

(No Model.)

2 Sheets—Sheet 1.

J. C. RICHARDSON.
MACHINE FOR MAKING LOCK NUTS.

No. 582,146.

Patented May 4, 1897.

Fig. 1.

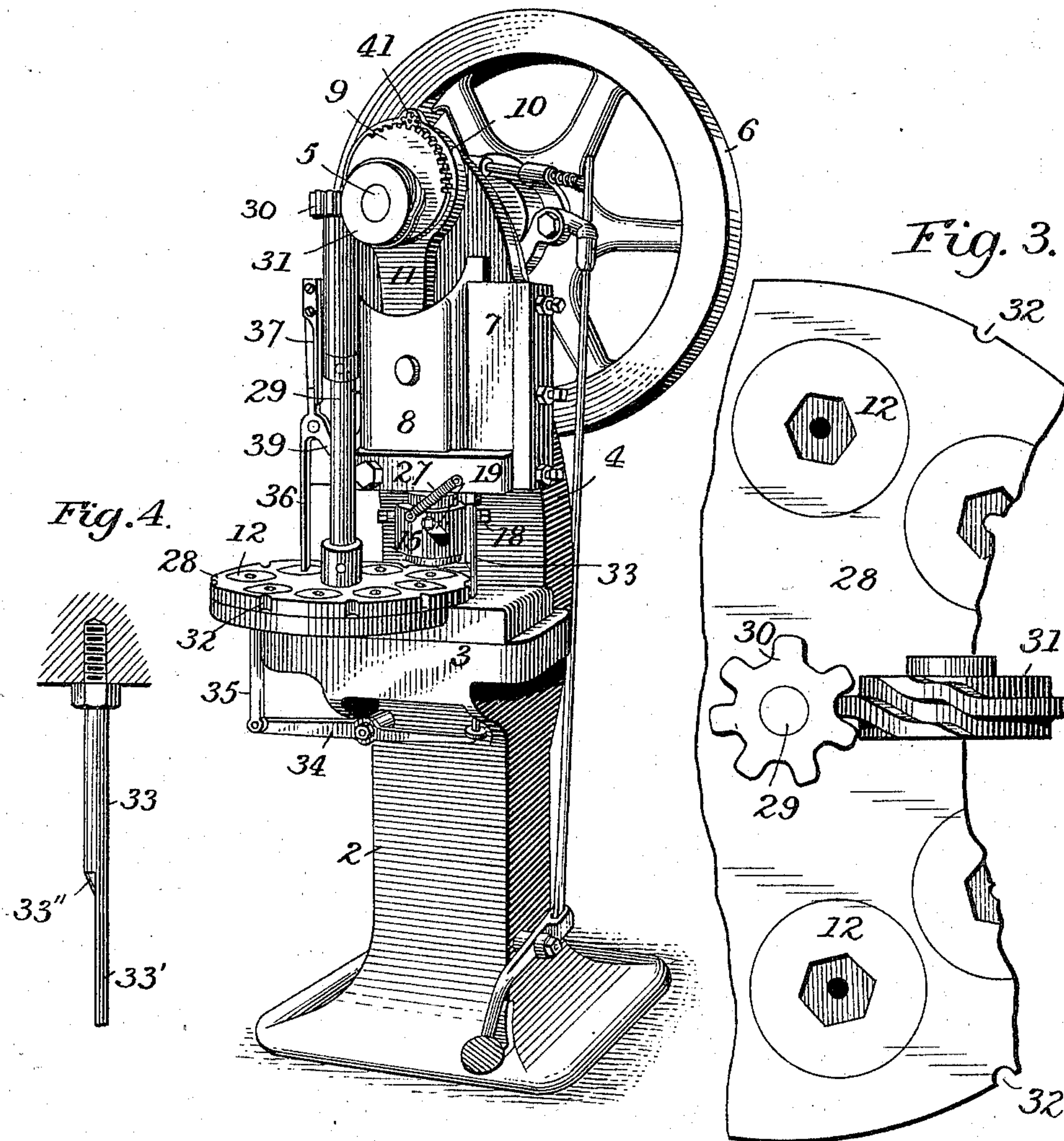


Fig. 3.

Fig. 4.

28

32

35

34

3

33

33''

33'

Fig. 5.

