3 Sheets—Sheet 1.

# J. C. GUERRANT.

## ENGRAVING-MACHINE.

No. 172,426. Patented Jan. 18, 1876.

Fig. 1.

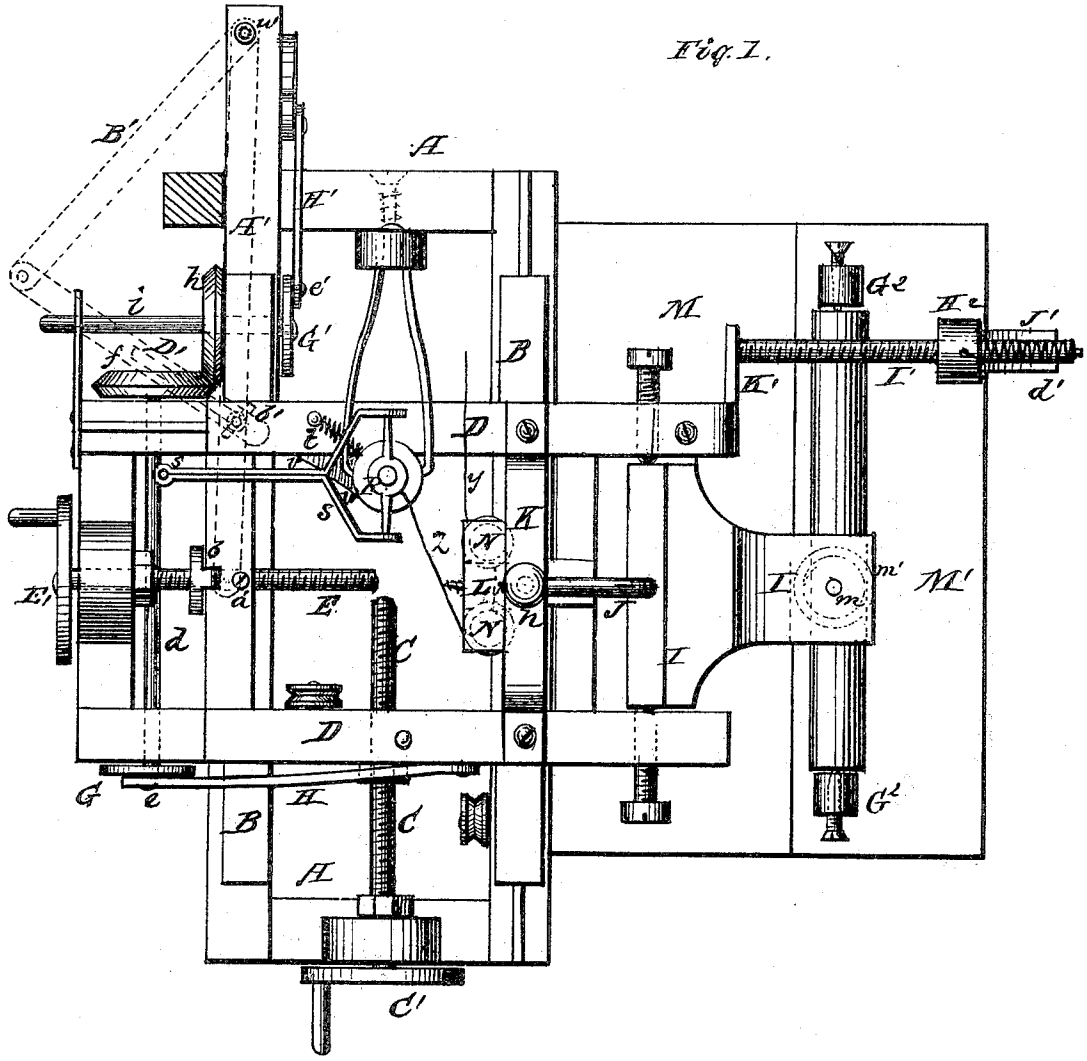
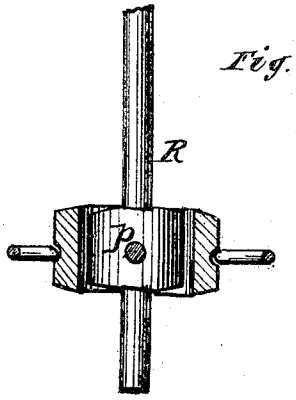


Fig. 6.



