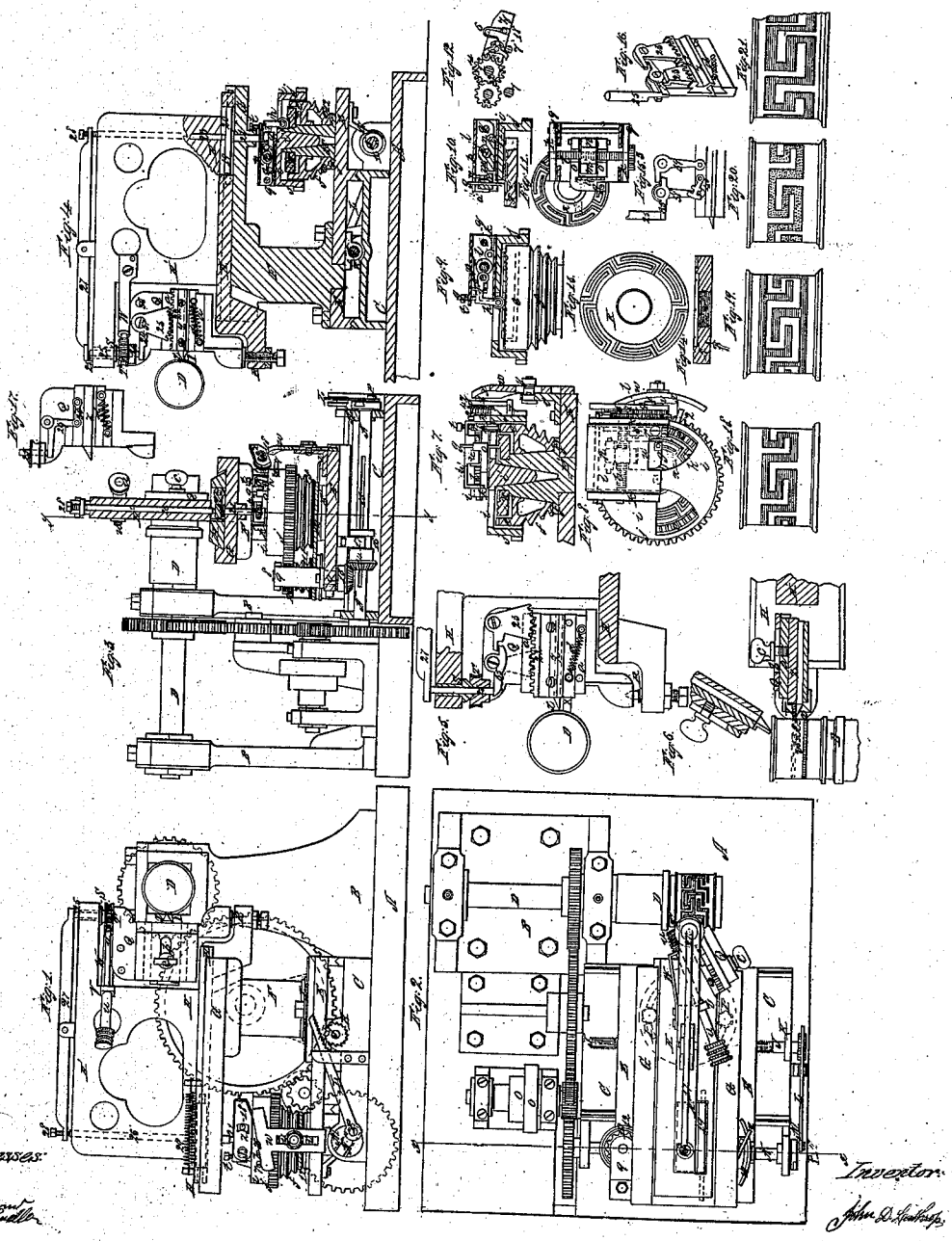
J. D. Lathrop,

Engraving Machine,

No. 104,744. Patented June 28, 1870.



Witnesses:

Inventor:

United States Patent Office.

JOHN D. LATHROP, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO LIPPIATT, MALTBY & MORSE, OF SAME PLACE.

Letters Patent No. 104,744, *dated June* 28, 1870.

IMPROVEMENT IN ENGRAVING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, J. D. LATHROP, of the city, county, and State of New York, have made certain new and useful Improvements in Machines for Engraving and Chasing; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and letters of reference marked thereon making part of this specification, in which—

Figure 1 represents a side elevation of the machine, with my improvements.

