(No Model.) 4 Sheets—Sheet 1.

J. HOPE.

PANTOGRAPH ENGRAVING MACHINE.

No. 281,510. Patented July 17, 1883.

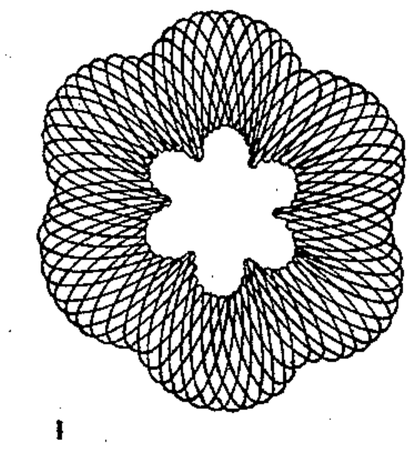

Fig. 3.

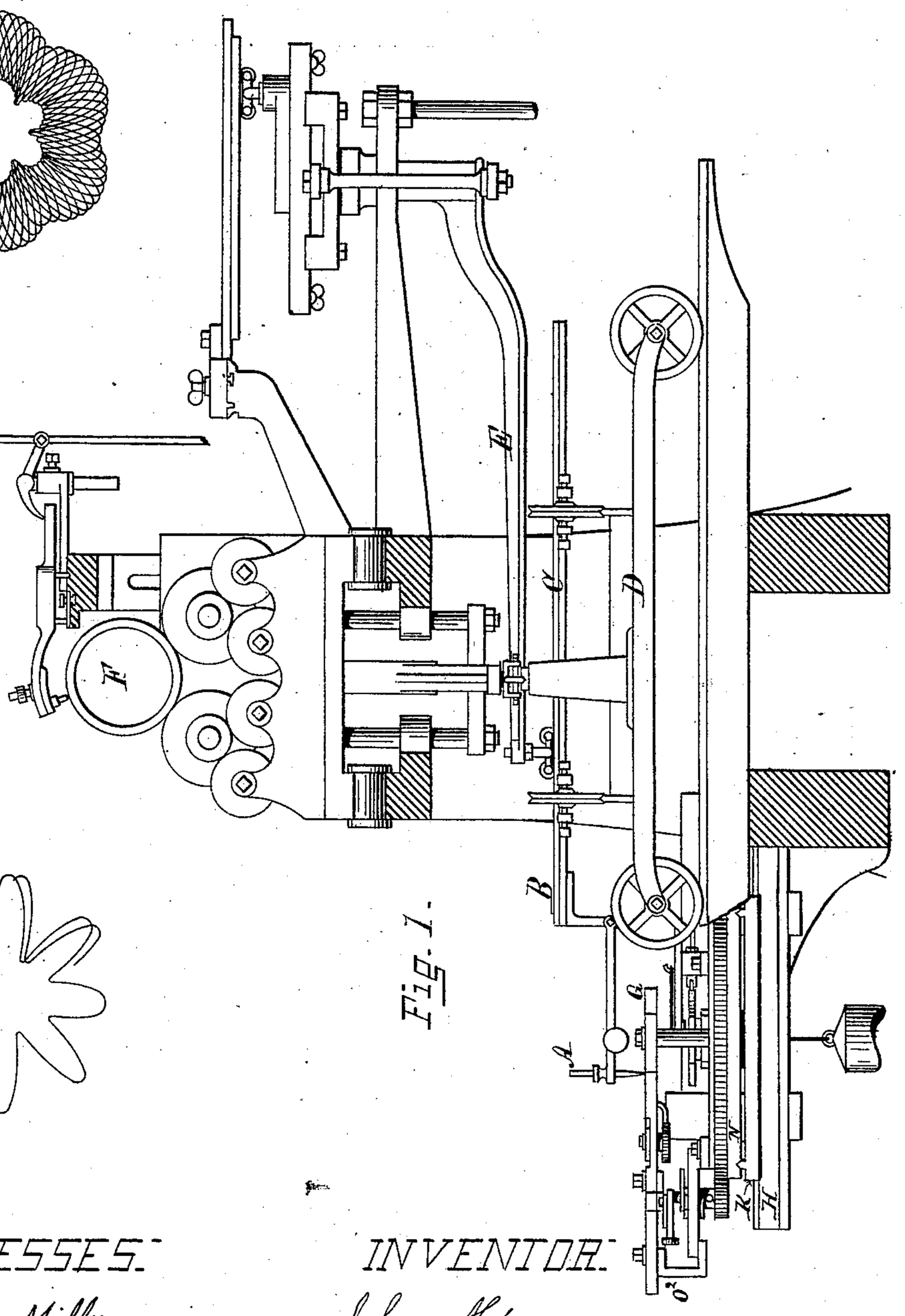

Fig. 1.

