(No Model.)

5 Sheets—Sheet 1.

# J. MURRAY & D. A. BRISLIN.

## SPRING KEY SHAPING MACHINE.

No. 345,717. Patented July 20, 1886.

Fig. 1,

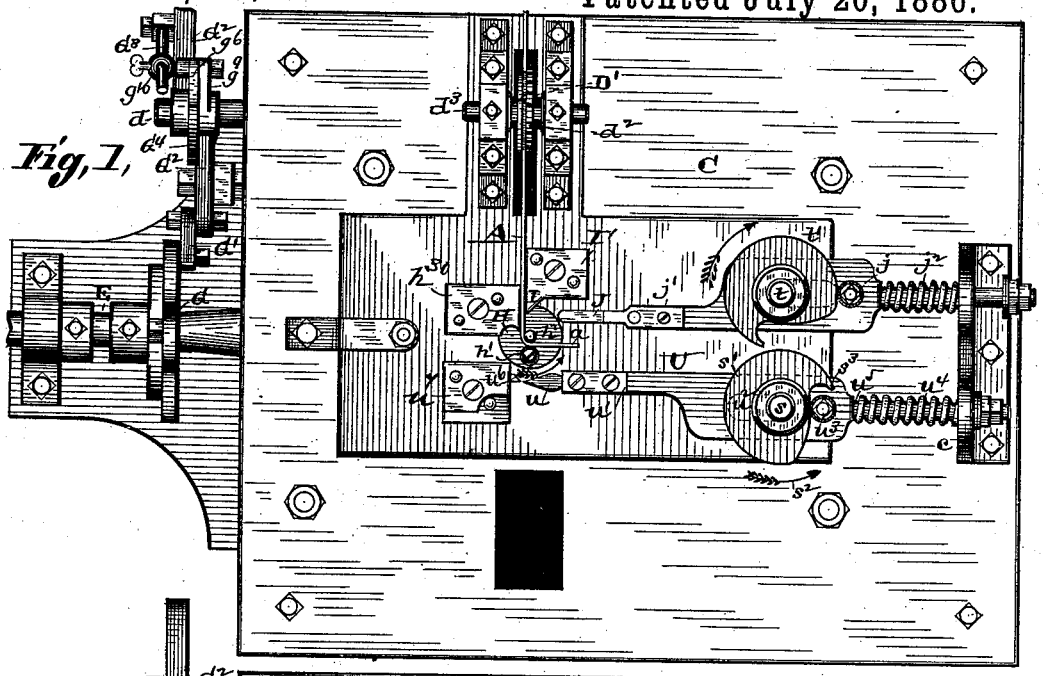
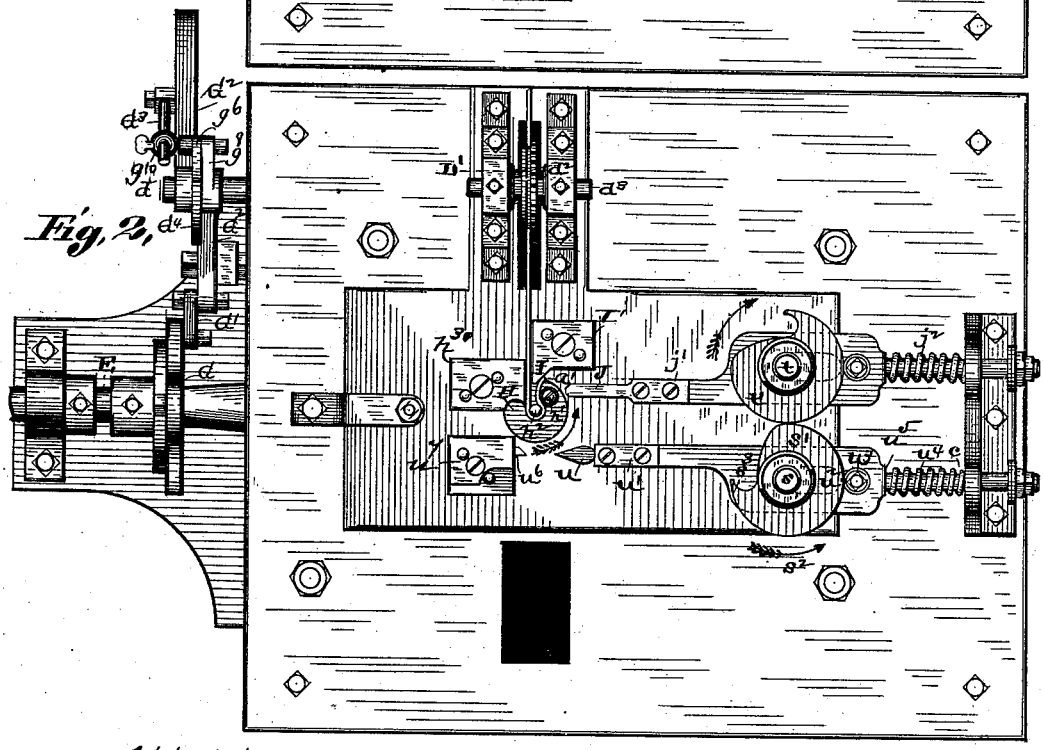


