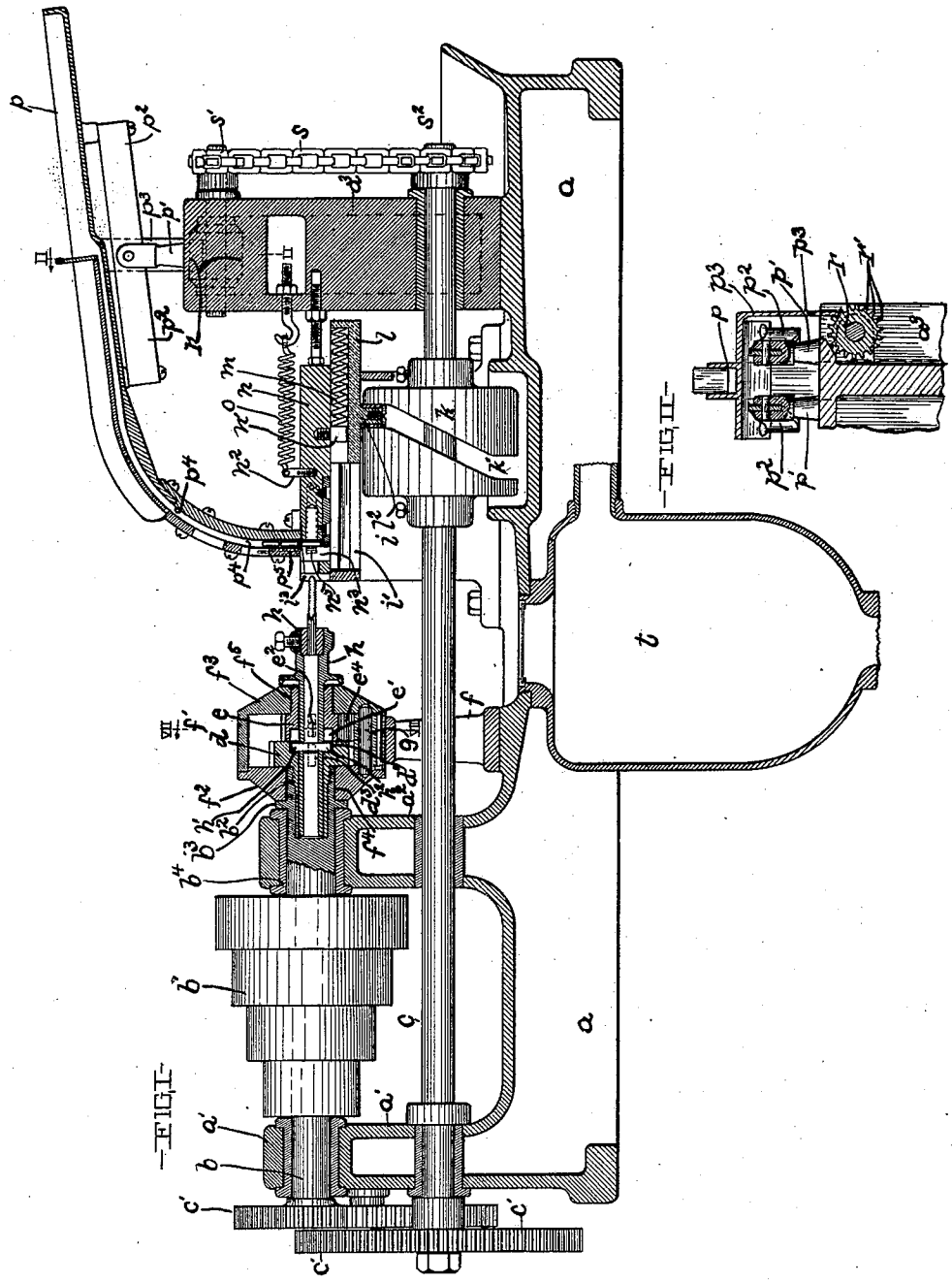
No. 698,828. Patented Apr. 29, 1902.

