(No Model.) 5 Sheets—Sheet 1.

J. SCHWEIZER.

ENGRAVING MACHINE.

No. 303,057. Patented Aug. 5, 1884.

Fig. 1.

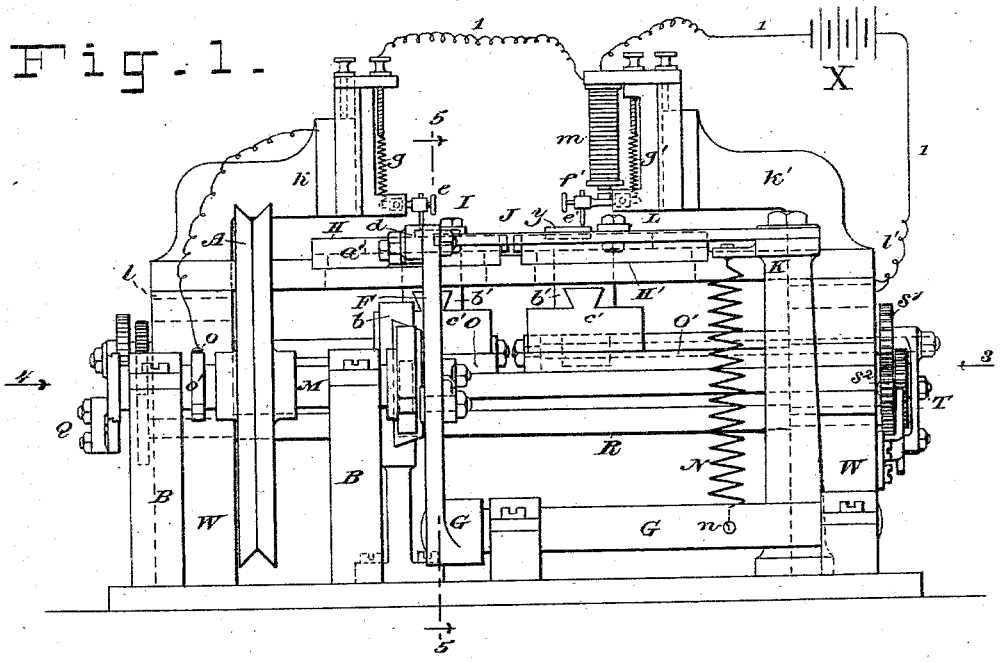

Fig. 2.

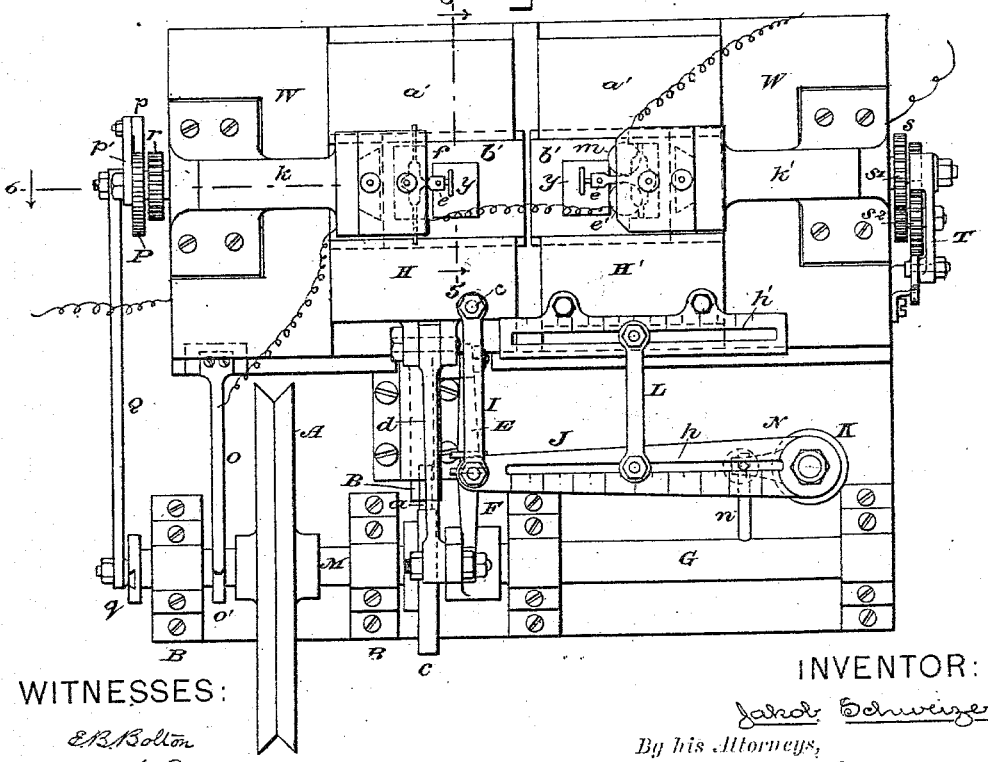

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Fig. 3.