Fig. 2.

Fig. 4.

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Fig. 4.

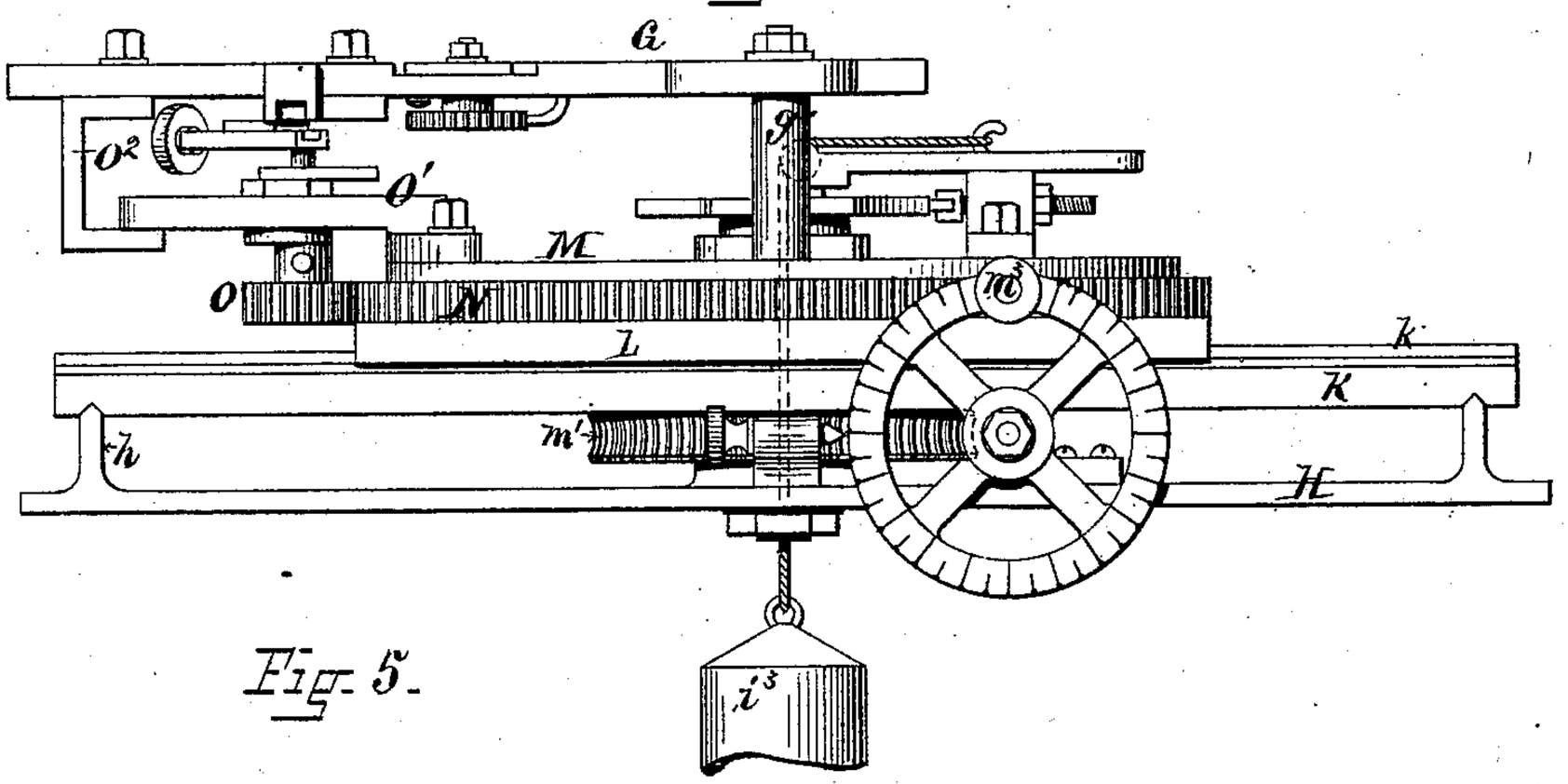
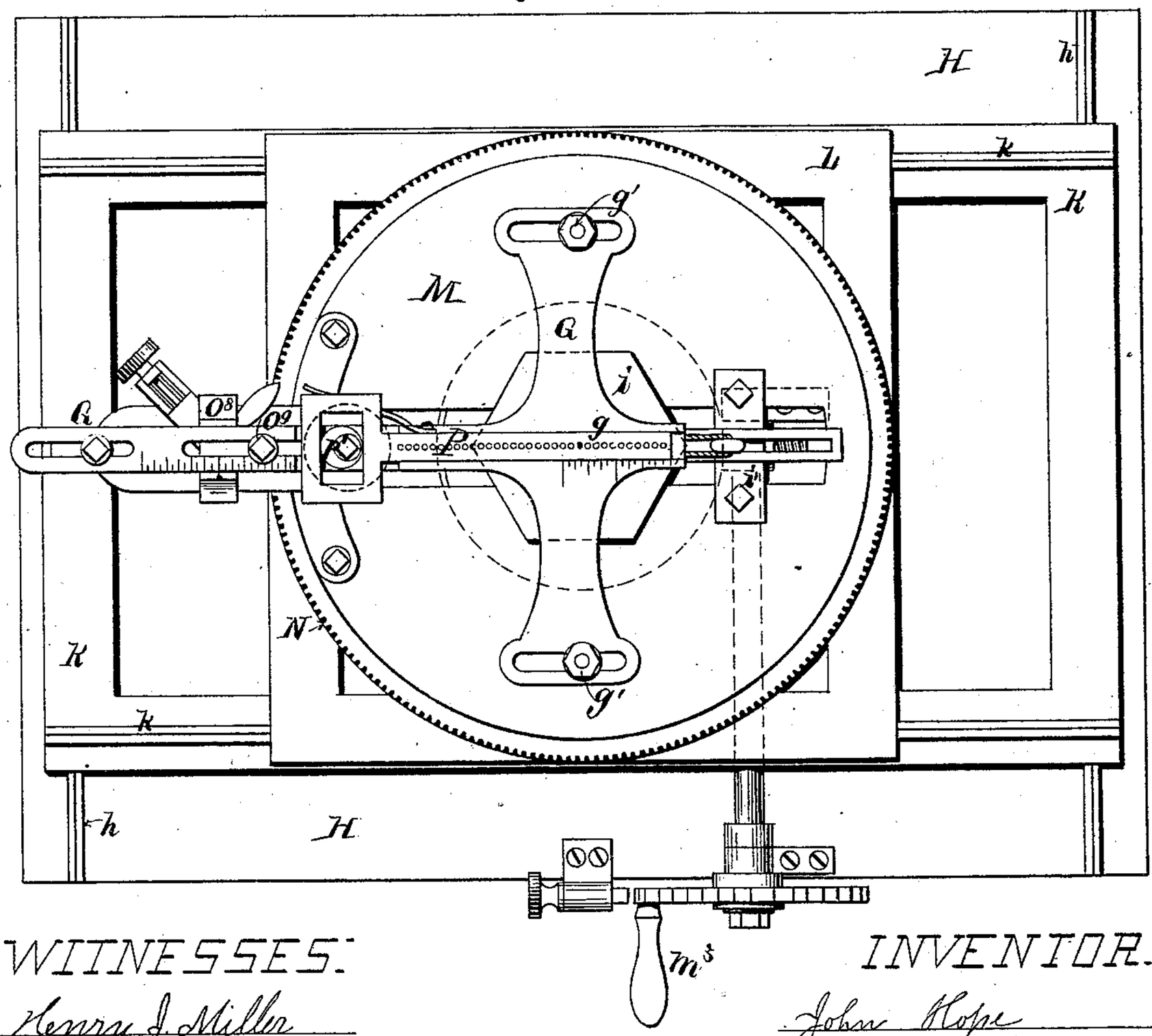


Fig. 5.