T. FERRY.

NUT TAPPING MACHINE.

(Application filed Mar. 31, 1900.)

(No Model.) 5 Sheets—Sheet 1.



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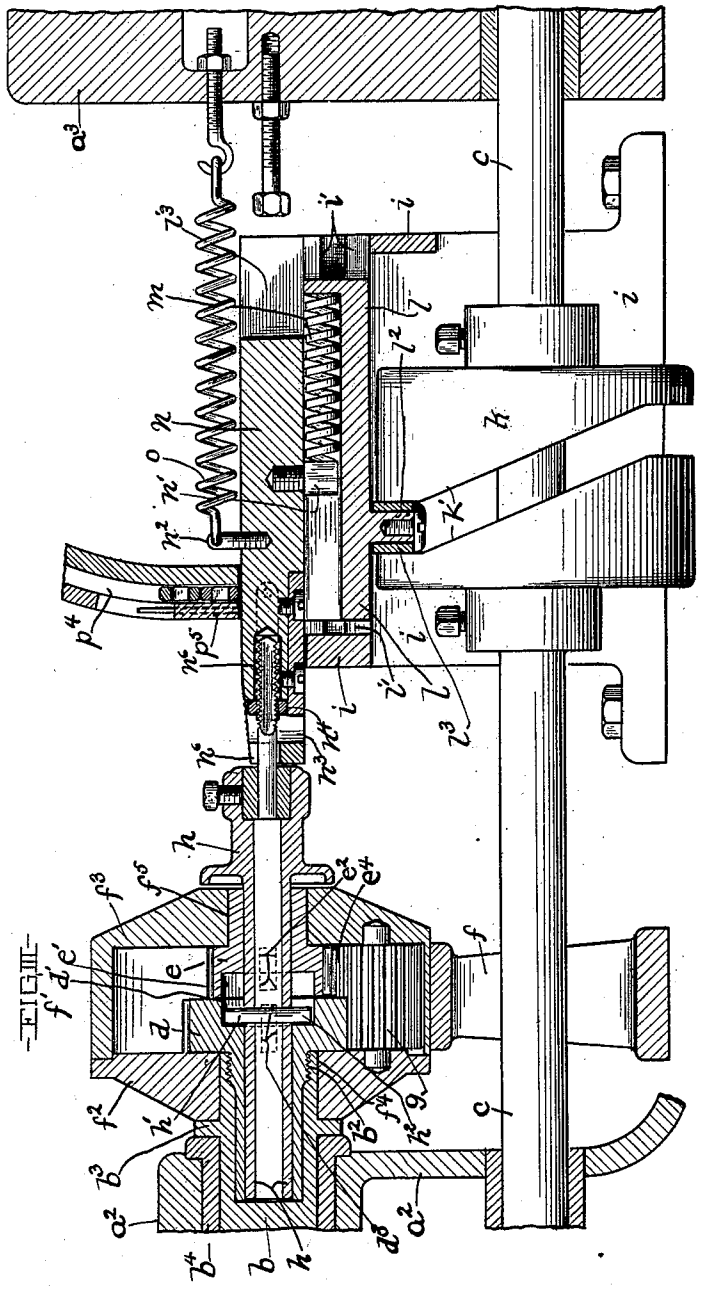

FIG. III.