Fig. 2,



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(No Model.) 5 Sheets—Sheet 2.

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Fig. 3,

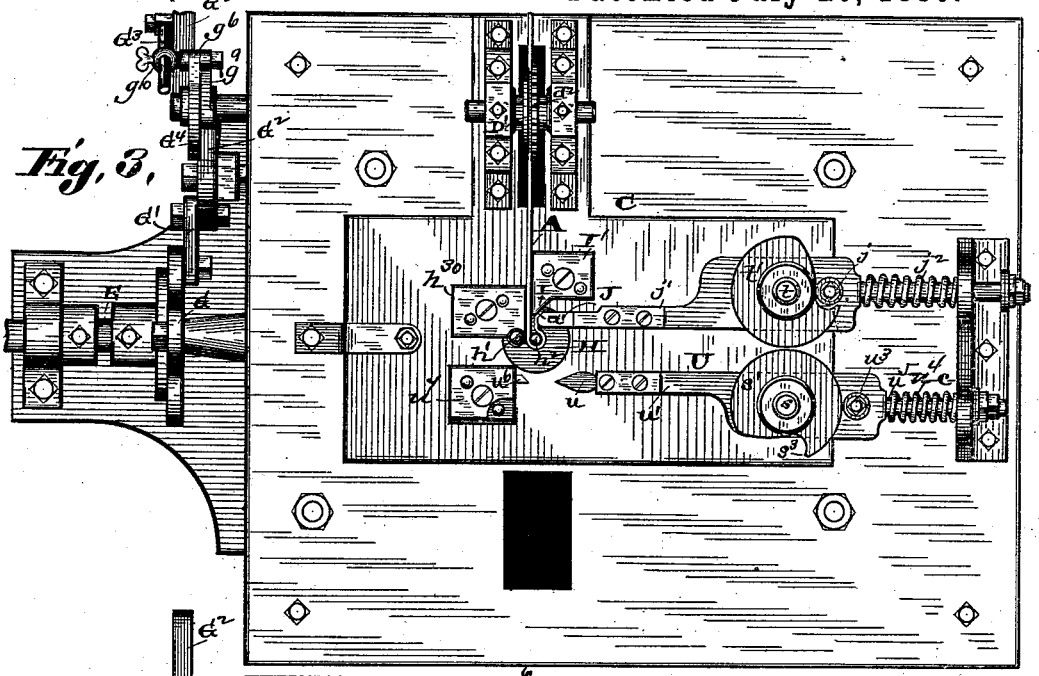
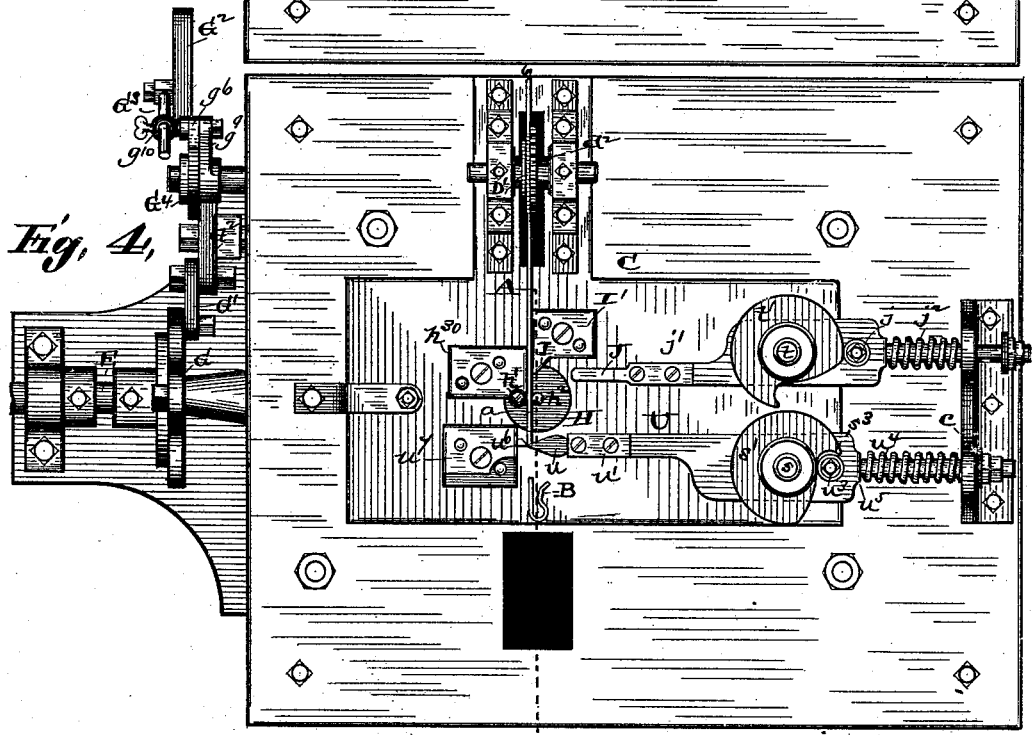