Figure 2 is a plan view of the same.

Figure 3 is a vertical cross-section of the same, the plan of section being indicated by the line *x x* in fig. 2.

Figure 4 is a vertical longitudinal section of the same, the plan of section being indicated by the line *y y* in fig. 3.

Figure 5 is a detached side view of the tool-stock, on a somewhat larger scale.

Figure 6 is a horizontal section of the same.

Figure 7 is a detached vertical central section of the pattern-die mechanism of the same.

Figure 8 is a top view of the same.

Figure 9 is a side view of the rosette-die and its transferring mechanism, shown in connection.

Figure 10 is a detached vertical section of the transferring pin-feed and other mechanism, showing its connection with the pattern-die.

Figure 11 is a top view of the same, partly shown removed.

Figure 12 is a side view of the feed lever, pawl, and gearing of the transferring-pin.

Figure 13, a face view of the pattern-die.

Figure 14 is a central vertical section of the same.

Figures 15, 16, and 17 are modifications of the transferring mechanism of the tool-slide.

Figures 18, 19, 20, and 21 are face views of engraved articles, for exhibiting various patterns of engraving made by the same die, under different manipulations of the machine.

Similar letters of reference indicate corresponding parts in the several figures.

The nature of this invention consists in arranging the machine so that the engraving-tool performs the cutting downward or on the under side of the tool, instead of on the top edge of the same, whereby the operator can better observe the work, and can see its work as ready as produced, and without inconvenience to light and obstruction of the parts of the machine, while, at the same time, by these means, the chips made by the tool are not obstructing the sight of the operator, neither obstruct the proper operation of the tool by sticking or collecting on the cutting-edge of said tool.

Also, it consists in the employment of a certain reciprocating apron lever, arranged to transmit the transferring motion, through the slide-rest of the machine, whereby the said motion is transferred entirely independent and isolated from the motion of the slide-rest, and is, therefore, not affected and varied by the irregular or other motions caused by the work upon the slide-rest, which effect causes often considerable interruption and irregular work in operating the machines heretofore used.

It consists also in the combination and arrangement of the tool-stock vertically suspended between centers, with the sliding bolt which transfers the motion from the die to the tool, the said sliding bolt passing through one of the said centers, whereby the operator is enabled to set the tool-stock to the desired angle with the work, without interfering or altering the motion of the tool given from the die.

Also, it consists in connecting the transferring-gear with the tool-slide in such a manner that the motion of the tool-slide may be readily changed and reversed, and, consequently, the operation of the die upon the work, which, in the one case engraved, is left blank in the other case, and *vice versa*.

Also, it consists in the employment of a revolving transferring-pin, provided with a radial horizontal feed-motion, whereby a stationary pattern-die can be used for operating the tracing-pin, which is less subject to irregular position, or to change of position by wear of the working-parts of the machine, and can be placed in its place with facility and precision.

Also, in providing a variable and a reversible feed-motion of the tracing-pin, in combination with a stationary pattern-die, whereby the image upon the work may be varied upon the same work, and a portion of the whole pattern of the die proper transferred, while, at any time of the operation, the said feed may be changed to reverse, and a different compound of the said image upon the work produced.

Also, it consists in the arrangement of a rosette-die, revolving around a stationary pattern-die, and the combination of a rosette-tracing roller, connected with the transferring-lever of the tracing-pin of the said stationary pattern-die, in a manner to engage, disengage, or interrupt the motion of the tracing-pin upon its lever, whereby the proper motion of the pattern-die may be instantly changed into an interrupted motion, or into the motion for producing frosted work, instead of the motion for plain line engraving.

Also, it consists in the combined arrangement of a variable feed-motion of the slide-rest, and a variable feed-motion of the tracing-pin, whereby the pattern may be expanded or diminished in transferring it to the work, and may be varied, to cover the desired blank space of the work, with facility.

Also, it consists in constructing and arranging the pattern-die and the transferring-pin mechanism of the machine, in a manner that the transferring-pin mechanism can be displaced with readiness, and die removed almost instantly and other substituted, without regard to extra labor and delicate adjustment in placing and restoring the said part properly.

And it consists, finally, in the arrangment and combination of the parts shown, as a whole, whereby a machine for engraving is obtained which can be manipulated with great facility and precision, and on which work can be done of different designs and various patterns, without requiring a great number of pattern-dies.

