(No Model.)

A. SCHMID.

AUTOMATIC ELECTRIC COPYING AND ENGRAVING MACHINE.

No. 298,030. Patented May 6, 1884.

Fig. 1.

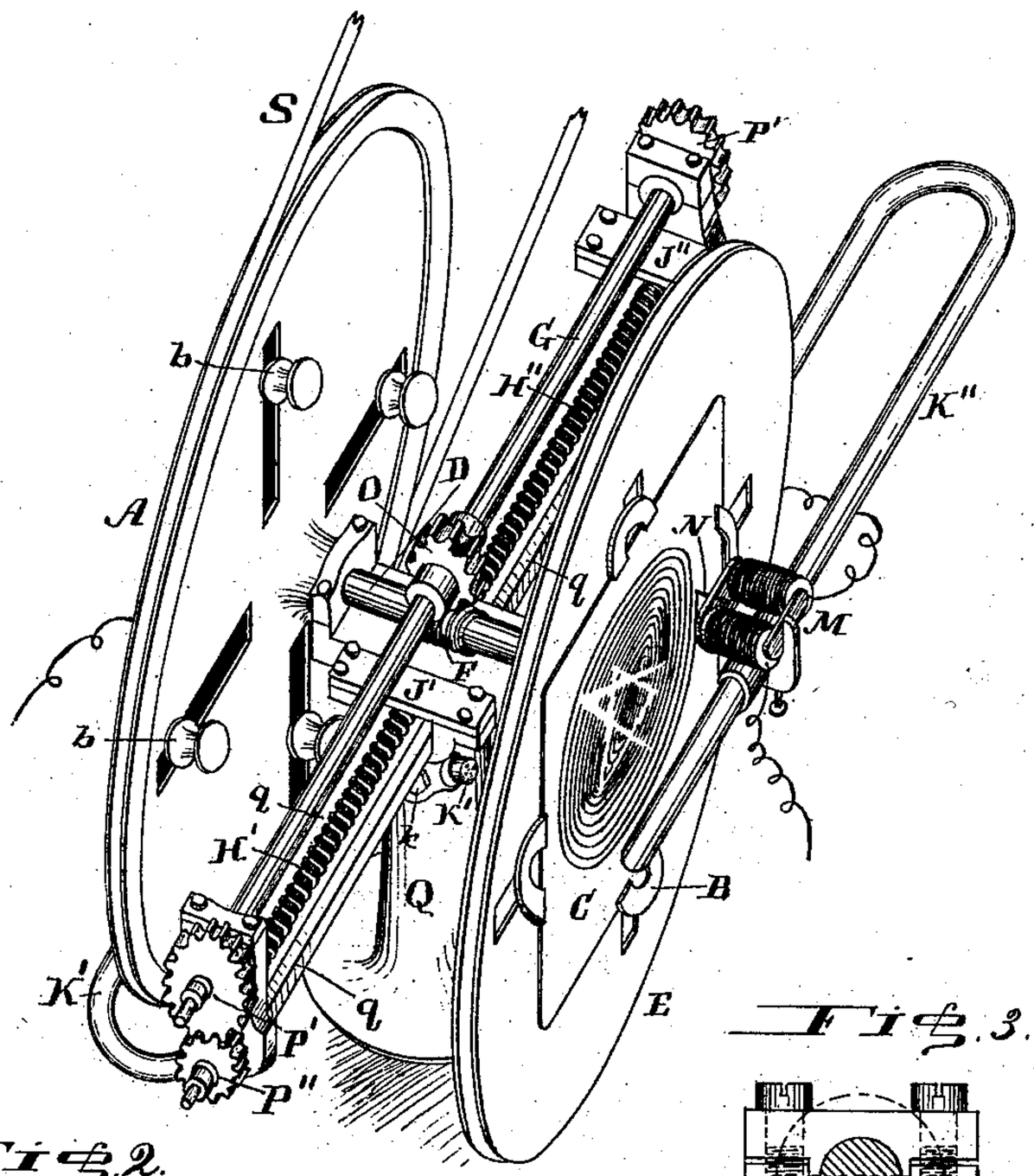


Fig. 2.