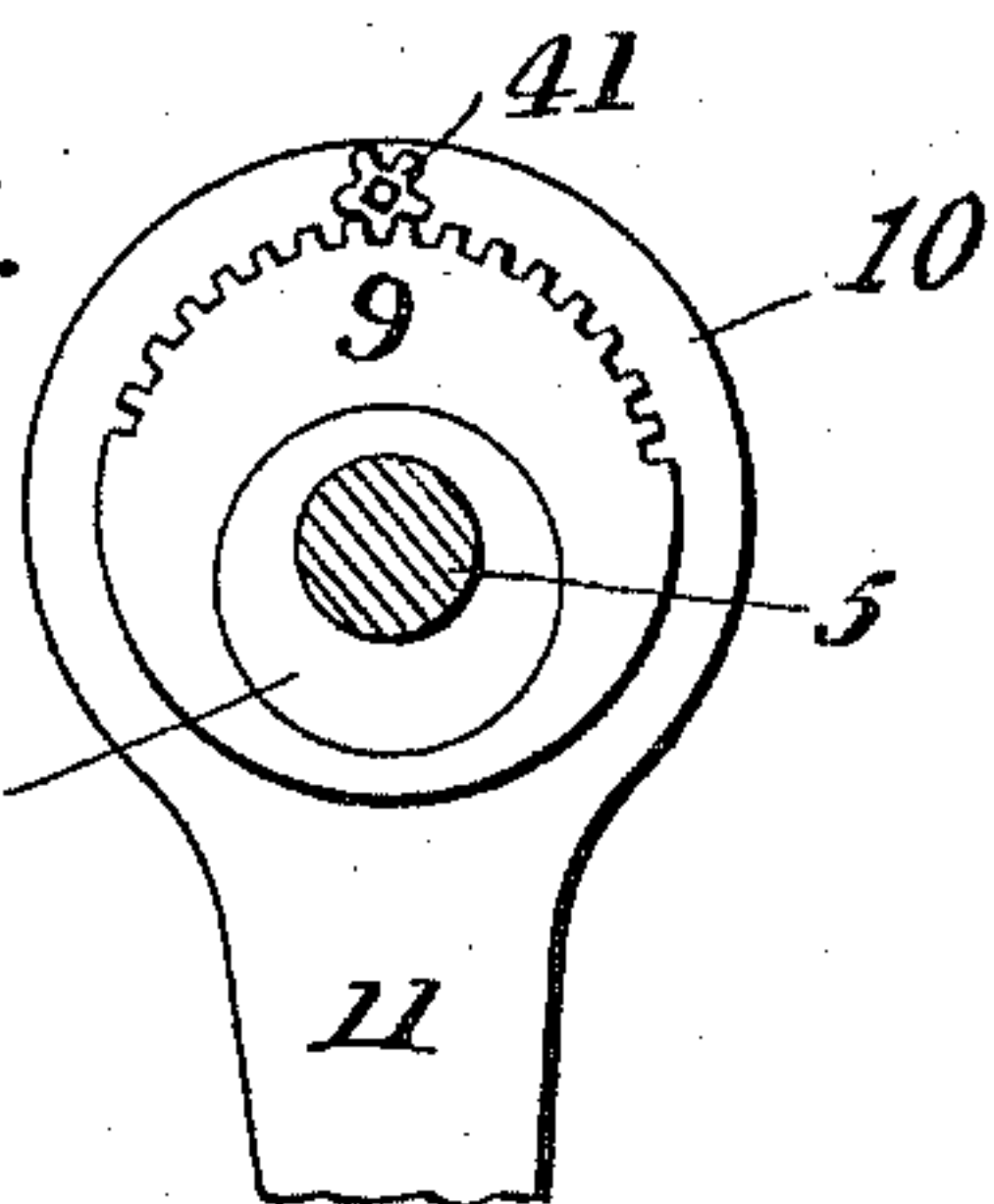
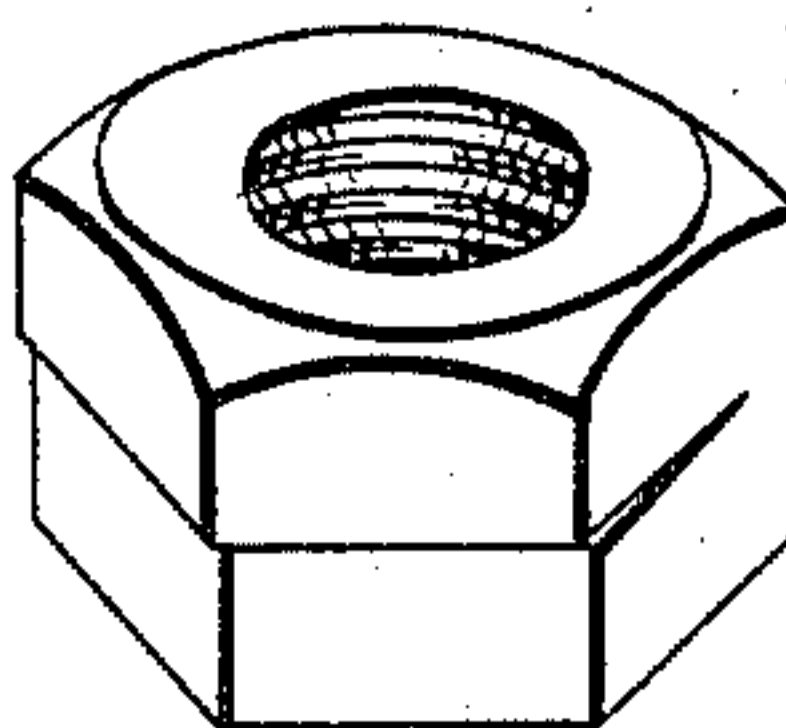


