured in June issue of Meccano Magazine. Based on a 1903 prototype used in Bradford.

IT IS at this stage in construction that the truck can be built up and then fitted to the chassis. Two similar side members are each obtained from two 7½ in. Angle Girders 44, connected by a 5½ in. Narrow Strip 45, but separated from each other by a distance of three holes. Two Girder Frames 46 are bolted one to the centre of each Girder 44 and their apexes are joined by a 9½ in. compound narrow strip 47, built up from two 5½ in. Narrow Strips. The Bolts joining these Narrow Strips also hold in place a Flat Trunion 48, the apex of which is bolted, along with a Double Bracket 49, to the centre of Narrow Strip 45. Another Double Bracket 50 is bolted to the outside end of each Girder 44.

Four wheels are now each produced from a Face Plate bolted to a Wheel Flange and are mounted in pairs on two 4½ in. Rods 51. These are journalled in the bosses of Double Arm Cranks bolted to the insides of Girder Frames 46, a Collar spacing each wheel from the adjacent Crank. A 2 in. Sprocket Wheel 52 is fixed on one of the Rods, as shown, then the finished truck is secured to Angle Girders 1 by four ¾ in. Bolts 53 passed one through each Angle Girder 44. Compression Springs on the shanks of the Bolts separate Girders 44 and 1, further separation being supplied by four pairs of curved 2½ in. Strips 54. As can be seen, one Strip in each pair is bolted to Girder 1 while the other is bolted to Girder 44. Additional suspension is obtained from another six Compression Springs each mounted on a 2 in. Rod 55 held in the boss of a Double Arm Crank (fixed to the inside of Girder 1) and passed through the lugs of Double Brackets 49 and 50. Collars are mounted on the ends of the Rods passing through Brackets 50.



Motor and control mechanism

Bolted to the underside of Flat Plate 27 is a Power Drive Unit carrying a ¾ in. Sprocket Wheel on its output shaft. This Sprocket is connected by Chain to Sprocket Wheel 52.

To make the tram self-supporting, a built-in power source for the P.D. Unit is provided by three Ever Ready 1839 or equivalent torch batteries 56, taped together and wired in series, i.e. the positive terminal of one battery is connected to the negative terminal of the next, and so on. It will be necessary to solder the connecting wires to the terminals.

A control lever is next built up from a Crank 57 mounted on a 5½ in. Rod, journalled free in the boss of a Double Arm Crank bolted to the top of Flat Plate 5, and held in place by a Collar beneath the Plate. Mounted on the Rod between the two Cranks is an arrangement consisting of a Cylinder 58 in each end of which a 1⅛ in. Flanged Wheel is wedged. Also mounted loose on the Rod is an 8-hole Insulating Bush Wheel 59 (Elektrikit Part No. 514), in seven holes of which Contact Studs are fixed. A ¾ in. Bolt 60, carrying a Washer, is fixed in the eighth hole, its shank projecting through a hole in Plate 5.

Connecting with the Contact Studs in Insulating Bush Wheel 59 is a Contact Screw in an 8-hole Bush Wheel 61, fixed on the lower end of the Rod. One of the Power Drive Unit leads is connected to this Bush Wheel, while all the other connections are as shown in the accompanying diagram. The batteries, incidentally, are fixed to the underside of the appropriate platform with Cord, and a Threaded Pin is attached to Crank 57.

