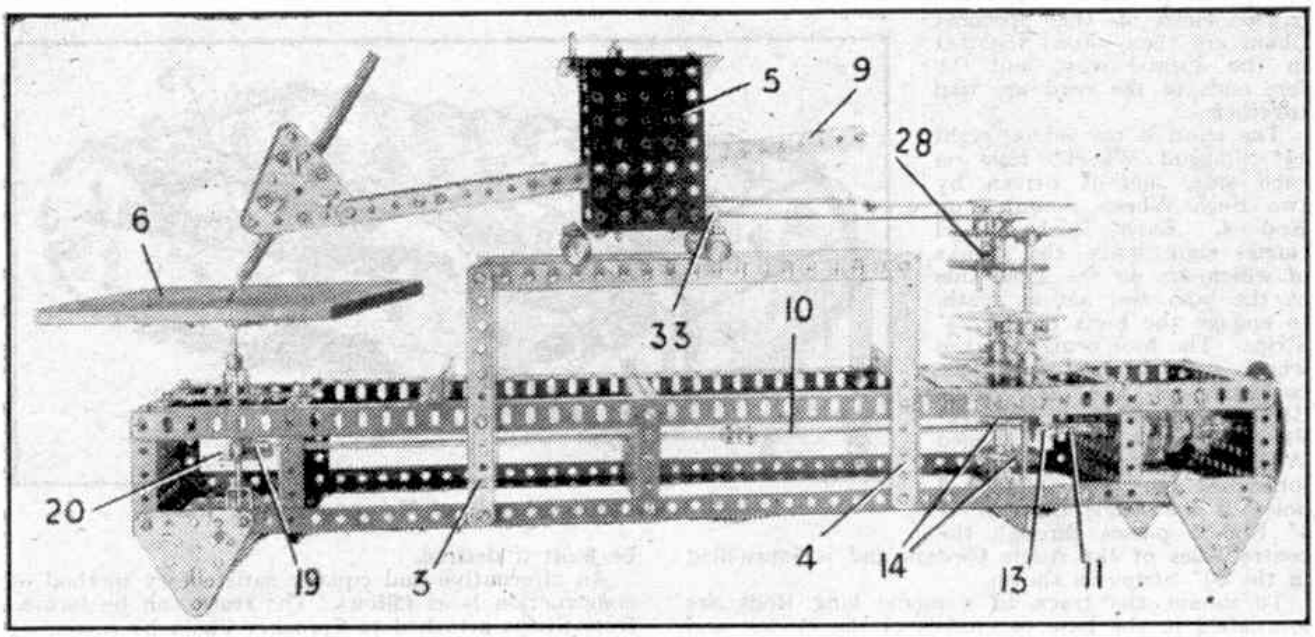


Fig. 1. A general view of the new Meccanograph. This fine machine produces hundreds of fascinating designs, examples of which are shown at the foot of this page.

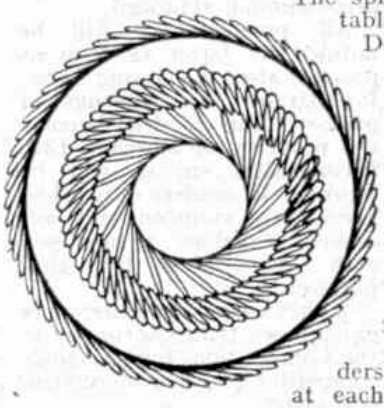
A New Meccanograph

Fascinating Designs Produced Automatically

THE Meccanograph continues to be one of the most popular among the limitless number of models that can be built from Meccano. For the benefit of new readers we may explain that a Meccanograph is a designing machine by means of which it is possible to produce hundreds of fascinating and beautiful symmetrical patterns such as those shown at the foot of this page, which are actual productions of the Meccanograph described in this article. Several different forms of Meccanograph have been described in the "*M.M.*" in the past, and this month we are able to give details of yet another that possesses several unique features and is capable of producing an even greater variety of beautiful patterns than any of the machines dealt with previously.

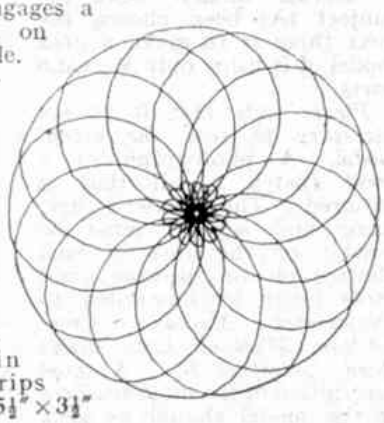
The model is built entirely from Meccano parts and is constructed as follows. The frame consists of four 18½" Angle Girders bolted to the corners of five 5½"×2½" Flanged Plates which are spaced in the frame as shown. Another 5½"×2½" Flanged Plate 1, Fig. 2, is bolted at the upper side of the frame to provide bearings for the Rods of the operating heads. A 5½" Angle Girder 2 serves a similar purpose for the lower ends of these Rods.