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PANTOGRAPH ENGRAVING MACHINE.

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Fig. 6

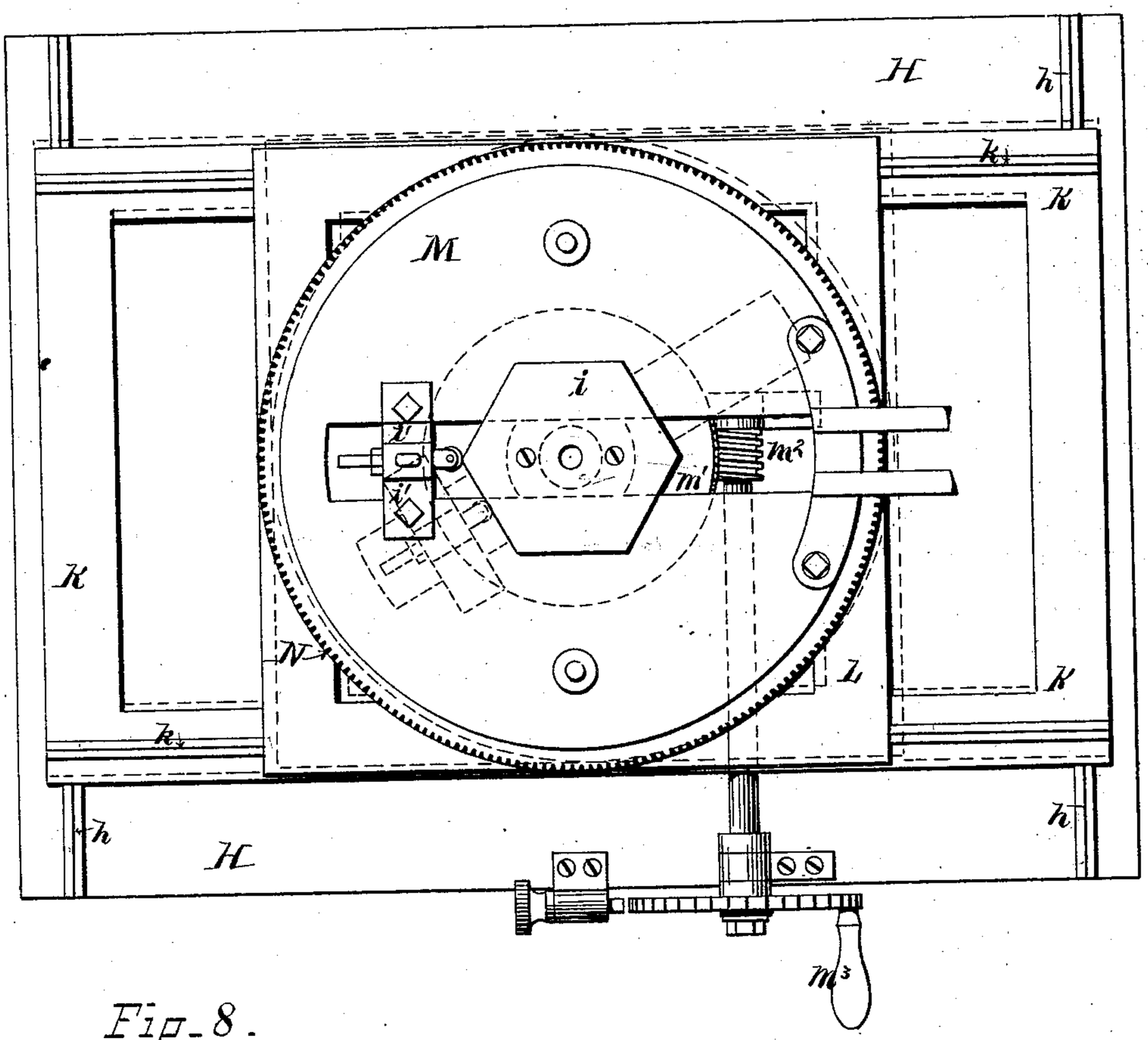


Fig. 8.

