

No. 671,174.

Patented Apr. 2, 1901.

H. M. ALBEE.
ENGRAVING MACHINE.

(No Model.)

(Application filed Feb. 15, 1900.)

3 Sheets—Sheet 1.

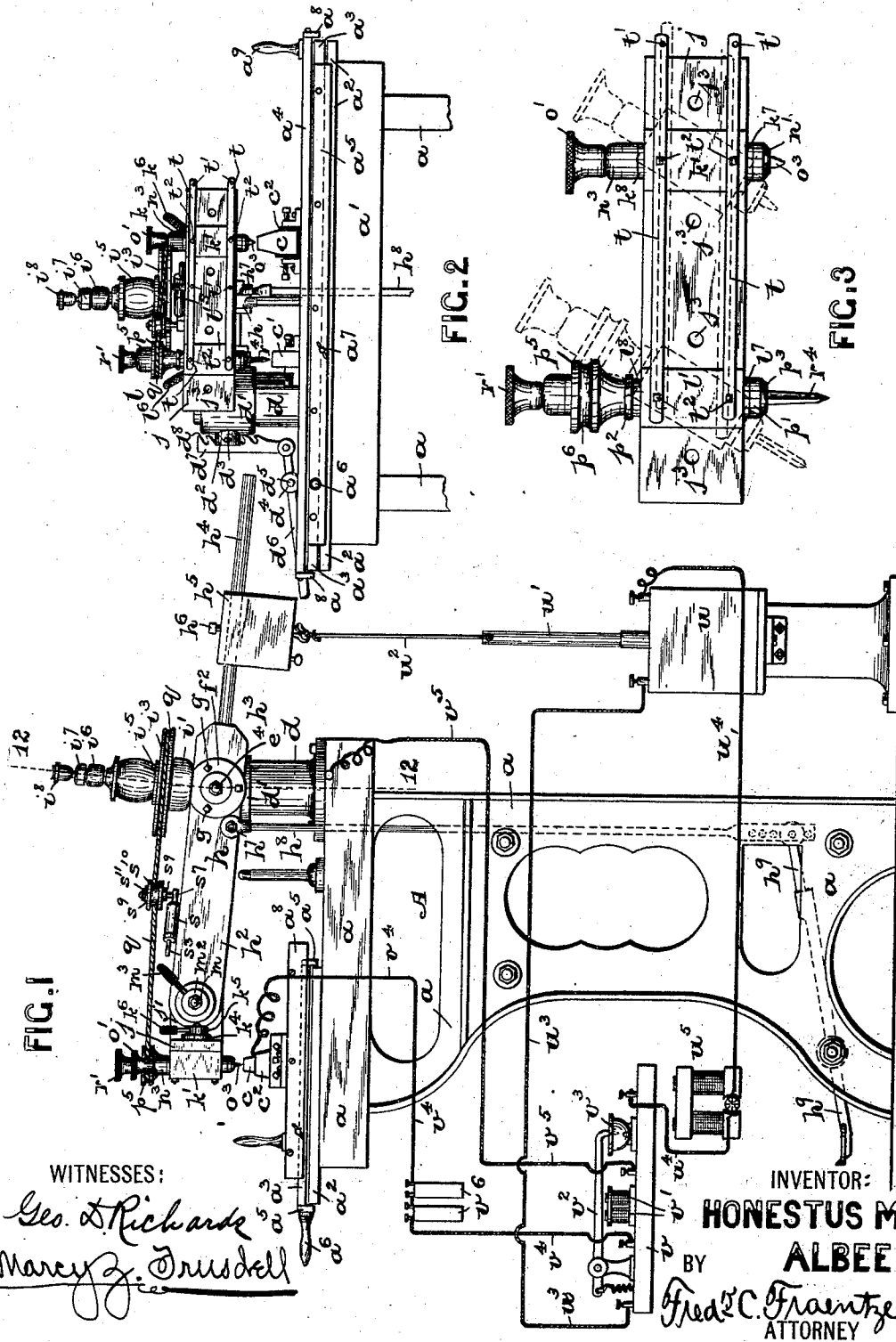


FIG. 1

FIG. 2

FIG. 3

WITNESSES:

