

W. W. BRADLEY.
ENGRAVING AND CHASING MACHINE.

No. 402,135.

Patented Apr. 30, 1889.

FIG. 5.

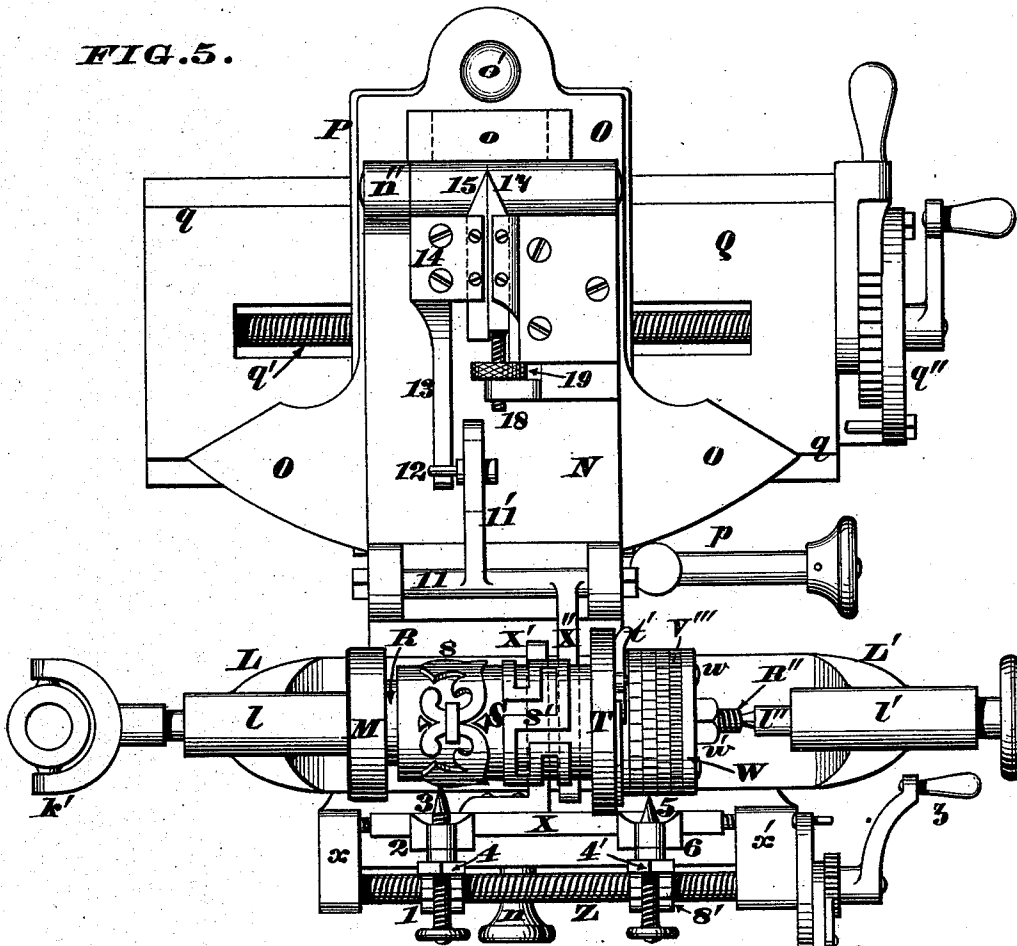
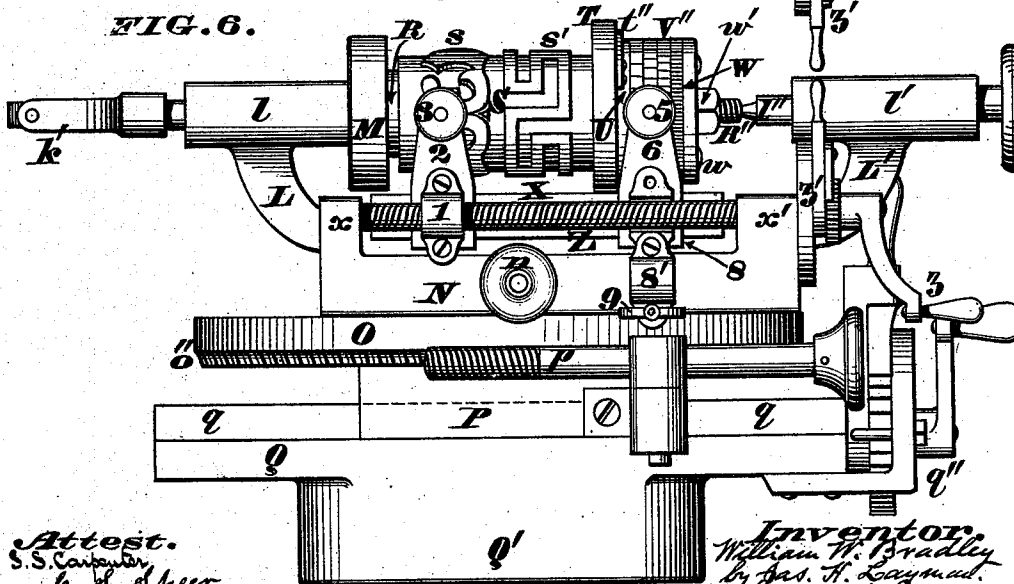