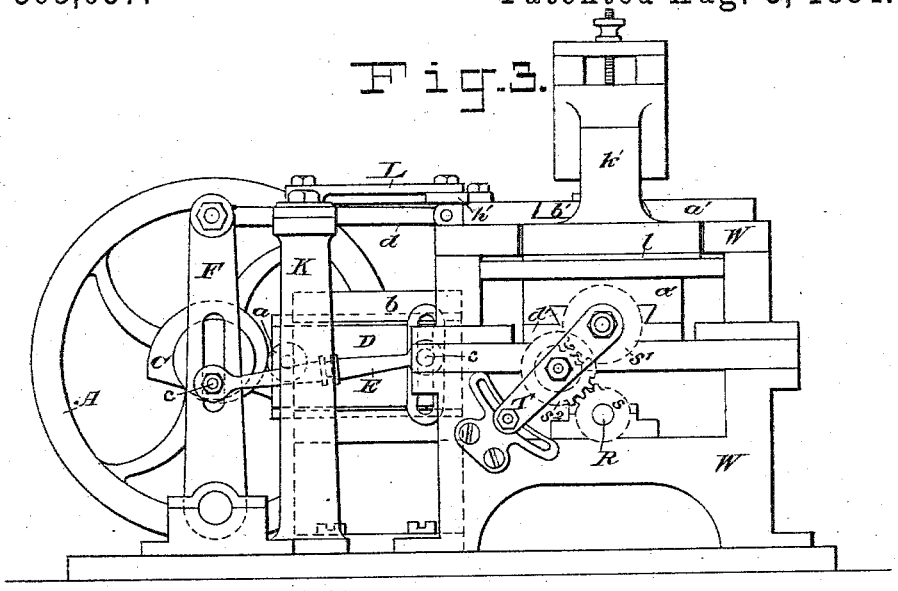
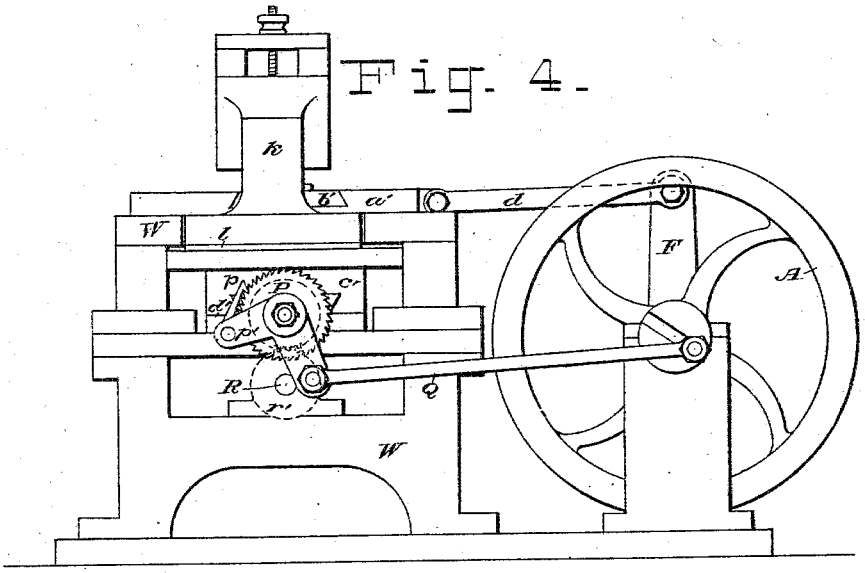


Fig. 4.



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ENGRAVING MACHINE.

No. 303,057. Patented Aug. 5, 1884.

Fig. 5.

