(No Model.) 3 Sheets—Sheet 1.

G. M. GUERRANT.

ENGRAVING MACHINE.

No. 305,177. Patented Sept. 16, 1884.

Fig. 1.

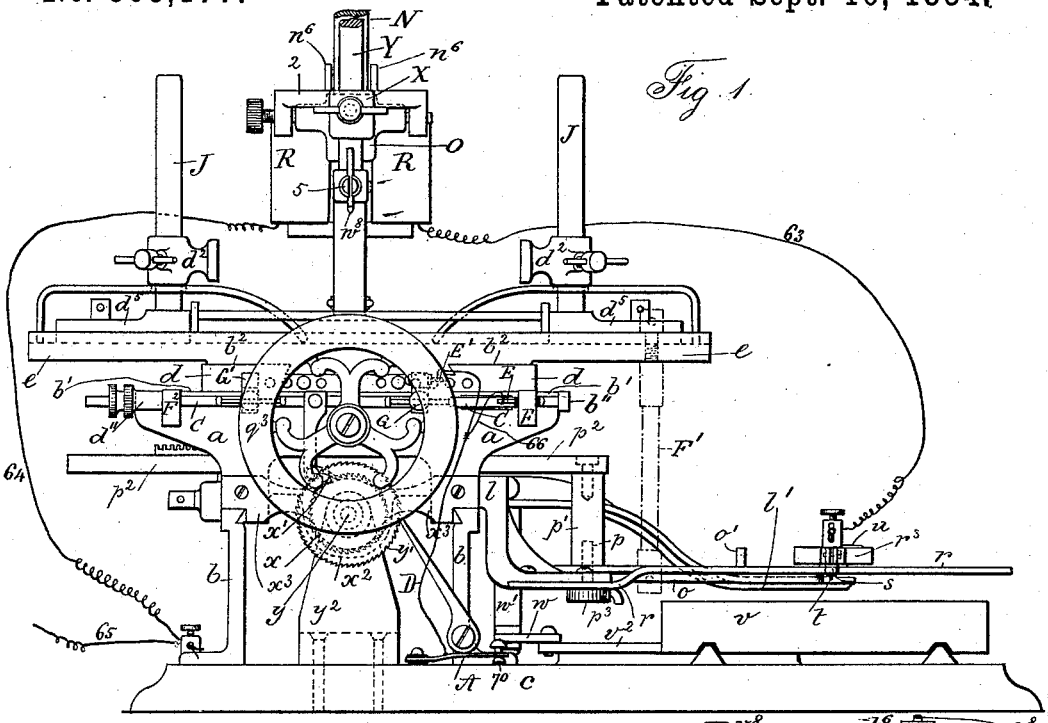
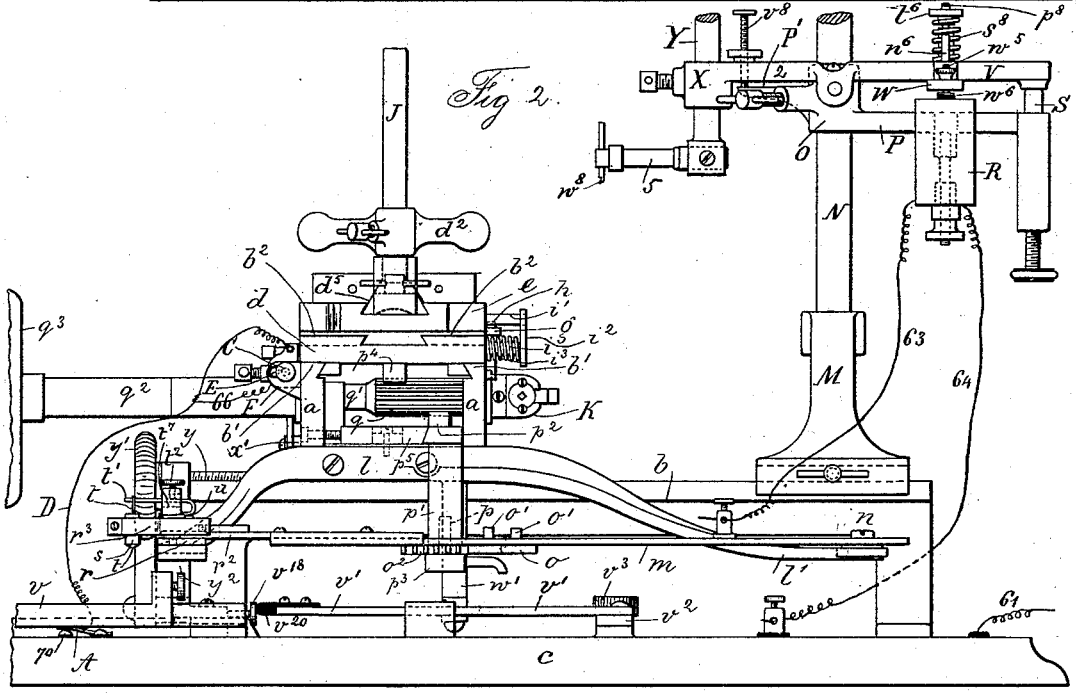


