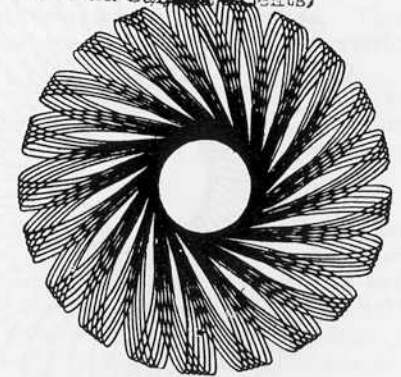


The Meccanograph

Australia 6d.

(Overseas 4d Canada 3 Cents)

A Wonderful Meccano Model that will draw hundreds of beautiful designs



This is one of the perfectly symmetrical designs that can be produced with the Meccanograph in the space of a few minutes, merely by turning the handle.

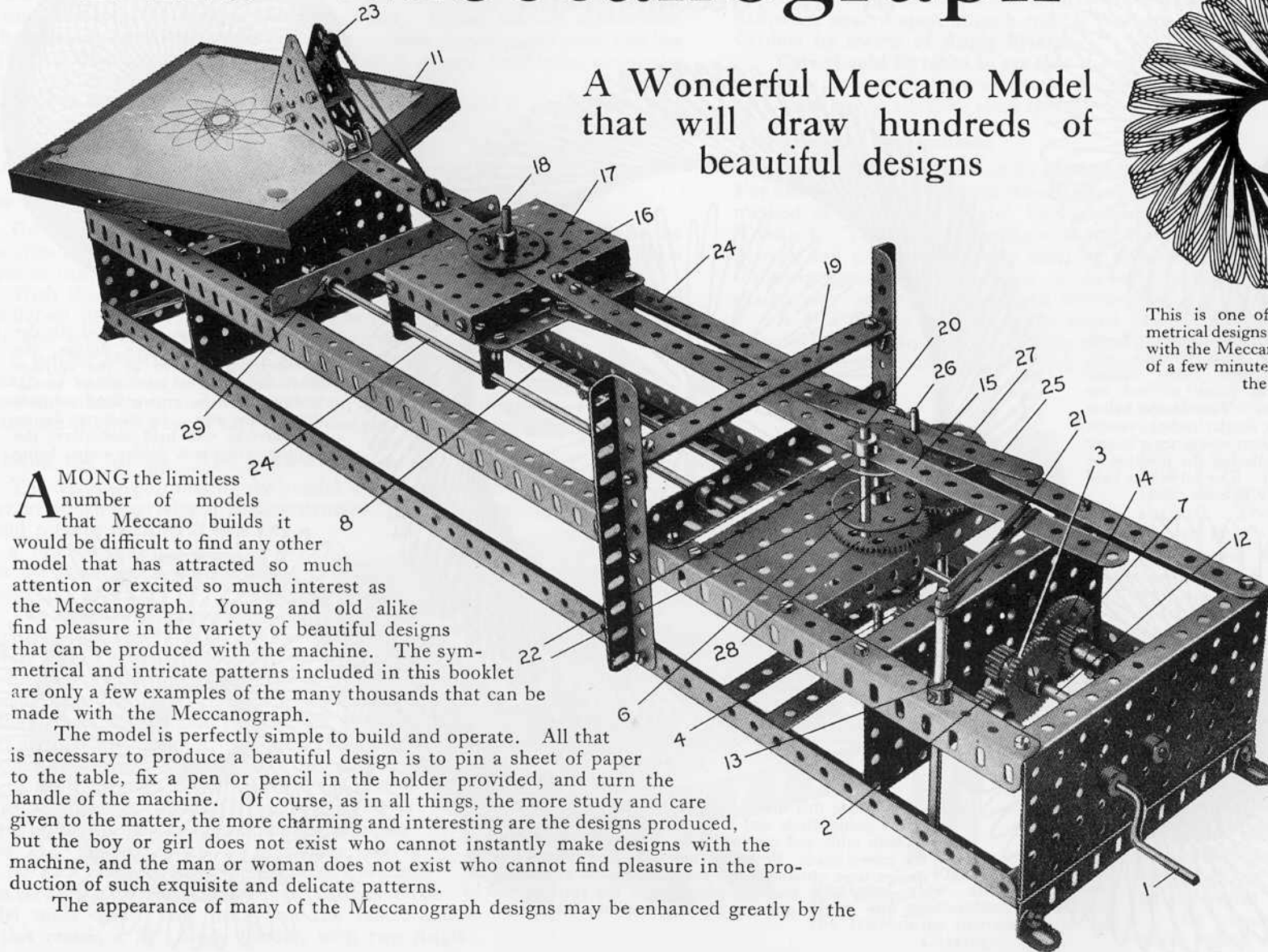


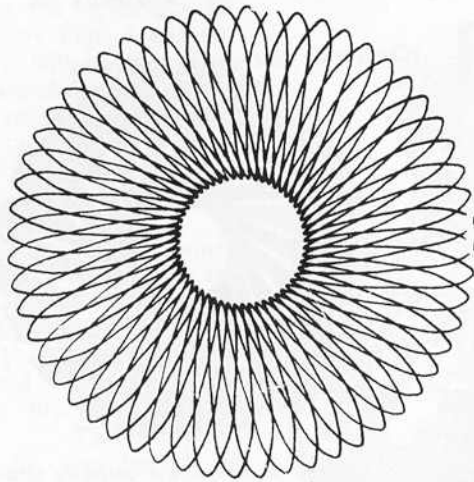
Fig. 1. General view of the Meccanograph, showing pen just completing a design.

AMONG the limitless number of models that Meccano builds it would be difficult to find any other model that has attracted so much attention or excited so much interest as the Meccanograph. Young and old alike find pleasure in the variety of beautiful designs that can be produced with the machine. The symmetrical and intricate patterns included in this booklet are only a few examples of the many thousands that can be made with the Meccanograph.