Fig. 4,



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## SPRING KEY SHAPING MACHINE.

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Fig. 5.

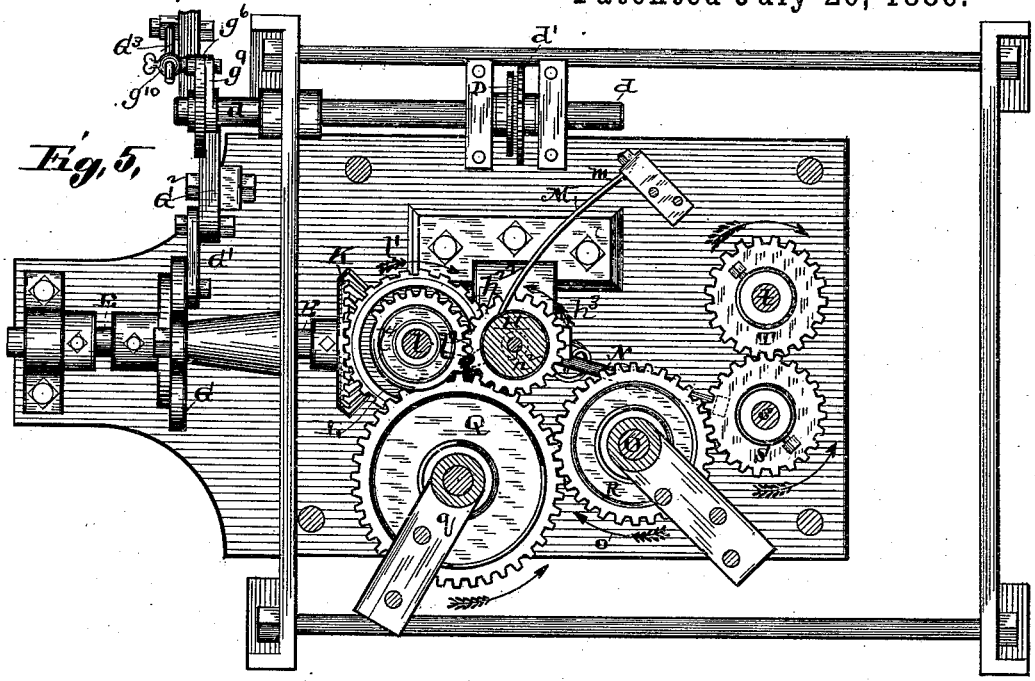


Fig. 6.