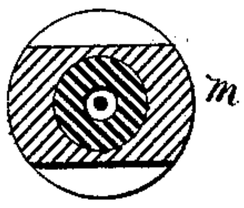
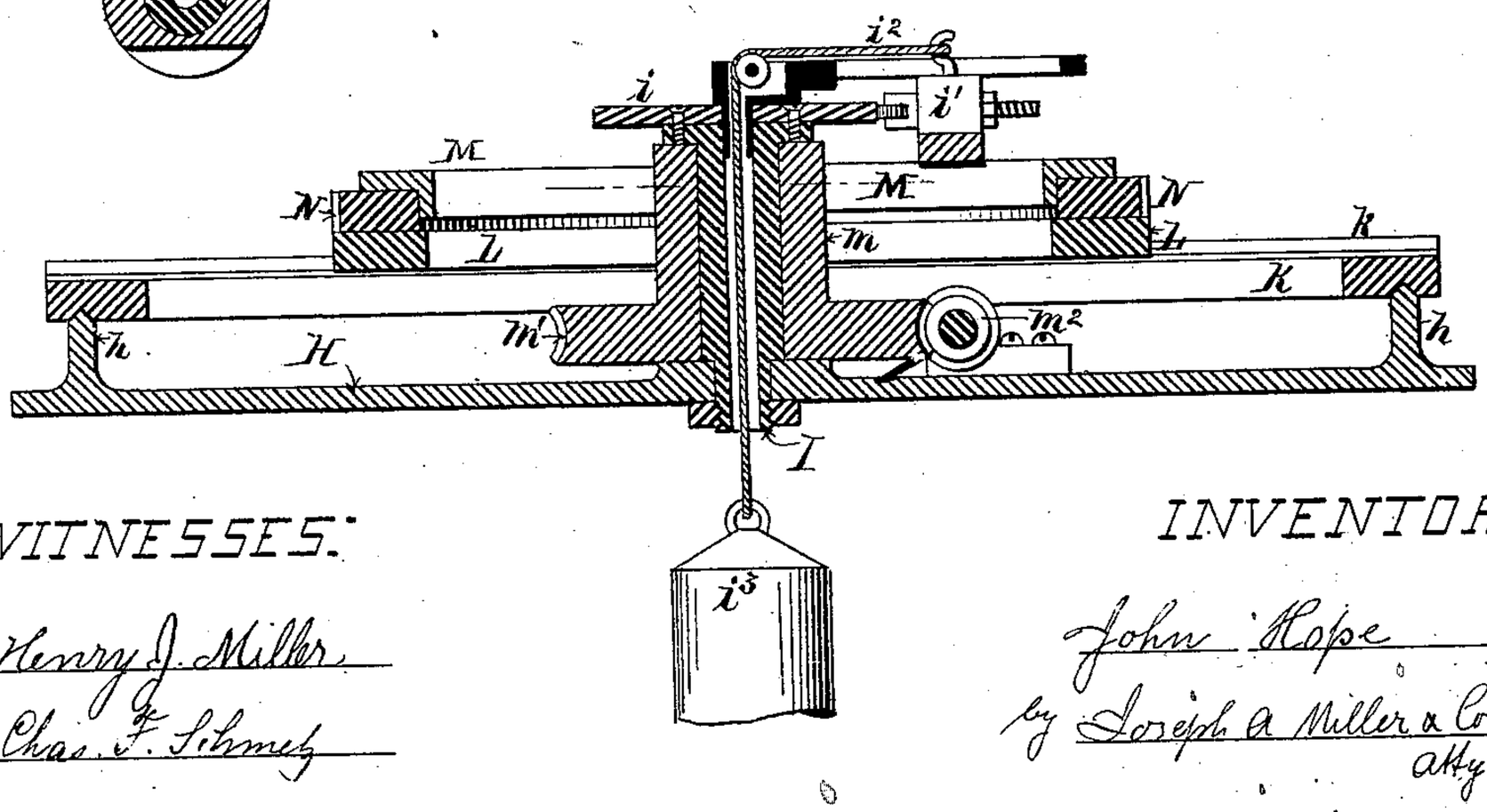


Fig. 7.