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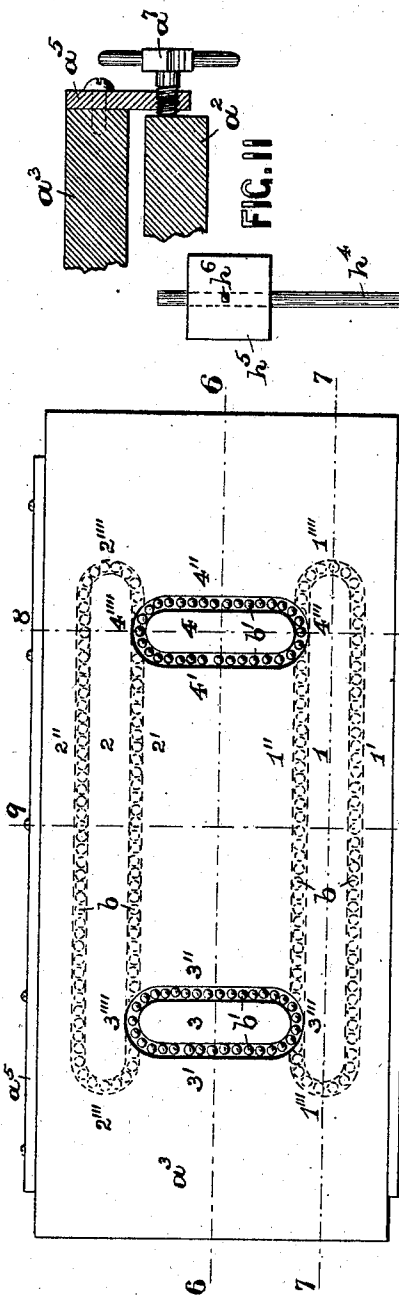
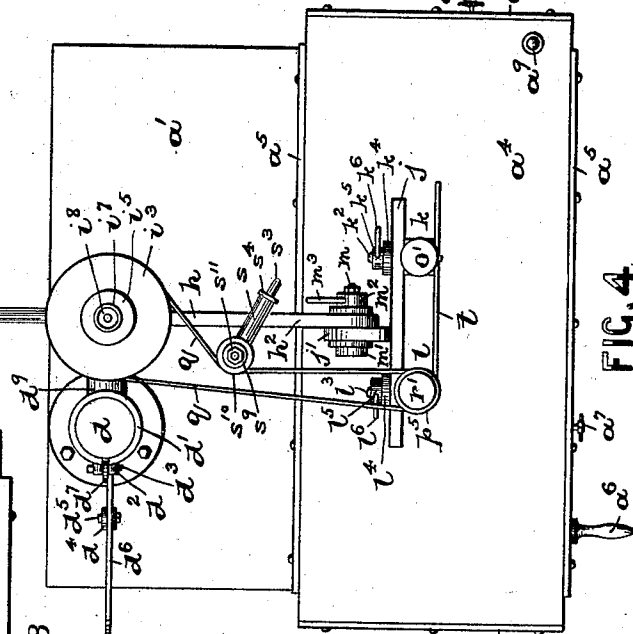
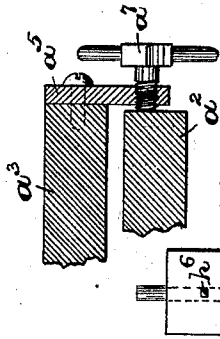