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3 Sheets—Sheet 2.

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## ENGRAVING-MACHINE.

No. 172,426. Patented Jan. 18, 1876.

Fig. 2.

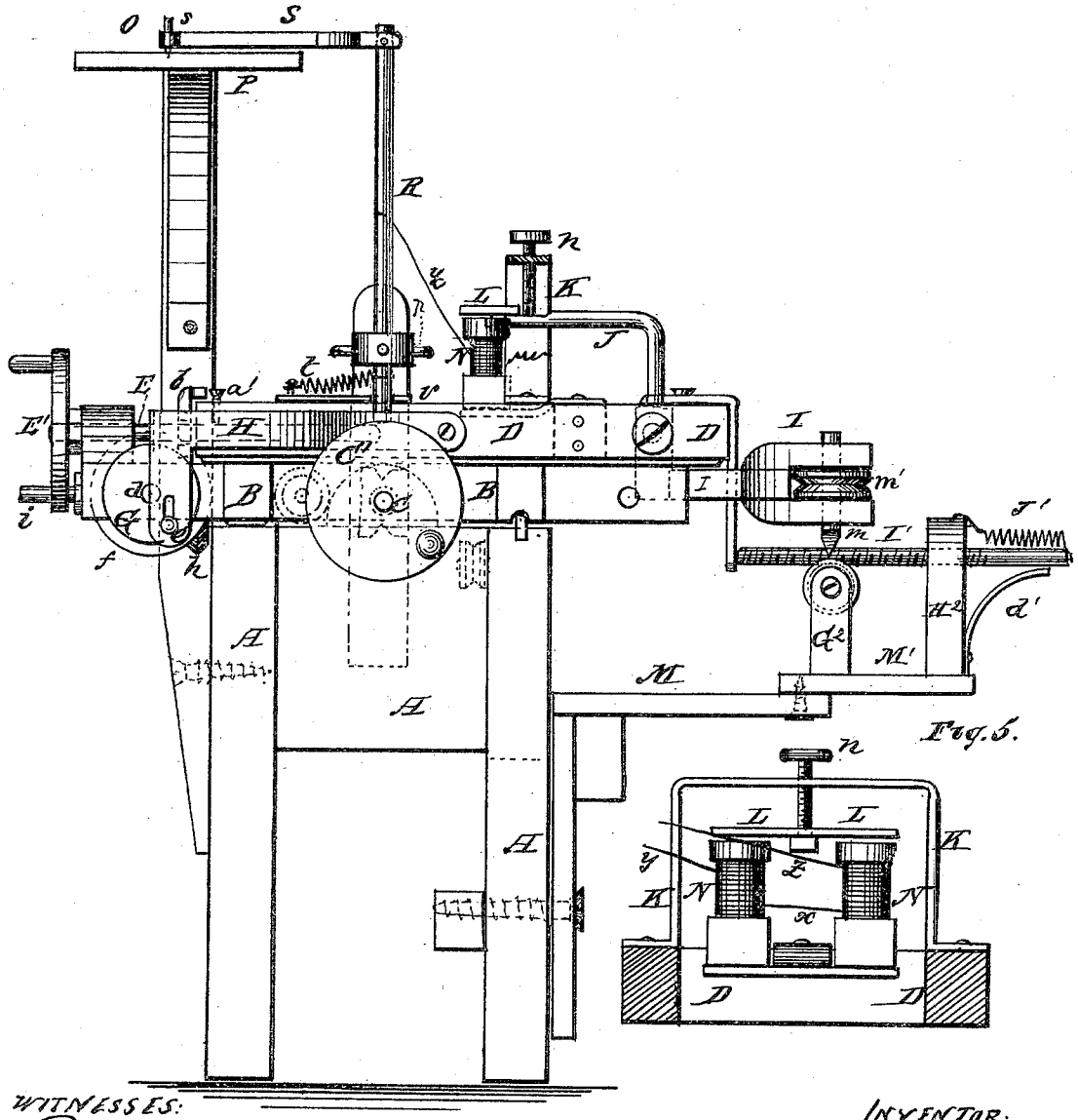


Fig. 5.




