

# Easy Model-Building

## Spanner's Special Section for Juniors

LAST month I described two models for Outfits Nos. 0 and 1 respectively, and now I have a very attractive model of a slightly larger type specially designed for owners of Outfit No. 2. This is the Electric Truck shown in pictures Nos. 1 and 2. For those readers who are interested in building model cranes, and I know that most Meccano boys are, I am describing a simple mechanism by means of which the load hoisting and the raising and lowering of the jib can be worked from one handle, instead of the two that are normally required.

To start with the Electric Truck its main frame or chassis is made by taking a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate and bolting a Flat Trunnion 1 to each of its longer sides. Now pass a  $3\frac{1}{2}''$  Rod through the Flat Trunnions and fix two 1" Pulleys fitted with Tyres on the Rod. Bolt two  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips to the Flanged Plate, and use the same bolts to fix two  $5\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates so as to extend the Flanged Plate on each side. Strengthen the outer edges of the Flexible Plates by  $5\frac{1}{2}''$  Strips and then attach further  $5\frac{1}{2}''$  Strips 2 to Angle Brackets on each side.

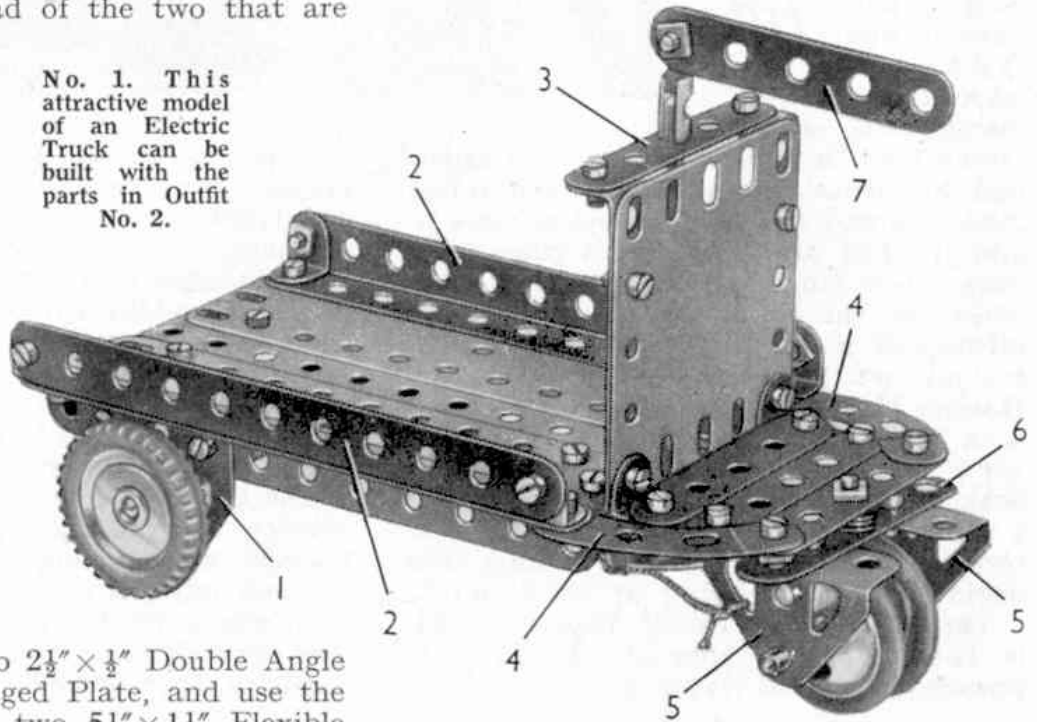
Fix a  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate to the  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips, and bolt a  $2\frac{1}{2}''$  Strip 3 to their top lugs.

To make the driver's platform, connect together three  $2\frac{1}{2}''$  Strips by means of four Fishplates, and attach it to Angle Brackets fixed to the lower ends of the  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips. Now bolt a  $2\frac{1}{2}''$  Stepped Curved Strip 4 on each side between the driver's platform and the front corner of one of the  $5\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates.