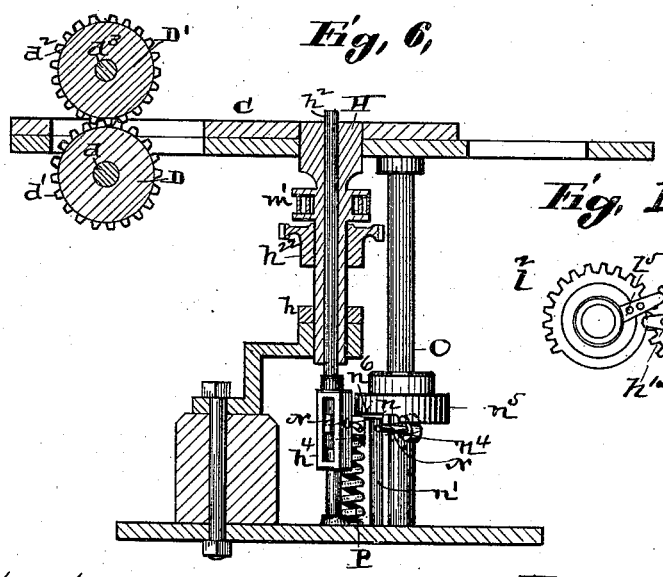
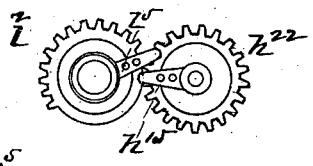


Fig. 11.



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(No Model.) 5 Sheets—Sheet 4.

# J. MURRAY & D. A. BRISLIN.

## SPRING KEY SHAPING MACHINE.

No. 345,717. Patented July 20, 1886.

Fig. 7,

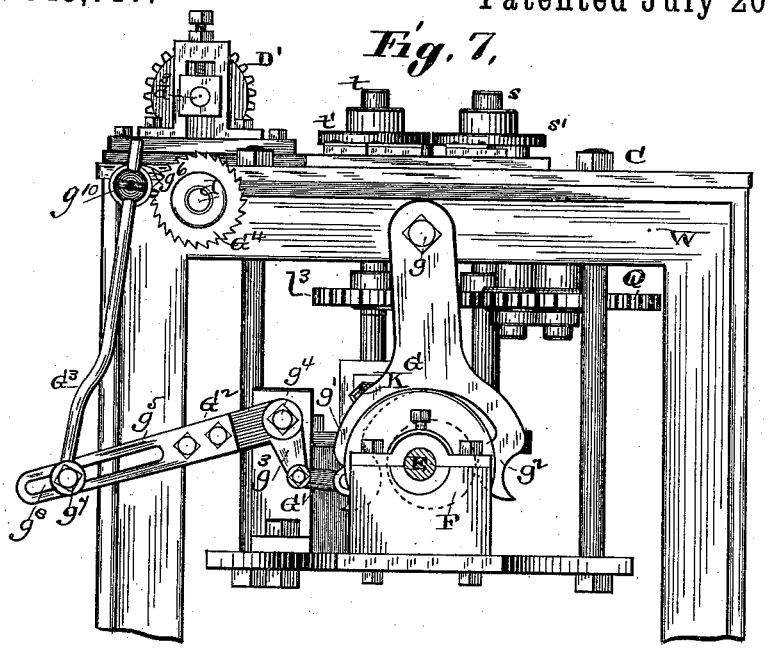
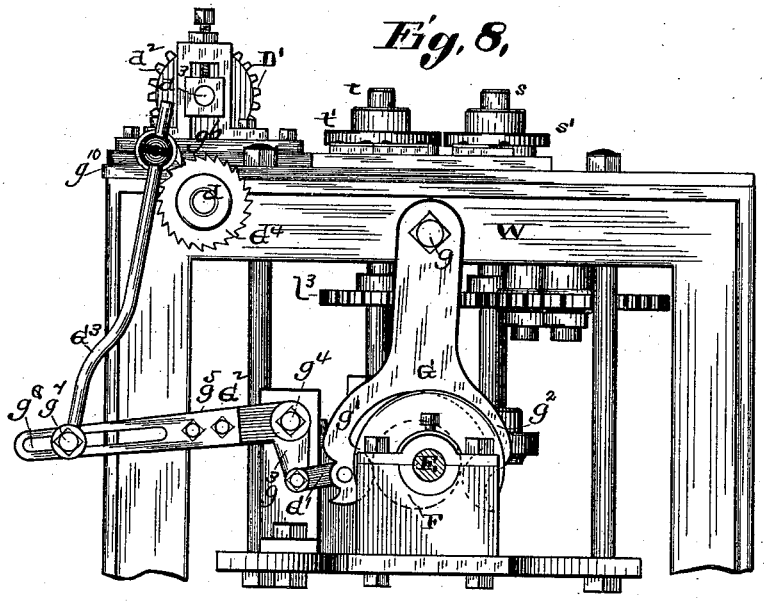