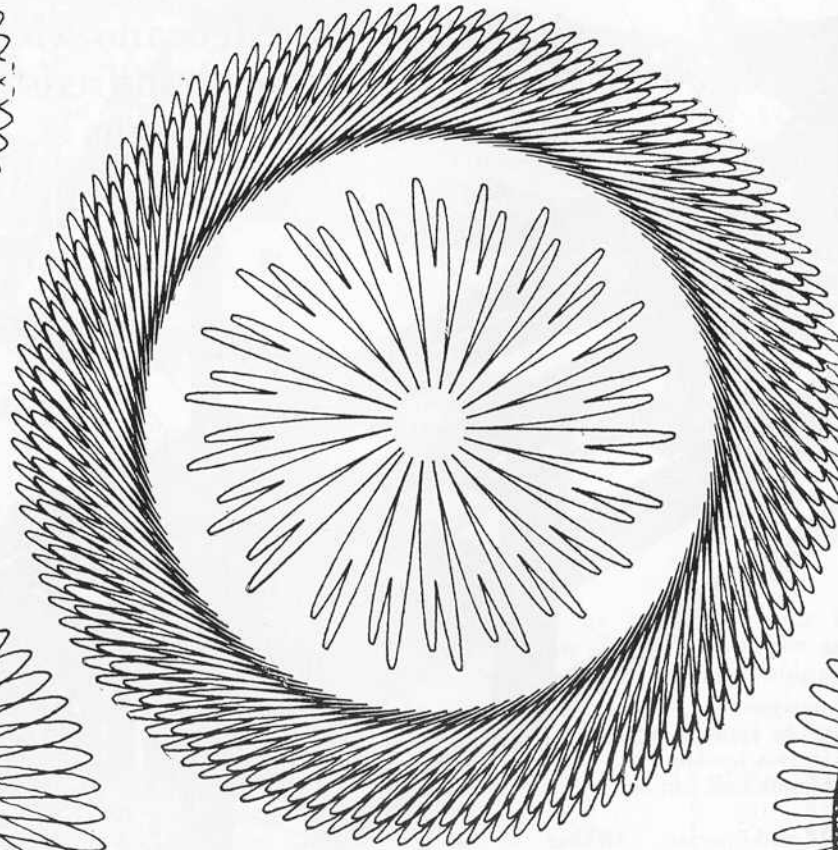
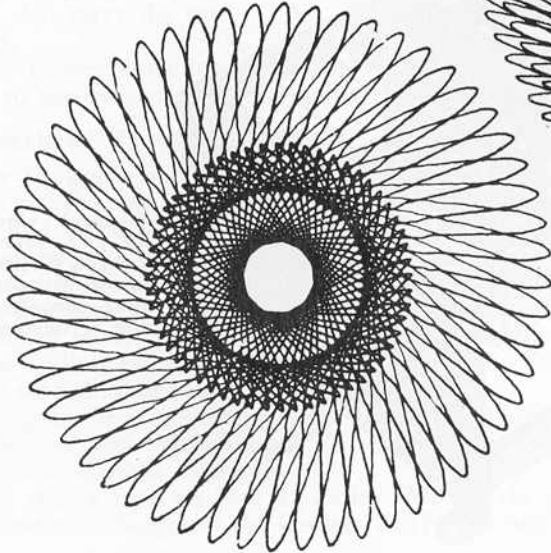
The model is perfectly simple to build and operate. All that is necessary to produce a beautiful design is to pin a sheet of paper to the table, fix a pen or pencil in the holder provided, and turn the handle of the machine. Of course, as in all things, the more study and care given to the matter, the more charming and interesting are the designs produced, but the boy or girl does not exist who cannot instantly make designs with the machine, and the man or woman does not exist who cannot find pleasure in the production of such exquisite and delicate patterns.

The appearance of many of the Meccanograph designs may be enhanced greatly by the

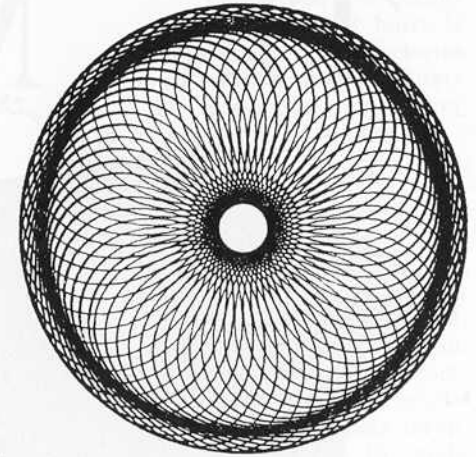
A few Specimen Designs produced by the Meccanograph



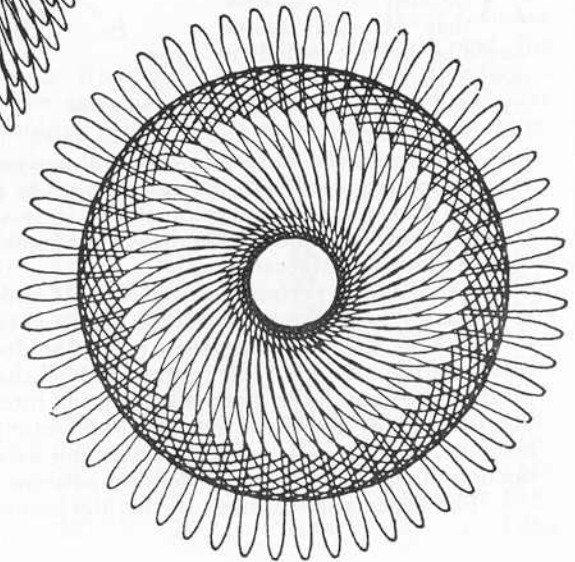
The design shown above was produced by rotating the table through one revolution, the pen being caused simultaneously to move to and fro across the paper. The design below was obtained by similar means, except that the writing arm was given a longer movement (by altering the position of the carriage pin). The table was held stationary in each case.



To produce this design the table was secured in position on its guide Rods and a fairly rapid movement imparted to both table and crown head. Two pins were placed in the crown head. Both the outer and inner portions of the design were obtained with exactly the same arrangements, excepting only that the positions of the carriage and of the pin in the drawing arm were changed slightly.



In order to obtain a series of circular lines as in the above design, the traversing movement of the carriage must be brought into action simultaneously as the crown head actuates the drawing arm. In the lower design the carriage was held stationary, the writing arm and table only being actuated.



use of coloured inks, particularly where combination designs are made, or spaces in the designs may be filled in with water colours.