For the steerable wheels use two 1" Pulleys fitted with Rubber Rings, and

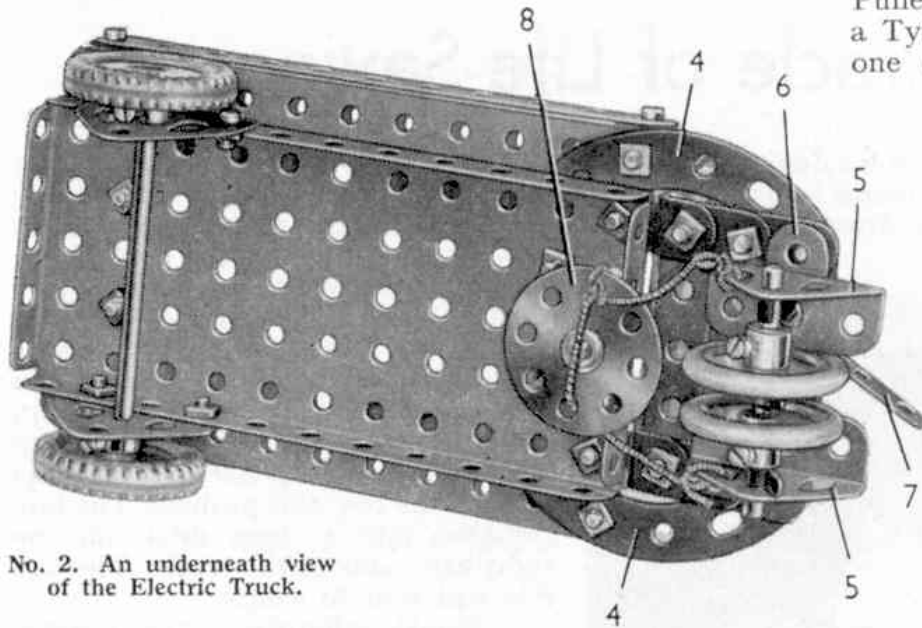
retain them on a 2" Rod by Spring Clips. Support this Rod in two Trunnions 5, bolted tightly to a  $2\frac{1}{2}''$  Strip 6. Pass a  $\frac{3}{8}''$  Bolt through the centre hole of the Strip 6 and place three Washers on it. Next screw a nut on the Bolt, but do not tighten it. Now pass the Bolt through the driver's platform and then screw a second nut tightly in place. Make sure that the Strip 6 is able to turn freely on the Bolt.

No. 1. This attractive model of an Electric Truck can be built with the parts in Outfit No. 2.



The steering mechanism is controlled by a lever 7. Take a  $2\frac{1}{2}''$  Strip and bolt it to a Rod and Strip Connector. Then fix the Rod and Strip Connector to the upper end of a  $3\frac{1}{2}''$  Rod. Support the Rod in the Strip 3 and in the  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate, and at its lower end fix a Bush Wheel 8. Tie a length of Cord to one of the Trunnions 5, pass it through one of the holes in the Bush Wheel and then through another hole in the Bush Wheel. Knot the Cord in place and then tie it finally to the second Trunnion 5.

To build the Electric Truck you will require the following parts: 4 of No. 2; 6 of No. 5; 4 of No. 10; 6 of No. 12; 2 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 3 of No. 35; 34 of No. 37a; 32



No. 2. An underneath view of the Electric Truck.

Pulleys, one of which carries a Tyre 2. The two Pulleys of one of the Rods are placed against the sides of the frame to prevent the Rod from sliding endways. One of the Pulleys on the other Rod is placed against the side of the frame also, but the second Pulley on this Rod is spaced about  $\frac{1}{2}$ " away from the side. A Spring Clip is placed on this Rod to prevent it from sliding.

of No. 37b; 3 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 1 of No. 111c; 2 of No. 126; 2 of No. 126a; 2 of No. 142c; 2 of No. 155; 2 of No. 189; 1 of No. 190; 1 of No. 212.

**A Useful Mechanism for a Crane**

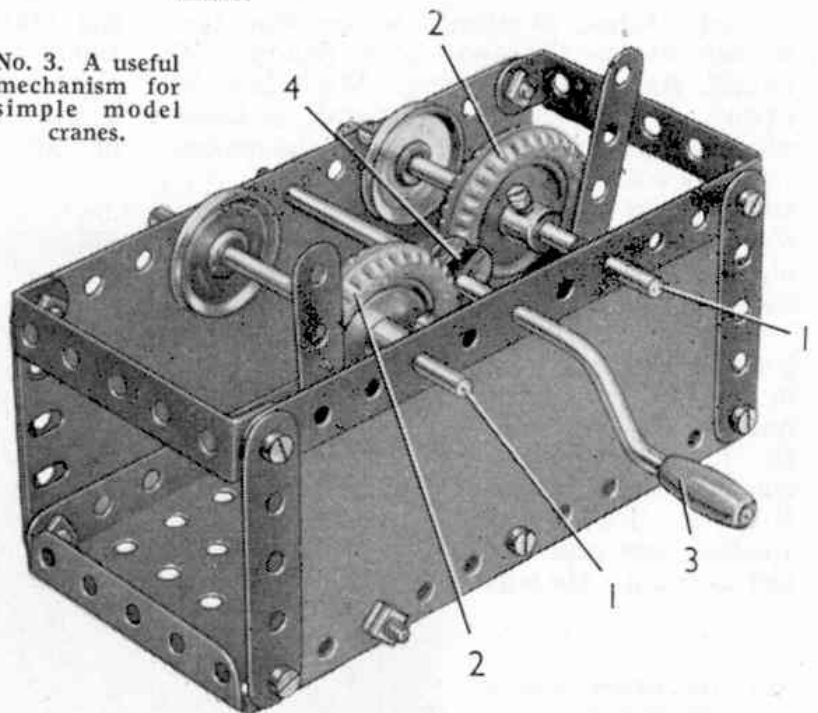
In most small model cranes two hand-operated movements are required, one to raise or lower the jib and the other to lift or lower the hook and its load. Generally a separate winding handle is provided for each movement, and of course this works quite satisfactorily. It is however, a good plan to simplify the control arrangements as much as possible, and in a crane the two movements I have mentioned can be operated by a single winding handle.