Fig. 8,

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## SPRING KEY SHAPING MACHINE.

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Fig. 9.

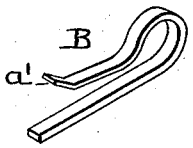
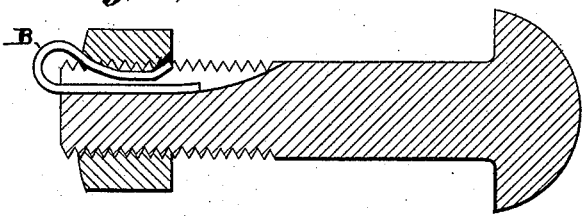



Fig. 10.

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# UNITED STATES PATENT OFFICE.

JAMES MURRAY AND DAVID A. BRISLIN, OF ST. LOUIS, MISSOURI.

## SPRING-KEY-SHAPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 345,717, dated July 20, 1886.

Application filed April 23, 1886. Serial No. 199,974. (No model.)

*To all whom it may concern:*

Be it known that we, JAMES MURRAY and DAVID A. BRISLIN, of St. Louis, Missouri, have jointly made a new and useful Improvement in Spring-Key-Shaping Machines, of which the following is a full, clear, and exact description.

The machine in question is designed for forming a special spring-key used in locking a nut upon a bolt. Its improved features will be explained in connection with the operation of the machine, and be designated in the claims.

In the annexed drawings, making part of this specification, Figure 1 is a plan of the machine, the parts being as when the rod from which the keys are made has been partly bent. Fig. 2 is a similar view, the parts being as when the rod has been folded nearly into the shape of the desired key, and the point of the key remains to be formed. Fig. 3 is a similar view showing the part termed the "hammer" in position to shape the key-point. Fig. 4 is a similar view showing the next stage of the operation, the key previously formed having been cut off, the rod from which the keys are made being advanced into the machine to form a second key, and the rod-folding device being in position to initiate the folding of the rod. Fig. 5 is a horizontal section of the machine taken just below its top. Fig. 6 is a vertical section on the line 6 6 of Fig. 4. Figs. 7, 8 are end elevations of the machine, showing, respectively, two positions of the feed mechanism. Fig. 9 is a view in perspective of the key made on the machine, and Fig. 10 is a longitudinal section of a bolt and nut locked together by means of the key.

The same letters of reference denote the same parts.

A, Figs. 1, 2, 3, 4, represents the metallic rod from which the keys are made.

B, Figs. 4, 9, represents the key made by the machine in question.