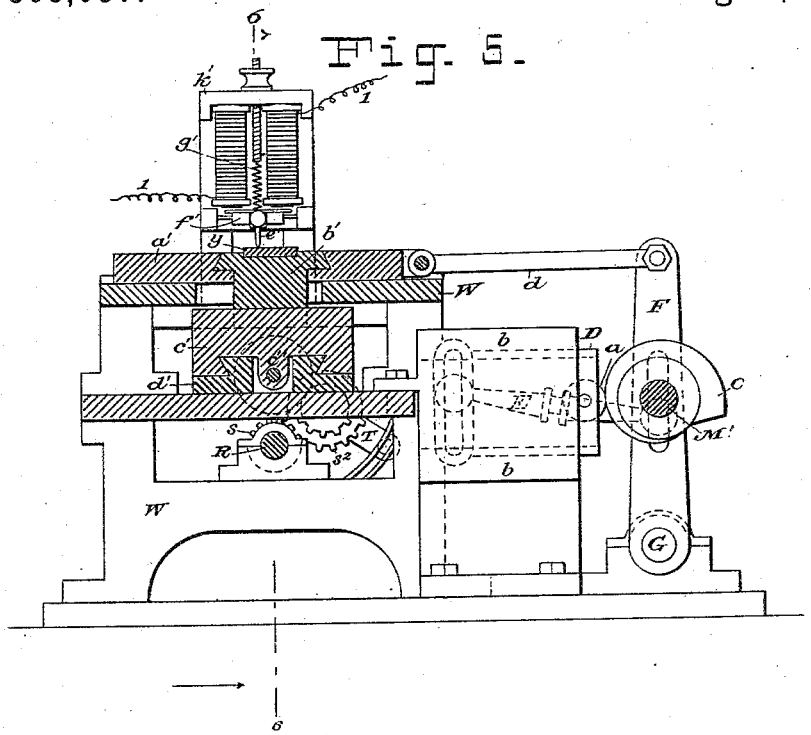


Fig. 6.

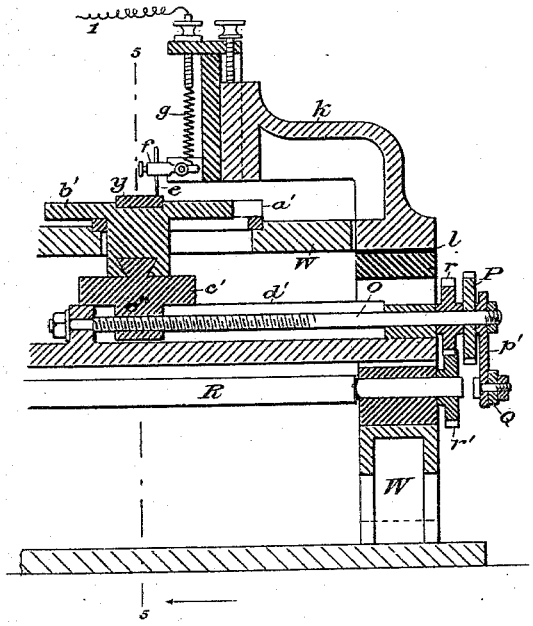
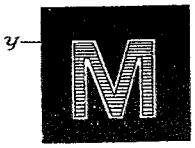


Fig. 7.