FIG. 11



H. M. ALBEE.
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3 Sheets—Sheet 3.

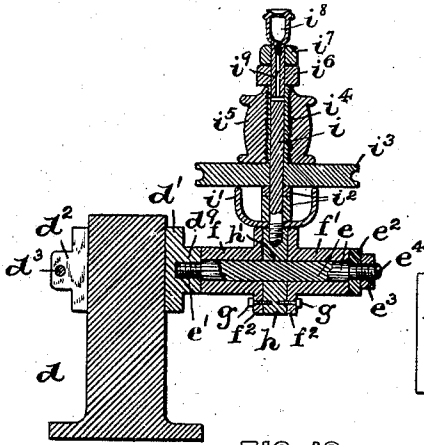


FIG. 12

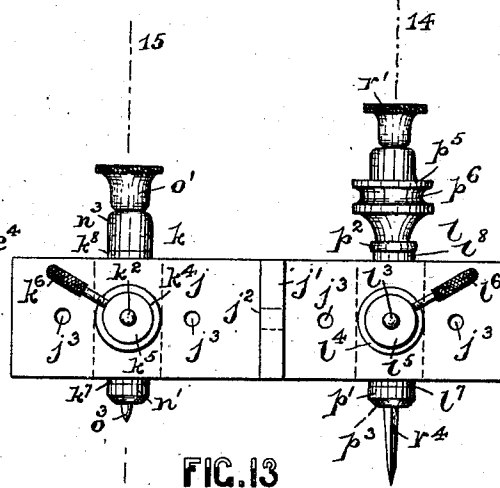


FIG. 13

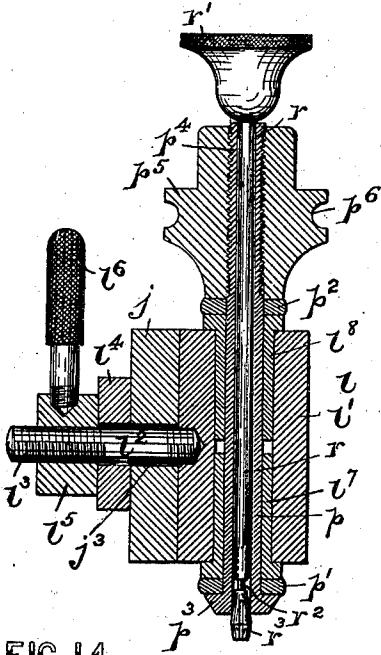


FIG. 14

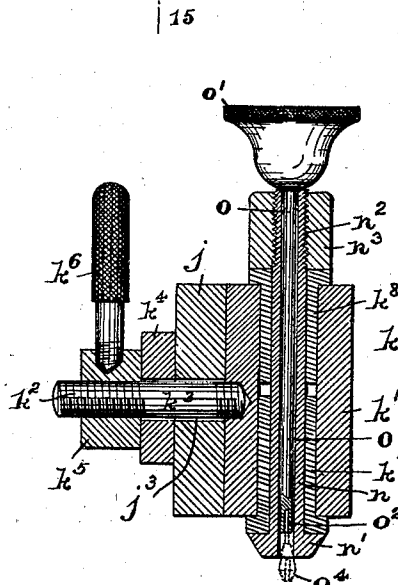


FIG. 15

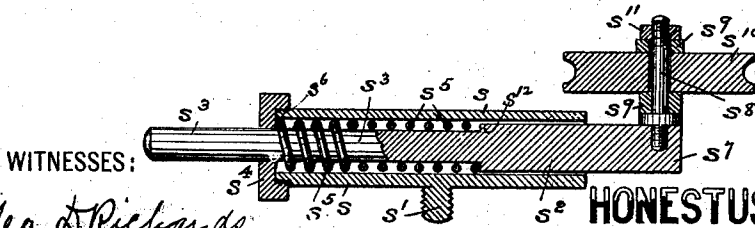


FIG. 16

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UNITED STATES PATENT OFFICE.

HONESTUS M. ALBEE, OF NEWARK, NEW JERSEY.

ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 671,174, dated April 2, 1901.

Application filed February 15, 1900. Serial No. 5,246. (No model.)

To all whom it may concern:

Be it known that I, HONESTUS M. ALBEE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in engraving-machines, and has for its primary object to provide a novel mechanism for cutting raised or intaglio designs in metal for the purposes of punches, dies, or engraving-plates, and, furthermore, to provide a novel mechanism for transferring any design employed as a pattern, whether such design is in a raised or depressed form, to a piece of metal, wood, or any other suitable material.

A further object of this invention is to provide a novel means for causing a very sensitive contact between the "tracer" and the engraved or ornamented surface of the pattern or templet, such means being electrically controlled to cause an intermittent making and breaking of electrical contact between the point of the tracer and the surface of the pattern or templet, the tracer thereby receiving a rapid vibrating motion, with its tracing-point in the most sensitive engagement with the ornamented surface of the pattern to be transferred to another piece arranged upon the supporting-platen, the motion of which controls the tracing action of the tracer with the ornamented surface of the pattern or templet, and causes the cutting-tool to produce the same design in the material or piece to be engraved.

A further object of this invention is to provide an engraving-machine having an arrangement of platens movably supported one above the other upon antifriction rollers or balls or other similar travelers, whereby one platen, which is supported upon the table or bed-plate of the machine-frame, has a reciprocatory motion in one direction in a horizontal plane, while another platen, directly above

this first-mentioned platen, has a reciprocatory motion in a horizontal plane, but at right angles to the direction of the motion of said first-mentioned platen, and whereby any part of the surface of the pattern or templet can be moved in any direction, practically in the manner of the compound motion derived from a pantograph mechanism, beneath the point of the tracer, and the surface of the plate which is to be engraved is in like manner moved beneath the point of the cutting-tool.

Other objects of this invention not here specifically mentioned will be fully set forth in the accompanying specification.