The spindle of the drawing table 6 is journalled in Double Bent Strips bolted to 2½" Strips, which in turn are fixed to the two 5½"×2½" Flanged Plates at the front end of the model. Four 2½" Triangular Plates bolted to the lower 18½" Angle Girders of the frame serve as legs. Two 5½" Angle Girders 3 and 4 are bolted at each side of the frame in the positions shown, and at their upper ends are bridged by two 9½" Angle Girders that form running rails for the travelling carriage 5.



The drives to the table 6 and the crown heads 7 and 8, which operate the carriage 5 and pen arm 9, are arranged as follows. Referring to Fig. 2 a compound rod 10 which runs the full length of the model carries a 57-teeth Gear, a 50-teeth Gear, 1" Gear, ¾" Pinion and ½" Pinion in that order. These are arranged to mesh with the following gears on a Rod 11, which are arranged in the following order, commencing from the rear end of the model; ½" Pinion, ¾" Pinion, 1" Gear, 50-teeth Gear and 57-teeth Gear. Outside the frame of the model Rod 11 is fitted with a Sprocket 12, and on its inner end is a ½" Pinion 13 that engages either of two 1½" Contrates 14 fixed on a shaft 15. Rod 15 carries also above the Flanged Plate a ½" Pinion, a 57-teeth Gear and a 2½" Gear in that order. The Rods of Crown heads 7 and 8 each carry a ½" Pinion 16, a 57-teeth Gear 17 and a 2½" Gear 18. These gears are all fixed on their Rods, but those on the centre Rod 15 are normally free, only one of them being fixed as desired, when operating the model. The Rod 10 drives the drawing table through a Worm 19, Fig. 1, which engages a 57-teeth Gear fixed on the shaft of the table.

The travelling carriage and the pen arm are constructed as follows. The framework of the carriage consists of two 3½"×2½" Flanged Plates to which two 5½"×3½" Flat Plates are bolted. The axles are journalled in Double Angle Strips fixed to the lower 5½"×3½"



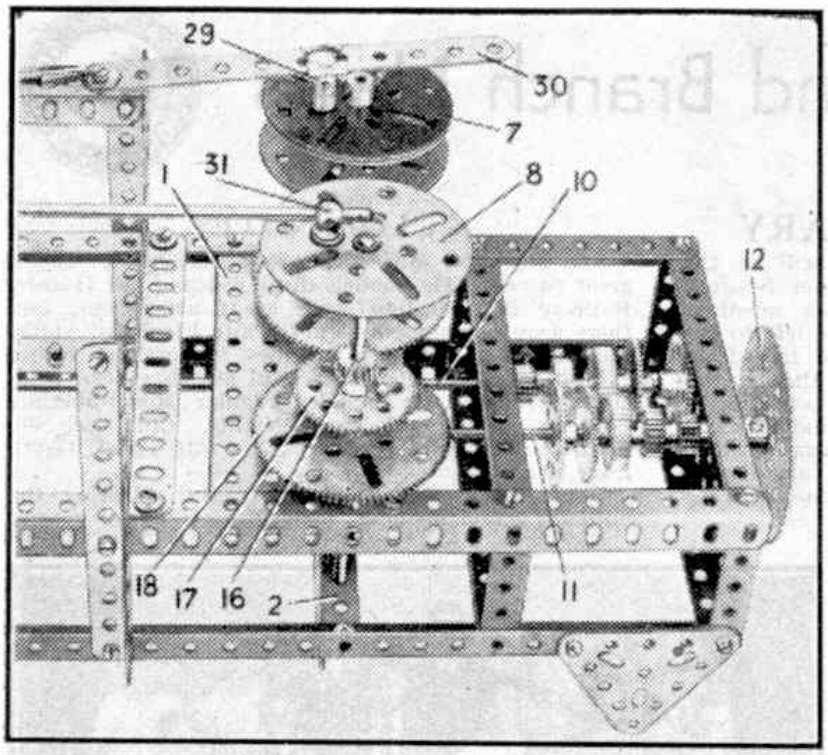


Fig. 2. The "crown heads" and main driving gears of the new Meccanograph.

Flat Plate and they each carry two ½" loose Pulleys as shown. Washers are used to space the Pulleys the correct distance apart to run freely on the flanges of the Angle Girders as seen in Fig. 3.