Fig. 2.



Witnesses

Chas. H. Smith

J. Stahl

Inventor

George M. Guerrant

per Lemuel W. Serrell atty

(No Model.) 3 Sheets—Sheet 2.

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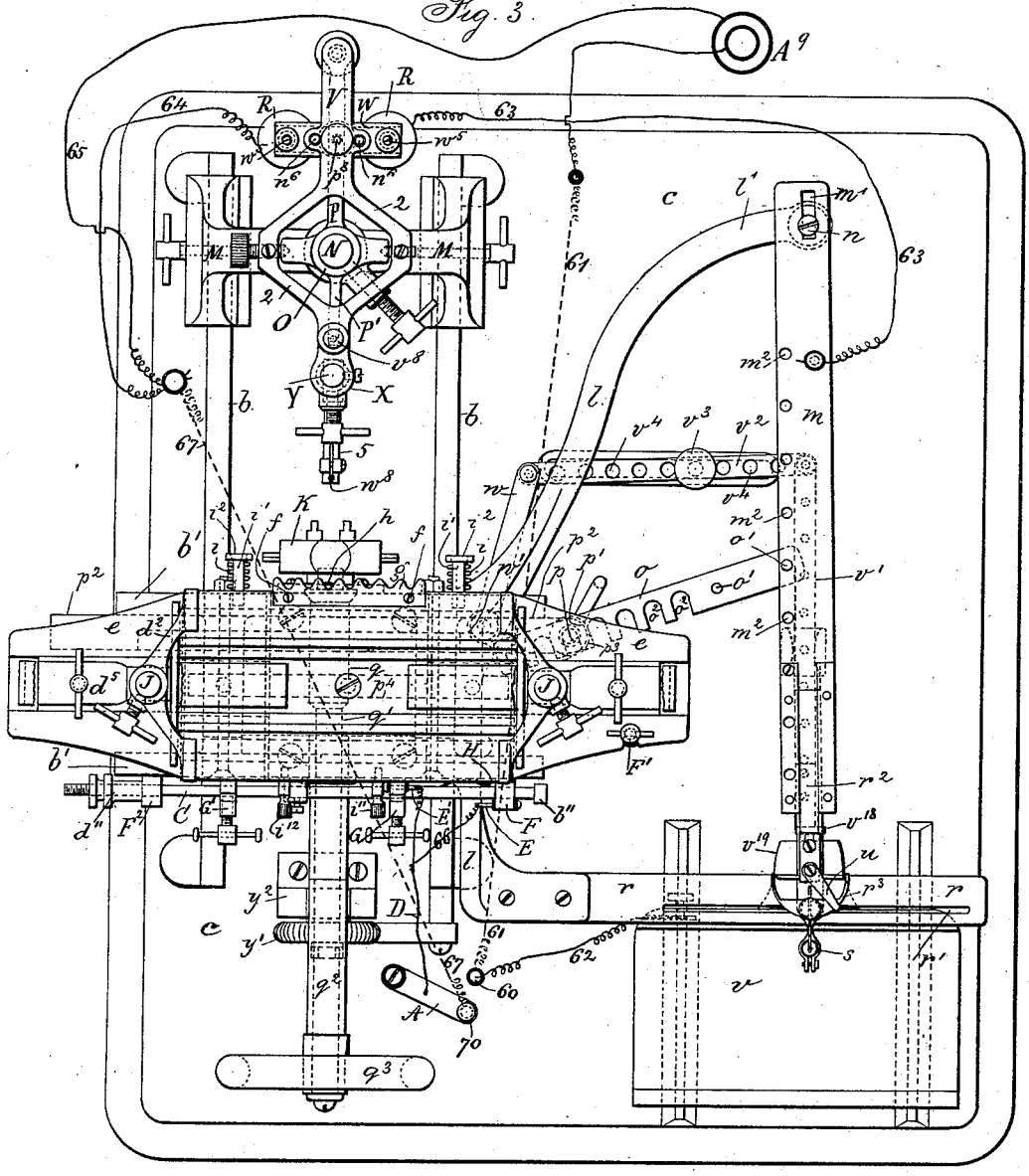
Fig. 3.