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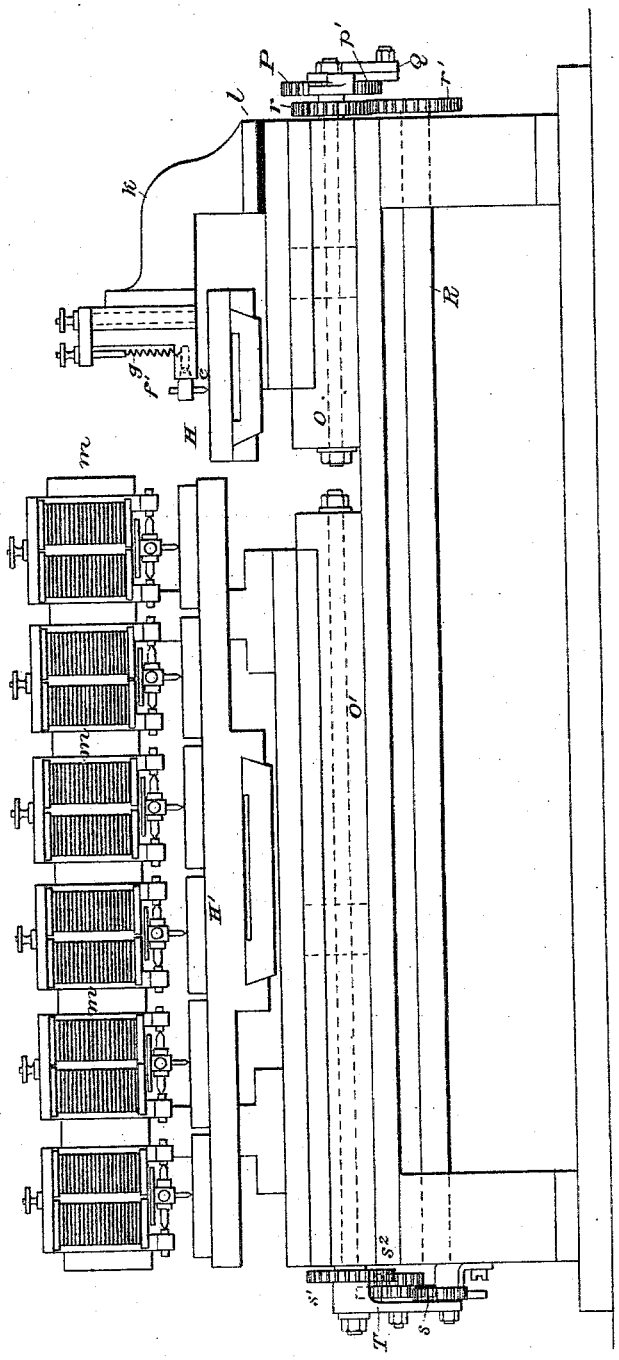
(No Model.) 5 Sheets—Sheet 4.

J. SCHWEIZER.

ENGRAVING MACHINE.

No. 303,057. Patented Aug. 5, 1884.

Fig. 4.



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(No Model.) 5 Sheets—Sheet 5.

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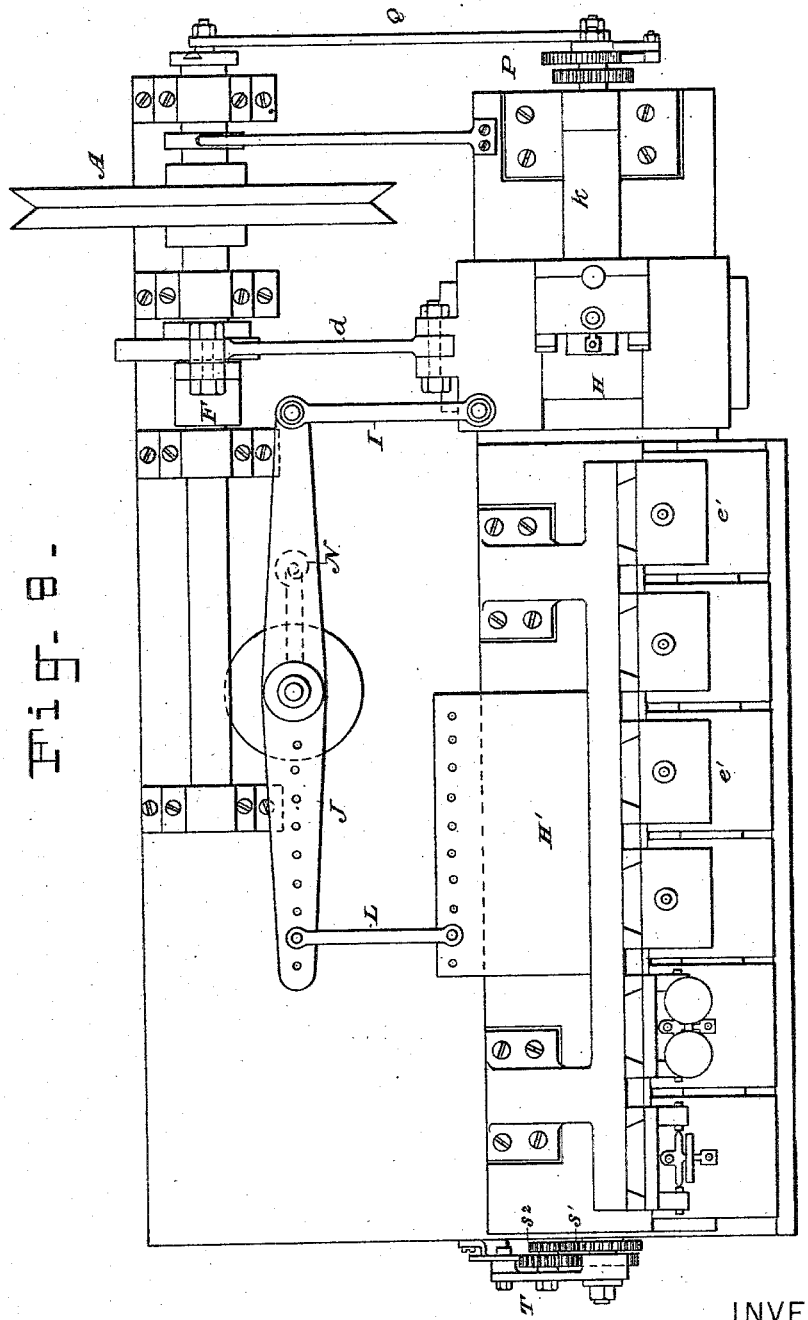