On the more serious side the machine may be applied to the production of designs suitable for crochet work, decorative glass work, embroidery, etc. In fact the possibilities of the machine are unlimited. It is wonderfully exciting to watch the designs being produced. Unless various adjustments in the machine have been made according to some pre-arranged plan, one has no idea of what the design will be like until it is seen developing under the moving pen or pencil.

This is a model of more than ordinary interest and it is our hope that every Meccano boy will build it. The fascination that it affords can only be appreciated by those who have seen it in operation. There appears to be no limit whatever to the variety and beauty of the designs that may be produced.

How it Works

On turning the handle 1 (Fig. 1) the table 11 is caused to revolve. At the same time the writing arm 16 is actuated by the Rod 20, which functions like a tappet or cam, and the pen is moved to and fro across the table.

With these two movements it is possible to produce an amazing number of different designs merely by varying the relative speed of operation of the table and arm, or by altering the position of the arm, etc.

A further movement may be given to the writing arm by causing the carriage 17 to slide to and fro along the guide Rods 24. This produces almost any number of still more elaborate and intricate designs. There are also many other ways of varying the designs, as will be explained later.

Building the Model: The Framework

The various portions of the model are described in the order in which they should be constructed. The framework should present no special difficulty, but a brief description to supplement the illustrations will no doubt be useful.

The rectangular frame consists principally of four $24\frac{1}{2}$ " Angle Girders bolted at the ends to $5\frac{1}{2}$ " by $2\frac{1}{2}$ " Flanged Plates. The gear box is formed from the front end Plate and another Plate of the same type bolted a short distance away from it. A fourth Plate is bolted in a similar manner near the table end of the machine. The bearings for the tappet mechanism consist of two parallel $5\frac{1}{2}$ " Strips, placed one hole apart and bolted to the two lower $24\frac{1}{2}$ " Angle Girders of the frame, and a $5\frac{1}{2}$ " by $2\frac{1}{2}$ " Flanged Plate bolted directly above them across the two upper $24\frac{1}{2}$ " Angle Girders. The model must stand very firmly on the table, and for this reason a $5\frac{1}{2}$ " Angle Girder, with two Angle

Brackets attached, is bolted flange downward to each end Plate.

The framework is completed by bolting in position the two Girders that carry the guide Rods 24, and the bridge 19, which supports the moving end of the writing arm. The bridge consists of two $5\frac{1}{2}$ " Angle Girders bolted in a vertical position as shown and connected together by two $5\frac{1}{2}$ " Strips. These Strips are spaced apart at each end by Washers, and are bolted to the vertical Girders by means of Angle Brackets.

Care should be taken to see that the writing arm is capable of sliding very smoothly and easily between these Strips. On the other hand, too much play must not be allowed, since this would produce shaky lines in the designs.

The Driving Mechanism

The mechanism operated by the handle 1 may now be placed in position. For most purposes the Crank Handle affords the simplest and most satisfactory method of driving the model, but a Meccano Electric Motor may be used if desired. The speed of the Motor should be reduced considerably by suitable gearing and an efficient means must be provided for stopping the Motor or throwing the model out of gear at the exact instant required, otherwise a design may be spoilt by the pen overstepping the lines.

A $\frac{3}{4}$ " Pinion 2 secured to the Crank Handle 1 engages with a 50-teeth Gear Wheel on the Rod 12. This same Gear Wheel 3 drives another $\frac{3}{4}$ " Pinion 7 on the Axle Rod 8, which extends the whole length of the model and drives the table by means of the mechanism to be described later. Secured to the Rod 12 is a $\frac{1}{2}$ " Pinion that meshes with a $1\frac{1}{2}$ " Contrate Wheel 5 (Fig. 5) fastened to the vertical shaft 6. The latter carries the crown head 22 and is caused to transmit motion to another vertical Rod by means of two 57-teeth Gear Wheels 28.

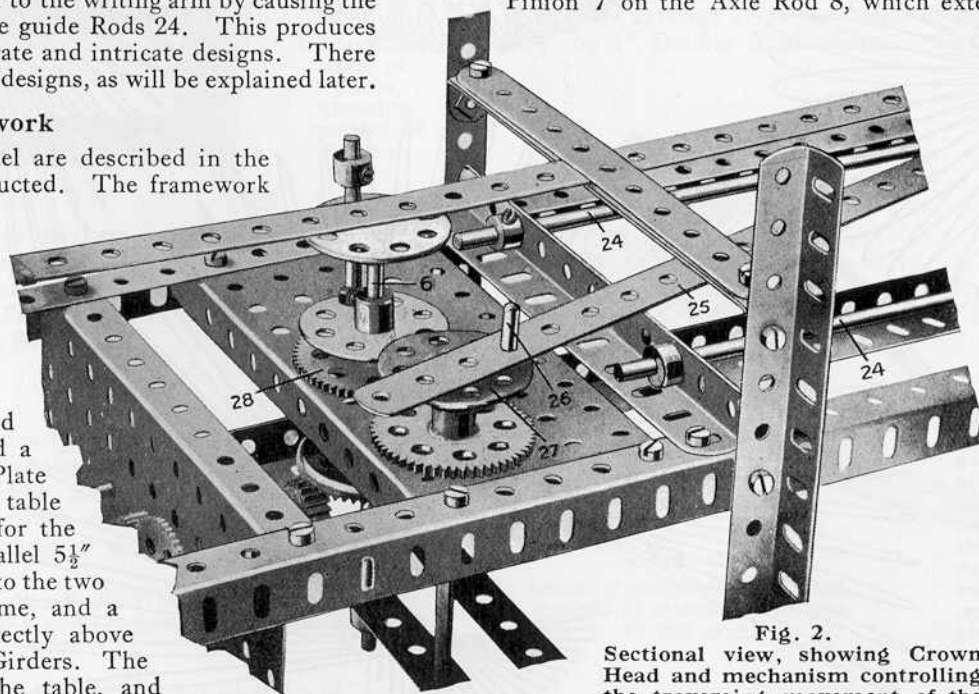


Fig. 2.
Sectional view, showing Crown Head and mechanism controlling the traversing movement of the Carriage.