The arrangement is shown in picture No. 3. You will notice that the mechanism is supported in a frame made from  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates bolted to a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate, and strengthened by Strips and Double Angle Strips. This frame is intended to represent the lower part of the cab of a crane, but of course the design of the frame can be altered to suit any particular model you wish to build and the parts you have available.

Each of the winding shafts 1 is a  $3\frac{1}{2}$ " Rod mounted in the frame as shown, and each shaft is fitted with two 1"

A Crank Handle is supported in the frame, between the Rods 1, and on it is fixed a  $\frac{1}{2}$ " Pulley 4. The Crank Handle is able to slide endways slightly, until the Pulley 4 is pressed against one or other of the Tyres 2. Thus if you push the Crank Handle to the left the  $\frac{1}{2}$ " Pulley presses against one Tyre, and when the Crank Handle is slid to the right its  $\frac{1}{2}$ " Pulley presses against the other Tyre. When the Pulley is in contact with either one of the Tyres the drive is sent to the winding shaft on which that Tyre is fixed. A brake to prevent each shaft from turning except when required is made in the way I described in the May M.M. You will remember that this brake is simply a Strip lock-nutted to the frame so that it can be moved against the Tyre on the winding shaft.

No. 3. A useful mechanism for simple model cranes.



# Among the Model-Builders

By "Spanner"

## A Front Wheel Drive Mechanism

Fig. 1 on this page shows an efficient front wheel drive axle suitable for use in models such as four wheel drive Army vehicles. The axle is fitted with a differential mechanism, and the arrangement enables the wheels to be fully steerable when the vehicle is in motion.

The crown wheel of the differential fitted in this mechanism is a  $1\frac{1}{2}$ " Contrate 1, which is mounted freely on the Rod forming one of the half-shafts. A  $\frac{3}{4}$ " Contrate 2 is fixed on the same Rod and two 1" Screwed Rods are fixed by two nuts each in diametrically opposite holes in the Contrate 1. The inner end of the

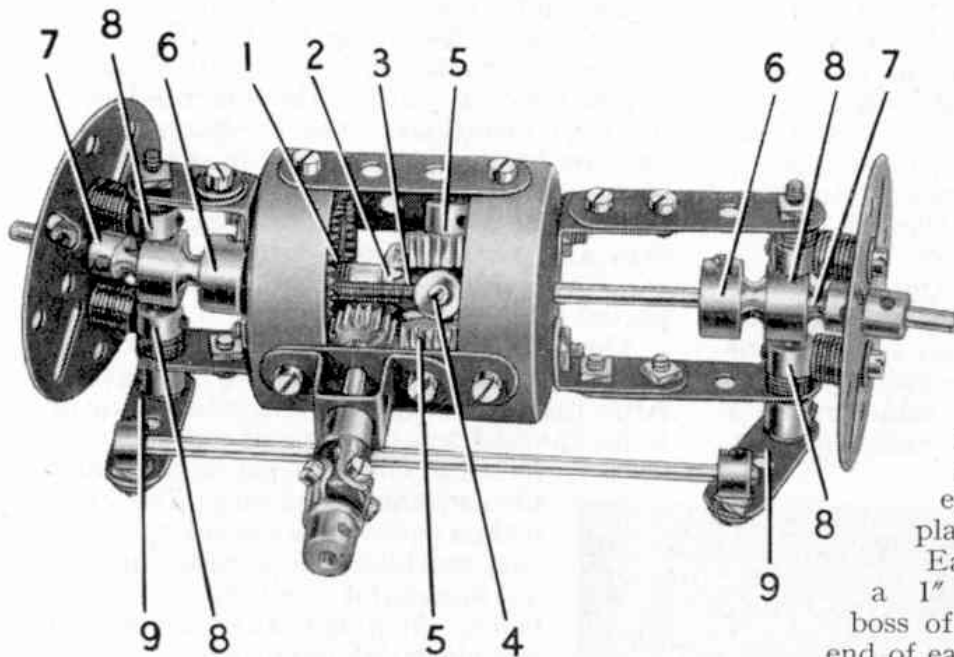


Fig. 1. The front wheel drive mechanism that is described in detail on this page.

half-shaft passes into one end of the bore of a Coupling 3, in the centre cross hole of which a  $1\frac{1}{2}$ " Rod 4 is fixed. This Rod is gripped at each end in a Collar screwed on to the end of one of the Screwed Rods.

