

The
Meccanograph
Manual of Instructions

Price 6^d.

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MECCANO, LTD.
LIVERPOOL

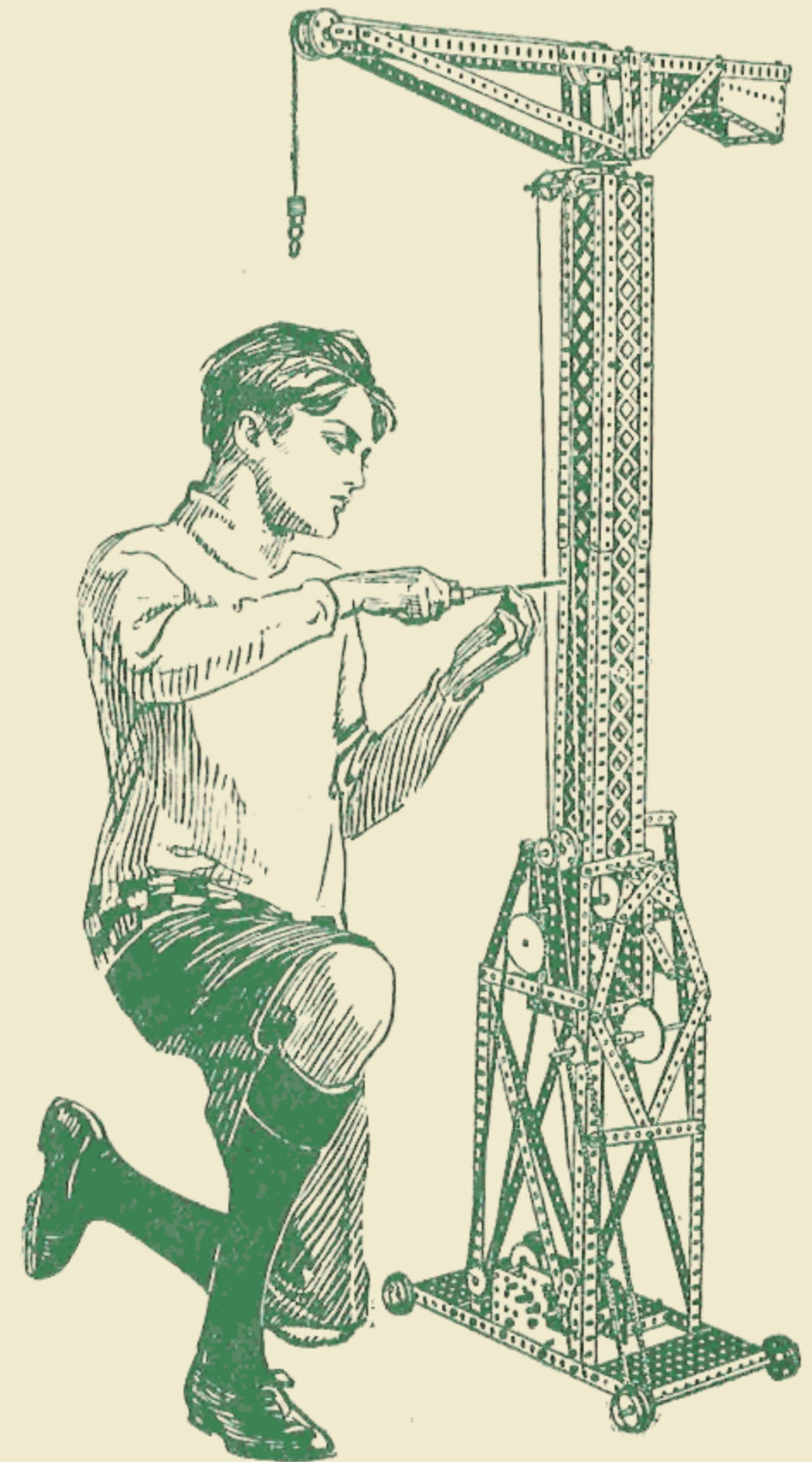
MECCANO SUPREMACY

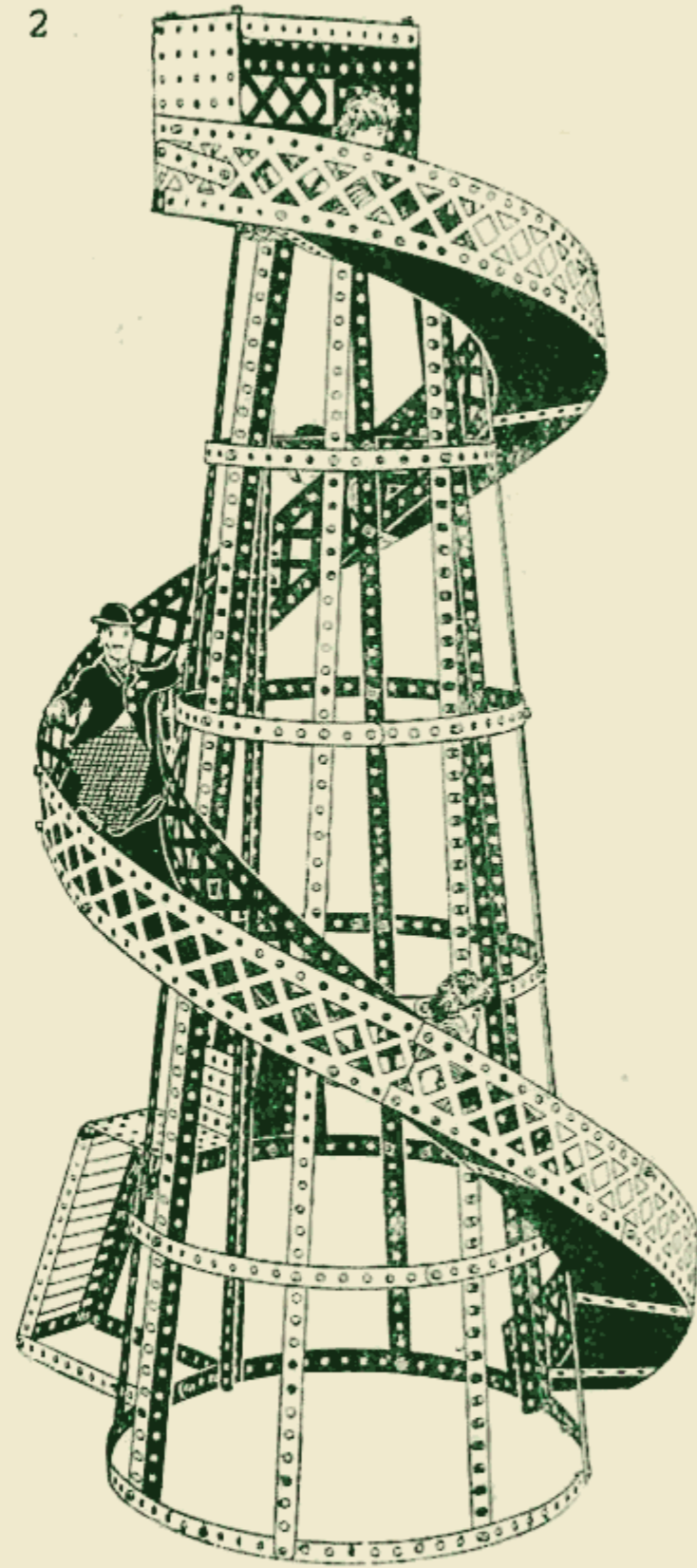
AND THE REASONS FOR IT

EACH MECCANO OUTFIT contains a number of accurately made and finished engineering parts, which enable the user to duplicate any and every movement known to mechanism.

The value of a constructional system does not lie in the number of parts which it contains, but entirely in the uses to which the various parts can be put. Meccano will do all and more than all other constructional toys put together, and no other system will make Meccano Models. Every other metal constructional toy is an imitation of Meccano, which is the first and original system. The genius and knowledge and experience are in the Meccano patented parts. Each part will fill a hundred different purposes in a perfect manner, and there is no limit to the uses to which they can be applied.

All boys who possess a Meccano outfit know all these facts, and understand why Meccano has maintained its supremacy amongst all toys. More than a million boys all over the world play with Meccano, and every boy who starts the hobby continues making models year after year, with ever-increasing enjoyment.





THE "MECCANO MAGAZINE"

No boy should miss this bright, chatty Magazine, which is written specially for users of Meccano. Its motto is "to help Meccano boys to have more fun than other boys." It contains illustrations of fine new models which have taken big money prizes in the Meccano Prize Competitions; special articles by Frank Hornby, the inventor of Meccano, on how he came to invent the hobby, the early difficulties which he encountered in manufacturing and selling it, its progress and development, with plans for the future; interesting articles which it will give any thinking boy pleasure to read; letters from boys who have found new uses and delights in Meccano; replies from the Editor to his big army of contributors, &c., &c. Those who desire to receive the "Meccano Magazine" regularly should send 2d. for postage on the next four issues.



A NEW GRAND MECCANO PRIZE CONTEST £200 IN PRIZES

There is more in Meccano than simply making fine models and playing with them. Each Meccano user, after he has built up a few models from the big Meccano Manual of Instructions, begins to think out new models for himself, and sometimes these are better even than those in our Manual. We want to know of these models, and to publish them for the benefit of other Meccano users. In the new Meccano Competition we offer prizes to the value of £200 for the best models submitted, the first prize being £50 in cash. There are more than 140 prizes altogether. Every Meccano user stands an equal chance of winning a prize whether he owns a No. 0 or a No. 6 outfit.

Your regular dealer will give you an entry form, or if you have any difficulty write to us. There are no entrance fees or restrictions of any kind in this Competition.

THE MECCANOGRAPH

Of the many thousands of models which Meccano builds none has attracted so much attention or excited so much interest and admiration as the Meccanograph. Some Meccano models interest young people only, but this is a model which has a charm for everyone. The Meccanograph is a machine which will make all the beautiful designs shown in this book, and many, many thousands of others, of equal beauty. The way in which they are made is by pinning a sheet of paper down on the table, fixing a pen or pencil in the holder, and turning the handle. Of course, as in all things, the more study and care you give to it, the more beautiful and charming the designs which you will get; but the boy or girl does not exist who cannot instantly make designs with the Meccanograph, and the man or woman does not exist who cannot spend many hours of pleasure in producing exquisite and delicate designs with it.

The beauty of many of the Meccanograph designs may be greatly enhanced by the use of coloured inks, particularly where combination designs are made, or the spaces in the designs may be very artistically filled in with colour. This, of course, develops any latent artistic ability, especially in children. A more serious application of the machine is the designing of d'oyleys, crochet work, embroidery, &c., or for designing patterns for pottery, for decorative glass, &c.