Fig. 6.



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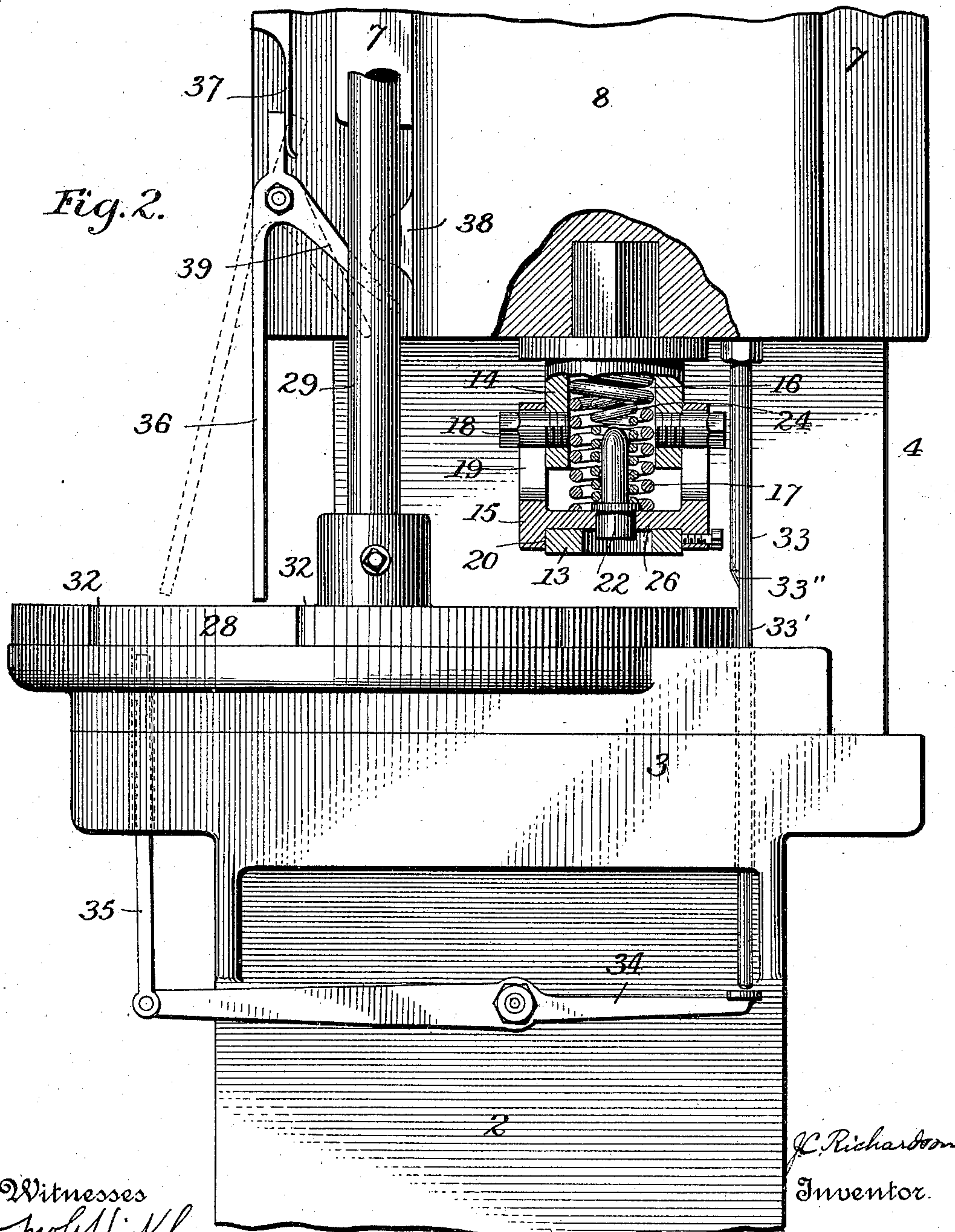
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JULIUS C. RICHARDSON, OF BUFFALO, NEW YORK.

