J. S. Ives

Engraving Machine

No. 37,235. Patented Dec. 23, 1862.

Fig. 2

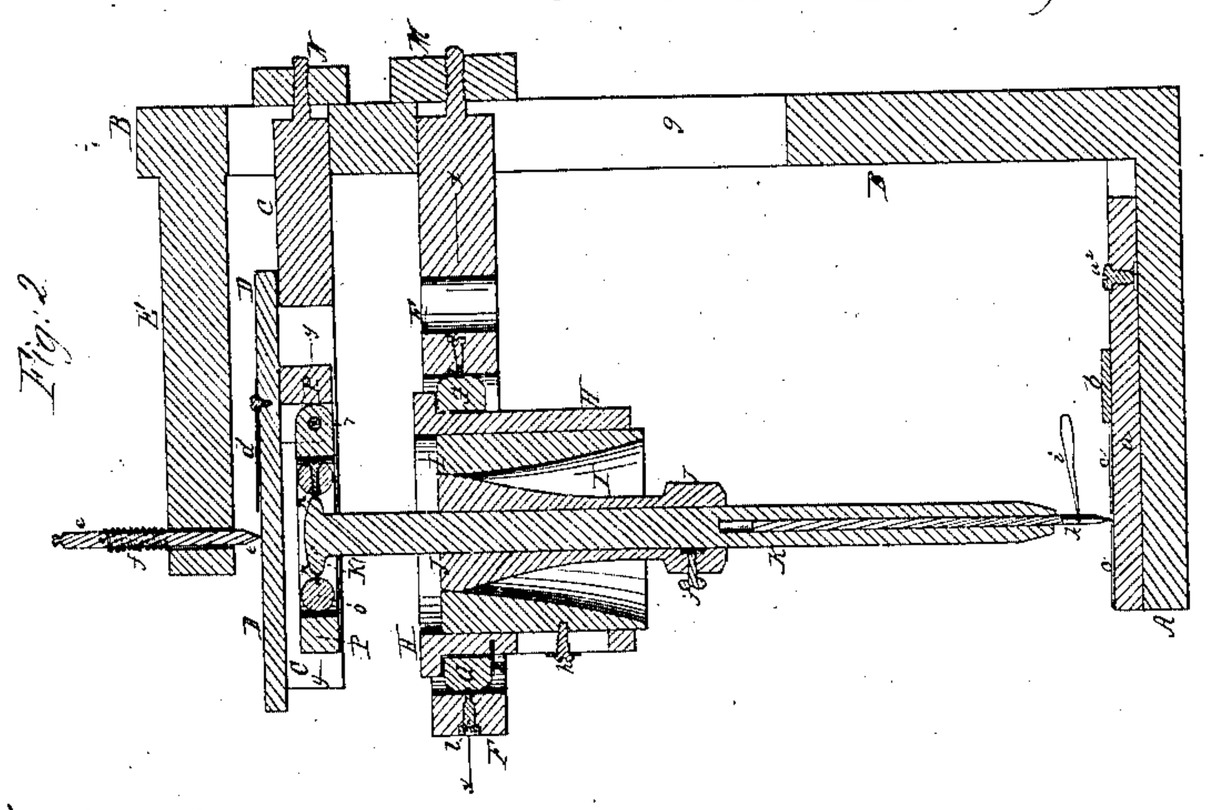


Fig. 3

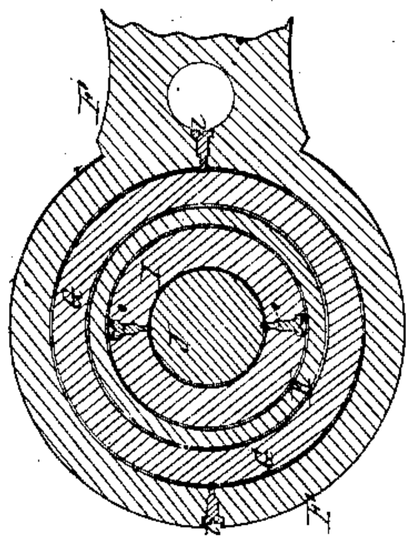


Fig. 4

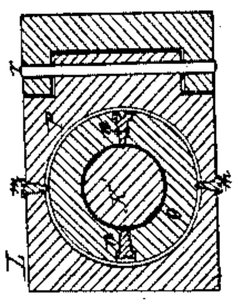
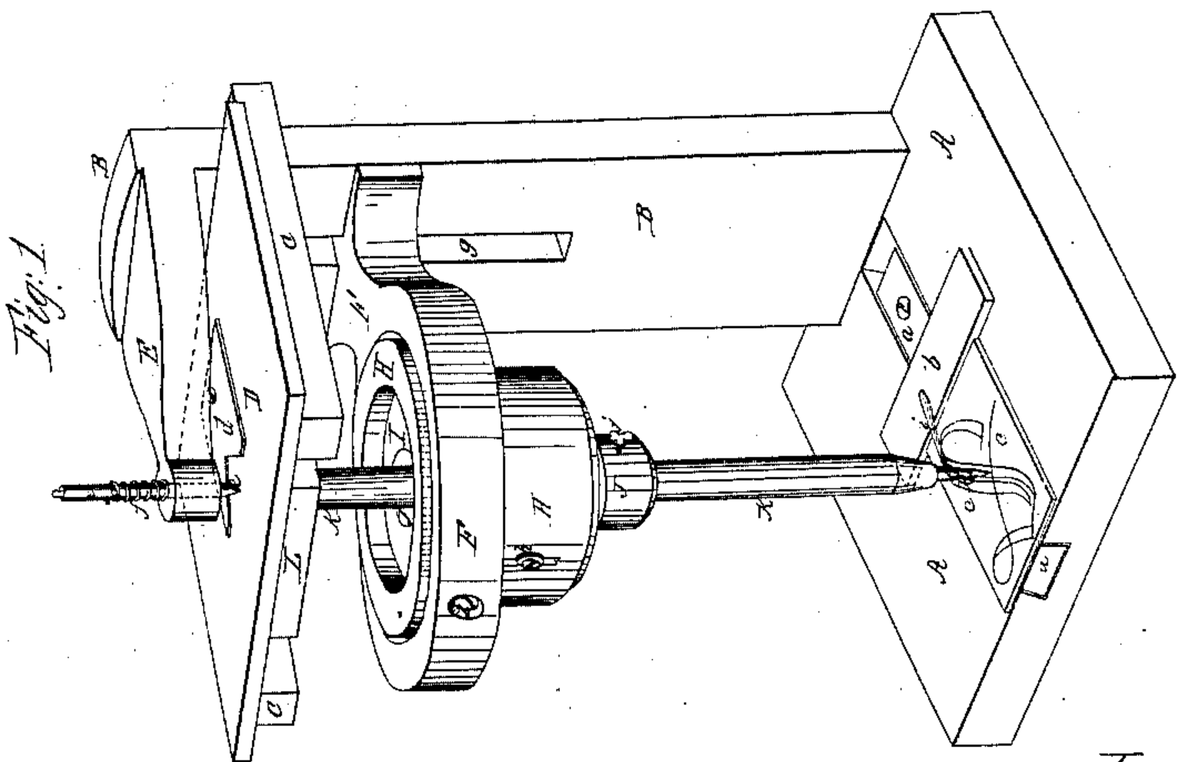


Fig. 1



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UNITED STATES PATENT OFFICE.

JOSEPH S. IVES, OF MORRISANIA, NEW YORK.

ENGRAVING-MACHINE.

Specification forming part of Letters Patent No. **37,235**, dated December 23, 1862.

To all whom it may concern:

Be it known that I, JOSEPH S. IVES, of Morrisania, of the county of Westchester, in the State of New York, have invented a new and useful Machine for Doing All Kinds of Engraving; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention has for its object to execute by machinery every variety of engraving, and relates to certain improvements in that kind of machines in which a given design is copied on a reduced scale, so as to make the machine capable of producing from a given former or design the same design on any required scale, and also varied in any and all of its proportions.

Previous to my invention machines have been invented and used for copying designs, writing, &c.—as, for instance, the pantograph—which were capable of reproducing plans, figures, &c., on the same or a larger or smaller scale than the original; but I am not aware that any machine has heretofore been conceived for engraving from a pattern, and so constructed as to vary at pleasure of the operator both the proportions and the scale of the copy.

My invention consists in an organized machine in which a graver or engraving-tool is made to engrave from a pattern or former, and so constructed that by various adjustments of the parts the design cut can be varied in scale and proportions from the pattern or former, substantially as hereinafter fully described.