FIG. 6.



Attest.
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William W. Bradley,
By Jas. H. Raymond,
att'y.

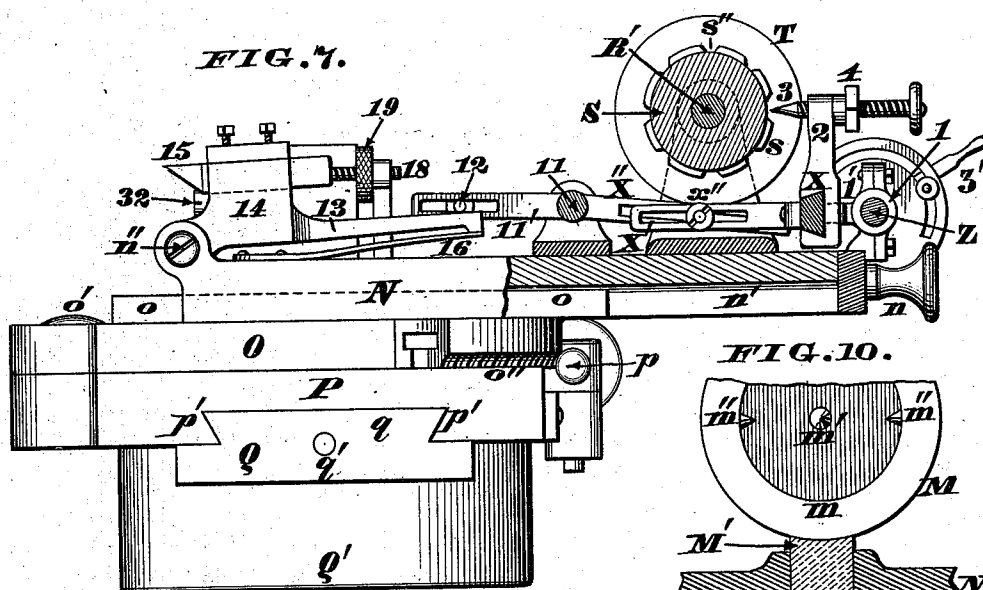
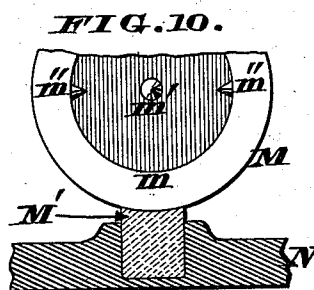
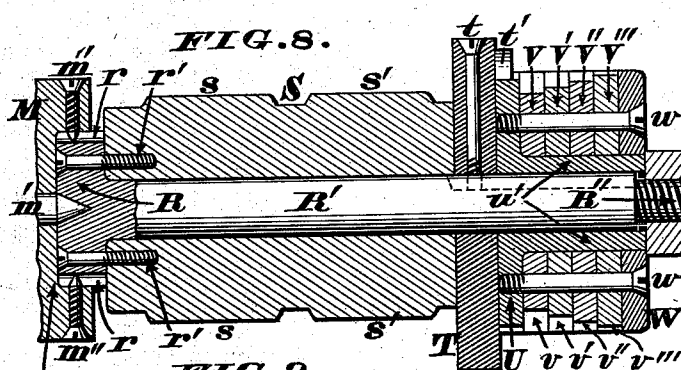
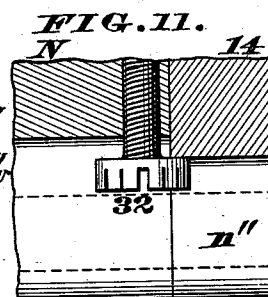
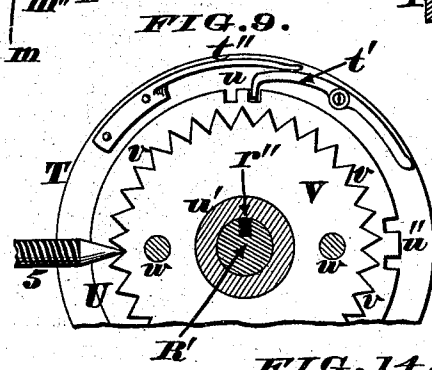
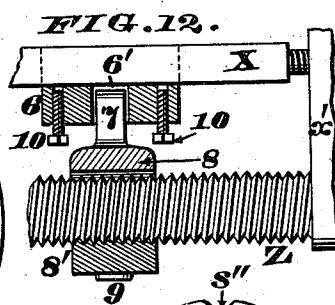
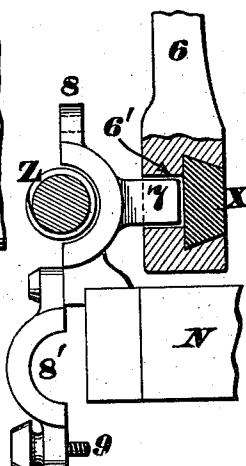
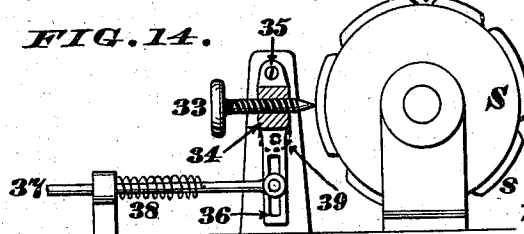
(No Model.)