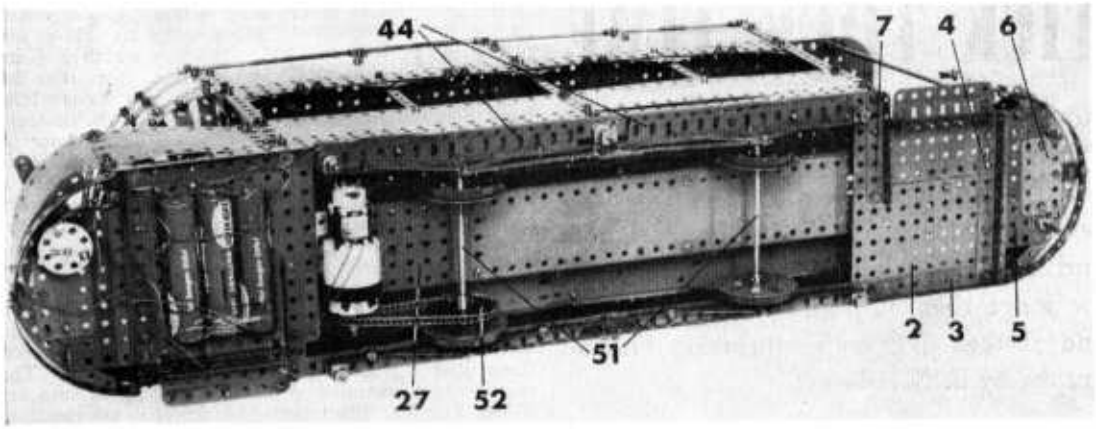
To complete the platform fittings, an imitation brake is built up from a Crank 62 on a 4½ in. Rod held by Collars in Flat Plate 5 and in an Angle Bracket bolted to Strip Plate 38. A similar imitation brake is built on to the other platform together with an *imitation* control lever. The latter is built up in the same way as the above working controller except that no Bush Wheels are added beneath the platform, their places being taken simply by a Collar.

Finally the trolley pole (non-working) is represented by an 11½ in. Rod 63 held by Collars in a 1 × ½ in. Double Bracket, the lugs of which are extended by 1½ in. Strips 64. The lower Collar is held on the Rod not by Grub Screws, but by Bolts passed through the lugs of the Double Bracket and into the tapped bores of the Collar. A Small Fork Piece carrying a ½ in.

Super Plastic Kits from Japan continued

are fully sprung, and the tracks are constructed from a number of small links. The basic kit costs 99/11d. and another kit is available including a control unit for 124/-.

The detail on the Chieftain 1/25th scale model tank by Tamiya is superb. Once again, construction is fairly straightforward, providing each step is carefully followed. All wheels are independently sprung and the tracks, instead of being the usual strip of flexible plastic, are fabricated from a number of plastic "links", each fitted with a soft rubber pad for additional grip. The performance is impressive, the model rapidly climbs steep slopes and obstacles. Power for the model is once again provided by electric motors. Another kit including the remote control unit that comprises of an additional motor and control panel, will be available at the end of the year price 126/-. Price for the basic kit we constructed is 99/11d.



loose Pulley is mounted on the top of the Rod.

The pole base consists of three Sleeve Pieces 65 wedged over two ½ in. Pulleys with boss mounted on a 5½ in. Rod, the Pulleys coinciding with the joints between the Sleeve Pieces. A ¾ in. Flanged Wheel 66 is clamped over the top Sleeve Piece, followed by a Collar, then the whole thing is fixed in the centre of the top deck by another Collar mounted on the Rod beneath the deck. The Bolts fixing Strips 64 to the Double Bracket are screwed into the tapped bores of yet another Collar 67 which is fixed to the top of the 5½ in. Rod.

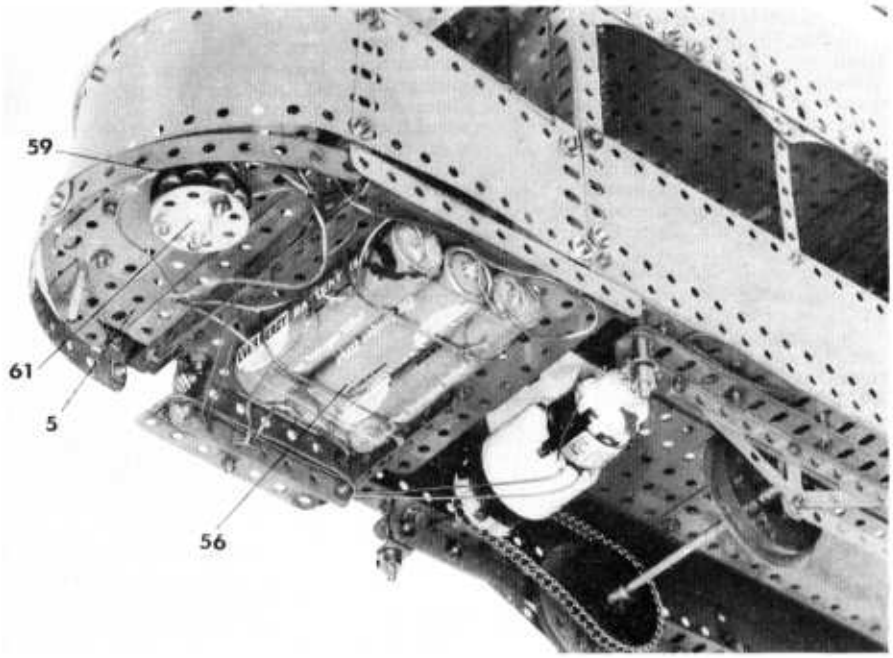
Held by Nuts in the end holes of Strips 64 is a 1 in. Screwed Rod 68 on which a Tension Spring 69 is mounted. The other end of this Spring is bolted to lower Sleeve Piece 65 to complete the model.