To enable others to make and use my invention, I will proceed to describe my improved machine, referring by letters to the accompanying drawings, forming part of this application, in which—

Figure 1 is a perspective view of my engraving-machine. Fig. 2 is a vertical section through the center of the same. Fig. 3 is a horizontal section at the line *x x*, Fig. 2; and Fig. 4 is a horizontal section at the line *y y*, Fig. 2.

In the several figures the same parts are indicated by the same letter of reference.

A is the bed-plate or base of the machine, from which extends a vertical frame-piece or standard, B, having at its upper end a head-block, E, and carrying the working parts of the machine. The bed-plate A serves as the table for holding the pattern, and has in its upper surface an adjustable carriage-piece, *a*, (secured by a screw, a^2,) and stop *b*, for the adjustment of the pattern or former *c*, which is fastened in the proper position on said carriage by any suitable device. The pattern *c* is illustrated as a plate having cut in it the letter "C," in old English. F is an adjustable stand or arm, which projects from the frame, B, as clearly seen. Said stand F is adjustable vertically in the slot *g*, (where it is secured by a thumb-nut, M,) and sustains a shaft or rod, K, which is hung therein, in the following manner, viz: The rod K is held in a sleeve-piece, J, which is hung by two pivots, *o o*, (see Figs. 3 and 2,) in the cylinder I. This cylinder I is secured within another, H, which hangs in the ring G, and this ring G is pivoted at *l l* to the said stand F, which has a circular hole through it, as shown, for the accommodation of the ring G. The cylinder I is adjustable vertically within the cylinder or hub H, (for purposes to be presently explained,) and is secured by a set-screw, *h*, which passes through a slot in the side of H and into I. (See Fig. 2.) The cylinder H is so arranged within the ring G as to turn freely therein, being held by a pressure or tension spring, *s*, and the sleeve J, which slides vertically on the rod K, is secured by a set-screw, *j*. The objects of the just-named adjustability of sleeve J and ring or cylinder H will be presently described.

In the lower end of rod K is arranged a smaller rod, *k*, which is free to slide vertically within the rod K, and which is provided at its lower end with a small handle, *i*. On the upper end of shaft or rod K is formed a button or head, K′, (see Figs. 2 and 4,) which is hung by pivots *n n* to a collar or ring, O. This ring O is pivoted at *m m* to the frame P, which is hinged at *r* to the table or frame D. The frame C is secured by a nut, N, to the frame B, and carries or supports the table D, on which the plate to be engraved is secured. *d* is a spring-clamp for holding the plate to be cut, and *e* is the engraving point or tool, which is arranged in the end of head-block E, and is fixed with a spring, *f*, which raises it from the work, when released by the hand of the operator. The table D, I have shown as resting on and sliding upon the top of frame C; but it will be understood that said table D may be

mounted on rolls or balls, or hung on ways, so as to enable it to move in any direction in a horizontal plane with very little friction.

In Fig. 1 it will be seen that on part of the external circumference of the cylinder H is marked (in red) a scale. There is also a similar scale of parts or degrees on the top edge of ring G, the object of which scales is to enable the operator to set or turn the cylinder H to any desired position within the ring G, as and for purposes to be presently explained.

Having so far alluded to the construction and arrangement together of the several parts of the machine, I will now describe its operation.

Suppose the pattern shown to be secured on bed-piece *b*, and the parts of the machine to be in the adjustment shown in the drawings, the operator, after placing his plate in the proper position on table D and securing it thereon, takes hold of the handle *i* with his right hand and holds the tool *e* with his left; then, placing the point of *k* in the lines or cut of the pattern *c*, and, tracing them over, the graver or tool *e* will be made to cut the design of *c* on a reduced scale on the plate placed on D, for the rod K being on a universal joint in the stand F, its upper end will duplicate the motions of its lower end, and the table D being hung by a universal joint to the upper end of rod K, the plate fastened on said table will be moved under the engraving-point precisely as the point of *k* moves, the extent of its motions compared with those of point *k* depending on the relative distances of said table D and said point *k* from the universal joint on which rod K turns.