3 Sheets—Sheet 3.

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ENGRAVING AND CHASING MACHINE.

No. 402,135.

Patented Apr. 30, 1889.



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UNITED STATES PATENT OFFICE.

WILLIAM W. BRADLEY, OF NEWPORT, KENTUCKY, ASSIGNOR TO JOHN C. DUEBER, OF SAME PLACE.

ENGRAVING AND CHASING MACHINE.

SPECIFICATION forming part of Letters Patent No. 402,135, dated April 30, 1889.

Application filed March 14, 1888. Serial No. 282,708. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. BRADLEY, a citizen of the United States of America, residing at Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Engraving and Chasing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to the peculiar form of engraving and chasing machine seen in Letters Patent No. 381,214, granted to John A. Coburn April 17, 1888; and the first part of my improvements consists in making the
15 ornamental roll, die, or pattern of two or more separable sections that revolve uniformly. Each die-section has an independent tracer or stub that communicates motion to a single cutter or graver, and said tracers are so arranged as to travel uniformly along the roll,
20 in order that one of them will transfer the design proper to the blank while the other tracer works in the background-lining that surrounds the main design or ornament, as hereinafter more fully described.

25 The second part of my improvements comprises a novel combination of uniformly-adjustable tracers, rocker, rocker-shaft, and levers wherewith the ornamented die is caused to communicate motion to the single cutter or
30 graver, as hereinafter more fully described.