Two  $\frac{3}{4}$ " Pinions 5 turn freely on Pivot Bolts screwed into the Coupling 3. The Pinions engage the Contrate 2 and another similar Contrate fixed on a Rod that forms the second half shaft.

The complete differential is mounted

in a casing made from two Boiler Ends connected by four 2" Strips. One of the Strips is spaced from the Boiler Ends by two Washers on each of the Bolts that hold it in place, and to this Strip is bolted a Double Bent Strip.

The driving gear is a  $\frac{1}{2}$ " Pinion that engages the Contrate 1. The Pinion is fixed on a  $1\frac{1}{2}$ " Rod mounted in the Double Bent Strip and the 2" Strip. Washers are placed on the Rods to ensure that the

Contrates and the Pinions mesh accurately.

The differential casing is extended on each side by two  $1" \times \frac{1}{2}"$  Angle Brackets bolted to the Boiler Ends. Those on one side have their slotted holes covered by Fishplates, and to those on the other side two 2" Strips are bolted. A Collar is fixed to the outer end of each half shaft and on it is placed a Socket Coupling 6.

Each front wheel is fixed on a 1" Rod supported in the boss of a Face Plate. The inner end of each Rod carries a Handrail Coupling 7 that fits into the end of one of the Socket Couplings 6. Each Handrail Coupling is fitted with a  $\frac{7}{32}"$  Grub Screw screwed into the threaded hole opposite to the standard Grub Screw provided in the rounded end. The two Grub Screws are tightened against each other so that they cannot come unscrewed, and the projecting head of the  $\frac{7}{32}"$  Grub Screw engages the slot in the Socket Coupling. This arrangement permits the Handrail Couplings to pivot in the Socket Couplings as the front wheels are steered, although they rotate as a unit owing to



B. A. Crack, Bury St. Edmunds, one of the many model-builders who have been successful in "M. M." Model-Building Competitions.

the engagement of the Grub Screws in the slots.

Two  $\frac{1}{2}$ " Bolts are passed through each Face Plate and each is fitted with Washers before it is screwed into a Collar 8. The upper Collar on each side is fixed on a Threaded Pin, and the lower Collar is held on a 1" Rod. Cranks 9 on the 1" Rods are connected by a Rod fixed in two Collars, each of which is screwed on to a bolt held by a nut in one of the Cranks.

**A Made-up Bush Wheel**

Some time ago I received a letter from P. M. Slotkin, High Wycombe, Bucks, who owns a No. 6 Outfit and is a very keen model-builder. During the course of his model-building activities he has found occasional need for an extra Bush Wheel



Fig. 2. A built-up bush wheel based on an idea of P. M. Slotkin, High Wycombe.

and carries a Collar between the arms of the Double Bent Strip. Bolts are then passed through the side holes of the Double Bent Strip and are screwed into the Collar to grip the Rod.

**An Outstanding Model**

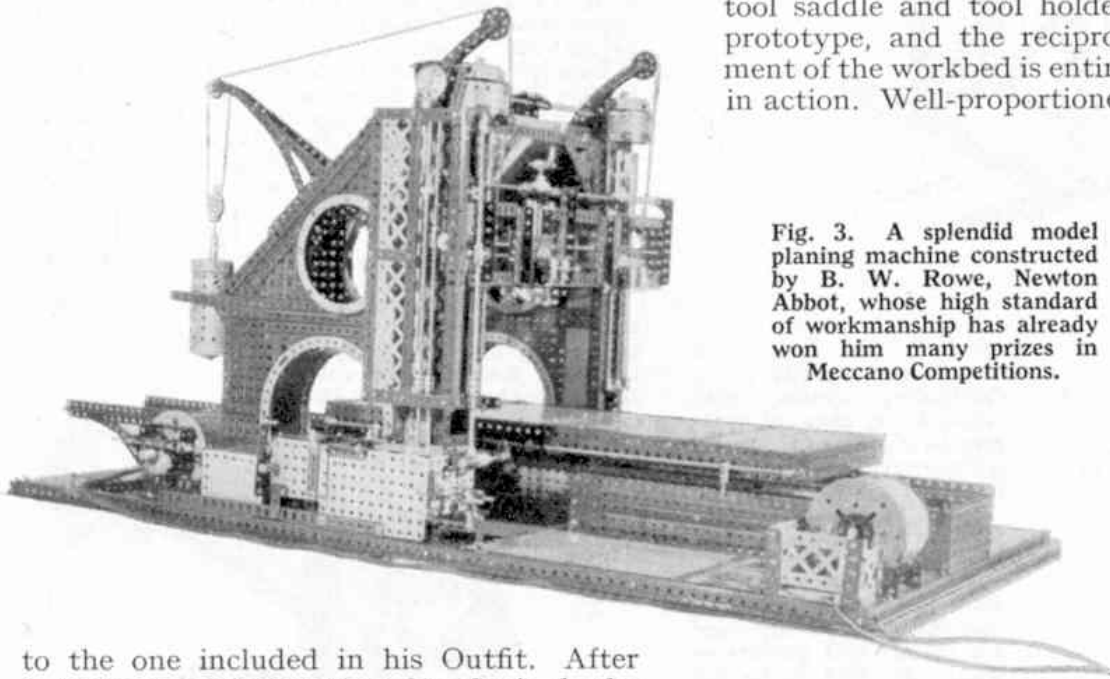
Models of the less common subjects are always interesting, especially when they have such a realistic appearance and display such excellent workmanship as the model of a large planing machine built by our old friend B. W. Rowe, Newton Abbot, which is illustrated on this page. I do not remember ever having seen a better model of this type and readers may be interested to know that