If required, a track can be built up from suitable Angle Girders, but the following parts list applies only to the model.

PARTS REQUIRED

6—1a	4—15a	2—74	2—179
4—1b	2—16a	4—89b	6—188
4—2a	6—17	16—90	18—189
24—3	4—20	1—94	4—191
8—5	1—20b	1—95	14—196
4—6	1—23	1—96a	1—197
20—6a	3—23a	6—103a	22—212a
8—7a	1—24	2—103d	4—213
4—8b	408—37a	2—103k	4—214
8—9	388—37e	4—109	2—216
10—9a	200—38	5—111	8—235
4—9b	1—43	1—111a	8—235a
6—11	27—48	4—111c	4—235d
1—11a	15—48a	4—113	12—235e
30—12	7—52a	4—115	
6—12b	4—53a	1—116a	1—514
6—12c	20—59	10—120b	7—544
6—13a	4—62	2—126a	1—543
2—14a	12—62b	4—137	4—561
7—15	3—70	3—163	
1 Power Drive Unit		3-3 V Batteries	

On opposite page, a wiring diagram showing the connections between the batteries, motor and controller Bush Wheels. A—Contact Studs; B—Contact Screws; C—Power Drive Unit.



Above, a complete underside view of the Tram showing construction of the driver's platform and drive from the motor to the truck.

At right, in this close-up view of the "business end" of the model, the layout of the batteries and controller Bush Wheels is clearly shown.

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 4½ × 2½ in. Flat Plates 1 bolted to two 9½ in. Angle Girders 2 with two 3 × 1½ in. Flat Plates 3 being added in the positions shown so as to leave a central winding slot. At the rear, a further two 4½ × 2½ in. Flat Plates 4 are bolted as shown to two 9½ in. Angle Girders which are then fixed, along with Girders 2, to a base, constructed from 5½ in. and 3½ 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 4½ in. Angle Girder 5, while 2½ in. Flat Girders 6 are bolted between the side Girders.

A detachable hood is now produced from 5½ in. and 3½ in. Braced Girders bolted to Angle Girders which are themselves bolted to a 5½ in. × 3½ in. Flat Plate 7. Attached to the centre of this Plate is an ornate handle made from ½ 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 ½ in. Pulley with boss is fixed on each Rod above the Plate, then the completed hood is fixed into position by four ½ 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 ½ in. Pulleys with boss, between which a ½ in. Pulley without boss 10 is sandwiched. Note that the inner ½ 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 ¾ in. Bolts each carrying a ½ 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.