35 The third part of my improvements consists in engaging the tracer-standards with a common feed-screw, in order that said tracers may be moved simultaneously and uniformly along the faces of their respective die-sections, so as to produce a certain class of work, as hereinafter more fully described.

40 The fourth part of my improvements comprises a novel combination of devices to be used only when the pattern of the foreground-die is to be transferred but once to the blank, as hereinafter more fully described.

45 The fifth part of my improvements consists in applying an auxiliary chuck at an angle to the main spindle of the machine, in order that the cutter may have a more extended action around the blank, as hereinafter more fully described.

50 In the annexed drawings, Figure 1 is a plan of an engraving and chasing machine em-

bodying my various improvements, the head of the compound slide-rest being advanced so as to bring the cutter in contact with the blank, and the "background section" of the die being composed of a plain cylinder. Fig. 2 is a rear elevation showing the gearing of said machine. Fig. 3 is a plan of the auxiliary chuck. Fig. 4 is a modification of said chuck. Fig. 5 is an enlarged plan of the compound slide-rest, the head of the same being retracted and the background section of the die being composed of notched or corrugated disks. Fig. 6 is a front elevation of said slide-rest, the standard of the background-tracer being uncoupled from the feed-screw. Fig. 7 is a sectionized side elevation of the slide-rest in the same position as seen in Fig. 5. Fig. 8 is an enlarged axial section of the roll or die and its accessories. Fig. 9 is an enlarged side elevation of a portion of the head that is inserted between the two sections of the roll, one of the notched disks being also seen in elevation, and the mandrel of said roll being sectioned. Fig. 10 is an elevation of a portion of the chuck-head that drives said roll. Fig. 11 is an enlarged section of a portion of the slide-rest head and cutter-carrier, said section being taken in the plane of the stop-screw that limits the swing of said carrier. Fig. 12 is an enlarged horizontal section of the divided nut that operates the standard of the background-tracer, said nut being engaged with the feed-screw. Fig. 13 is a vertical section showing said nut disengaged from said screw. Fig. 14 shows a modification of the tracer attachments.

A represents a table supported upon a suitable frame and having bearings or boxes *a*, within which the main spindle B is journaled, the front end of the latter having a chuck, *b*, while its rear end carries a pulley, *b'*, which may be driven in any approved manner, but preferably by the arrangement of belts and pulleys seen in the patent previously referred to. Furthermore, this spindle has secured to it a master-wheel, B', that communicates motion to a train of geared pinions, B'' B''', the stud-shafts of said pinions being adjustably secured within the longitudinal slot *c* of a swinging lever, C, whose fulcrum *c'* turns on the spindle B. The opposite or free end of

this lever takes the shape of a handle, c'' . Projecting from the under side of this lever is an arm, D, having a curved slot, d , concentric with the main spindle, said lever being held to any specific adjustment by a bolt, d' , passing through a lug, d'' , of the table, as seen in Fig. 2. Pinion B''' engages with a pinion, e , on the front end of a short countershaft, E, journaled in suitable bearings and carrying a gear-wheel, e' . This gear drives a wheel, F, journaled in suitable bearings, the hub of said wheel being provided with a feather or pin, f , traversing the longitudinal groove g of a shiftable and revolving shaft, G, which shaft has its front end journaled in a standard, g' , adapted to slide within the undercut groove a' of the table.

Shaft G carries a bevel-wheel, g'' , that gears with a similar wheel, H, the hub of which has a feather or pin, h , traversing the longitudinal groove i of a shaft, I. This shaft is journaled in suitable bearings of the standard g' , and has a universal-joint connection, i' , to which is attached a sleeve, J, whose feather or pin j traverses the longitudinal groove k of another shaft, K, which latter has a universal-joint connection, k' , with the bearing l of the chuck-head M. l' is another bearing, which devices l'' are carried by brackets L L', projecting from the opposite sides of the slide-rest head N, whose front end has a knob or handle, n , wherewith said rest is advanced or retracted, as occasion requires. Furthermore, the under side of this head is grooved longitudinally at n' to admit a dovetailed tongue, o , of a horizontally-swinging plate, O, the rear end of said plate being pivoted at o' to a sliding plate P. The front end of plate O is the segment of a circle struck from the pivot o' , and has a worm, o'' , which worm engages with a tangent-screw, p , whose bearing is attached to the other plate, q . Screw p is maintained in gear with the worm o'' by a suitable spring.