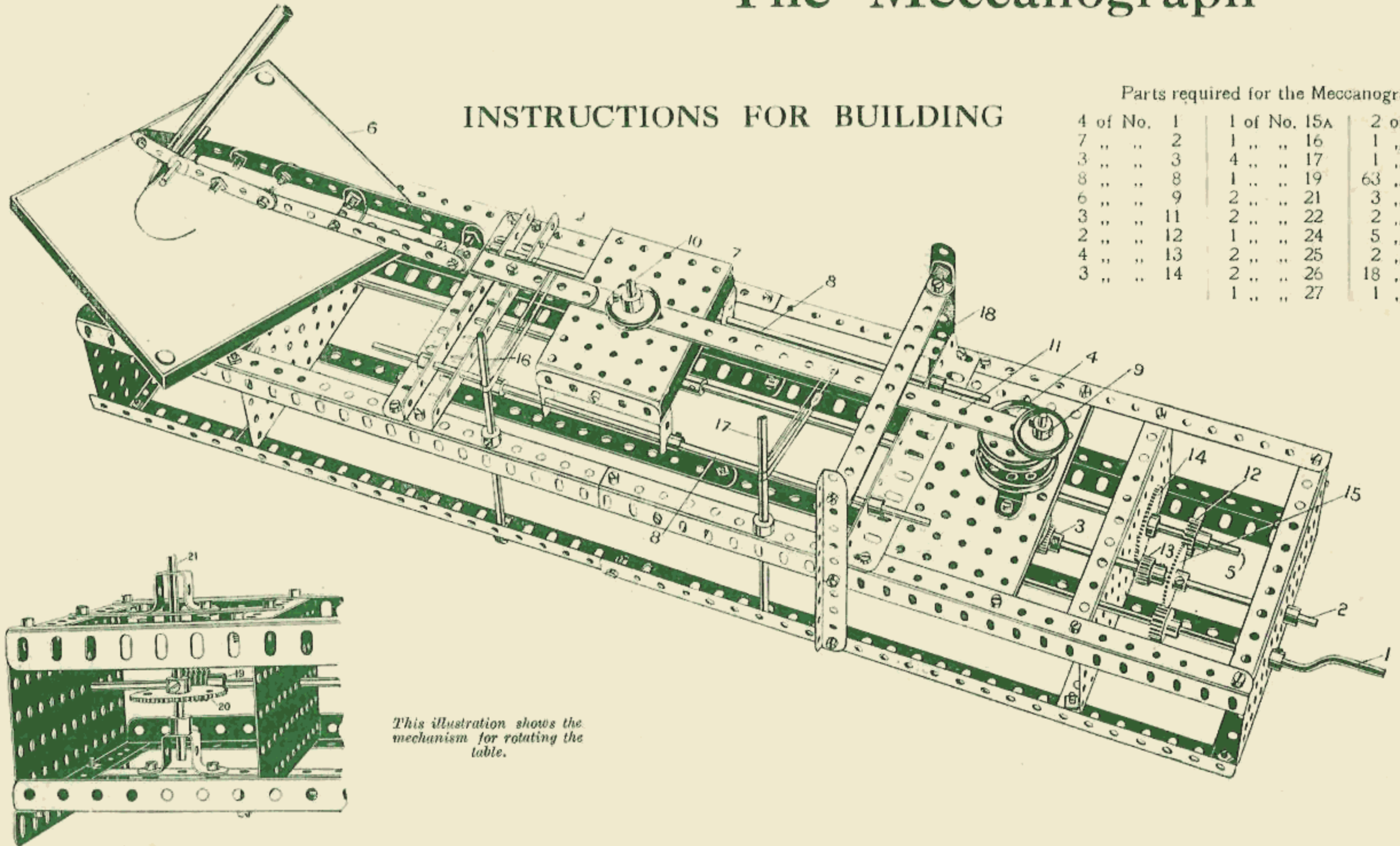
It is the standardisation of the Meccano system which makes this and other machines possible, the equidistant holes, the design and dimensions of the parts, and its complete system of interchangeability. The accuracy with which the various parts are made is another important feature, without which the designs shown in this manual could not be produced.

The Meccanograph

INSTRUCTIONS FOR BUILDING

Parts required for the Meccanograph

4 of No.	1	1 of No.	15A	2 of No.	27A
7 " "	2	1 " "	16	1 " "	28
3 " "	3	4 " "	17	1 " "	32
8 " "	8	1 " "	19	63 " "	37
6 " "	9	2 " "	21	3 " "	45
3 " "	11	2 " "	22	2 " "	46
2 " "	12	1 " "	24	5 " "	52
4 " "	13	2 " "	25	2 " "	53
3 " "	14	2 " "	26	18 " "	59
		1 " "	27	1 " "	63



This illustration shows the mechanism for rotating the table.

INSTRUCTIONS FOR BUILDING—*continued*

The framework of the model presents no special difficulties and may easily be constructed by reference to the illustration.

GEARING.—The crank handle 1 is geared by a $\frac{3}{4}$ " pinion (25 teeth) and a $1\frac{1}{2}$ " gear wheel 15 (50 teeth) to a shaft 2. At the end of this shaft is secured a $\frac{1}{2}$ " pinion 3 (20 teeth) engaging a large contrate wheel on a $4\frac{1}{2}$ " vertical spindle operating the crown head 4. The gear 14 (56 teeth) and pinion 13 (20 teeth) are also included in the model, the functions of these being explained later.

The shaft 5, which is also geared by a $\frac{3}{4}$ " pinion 12 (25 teeth) to the gear wheel 15, rotates the table 6 by means of a worm wheel 19 engaging a 56-tooth wheel 20 on a 3" vertical spindle.

CROWN HEAD.—The crown head 4 is formed of two $1\frac{1}{2}$ " pulley wheels adjusted so that the holes of the top wheel are opposite to those of the bottom wheel to permit of the crown head pin passing through both of them. A collar and set screw is placed between the lower wheel and the double bent strip, so that the top of the crown head may be in adjustment with the arm 11.

TABLE.—The table has a bush wheel screwed on the underside, and is secured on the upright spindle 21 by the set screw of the bush wheel.

CARRIAGE.—The carriage 7 slides along the rods 8, or is secured to them by collars and set screws, its position being decided by the adjustment of the arm 11 according to the designs to be produced (see transverse movement).

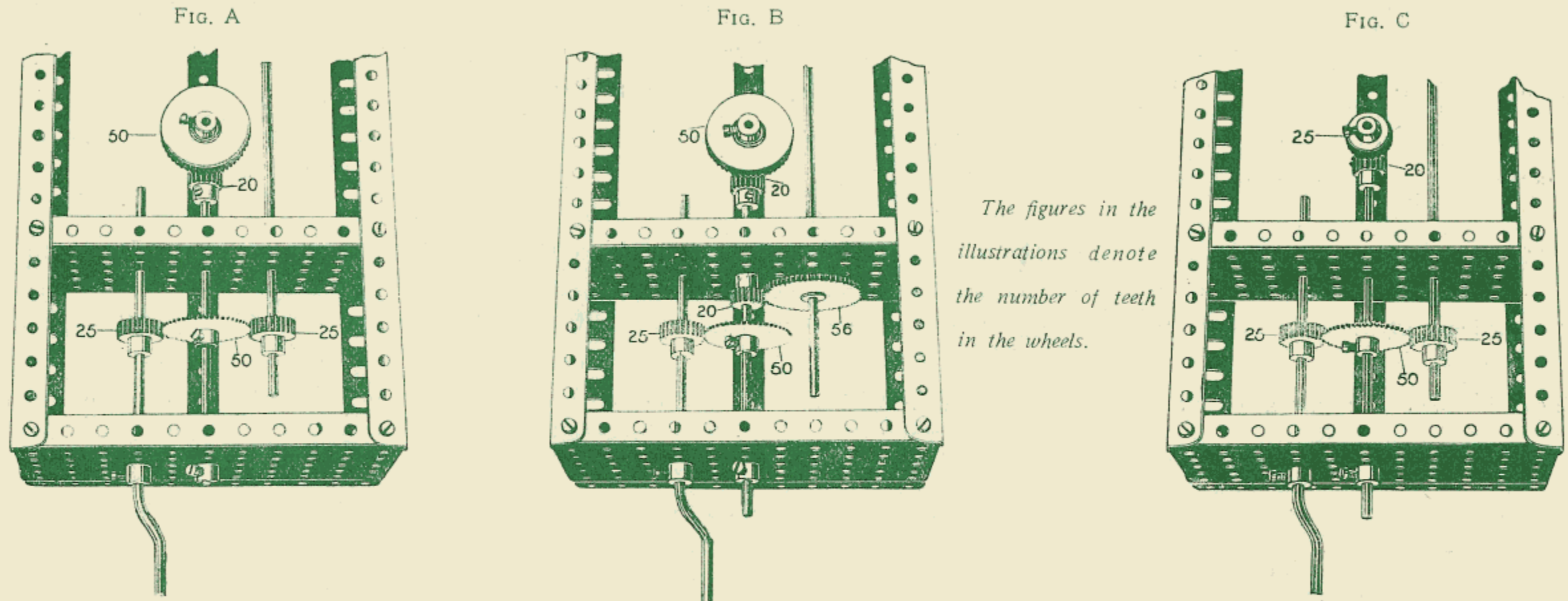
ARM.—The arm 11 is formed of two $12\frac{1}{2}$ " strips bolted together, on which a $5\frac{1}{2}$ " strip overlapped 7 holes is fastened. The holder is connected to this $5\frac{1}{2}$ " strip by means of double brackets. The near end of the arm 11 slides between two $5\frac{1}{2}$ " strips 18, which are spaced with washers to permit a free movement.

To overcome any slack movement of the arm when working, thin rubber bands are passed around it and connected with upright rods 16 and 17.

Care should be taken to see that all parts of the model work smoothly, and that no jolting takes place, otherwise the lines of the design will be uneven.

HOW TO OPERATE THE MECCANOGRAPH

GEARING.—To produce the designs, various combinations of gearings are necessary. These are here illustrated, and will be referred to by letters as follows:—



Combined with these gearings, it is also necessary to have either a slidable movement, or a transverse movement of the arm 11.

SLIDABLE MOVEMENT.—The slidable movement requires the carriage 7 to slide backwards and forwards along the rods 8, whilst the near end of the arm 11 is secured by the pin 9 in the hole indicated in the first figure of the formula.

The second figure in the formula refers to the pin 10 which is passed through the hole in the arm 11, and any of the centre holes in the carriage.

In a slidable movement only one pin (2" rod) is required to pivotally secure the arm to the crown head, and this may be inserted in any hole at the commencement of a design. In order to give uniformity of design light rubber bands should be passed around the arm at the positions indicated in the illustration and over rods 16 and 17.

HOW TO OPERATE THE MECCANOGRAPH—*continued*

TRANSVERSE MOVEMENT.—The transverse movement requires the carriage to be secured to the rods 8 by collars and set screws, whilst the arm is moved transversely by the operation of the pin or pins in the crown head.

In arranging a transverse movement the first number in the formula refers to the holes in the near end of the arm. The hole indicated must be placed exactly opposite the centre hole in the bridge 18. The pin 10 must then be passed through the hole in the arm indicated by the second figure in the formula, and through any centre hole in the carriage. The carriage itself is then secured in this position on the rods by collars and set screws.

In a transverse movement several pins may be required to be inserted in the crown head for one operation, and in such cases will be represented in the formulæ as H 1, 3, 5, or as the case may be. The numbers of the holes in which these pins are to be inserted are to be counted from the first pin.

FORMULÆ.—Having now described the functions of the various elements, the manner of producing the designs will be described thus:—

$$\begin{array}{l} S \quad A \\ 5 - 16 \end{array}$$

This means that the design is produced by a sliding movement with Fig. A gearing, and the crown head pin 9 is to be placed through the fifth hole of the arm, and the carriage pin 10 through the sixteenth hole of the arm. If it be required to move the arm one hole to the right of the centre hole of the carriage, to produce another design, it will be described thus:—

$$\begin{array}{l} S \quad A \\ 5-16 \quad R \ 1. \end{array}$$

or if to the left

$$\begin{array}{l} S \quad A \\ 5-16 \quad L \ 1. \end{array}$$

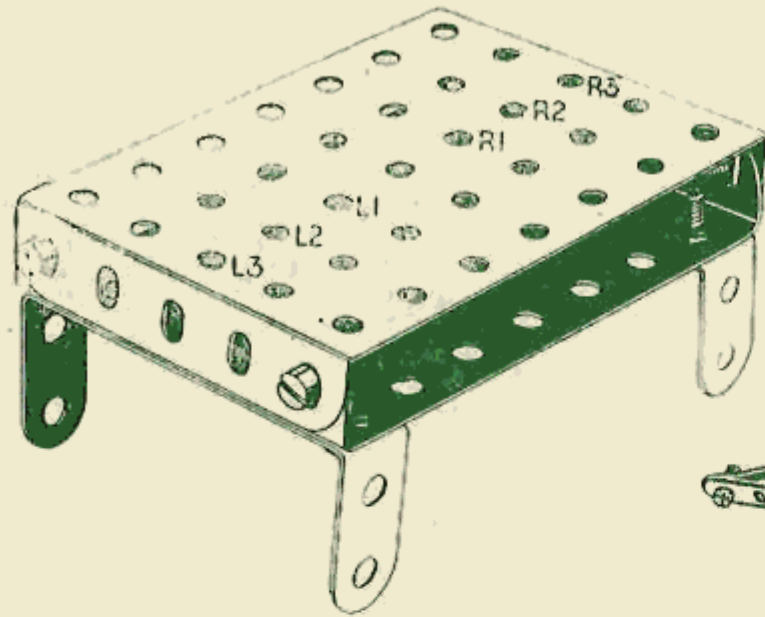
A transverse design will be described in the following manner:—

$$\begin{array}{l} T \quad A \\ 10-16 \quad H \ 1. \end{array}$$

This means that the carriage requires to be secured on the rods 8, with hole 10 of the arm immediately at the centre hole of the Bridge 18, and the carriage pin 10 inserted in hole 16, and pin 9 passed through one of the holes in the crown head and secured in position by a collar and set screw between the two crown-head wheels.