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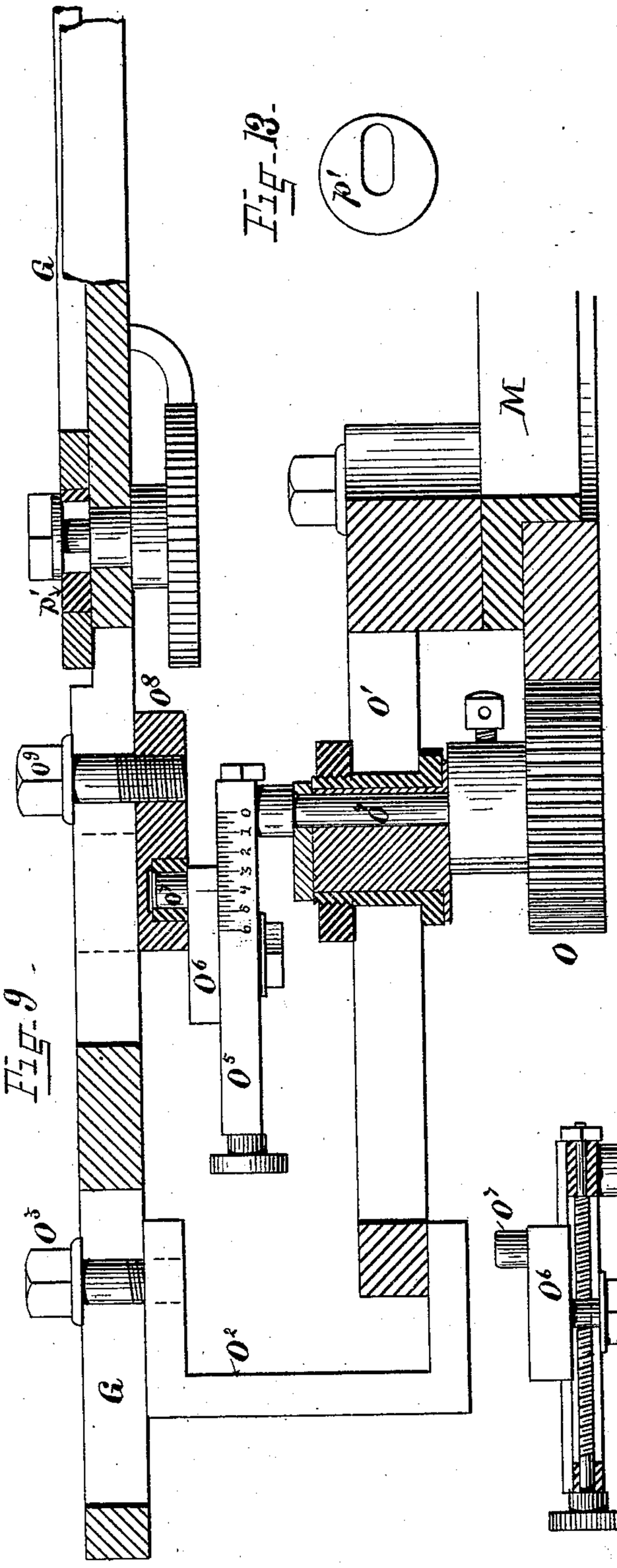

Fig. 9.

Fig. 13.

Fig. 10.

Fig. 11.

Fig. 12.

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UNITED STATES PATENT OFFICE.

JOHN HOPE, OF PROVIDENCE, RHODE ISLAND.

PANTOGRAPH ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,510, dated July 17, 1883.

Application filed October 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN HOPE, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Pantograph Engraving-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improvement in machines for engraving the rolls for calico-printers, and similar rolls used for printing.

The invention consists in the peculiar construction of the machine by which a large variety of figures and designs can be engraved by mechanical means, as will be more fully set forth hereinafter.

Pantograph engraving-machines have heretofore been used to engrave the rolls for calico and other printers by tracing with a stylus over a large pattern, and reproducing the same pattern on a smaller scale many times, as a number of diamond-pointed gravers were operated by the stylus. In my improved pantograph engraving-machine I employ a geared mechanism, similar to the rose-engine, provided with holes, into which the stylus is entered, so that it follows every motion of the machine, and these motions are reproduced by each one of the gravers.