it is based on a machine manufactured by John Stirk and Sons, Halifax, which was illustrated in the *M.M.* some years ago.

Operated by two Electric Motors, the model has all the essential movements, tool saddle and tool holder feeds of its prototype, and the reciprocating movement of the workbed is entirely automatic in action. Well-proportioned, neatly and

sturdily constructed, the model is altogether an outstanding example of Meccano construction, and well up to the standard I have come to expect from this very enthusiastic

Fig. 3. A splendid model planing machine constructed by B. W. Rowe, Newton Abbot, whose high standard of workmanship has already won him many prizes in Meccano Competitions.



to the one included in his Outfit. After a little experimentation he devised the simple arrangement seen in Fig. 2, and he sent details of it to me in the belief that other model-builders might find the scheme useful in similar circumstances, when the lack of a proper Bush Wheel might hold up their activities.

The arrangement is quite simple and is made by bolting a Double Bent Strip to a Wheel Disc. Either the eight-hole Wheel Disc or the new Wheel Disc with six holes can be used for this purpose. A Rod is passed through the centre hole of the Wheel Disc and the Double Bent Strip,

and experienced model-builder. The saddle is counterweighted by means of Boilers filled with odd parts and has helical gearing situated in the housings at the tops of the columns.

The twin tool saddles are independently controlled from the main distribution box, and the main horizontal saddle is raised and lowered by a screw mechanism consisting of  $11\frac{1}{2}$ " Screwed Rods.

The machine will actually plane blocks of soft material such as wax and is nearly 4 ft. in length and over 2 ft. in height.