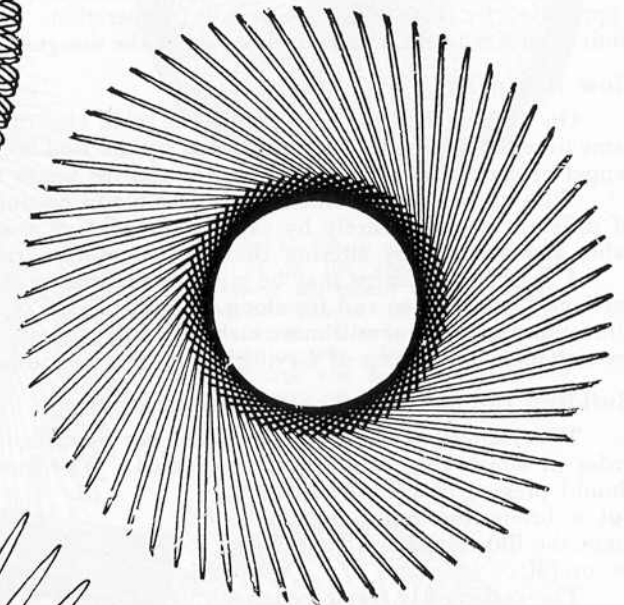
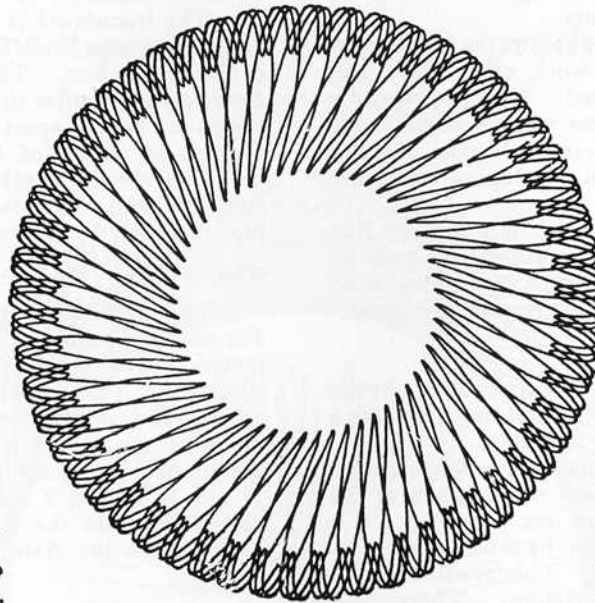
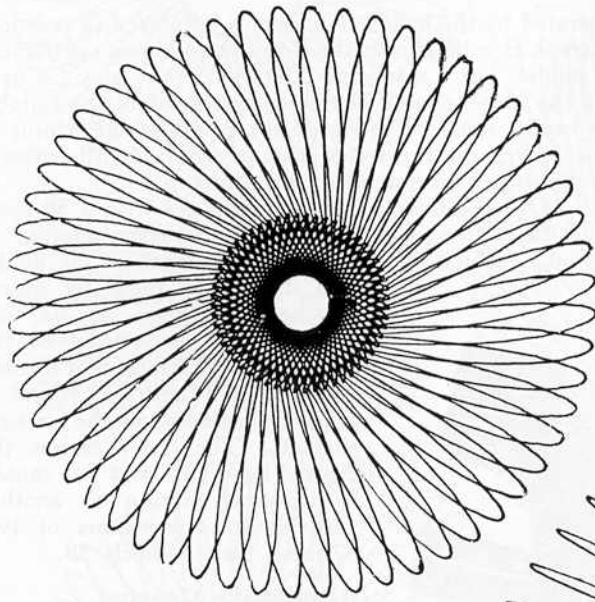
Alternative Gearing

The speed of the table can be altered without affecting the rest of the mechanism by removing the Pinion 7 (Figs. 1 and 5) and securing the 57-teeth Gear Wheel 14 so that it meshes with the $\frac{1}{2}$ " Pinion 13 on the Rod 12. If this alteration is made the table will then rotate much more slowly and an amazing difference in the designs will be the result.

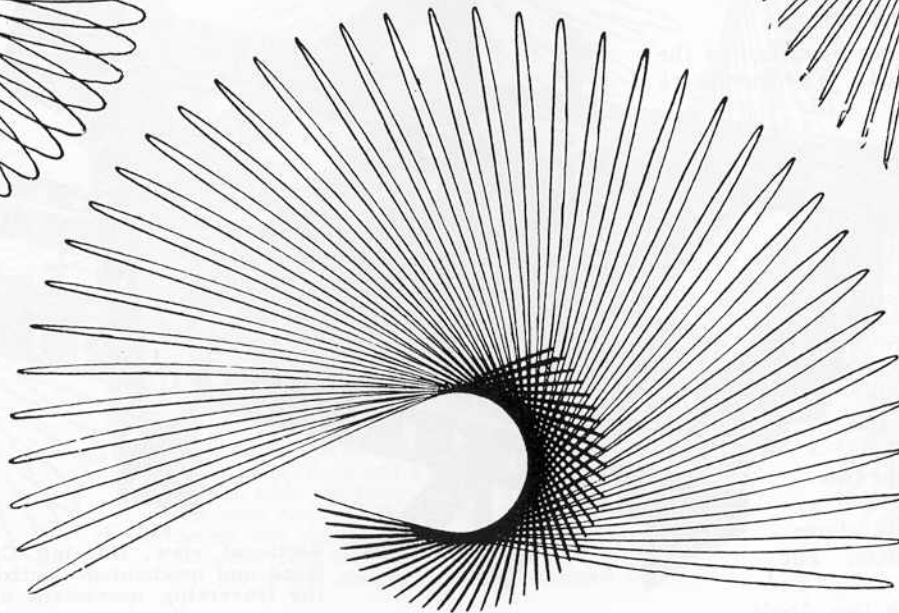
Of course, there are many other speed ratios that may be

Apart from the fascination in producing Meccanograph Designs, there is another attraction:—

The Designs may be used for Decorative Pottery-work, Crochet-work, Embroidery, D'Oyleys, etc., etc.



The design at the top of this page was produced with the gear ratio shown in Fig. 1, but the table was secured in position and three pins were arranged at equal distances apart in the crown head. Two or three revolutions of the table are necessary. The design shown immediately above, and also the other two patterns included on this page, were obtained with the carriage held stationary on its guide Rods.