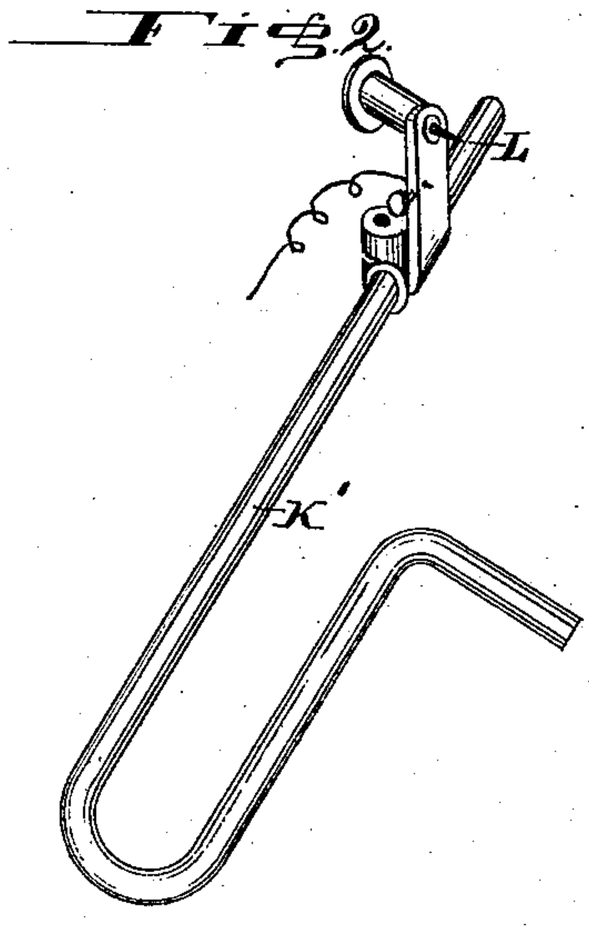


Fig. 3.

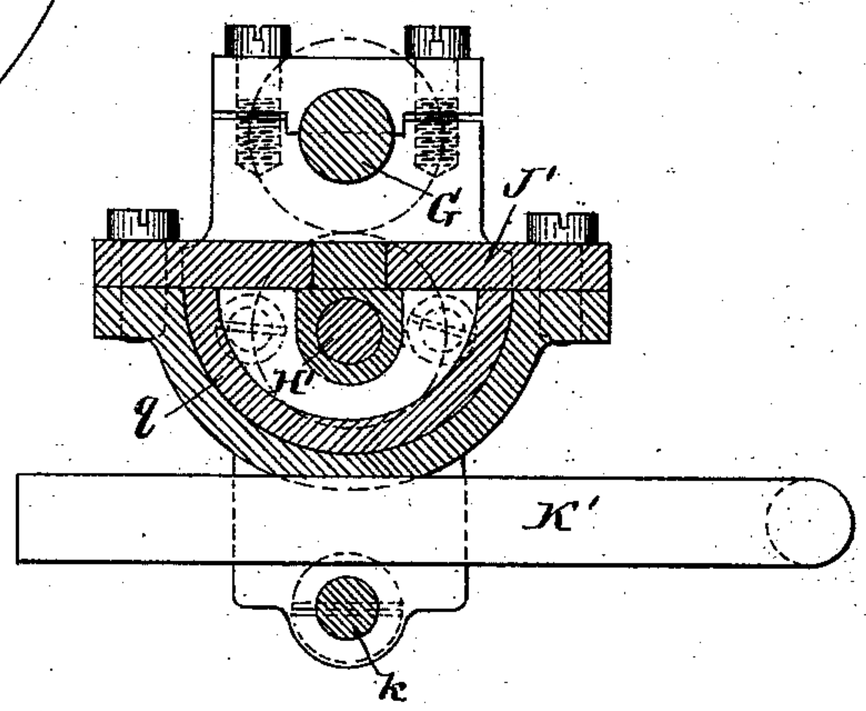
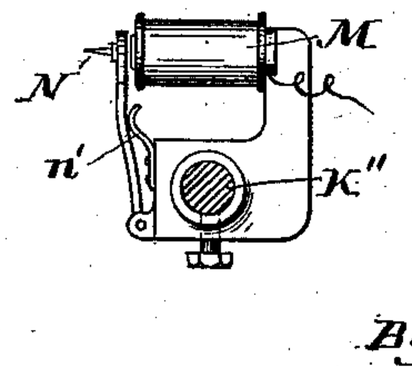


Fig. 4.



WITNESSES.

C. J. Bell.

Oscar Nauck.

INVENTOR

Albert Schmid,

By Paine Sadd.

Attorneys

UNITED STATES PATENT OFFICE.

ALBERT SCHMID, OF ZURICH, SWITZERLAND.

AUTOMATIC ELECTRIC COPYING AND ENGRAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 298,030, dated May 6, 1884.

Application filed October 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, ALBERT SCHMID, a citizen of Switzerland, residing at Zurich, in the Canton of Zurich, Switzerland, have invented certain new and useful Improvements in Automatic Electric Copying and Engraving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to the class of automatic engraving-machines which have an engraving-tool that is controlled by an electro-magnet, the electric circuit being opened or closed according as the tracing-point on the design is in contact with a non-conducting or conducting surface; and the invention consists of an improved machine, as hereinafter described and claimed, adapted to copy accurately any picture, drawing, writing, or other graphic production on any material, either on the same scale as the original or on a larger or smaller scale, as desired. By means of a reduced reproduction sharp and clear-cut transfers from an original can be obtained for bank-notes, bills, bonds, share-certificates, pictures, and similar productions.