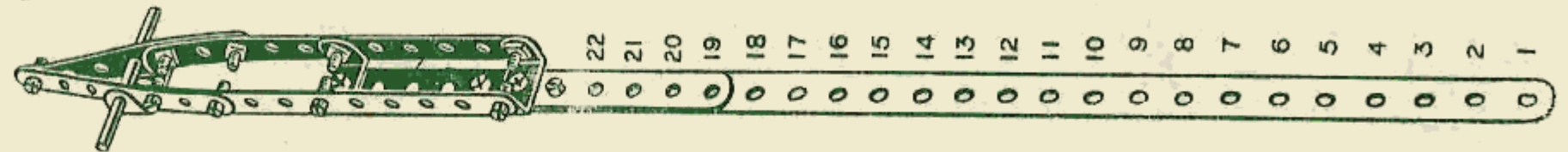
To obtain the transverse movement a rubber band should be passed over the arm *behind the bridge* and on to the rod 17. The rubber band should be of just sufficient strength to hold the arm against the pin during the operation.

HOW TO OPERATE THE MECCANOGRAPH—*continued*



CARRIAGE.—In this illustration the transverse holes are numbered from the centre to the right and the left for the purpose of making the formulæ clear.

It is not necessary to change the position of the carriage each time, provided that the number of the arm holes is within the range of the carriage holes. It is very important to observe this when two movements are necessary to complete a design.



ARM.—In this illustration the holes are also numbered in order to make the formulæ clear.

THE PEN.—A fountain pen should be used and should not protrude through the holder further than to touch the paper lightly. A small weight placed just behind the pen will ensure steadiness and give the necessary pressure.

It is to be noted that a double bracket is threaded on to the small rod to give the pen the correct angle for writing.

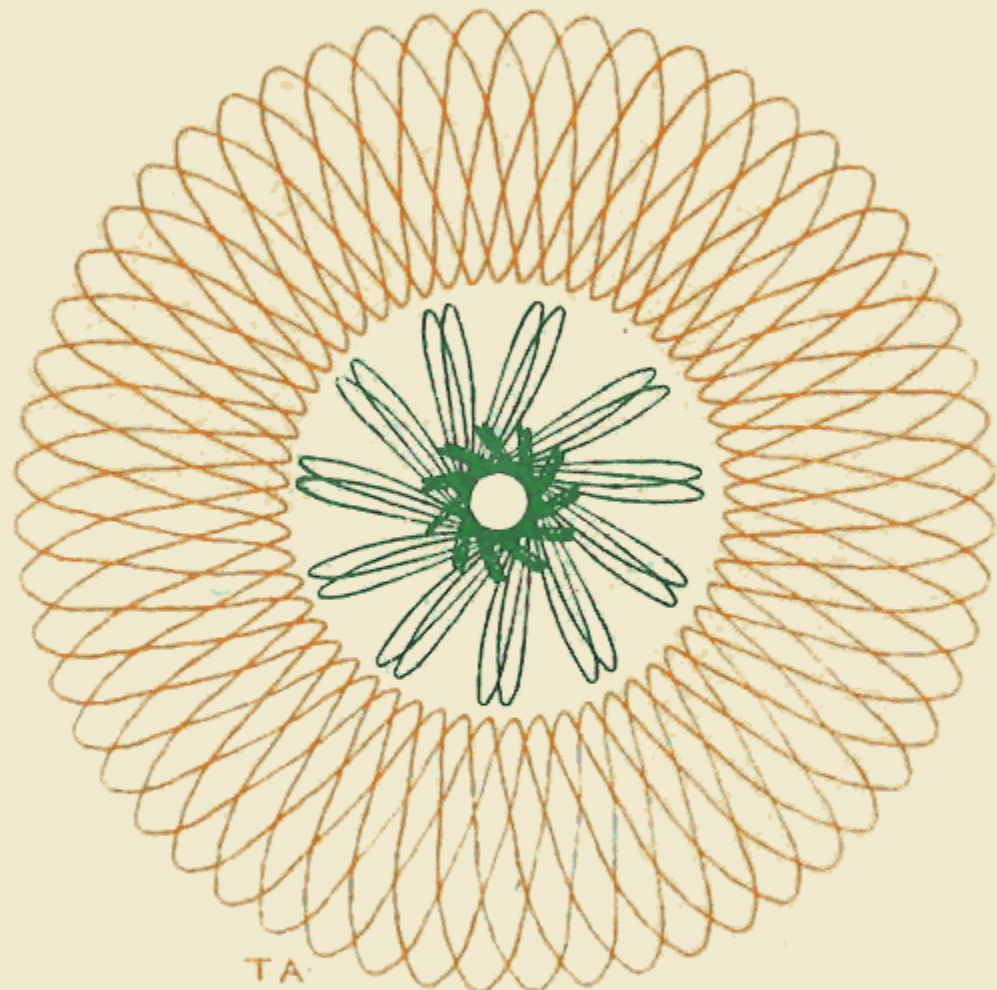
CIRCLES.—These may be formed of any size within the limits of the paper by inserting pin 9 through the arm and central hole of the bridge, and pin 10 through the arm and necessary hole in the carriage, or by clamping the arm between the bridge by means of a nut and bolt at the side of the arm. The arm is to be perfectly rigid, and the circle is produced by merely turning the handle which will cause the table to revolve.

OILING.—Oil all working parts before starting, and see that the carriage moves easily along the rods, otherwise even designs are impossible.

PAPER.—The best paper to use is one of good quality with a smooth, hard surface.

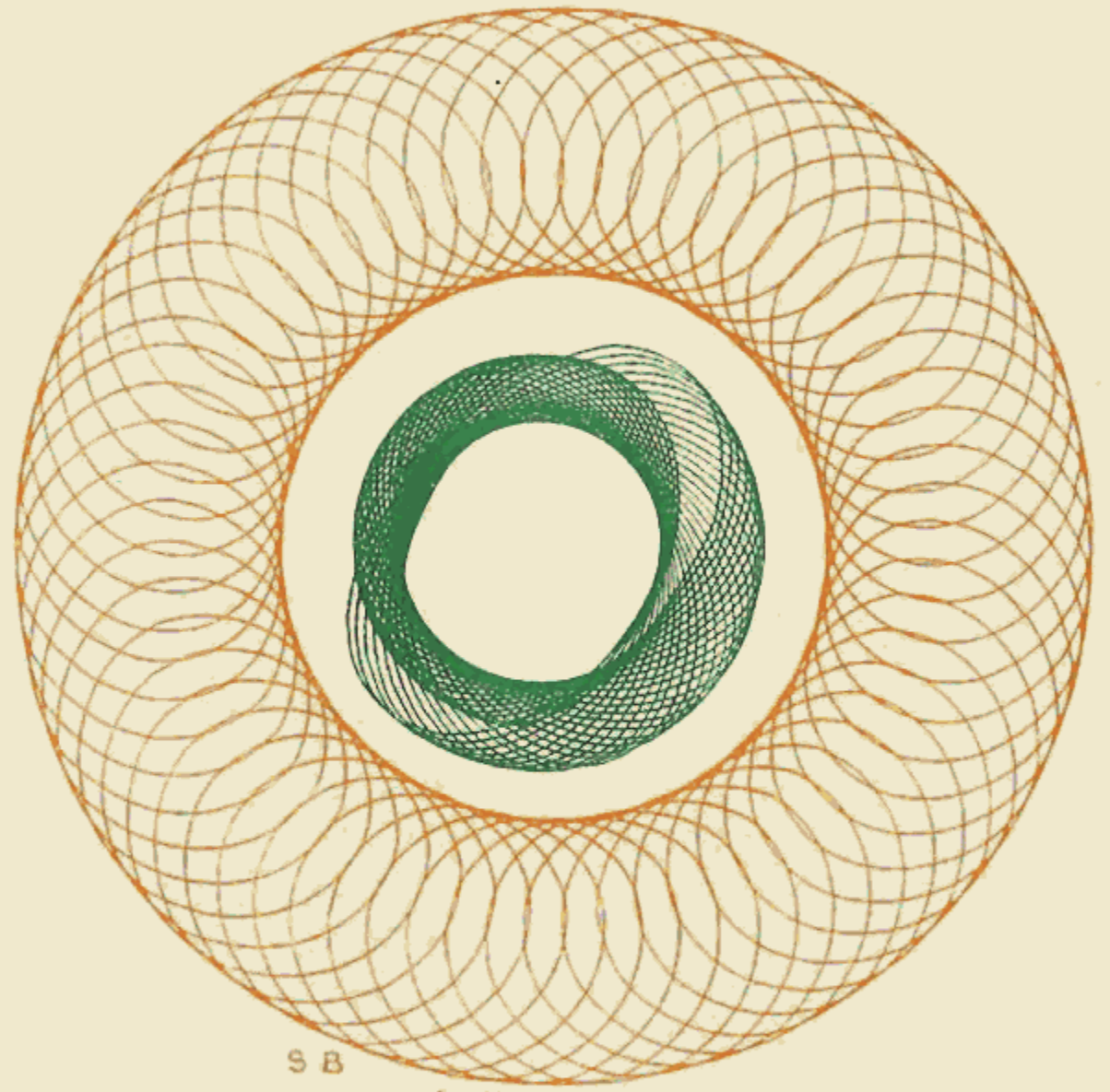
The following is an explanation of the letters used in the formulæ:—

- | | | |
|------|-------------------------------|-----------------------------|
| S | Slidable Movement. | |
| T | Transverse Movement. | |
| A | Combination of Gearing Fig. A | (see gearing illustration). |
| B | " " " " | B. |
| C | " " " " | C. |
| H | Crown Head. | |
| R | Right of Central hole. | |
| L | Left " " " | |
| REV. | Indicating Revolutions. | |