Fig. 8.

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UNITED STATES PATENT OFFICE.

JAKOB SCHWEIZER, OF SOLEURE, SWITZERLAND.

ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 303,057, dated August 5, 1884.

Application filed April 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAKOB SCHWEIZER, a citizen of the Swiss Republic, and a resident of Soleure, Switzerland, have invented an Improved Engraving-Machine, of which the following is a specification.

The object of my invention is to provide a machine that will automatically engrave a plate or block in intaglio and relief from a model or pattern previously prepared. The engraving on this plate or block may be of the same size as that on the pattern, or be reduced or enlarged, or be made disproportionate, as desired. In its general construction my machine comprises two carriages or moving beds, each of which has, by preference, two movements at right angles to each other. One carriage bears the pattern or model under a metallic point, and the other bears the block or plate to be engraved under a burin or engraving-tool. The sunken lines in the metal pattern or model are, by preference, filled with enamel or other hard non-conducting material, and the metallic point which passes over its surface forms part of an electric circuit, which circuit is broken by the passage of the point over the said enamel. An electro magnet in the circuit is arranged to act on the burin, which is attached to its armature, so that when the circuit is closed by contact of the metallic point with the raised metallic lines of the pattern, the armature is attracted, and the burin raised out of contact with the plate to be engraved; but when the said point rests on the enamel, which represents the sunken lines, the circuit will be broken and the burin will be pressed down upon the plate by a spring or weight, and will engrave the same. Means are provided for reciprocating the carriages bearing the pattern and plate, for preventing the burin from resting on the plate while it is being retracted or moved in one direction for feeding the plates laterally, and for varying the relations between the movements of the two carriages, whereby the figure engraved may vary in size and proportion from the pattern. All of these will be hereinafter referred to.

My machine may be simple—that is to say, it may be constructed to engrave but one plate at a time from the pattern, or it may be arranged to engrave several plates at once from one pattern or model.

In the drawings I have shown my machine in its simple form in Figures 1 to 7, Fig. 1 being a front view of the same; Fig. 2, a plan; Fig. 3, an elevation of the right-hand side of the machine, and Fig. 4 an elevation of the left-hand side of the machine. Fig. 5 is a cross-section substantially on line 5 5 in Figs. 2 and 6; and Fig. 6 is a section of one end of the machine, taken substantially on line 6 6 in Fig. 5. Fig. 7 is an enlarged view of the pattern or model, showing the enamel in the recesses. Fig. 8 is an elevation, and Fig. 9 is a plan, of the machine where several plates are engraved simultaneously from one pattern.

Movement is imparted to the machine from any suitable motor through the medium of a belt-pulley, A, on a shaft, M, rotatively mounted in bearings B B on frame W. On the shaft M is fixed a cam or eccentric, C, which bears on an anti-friction roller, *a*, mounted on a carriage or slide, D, which plays in keepers *b b*. The slide D is coupled to a lever, F, by means of a connecting-rod, E, the coupling-pins *c c* on the ends of which engage, respectively, slots in the slide D and lever F, (see Fig. 3,) whereby the movement may be regulated. The rod E may also be regulated as to length by a coupling. The lever F is mounted to oscillate on an axis, G, and to its upper extremity is coupled a connecting-rod, *d*, the other end of which is coupled to the carriage H, which bears the pattern or model *y*, from which the engraving is to be made. This pattern moves under a metal point, *e*, which is borne on the end of a pivoted lever, *f*, to the other end of which is attached a coil-spring, *g*. The point *e* is supported in an arm or bracket, *k*, which is insulated from the metal frame of the machine by insulating material *l*.