To enable others skilled in the art to make and use my invention, I will proceed to describe its details and operation.

In the drawings—

A represents the bed-plate of the machine. It is provided and made in the ordinary way.

It supports the ordinary spindle-head B, which is fixed permanently upon it, and supports the ordinary bed C of the slide-rest, which is attached in the usual manner, so that the ways of the slide-rest may be changed from the right-angular to parallel position to the spindle D of the spindle-head.

The slide-rest consists of a bottom plate, E, fitted upon the ways of the bed C, of a strong vertical post, F, resting upon the plate E of the dovetail-grooved plate G, and of the slide H, fitted to slide easy in the groove of the plate G.

The post F and plate G are permanently attached or cast in one piece, whereas the plate E and the said post are secured in a manner that they may be detached, or that the position of the post with the plate G may be turned on it and changed relative to the position of the plate E, and, for this purpose, the post is provided with a flange, having slotted bolt-holes I I through which the screws or bolts for securing them, pass.

In order to provide for the feed-motion for the slide-rest, the usual screw J is arranged between the bed C and bottom plate E of the slide-rest, which screw is fitted in a nut attached to the plate E, and its outer end fitted in a proper bearing, K, secured to the bed C, and having upon its final end a ratchet-wheel, engaged by a pawl, L, shown in figs. 1 and 2, while the motion to this part is transmitted from a crank, M, upon the end of a horizontal shaft, N, located in bearings attached to the rear end of the bed C, and the shaft N receives motion from the ordinary gearing of the driving-pulleys O.

This shaft N, however, may be driven in any convenient manner, and the driving-pulley may be upon the spindle D, and the spindle geared in any convenfent manner with the shaft N.

In order to vary the speed of the screw J, or the speed of the feed, I provide the crank M, with a movable crank-pin, P, which is fitted in a dovetail slot in the crank, and may be secured at the desired distance from the center of said crank.

In the fore part of the slide H, I arrange the tool-stock Q, for which purpose I construct this slide with a vertical extension, H′, forming part of the same, and I form this part of it with a central portion removed, sufficiently for the tool-stock to pass through while being therein vertically suspended between two centers or bearings R and S, of which the lower is made solid, and is secured by means of being fitted in the lower part of the slide with a screw-tread, while the upper center S of the same is made with a central vertical opening through it, and is fitted tightly in the upper part of the slide.

In order to provide for turning and adjusting the relative position of this stock to the face of the work, I employ on its top end a worm-wheel, T, fixed permanently to it, and have a worm or hand-screw, U, to engage therein, which is, near its handle, held in a bearing, V, on the side of the slide, and being held by a spring bearing, W, near its screw or worm, as clearly shown in figs. 1 and 2, so that, by means of turning the screw with its handle, the stock is slowly turned and adjusted to the work; when desired to be quickly changed in position the spring bearing V allows the screw to be disengaged and the stock turned quickly.

X represents the cutting-tool, and

Y, the tool-guide, which serves the purpose of preventing the tool from cutting deeper than desired into the work.

Both are secured to the tool-slide Z, which is provided in the usual way with a proper horizontal opening for the tool to be placed in, and with proper set-screws, to secure the tool to its slide.

In order to provide for the tool-slide being set more projecting forward of the axis of the tool-stock, as in the case when used for face-work, I employ a secondary slide, *a*, fitted in a groove made in the stock for this purpose, and have a slot, *b*, in the stock, through which a set-screw, *c*, passes into the secondary slide *a*, for the purpose to secure the said secondary slide, after being set properly, all clearly shown in figs. 1 and 2.

This secondary slide has the proper dovetail groove, in which the tool-slide works with ease, so that it can be moved by means of a spiral spring, *d*, attached with the one end to the tool-slide, while with the other is attached to the secondary slide, shown more clearly in fig. 5.

Now, instead of the use of a pattern-die which revolves and has the image on its periphery, I employ a stationary pattern-die, *e*, having the image on its face, as shown in figs. 13 and 14, and I locate the same upon the rear part of the bottom plate E, on a vertical mandrel, E′, fixed permanently thereupon; and, instead of making the said die of steel and engraving the pattern thereon, I produce it by means of pressing, molding, or engraving it in wax, wood, *papier maché*, or other easy-worked material, and taking a casting or impression in plaster of Paris, or other material therefrom, which I use then as a pattern to obtain a casting in iron of the same, and from the casting in iron I procure a casting of chilled iron, or the die proper, which I use in the machine.