A fairly rapid motion was given to the crown head to produce the above design, while the table was turned very slowly. The fan-shaped design on the left is the result of giving the arm a long traversing motion, its pivot being placed in the centre of the carriage and well back along the drawing arm. The table was rotated through little more than half a revolution.

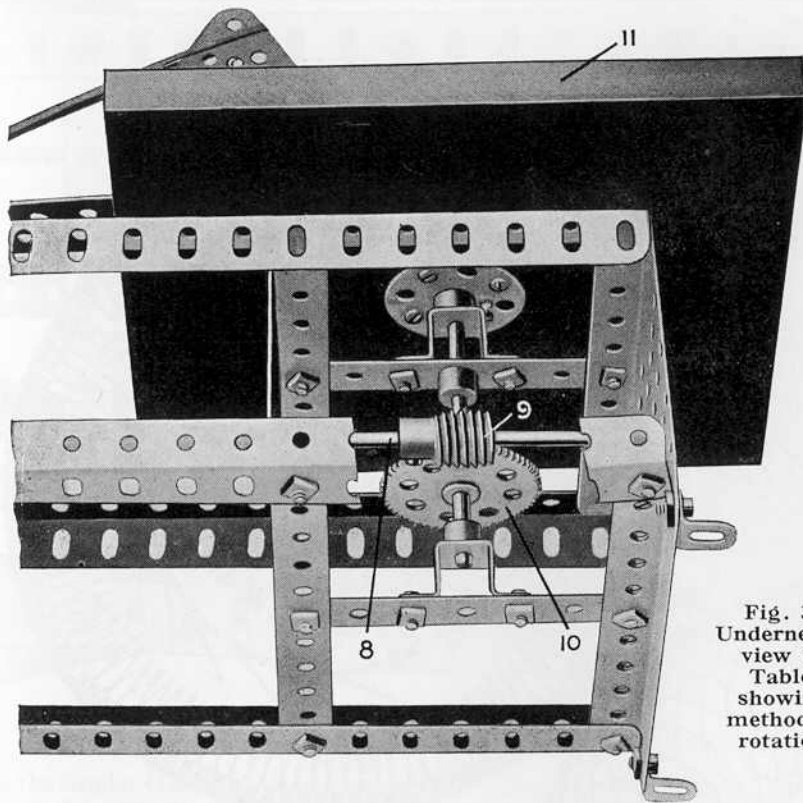


Fig. 3.
Underneath
view of
Table,
showing
method
of rotation.

obtained from Meccano gears. A few of them are explained in Section I of the Standard Mechanisms Manual, and any alteration in the speed in one of the driving shafts will produce a whole set of new designs. The relative speeds of the shafts 12 and 6 (Fig. 5) may be varied by using a smaller Contrate Wheel at 5 or by substituting Bevel Gears. The number of possible gear combinations is limitless.

The Crown Head

The crown head 22 is shown clearly in Figs. 1 and 2. It is formed from two Bush Wheels secured one above the other on the Rod 6 and adjusted so that the holes of the uppermost wheel are exactly opposite those of the lower wheel. A 2" Rod 20 passes through a hole in each Wheel and forms the crown head pin. Its lower end rests on the face of the 57-teeth Gear Wheel 28.

Several pins may be mounted in the Bush Wheels. The addition of a single pin or any alteration in its position will result in an entirely new design.

The Writing Arm

This part of the model is built up from a 12½" Strip 15 and a 9½" Strip 16 overlapped three holes and bolted together. The arm is pivoted to the

carriage 17 by means of a short Rod 18 passed through opposite holes in the Flanged Plates forming the carriage. The pin 18 may also be passed through any hole in the pencil arm. An alteration in its position, even by a single hole, will alter the design.

As already explained the Strip 16 is guided between the 5½" Strips 19. It is caused to bear continuously against the Rod 20 of the crown head by the pulling action of an elastic band 21, which is attached to the upper end of a vertical Rod 13 mounted in the Girders at one side of the frame, as shown in Fig. 1. If desired a piece of Spring Cord may be used instead of the elastic band.

As the crown head rotates the Rod 20 acts as a cam or tappet and causes the writing arm to move to and fro about its pivot 18 on the carriage 17, thereby causing the pen 23 to move across the paper on the table 11.

The pen holder, which is attached to the end of the Strip 16, is formed from two 2½" Triangular Plates secured together by Double Brackets 31. The pen or pencil is clamped between the foremost Double Bracket at 31 and another Double Bracket bolted at 32. It also rests against a fourth Double Bracket 32 and is held steadily in position by an elastic band 33, one end of which is attached to an Angle Bracket 34 bolted to the arm 16. Spring Cord may be used in place of the elastic, if desired, of course.

The Operation of the Carriage

The carriage 17 is composed of two 3½" by 2½" Flanged Plates and two 2½" by 1" Double Angle Strips. The end holes of the latter slide on the horizontal 11½" Rods 24. A 3½" Strip is bolted to the front of the carriage by means of two Angle Brackets, and at the centre of this Strip the 9½" Strip 25 is pivoted by a bolt and lock nuts (see Standard Mechanism No. 263).

One of the holes in the Strip 25 is slipped over a Threaded Pin 26 secured to the Bush Wheel 27, the shaft of which is rotated by means of a 57-teeth Gear Wheel meshing