# New Meccano Model

## A Fascinating Designing Machine

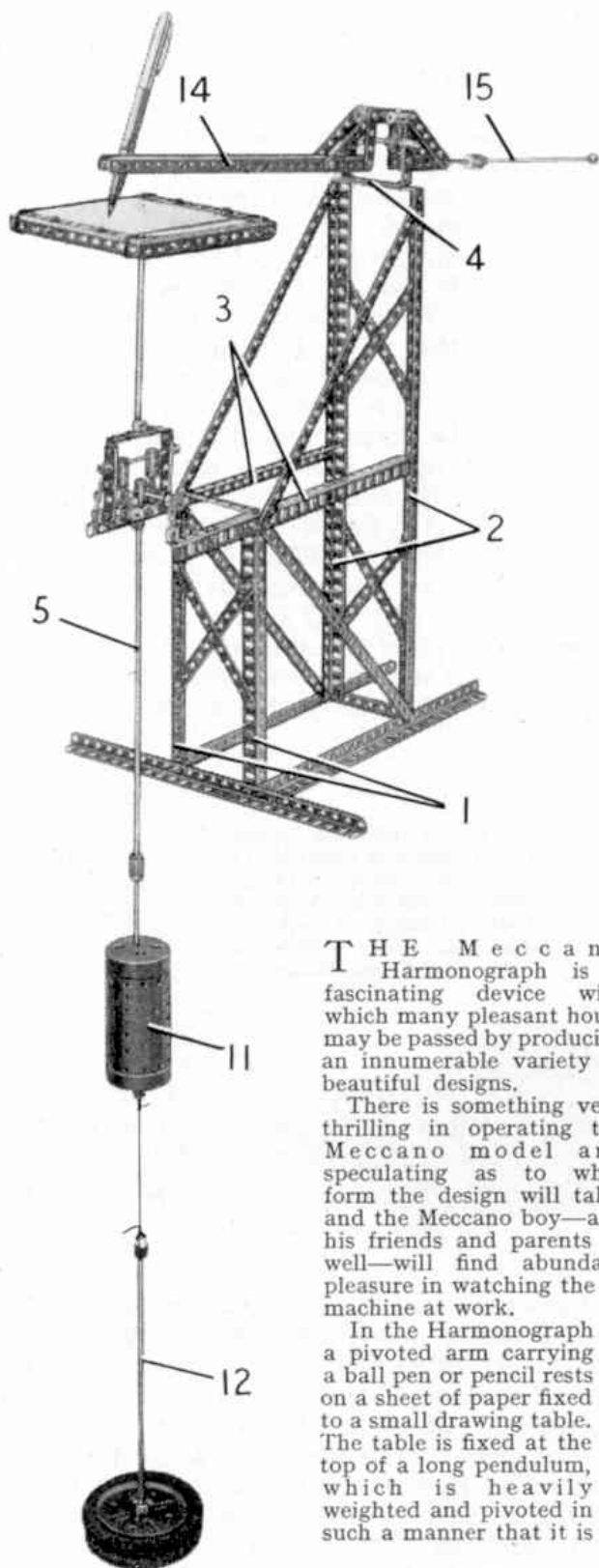


Fig. 1. This interesting machine will produce patterns by tracing the movements of a swinging compound pendulum.

THE Meccano Harmonograph is a fascinating device with which many pleasant hours may be passed by producing an innumerable variety of beautiful designs.

There is something very thrilling in operating the Meccano model and speculating as to what form the design will take, and the Meccano boy—and his friends and parents as well—will find abundant pleasure in watching the machine at work.

In the Harmonograph a pivoted arm carrying a ball pen or pencil rests on a sheet of paper fixed to a small drawing table. The table is fixed at the top of a long pendulum, which is heavily weighted and pivoted in such a manner that it is

free to move in any direction when the pendulum is set swinging. As the table moves the pen traces on the paper a design. The design varies according to the direction and extent of the movement of the pendulum and some of these assume very intriguing and beautiful forms. Further variety can be produced by varying the mass of the weight and by altering the length of the pendulum. Also if instead of only one pendulum, two or more are employed and so arranged that their combined movements operate the same pencil the resultant designs become much more complex and beautiful.

The Harmonograph is so simple that the youngest child can obtain successful results. All that is necessary is to clamp a sheet of white paper to the table of the machine using Driving Bands, fit a ball pen to the pivoted arm and then set the pendulum rod and weights swinging.

Construction of the model is begun by assembling a simple but strongly braced frame to support the pendulum and table and the pen arm. The main uprights of this frame are two  $9\frac{1}{2}$ " Angle Girders 1 and two  $18\frac{1}{2}$ " Angle Girders 2 (Fig. 1). These are connected at the base by a  $3\frac{1}{2}$ " Strip and three  $12\frac{1}{2}$ " Angle Girders, and two  $12\frac{1}{2}$ " Angle Girders 3 are bolted between the Girders 2 and the top ends of Girders 1. A  $3\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip 4 is fixed between the upper ends of Girders 2 and the frame is braced by  $5\frac{1}{2}$ " and  $12\frac{1}{2}$ " Strips.

Two  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips, each fitted with a Double Arm Crank are connected by two  $2\frac{1}{2}$ " Strips. A  $6\frac{1}{2}$ " Rod is held in the upper Double Arm Crank and to its top end is fixed a Bush Wheel. The latter is bolted to two  $5\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips, which are attached to two of the four  $5\frac{1}{2}$ " Angle Girders that form the table to which the paper is fixed. The face of the table is filled in with three  $5\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates. An  $11\frac{1}{2}$ " Rod 5 is held in the lower Double Arm Crank and forms part of the pendulum.

The frame that supports the table and pendulum is mounted universally, which means that it is free to move in all directions, on special bearings designed to reduce friction to the minimum. These are known as "knife-edge" bearings, and they make use of the Meccano Centre Fork. A

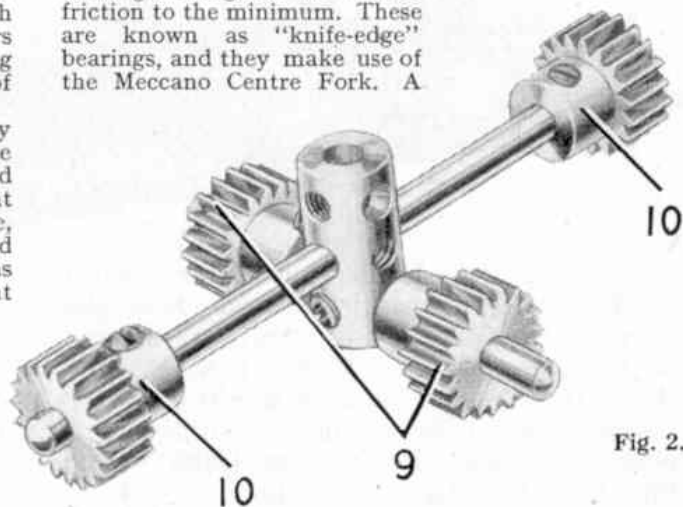


Fig. 2.

close-up view of the arrangement of these bearings is shown in Fig. 3 and it will be seen that a Centre Fork 6 is held in a Rod Socket fixed to each of the Girders 3. Two further Centre Forks 7 are held in Couplings fastened on a  $3\frac{1}{2}$ " Rod, and this Rod is fixed in Double Arm Cranks 8 bolted to the pendulum and table frame. The other section of the knife-edge bearing unit is

shown separately in Fig. 2. Two  $\frac{1}{2}$ " Pinions 9 are fixed on a 2" Rod held in a Coupling that supports also a  $3\frac{1}{2}$ " Rod that carries two  $\frac{1}{2}$ " Pinions 10. The Pinions 10 rest on the Centre Forks 6, and the Centre Forks 7 are arranged so that their prongs are located between the teeth of the Pinions 9.