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3 Sheets—Sheet 3.

# J. C. GUERRANT.

## ENGRAVING-MACHINE.

No. 172,426. Patented Jan. 18, 1876.

*Fig. 3.*

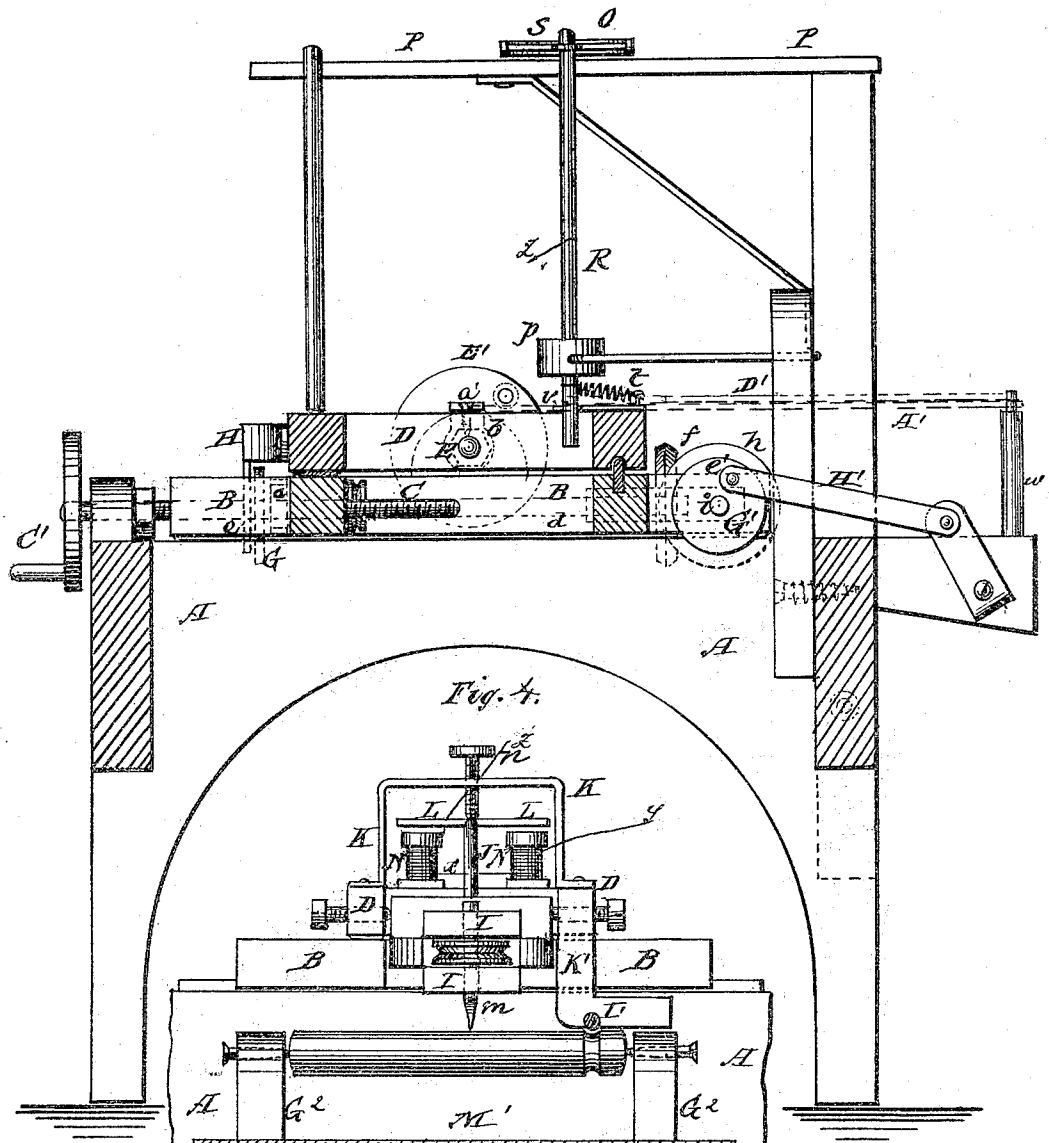


*Fig. 4.*




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# UNITED STATES PATENT OFFICE

JOHN C. GUERRANT, OF DANVILLE, VIRGINIA.