MACHINE FOR MAKING LOCK-NUTS.

SPECIFICATION forming part of Letters Patent No. 582,146, dated May 4, 1897.

Application filed January 7, 1896. Serial No. 574,602. (No model.)

To all whom it may concern:

Be it known that I, JULIUS C. RICHARDSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Machines for Making Lock-Nuts, of which the following is a specification.

My invention relates to die-presses and similar machines, and more especially to an improved machine for making twisted lock-nuts, examples of which style of nuts are shown in my Patents No. 450,377, of April 14, 1891, and No. 550,898, of December 3, 1895.

The preferred form of machine embodying my invention is illustrated in the drawings, although I do not wish it understood that my invention is limited in its useful applications to the particular form thereof which I have chosen to illustrate as an embodiment of such invention.

Figure 1 is a perspective view of a machine embodying my invention. Fig. 2 is a front elevation, partly in vertical section, of a portion of such machine, the view being on a larger scale than Fig. 1. Figs. 3, 4, and 5 are detail views. Fig. 6 is a perspective view of the nut which is made by my improved machine.

My invention is shown as applied to a machine many of the features of which are common in presses and punching-machines, and I need not therefore give a detailed description of such parts as are old in the art. As shown, this machine is mounted in a frame consisting of a base 2, a shelf or table 3, and a standard 4, extending upward beyond the shelf. In the upper end of the standard 4 is mounted the shaft 5, which drives the machine, such shaft being provided with a belt-wheel 6. The standard is provided with vertical guides or ways 7, between which is mounted the head 8, which is suitably connected with the shaft 5, so as to be reciprocated in its ways, such connection in the form of apparatus shown being an eccentric 9, a strap 10, surrounding the eccentric, and a connecting-link 11 between the strap and the head. Other mechanism might be employed, however, for effecting the reciprocation of the head or slide 8.

Suitable mechanism for starting and stopping the machine is employed, but as such

mechanism may be of any usual or approved character and does not form a part of the present invention I have not shown nor need I describe it.

The mechanism which I have invented to effect the twisting of a nut consists, essentially, of two dies, which, when brought together, are adapted to engage with the opposite ends of the nut, and mechanism combined with such dies for imparting to one of them while they are in engagement with the nut a slight lateral movement or partial rotation. One of these dies in the machine shown is mounted upon the table or shelf 3, and as this die is held firmly and remains stationary during the twisting of the nut I shall refer to it as the "stationary" or "holding die," notwithstanding the fact that it is movable at other times than while such twisting operation is being effected.

The form of the holding-die and manner of holding or supporting it are not material so long as it fits the nut and operates to hold it with sufficient firmness while the twist or lateral turn is being imparted. The cavity in the holding-die in which the nut is placed should, however, be of such depth or shape as to receive only about one half of the nut, leaving the other half above the face of the die to be engaged by the other or twisting die.