My invention consists in the novel construction of engraving-machine hereinafter more fully described; and, furthermore, the invention consists in the novel arrangements and combinations of the various mechanism and parts comprised in the novel construction of said engraving-machine, as well as in the details of the construction thereof, all of which will be fully described in the accompanying specification and then finally embodied in the clauses of the claim which are hereto appended.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the complete machine embodying the leading features of my invention, and Fig. 2 is a front view of the several parts of the machine with the lower portion of the machine-frame omitted. Fig. 3 is a face view of a support or plate provided with a pair of adjustable and pivoted holders, one for the reception of the tracer and the other for the reception of the cutting-tool. Fig. 4 is a top or plan view of the machine. Fig. 5 is a plan view, on an enlarged scale, of the movable and antifriction roller or ball supported platen with the upper platen for the support of the pattern or templet and the work to which the design is to be transferred omitted. Fig. 6 is a longitudinal vertical section, taken on line 6 6 in Fig. 5, of the upper and middle movable platen with the lower stationary platen omitted. Fig. 7 is a similar section, taken on line 7 7 in said Fig. 5, of the lower stationary platen and the movable middle platen, the upper movable platen being omitted. Fig. 8 is a verti-

cal cross-section, taken on line 88 in said Fig. 5, of the upper and middle and movable platen with the lower stationary platen omitted; and Fig. 9 is a similar section, taken on line 99 in said Fig. 5, of the lower stationary platen and the movable middle platen with the upper movable platen omitted. Fig. 10 is a detail section, on an enlarged scale, through the retaining grooves or channels in either platen with an arrangement of antifriction supporting-travelers therein, said view representing the supporting-travelers in one side or portion of the channel in operative support with the under surface of the platen above the channel and the travelers in the other side or remaining portion of the groove or channel in their positions removed from the supporting contact with the lower surface of the platen above said travelers. Fig. 11 is a detail section of the edge portions of any two of the platens, illustrating one means for securing the movable platens in fixed positions. Fig. 12 is a vertical section taken on line 12 12 in Fig. 1. Fig. 13 is a rear view of the support or plate and the adjustable and pivoted holders represented in Fig. 2. Fig. 14 is a vertical cross-section, on an enlarged scale, of the tool-holder, said section being taken on line 14 14 in Fig. 13; and Fig. 15 is a similar section of the holding device for the tracer, said section being taken on line 15 15 in said Fig. 13. Fig. 16 is a longitudinal vertical section of one form of belt-tightening device employed in connection with the machine.

Similar letters of reference are employed in all of the said above-described views to indicate corresponding parts.

In said drawings, A indicates the machine-frame, comprising a pair of suitable frames or standards *a* and provided with a table or bed-plate *a'*. At or near the front of said table or bed-plate *a'*, as clearly illustrated in Figs. 1 and 4, and upon said table or bed-plate is a fixed or rigid lower platen *a²*. The said rigid or lower platen *a²* is provided in its upper surface with a pair of longitudinally-extending grooves 1 and 2, each groove being preferably of the configuration indicated in dotted outline in Fig. 5, the groove 1 having the longitudinal portions 1' and 1'' and the curved end portions 1''' and 1''', whereby a circuitous or continuous channel is provided for the reception of supporting-travelers *b*, such as antifriction rollers or balls, as clearly indicated in the several figures of the drawings. The said groove 2 is likewise made up of a pair of longitudinal portions 2' and 2'' and the curved end portions 2''' and 2''', thereby providing a second circuitous or continuous channel for the reception of another series of supporting-travelers *b*, such as antifriction rollers or balls.

As clearly indicated in Fig. 10, one of the longer channel portions, as 1'' and 2'', of each groove 1 and 2 is deeper than the channel portions 1' and 2' of said grooves, whereby

that portion of the travelers *b* in the portions 1' and 2' is higher than that portion of the travelers *b* in the portions 1'' and 2'' of the respective channels 1 and 2, for the purpose to be presently more fully stated. Supported directly upon the said travelers *b* in the channel portions 1' and 2' is a second platen *a³*, which I shall hereinafter term the "middle movable platen." Said platen *a³* has at its longer edges or sides suitably-constructed and downwardly-extending guides *a⁵*, which embrace the longitudinal edges of the lower fixed platen *a²*, whereby said platen *a³* is capable of a movement in a transverse direction above said platen *a²* upon the travelers *b* in the higher channel portions 1' and 2'. The rolling travelers, as will be evident, will move into the deeper channel portions 1'' and 2'', returning to their former operative positions in a direction directly opposite to the transverse movement of the platen *a³*. I thereby prevent any counteraction of the returning travelers and overcome any possible and extra friction, which would result if the returning travelers came in rolling contact with the under surface of said middle movable platen *a³*, as will be clearly evident from an inspection of said Fig. 10. In order that said middle movable platen *a³* may be pushed in either direction transversely across the lower fixed platen *a²*, a handle *a⁶* may be secured in one of said guides *a⁵*, as shown, and if desired to lock or retain said middle movable platen *a³* in any fixed position above the lower fixed platen *a²* a locking or holding screw, as *a⁷*, of any desirable construction may be employed. As shown more especially in Figs. 5, 6, and 8, the said middle movable platen *a³* is provided in its upper surface with a pair of transversely-extending grooves 3 and 4, each groove being preferably of the configuration indicated in said Fig. 5, the groove 3 having the longitudinal portions 3' and 3'' and the curved end portions 3''' and 3''', thus providing a circuitous or continuous channel for the reception of supporting-travelers *b'*, such as antifriction rollers or balls, and the said groove 4 is likewise made up of a pair of longitudinal portions 4' and 4'' and the curved end portions 4''' and 4'''' to provide a second circuitous or continuous channel for the reception of another series of supporting-travelers *b'*, such as antifriction rollers or balls. In this case also one of the longer channel portions 3'' and 4'' of each groove 3 and 4 is deeper than the channel portions 3' and 4' of said grooves, whereby that portion of the travelers *b'* in the portions 3' and 4' is higher than that portion of the travelers *b'* in the portions 3'' and 4'' of the respective channels 3 and 4 for the purpose fully specified hereinabove. Supported directly upon the said travelers *b'* in the channel portions 3' and 4' is a third platen *a⁴*, hereinafter termed the "upper movable platen." The said upper movable platen *a⁴* has its shorter or transverse edges provided with suitably-con-