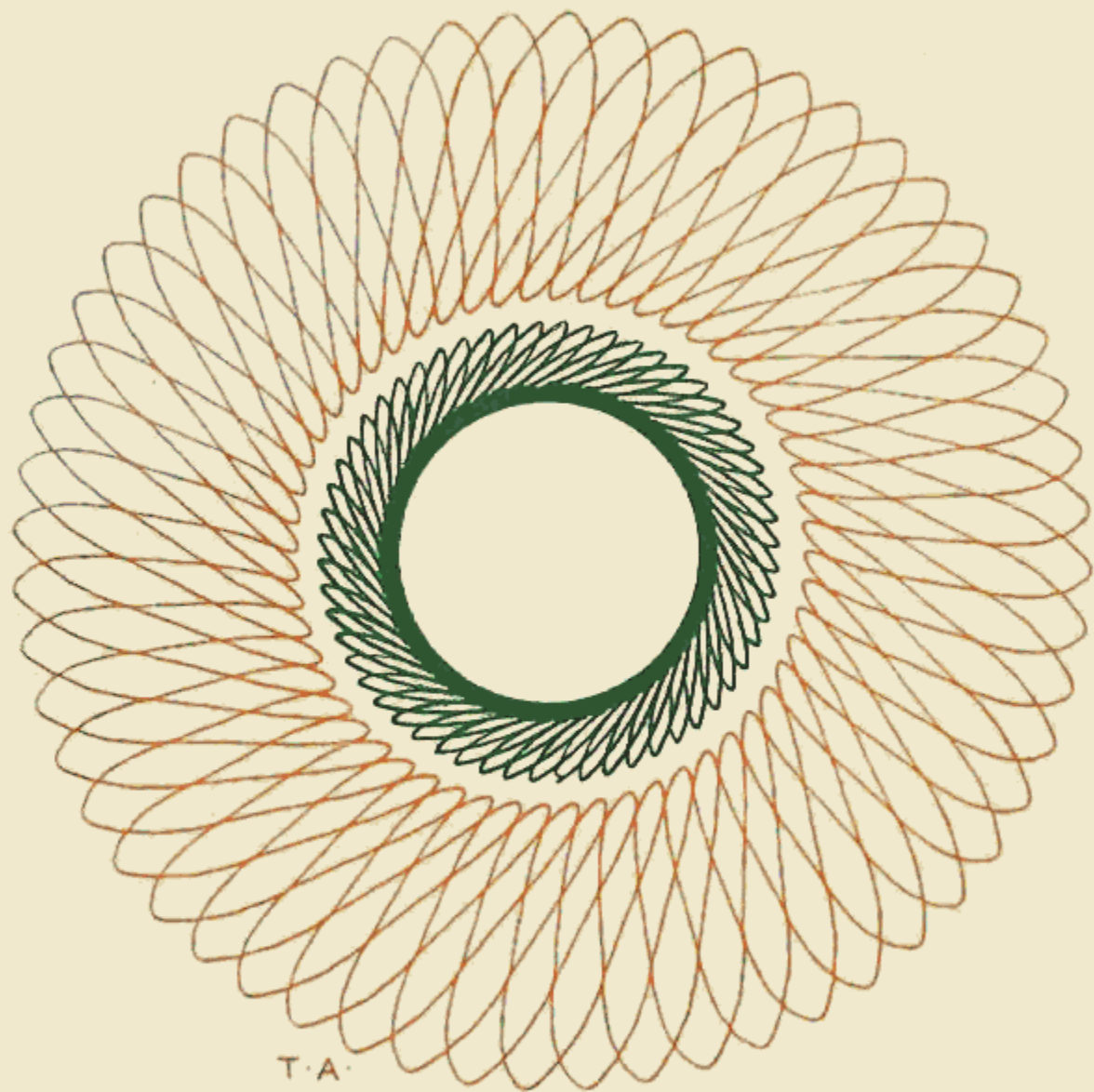
TA

9-21 2 REV.
9-21 — LI.

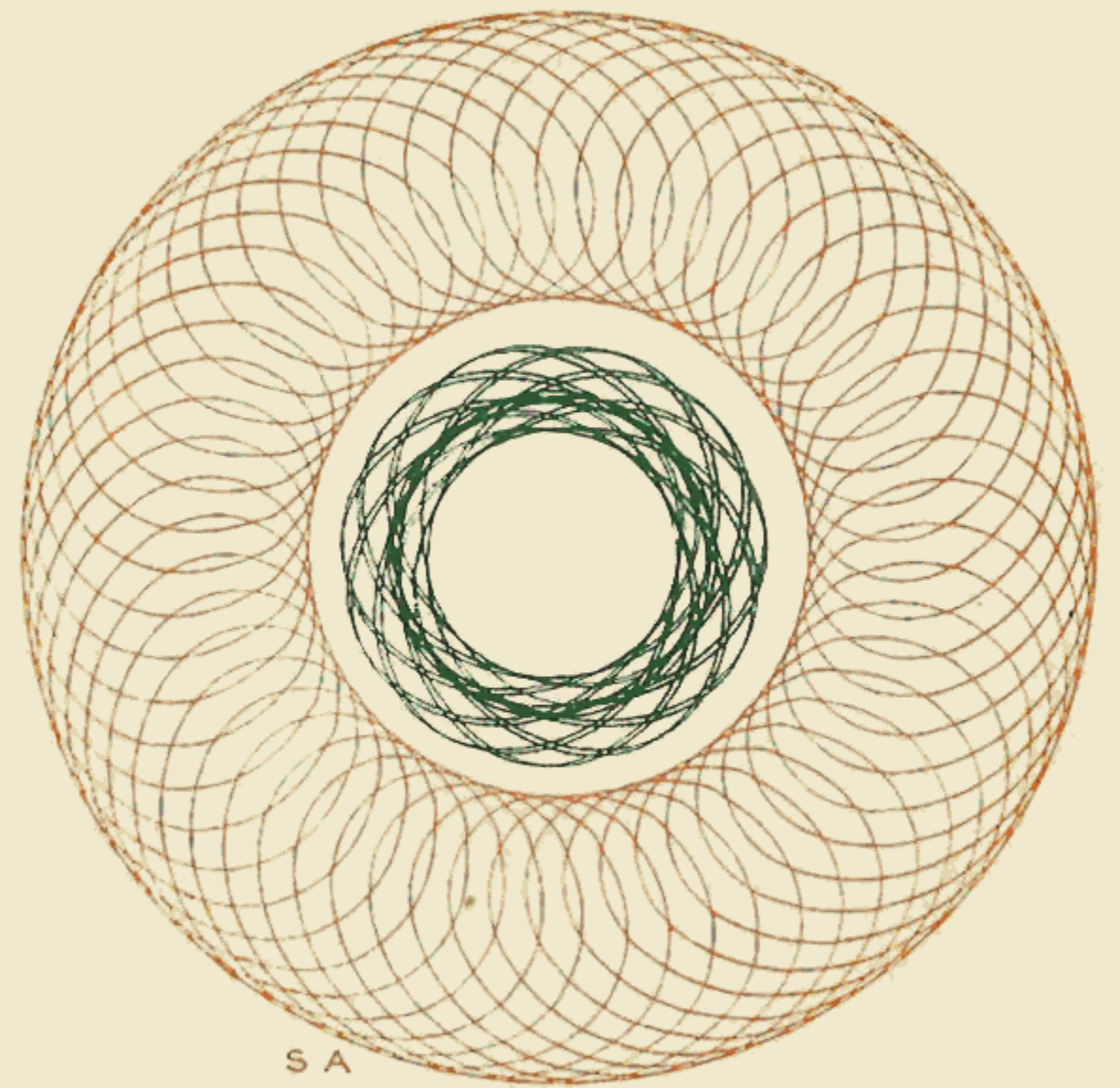


SB

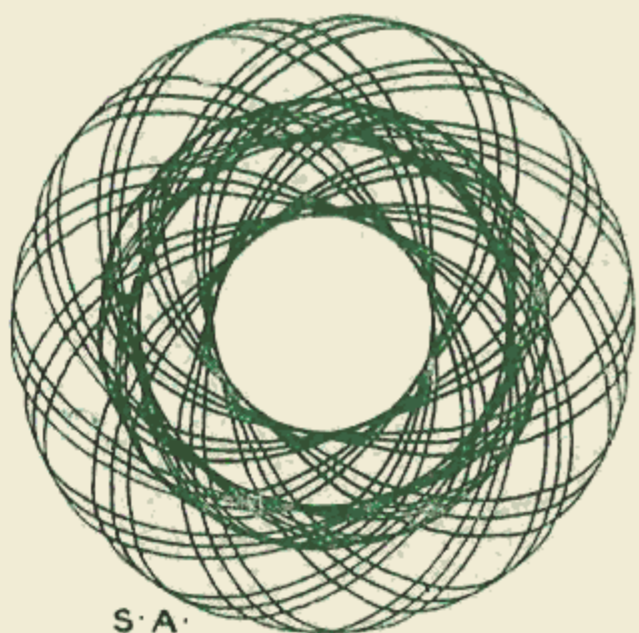
4-17
1-18 LI.



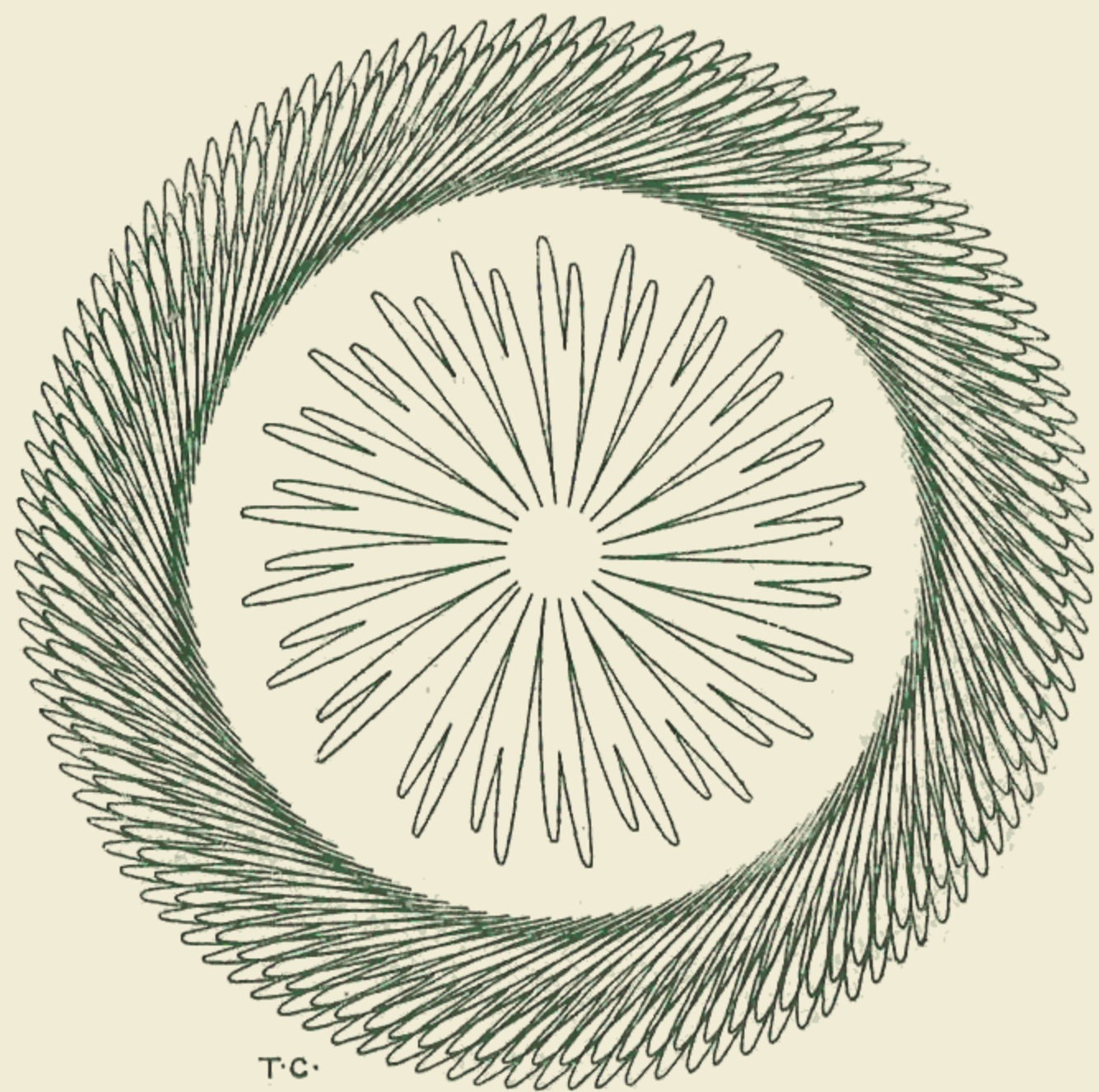
T.A.
10-20 LI.
10-22



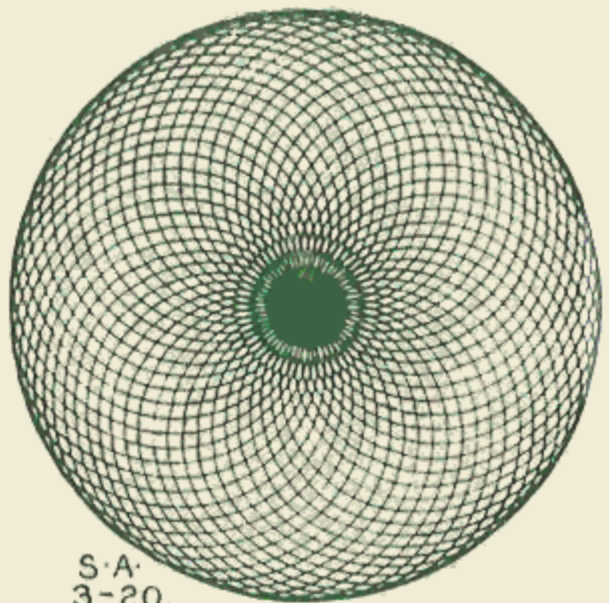
S A
2-18 LI.
5-19 2 REV.