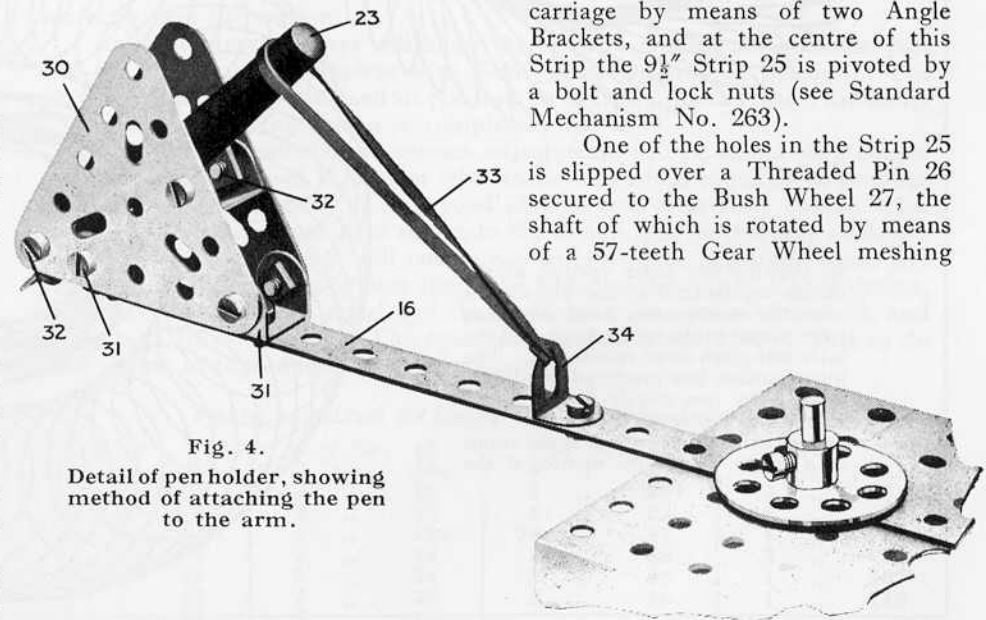
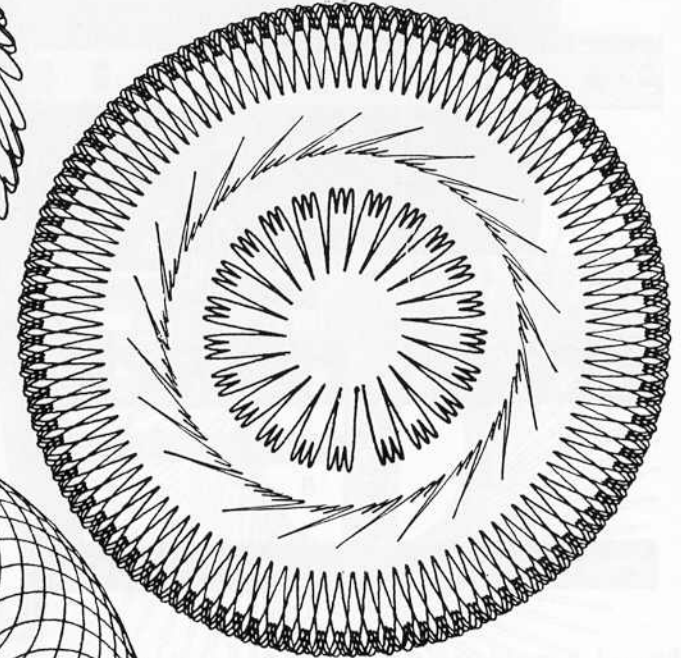
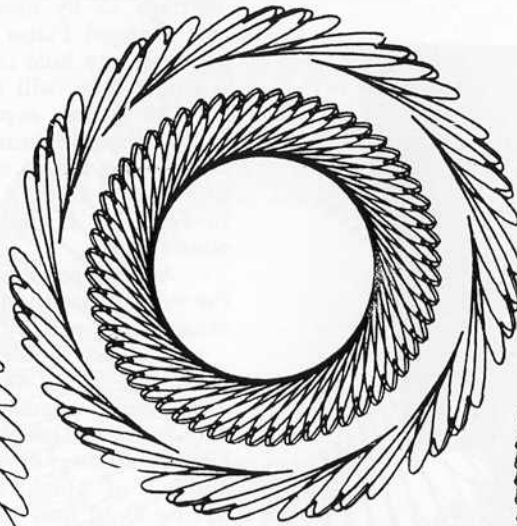
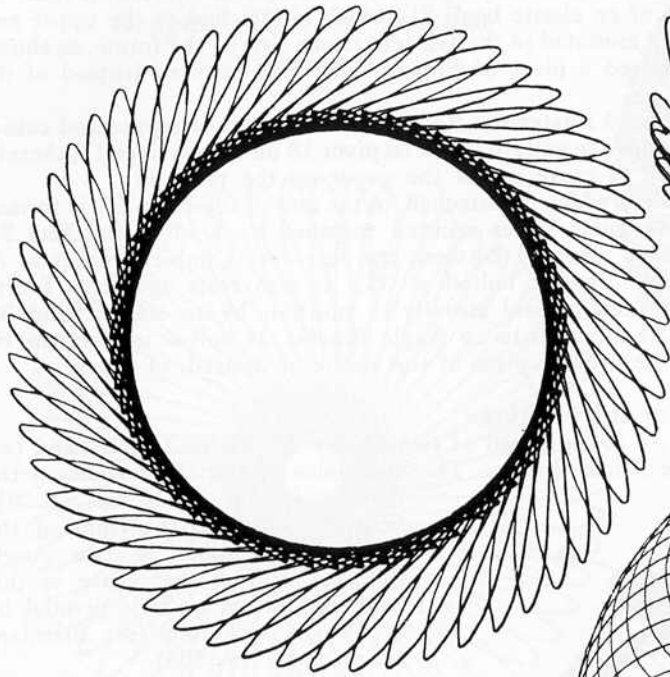


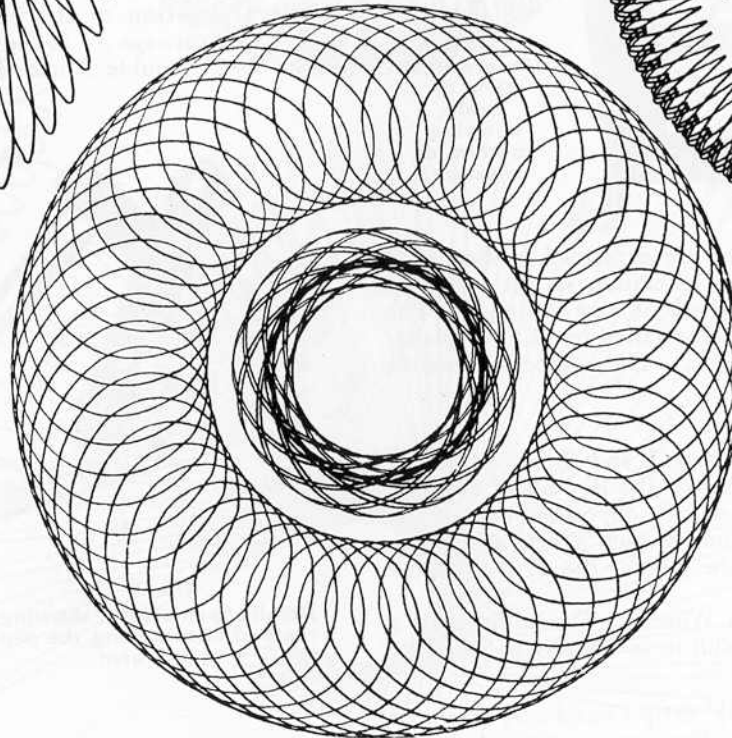
Fig. 4.
Detail of pen holder,
showing
method of attaching the pen
to the arm.