The manner of mounting the dies which I prefer is illustrated in Fig. 1 and will be hereinafter more fully set forth.

The other or twisting die 13 is carried by the reciprocating head 8 and has, by reason of its connection with such head, a reciprocatory motion toward and from the stationary die, and at the same time it is so combined with a mechanism now to be described that when it has approached close to the stationary die it has a slight lateral turn or partial rotation imparted to it.

The block 13, which constitutes the twisting-die, is mounted in a recess 20 in the lower end of a sleeve 15, that fits over a cylindrical bearing 14, carried by and projecting downward from the reciprocating head 8. That part of the said support 14 which projects beyond the base of the head is preferably chambered, as indicated at 16, and has mounted within it a spring 17, which bears against a cross-plate 26 at the outer end of the sleeve

and tends to force the latter downward or outward from its support. The latter is, however, held from being moved too far off the support by the studs or pins 18, which pass
5 through the slots 19 of the sleeve and are seated in the cylindrical support 14. The slots 19 are inclined, so that if the sleeve be moved longitudinally upon its support the engagement of the studs 18 with the inclined
10 walls of the slots 19 causes a partial rotation of the sleeve about its vertical axis.

22 indicates a small plunger actuated by a spring 24, preferably mounted within the chamber 16 and which operates as an ejector
15 to discharge the nut from the die 13 after it has been twisted.

My invention has now been sufficiently described to permit an understanding of the operation of the mechanism which imparts to
20 the nut its twist.

Such operation is as follows: A nut is fitted in one of the holding-dies and that brought directly below and in alinement with the movable die 13, which is then brought down until
25 it fits over the upper half of the nut. As the die 13 passes over the nut the plunger 22 comes into engagement therewith and is forced into the sleeve 15 as the other parts are advanced, the spring 24 in the meantime being compressed. When the upper face of the nut
30 comes into engagement with the end plate 26 of the sleeve 15, the further downward movement of the sleeve is of course arrested; but this takes place before the head 8 has completed its downward movement. The engagement
35 of the studs 18 with the inclined walls of the slots 19 causes a partial rotation to be given to the sleeve after it has been arrested in its vertical movement and while the head
40 is still moving to complete its stroke, the extent of such rotation being dependent on the inclination of the slots and the extent to which the part 14 moves after the part 15 has been arrested. This turning of the sleeve
45 also turns with it the die 13, and that in turn causes the nut to be twisted. Upon the return or upward movement of the head 8 the parts recede from the nut, the spring 24 forcing outward the plunger 22, which acts to
50 eject the nut from the die 13, leaving it in the holding-die 12. The spring 17 restores the sleeve 15 to its normal position—that is, to a position as far off from its support 14 as the studs 18 will allow it to go. As an additional means for restoring the sleeve to its
55 normal position, in order to insure its coming into the proper engagement with the nut, I may employ the spring 27, which is connected at one end with the press-head and at its
60 other end to the periphery of the sleeve.

Instead of employing but a single stationary or holding die with a machine I prefer to use a plurality of such dies and to mount them in a die-holder which is automatically
65 moved with a step-by-step motion. Such a construction is illustrated in Fig. 1. The stationary or nut-holding dies 12 are mounted

or supported in a circular die-carrier 28, which consists of a plate mounted above the table
3 and provided with a number of recesses 70 into which the holding-dies are inserted. This plate is secured to the lower end of a vertically-disposed shaft 29, which is intermittently rotated, so that the die-carrier 28 is given a step-by-step motion. Any preferred
75 mechanism for imparting such intermittent motion may be employed, but I prefer that which is shown, which consists of a worm-wheel 30, arranged upon the upper end of the shaft 29, and a worm 31, carried by the shaft
80 5 and engaging with such worm-wheel. The worm 31 is of peculiar construction, as illustrated in Fig. 3. Instead of being a continuous scroll the thread which constitutes the worm is straight for about two-thirds of its
85 extent and arranged in a plane which is transverse to the axis of the shaft 5, the balance of the thread being so inclined as to give the proper movement to the shaft and disk. The straight portion of the thread gives a
90 dwell or rest to the plate when that part engages with the wheel 30, while the inclined part of the worm causes a partial rotation of the holder 28. By this mechanism the die-holder is first moved and then stopped, the
95 duration of the dwell or rest compared with its movement being varied to secure the best results by changing the relative length of the straight portion of the thread.