## IMPROVEMENT IN ENGRAVING-MACHINES.

Specification forming part of Letters Patent No. **172,426**, dated January 18, 1876; application filed March 30, 1875.

*To all whom it may concern:*

Be it known that I, JOHN C. GUERRANT, of Danville, in the county of Pittsylvania and State of Virginia, have invented certain new and useful Improvements in Engraving and Type-Cutting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to electro-magnetic machines used for engraving or cutting letters, figures, or other characters on wood, metal, or other material; and it consists in the construction and arrangement of the machine, all as hereinafter more fully set forth, and described in the claims.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a plan view, Fig. 2 is a side elevation, Fig. 3 is a central vertical section, and Figs. 4, 5, and 6 are detail views, of my invention.

A represents a frame-work of any suitable construction, on top of which are longitudinal guides or ways for a carriage, B, to move back and forth. At one end of the frame is a suitable lug or projection, in which a screw rod or shaft, C, has its bearing, the outer end of said screw-rod being provided with a crank, C′, and the inner end passing loosely through the end of the carriage B. On the screw-shaft C is placed a nut, *a*, which is to be moved out and in thereon to adjust and limit the movement of the carriage in that direction. On top of the carriage B, and at right angles with the line of motion thereof, are suitable guides or ways, upon which a second carriage, D, moves back and forth. The movement of this carriage is adjusted and limited in a similar manner by means of a nut, *b*, on a screw rod or shaft, E, having its bearing in a suitable projection on the rear of the bottom carriage B, and provided at its rear end with a crank, E′, for turning the same. Through the rear portion of the carriage B passes a shaft, *d*, parallel with the line of motion of the carriage, and upon one end of this shaft is a disk or wheel, G, with wrist-pin *e*, connected by an L-shaped arm, H, with the upper carriage D. On the other end of the shaft *d* is a bevel friction-wheel, *f*, which is in contact with a similar wheel, *h*, on a shaft, *i*, which also has its bearings in the lower carriage B, at right angles with the shaft *d*. On the front end of the shaft *i* is a disk or wheel, $G^1$, with wrist-pin *e′*, connected by an arm, $H^1$, with the main frame A. At the front end of the upper carriage D is pivoted a head-block, I, in the outer end of which is arranged a vertical cutter, *m*, which cutter is made to rotate by a band applied to the pulley *m′*.

It will readily be seen that when power is applied to the shaft *i* the two carriages B and D will be moved back and forth on lines at right angles with each other, and the upper carriage D, in addition thereto, will move with the lower carriage, and hence, if the two wrist-pins *e e′* are at equal distances from the centers of their respective shafts, the rotating cutting-tool *m* will describe a perfect circle.

By means of the two screw-shafts C and E the circle thus described by the cutting-tool may be gradually diminished, so that the cutting-tool will work over every particle contained within the original circle in a series of concentric circles, until it at last reaches the center. The wrist-pin *e* is to be movable in a slot, or otherwise, on the disk G, so as to be adjusted out and in radially from the center, and thereby change the movement of the upper carriage D, in such a manner as to make the path traveled by the cutting-tool *m* of more or less oval form, as desired.

The head-block or cutter-head I is provided with an L-shaped arm, J, which extends inward through a frame, K, on the upper carriage D, and through said frame is passed a set-screw, *n*, to bear on the top of said arm at or near the inner end, which set-screw holds the entire head-block at the desired position to let the cutting-tool operate on the work placed on the table M. Upon the inner end of the arm J is placed an armature, L. N N is an electro-magnet, around which passes the conducting-wire, one end, *y*, of which is connected with the pole of a battery. The other pole of the battery is connected by a wire with pattern O, placed upon the elevated trac-

ing table P. The end *z* of the wire connects with the end of a rod, R, which is, by a swivel-joint, *p*, connected to suitable arms projecting from the main frame over the movable carriages. At the upper end of the rod R is pivoted an arm, S, carrying at its outer end a pointer or tracer, *s*, to traverse over the pattern O.