The rod is fed across the top C of the machine by means of the feed-rolls D D', Figs. 1, 2, 3, 4, 6, 7, 8, and as follows: E represents the main shaft of the machine. It is provided with a cam, F, Figs. 7, 8, for the purpose of effecting the oscillation of a forked lever, G, which is pivoted to the frame W of the machine at $g$, and adapted to be swung to the right and to the left, as indicated by its two positions (shown in Figs. 7 and 8, respectively) the cam in its rotation encountering the forks $g'$ $g^2$ alternately, and thereby swinging the lever G to and fro. The motion of the lever, by means of the link G', is communicated to the arm $g^3$ of the bell-crank $G^2$, which is pivoted at $g^4$ to the frame H, and whose arm $g^5$ is connected with the rod $G^3$, and in such manner as to cause the rod to rise and fall with the oscillation of the lever G and bell-crank $G^2$. The rod at its upper end is provided with a pawl, $g^6$, which operates in connection with the ratchet $G^4$ upon the shaft $d$. When the rod is lifted, the pawl engages with and rotates the ratchet, and when the rod is lowered the pawl drops backward on the ratchet. The lower end of the rod $G^3$ is provided with a pin, $g^7$, which passes through the slot $g^8$ in the bell-crank, and is thus made to connect therewith, and at any desirable point of adjustment thereon, and at its upper end the rod $G^3$ is held against the ratchet, so that the pawl shall be kept in position for engagement with the ratchet by means of the arm $g^9$, Figs. 1, 2, 3, 4, the rod $G^3$ passing through the pin $g^{10}$, which in turn passes through the pawl $g^6$ and arm $g^9$, and the arm $g^9$ being journaled on the shaft $d$. The ratchet $G^4$ is fastened to the shaft $d$, as is also the lower feed-roll, D. The feed-rolls D D' are respectively provided with the gears $d'$ $d^2$, which engage with each other. The upper feed-roll, D', is attached to the shaft $d^3$, Fig. 7. The rotation of the shaft $d$ therefore causes the feed-rolls to rotate and to feed the rod A across the top C of the machine in the direction indicated by the various positions of the rod, as shown in Figs. 3 and 4, respectively. The rod, as it is fed, passes over the upper end of an upright shaft, H, which is held and adapted to be rotated reciprocatingly in a suitable bearing, $h$, Fig. 6, in the machine-frame. The shaft, at a point at the side of its center, is provided with a projection, $h'$, which is in the form of a pin, and preferably furnished with a friction-roller. The shaft at its center is perforated vertically to receive a vertically-operating rod, $h^2$. The pin $h'$ is spaced sufficiently apart from the rod $h^2$ to admit the rod A between them, as shown in the various figures above named. The shaft H, by means presently described, is caused to rotate in the

direction indicated by the arrow in Figs. 1 and 2. The pin $h'$ bears against the part $a$ of the rod A and causes it to be bent around the projecting end of the rod $h^2$, and the part $a$ is thereby brought into the position shown in Fig. 2. It is desirable, however, to bend the extreme end $a'$ of the part $a$ into the shape substantially shown in Figs. 3, 4, 9, 10. To this end the part $a$, after it has, by means of the rotation of the shaft H, been carried against the shoulder I, Figs. 1, 2, 3, and 4, is acted upon by what is termed the "hammer" J, which is caused to strike the end $a'$ against the shoulder I, as shown in Fig. 3, and thereby impart the desired shape to the end $a'$. Before, however, the hammer can act upon the end $a'$, the pin $h'$ must be removed out of the way. The shaft H, therefore, just before it is time for the hammer to act, is rotated backward into its original position. (Shown in Figs. 3 and 4.) The hammer then moves forward, as stated, and effects the shaping of the part $a'$.

