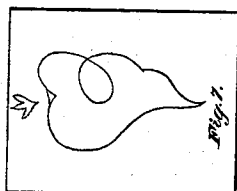
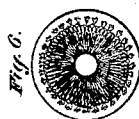
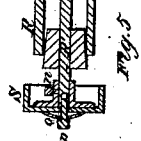
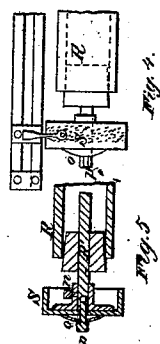
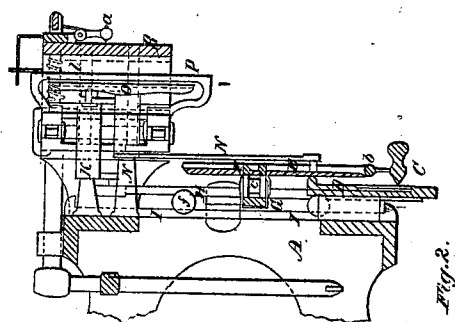
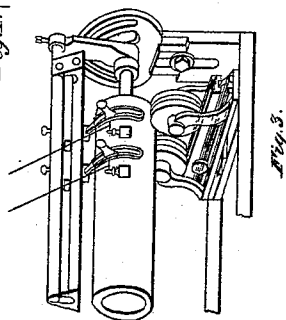
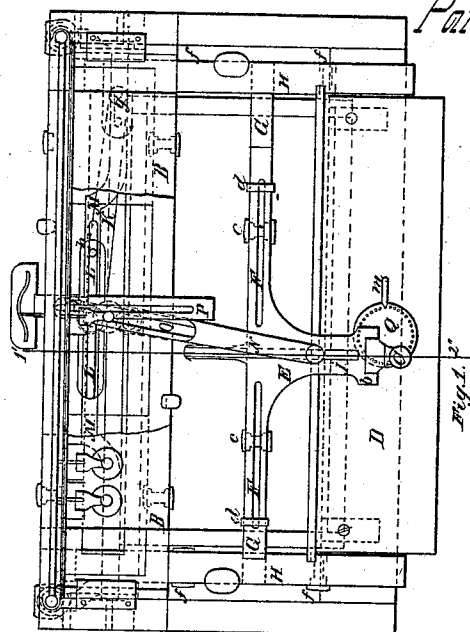


J. Hope, Engraving Machine.

N^o 7,010.

Patented Nov. 19 1867.



Witnesses.
William M. Richard.
Eugene Vaughan.

Inventor.
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United States Patent Office.

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Letters Patent No. 71,010, dated November 19, 1867.

IMPROVEMENT IN PANTOGRAPHIC ENGRAVERS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN HOPE, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Pantographic Engraving Machines; and I do hereby declare that the following specification, taken in connection with the drawings making a part of the same, is a full, clear, and exact description thereof.

Figure 1 is a top view.

Figure 2 is a section on line 1-2 of fig. 1.

Figure 3 is a fragmentary elevation of so much of the machine as is necessary to show its application to the engraving of calico-printers' rollers.

Figures 4 and 5 show in detail a convenient arrangement for holding and setting the rollers to be engraved in different positions upon their axes.

Figures 6 and 8 exhibit some of the effects of which the machine is capable.

Figure 7 is an illustrative pattern, from which, by the aid of the machine, the effect shown in fig. 6 is obtained.