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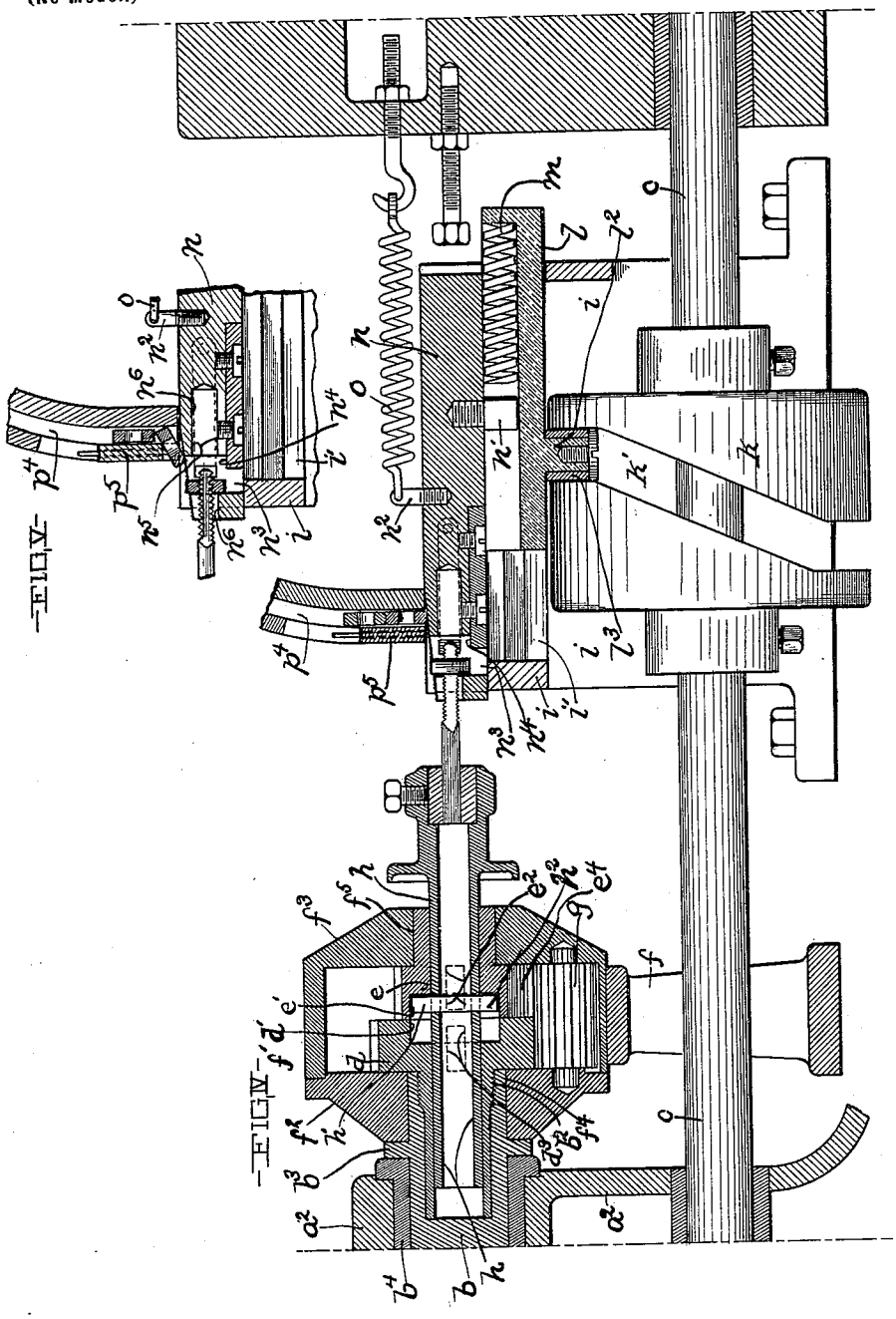

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(No Model.) 5 Sheets—Sheet 4.

FIG. VI.