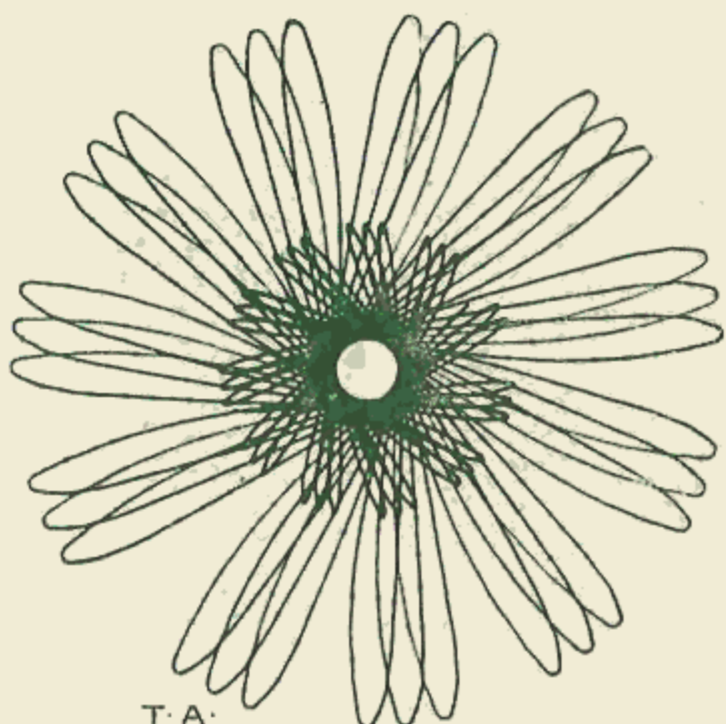
S·A·
4-16 3 REV



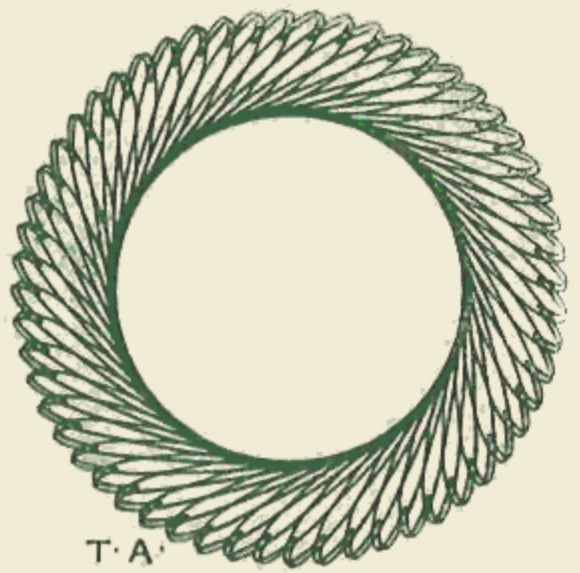
T·C·
12·17·H 1-4·
9·16·H 1-4·



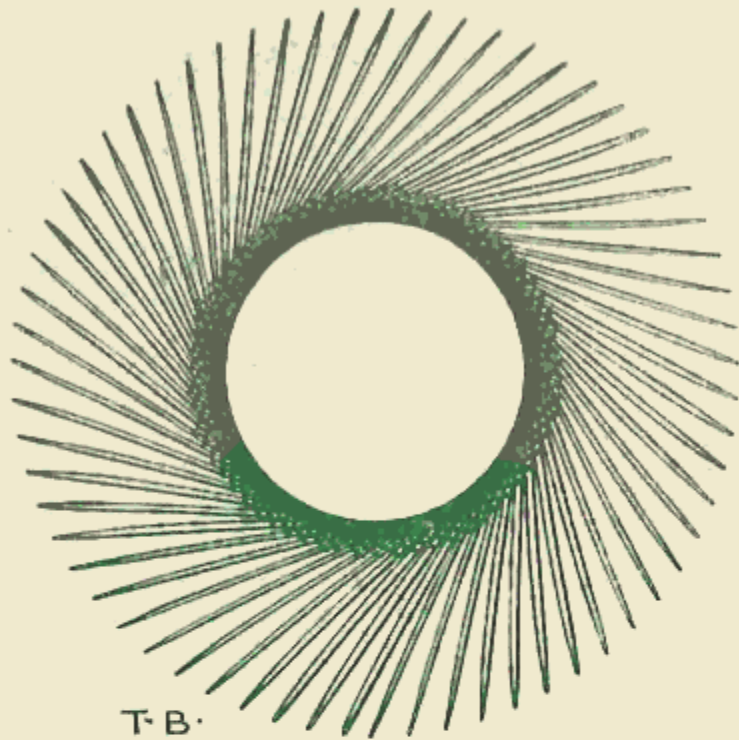
S·A·
3-20.



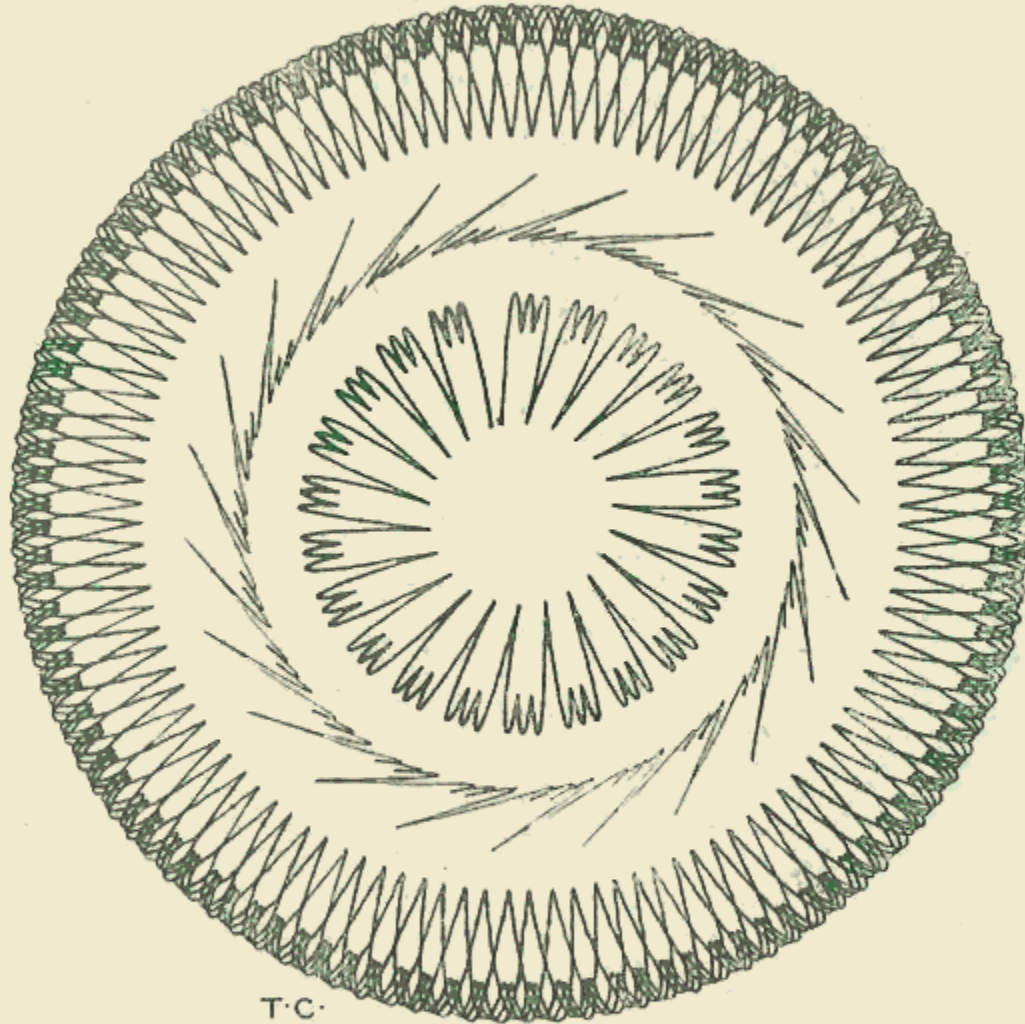
T·A·
9·16 3 REV.



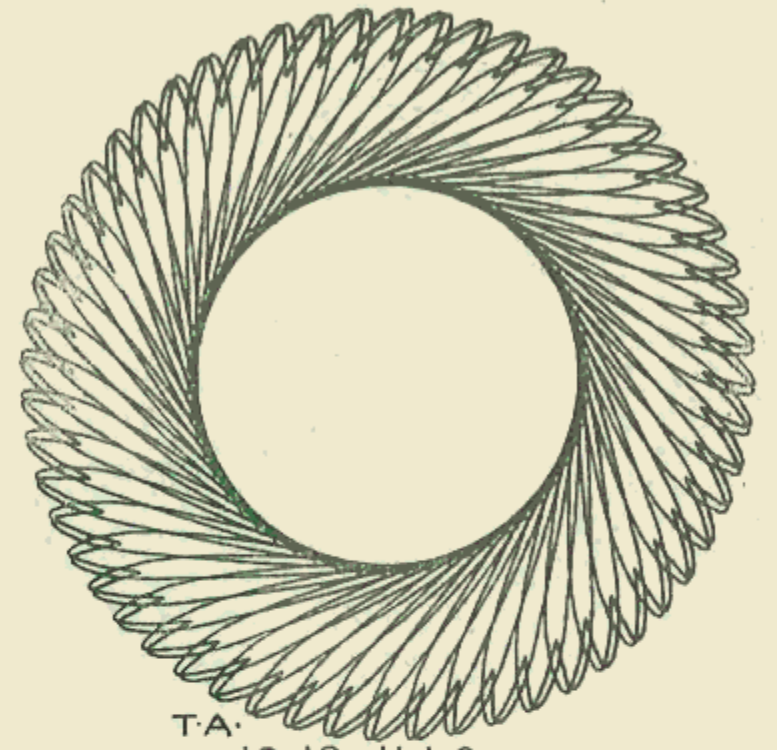
T·A·
10-22 H·1·3



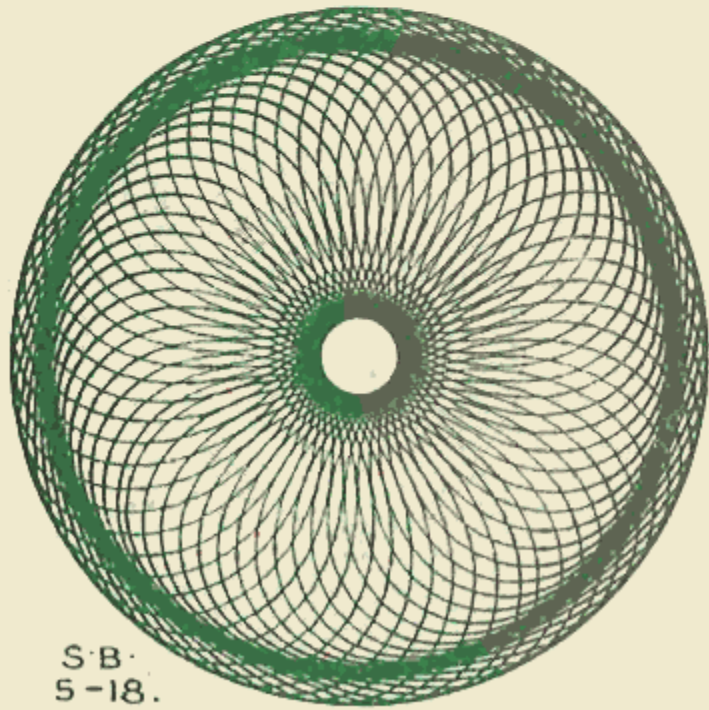
T-B.
10-18. 1 REV



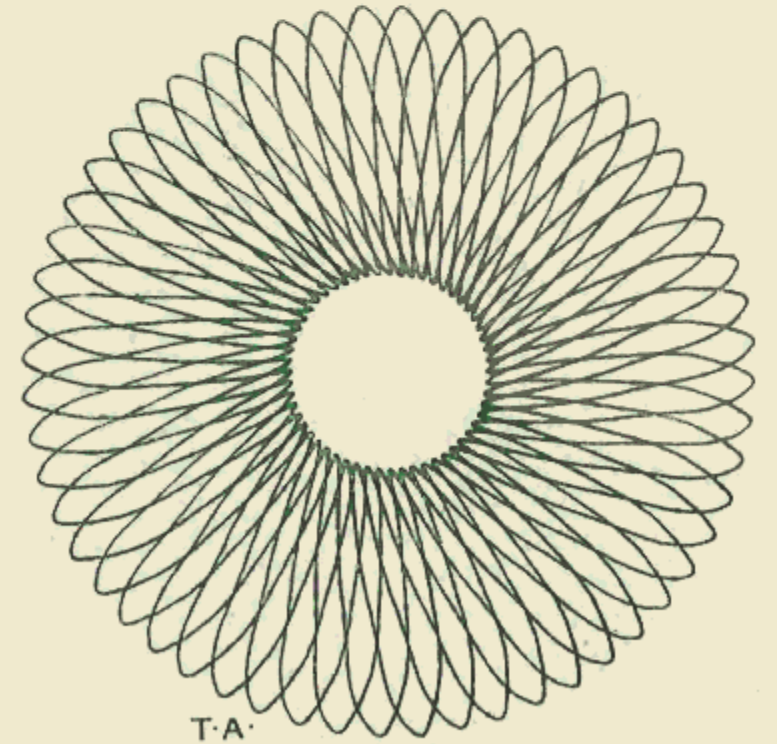
T-C.
9-21. H. I. 3.5. 1 REV
9-21. . . . DO. - LI.
7-19. . . . DO. - RI.