Sliding plate P is grooved transversely on its under side, as at $p' p'$ in Fig. 7, to admit the dovetail tongue q , running longitudinally of the bed-piece Q, which bed is usually integral with the base Q', and has a leading-screw, q' , wherewith it is shifted, said screw being operated by ratchet mechanism q'' . The base Q' is secured in its proper place by a bolt passing through a circular slot, a'' , of the table A. As all the devices thus far alluded to are practically the same in arrangement and operation as in Coburn's patent, No. 381,214, further description of them is unnecessary in this specification, and I will now proceed with an explanation of the appliances embodied in my invention.

Referring, in the first place, to Figs. 8 and 10, it will be noticed that the chuck-head M has a circular chamber, m , a center or pointed bearing, m' , and a pair of radial screws, $m'' m''$, which latter enter longitudinal grooves $r r$ in the cylindrical-head R of a mandrel, R', in order that said mandrel may be driven by said chuck-head.

$r' r'$ are screws that connect the mandrel-head R with the engraved or otherwise ornamental roll or die S, which is here shown as provided with a pair of different raised designs, $s s'$, of any approved pattern. This part of the die, whether provided with one or two or more patterns or designs, is used for producing the main or most prominent ornaments on the blank, and will hereinafter be alluded to as the "foreground section" of said die.

T is a head having a central circular orifice, through which the mandrel R' is passed, said head being secured to the latter by a key or screw, t , that enters a groove or recess, r'' , of said mandrel. Furthermore, this head carries a detent, t' , which is held in lock with the peripheral notches u of a stop-plate, U, by means of a spring, t'' . This stop-plate fits up snugly against the head T, and has an annular neck, u' , carrying a series of disks, V V' V'' V''', the edges of which are notched or waved as at $v v' v'' v'''$, the notches or corrugations of the various disks being of different sizes.

W is a cap provided with screws $w w$, that pass through the various disks and then engage with the stop-plate W. These disks are practically the same as those of an ordinary rose-engine, and, as they are used for producing waved or interlaced lines around the prominent ornaments of the blank, this portion of the roll or die will hereinafter be designated as the "background section." w' is a nut that holds this background section against the head T, said nut being screwed upon a threaded shank, R'', of the mandrel R'. w'' is a center in the end of this mandrel to admit a point, l'' , of the bearing l' . (See Figs. 5 and 6.)

Arranged parallel with and in front of the roll is a rocker, X, whose opposite ends are supported by suitable bearings, $x x'$, which bearings also carry a feed-screw, Z, operated either by a crank, z , or ratchet mechanism z' . Engaged with this screw is a divided nut, 1, having a rearwardly-projecting lug, $1'$, that enters a slot in the base or slide of a standard, 2, the upper end of the latter having a tracer, 3, of the foreground section of the roll adjustably engaged therewith and secured by a jam-nut, 4.

5 is the adjustable tracer of the background section, said tracer being secured in the standard 6 by a jam-nut, 4', and the standard being slotted, as seen at 6' in Figs. 12 and 13, to admit a lug, 7, that projects laterally from the rear half, 8, of the divided nut 8 8'. The bore of this rear half of the nut is slightly larger in diameter than the feed-screw Z, so as not to engage with the latter; but the front half, 8', of said nut has a thread cut in it. Consequently, when this front is swung up and locked to the back by the thumb-screw 9, the divided nut is then engaged with the screw and travels when the latter is turned in either direction.

10 are set-screws tapped into the base of

standard 6 and adapted to bear against the rocker X when it is desired to lock said standard, so as to cause its tracer 5 to bear against either of the disks V; but previous to this locking the nut 8 8' must be disengaged from the screw Z, as seen in Fig. 13.