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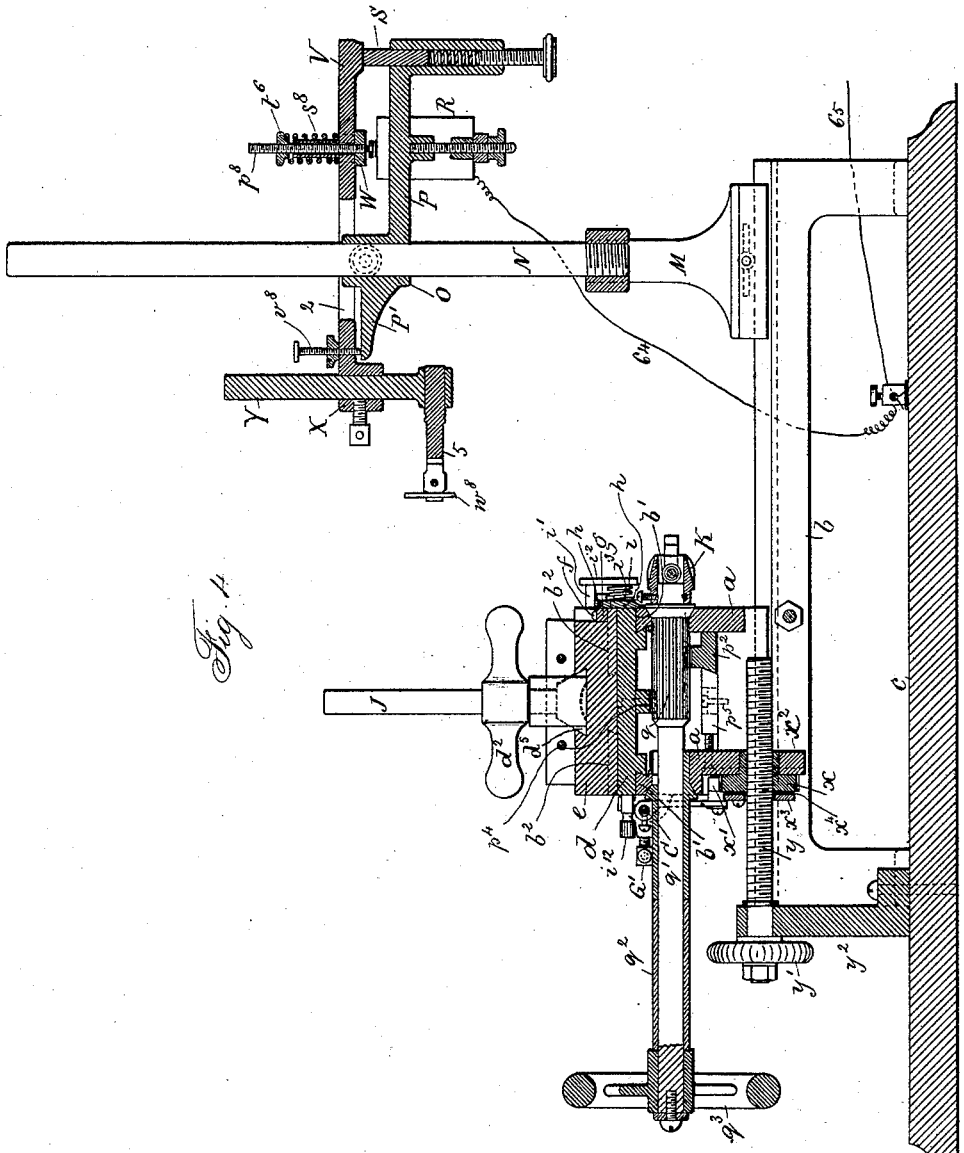

Fig. 1.

Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE M. GUERRANT, OF NEW YORK, N. Y.

ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 305,177, dated September 16, 1884.

Application filed November 20, 1883. (No model.) Patented in England September 22, 1882, No. 4,527.

To all whom it may concern:

Be it known that I, GEORGE MCKENDREE GUERRANT, of the city of New York and State of New York, have invented an Improvement in Engraving-Machines, of which the following is a specification.

This invention is an improvement upon devices heretofore made and patented by me, and reference is made to Letters Patent No. 212,927, which shows certain of the devices, but not herein claimed by me, and to Letters Patent No. 4,527, granted in Great Britain September 22, 1882, upon which my present application is based. My present construction and combination of devices is hereinafter set forth.

In the drawings, Figure 1 is a front elevation of a machine constructed in accordance with my invention. Fig. 2 is a side elevation, Fig. 3 a plan, and Fig. 4 a central longitudinal section, of the said machine.

a represents a carriage, which is movable longitudinally upon the slides or guideways *b* on the bed-plate *c*. A second carriage, *d*, is movable transversely upon the slides or guideways *b'* on the carriage *a* in a similar manner. In machines of this class as heretofore constructed, when it is required to engrave curved or undulating lines, a small plate is attached to the upper movable carriage. This plate at one edge is made with the required curved or wave line, and the said edge is pressed against a fixed pointer or guide-pin by means of a spring, the article to be engraved being fixed upon the said plate. This arrangement is inconvenient, because the article must be removed in order to change the said plate for one of different shape. I obviate this inconvenience by attaching the article to be engraved to a third carriage, *e*, capable of a slight to-and-fro motion in the guideways b^2 on the carriage *d*, and at one side of the said carriage I attach by screws *f* or other suitable means a plate, *g*, having one edge of the required curved or other shape. This edge of the plate *g* bears against a pointer or guide-pin, *h*, and the said carriage is arranged to be acted upon by the springs *i*, as hereinafter described, to retain the edge of the plate *g* against the guide-pin *h* and cause the carriage *e* to move to and fro in the carriage *d*, according to the shape of the said plate—that is to say, I fix pins i' to the carriage *e*, and upon the ends of these pins I secure plates i^2, which are made with apertures to receive the guide-pins i^3, upon which the springs *i* are placed. In some cases I employ a roller fitted on a pin or stud, instead of the guide-pin *h*.

The object of the detachable plate *g* is to permit of changing the said plate to alter the curvature or shape of the line to be engraved by the cutting-tool without removing the said article to be engraved.

I provide an improved pantograph or device for varying to any desired extent the size of the engraving relatively to that of the type or pattern to be copied. For this purpose I form an extension on the bed-plate *c* on one side of the machine.

To the lower carriage, *a*, upon the same side of the machine, I fix a curved arm, *l*, projecting from the carriage, and having its outer end preferably curved, as shown at l'.

To the outer end of the arm *l* is attached a movable arm, *m*, having a longitudinal slot, m', to enable it to slide and turn freely upon a set-screw, *n*, which secures it to the end of the fixed arm *l*. This movable arm *m* is provided with a series of holes, m^2, each adapted to receive one of two or more pins or studs, o', upon another movable arm, *o*. The latter arm is capable of adjustment near one end by means of a series of slots or recesses, o^2, adapted to receive a screw-threaded pin, *p*, carried by a stud, p', projecting down from a slide-rack, p^2. To this rod p' the arm *o* is secured by means of a thumb-nut, p^3. There may be a continuous longitudinal slot in the arm *o* instead of the notches o^2. The rack p^2 is free to slide in the lower carriage, *a*, and has a movement in the opposite direction to that of the carriage *d*, which is provided with a similar rack, p^4, each of the said racks being operated by means of a pinion, *q*, and shaft q', in the manner heretofore employed by me. The rack p^2 actuates the pantograph, and motion is imparted to the carriage *d* by the pinion *q* and rack p^4. At the front of the machine is adjustably fixed another arm, *r*, having a slot, r', in which is free to slide a pin or stud fixed in the end of a bar, r^2. This bar is fitted in grooves in the movable arm *m* in such a manner that the said