A pantographic mechanical engraving machine is to be understood to be a machine capable of multiplying upon either a curved or plane surface, in proportion to the numbers of gravers employed, any figure from a single-pattern sketch. It is also expected to be able to produce a full, regular, geometrical figure, or one of a complex ornamental character, from a pattern which contains only a single complete set of the elements which, by repetition, will make up such figure. Machines of this class consist of a number of diamond-pointed gravers, fixed upon a bar at stated distances apart, and capable, by means of a foot-treadle, of being brought to bear at pleasure upon the copper roller or other article to be engraved. The surface of the metal to be engraved is coated with a prepared varnish, which will resist the action of acids, but can be readily etched by the diamond points. The pattern-sketch, which is usually made of nine times the size of the intended figure when etched, is placed upon the flat surface of a table, in front of the operator. Over the sketch is a stylus or metallic pointer, which, as it is moved over the figure upon the pattern-sheet, causes a movement corresponding in direction, but reduced in extent, to be given to the table or frame which supports the article to be engraved by means of intermediate connecting mechanism, and thus the pattern is reproduced upon the varnished coating as many times as there are fixed gravers. A type of such machines, as they have heretofore been constructed, is shown and described in the Letters Patent of the United States, granted to _____, bearing date _____.

Prior to my invention this class of machines were complicated in structure, and, consequently, defective in operation, owing to the want of exact correspondence between the movements of the object-table and those of the stylus, induced by disturbances from the slippage of friction-wheels and variations in the length of pulley-bands used in transmitting motion from one to the other. I have sought in the present invention to overcome all the objections which have on this account existed in a machine of this kind, and also to give it capacities of which it has not before been practically capable.

Referring to the drawings, it will be understood that the machine is supported by a suitable stand, A, a fragment of which is seen in fig. 2. B is the object-table, upon which the prepared plate to be engraved is laid and secured, or, in place of a plane surface, if a shell for calico printers' use is to be engraved, the latter should rest upon roughened-faced rollers, as seen in fig. 3. The diamond gravers *a* are set in holders, which are secured upon a bar, and are brought to bear upon the roller or plate to be engraved by means of a treadle, in the well-understood way. C is a pointed stylus or tracer, hinged to the mechanism which connects it with the object-table at *b*, and D is the table upon which the pattern-sketch is placed.

The manner in which the various movements given by the operator to the point of the stylus in following the outline of the sketch, will be imparted to the table B, is as follows:

The neck-piece E, fig. 1, to which the stylus C is hinged, projects from the bar F F, of which it is a part. Parallel with this bar F F, and directly underneath the same, but separated therefrom by the friction-rollers *c c*, upon which such bar rests, is a second bar, G, forming, with the two transverse bars H H', which it connects, a frame. The bar F F and the frame just mentioned, are kept in connection by means of flanches upon the ends of the friction-rollers *c c*, which flanches will cause a movement to be given to the entire frame above referred to, whenever a movement other than one in a line parallel with the axis of F is given to the point of the stylus. The side bars H H' of the frame rest upon friction-rollers *ffff*, which are supported by a fixed transverse rail, I, fig. 2, forming a part of the framework of the machine. Near the extremity of one of the side bars H' is pivoted at *g*, fig. 1, a lever, K, shown partly in dotted lines, which radiates from the upright standard K', fig.

2, having the capacity to rock upon its axis. Across the top of the shaft K' is a lever, L , and this last-named lever carries a pin, h , fig. 1, which works in a slot cut in a bar, $M M$, extending from end to end of the object-table B . By keeping in mind the fact that every forward or backward movement given to the stylus will, as before explained, give a corresponding movement to the frame $H G H'$, it follows that any vibration upon its axis given to the standard K' , through the lever K , pivoted to the said frame, will be communicated to the table B , so that the movement of the latter will be coincident both in point of time and direction with that of the stylus. The extent, however, of such movement relatively to that of the stylus can be varied at pleasure, by altering the position of the pin h in the slot of the lever L , the former being held by a clamp-nut in the latter, so that it can be set at any point in the slot which will give the desired extent of movement to be imparted to the table B .