The said die has the proper central opening, requisite to be received by the mandrel E′, and the mandrel has a proper shoulder on it, to guide and rest the die in proper position.

The opening of the die may be made, as shown, with a screw-thread and a mandrel correspondingly provided, or the die made with smooth opening, fitting properly over the mandrel, and the mandrel provided with a screw-nut, to secure the die upon the shoulder of the mandrel, whichever may be found preferable, in order to place and secure the die upon the mandrel with convenience and precision.

e represents the rosette-die, which I construct of ring form, and of somewhat larger diameter than the pattern-die, so as to surround the said pattern-die; its working-face is nearly level with that of the pattern-die, and is made with the proper projections and depressions, for producing the desired motion upon the tracing-pin of the pattern-die, to disengage it sufficiently from it in producing the frosted motion upon the work; and this rosette-die either forms part or is permanently secured upon the top of a cone-pulley, *f*, which is fitted upon the part of the mandrel E′, below that upon which the pattern-die is secured, in a manner that it may be freely rotated upon said mandrel, and that it rests upon a broad shoulder, *f′*, of it, by means of which the said pulley and die are properly and durably supported.

g represents the tracing or transferring-pin, working upon the pattern-die, and

h, the tracing-roller, working upon the rosette-die.

They are both arranged above the dies upon a revolving disk, *i*, which has a taper stud, *i'*, or shaft fitted and projecting downward into the mandrel E', and it has also a rim, *j*, projecting downward and overhanging the periphery of the rosette-die, which rim *j* is provided with cogs on its lower periphery, for the purpose of giving it a rotating motion.

On the top face of this disk I provide two tangentially-arranged vertical sides or upward-projecting ribs, *k k*, which form the frame and support the working-parts of the transferring-pin and roller *g* and *h*.

Of these ribs the one is about over the edge of the disk *i*, while the other is near the center of the same, and of the seworking parts, *l* represents the feed-screw of the tracing-pin *g*, arranged to guide and feed the said pin radially across the pattern-die. It has its bearings in the sides *k k*, and is furnished with a flat, two-armed screw-nut, *m*, to the rear end *n* of which is hinged the forked lever *o*, in the fore end of which the pin *g* is held and secured, all clearly shown in figs. 7, 8, 9, 10, and 11.

Over and across from the one rib to the other, I arrange the hinged cap or apron-lever *p*, which has sides fitting between the ribs *k k*, to the rear end of which the said lever is hinged at *q*. The forward end of said lever is attached on the side above the rosette-die, the bend or elbow-shaped lever *r* of the tracing-roller *h*, or in the end of which the tracing-roller *h* has its bearings, and there is also attached to the same end of that lever a spring, *s*, bearing upon said lever *r* and set-screw *t*, by which the upward motion of the said lever *r* may be transferred to the fore end of the apron-lever *p*.

The central portion *u* of the forward end of the lever *p* is bent downward, to come in contact with the top side of the forward end of the forked lever *o* of the tracing-pin, in order to receive the motions of the raised portions upon the face of the pattern-die, which motions are received by the transferring mechanism of the slide-rest from the end *u'* of the said apron-lever *p*.

Now, in order to give motion to the feed-screw *l*, I employ on the side of a small vertical standard, *v*, a flat T-shaped piece, *w*, upon the rear end of the plate E, and a short distance from the ring of the disk *i*, which piece *w* has an inclined top edge *x*, and is provided with a vertical slot, *y*, through which it is bolted to the standard *v*, so that it may be adjusted up or down, to vary the feed of the screw *l*. And I provide on the side of the outer rib *k* a feed-lever, *z*, which has its fulcrum upon a stud, 1, fixed on the side of said rib *k*, and also of two small cog-wheels, 2 and 3, which gear into one another, and the one of which is secured upon the outer end of the feed-screw *l*, while the other is permanently attached with a ratchet-wheel, 4, and both the latter turning freely upon the same stud 1 upon which the feed-lever vibrates. And to move the ratchet-wheel 4, I employ a double-acting spring-pawl, 5, attached to the said lever and provided with the spring 6. To rest the said lever while out of operation, I provide upon the rim *j* two stands 7 7, the one of which serves in resting the lever in feeding in the one direction, while the other answers for the feed in the opposite direction.