arm is capable of a to-and-fro longitudinal motion relatively to the said bar. By these means the tracer *s* is caused to move in a straight line, and the pantograph is maintained at the proper level and cannot get out of position. This arrangement also enables me to reproduce the pattern in full size, or to reduce it either in height or width, or in both height and width. The slide-rack p^2 is held in its place by means of adjustable pieces p^5, which form one side of the guide for the said rack. The pieces p^5 are attached to the lower carriage, *a*, by means of screws passing through elongated holes in the said pieces, and they are each adjusted by means of set-screws bearing against one of their ends.

To the aforesaid bar r^2 I attach a pivoted yoke or forked piece, r^3, for carrying the tracer *s*, which is constructed in the same manner as described in the former patent, No. 183,920, and connected to the pantograph by a hinged yoke, r^3. In the former case the weight of the tracer and yoke was depended upon to keep the former in contact with the pattern; but in practice this is found to be insufficient, and therefore a spring, *u*, is added, as shown, for pressing down the tracer. This spring, instead of being helical, as in the Patent No. 212,927, is made as a blade, pivoted to the bar r^2, and pressing at its outer end upon the yoke.

An arm, F′, (see dotted lines, Fig. 1,) is attached to the end of the table *e*, to which arm the movable part of the pantograph is connected for certain work, the tracer and table then moving in the same direction instead of in opposite directions. The table *e* is provided with adjustable standards J J, the bases d^5 of which are in dovetailed grooves in *e*, and there are suitable adjustable arms or clamps, d^2, for holding the article to be engraved when such article is a flat surface. When the engraving is to be made on a convex or concave surface, the article is held in a suitable clutch, K, attached to the inner end of the operating-shaft *q*′.

To permit the adjustment of the wire *t* of the tracer, I provide a wire, *t*′, passing through a slot in a block, t^1, on the yoke r^3, and bent so as to be held in the lower part of this block. There is a set-screw, t^2, through the top of the block t^1, to raise or lower the wire *t*′, and consequently the wire *t*, and cause it to project more or less at the bottom of the tracer *s*.

M represents an arch on the frame-guide-way *b*, and provided with a central upright post, N. On this post is secured a hub or collar, O, having arms P P′, projecting in opposite directions. The arm P is provided with suitable pendants for supporting the electro-magnets R R, and at the extreme end of said arm is formed a suitable casing for a spring-bolt, S, which operates upward against the end of the armature-lever V. This lever is formed with a yoke, Q, to straddle and be pivoted to the hub O.

W is the armature, which is detached from the lever V. This armature is provided with a center pin, p^8, and two end guide-pins, w^6 w^6, which all pass upward through holes in the lever V. On the upper end of the center pin, p^8, is screwed a nut, t^6, between which and the lever is placed a spiral spring, s^8, surrounding the pin. The spring s^8 keeps the armature up against the lever.

In some cases the frame O P is taken off the standard N and turned over and replaced on said standard N, with the electro-magnet R above the armature-lever V. In this case the tool, when properly placed, is forced into the material by the attraction of the magnet. The spring s^8 yields as the armature moves, whereby the engraving-tool w^8 is not forced suddenly into the material to be cut, as it would if the spring s^8 were dispensed with, and such spring s^8 represents the force that is exerted to hold the engraver to its work.

In my present invention, to insure an easier and more perfect contact between the armature and magnets, I pass through each end of the armature a screw-threaded pin, w^5, having a little round plate, w^6, opposite the core of each magnet, and these pins can be screwed up and down to adjust the plates at both ends of the armature to the level of the magnets.

v^8 is an adjusting-screw through the forward part of the lever V, operating against the arm P′ on the hub O. In the extreme forward end of the lever is a socket, *x*, in which the holder Y is adjusted, said holder carrying the arm 5 with the engraving-tool w^8.

A^9 represents the battery, connected by electric wires with the electro-magnets and other parts of the machine, with the pantograph and with the stationary bed C and carrier *v*, upon which the type or pattern is to be secured, so as to form a complete circuit.