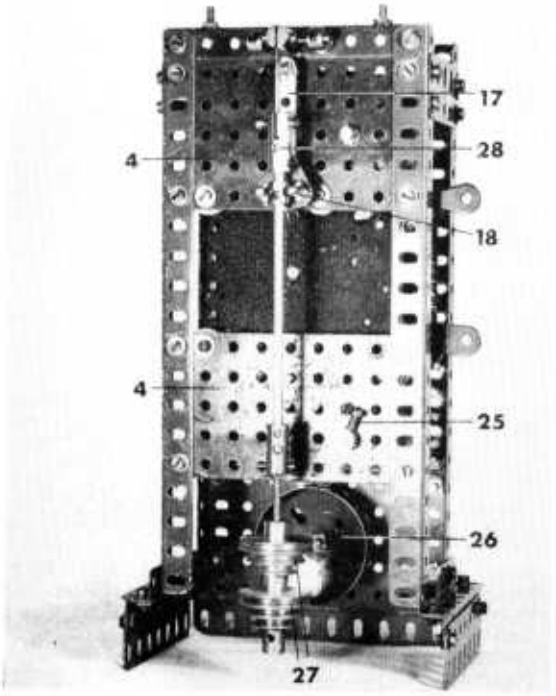
Fixed on the Motor output shaft is a 60-teeth Gear Wheel 11 which meshes with a $\frac{7}{16}$ in. Pinion mounted above it on an Elektrikit 2 in. Pivot Rod. Fixed on this Rod in turn is another 60-teeth Gear which meshes with a second $\frac{7}{16}$ in. Pinion on another 2 in. Elektrikit Pivot Rod 12 serving as the escapement rod. The escape wheel, mounted on this Rod, is a 1½ 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" escapment is produced from a 1½ 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 3½ 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.

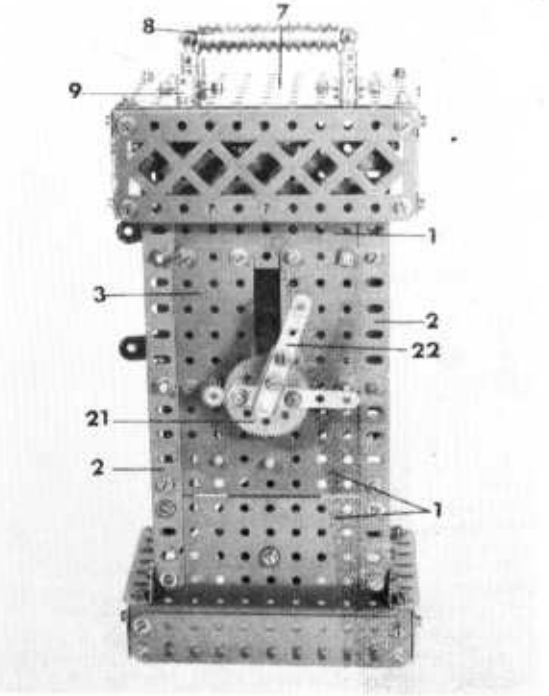
Mounted on the rear end of Rod 16, outside the casing, is a Rod Socket to which the crutch arm is fixed. This consists of a 2½ in. Narrow Strip 17 to the lower end of which a 1 in. Triangular Plate, carrying two Threaded Pins 18 as shown, is bolted. Note that extended bearings are given to Rod 16 by 1½ 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 1½ 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 ½ 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.

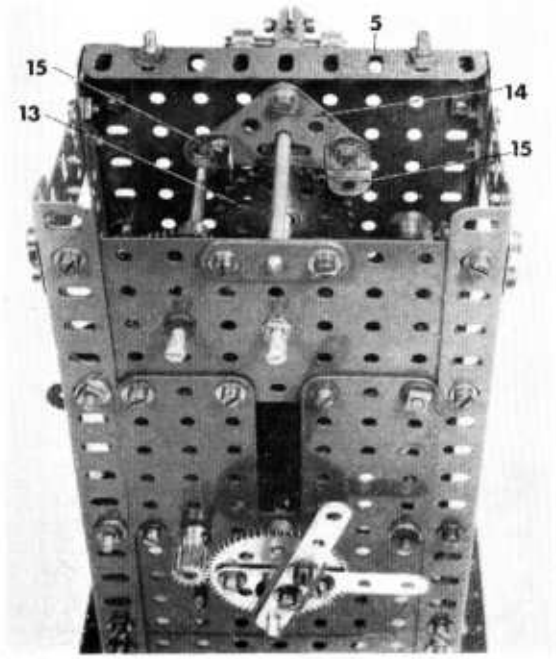
In the mesh with the "loose" gear is a further 57-teeth Gear mounted directly above it, this Gear also acting as the strike wheel, being mounted on the minute hand shaft and carrying in its face four ½ in. Bolts, the Nuts of which trip the striking lever every fifteen minutes. (The corners of the Nuts 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 ½ in. Pinion, while loose on the outside end