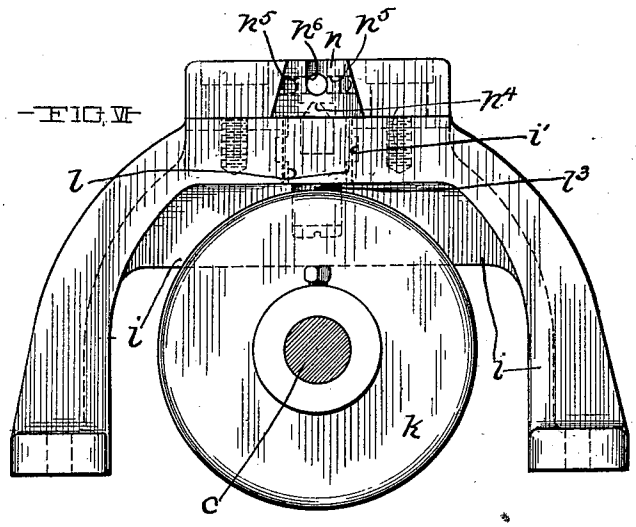
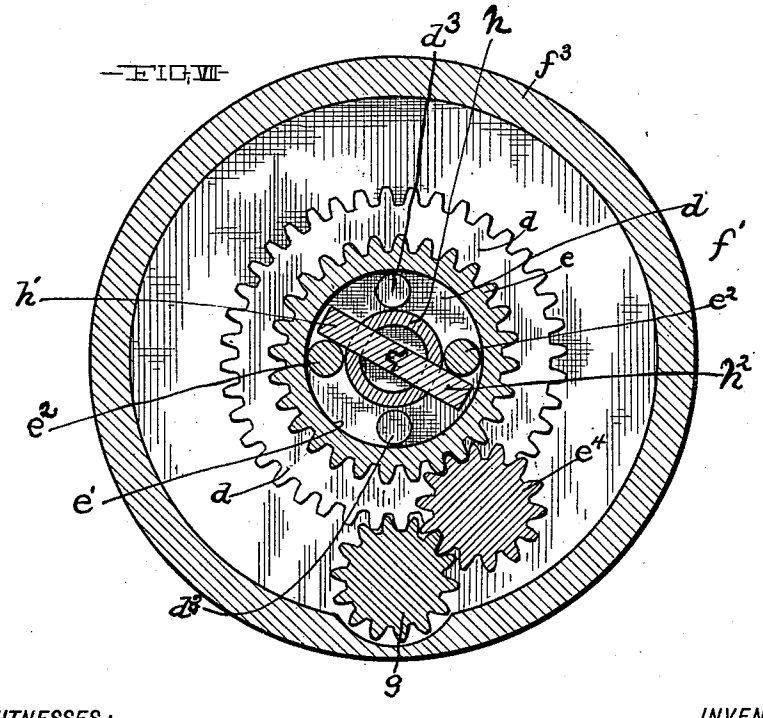


FIG. VII.