As before stated, the pattern-die in this machine is arranged to remain stationary, whereas the rosette-die is arranged to revolve, the tracing-pin is arranged to revolve, and the tracing-roller, working upon the rosette-die, revolves with it, and the rosette-die revolves in opposite direction to that of the tracing-pin and roller.

In order to obtain the proper motion for the same, I have a vertical shaft, 8, arranged in bearings *g g*, on the rear end of the plate E, which shaft I furnish with a pinion, 10, gearing into the cogs of the rim *j*, and with a cone-pulley, 11, to correspond and to connect by a belt, 12, with the pulley on the rosette-die. And I connect the lower end of said shaft with the horizontal shaft N, above described, by means of two bevel-gears, 13 and 14, properly engaging into one another.

The gear 14 has a long hub and key in it, to work in a grooved key-seat, 15, made in the shaft N, to provide for its proper connection with the said bevel-gear, which has also a circular groove, 16, in its hub, in which a downward-projecting arm, 17, from the plate E, engages, to keep the wheel 14 in its gear while the slide-rest is moved and fed.

It will be clearly observed that the feed-motion of the tracing-pin is effected by the revolution of the disk *i*, on account of the lever *z* passing up on the inclined top edge of the T-shaped piece *w*, and, after passing the incline, falling down upon its stop 7, by means of the double-acting pawl 5, and the secondary stop 7; the said feed may be reversed at any time of the operation, for which purpose I prefer to have a small handle, 18, attached to the said pawl, which passes through a small slot, 19, through the said lever *z*, shown in red outline in figs. 1, 3, and 12, so that the said pawl may be operated from the outside of the lever, and while rotating.

Now, in order to transfer the motions of the tracing-pin upon the engraving-tool, and thereby upon the work, I provide an apron-lever, 19, which is located horizontally and longitudinally either in the rear part of the slide H or plate G, for which the same has a sufficient cavity, 20, for the said lever to vibrate. And I have a sliding vertical bolt, 21, under the said lever, which has the proper length to rest upon the lever *p*, so that the motion of the transferring-pin given to the lever *p* is properly transferred on the apron-lever 19.

Now, the tool-slide is provided with a rack-bar, 22, and, to the tool-stock above the slide I have pivoted a toothed segment, 23, which engages in said rack-bar 22, and has a right-angular arm, 24, and upon the end of this arm resting a sliding bolt, 25, which passes through the central opening in the upper center or bearing *s* of the tool-stock extending above the top of the slide H.

I have also a similar vertical sliding bolt, 26, resting upon the apron-lever 19, and extending above the top of the rear end of the slide H, so that, by means of a balance lever, 27, which I pivot near the center of the top of the slide H, and extending with the one arm over the pin 25, while with the other over the pin 26, the motion of the apron-lever is transferred to the tool-slide and tool upon the work on the spindle D.

For the proper adjustment, as well as for making up for lost motion in these last-mentioned contrivances, I provide, on the arms of the lever 27, a set-screw, 28.

The slide H is provided with the usual spring 29, for keeping the slide with the tool-guide Y bearing upon the surface of the work. And it will be observed that although the slide H may work back and for considerable distance, which is the case in operating upon oval work, the motion transferred from the die to the tool is not affected or varied thereby. And it will be observed, by means of the arrangement of the segment lever 23, and rack-bar 22, and spring *d*, the tool-slide is in continuous connection with the tracing-pin *g* and pattern-die, which, when properly adjusted, with the screw 28, to have no lost motion, can be operated to work with certainty and precision upon the work, an effect which is of the utmost importance in machines for this purpose.

It will be observed for ordinary plain line engraving, the motion of the tracing-pin is directly transferred to the cutting-tool. In order to convert this motion into such as required for the tool for producing frosted work, the set-screw *t* is simply sufficiently lower

so that, as the tracing-roller *h* passes over the raised portions of the rosette-die, the lever *r* is brought in contact with the said set-screw *t*, and consequently the motion of the lever *p* is, at those periods, interrupted, and the tool, instead of remaining on the work during the time of cutting, is interrupted and only allowed to dot, and hence producing frosted work.

Instead of employing the segment 23, and rack-bar 22, to connect the sliding bolt 25 with the tool-slide, a bell-hanged lever, 29, connected by means of the rod 30 with the tool-slide, may be used with the same advantage as that of the segment and rack-bar.