To the carriage H is coupled a connecting-rod, I, the other end of which rod is coupled to the free extremity of an arm, J, pivoted to the top of a post or column, K, or some part of the frame. This arm has a slot, *h*, the margin of which is graduated, (see Fig. 2,) and the carriage, H′, which bears the plate to be engraved, has also a slot, *h′*, with a graduated margin. A connecting-rod, L, couples the

arm J to the carriage H′, the coupling-pins of said rod taking into the slots *h* and *h′*, as shown. Thus motion is imparted by cam C to both of the carriages H and H′. The carriage H′ moves under a burin, *e′*, which is borne by a pivoted lever, *f′*, and the burin is kept normally depressed by a spring, *g′*. The lever *f′* is borne by an arm or bracket, *k′*, insulated from the metal frame of the machine by insulating material *l′*. The lever *f′* is an armature-lever, and over it is mounted an electro-magnet, *m*. It will be obvious that if the magnet *m* be excited the armature-lever *f′* will be attracted, and the burin *e′* raised or lifted free of the plate to be engraved, which plate is borne by the carriage H′, and this will take place whenever the metallic point *e* touches a metallic portion or raised line of the pattern borne by carriage H.

X represents the battery, and 1 1 the wires forming the electric circuit. The current entering the frame of the machine cannot pass to the point *e* through arm *k* by reason of the insulation *l*, but may pass by way of the metal pattern borne by H whenever any portion of same contacts with *e*. The current then passes through *e*, *f*, and *g* and wire 1 to the electro-magnet, and thence to one pole of the battery X.

The engraving is effected while the cam C is acting to move the carriages. When the point of the cam has passed the roller *a*, the parts are quickly retracted by a spring, N, attached at its upper end to the column K and at its lower end to an arm, *n*, attached to the axis or shaft G of lever F. During this period of the return movement of the carriages the burin *e′* must be raised. This I effect by sending an electric current through a contact-plate or spring, *o*, which rests on a wheel, *o′*, on the motor-shaft M, which wheel is a conductor only in that fraction of its revolution which corresponds to the return movement of the carriages.

I will now describe the mechanism for effecting the feed or lateral movement of the carriages H and H′, which is effected during the return movement of the latter.

To avoid complexity, I have heretofore simply referred to the carriages H and H′ by letter. In order to obtain the necessary compound movement, these carriages are of a somewhat complex construction, which is best illustrated in Figs. 5 and 6. As both carriages are substantially alike, I will only minutely describe one.

a′ is a plate which reciprocates in keepers in the bed of the main frame W. To this plate is coupled the rod *d*.

b′ is a bed mounted to slide transversely across *a′*, and in keepers therein. This bears the pattern *y*. The lower pendent part of bed *b′* is dovetailed to slide on a bed, *c′*, when the carriage is reciprocated, and *c′* is dovetailed to slide laterally of the machine on a fixed bed-piece, *d′*. On *c′* is a pendent nut, *c″*, which is engaged by a feed-screw, O, whereby lateral motion is imparted to bed *b′*, while at the same time this bed is free to be reciprocated through the medium of plate *a′*. The several parts *a′*, *b′*, *c′*, and *c″* comprises the carriage H.

The screw O, which actuates the carriage H, is provided (see Fig. 4) at the end of the machine with a ratchet-wheel, P, which is rotated intermittently by a pawl, *p*, pivoted to an arm, *p′*, hung loosely on the axis of the wheel P, and connected by a rod, Q, with an adjustable crank, *q*, on the main shaft M. This adjustable crank enables one to regulate the feed. Fixed on the same shaft with the ratchet-wheel P is a toothed wheel, *r*, which meshes with another toothed wheel, *r′*, on a shaft, R, which extends across to the r side of the machine. On the other end of shaft R (see Fig. 3) is fixed a gear-wheel, *s*, which drives screw O′ through a gear-wheel, *s′*, fixed on its end, and through intermediate gear-wheels, s^2, mounted in a slotted radially-mounted swinging arm T. This arm permits the use of change-wheels in order to vary the lateral feed of carriage H′.