Upon the bed-plate *c*, I place a stand or holder, *v*, for the type or pattern to be copied. This stand or holder is made with grooves on its under side fitting onto corresponding ribs or projections upon the said bed-plate, upon which the said holder is free to slide in a direction parallel to that of the lower carriage, *a*. I put insulating material in these grooves in the stand *v* to insulate it from the plate *c*, as seen in Fig. 1. There is a screw, v^{18}, at the edge of the stand *v*, against which the end v^{20}, of insulating material, at the end of the slide-bar *v*′ bears. By adjusting this screw v^{18}, the stand *v* can be moved so as to bring the proper part of the type beneath the tracer *t* to avoid adjustment of the tool w^8 or the standard N holding the same. The bar *v*′ is pivoted to one end of a lever, v^2, the fulcrum of which consists of a screw-bolt, v^3. This screw-bolt can be passed through one of a number of holes, v^4, in the lever v^2, and be screwed into one of a number of tapped or screw-threaded holes in the bed-plate *c*, so that the fulcrum of the said lever can be adjusted as required. The other end of the lever v^2 is connected by means of a link, *w*, to a stud, *w*′, projecting

downward from the lower carriage, *a*. The lower carriage, *a*, is provided with a ratchet-wheel, *x*, and pawl *x'*, for feeding the same forward, similar to that in the machines heretofore constructed. The ratchet-wheel *x* fits into a bearing, x^2, in the said carriage, and has an internal screw-thread fitting on the feed-screw *y* in the ordinary manner; but in order that the said carriage may be moved in either direction by the hand-wheel *y'*, I attach the plate x^3 at each end to the carriage *a*, and through the central part of this plate the screw *y* passes, as shown. Between the said plate and the ratchet-wheel *x*, I usually place an elastic washer, x^4, of leather or other suitable material, the object of which is to cause sufficient friction between the nut ratchet-wheel and the plate x^3 to allow the carriage *a* to be moved to and fro by turning the hand-wheel *y'*. The end of the feed-screw *y* to which the hand-wheel *y'* is attached is carried in a bearing in the bracket y^2. This bracket is secured to the bed-plate by means of screws.

The shaft *q'*, carrying the pinion *q*, for imparting motion to the carriage *d* and to the pantograph, is preferably made in one piece with the said pinion, and at one side of the latter the said shaft is provided with a tube, q^2, fitting over it and into a bearing in the said carriage. This tube is kept in place by a hand-wheel, q^3, fixed on the end of the shaft. This prevents looseness of the shaft *q'* in its bearings.

In engraving-machines of this character the engraving-tool has sometimes been raised by hand while the table is returned back, as the tool will only cut in one direction. In the present machine an automatic circuit breaker and closer is used, so arranged that when the table moves in one direction the circuit is closed, and when it moves in the opposite direction the circuit is broken. This device is constructed in the following manner: In bearings F F^2 upon the carriage *a* is placed a sliding rod, C, provided at one end with a head, b^{11}, and at the other end with an adjustable nut, d^{11}, for regulating the length of travel or stroke of the rod. On the rod C between the two bearings are two stops, G G', adjustable thereon by means of set-screws, and on the side of the table *d* are two projecting pins, i^{11} i^{12}, to form electric connection, respectively, with the stops G G'. I connect a conducting-wire, D, with the switch A, and divide the same into two branches, one of which is connected to a pin, E, passing through the bearing F, but insulated therefrom, the other being connected to an insulated pin, E', fixed to the adjustable stop G on the rod C. I employ a spring, H, or other suitable device to exert a friction on the rod C to hold it and prevent it from moving accidentally and breaking contact at the wrong time. When the table moves to the left the pin i^{12} comes in contact with the stop G' and draws the rod C to the left until the head b^{11} on the rod comes in contact with the pin E, and thus completes the circuit. The table now is started to the right, the circuit remaining closed, and as the pin i^{11} comes in contact with the stop G and commences to carry the rod C to the right, the connection at b^{11} is severed, but the circuit is not broken, as it is continued through G i^{11}. When the table has completed its movement to the right and commences to start back to the left, the circuit is at once broken at G i^{11}, and remains so until it is closed at b^{11} E again. The switch A is turned off the pin 70, so as to rest upon the contact-pin 60, Fig. 3, when the machine is used for engraving raised work. In this position the circuit passes from battery A^9 by wires 61 62, to table *v* through the conducting-type upon this table *v*, and by the tracer *s*, bars r^2, and *m* to the wire 63, thence through the magnet R, and by wires 64 65 to battery. When the type closes the circuit, the magnet is energized and the engraving-tool is raised from the work, and when the circuit is broken between the types and the tracer the spring-lifter *s* presses the tool upon the article to be engraved. When the slide-head b^{11} is in contact with the insulated pin E, the circuit is closed, the current coming from A^9 by 61 60 A D 66 E b^{11} and machine to *m* 63 R 64 65, to battery, so that the current is not broken and the tool is kept off the work until the types have been moved back beneath the tracer and the circuit is broken at b^{11} and i^{11}, as aforesaid, allowing the type and tracer to operate the magnet and engraving-tool when the types are moving in the proper direction for performing the engraving.