structed and downwardly-extending guides a^8 , which embrace the short sides of the middle movable platen, whereby said upper movable platen a^4 is capable of longitudinal motion above the bed-plate of the machine proper and whereby said upper movable platen a^4 is capable of a reciprocatory motion from front to rear or rear to front of the machine during the transverse motion of the middle movable platen a^3 , as will be clearly understood. The said upper movable platen a^4 may be provided with a suitable handle a^9 for motion of the platen a^4 , and in one of said guides a^8 may be a locking or holding screw, as a^{10} , or other suitable means for securing the said upper movable platen a^4 in a fixed position upon the middle movable platen a^3 , if desired. Thus it will be seen that the operator standing in front of the machine can take the handle a^6 in his left hand and the handle a^9 in his right hand and by proper manipulation easily move the two platens a^3 and a^4 as desired to produce a compound motion of the upper platen a^4 for the purposes hereinafter more fully set forth.

Of course it will be evident that I may vary the relative movements of the movable platens a^3 and a^4 and I may change the arrangement of the respective guides connected with said platens and may also employ a different arrangement of channels for the respective travelers b and b' without departing from the scope of my present invention. Upon the said upper movable platen a^4 I secure in any well-known manner to those versed in the art of machine practice a block c , bearing the pattern or design, directly beneath a tracer, and also the piece of work c' , to which the design is to be transferred, directly beneath the cutting-tool, substantially in the manner and for the purposes hereinafter described.

Suitably secured upon the table or bed-plate a' of the machine, at or near the back thereof and preferably at one side of the longitudinal central axis of said bed-plate a' , is a post or upright d , provided with a clamping sleeve or collar d' , having perforated ears or lugs d^2 and a binding screw or bolt d^3 for securing said sleeve or collar d' in its vertically-adjusted position upon said post or upright d . In order that the said sleeve or collar d' may be raised or lowered by the slackening up of the screw or bolt d^3 , I have provided the bed-plate a' with a bearing d^4 , having a pin d^5 , on which is fulcrumed a lever d^6 . Said lever has pivotally connected therewith an upwardly-extending rod or plate d^7 , having notches or serrations d^8 , any one of which can be brought into lifting or lowering engagement with the screw or bolt d^3 for the adjustment of said sleeve or collar d' , said screw or bolt d^3 being employed after such adjustment to screw the lugs or ears d^2 together, and thus retain said sleeve or collar d' in its proper and adjusted position. The said sleeve or collar d' has also connected therewith, preferably by the use of a pin or stem e , hav-