*Any Meccano Boy can
produce these designs—*

*—and thousands more
all equally beautiful*



In drawing the outer portion of the design reproduced at the top of this page the carriage was fixed, two pins were placed in the crown head, and the table was given three revolutions. The inner portion was produced by similar means, the pen merely being moved nearer the centre of the paper. The pattern immediately above is the result of a simple to-and-fro motion of the pen.



In this case (above) three distinct operations were necessary. The carriage was held stationary for each operation and three pins were placed in the crown head. The variations in the pattern were obtained merely by altering the position of the carriage pin. The symmetrical design on the left was obtained by a sliding movement of the carriage combined with a traversing movement of the pen.

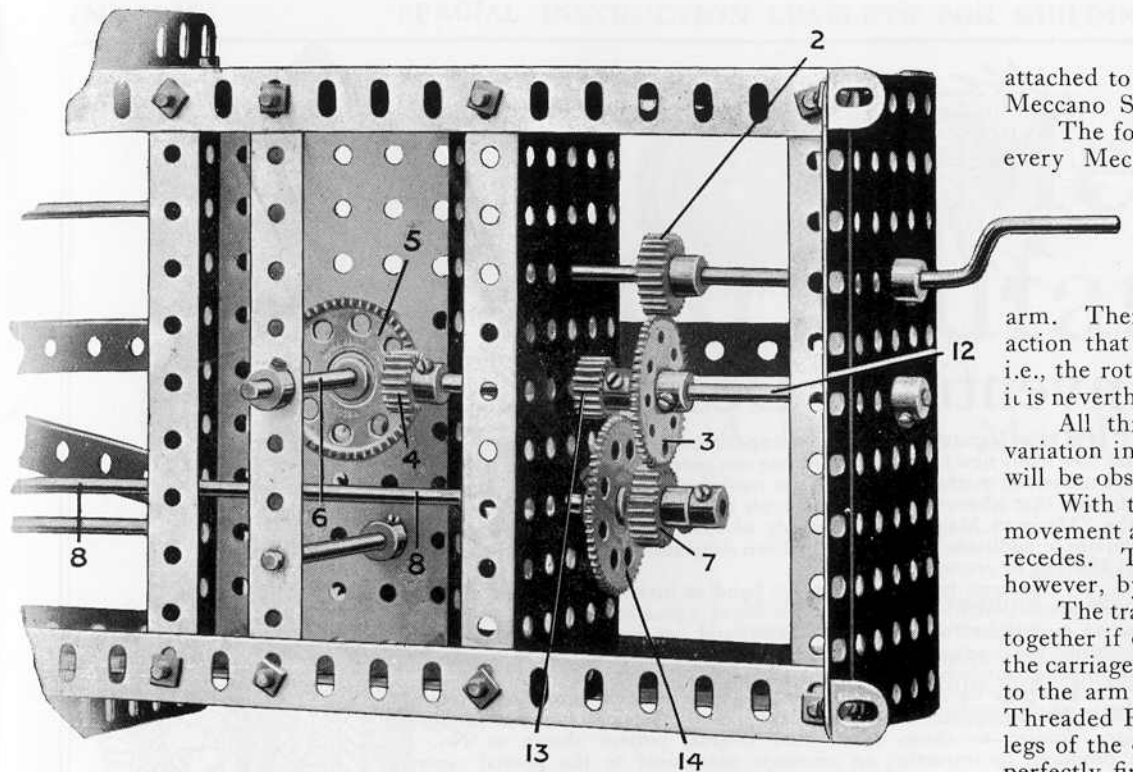


Fig. 5. Plan view of Gear Box, showing drive to crown head, etc.

with the similar Gear 28. Hence on rotation of the Bush Wheel 27 the carriage is caused to travel to and fro along the guide Rods 24 and thus a further movement is imparted to the writing arm 16.

Operation of the Table

The mechanism controlling the movement of the table is shown in Fig. 3. The Bush Wheel secured by ordinary wood screws to the underside of the table is mounted on a vertical Rod carrying the 57-teeth Gear Wheel 10. This Gear Wheel is engaged by a Worm 9 fastened to the horizontal Rod 8, which is driven by the Gears 7 or 14 in the gear box (see Fig. 5).

This completes the construction of the Meccanograph. The following are a few general remarks that may be helpful.

First it is important to see that everything works as smoothly as possible. Play in the bearings of the various shafts should be as small as possible. This is specially important in the case of the table operating mechanism (Fig. 3), for if the Rod 8 is capable of longitudinal movement in its bearings, the table may tend to rotate jerkily. All the working parts should be oiled frequently.

If possible a stylo or fountain pen should be mounted on the writing arm when inks of various colours can be employed. Some very fine effects may be obtained if the different portions of a design are drawn in different colours. If the pressure of the pen on the paper is insufficient, small weights should be

attached to the holder or writing arm 16. The weights may consist of a few Meccano Strips or Wheels.

The following notes on how to operate the Meccanograph should enable every Meccano boy to go right ahead and produce hundreds of beautiful designs such as those shown in these pages.

Operating the Meccanograph

After the machine has been completed study it carefully and observe how the different movements are imparted to the writing arm. There is the sliding movement of the carriage 17 and the traversing action that is given to the pen by the crown head. The third movement, i.e., the rotation of the table, does not affect the movement of the arm, but it is nevertheless a very important factor in the production of different designs.

All three movements can be varied in many ways, and the slightest variation in any one will create a vast difference in the designs produced, as will be observed on studying the model closely.

With the model arranged as shown in Fig. 1 the pen is given a single movement across the paper and back again each time the carriage advances and recedes. The traversing movements of the pen can be multiplied if desired, however, by adding to the crown head 22 short Rods similar to the Rod 20.