The Rod 5 is extended by an 8" Rod connected to it by a Coupling, and a Boiler 11 is placed on this Rod. The lower end of the Rod carries an End Bearing and this is connected by Cord to another End Bearing on an  $11\frac{1}{2}$ " Rod 12. Two 3" Pulleys with Tyres are fixed on Rod 12 to form bob weights, and the Boiler 11 should be heavily weighted by placing in it any suitable parts left over when the model is completed. This arrangement forms a compound pendulum, and when the two weights on it are set swinging in different directions they impart a complicated motion to the drawing table above them.

The centre section of the pen arm consists of two  $2\frac{1}{2}$ " Strips 13 connected by two Double Brackets, and fitted at each end with 2" and 3" Strips as shown. The lower ends of the 2" Strips also are connected by Double Brackets, and on one side the 2" and 3" Strips support two  $12\frac{1}{2}$ " Strips 14. The 2" and 3" Strips on the other side are connected by  $2\frac{1}{2}$ " Strips, the outer ends of which are joined by a Double Bracket. An  $11\frac{1}{2}$ " Rod 15 is held by Collars in the Double Brackets at this end of the pen arm.

The pen arm also is mounted on knife-edge bearings, as shown in Fig. 4. Two  $\frac{1}{2}$ " Pinions 16 are fixed on a  $3\frac{1}{2}$ " Rod held in Cranks bolted to a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Double Angle Strip attached to Double Angle Strip 4. Two Couplings 17, one on each side, are fixed on 2" Rods passed through the pen arm, but spaced from it by Washers on the Rods. A Centre Fork held in each Coupling rests between the teeth of one of the Pinions 16.

A ball point pen is placed between the ends of Strips 14, and two  $\frac{3}{4}$ " Bolts, passed through holes in the Strips, are used to clamp the pen in position. A sliding balance weight 18, which in our model is a  $\frac{1}{2}$ " diam.  $\frac{3}{4}$ " face Pinion, is placed on Rod 15, so that when the weight is moved to the outer end of the Rod the pen is raised clear of the table. By sliding the weight inward the pen is lowered until it rests on a

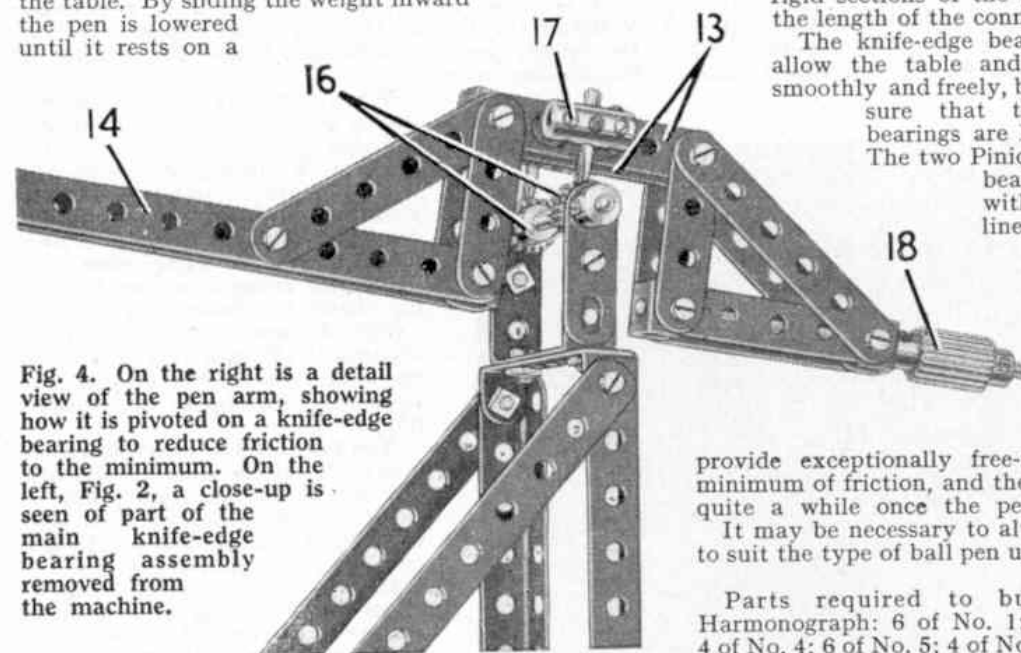


Fig. 4. On the right is a detail view of the pen arm, showing how it is pivoted on a knife-edge bearing to reduce friction to the minimum. On the left, Fig. 2, a close-up is seen of part of the main knife-edge bearing assembly removed from the machine.

sheet of paper clamped to the table by Driving Bands.