In order to hold the die-carrier 28 rigidly
100 during the operation of twisting the nut, I have provided a lock therefor. The edge of the plate 28 is provided with notches 32, corresponding in number to the number of dies
105 which are carried by the holder, and with these notches there engages a pin 33, carried by the reciprocating head 8. This pin is preferably round and when depressed fits in a recess 32, thereby preventing any rotation
110 or movement of the plate so long as the pin is in engagement therewith. I prefer that the pin should be of sufficient length to extend through the table 3 for a purpose to be
115 presently described, and the portion 33' of the pin which extends past the edge of the plate 28 when the head is raised is cut away on one side, as indicated in Fig. 4, so that the die-carrier may be freely turned to pass this cut-away part of the pin without any interference therefrom. I prefer to provide
120 the pin at the part where the half-round portion 33' joins the cylindrical part with a beveled or tapering portion 33'', the object of thus forming the pin being to prevent a shoulder at such junction and to insure that the
125 pin in descending shall enter the recess notwithstanding the fact that the plate 28 might not have been moved to the exact position required to cause the recess 32 to register with the pin 33, for it will be seen that the
130 wedge-faces formed by the beveled portion 33'' of the pin will force the plate into proper position as it is descending.

As has been stated, the pin extends through

the platform or table 3, and it is so arranged as to operate a lever 34, which carries at its end opposite the pin 33 an ejecting pin or plunger 35, that extends upward through the platform 3 and, when elevated, through or into the opening for the nut in one of the dies 12. Whenever the head 8 is depressed, the pin 33 engages with and operates the lever 34 and causes the ejecting-plunger 35 to be raised, throwing a nut, which has been twisted, out of the die in which it has been held. The lever 34 may be weighted or operated upon by a spring, so as to normally be in a position with the plunger or rod 35 depressed and out of the way of the die-holding plate 28, so that the movement of the latter is not interfered with thereby.

I prefer to provide the machine with a device for pushing the nuts, after they have been ejected from their holding-dies, from off the revolving plate 28. It consists of a pivoted finger 36, which normally, under the action of a spring 37, occupies the position indicated in full lines in Fig. 2. The reciprocating head 8 is provided with a projection 38, which is adapted to engage with a short finger or projection 39, carried by the finger 36, when the head reaches a position near its lowermost movement, the engagement of this projection with the finger moving it into the position indicated in dotted lines in said Fig. 2, causing the end of the finger to sweep over the plate 28 and to carry with it the nut which has just been ejected by the plunger 35. As the nut is thus swept off the plate it falls into a receptacle provided therefor or into a chute or conveyor.

The extent to which the sleeve 15 is turned, and hence the amount of twist which is imparted to the nut upon each downward movement of the head 8, may be varied by varying the extent of reciprocation of the head. Various means may be employed for this purpose, one well-known means being illustrated in Fig. 5, wherein 9 represents an eccentric collar, which is mounted upon an eccentric 40 on the shaft 5 and between it and the strap 10. By turning the collar by means of the small pinion 41 from one position to another the amount of movement imparted to the head may be varied, as will be understood.

Other well-known or preferred means may be employed for adjusting the throw of the head 8 in lieu of that shown; but this mechanism does not *per se* constitute a part of my invention, and therefore I do not deem it necessary to describe other forms of mechanism for accomplishing these results.

It will be observed that the walls of the inclined slots 19 in the sleeve or carrier for the twisting-die constitute a cam, and that the studs 18 are the projections which engage therewith; and it will be understood that it would not be a departure from my invention were the cam to be upon the support 14 for the twisting-die carrier and the projections which engage with the cam be carried with

the said carrier, or should other forms of cams be used for the same purpose.

My invention is primarily intended to be used in connection with machines for making twisting nuts, but it will be apparent that many of its features are applicable to die-presses or similar machines used for other purposes.

What I claim as my invention is—

1. In a machine for making lock-nuts, the combination of two dies provided with cavities which register when the dies are brought together face to face, and are shaped to fit the opposite ends of the nuts which are to be operated upon, mechanism for separating and bringing together the dies, and mechanism for imparting to one of the dies a partial rotation after they have been brought close together, and immediately on their approach toward each other being arrested, substantially as set forth.