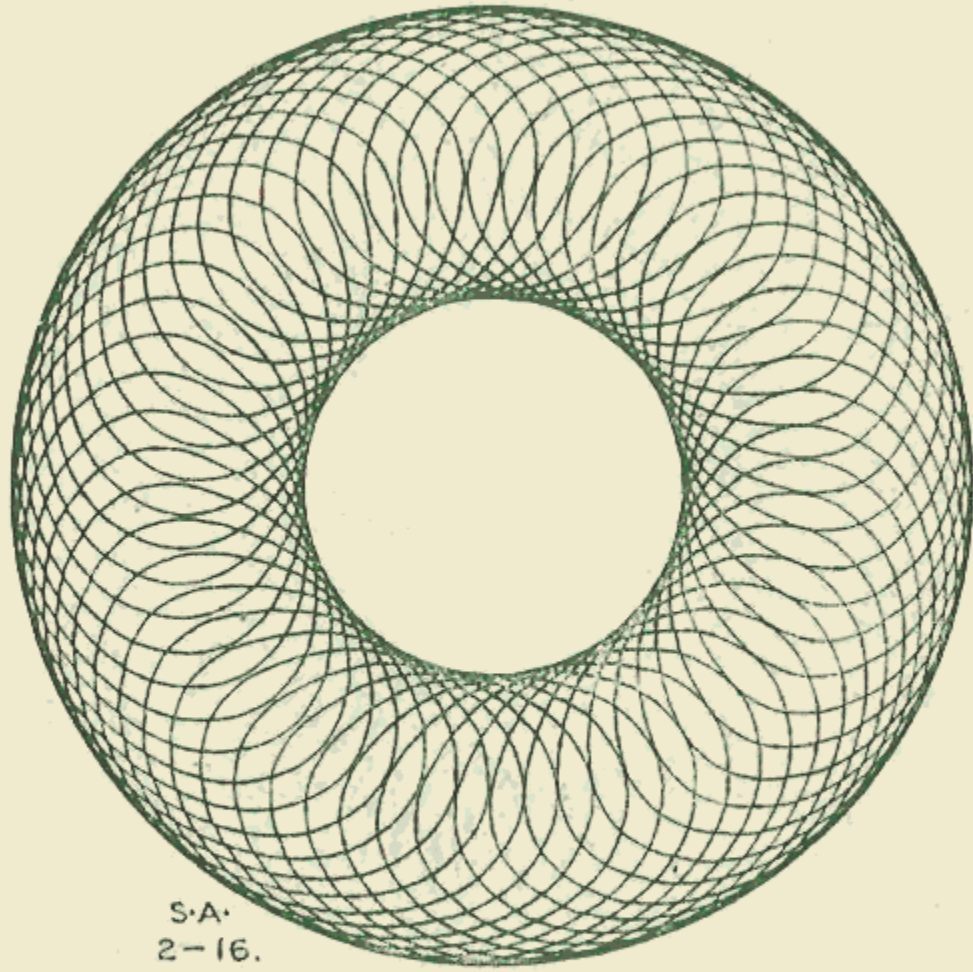
T-A.
10-18 H I. 3.



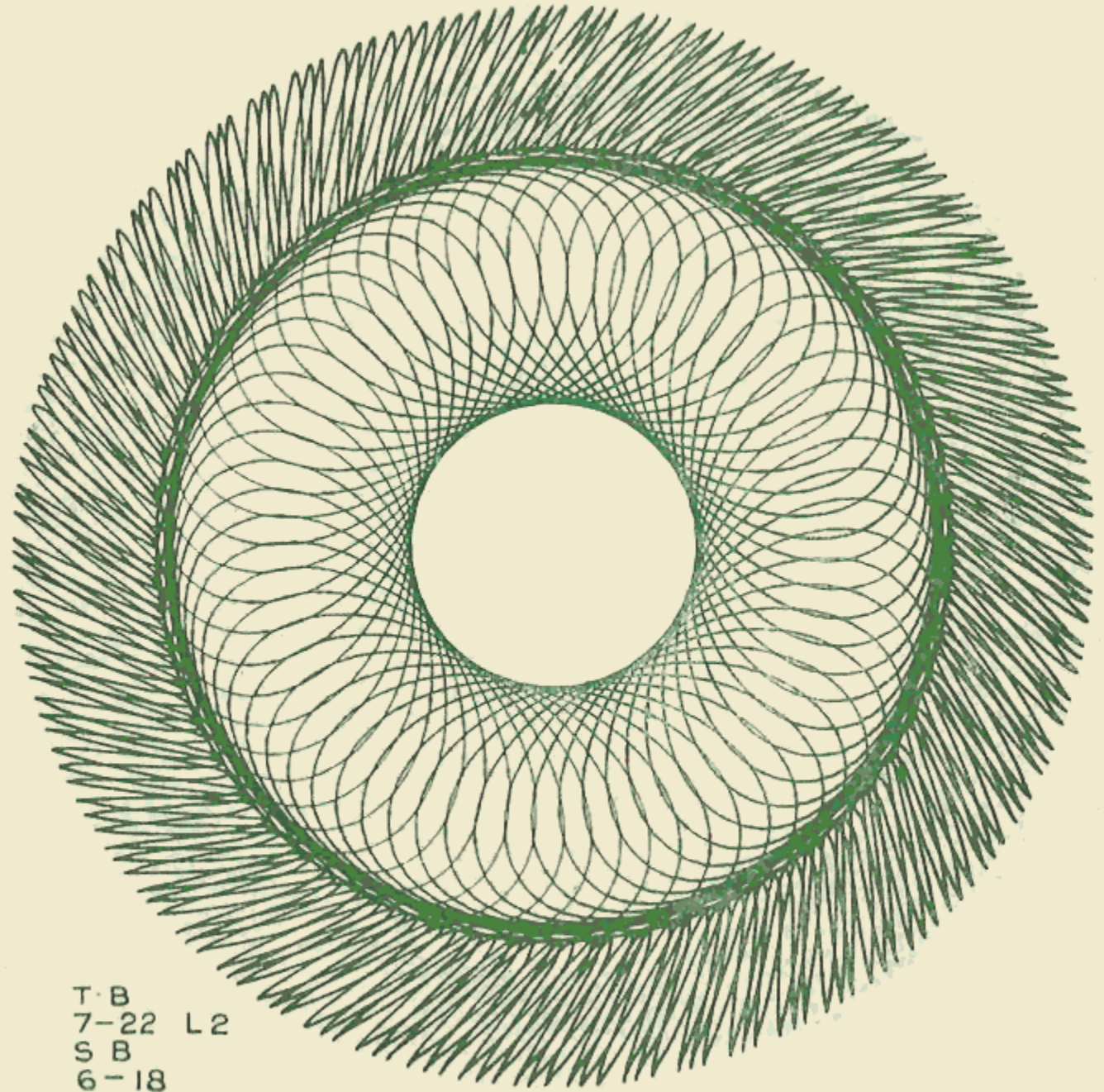
S-B.
5-18.