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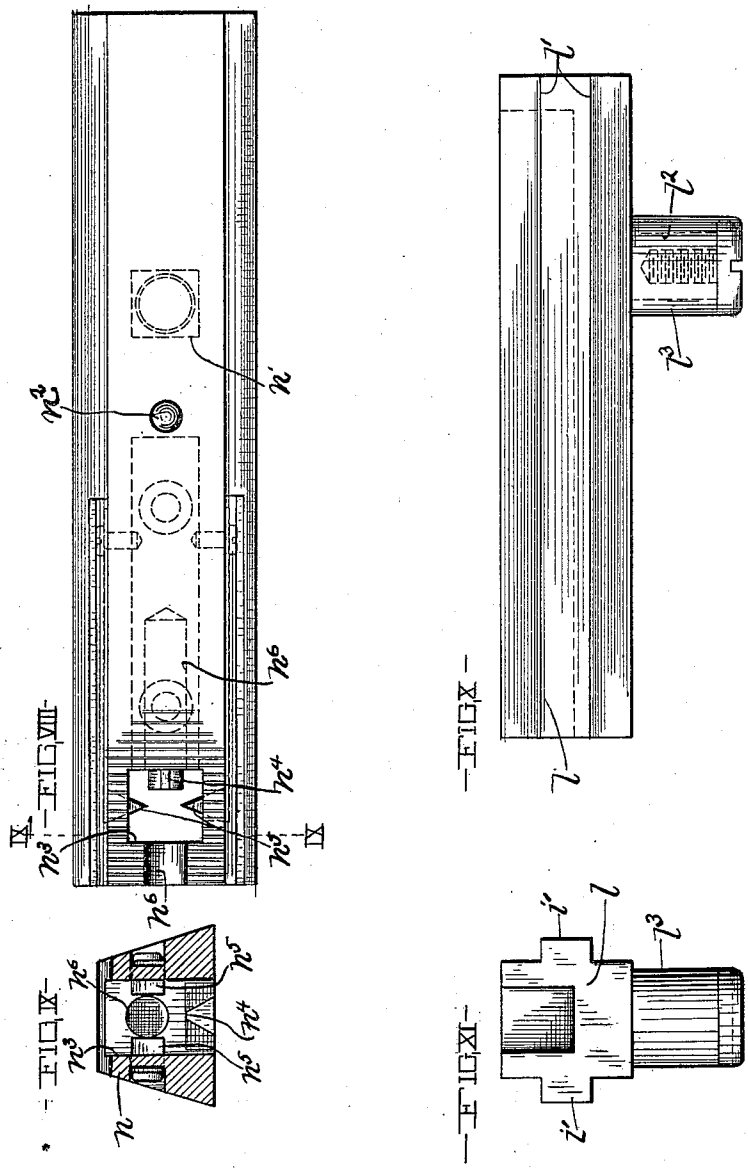

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UNITED STATES PATENT OFFICE.

THOMAS FERRY, OF CLEVELAND, OHIO.

NUT-TAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 698,828, dated April 29, 1902.

Application filed March 31, 1900. Serial No. 10,996. (No model.)

To all whom it may concern:

Be it known that I, THOMAS FERRY, a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Nut-Tapping Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in nut-tapping machines.

The object of my invention is to provide an improved nut-tapping machine comprising mechanism for actuating the tap, means for reversing the movement of said tap-actuating mechanism, mechanism for feeding the nut onto the tap, means for withdrawing the nut from the tap, means for feeding the nuts in position for the beginning of the tapping operation, and means for collecting the nuts when the operation is completed.

My invention also consists of certain details of construction and arrangement of parts, which will be fully set forth hereinafter in the specification, illustrated in the drawings, and pointed out in the claims.

Referring to the drawings, Figure I represents a longitudinal sectional view of my improved machine. Fig. II is a section on lines II II, Fig. I, showing the mechanism for agitating the nut-receptacle. Fig. III is a longitudinal sectional view showing the relative position of the parts of the machine when the tapping operation is just completed, the nut being still on the tap. Fig. IV is a longitudinal sectional view showing the relative position of the parts of the machine when the tapping operation has been completed and the nut is almost withdrawn from the tap. Fig. V is a sectional view showing a portion of the work-carriage and a portion of the nut-conduit with the sliding gate open and a nut being ejected therefrom. Fig. VI is a sectional view on lines VI VI, Fig. I. Fig. VII is a sectional view on line VII VII, Fig. I, showing the gear for operating the chuck-spindle. Fig. VIII is a plan of the nut-carrying slide. Fig. IX is a section on line IX IX, Fig. VIII. Fig. X is a side elevation of the sliding box. Fig. XI is a cross-section on lines XI XI, Fig. VIII.

Referring to the drawings, a represents the base of the machine. Mounted upon the base a are the pedestals or supports a', a^2, and a^3, in which are formed bearings for the shaft c, which extends longitudinally the full length of the machine. Mounted in bearings in the pedestals a' and a^2, above the shaft c and parallel therewith, is a spindle b. This spindle is operatively connected with the shaft c by means of a train of gears c', so that motion may be imparted from the said spindle to the said shaft. The spindle b is provided with a driving cone-pulley b'. The inner end of the spindle b is bored centrally for a short extent and provided with an internal screw-thread, as at b^2. Into this bore is secured a hollow screw-threaded stem formed integral with the hub of a gear-wheel d. The body of this gear is countersunk, so as to form an annular recess d'. Projecting outwardly from the flange of the gear d at diametrically opposite points are the lugs or pins d^3 d^3. The object of these pins will be explained hereinafter.