The mechanism for operating the shaft H will now be described. Referring to Figs. 5, 6, 7, 8, the main shaft E, which is arranged horizontally and adapted to be rotated in suitable bearings in the machine-frame, in addition to the cam F is furnished with the bevel-gear K, Figs. 5 and 7. This gear engages with the horizontal bevel-gear L, which is fastened to the upright shaft $l$. The rotation of the main shaft causes the shaft $l$ and gear L to rotate in the direction indicated by the arrow $l'$, Fig. 5. The shaft $l$ is also provided with the toothed segment $l^2$ and the gear $l^3$, Figs. 7 and 8. The toothed segment $l^2$ engages with a gear, $h^{22}$, Figs. 5 and 6, fastened to the shaft H. The rotation of the main shaft causes, by means of the engagement of the segment with the gear, as described, the shaft H to rotate in the direction indicated by the arrow $h^3$, Fig. 5, until the end of the segment is reached and the untoothed part $l^4$ of the segment comes opposite the gear $h^{22}$. The last-named part, being now free, is, by means of the spring M, Fig. 5, rapidly rotated in the contrary direction, and at the right time to enable the pin $h'$ to be withdrawn, as described, out of the way of the hammer and into the position shown in Figs. 3 and 4. The spring M at its end $m$ is fastened to some part of the machine-frame, and its opposite end is coiled around at $m'$, Fig. 6, and fastened to the shaft H, and when the segment $l^2$ is acting upon the gear $h^{22}$ the spring is being wound upon the shaft H, and as soon as the segment ceases to engage with the gear the spring acts, as described, to turn the shaft backward. After the key has been shaped in the manner described, and the shaft has been turned backward to bring the pin $h'$ into the position of Figs. 3, 4, the rod A is moved along, by means of the feed mechanism described, into position (indicated in Fig. 4) for the key to be severed from the straight portion of the rod; but before this can be done, the rod $h^2$ must be withdrawn downward below the level of the key, so as to offer no obstruction to the movement of the rod. This withdrawal of the rod is effected, preferably, in the following manner: N, Figs. 5, 6, represents a lever pivoted at $n$ to a fulcrum, $n'$. One end, $n^2$, is pivoted to a slotted extension, $h^4$, of the rod $h^2$, and the opposite end, $n^4$, is extended and carried under a horizontal disk, $n^5$, that is fastened to an upright shaft, O. A spring, P, fastened at one end to the lever N, and at the other end to the machine-frame, acts, through the lever N, to draw the rod $h^2$ downward out of the way of the key whenever the end $n^4$ of the lever N is free to rise. The end $n^4$ cannot rise, however, as long as the disk $n^5$ bears upon it, as shown in Fig. 6; but the rotation of the shaft O carries the disk around until the end $n^4$ comes opposite a recessed portion, $n^6$, of the disk, thereby providing room for the end $n^4$ to rise. The spring P then acts and the rod $h^2$ moves downward, and remains depressed until the recessed portion $n^6$ is passed, whereupon the lever end $n^4$ is depressed, and, in consequence, the spring P is stretched, and the rod $h^2$ raised again.

The shaft O is rotated in the following manner: The motion of the gear $l^3$, Figs. 7, 8, is imparted to the gear Q, Fig. 5, which is journaled in the bearing $q$, and imparts its motion in turn to the gear R upon the shaft O, causing that shaft to rotate in the direction indicated by the arrow $o$, Fig. 5. The gear R also serves to drive the gear S upon the shaft $s$, and the gear S in turn drives the gear T upon the shaft $t$. The shafts $s$ $t$ are respectively provided with the cams $s'$ and $t'$, Figs. 1, 2, 3, 4, 7, 8, which, respectively, are used in operating the rod-severing device U and the hammer J. The knife $u$ is attached to the arm $u'$, which is slotted at $u^2$ to receive and to provide for a reciprocating movement past the shaft $s$, and is held between the cam $s'$ and the top C, and also in the bearing $c$ upon the top C, but so that it can be moved longitudinally toward and from the rod A, the operation being as follows: The cam $s'$ in its rotation in the direction indicated by the arrow $s^2$, Figs. 1, 2, bears against the pin $u^3$, that is attached to the arm $u'$, and thereby causes the arm to be moved backward into the position shown in Figs. 2, 3, and to hold it back until the point $s^3$ of the cam passes the pin $u^3$, whereupon the spring $u^4$, pressing at one end against the bearing $c$ and at the other end against the shoulder $u^5$ of the arm, acts to throw the arm sharply forward, and the knife $u$, in conjunction with the stationary knife $u^6$, to sever the key from the rod, as indicated in Fig. 4, after which the knife $u$, by the action of the cam, is immediately withdrawn to make room for the advancing rod A. The hammer J is operated by an analogous mechanism, the cam $t'$ acting against the pin $j$ upon the hammer-arm $j'$ to press the hammer backward, to be out of the way until the blow is to be given, whereupon the spring $j^2$ acts to move the hammer-arm and hammer sharply in the opposite di-

rection to shape the end of the key, as described.