Figure 1 is a view showing the improved pantograph engraving-machine in cross-section. Fig. 2 represents one of the figures through which the stylus moves at each revolution of the rose-engine mechanism. Fig. 3 is a view of the completed figure. Fig. 4 is an end view of the rose-engine mechanism, showing the hand-wheel by which the same is operated. Fig. 5 is a top view of the machine. Fig. 6 is a top view of the geared disk, the reciprocating plate being removed. Fig. 7 is a sectional view through the center, showing the weight by which the reciprocating plate is guided around the central pattern. Fig. 8 is a section of sleeve *m*. Fig. 9 is an enlarged sectional view of the adjustable crank by which the reciprocating plate is operated. Fig. 10 is a sectional view of the adjustable crank, showing the screw engaging with the stud on which the crank-pin is secured. Fig. 11 is an enlarged view, showing the means for adjusting the reciprocation of the stylus with reference to the size of the figure produced. Fig. 12 is a view of the locking device for holding the pinion. Fig. 13 is a view of the slotted eccentric used for the final adjustment of the reciprocating plate.

In the drawings, A is the stylus, hinged to the tracer-arm of the pantograph engraving-machine, which machine is of the usual construction used by me in such machines—that is to say, B is the tracer-arm, secured to the carriage C, which is mounted on ways secured to the carriage D, also mounted on ways. The carriage C, through the arm E, imparts lateral motion, and the carriage D rotary motion, to the roll F, and so transmits every motion of the stylus to the roll; or it may be made to transmit such motion to the gravers.

As this invention refers to the application of the geared mechanism to any of the pantograph engraving-machines as now constructed, a more particular description of such machines is deemed unnecessary.

Fig. 1 shows the connection of the mechanism with the stylus of one kind of pantograph engraving-machines.

Referring to Fig. 5, G is a reciprocating plate provided with a slide, in which a row of holes, *g g*, are made, and into any one of which holes the stylus A of the pantograph engraving-machine may be placed, and every motion of the same transmitted to either the roll or the gravers, so as to be produced manifold on the roll.

The construction of the machine is as follows:

On the bed-plate H, provided with two rails, *h h*, the central tubular post, I, is, firmly secured, and on top of this post the pattern *i*, representing the outline of the desired figure, is secured, so as to form a guide or bearing for the roller in the bracket *i'*, which is part of the machine proper.

i^2 is a cord or chain passing over a pulley down through the center of the post I. It is secured to the bracket *i'*, and has a weight sus-

pended from the other end. This weight keeps the machine proper at all times in contact with the pattern *i*, and thus gives to the figure produced the general outline of the pattern, which may be of any form desired. To allow the geared mechanism to freely adjust itself to the central pattern in all directions, the same is mounted on two carriages or slides. K is one of these carriages, supported on the ways *h h*, on which it may be arranged to slide; or it may be supported on wheels in the same manner as the carriages of the pantograph-machine shown in Fig. 1.

k k are rails or ways placed on the carriage K, at right angles to the ways *h h* on the base plate H. On these ways *k k* the carriage L is made to slide, or, if provided with wheels, to roll.

M is a circular disk turning on the toothed rim N, which is secured to the carriage L. The disk M is rotated by the sleeve *m*, which has two flattened sides, as is shown in Fig. 8, and which enters a slot in the disk M, as is shown in Fig. 6, partly in solid and partly in broken lines. The sleeve *m* forms part of the worm-gear *m'*, and is rotated by means of the worm m^2, turned by the crank m^3. It will therefore be seen that by turning the crank m^3 the worm m^2, turns the worm-gear *m'* and the sleeve *m;* that this sleeve turns the disk M, and with it anything mounted on the said disk; that the disk M, being mounted on the two carriages L and K, each moving on ways at right angles to the other, can freely move on the driving-sleeve *m* and adjust itself to the pattern *i*, against the edge of which it is held by means of the weight i^3, and that therefore in its rotation the disk M will follow the outline of the pattern *i*. The plate G is mounted on the disk M and held by the posts *g'*, which enter slots formed in the lateral projections or arms of the plate G, and form guides in which the plate reciprocates. The reciprocating motion is produced by means of the pinion O which gears into the stationary toothed disk N. The pinion O is journaled in the bracket O', which is secured to the disk M, and is connected with the reciprocating plate G, forming the third bearing on which the plate G slides, the screw O^3 passing through a slot in said plate G. Connected with the shaft O^4 of the pinion O is the crank O^5 in which the block O^6, provided with a zero-mark, slides, controlled by an adjusting-screw, so that the throw of the crank can be accurately adjusted, and such adjustment ascertained by reference to the position of the zero-mark on the block O^6, in connection with the divisions marked on the crank O^5, as is clearly shown in Figs. 9 and 10. The pin O^7 enters the block O^8, which is secured in the plate G by the screw O^9, and can also be adjusted with reference to a scale marked on the plate G. P is a slide provided with the the holes *g g*, on one end of which a square projection, *p*, is formed, in which the eccentric *p'* is secured, so that by the turning of the eccentric a very nice adjustment can be secured. Fig. 11 shows these means for adjustment very clearly on a large scale.