2. In a machine for making lock-nuts, the combination of a reciprocating head, ways or guides in which the said head moves, and by which it is caused to move in straight lines, a twisting-die carried by the head, and provided with a cavity adapted to fit one end of a nut, a holding-die provided with a cavity adapted to fit the end of a nut and to a depth to receive about one-half only of the nut, means for moving the holding-die into a position opposite the twisting-die, and then away therefrom, mechanism for moving the twisting-die toward and from the holding-die, and mechanism for giving to such die a partial rotation when it has been brought close to the other die, substantially as set forth.

3. In a machine for making lock-nuts, the combination of two dies provided with cavities which register when the dies are brought together face to face, and are shaped to fit the opposite ends of a nut, mechanism for bringing together and separating the dies, mechanism for giving to one of the dies a partial rotation after they have been brought close together, and means for adjusting the amount of rotation imparted to the die, substantially as set forth.

4. In a machine for making twisted lock-nuts, the combination of a reciprocating head, a supporting-piece, 14, carried thereby provided with a chamber or cavity, 16, a sleeve, 15, mounted upon the said support and provided with inclined slots, 19, a twisting-die mounted in the said sleeve, the studs, 18 supported in the piece, 14, and extending through the slots in the sleeve, a spring mounted in the cavity, 16, and bearing against the sleeve, a spring-actuated ejector extending normally into the cavity of the die, and a stationary or holding die arranged to be brought opposite to the twisting-die, substantially as set forth.

5. The combination of a reciprocating head or slide, a support for the die carried thereby, but free to move relative thereto both longitudinally and around its axis of reciprocating movement, a cam carried by one of the said

parts and a projection engaging with the cam carried by the other, whereby when the die is stopped in its reciprocatory movement, a continued movement of the head causes the die
5 to be partially rotated, means which tend to separate the die-support and the head, and means for adjusting the extent of reciprocation of the head, whereby the amount of rotatory movement of the die may be varied,
10 substantially as set forth.

6. In a machine for making lock-nuts, the combination of a reciprocating die adapted to fit one end of a nut, a plurality of holding-dies, 12, each having a cavity in which may
15 be placed and be held a nut with its end projecting beyond the face of the die so that the reciprocating die may engage therewith, a holding-plate in which all of the said dies, 12, are securely held, mechanism which imparts
20 to said plate a step-by-step movement, whereby the holding-dies are successively brought opposite to the reciprocating die, and mechanism for imparting to the reciprocating die a slight rotatory movement when the dies are
25 brought close together, substantially as set forth.

7. The combination of a reciprocating die, a plurality of holding-dies, a plate, 28, in which the said dies are mounted, a shaft to
30 which the plate is secured, a worm-wheel carried by the shaft, and a worm gearing with the wheel, the worm having a straight portion, and a curved portion, the latter imparting movement to the die-carrying plate, and
35 the former causing the same to rest or dwell, substantially as set forth.

8. The combination of a reciprocating head

carrying a die, a circular plate carrying the holding-dies, having its edges notched as at 32, means for turning the said plate with a
40 step-by-step movement, and a pin, 33, carried by the reciprocating head, and adapted, when the latter descends, to engage with one of the notches in the plate, the pin having a circular portion, a cut-away portion, and the
45 beveled portion between them, substantially as set forth.

9. The combination of a reciprocating head carrying a die, a carrier for the articles to be operated upon, a pivoted finger, 36, arranged
50 when moved to sweep across the carrier in the path of the articles, and to remove them, and means carried by the reciprocating head for operating the said finger, substantially as set forth.
55

10. The combination of a reciprocating head carrying the die, a series of dies for holding the articles to be operated upon, means for giving the said dies a step-by-step movement, an ejector for removing the articles successively
60 from the dies, and a pivoted finger for removing the articles after they have been ejected from the dies, arranged to sweep over the dies as it is moved and mechanism for operating the ejector and the said finger at sub-
65 stantially the same time, substantially as set forth.

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

JULIUS C. RICHARDSON.

Witnesses:

JACOB F. SCHMIDT,
E. J. SMITH.