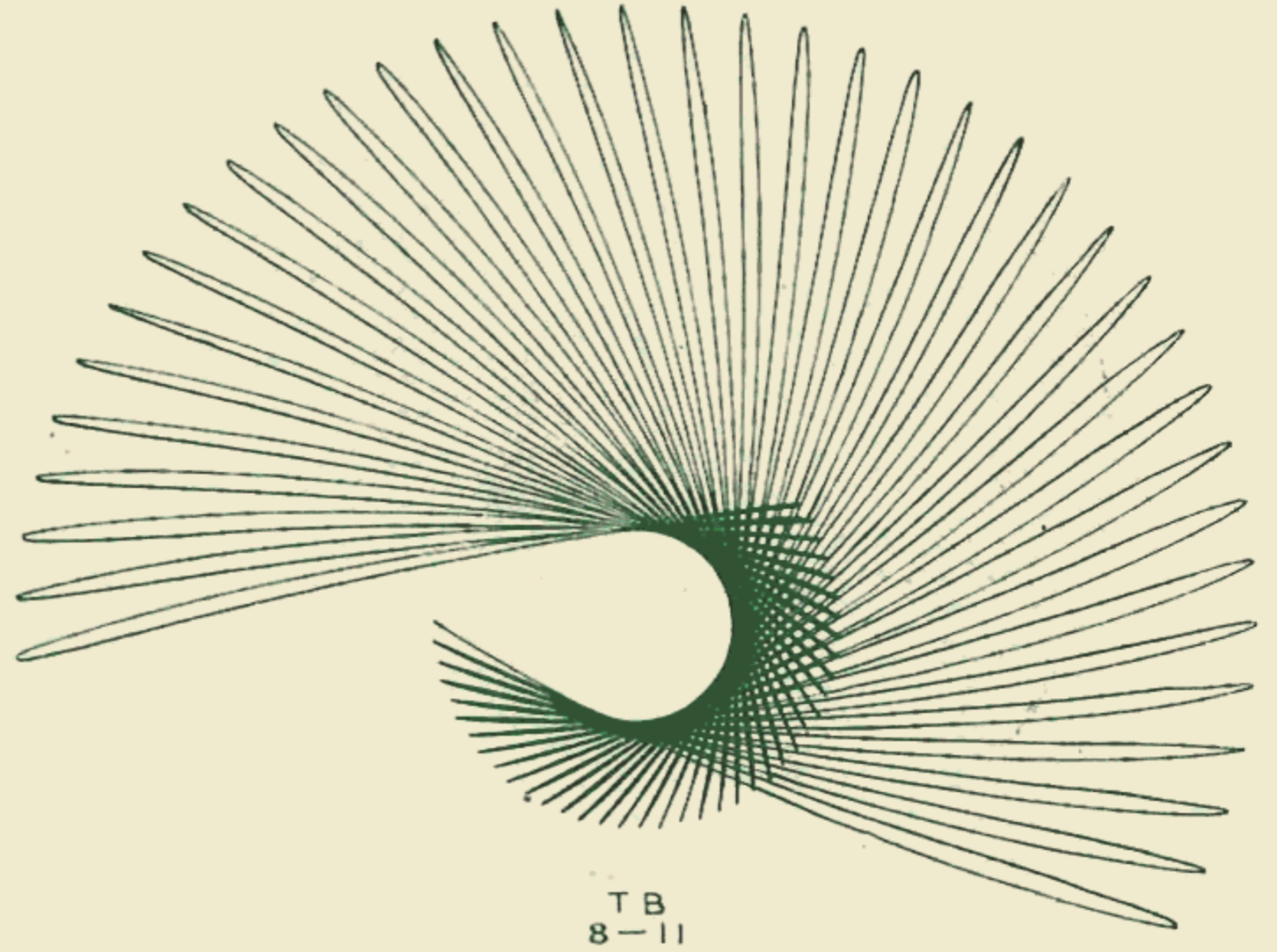
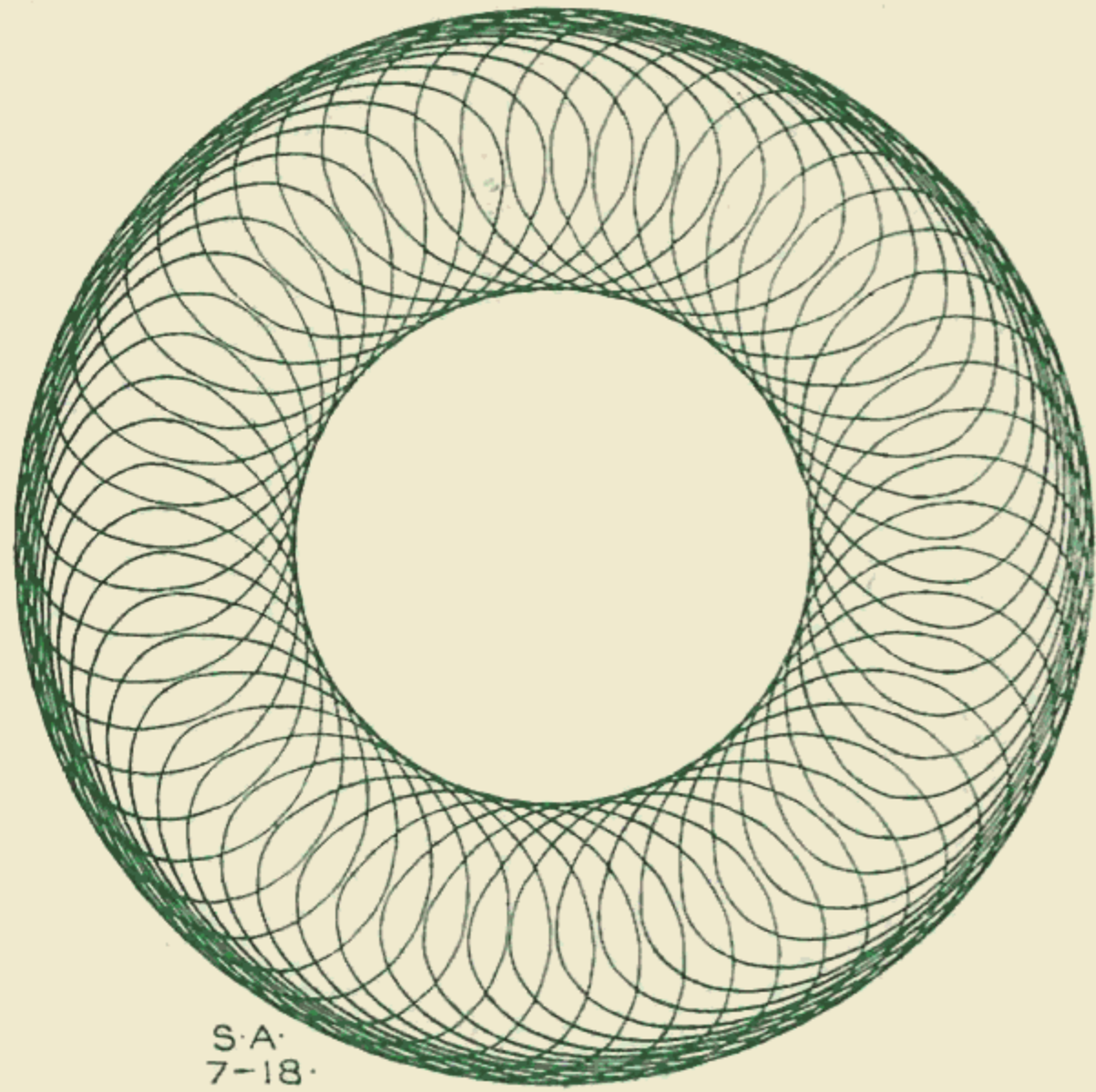
T-A.
9-21. RI.

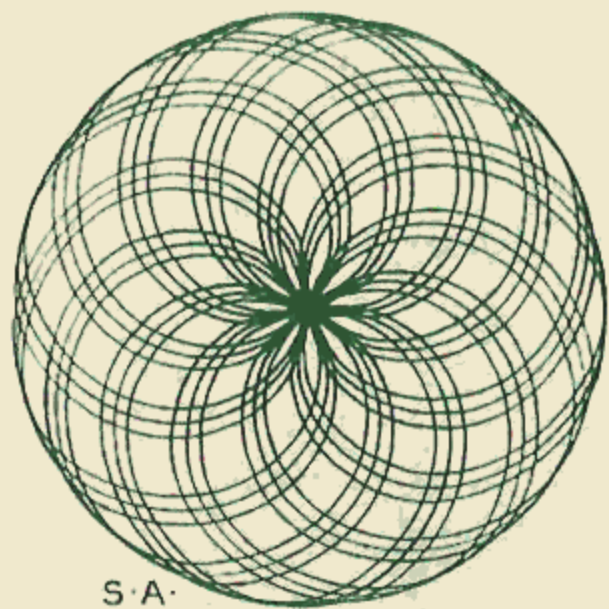


S·A·
2-16.