The operation of this mechanism is as follows: Considering that the previous description clearly sets forth the means for rotating the disk M and all connected with the same with reference to the pattern *i*, and how the disk will adjust itself to the said pattern, it will be seen that the pinion O will be rotated around its own axis and around the toothed rim N by being geared with the same, and that the crank O^5 will reciprocate the plate G and slide P in and out at each revolution of the pinion O, and that at each revolution of the disk M a complete figure is produced. The size of the figure produced depends on the size of the pattern *i*, the length of the throw of the crank O^5, and the hole *g* into which the stylus is placed. A great variety of work can be produced by this machine and multiplied by the pantograph engraving-machine. In the drawings, a pinion, O, of one-eighth the diameter of the toothed rim N is shown; but the pattern *i* is six-sided. Now, the figure produced is shown in Fig. 3, and differs materially from a figure produced by the same gear with an eight-sided pattern, while, with the same gear and the same pattern, the moving of the stylus one hole farther out or in will describe a series of lines in the first pattern that will produce a new effect; and if, by means of the eccentric *p'*, the slide P is slightly changed a very fine effect of shading is produced, as the difference is most apparent on the outer loop, and the lines merge on the inward and outward lines. A large variety of other changes can be made by the interchange of larger or smaller pinions, for the pinion O changes in the throw of the crank O^5, or the point at which the block O^8 is secured, and all can be transferred and multiplied by the pantograph engraving-machine.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the pantograph engraving-machine, of the rose-engine, a geared mechanism, substantially as described, provided with a pattern-holder and adjustable slide having holes *g* to receive the stylus, and automatic means for keeping said slide in position to hold the stylus in contact with the pattern while permitting it to follow the contour thereof, essentially as set forth.

2. In a machine for producing geometrical figures, as described, the combination, with the disk M, supported on the carriages L and K, of the tubular post I, the pattern *i*, and the weight i^3, constructed to guide the disk M and the reciprocating parts connected therewith around the pattern, as described.

3. The combination, with the plate H, provided with the ways *h h*, the carriage K, provided with the ways *k k*, and the disk M, provided with a central slot, of the post I, the pattern *i*, the weight i^3, the sleeve *m*, provided with the worm-gear *m'*, and the worm m^2, con-

structed to rotate the reciprocating parts described around the pattern, as and for the purpose set forth.

4. The combination, with the disk M and means for rotating the same around a fixed pattern, of the pinion O, geared into the fixed toothed rim N, the adjustable crank O^5, and the plate G, provided with the slide P, having the holes *g g*, of the stylus A of a pantograph engraving-machine constructed to produce geometrical figures, as described.

5. In a geared mechanism for producing geometrical figures through a pantograph engraving-machine, the combination, with the reciprocating slide provided with holes for receiving the stylus and connecting the pantograph engraving-machine, of the adjusting devices consisting of the eccentric *p'*, the block O^8, and the scale for regulating the adjustment, and the block O^6, adjusted by means of the screw in the crank O^5, as and for the purpose described.

6. The combination, with the disk M, constructed to rotate around a fixed pattern and guided by the same, of the toothed rim N, the pinion O, the adjustable crank O^5, and the reciprocating plate G, provided with holes to receive and operate the stylus of a pantograph engraving-machine, as described.

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