ing a screw end e' , secured in a screw-threaded boss or enlargement d^9 on said sleeve or collar d' , a pair of sleeves f and f' , each sleeve having a shoulder f^2 , provided with suitably-disposed holes or perforations for the reception of bolts g and the securing between said shoulders f^2 and upon said pin or stem e of the perforated portion h' of a rock beam or bar h . The said beam or bar h and the two sleeves f and f' are retained upon said pin or stem e , so as to be capable of a rocking motion thereon, by means of a suitable washer e^2 and a nut e^3 , screwed upon the opposite screw-threaded end e^4 of said pin or stem e , substantially as represented in Fig. 12 of the drawings. Screwed upon said beam or bar h , in a position preferably above said pin or stem e , is a post or rod i , a cup-shaped oil-receiver or catch-basin i' being arranged on said post i and resting upon the upper surface of the beam h , as shown. Encircling the lower portion of said post or rod i , within said receiver or basin i' , is a washer or pair of washers i^2 , and loosely arranged upon said post or rod i , directly above the upper surrounding edge of said receiver or basin i' , is a grooved wheel or pulley i^3 . In the present case said wheel or pulley i^3 has an upwardly-extending sleeve or collar, as i^4 , loosely arranged around said rod or post i and provided on its outer surface with a screw-thread for the securing thereon of a driving-pulley i^5 . Upon the upper portion of said rod or post i are a pair of nuts, as i^6 and i^7 , and an oil-cup i^8 for the passage through ducts i^9 in said rod or post i of a lubricant from said cup i^8 between said post or rod and the inner tubular portion of the grooved pulley i^3 and its sleeve or collar i^4 , as will be clearly evident from an inspection of Fig. 12. The said rock beam or bar h , fulcrumed upon the pin or stem e , as above set forth, has a forwardly-extending main supporting arm or portion h^2 , with the free end of which is connected a cross-frame j , bearing a holder k for the tracer and a holder l for the carving-tool. Connected with a rearwardly-extending portion h^3 of said beam h is a rod h^4 , on which is a sliding counterbalance h^5 , adjustably secured on said rod h^4 by means of a set-screw h^6 . In order that the forward portion of the arm h^2 , with the parts connected therewith, may be raised in an upward direction clear of the pattern or templet and the work upon the upper movable platen a^4 to allow of the securing of these parts in position upon the platen and the inspection of the same, I have pivotally attached by means of a pin or bolt h^7 to the beam h a rod h^8 , the lower end of which is operatively connected in any usual manner with a foot-lever h^9 , substantially as illustrated in Fig. 1.

As shown, the cross-frame j , above mentioned, has a rearwardly-extending lug or projection j' , provided with a hole or perforation j^2 , (see dotted indication in Fig. 13,) in which is a bolt or pin m , having a head m' and a lock-nut m^2 , provided with a handle m^3 , said

bolt or pin m extending through a hole or perforation in the end of the arm h^2 of the beam h for pivotally attaching said cross-frame j to said arm h^2 , and by means of said nut m^2 securing said cross-frame in a vertically-adjusted position to said beam h , as will be clearly evident. The said cross-frame j may be provided with a suitable arrangement of holes or perforations, as j^3 , for adjustably securing at an angle a tracer-holder k and a tool-holder l in position against the front of said frame j , as represented in Figs. 2, 3, and 13, and at the same time permitting of a change of distance between said holders k and l by arranging them over the variously-spaced holes j^3 .

The construction and arrangement of the various parts of the holder k are more clearly represented in Fig. 15, and the construction and arrangement of the various parts of the holder l are clearly illustrated in Fig. 14.

The tracer-holder consists, essentially, of a rectangular box or bearing portion k' , having secured to its back in any well-known manner a pin k^3 , which is passed through one of the holes j^3 in the cross-frame j , said pin k^3 having a screw-threaded end k^2 extending through a suitable washer k^4 and provided with a lock-nut k^5 and handle k^6 for screwing said parts up tight and securing said portion k' at any desired angle against the front of said cross-frame j . Said box or bearing portion k' has a pair of sleeves k^7 and k^8 in a tubular duct therein, and in said sleeves is a tube n , having a shoulder n' at its lower end and a screw portion n^2 at its upper end for the reception of a nut or sleeve n^3 , whereby the said parts are operatively connected, as clearly illustrated. Within said tube n is a stem o , having a finger-piece o' at the top resting upon the upper end of said tube n and having a receiving-slot o^2 in its lower end for the securing therein of the tracer o^3 and a chuck o^4 , as indicated in dotted outline in said Fig. 15, in which the upper end of the tracer is held in the usual and well-known manner. The tool-holder l is similarly constructed, and it consists, essentially, of a rectangular box or bearing portion l' , having secured to its back in any well-known manner a pin l^2 , which is passed through one of the holes j^3 in the cross-frame j , said pin l^2 having a screw-threaded end l^3 extending through a suitable washer l^4 and provided with a lock-nut l^5 and handle l^6 for screwing said parts up tight and securing said portion l' at any desired angle against the front of said cross-frame j . The said box or bearing portion l' has a pair of sleeves l^7 and l^8 in a tubular duct therein, and rotatively arranged in said sleeves is a tube p . Washers p^1 and p^2 are preferably arranged upon said tube p at the lower and upper ends of the respective sleeves l^7 and l^8 , substantially as illustrated. Said tube p has a shoulder p^3 at its lower end on which said washer p^1 rests and also has a screw portion p^4 on its upper end, on which is screwed an ornamental wheel or pulley p^5 ,

having a groove p^6 , around which is passed a belt q , operated from the wheel or pulley p^5 on the rod or post i . Within said tube p is a stem r , provided at the top with a finger-piece r' , resting directly upon the upper end of the tube p , and on the lower end of said stem r is a short pin r^2 , suitably screwed into the said stem, which is provided with a chuck r^3 of the usual construction for firmly and operatively securing the engraving-tool r^4 to those parts of the holder l in the manner illustrated.