It will be understood that by hanging the sleeve J of rod K on pivots *o o*, and the ring G (which moves with cylinders H and I) on pivots *l l*, as shown and described, the rod K will turn in every direction in the stand F, as though hung therein on a "ball-and-socket joint," and it will be seen that a similar result is accomplished at the upper end of the rod K by connecting it to the table D in the manner shown and described. As the lower end of rod K moves in the surface (or plane of the surface) of a sphere, and the pattern *c* is in a horizontal plane, it is evident that the point *k*, if fast to rod K, could only touch the plane of *c* at one point; but by having the rod *k* arranged to slide up and down in rod K, as shown, the rod *k* will rise and fall as its point travels over plane of *c*, keeping always in contact therewith, except when lifted entirely off by the operator having hold of handle *i*. The pressure of the spring *f* has a tendency to lift the graver or tool *e* off of the work, and when said tool has a simple cutting-point the operator only keeps said point down in contact with the plate to be engraved during the time of cutting, allowing it to rise when not cutting, to prevent scratching the plate while moving the point *k* from one part to another of the pattern or former *c*. When the tool *e* is of that kind which have a cutting-edge or side and requires to be turned in the direction of the cut, then the operator will turn the tool *e* around in its bearings in accordance with the line of travel of the point *k*, so as to keep the cutting-edge or side of tool *e* always against the motion of plate on table D.

When it is desired to vary the size of the design to be cut, the screw *j* is turned so as to release the rod K from sleeve J. The nut M is then loosened and the stand F moved vertically down to increase size and up to decrease it, (the sleeve *j* sliding around the rod K,) and refastened at any desired position on frame B by said nut M, when sleeve J is again secured to rod K. This adjustment varies the distance from each end of rod K to its fulcrums *l l* and *o o*, and hence the size of the design to be cut.

When it is desired to change the proportions of the design, (say, for instance, to increase or diminish the height of the letter on *c* without varying its width,) the screw *h* is loosened and the cylinder I moved up or down and refastened by screw *h*. By thus changing the position of cylinder I vertically within cylinder H the pivots *o o* are raised or lowered, while those, *l l*, remain in the same position, (relative to the two ends of rod K,) and thus the motions of the upper end of rod K in one direction are varied in their extent while the motions in the other direction are not changed, thereby changing the height of the design cut without changing its width. It will be understood that in making the adjustment just described the sleeve J must be temporarily released from the rod K.

Besides the variations of design from one pattern, already described, another can be made—viz., the letter to be cut from former *c* can be made to droop or incline in either direction from its base, at any desired angle, by the following adjustment: I have hereinbefore described the cylinder H as being capable of turning around within the ring G, and held by a tension-spring, *s*. (See Figs. 2 and 1.) By turning said cylinder H in either direction (by the scale on it and on ring G) the machine may be set to cut the letter on *c* at any given inclination to its base in either direction, (that is, inclined backward or forward.)

From the foregoing description of the construction and operation of my machine it will be observed that although the machine is exceedingly simple in its construction and easily operated by any one, it can be made to produce almost infinite changes of design from a given pattern.

In executing all the various designs—for bank-note and other engraving—the patterns can be made of such a size as to have the lines and spaces between them very large, while the machine may be adjusted to engrave plates from these patterns with mathematical precision and with a nicety of execution which cannot be accomplished by hand-engraving.

It will be understood that almost innumer-

able combinations of patterns may be made for producing mixed designs of a given design or figure by setting duplicate patterns up together in various forms.

The head-block E may be hinged to the frame B instead of being made solid, as shown, so as to be turned up out of the way for arranging work on the table D.

Having fully described the construction and operation of my machine, what I claim as new, and desire to secure by Letters Patent, is—

1. The employment of a shaft or rod, K, hung by a universal joint in an adjustable stand, F, in combination with a table, D, or its equivalent, connected by a universal joint to one end of rod K, and a tracer or engraving-tool, *e*, the whole operating, substantially as set forth, to produce on a surface placed on table D various designs from patterns which guide the lower end of rod K, in the manner hereinbefore described.

2. Making the pivots or their equivalents of the universal joint in stand F adjustable or variable, substantially as described, for the purpose of changing the proportions of the designs cut from the same pattern.

3. The construction of the machine, substantially as described, so as to admit of changing the angles of the axes of the universal joint, as set forth, for the purpose of inclining the design in either direction to its base, while the pattern has no inclination, as hereinbefore described.

4. The sliding rod *k*, in combination with the rod K and a suitable handle, *i*, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand and seal.

JOSEPH S. IVES. [L. S.]

In presence of—
J. N. McINTIRE,
PETER COOKE.