To insure the proper engagement of the gears $l^2$ $h^{22}$ it is desirable to employ the mechanism shown in Fig. 11, and indicated in dotted lines in Fig. 5. The gears or the shafts of the gears are respectively provided with the arms $l^5$ and $h^{15}$, which are relatively so arranged and also so attached to the gears, respectively, as to insure the entrance of the teeth of the segment into the spaces between the teeth of the gear $h^{22}$, and to prevent them from striking the points of the last-named teeth. To this end the arm $l^5$ extends considerably beyond the periphery of the segment-teeth, and so as to encounter the arm $h^{15}$ in the manner indicated in Fig. 11, and thereby correct and readjust relatively the gears $l^2$ $h^{22}$, so that they shall properly engage. The shoulder I is upon or attached to the block I'. The stationary knife $u^6$ is attached to the block $u^7$. The block $h^{30}$, Figs. 1, 2, 3, 4, forms a shoulder to arrest the projection $h'$ as the shaft H is turned backward. These blocks I' $u^7$ $h^{30}$ are each made universally adjustable, in a horizontal plane, upon the top C, to enable thereby the shoulder I and knife $u^6$ to be properly placed, and the movement of the part $h'$ to be properly limited.

We claim—

1. The reciprocating rotating part H, carrying the projection $h'$, in combination with the vertically-operating part $h^2$, as and for the purpose described.

2. The combination of the part H, having reciprocating rotary movement, and provided with the projection $h'$, with the vertically-operating part $h^2$, the hammer J, and the block I', having shoulder I, substantially as described.

3. The combination of the part H, having the reciprocating rotary movement, and provided with the projection $h'$, with the vertically-operating part $h^2$, and the knives $u$ $u^6$, substantially as described.

4. The combination of the part H, having the reciprocating rotary movement, and provided with the projection $h'$, with the vertically-operating part $h^2$, the hammer J, the block I', having shoulder I, and the severing device, substantially as described.

5. The combination of the feed device D D', the vertically-operating part $h^2$, and the rotary reciprocating part H, carrying the projection $h'$, substantially as described.

6. The combination of the feed device D D', the vertically-operating part $h^2$, the rotary reciprocating part H, carrying the projection $h'$, the hammer J, the block I', having shoulder I, and the severing device, substantially as described.

7. The combination of the feed device, the rotary reciprocating part H, carrying the projection $h'$, and having at its center a projecting bearing, around which the rotating projection $h'$ can wrap the rod end, and the severing device, substantially as described.

8. The combination of the hammer J and the block I', having shoulder I, substantially as described.

9. The combination of the forked lever G, the shaft E, the cam F, the link G', the bell-crank $G^2$, the rod $G^3$, the pawl $g^6$, the ratchet $G^4$, the shaft $d$, and the feed-rolls D D', having the gears $d'$ $d^2$, substantially as described.

10. The combination of the shaft E, the gears K L, the shafts $l$ H, the segment $l^2$, and the gear $h^{22}$, substantially as described.

11. The combination of the shafts $l$ H, the segment $l^2$, the gear $h^{22}$, and the spring M, substantially as described.

12. The combination of the rod $h^2$, the lever N, the shaft O, the disk $n^5$, having the recessed portion $n^6$, the bearing $n'$, and the spring P, substantially as described.

13. The combination of the gears Q R S T, the shaft $s$ $t$, the cams $s'$ $t'$, the arms $u'$ $j'$, the bearing $c$, the pins $u^3$ $j$, and the springs $u^4$ $j^2$, substantially as described.

14. The combination of the adjustable blocks I' $u^7$ $h^{30}$, the hammer J, the knife $u$, and the shaft H, having the projection $h'$, substantially as described.

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