To operate the model first the pen should be raised clear of the paper, and then the pendulum should be set swinging. Then the pen can be brought into contact with the paper when it will commence to trace a pattern governed by the swing of the pendulum. The swing can be varied in many ways by making use of the compound

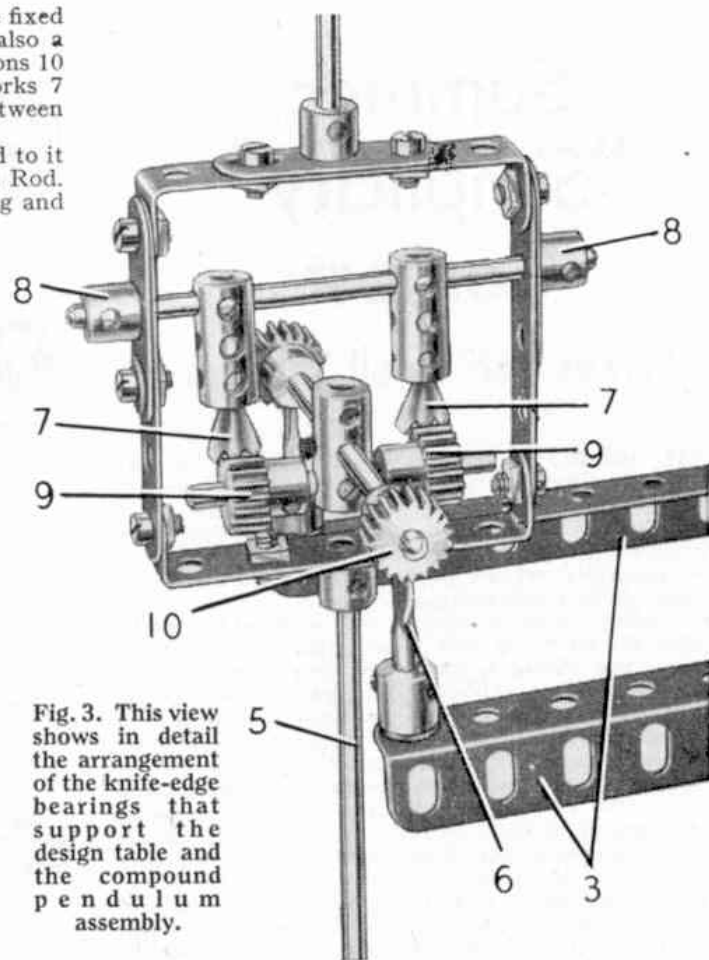


Fig. 3. This view shows in detail the arrangement of the knife-edge bearings that support the design table and the compound pendulum assembly.

pendulum with its two weights, and further variety can be introduced by altering the values of the weights and by adjusting the relative lengths of the two rigid sections of the pendulum, or by altering the length of the connecting Cord.

The knife-edge bearings used in the model allow the table and the pen arm to move smoothly and freely, but it is necessary to make sure that the components of the bearings are lined up very accurately.

The two Pinions that form part of each bearing must be arranged with their teeth exactly in line, and the prongs of the Centre Forks must be parallel to the teeth while the Centre Forks themselves must be in line with each other. If the parts are assembled carefully they

provide exceptionally free-moving bearings with a minimum of friction, and the model should operate for quite a while once the pendulum starts its swing.

It may be necessary to alter the value of weight 18 to suit the type of ball pen used.

Parts required to build the Twin-Elliptic Harmonograph: 6 of No. 1; 6 of No. 2; 2 of No. 3; 4 of No. 4; 6 of No. 5; 4 of No. 6; 2 of No. 7a; 5 of No. 8; 2 of No. 8a; 4 of No. 9; 4 of No. 11; 3 of No. 13; 1 of No. 13a; 1 of No. 14; 3 of No. 16; 3 of No. 17; 2 of No. 19b; 1 of No. 24; 6 of No. 26; 1 of No. 26b; 72 of No. 37a; 70 of No. 37b; 40 of No. 38; 1 of No. 40; 1 of No. 47; 2 of No. 48a; 1 of No. 48b; 2 of No. 48d; 3 of No. 59; 2 of No. 62; 4 of No. 62b; 6 of No. 63; 6 of No. 65; 2 of No. 111; 2 of No. 142b; 1 of No. 162; 2 of No. 166; 2 of No. 179; 2 of No. 186c; 3 of No. 192.