Instead of arranging the machine for the tool to cut on the upper side of it, I arrange it to cut on the under side, as shown in fig. 5. By these means the operator can see the action of the tool at all times, as proceeding, and the frequent interference of its perfect operation, caused by shavings or chips remaining on the tool, is obviated, and the operator can work with less annoyance from the chips thrown from the work to the operator, as they are thrown downward instead of upward or toward the eyes of the operator.

In order to cause the machine to engrave those portions which are left blank in the ordinary manner, and to leave blank those ordinarily engraved, I employ a secondary two-armed intermitting lever, 35, between the sliding bolt 25 and the segment 23, shown in fig. 5, so that the action of the sliding bolt is reversed, and consequently the pattern upon the work. For this purpose, the tool-stock has a secondary hole, 36, to insert the fulcrum-pin or screw 37.

This operation, and that of changing the feed of the tracing-pin *g*, may be done while operating on the same work, and, instead of ordinarily producing from the die shown, work such as shown in fig. 18, it may be manipulated to that shown in fig. 19, or to a compound pattern, as shown in fig. 2 in colored lines, or, by setting the screw *t* down, the ordinary line engraving changed to frosted work, as shown in fig. 20. Or from the same die, in varying the feed of the slide-rest, the said engraving stretched or diminished over more or less surface.

Instead of detaching the segment 23 and inserting the lever 35, the same effect may be had more convenient by means of using a sliding bolt, of which half of its thickness is removed on its lower part, as shown in fig. 16, and a segment on each of the fulcrums attached, beside the secondary lever 35, so that, by simply turning the sliding-bolt, either the lever 35 or segment on the same fulcrum is brought in action with the bolt, and thereby the effect had in a more ready manner.

Or, instead of that arrangement, the bolt may be round, as first described, and instead of employing segments, ordinary levers, such as shown in fig. 15, at 38 and 39 employed, and a connecting link, 40, employed, which is hinged to the tool-slide, and is slotted from both sides, that it may be thrown in engagement with either of the levers 38 and 39, which are provided in that case with the proper pin on the end of their arms. Or other contrivances may be used to change the motion between the tool-slide and tracing-pin, to reverse the motion ordinarily used, or to change it for more or less motion, according to the occasion, or in accordance with the requirements of the work.

Having fully described my invention,

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

1. In machines for engraving and chasing, the arrangement of the tool-stock Q, tool-slide Z, to operate with the spindle D upon the work, substantially as and for the purpose herein shown.

2. The employment of a stationary pattern-die, in combination with the revolving tracing-pin *g*, substantially as and for the purpose herein stated.

3. The use of the flat-faced chilled cast-iron dies, in combination with the slide-rest and transferring-mechanism, substantially as and for the purpose herein described.

4. The arrangement and combination of the rosette die with the pattern-die, tracing-pin *g* and tracing-roller *h*, operating upon the lever *p*, substantially as and for the purpose herein shown.

5. The employment of the apron-lever 19, in combination with the slide-rest and transferring-mechanism, substantially as and for the purpose herein shown.

6. The combination of the vertical tool-stock, suspended between the centers R and S, with the sliding bolt, when relatively arranged and operating substantially as and for the purpose herein shown.

7. The construction and arrangement of the mandrel E, pattern-die *x*, and revolving disk *i*, operating and arranged for the changing of the dies, substantially as herein stated.

8. The arrangement of the pattern die, the tracing-pin *g*, in combination with the feed-screw *l* and lever *p*, substantially as and for the purpose herein shown.

9. The combination and arrangement of the lever *p*, the screw *t*, lever *r*, tracing-roller *h*, and lever *o* and tracing-pin, substantially as and for the purpose herein stated.

10. The combination of the variable-feeding device of the slide-rest with the variable-feeding device of the tracing-pin, when the latter operates substantially as and for the purpose herein shown.

11. The combination of the sliding pin 25, the segment or bell-hanged lever 23, and positive connecting device with the tool-slide, substantially as and for the purpose herein stated.

12. The device herein shown for changing from direct to reverse action, and *vice versa*, of the pattern-die upon the tool-slide 2, substantially as and for the purpose herein described.

13. The arrangement of the feed-screw *l*, the feed-lever *z*, the gear 3, and reversible pawl 5, in combination with the inclined T-faced piece *w*, substantially as and for the purpose herein shown.

14. The combination and arrangement of parts as a whole, substantially as and for the purpose herein stated.

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Witnesses:

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