Projecting rearwardly from rocker X is a slotted lever, X', suitably coupled at x'' to another slotted lever, X'', which latter is attached to a rock-shaft, 11, arranged transversely of the slide-rest head N, said shaft being provided with another lever, 11'. This latter lever has an adjustable pin, 12, bearing upon the toe of a lever, 13, projecting from the front of a carrier, 14, to which the tool, graver, chaser, or cutter 15 is secured in any convenient manner. This cutter-carrier is hinged to the rear of the slide-rest head at n'', and is normally elevated by a spring, 16, or equivalent device. Adjustably secured alongside the cutter is a guide, 17, having a screw-threaded shank, 18, wherewith is engaged a disk-nut, 19, the proper turning of which will either advance or retract said guide, so as to permit a greater or less penetration of said cutter.

20 in Figs. 1 and 2 is a sprocket-wheel whose hub has a screw, 21, which, when run home, causes said wheel to revolve in unison with the main spindle B; but at all other times said wheel turns freely around said spindle. The teeth of this wheel engage with the perforations of an endless metallic band, 22, which band drives another sprocket-wheel, 23, the latter being mounted upon the shaft G and having a pin, 24, that traverses the groove g of said shaft. This wheel must be so journaled upon the machine as to turn constantly with the shaft, while at the same time the latter must be free to shift longitudinally within its bearings.

25 in Fig. 3 is a bevel-wheel screwed upon the front end of spindle B after the chuck b has been detached therefrom, said wheel being engaged with another bevel-gear, 25', secured to a shaft, 26, journaled in a standard, 27, projecting vertically from a base-plate, 28, which plate, when attached to the table A, causes the shaft 26 to preferably be at a right angle with reference to the spindle B. Shaft 26 carries a chuck, 29, to which a complete watch-case, 30, can be readily cemented; or this chuck can carry a tapering plug, 31, as seen in Fig. 4, when finger-rings and other small articles are to be engraved by the machine.

32 in Figs. 7 and 11 represents a finely-threaded screw tapped in the slide-rest head N, the head of said screw being graduated to limit the swing of the tool-carrier 14 and thereby determine the depth of the cut of the graver 15. This screw is used when but one of the tracers is brought into service.

M' in Fig. 10 is a rubber or other elastic spring or brake that bears against the periphery of chuck-head M, and thereby prevents

"backlash" in any part of the roll-operating mechanism.

In the modification of my invention seen in Fig. 14 the tracer 33 is engaged within a swinging bar, 34, whose ends are pivoted at 35 to suitable standards, a slotted lever, 36, depending from said bar, serving to impart motion to a rod or other connection, 37, that operates the cutter or cutter-carrier. 38 is a spring that retracts this carrier.

The dotted line 39 indicates other bearings that may be arranged under the bar 34 in order that the simple removal of the pivots from the upper bearings of said bar and the insertion of them within the lower bearings will reverse the action of the tracers driven by the roll.

The operation of this machine is as follows: The blank or watch-back marked W B in Fig. 1 is first secured to the chuck b, and the slide-rest is then manipulated so as to cause the cutter to act on the crowning-surface of said back in precisely the same manner as described in the patent previously alluded to. Therefore it is unnecessary to describe the various motions of the compound slide-rest and universal couplings in this specification; but a description of the operations of the tracers will now be given. By referring to Fig. 7 it will be noticed that when the spring 16 has swung up the cutter-carrier 14, so as to cause the graver 15 to penetrate the blank as far as may be desired, the tracer 3 will occupy one of the interdental spaces s'' between the raised portions of the pattern s; but care must be taken to prevent the point of this tracer coming in actual contact with the face of the roll, which contact is guarded against by properly adjusting the jam-nut 4. Therefore, as this tracer is not in contact with the raised pattern s, it is evident no portion of said pattern is now being transferred to the blank; but the other tracer, 5, is set in such a manner as to bring its point in contact with either of the notched disks; hence it is apparent that at this precise moment the tracer 5 is working in a background-lining on the blank, on account of the revolution of the roll; but the very instant this roll has turned sufficiently to bring the raised pattern s in contact with the tracer 3 the latter will begin its work, and the consequent rocking of bar X will cause such a receding of the tracer 5 from the roll as to render said tracer 5 inoperative for the time being. It will thus be seen that when the tracer 3 is forming the foreground design the other tracer, 5, is out of service; but when the latter is producing a background the tracer 3 is inoperative. From this description it is evident that my machine will produce both a foreground and background ornament through the instrumentality of a single graver that is operated alternately by one tracer and then by another.