A pedestal f extends upwardly from the base a and supports a housing f'. This housing f' is preferably formed in two sections f^2 and f^3, suitably secured together, preferably, so as to be oil-tight. Each of the respective sections is bored so as to form bearings f^4 and f^5 immediately opposite each other and in line with the bore in the end of the spindle b. This housing f' is located and adapted so as to receive the end of the spindle b in the bearing f^4 and to inclose the gear d, secured to said spindle. A collar b^3 is located on the end of the spindle between the bushing b^4 and the adjacent portion f^2 of the housing. This collar serves to prevent dust or other foreign material from working into the interior of the housing.

In the interior of the housing, immediately opposite and adjacent to the gear d, is located a gear e. This gear is preferably of less diameter than the gear d and is rotatably secured in its position by means of an elongated hub or hollow stem mounted in the bearing f^5. The body of the gear e adjacent to the gear d is countersunk, so as to form a recess e', corresponding to the recess d' formed in the body of the gear d. The body of the gear e is also provided with lugs or pins

e^2 e^2, diametrically opposite each other. A pinion g is mounted in the lower part of the housing, extending under the gears d and e and having its axis parallel with the axes of the said gears d and e. This pinion is located so as to be always in mesh with the gear d. Between the gear e and the pinion g is located a pinion e^4, adapted to mesh with both the gear e and the pinion g.

h represents the chuck-carrying spindle. This spindle is adapted to enter and have its bearing in the hubs of the gears d and e, respectively, and is arranged so that it may have a slight longitudinal movement in its said bearings. This spindle is provided with lugs or pins h' and h^2, which extend into the recess formed in the gear d or the gear e, according to the relative position of the spindle. The function of these pins is to engage the pins or lugs on the bodies of the gears d and e, respectively, according as the spindle is moved in or out in its bearings.

Motion is transmitted to the chuck-spindle as follows: The spindle b is rotated by means of the cone-pulley b', which in turn revolves the gear d, which is rigid with the said spindle. The said gear d in turn rotates the pinion g, which imparts rotary motion to the pinion e^4, which in turn revolves the gear e. It will thus be seen that the gears d and e will always revolve when the machine is in motion, but that the gear e will revolve in the opposite direction to that in which the cone-pulley is being driven. When it is desired that the chuck-spindle shall be driven in the direction in which the cone-pulley is being driven, the chuck-spindle is pushed back in its bearings until the lugs h' and h^2, formed on the said chuck-spindle, enter the recess in the gear d, where the lugs will be engaged by the pins d^3 d^3, and the chuck-spindle will be carried around in the direction in which the gear d is moving. When it is desired to reverse the movement of the chuck-spindle, the chuck-spindle is pulled forward until the pins h' and h^2 enter the recess formed in the gear e, where they are engaged by the pins e^2 e^2. The spindle will then be revolved in the direction in which the gear e is revolved, which will be in the opposite direction to that in which the pulley is being driven.

As will be hereinafter explained, in the operation of my machine the pushing in or pulling out of the chuck-spindle, so as to cause its engagement with the respective gears d or d', is automatically accomplished by the engagement of the tap with the work.

A bifurcated pedestal or support i (shown in cross-section in Fig. IV of the drawings) is mounted on the base a so as to straddle a portion of the shaft c. On the portion of the shaft c arched by this pedestal is rigidly keyed a cam k. This cam is composed of two members rigidly mounted on the shaft c a short distance apart, so as to form a cam-groove k'. This groove extends diagonally around the periphery of the cam for a quarter of its circumference at two diametrically opposite points and at right angles to the axis of the cam at two diametrically opposite points the rest of the circumference. The cam will thus impart an intermittent backward and forward motion to the mechanism driven thereby.