By varying the position of the rod L along the slots *h h′* the amount of longitudinal movement of the carriage H′ with respect to that of carriage H is varied, and by changing the wheels s^2 the amount of lateral movement or feed of the carriage H′ with respect to that of carriage H is varied. This enables the operator to vary the proportions of the engraved plate with respect to the pattern very considerably. To illustrate, if the pattern shows a circle, the engraving made from it may present the form of an ellipse.

The machine represented in Figs. 8 and 9 is identical in principle with that I have just described; but, as before stated, it is designed to engrave a number (six in the drawings) of plates simultaneously from one pattern. The lever J actuates by a rod, L, the carriage H′, which bears the various plates to be engraved. As many burins *e′* and magnets *m* are employed as there are plates, and these magnets are all in one circuit and are simultaneously excited by the closing of the circuit at *e*. It would be possible, however, to employ but one electro-magnet and secure all the burins in the elongated armature of this magnet; or, in lieu of but one rod, L, arranged to operate but one carriage, H′, bearing all the plates, might be mounted on separate carriages and each be operated by a separate rod, L, and each carriage might have an independent feed-screw. This would enable the operator to engrave simultaneously plates of various proportions with respect to the pattern or model.

I prefer to fill up the recessed portions of the pattern with enamel, as before stated, so that the point *e* may have a smooth and level surface to glide over; but by a delicate adjustment of this point it may be made to merely touch the raised lines or parts on the

pattern, and not to sink into the recessed lines or parts. By this means I am enabled to dispense with the enamel.

I do not wish to limit myself to the precise construction and arrangement of the mechanical devices I have herein shown, as these may be changed to some extent without materially departing from my invention—as, for example, the carriages may be retracted by a spring arranged in any well-known way, or the cam C might be arranged to reciprocate the carriages without the aid of a retracting-spring. I might also give to the carriages H and H′ a longitudinal reciprocating motion only, and construct the point *e* and burin *e′* to be fed or moved laterally, which would effect the same result as that described.

In Figs. 3 and 4 I have shown the brackets *k* and *k′* in section, the better to illustrate the mechanism borne by them.

Having thus described my invention, I claim—

1. An engraving-machine comprising a carriage for the pattern or model, and a carriage for the plate to be engraved, both having a longitudinal reciprocating and a lateral movement, means, substantially as described, for imparting the movements to said carriages, a burin arranged over the plate to be engraved and normally depressed into contact with the plate by a spring, an electro-magnet arranged and adapted to lift said burin when electrically excited, an electric circuit of which said electro-magnet forms a part, a metallic point in said circuit arranged to press upon the pattern or model, and said pattern or model made from some conducting material, and its raised lines adapted to be brought into contact with the metallic point, and thus close the electric circuit, substantially as and for the purposes set forth.

2. The combination, in an engraving-machine, of a carriage for the pattern or model and a carriage for the plate to be engraved, said carriages having each a longitudinal reciprocating and a lateral movement, mechanism, substantially as described, for imparting the proper movement to the said carriages, a burin arranged over the plate to be engraved, and electrical means, substantially as herein described, for regulating the operations of the burin, whereby it is made to engrave a design similar to that on the pattern, substantially as set forth.

3. In an engraving-machine, the combination, with the carriages H and H′, and the means, substantially as described, for imparting to them the proper motions, of the metallic point *e*, the burin *e′*, the magnet *m*, the battery, the wires, and other parts forming the electric circuit, and the means, substantially as described, for raising the burin free from the plate when the carriages are retracted, substantially as set forth.

4. In an engraving-machine, the combination of the main shaft, the cam C, the frame D, the lever F, the connecting-rod E, the carriage H, connecting-rod *d*, arm J, rod I, carriage H′, rod L, and means, substantially as described, for retracting said carriages, all arranged to operate substantially as set forth.

5. In an engraving-machine, as a means for feeding the carriages laterally, the combination of the said carriages, the feed-screws O O′, the shaft R, the ratchet-wheel P, pawl *p*, the means, substantially as described, for operating said pawl, the gear-wheels *r r′*, the gear-wheels *s s′*, and the intermediate gear-wheels, *s²*, all arranged to operate substantially as set forth.

6. The combination of the carriage H, the carriage H′, provided with a slot, *h′*, the arm J, provided with a slot, *h*, the rod I, and the adjustable rod L, all arranged to operate substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAKOB SCHWEIZER.

Witnesses:
ROBT. M. HOOPER,
AMAND RITTER.