In the accompanying drawings, Figure 1 is a perspective view of the machine. Fig. 2 is a detached view of the arm K′, showing the tracing-point L, carried by it. Fig. 3 is a cross-section through the shaft G and screw-shaft H′, showing in side elevation the cross-head J′; and Fig. 4 illustrates the magnet and armature carrying the engraving-tool.

The standard Q, which supports the machine, has on its top the shaft D, turning in suitable bearings, which carries at either end the disks A and E, and is also provided with the worm F. Both of the disks A and E are provided with suitable clamping devices for holding the original from which the engraving is to be made on the former, and the plate to be engraved in the latter, disk. In the present case clamps B, sliding in radial slots in the plates, and fastened by binding-screws *b* on the back of the disks, are shown. The disks receive motion from a belt, S, on the periphery of one of them. The worm F gears into a worm-wheel, O, fixed on the shaft G, which is placed at right angles to and above the shaft D, and which carries at its ends the gear-wheels P′, that mesh into the pinions P″, the latter being fixed each at the end of the feed-screws H′ and H″. The standard Q has the extensions *q*, which form ways for the cross-heads J′ J″, and which also carry the bearings at the ends for the shaft G and the feed-screws H′ H″. The two bent arms K′ K″, each of the form shown by Fig. 2, are adjustably attached by their right-angle arms to the cross-heads J′ and J″, respectively, and held each by a clamp and set-screw, *k*. The arm K′ carries the contact-point L, and the arm K″ the engraving-tool and electro-magnet M, which controls it. The contact-point L may be a metallic point, as shown; or a small wheel may be used, and it is adjustably fastened on its arm. The electro-magnet M and the engraving-chisel or drawing-point N, attached to the armature of the magnet, is also clamped onto its arm, on which it can be adjusted. In the present case the armature is held forward against the plate by a spring, *n*′, and drawn back by the magnet when the circuit is closed; but it may also be arranged so that the magnet will hold the tool or drawing-point against the plate when the circuit is closed, as in other engraving-machines heretofore used. An electric current generated by a battery or otherwise is employed, one wire being connected with the tracing-point L, and the other with the electro-magnet, an electric circuit thus being established through the tracing-point, the disk A, the machine, the arm K″, and the electro-magnet M, when the surface of the picture, or whatever is being copied, that is in contact with the tracing-point is a conductor—that is, when the tracing point or wheel touches an uncovered part of the metal plate or a metallic line upon the paper, the circuit being broken when it touches non-conducting material or the paper.

The operation of the machine is as follows: The original picture, drawing, writing, or graphic production which is to be copied, having been executed upon a metallic plate by means of a well-adhering and non-conducting material or color, or on paper by means of a metallic ink, is fastened to the center of the disk A by means of its clamps and binding-

screws. The plate C, on which the copy is to be engraved or drawn, is in the same manner fastened to the disk E. After having placed the point of contact L and the drawing point or chisel N in the centers of their respective disks A and E the machine is put in motion. As the disks rotate, the tracing-point and the drawing point or chisel are each moved slowly and uniformly outward from the center of their disks on a horizontal plane, and they will each describe a spiral path on their plates. The tracing point or wheel glides over the surface of the original plate, while the drawing point, pin, or chisel is held away from the plate or pressed against it by the armature of the electro-magnet, either at the interruption or at the closing of the electric circuit, as the work to be executed admits of. When the copy or engraving is to be of a different size than the original, interchangeable cog-wheels P′ P″ are used, which give a slower or faster movement to the feed-screw H″, and consequently to the chisel or point N, than is given to the feed-screw H′ and the tracing-point L, according to whether the copy is to be smaller or larger than the original, and proportionate to the difference in the scale or size of the two, whereby an accurately enlarged or reduced reproduction is drawn or engraved on the plate C by means of the spiral path of the tool, which is interrupted or marked by the line of the picture, drawing, writing, &c., of the original.

Having thus described my invention, what I claim as new is—

1. In a copying or engraving machine, the combination of the revolving disks A and E, carried at opposite ends of the shaft D, the tracing-point L and drawing point or chisel N, and suitable automatic feed mechanism which moves the tracing-point and drawing point or chisel across the face of their respective disks, substantially as and for the purpose set forth.

2. In a copying or engraving machine, the combination of the revolving disks A and E, carried at opposite ends of the shaft D, the tracing-point L and drawing point or chisel N, controlled by the armature of a magnet, M, suitable automatic feed mechanism which moves the tracing-point and drawing point or chisel across the face of their respective disks, and an electric circuit established through the tracing-point and its disk and the electro-magnet, substantially as and for the purpose set forth.

3. In a copying or engraving machine, the combination of the arms K′ and K″, cross-heads J′ and J″, feed-screws H′ and H″, and suitable gearing connecting the feed-screws with the shaft D, constituting a feed mechanism for the tracing point and chisel, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT SCHMID.

Witnesses:
T. A. BOURRY,
ED. EGLI.