All forward and backward movements of the stylus, unaccompanied with any movement laterally, will, as above explained, be followed only by movements in corresponding directions on the part of the table B . To enable all lateral movements given to the stylus to be in like manner responded to by the object-table, a lever, N , radiating from an upright rocking standard, N' , fig. 2, is connected with the neck-piece E of the bar $F F$ by a pin, i , which works in a slot, j , cut in such neck-piece. While it is clear that such lever N will not, with such a connection, be disturbed in its position so long as the stylus is moved only in a line coincident with the axis of such lever, it is at the same time evident that any movement of the stylus to the right or left of such supposed line will cause the standard N to be rocked in its bearings. Any such axial movement given to such standard will impart to the table B a movement in a lateral direction, by means of the cross-bar O , which is furnished with a channel, k , and carries a stud-pin, l , which can be adjusted to any position in the channel, and which stud-pin engages with a slot cut in the yoke P , attached to the carriage upon which the table B rests.

In this, as in other machines of its class, the object-table is made in two parts, the upper portion being arranged so that it can be moved in a direction at right angles to its length, upon its lower portion, in a way well understood.

In my machine, as above described, it will be observed that by the means employed by me for connecting the stylus with the object-table, it will follow that every motion given to the stylus will be repeated by the table; that the relative size of the etching to the pattern can be regulated at pleasure, and that if desired, by simply adjusting the stud-pins h and l upon the one side or the other of the rocking standards K' or N' , respectively, in the channels of their levers L and O , the etching will be the same as or the reverse in position of the design on the pattern-sketch, as the case may be, it being quite evident that in whatever directions the table will move in correspondence with the movements of the stylus upon the stud-pins, which are set upon one side of the standards. Movements in opposite directions for the same movements of the stylus will result from the change of such pins to the other side of the standard.

By this machine, also, when used for bank-note or like ornamental engraving, a letter or figure may be etched so that its longitudinal and transverse axes shall not be of the same relative lengths as those of the design, although the character of the letter or figure will, in other respects, be the same, by adjusting the length of the lever which gives motion to the table, so that the movement of the table for a given movement of the stylus shall be in one direction in excess of what it is in the other.

In fig. 6 is shown a specimen of the effects which can be produced by the machine. The complex figure there shown is made up of the simple elements represented in fig. 7 repeated. To assist the operator in this style of engraving, the pattern-table is furnished with a circular plate, Q , embedded in the same, the surface of which is furnished with holes at equal distances apart, into which holes the point of an index, m , fits. By placing the pattern (fig. 7, for example,) upon the plate, whose position upon its axis can be changed by successive angular movements of equal extent, graduated conveniently by the index m , and by etching the design for each position of the pattern, a similar effect to that shown in fig. 6 will be produced.

For engraving cylinders for calico printers, it is often necessary to change the position of the roller upon its axis by angular movements of equal extent. For this purpose an index-plate and finger are employed, the plate being secured to a shaft put through the axis of the cylinder. It often occurs, however, that it is desirable to adjust the index-plate more accurately with the surface of the cylinder, by reason of the axis of the shaft to which the index-plate is attached, from inequalities in the thickness of the shell of the cylinder not coinciding exactly with the axis of the outer surface. A convenient device in such cases is shown in figs. 4 and 5. R is the copper shell, and R' the mandrel, placed through the axis of the same. A flanch, n , is clamped to the end of the mandrel, and the index-plate S , which has a hole through its centre of greater diameter than the mandrel, is placed so as to bear against the flanch, as shown in section, fig. 5. A washer, o , which may be dome-shaped, and of spring steel, is then placed upon the end of the mandrel, and by the aid of a nut, p , holds the index-plate against the face of the flanch. It is clear that with this arrangement the index-plate may be adjusted readily to meet the requirements of the case.

What is claimed as my invention, and is desired to be secured by Letters Patent, is—

1. Combining the carriage of the tracer or stylus in a pantographic engraving machine with the object-table by means of the levers L and O and the stud-pins h and l , operated respectively by the levers K and N , through the rocking standards K' and N' , substantially as described for the purposes set forth.

2. Making the index-plate S adjustable with reference to the surface of the roller, to be engraved by the means substantially as described.

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Witnesses:

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