When the frame O P and parts are removed from the standard N and replaced upside down, as aforesaid, the switch A has to be moved to the position shown in Fig. 3, closing contact with the stud 70 and breaking it from contact with the stud 60. In this position the current comes from battery A^9 by 61 60 62 to type on *v*, and by tracer S, bars r^2 *m*, and wire 63 to magnet R, thence by 64 65 to battery. The engraving now takes place during those portions of the movement when the circuit is closed through the conducting-types, and the tool is raised from its work when the circuit is broken between such types. On the return-stroke it is necessary to short-circuit the magnet, so that it may not be energized to draw down the engraving-tool. This is effected by the end movement of *c* closing a shunt-circuit at b^{11} E, the current passing from *m* through the machine, through b^{11}, E, 66, D, A, 70, 67, and 65 to battery, instead of going through the magnet R, thus preventing the engraving-tool touching on the return-stroke.

The machine is fed by means of a pawl, *x'*, connected to the rod C, and operating upon a ratchet-wheel, *x*, on a screw-shaft, which passes through the carriage, and thus moves the same a certain distance for each stroke of the table.

Instead of having a slot, *m'*, in the bar *m*, I

sometimes provide a pivot-hole at n. In this case the stud p' and arm o are to be connected, so that the link may swing as it gives motion to the bar m, when the stud p' and rack p^2 are moved endwise, as aforesaid.

I claim as my invention—

1. The combination, with the carriage e and mechanism upon the same for holding the article to be engraved, of the carriage d, upon which the carriage e may be moved transversely, a detachable plate or form, g, and a guide-pin or roller upon the carriage d, and springs to cause the plate or form to bear against such pin or roller, substantially as set forth.

2. The combination, with the carriage for holding the article to be engraved and the means for moving the same, of the arm l', pantograph-bar m, guide-bar r, tracer s, and holder v, substantially as set forth.

3. The combination, with the tracer s and its wire t, of the spring-wire t' and adjusting-screw t^2, substantially as set forth.

4. The combination, with the tracer s, of the yoke r^3, spring u, and sliding bar r^2, substantially as set forth.

5. The stand or holder v, for the pattern or type, and the slideways for supporting the same, in combination with the tracer, the pantograph, and the connecting levers and links, and the bed a, and carriages for the article to be engraved, whereby the stand v is automatically moved at right angles to the movement of the tracer, substantially as set forth.

6. The electro-magnet R, rocking lever V, and engraving-tool w^8, in combination with the adjustable spring s^8, armature, and yielding connection for such armature, substantially as set forth.

7. The combination, in an engraving-machine, of the electro-magnet and the engraving-tool actuated thereby, and the electric-circuit connections and the switch, substantially as set forth, whereby the machine can be used for engraving either raised or depressed work, as specified.

8. The combination, with the carriages d e, of the sliding rod C, the movable stops G G', pins i^{11} i^{12}, switch and electric-circuit connections, engraving-tool, and electro-magnet, to act upon the tool, substantially as set forth.

Signed by me this 24th day of November, A. D. 1883.

GEO. M. GUERRANT.

Witnesses:
GEO. T. PINCKNEY,
HAROLD SERRELL.