The lower end of the rod R is, by an elastic spring, *t*, held in a notched plate, *v*, on the upper carriage D, so as to follow every movement thereof, and the pointer or tracer *s* describes similar circles or ovals as described for the cutting-tool *m*, the relative size thereof depending upon the location of the swivel-joint *p*. If the same size is desired, a stationary rod on the carriage D is to be used in place of the swiveled rod.

This machine is mainly designed for cutting large wood type, but may be used equally as well for cutting or engraving any figures or characters on any desired material, and the operation is substantially as follows:

The type, which must be made of conductive material, are set up in the desired form, and the spaces between them filled with plaster-of-paris, or other suitable non-conducting or insulating material, to the same height as the face of the type, this forming the pattern O. This pattern is placed on the tracing-table P, and the material to be cut or engraved upon is secured on the table M. The connections then being made with the magnet N and battery, the machine is set in motion, the tracer *s* and cutting-tool *m* describing the same circles or ovals as above described. When the tracer *s* is on the non-conducting filling in the pattern O, the tool *m* will cut in the material upon which it works; but when the tracer comes in contact with the metal of the pattern, the electric circuit is at once completed, and the magnet N will attract the armature L on the arm J, and raise the cutter from the work. The instant the tracer gets off the metal the electric current is broken, and the tool falls down again to its work. In this manner the entire pattern is reproduced, either of the same or different size, with precision and certainty.

When straight parallel lines are desired to be made the connection between the carriages B and D is removed, and a straight bar, A′, is placed on a post, *w*, projecting from the main frame, and said bar extends over the rear end of the carriage D, between a headed pin, *a′*, therein and a flange on the nut *b*. To this end of the bar A′ is pivoted another bar, B′, which may be held at any angle therewith by means of a slotted arm, D′, and set-screw *b′*, as shown. As the machine is in operation, the carriage D is moved forward for each separate line by the screw-shaft E and nut *b*.

The machine may also be used for engraving or cutting on convex or concave surfaces, as follows: The head-block I is removed from the carriage D and pivoted in the carriage B. The table M is lowered, and on the same is attached an auxiliary table, M′, upon which are two posts or standards, $G^2$ $G^2$. Between these posts the cylinder to be engraved is pivoted, as shown. Through another standard, $H^2$, on the table M′ passes loosely a screw-rod, I′, the outer end of which is held up by a spring, *d′*, so that its inner threaded end will rest in a circumferential groove on the cylinder, and be held therein. The outer end of the screw I′ is, by a spiral spring, J′, connected with the post $H^2$, for throwing the same inward. On the end of the carriage D is an arm, K′, which operates against the inner end of the screw I′, forcing the same outward as the carriage moves in that direction, and as the carriage returns the spring J′ returns the screw I′, and both movements of said screw rotate the cylinder.

The cutter in this case, it will be noticed, has only one motion—namely, lateral—the other motion that it had while cutting on plain surfaces being compensated for by the reciprocating rotating motion of the cylinder.

I do not claim, broadly, an electro-magnet in combination with an engraving-machine, nor two reciprocating carriages at right angles to each other, nor a pivoted head-block carrying the cutting-tool, nor filling the interstices of the pattern with non-conducting material; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In an engraving or type-cutting machine, the laterally-moving carriage B, the longitudinally-moving carriage D thereon, carrying the head-block I, with cutting-tool *m*, and the disks G $G^1$, with wrist-pins *e e′* and pitmen H $H^1$, all substantially as and for the purposes herein set forth.

2. The combination, with the carriages B and D, of the screw-shaft C, with nut *a* and crank C′, and the screw-shaft E, with nut *b* and crank E′, substantially as and for the purposes herein set forth.

3. The combination, with the carriage D, having notched plate *v*, of the rod R, swivel *p*, spring *t*, and pivoted arm S, with tracer *s*, substantially as and for the purposes herein set forth.

4. The straight bar A′, with pivoted bar B′, the slotted arm D′, and set-screw *b′*, in combination with the carriages B D, screw-shaft E, and nut *b*, substantially as and for the purposes herein set forth.

5. The combination of the screw-rod I′, spring-support *d′*, spiral spring J′, and arm K′ on the carriage D, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN C. GUERRANT.

Witnesses:
T. H. ALEXANDER,
W. C. MCARTHUR.