The background-lines may be indefinitely

varied, according to the manner of adjusting the machine, one method of arranging the tracers for this purpose being as follows: Said tracers are first set, respectively, to the extreme left of the design *s* and the disk V, in order that the proper turning of feed-screw Z will cause a simultaneous movement of the tracers to the right. Therefore, when the tracer 3 has traversed the entire length of the design *s*, the other tracer will have passed over the surface of the disks V V' V'' V''', and, as a matter of course, the background thus engraved on the blank will be formed of an intricate combination of interlaced lines produced by the different-sized notches in the peripheries of said disks. After transferring the design *s* to the blank the tracer 5 can be disengaged from the screw Z, run back to the disk V, and again coupled to said screw, the turning of which latter will now transfer the other pattern, *s'*, to the blank and cause the tracer 5 to again travel over the faces of the notched disks, thereby reproducing the above-described background-lining; but if it should be desired to transfer a background solely from one of the disks the tracer 5 is brought opposite the disk selected, the threaded portion 8' of the nut is uncoupled from the screw Z, and the set-screws 10 10 are run home, so as to clamp the standard 6 immovably to the rocker X. It is evident the background will now be a reproduction of the notches or waves of the disk that operates the tracer 5, no matter what pattern may be operating the other tracer, 3. Another change of the background will be afforded by simply removing the disks V and inserting in their place a smooth-faced cylinder, Y, as seen in Fig. 1, which cylinder will cause the tracer 5 to transfer a series of unbroken concentric circles to the blank; or this cylinder may be engraved so as to produce what is known as a "vermicelli work" in the background of the design, or by employing one plain disk, one engraved disk, and one notched disk for the tracer 5 to travel over the background-lines will be varied accordingly. In addition to these changes others may be effected by turning the stop-plate U and engaging the detent *t'* with either of the notches *u* of said plate, thereby causing the tracer 5 to begin its work at a new point on the notches *v* of disk V, and thus producing a new combination of zigzag lines as a background. A further turn of said plate will bring either of the other notches, *u''*, into service; but as this expedient is well known to all operators of rose-engines further description of the same is unnecessary. The pattern on the roll will be repeated on the blank exactly in proportion as the shaft G revolves at a higher velocity than the main spindle B, and by changing the gears B'' B''' this repetition can be regulated as desired. In some cases, however, it is desired to engrave the pattern but once on a single blank, in which event the bolt *d'* will be unslackened

and the lever C swung up sufficiently to throw the pinion B'' out of gear with the pinion *e*, and said lever will then be locked in this position by again tightening said bolt. Screw 21 is now run home, so as to lock the sprocket-wheel 20 to the main spindle B, in order that the turning of the latter will cause a similar and uniform turning of the shaft G and chuck-head M, on account of the pair of sprocket-wheels 20 and 23 being of the same diameter. Therefore one complete turning of the spindle will cause but a single turning of the die, and as a natural result the pattern on said die will not be repeated on the blank, although the background-pattern of the latter may be duplicated by the tracer 5 passing over the various notches of the disks V.