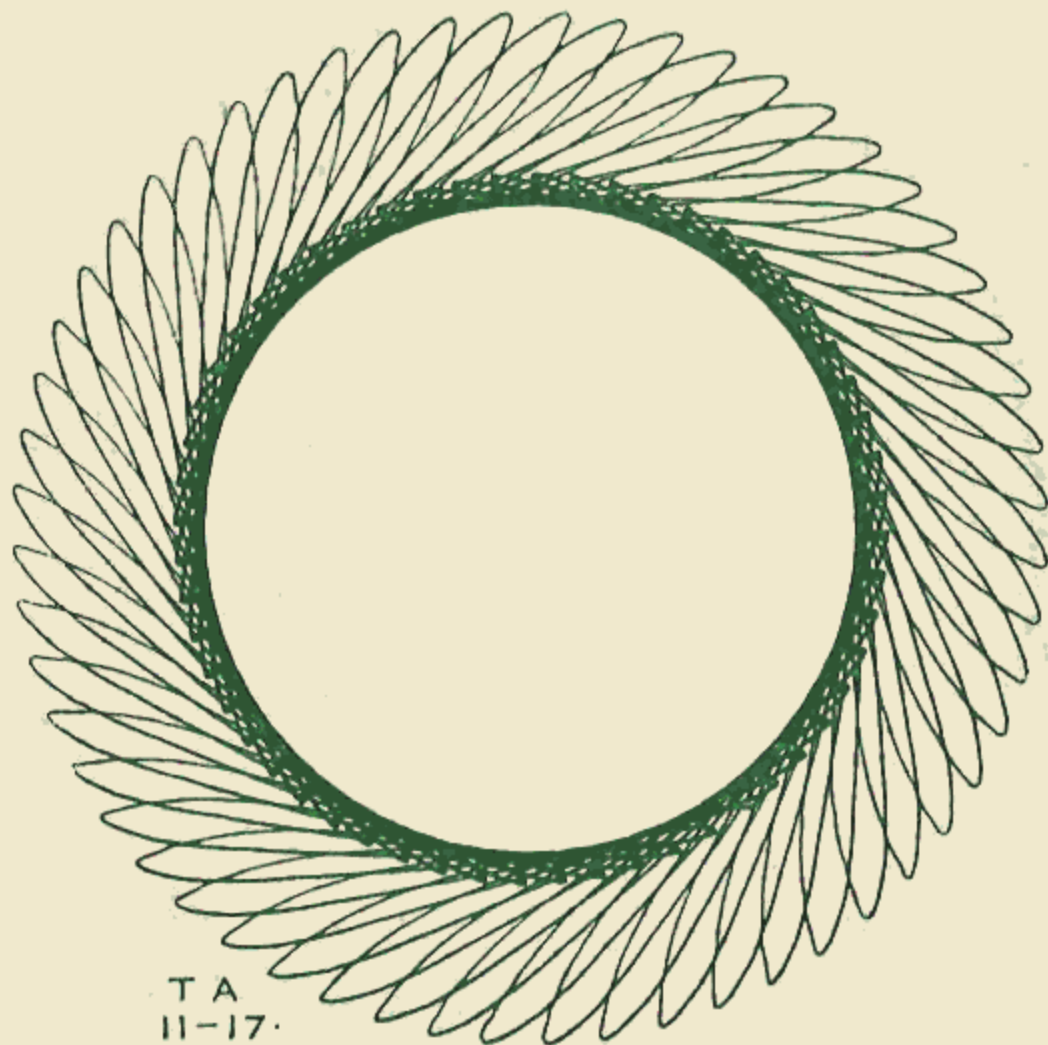


T·B
7-22 L2
S·B
6-18

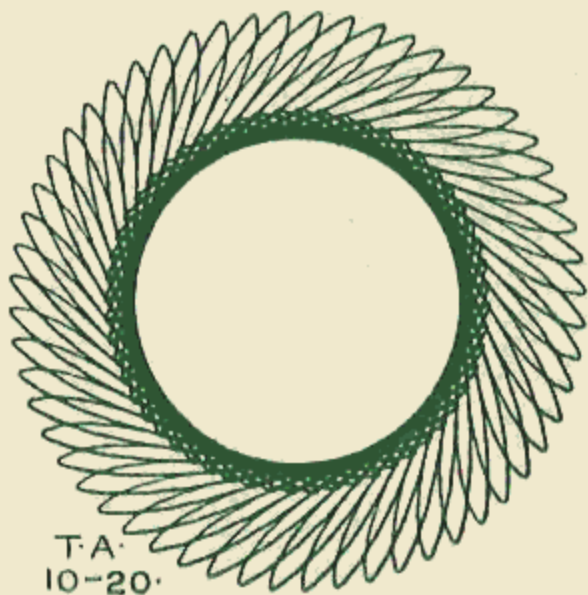




S·A·
3-20· 3 REV



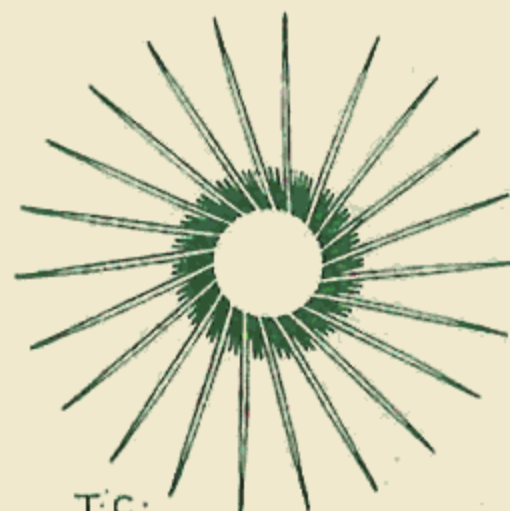
T·A·
11-17·



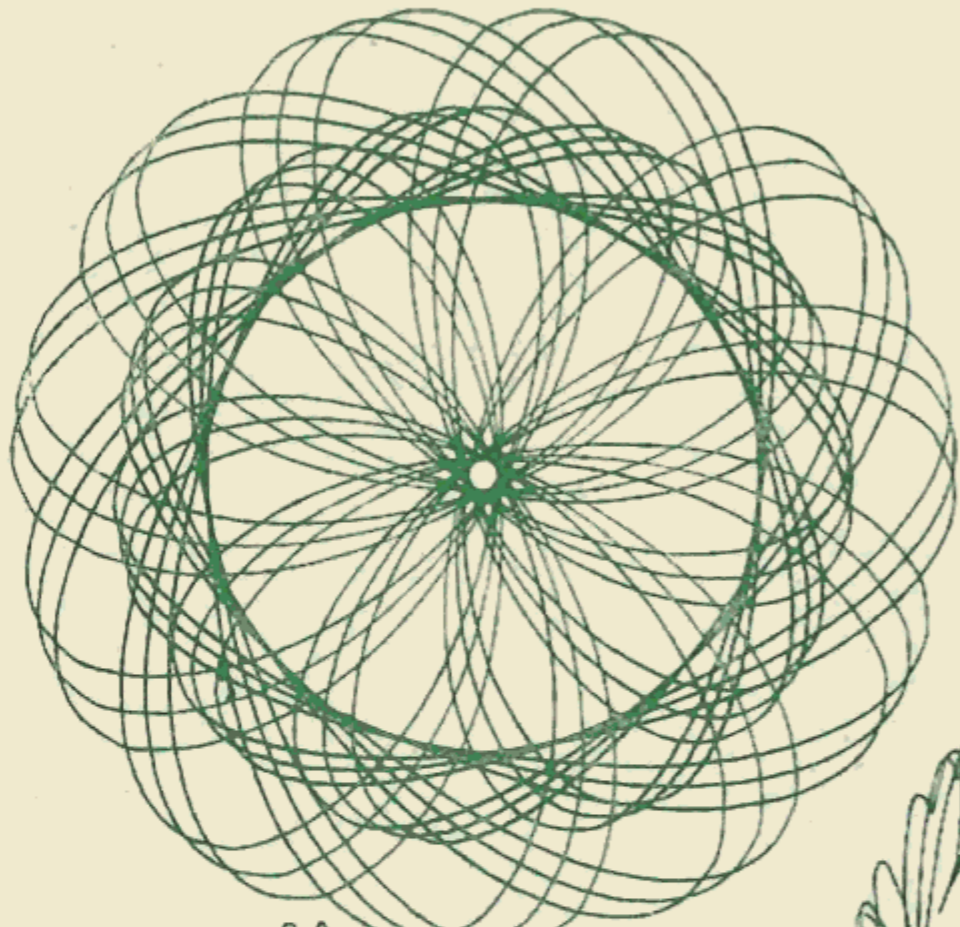
T·A·
10-20·



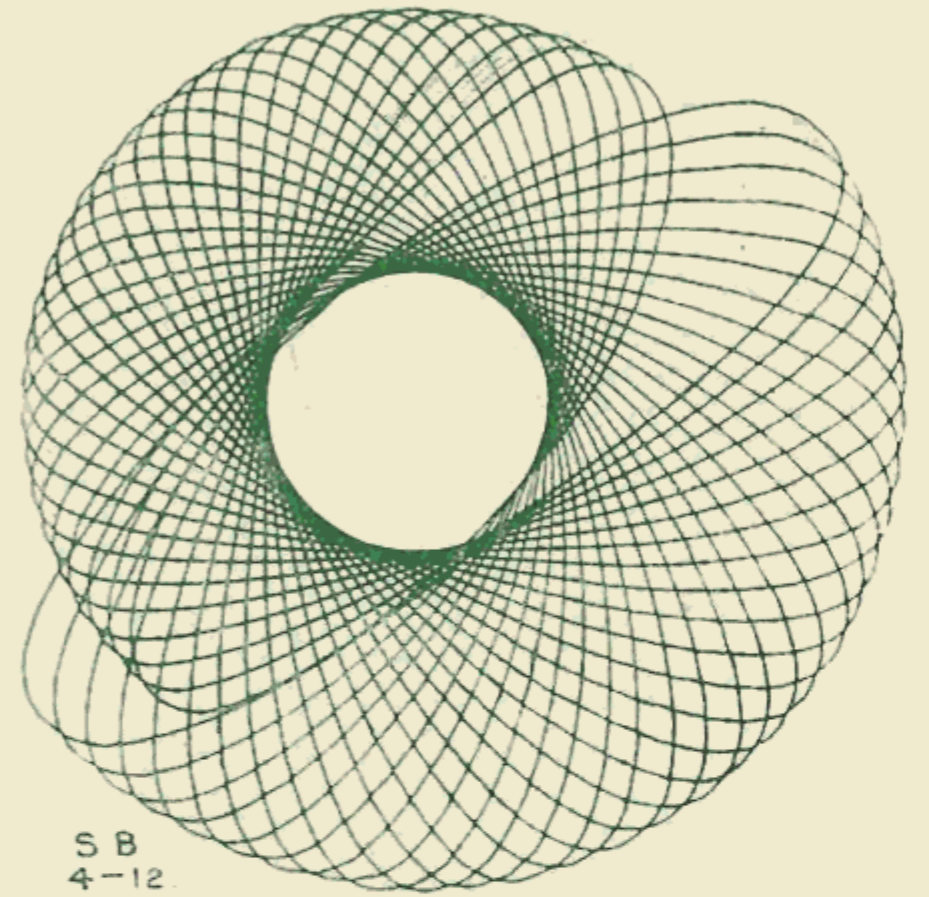
T·C·
8-20· H·13·5 I·REV
8-20· H·13·5 RI·I·REV



T·C·
9-17· H·13·5 RI·I·REV



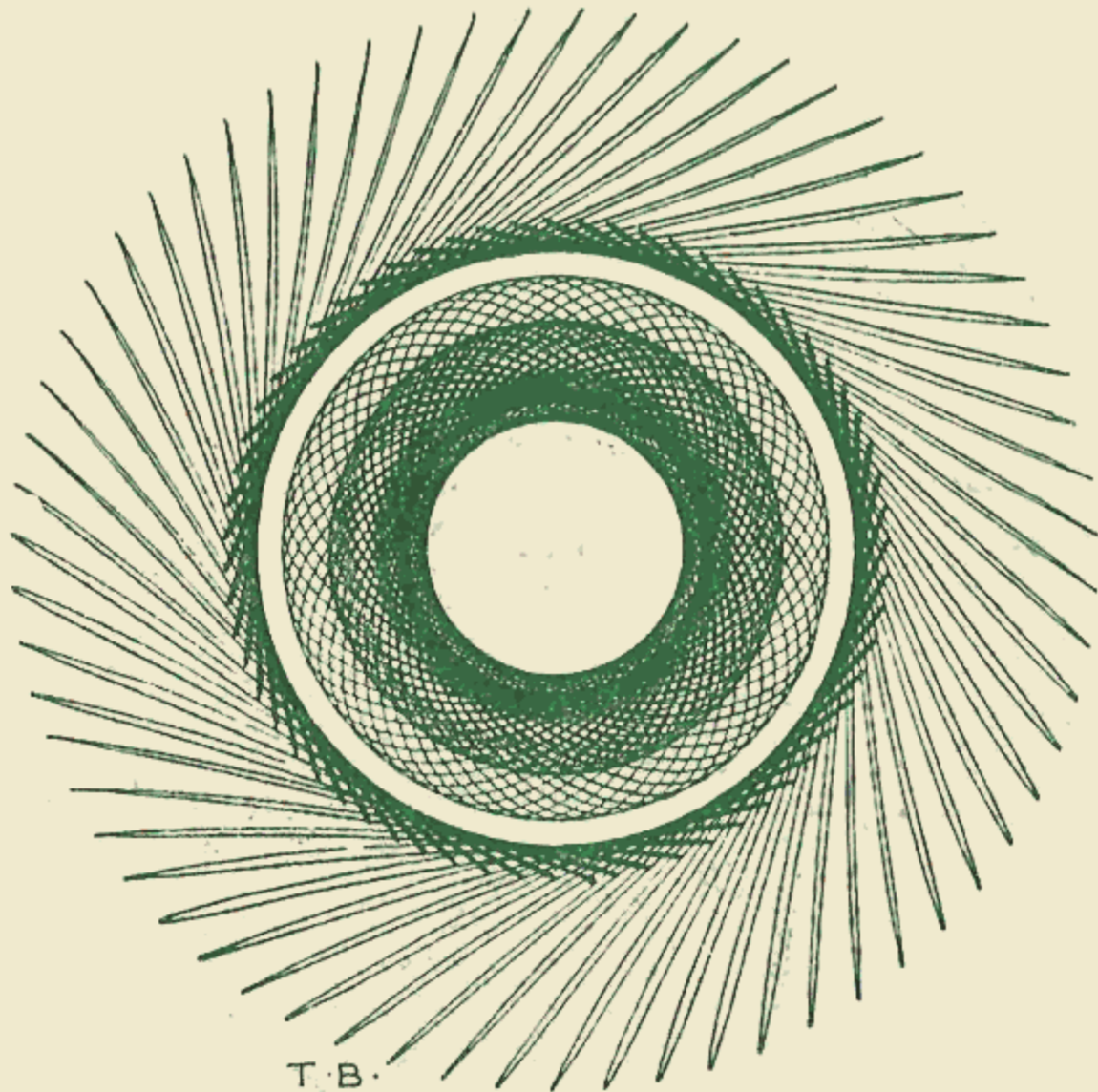
S A
5-14 3 REV



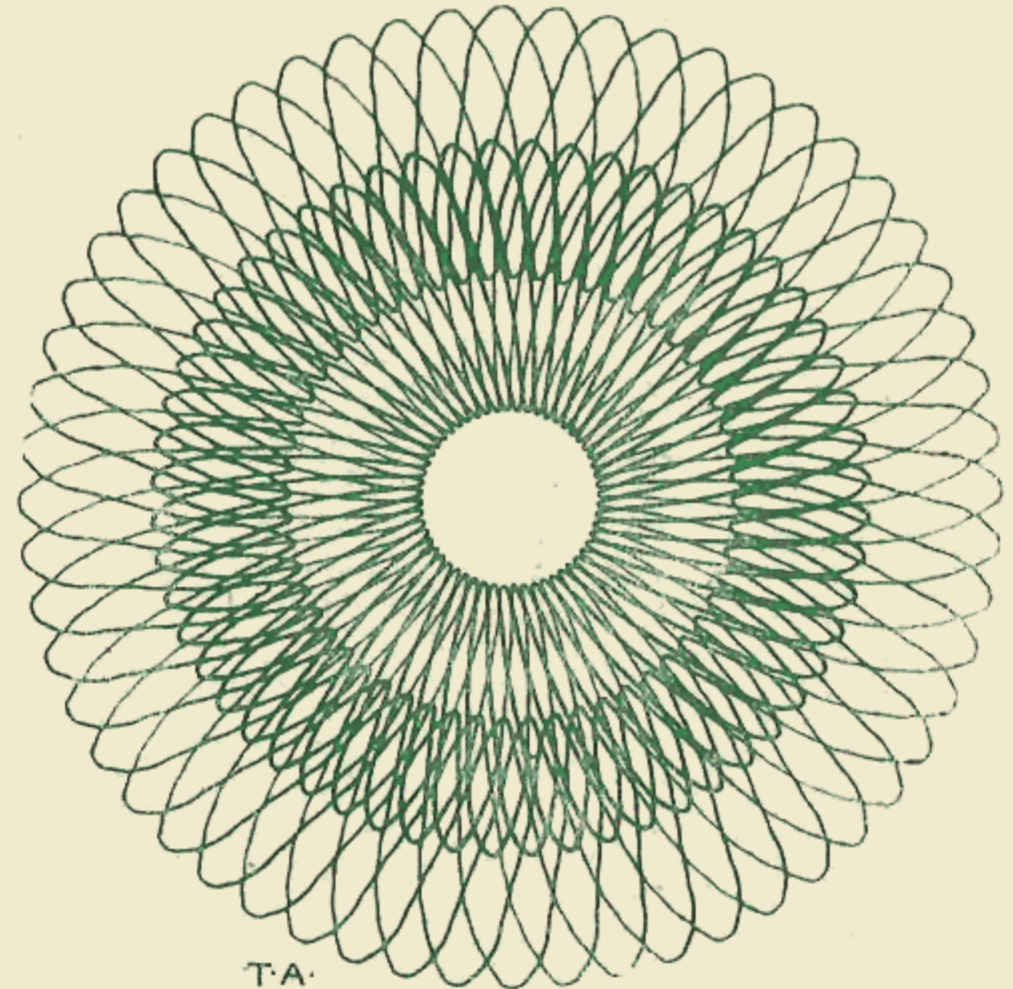
S B
4-12



T A
11-22 H 1 3 3 REV



T.B.
11-16 1 REV
S B — 4.16.



T.A.
9-21. RI.
9-21. LI.