In order that the tracer-holder k and the tool-holder l may be set at the same angles, (see dotted indication in Fig. 3,) the boxes or bearing portions of said holders may be connected by suitable links or rods t , having perforations t' for lateral adjustment and operatively secured and held in position by means of set-screws t^2 .

The arrangement of the belt q for causing a rotary motion of the engraving-tool is clearly represented in Figs. 1, 2, and 4, and in connection therewith I may employ a belt-tightening device, which may be of the construction more particularly illustrated in Fig. 16 of the drawings. Said device consists, essentially, of a tubular or chambered barrel s , having a screw-stud s' for securing it in a suitable position upon the upper surface of the arm h^2 of the rock-beam h . Within said barrel s is a bolt or rod s^2 , extending from the open end of said barrel and having a smaller stem portion s^3 , which passes through a perforation or opening in the closed end or cap s^4 of said barrel s . Said cap s^4 is preferably secured upon a screw-thread s^6 , with which the open end of said barrel s is provided. A spring s^5 encircles the said stem portion s^3 between a shoulder s^{12} on said bolt and the inner surface of the closed end or cap s^4 of the barrel s . At its free end s^7 the bolt or rod s^2 has a stud or pin s^8 , on which is rotatively arranged between a pair of collars or washers s^9 an idler or grooved wheel s^{10} , the said several parts being operatively held in place by a nut s^{11} on the upper screw-threaded end of the said stud or pin s^8 . The arrangement of the belt-tightening device is such that said idler s^{10} is forced directly against the belt q , as illustrated more particularly in Fig. 4, thereby preventing the slipping of said belt while passing over the pulleys i^3 and p^5 .

The operations and workings of the several mechanisms herein described will be evident from the above description of the same and from an inspection of the several figures of the drawings.

When it is desired to cut plates or patterns from a design drawn upon a thin sheet or from a design formed in soft metal, as electroplates or the like, great skill has to be employed to prevent the tracing-point of the tracer from cutting or scratching the pattern.

In order to produce a sensitive and still an operative contact of the tracer with the lines

of configuration in the pattern, I employ an electric device for intermittently and rapidly making and breaking an electrical contact between the tracer-point and the upper surface of the pattern by causing a vibratory action of the rock-beam and its parts. This means is illustrated in Fig. 1 of the drawings, in which u is a solenoid, the rod or core u' of which is connected with the adjustable weight or counterpoise of the rock-beam h in any suitable manner by means of a flexible connection u^2 . Connected in circuit with said solenoid by means of the circuit-wires u^3 and u^4 , in one of which, as u^4 , is a dynamo u^5 , is a make-and-break device v , having the usual electromagnet v' , spring-actuated contact-lever v^2 , and a suitable contact, as v^3 . The said magnet v' is in circuit with the wires v^4 and v^5 , in one of which, as v^4 , may be a battery v^6 or other source of electrical supply. Said wire v^4 is connected with the pattern c , which is insulated at c^2 from the upper movable platen a^4 , on which the pattern is supported. The other circuit-wire v^5 is attached to any portion of the machine, as illustrated. When the point of the tracer rests upon the pattern, a complete circuit is thus established through the wire v^4 , battery v^6 , electromagnet v' , wire v^5 , machine-frame A , and beam h with the tracer and the surface of the insulated pattern, as will be clearly evident. Now as soon as the contact just described has been made by the tracer owing to the normal downward motion of the arm portion h^2 of the rock-beam, which is due to its weight, then the electromagnet v' will attract the contact-lever v^2 , making contact at v^3 . At once the rod or core u' of the solenoid will be drawn farther into the solenoid, whereby the arm portion h^2 of the beam h and the tracer will be raised from its contact with the surface of the pattern c . This action breaks the circuit between the wires v^4 and v^5 , and the magnet v' becoming demagnetized the contact-lever v^2 is raised and the electrical circuit with the solenoid is broken. Immediately the weight of the arm h^2 of the rock-beam h causes the tracer to come again in contact with the surface of the pattern and the electromagnet v' is again energized for the purpose of again completing a circuit through the solenoid and once more lifting the tracer from the surface of the pattern. In this manner contact is made and broken intermittently and in rapid succession, the tracer receiving a vibratory motion with its point hardly bearing upon the surface of the pattern, but still of such sensitive contact that a design of the finest lines and upon a very thin or upon soft metal is readily and perfectly transferred to the work by the engraving-tool without the tracer in any way marring or spoiling the ornamented surface of the pattern.

Of course I am fully aware that many changes may be made in the several arrange-

ments and combinations of the mechanism hereinabove set forth as well as in the details of the construction thereof without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations of the various mechanisms herein set forth, and illustrated in the accompanying drawings, nor do I confine myself to the details of the construction of such mechanisms.