The above is a description of a machine capable of engraving merely the back of a watch-case or other similar blank; but by employing the auxiliary chuck seen in Figs. 3 and 4 the utility of the machine is greatly increased. Preparatory to using this chuck the front and back of the case are temporarily attached to the center, and said case is then shellacked to said chuck. The spindle B is then set in motion, and by properly manipulating the compound slide-rest the cutter will engrave the front of the case, then the center of the same, and finally the back as far as the shellac joint will permit, all of which operations can be effected without removing said case. The case is then removed from the chuck, the back detached from the center, and the unengraved portion of said back is finished by another operation. By inserting a tapering plug 31, within the chuck 29, as seen in Fig. 4, the pattern of the die can be readily transferred to finger-rings of various sizes, and by using a larger tapering plug napkin-rings can be engraved with the utmost facility.

I claim as my invention—

1. The combination, in an engraving and chasing machine, of a spindle provided with means for holding the blank, a roll having one section that produces the foreground ornament on said blank and another section that produces the background-lining on the same, a pair of tracers operated uniformly by a feed-screw and sliding along a common rocker, so as to traverse these sections, and devices that communicate the motion of said tracers to a single cutter, substantially as herein described.

2. An engraving and chasing roll composed of an ornamented section and another section consisting of a series of notched or fluted disks, said sections being mounted upon a common mandrel and traversed by uniformly-moving tracers that actuate a single cutter, substantially as herein described.

3. The combination, in an engraving and chasing machine, of a roll having foreground and background sections, tracers that traverse said sections and communicate motion to a

single cutter, and a feed-screw that uniformly operates said tracers, substantially as herein described.

4. The combination, in an engraving and chasing machine, of a spindle provided with means for holding the blank, a roll having one section that produces the foreground ornament and another section that produces the background-lining, a pair of tracers operated uniformly by a feed-screw and sliding along a common rocker, so as to traverse these sections, and devices that communicate the motion of said tracers to a single cutter mounted in a carrier hinged to the head of a compound slide-rest, substantially as herein described.

5. In an engraving and chasing machine, the ornamented roll S's and notched disks V v, secured upon a common mandrel, R', having a head, R, in combination with the driving-chuck M, having a chamber, m, center m', and screws m'' m'', which screws enter the longitudinal slots r r of said head R and cause the mandrel, roll, and disks to revolve in unison with said driving-chuck, as herein described.

6. The combination of rocker X, feed-screw Z, standard 6, having slot 6', and set-screw 10, and the divided nut composed of an unthreaded portion, 8, and threaded portion 8', said unthreaded portion being provided with a lug, 7, that engages said slot 6', for the purpose herein described.

7. The combination, in an engraving and chasing machine, of the main spindle B, having a sprocket-wheel, 20, and means for holding the blank, a longitudinally-shiftable shaft, G, having a sprocket-wheel, 23, and universal-joint connections with the slide-rest that carries the ornamental roll, and a perforated belt that communicates motion from wheel 20 to wheel 23, said wheel 20 having means for

temporarily locking it to said spindle B, for the purpose described.

8. The combination, in an engraving and chasing machine, of the main spindle B, carrying a bevel-gear, 25, that drives a similar gear, 25', and an auxiliary chuck, 29, which is temporarily attached to the machine, for the purpose described.

9. An auxiliary chuck geared at an angle to the main spindle of an engraving and chasing machine, for the purpose described.

10. The combination, in an engraving and chasing machine, of a roll having foreground and background sections, a pair of tracers operated uniformly by a feed-screw and sliding along a common rocker; and devices for uncoupling the background-tracer from said screw, and means for temporarily locking said tracer to said rocker, for the purpose described.

11. The combination, in an engraving and chasing machine, of mandrel R', having a head, R, screw-threaded shank R'', and longitudinal groove r'', the ornamented roll S's, secured to said head by the screws r' r', the head T, having a screw, t, that enters said groove r'', the stop-plate U, having an annular neck, u', surrounding the mandrel R', a series of notched disks, V v, mounted upon said annular neck, a cap, W, secured to the stop-plate U by screws w w, traversing said disks, and a nut, w', engaged with the screw-threaded shank R'' of the mandrel, which latter is coupled to the driving-chuck M, as herein described.

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

WILLIAM W. BRADLEY.

Witnesses:

JAMES H. LAYMAN,
SAML. S. CARPENTER.