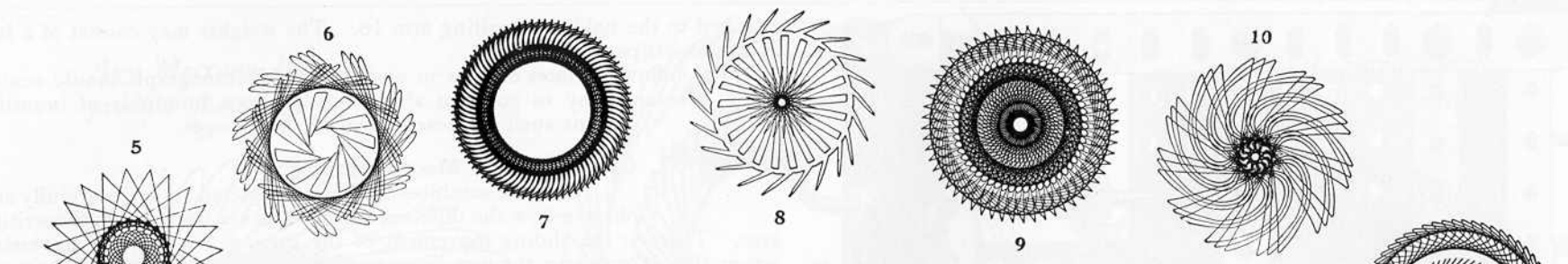
The traversing movement and the sliding movement can both be employed together if desired, but in the production of certain designs it is essential that the carriage 17 should remain stationary while the traversing movement is given to the arm only. To obtain this result the Strip 25 is removed from the Threaded Pin 26 and Collars 29 on the guide Rods 24 are moved against the legs of the carriage and locked in position to ensure that the carriage remains perfectly firm in position.

As most Meccano boys will know the table 11 is a special Meccano part and can be obtained complete with Bush Wheel secured in position. The drawing paper should be fixed in position by drawing pins so that it can easily be removed when the design is completed.

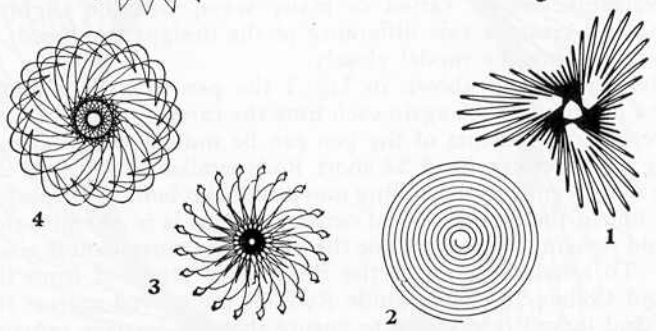
After a little practice the various adjustments will be found very simple and Meccano boys will know just what to do when it is required to produce certain types of designs. It is a good plan to study carefully exactly what difference a certain adjustment makes to the design, and in this way sufficient data may be collected that will enable one to reproduce again and again any particular design. A pencil note should be added to the corner of each design, indicating the gears employed and the positions of the arms 15 and 25, and of the pins 18, 20 and 26. The operator will then know exactly what to do if he wishes to reproduce a particular design.

Parts required to build the Meccanograph.

1 of No.	1	1 of No.	15	1 of No.	27	1 of No.	48d
2 "	1a	2 "	15a	4 "	27a	5 "	52
3 "	2	2 "	16	1 "	28	3 "	53
3 "	3	2 "	17	1 "	32	18 "	59
4 "	7	1 "	18a	70 "	37	1 "	63
6 "	9	1 "	19	2 "	38	2 "	76
4 "	11	5 "	24	2 "	45	1 "	107
7 "	12	2 "	25	2 "	46	1 "	115
4 "	13	2 "	26				



The Joy of "Inventing" Designs



IT is a very fascinating pastime to experiment with the Meccanograph to see how many new kinds of designs one can produce with the model. There are numerous methods by which the model may be modified, as is proved by the fact that whenever a Meccanograph Design Competition is announced in the "Meccano Magazine," hundreds of readers send in suggestions for alterations or additions to the model. Each suggestion is capable of producing a whole series of original designs!

Every Meccano boy should try his hand at inventing a special style of Meccanograph design. As everyone knows, it is possible to obtain some very involved movements with Meccano parts, and consequently Meccanograph designs may be produced varying from plain geometrical figures to wonderful mazes of most intricate patterns.

On this page we illustrate some of the prize-winning efforts in a recent "M.M." Meccanograph Design Contest. Any Meccano boy can produce designs similar to these. The very original pattern shown at No. 1 was produced by imparting an eccentric movement to the pivotal centre of the drawing arm. To obtain this result, the Meccanograph carriage should be locked in position and its top plate replaced by a transverse $3\frac{1}{2}$ " Strip, upon which an Eye Piece is free to slide. An Eccentric is secured to a Rod that is journalled in the $3\frac{1}{2}$ " Strip and in the lower Flanged Plate of the carriage as well as in a $5\frac{1}{2}$ " Strip bolted to the bottom pair of $24\frac{1}{2}$ " Angle Girders of the frame. The Eccentric is operated by a $\frac{1}{2}$ " Pinion engaging a Worm secured to the shaft that causes the table to revolve. The end hole of the Eccentric arm and the writing arm of the Meccanograph are placed over a Threaded Pin secured to the sliding Eye Piece.

The spiral design (No. 2) was produced by a special arrangement that causes the pen to move slowly toward the centre of the revolving table. A simple improvement favoured by a large number of competitors was the use of a Face Plate, $3\frac{1}{2}$ " Gear Wheel, or Sprocket Wheel, in place of the usual $1\frac{1}{2}$ " Pulley Wheel for the crown head. The use of the larger Wheels gives a larger range of alternative positions for the operating pins. Another very good plan suggested by a competitor was the use of a screw-operated brake acting upon the shaft of the table. This has the effect of causing the table to revolve very steadily without vibration.

Designs Nos. 3 to 17 were produced merely by making slight adjustments or modifications on these lines. They should serve to induce every Meccano boy to try his hand at producing novel forms and shapes to suit his own ideas.