Having thus described my invention, what I claim is—

1. In an engraving-machine, movable platens arranged above each other, having traveler-receiving grooves or channels and travelers movably arranged in said channels, for movably separating and supporting the platens one above the other, one of said platens bearing a pattern or design and also the work to which said pattern or design is to be transferred, a fixed table-support or bed-plate on which said platens are movably arranged, all combined with an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extending therefrom, a rock-beam fulcrumed on said rod or stem, a cross-frame connected with said beam, a "tracer-holder," and a tool-holder on said cross-frame, substantially as and for the purposes set forth.

2. In an engraving-machine, a supporting-frame, a lower fixed platen, a movable middle platen, and a movable upper platen, traveler-receiving grooves in said lower fixed platen, certain portions of said grooves being deeper than others, traveler-receiving grooves in said movable middle platen, certain portions of said grooves being deeper than others, and travelers movably arranged in said channels, some of said travelers being in supporting engagement with the next upper platen and others of said travelers being disengaged from such supporting engagement, and guiding means connected with said platen for retaining them in their relative positions, one above the other, and means for rigidly connecting or holding said platens, the said movable upper platen bearing a pattern or design and also the work to which said pattern or design is to be transferred, a fixed table-support or bed-plate on which said platens are movably arranged, all combined with an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extending therefrom, a rock-beam fulcrumed on said rod or stem, a cross-frame connected with said beam, a "tracer-holder," and a tool-holder on said cross-frame, substantially as and for the purposes set forth.

3. In an engraving-machine, the combination, with a supporting-frame, a bed-plate thereon, a movable platen on which a pattern and the work to which said pattern is to be transferred are arranged, of an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extend-

ing therefrom, a rock-beam fulcrumed on said stem or rod, a cross-frame connected with said beam, a "tracer-holder" and a tool-holder on said cross-frame, substantially as and for the purposes set forth.

4. In an engraving-machine, the combination, with a supporting-frame, a bed-plate thereon, a movable platen on which a pattern and the work to which said pattern is to be transferred are arranged, of an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extending therefrom, a rock-beam fulcrumed on said stem or rod, a cross-frame connected with said beam, a "tracer-holder" and a tool-holder on said cross-frame, and a pivotal connection between said rock-beam and cross-frame, substantially as and for the purposes set forth.

5. In an engraving-machine, the combination, with a supporting-frame, a bed-plate thereon, a movable platen on which a pattern and the work to which said pattern is to be transferred are arranged, of an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extending therefrom, a rock-beam fulcrumed on said stem or rod, a cross-frame connected with said beam, a tracer-holder and a tool-holder on said cross-frame, and a means of angular adjustment connected with each holder, substantially as and for the purposes set forth.

6. In an engraving-machine, the combination, with a supporting-frame, a bed-plate thereon, a movable platen on which a pattern and the work to which said pattern is to be transferred are arranged, of an upright on said bed-plate, an adjustable clamping sleeve or collar on said post, a stem or rod extending therefrom, a rock-beam fulcrumed on said stem or rod, a cross-frame connected with said beam, a "tracer-holder" and a tool-holder on said cross-frame, and a means of angular adjustment connected with each holder, and a means of pivotal adjustment between said

rock-beam and cross-frame, substantially as and for the purposes set forth.

7. In an engraving-machine, the combination, with the machine-frame and bed-plate, of a rock-beam, a "tracer-holder" connected with said beam, a movable platen, a pattern on said platen, but insulated therefrom, an electric circuit connected with the machine-frame and the pattern, a make-and-break device in said circuit, and a source of electricity, a second electric circuit connected with said make-and-break device, a solenoid in said second circuit, and means between the said solenoid and the rock-beam for causing a vibratory action of the said rock-beam by intermittently making and breaking the circuits, substantially as and for the purposes set forth.

8. In an engraving-machine, the combination, with the machine-frame and bed-plate, of a rock-beam, a "tracer-holder" connected with said beam, a movable platen, a pattern on said platen, but insulated therefrom, an electric circuit connected with the machine-frame and the pattern, a make-and-break device in said circuit, and a source of electricity, a second electric circuit connected with said make-and-break device, a solenoid in said second circuit, and means between the said solenoid and the rock-beam for causing a vibratory action of the said rock-beam by intermittently making and breaking the circuits, consisting of a sliding counterbalance on said rock-beam, a rod or core *u'* in said solenoid, and a connection between said counterbalance and said rod or core, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 10th day of February, 1900.

HONESTUS M. ALBEE.

Witnesses:

FREDK. C. FRAENTZEL,
GEO. D. RICHARDS.