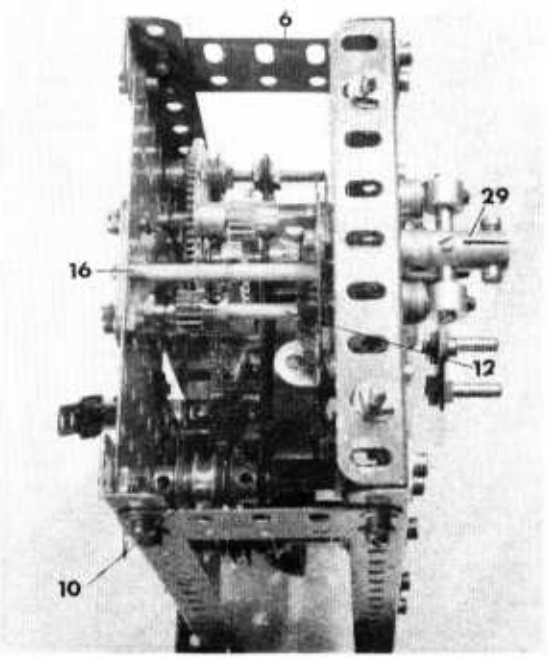


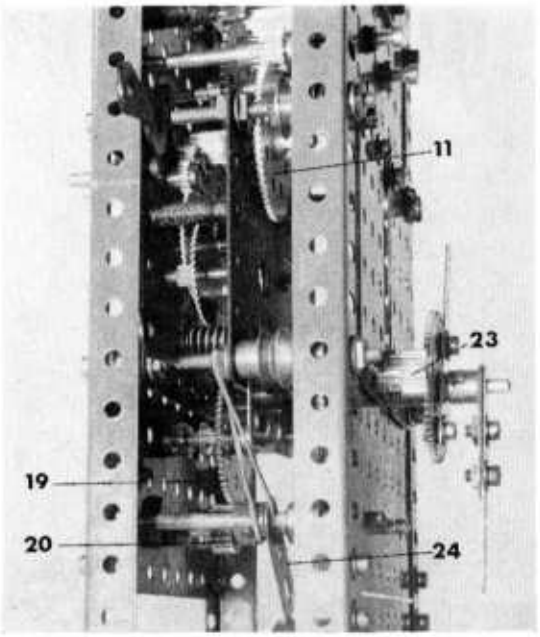
Above left, in this view of the Clock, construction of the pendulum is clearly shown. Below left, a close-up view of the Clock's escapement mechanism. The position of Angle Brackets 18 is critical.



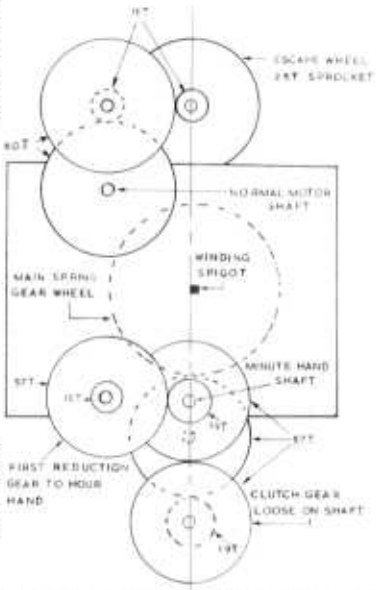
Above right, this superb Mantel Clock is powered by a No. 1 Clockwork Motor. One winding allows it to run for more than 30 hours. Below right, a top view with the upper section removed to show motor mounting.







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.

of the Rod is a 60-teeth Gear 21 to which a 2½ in. Narrow Strip is bolted and which is held in place by a Crank, itself extended by a 2½ in. Narrow Strip 22. The ½ in. Pinion inside the Plate meshes with a 57-teeth Gear on another Rod also journalled in the Motor sideplates and Plate 1. A ⅞ 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 ½ 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-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.

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—90c	3—235
13—23a	4—81	
2—26	1—95a	**Elektrikit Parts**
3—26c	4—97	1—530
4—27a	2—100	4—545
3—27d	1—103	2—549

No. 1 Clockwork Motor

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.