A Channel Bearing 21, Fig. 3, is bolted to a Bush Wheel 22 and it carries two Slide Pieces (Part No. 50) which pivot freely on Bolts locked in their bosses. A Large Fork Piece 23 is also bolted to the Channel Bearing, and to the Bush Wheel 22 is fixed a Handrail Support 24. The whole of this unit is mounted freely on a 4½" Rod 25, which can be journalled in any of the holes in the upper and lower Flat Plates of the carriage. A Crank 26 is fixed to the upper end of Rod 25 and a Threaded Pin 27 is provided to lock the crank to the frame of the carriage, which is necessary in producing some types of designs. The crownhead 7, Fig. 2, which operates the side to side movement of the pen arm, consists of four Face Plates bolted in pairs back to back and mounted on a Rod about 1" apart as shown. The holes in the two pairs of Face Plates must be opposite to each other, so that a 1½" Rod 28 Fig. 1 can be passed through any of them. This Rod carries a Slide Piece 29 Fig. 2, and in this slides a 5½" Strip 30, which is joined by a Rod and Strip Connector to a Rod fixed in the Handrail Support 24 of the pen arm pivot (see Fig. 3).

The crown head 8 is a single Face Plate in which is pivoted freely a Handrail Support 31. This holds a Rod 32, the other end of which passes through and is gripped in a further Handrail Support 33 fixed to the lower Flat Plate of the carriage as seen in Fig. 1.

The pen arm consists of two 12½" Strips carrying at their front ends two 1½" Triangular Plates between which the tracing pen is gripped. The Strips pass through Slide Pieces pivoted to the Channel Bearing, and their rear ends are drawn together by a long Bolt and nut. This completes the constructional details of the model and when the Sprocket 12 is connected to a Motor it is ready for working.

The infinite variety of designs that can be produced on this machine are made possible by the wide range of alternative gearing that can be employed in the drives to the crown heads and the table. Any one of the gears on Rod 11 can be selected as the driver, and this should be fixed to the shaft, the other gears on this shaft being allowed to run freely. All the gears on Rod 10 should be fixed to the shaft. Further variations in design can be produced by using either of the two Contrates 14 in mesh with Pinion 13. Only one Contrate must be meshed at one time. The gears on the shafts of the crownheads 7 and 8 should all be fixed permanently to their Rods, but two of the three Gears on Rod 15 should be left free, only one of the three being fixed to the shaft at any time. The one to be fixed can, of course, be selected and varied as desired. Considerable variation is also possible by altering the holes in which the Rod 25 of the pen arm pivot is journalled.

It will also be found that great differences in the designs are produced by altering the length of the pen arm merely by sliding the 12½" Strips in the Slide Pieces, and by varying the lengths of the coupling rods 32 between the crown head 8 and the travelling carriage, and of the Rod connecting the crown head 7 with the pen arm pivot.

The designs are best drawn with a fountain pen or a special pen made from a piece of glass tube about ¼" dia. and 6" long. The tube is gripped by pliers at each end and the centre portion is held over a gas flame until it softens, when it is stretched until it becomes a very fine tube. This is broken at the centre to form two drawing pens, the ends of which are rounded off by holding them in the flame. The pen is loaded with ink by means of a fountain pen filler.

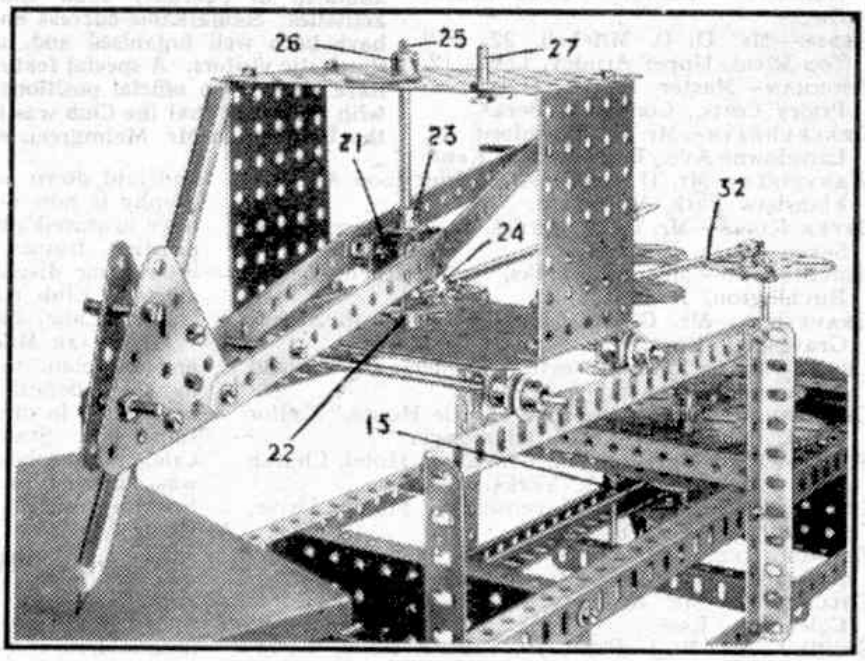


Fig. 3. A "close-up" view of the travelling carriage and the pen arm pivots.