The mechanism for feeding the nuts to the tap consists, essentially, of a positively-actuated intermittingly-reciprocating slide l and a nut-receiving and carrying slide n, located in juxtaposition to and movable parallel with said slide l and adapted to be operated in one direction by the said slide l through the medium of a spring and to be returned to its original position by a pull of a spring attached to said slide and the frame of the machine. This mechanism is constructed as follows: In the top of the pedestal i is formed a slideway i', into which is fitted a sliding box l, open at its top and forward end. This sliding box is approximately cruciform in cross-section, as shown in Fig. XI, and the projecting arms l' l' are adapted to fit into grooves formed in the opposite sides, respectively, of the slideway i'. The bottom of the slideway is cut away to permit the free movement of a lug l^2, which projects downwardly from the bottom of the sliding box l. This lug is provided with a friction-roller l^3, adapted to fit into and travel in the peripheral groove k'. In the sliding box l is placed a coiled spring m, having one of its ends abutting against the closed end of said box.

Immediately above the slideway i' is formed a slideway i^3. Into this slideway is fitted the nut-carrying slide n. A stud or lug n' projects downwardly from this slide into the sliding box l and abuts against the forward end of the spring m. At a suitable point on the top of the slide n is secured a stud or lug n^2. To this stud is fastened one end of a coiled spring o. The other end of the spring o is adjustably secured to the pedestal a^3 at the rear of the said slide. A vertical slot or opening n^3 is formed in the forward end of the slide n, extending from the top to the bottom of the slide. An approximately triangular ledge n^4 extends part way into this opening and forms a shelf or rest for the nut when in position to be tapped. Spring-controlled supports n^5 n^5 project into this opening and are adapted to hold the nut vertically on the ledge n^4. Sufficient space is left unimpeded to allow the nut to drop through the opening n^3 when it is drawn from the ledge n^4 and freed from the tap. A bore n^6 is formed in the slide n, extending inwardly from the front end of the slide and in line with the axis of the chuck-spindle. This bore is formed to accommodate the end of the tap after it has passed through the nut.

p represents a hopper adapted to receive and feed the nuts to the nut-carrying slide n. This hopper is mounted upon the pedestal a^3 by means of a support p' and spring connection p^2, which allow it to have a slight vibratory movement. This vibratory movement

is imparted to the hopper by means of a toothed wheel r, mounted on the side of the pedestal a^3. When the wheel is revolved, the teeth r' come in contact with a bar p^3, depending from the hopper. This wheel is operatively connected with the shaft c by a sprocket-chain s and sprockets s' s^2. The hopper is provided with a feed conduit or spout p^4, the mouth of which is located so as to be over the opening n^3 when the work-carriage is in position to receive a nut-blank. The nut slips into the opening n^3 and rests on the ledge n^4 behind the supports n^5 n^5. As the slide n moves forward the upper face of the said slide closes the mouth of the feed-conduit, retaining the blanks therein, and said conduit will remain closed until the slide is again drawn backward to its first position. At the front end of this spout is located a vertically-sliding gate p^5. This gate allows such nuts as will not fit the aperture in the work-carriage to be forced out of the spout by the contact of the upper surface of the work-carriage.

A receptacle t may be located beneath the machine to receive the nuts when tapped.

The operation of the machine is as follows: Motion is imparted to the main driving-pulley, which revolves the spindle b. The spindle b communicates motion to the shaft c by means of the gearing c'. The shaft c revolves the cam k. When the lug l^2 first enters the diagonal portion of the groove k', the slide l is quickly advanced, compressing the spring m against the lug n' and causing the work-carriage to advance toward the tap. The nut-blank is forced against the tap, and if the chuck-spindle is not already in engagement with the gear d the pressure of the nut against the tap pushes the spindle back in its bearings until it is engaged by the said gear. When the lug l' enters the portion of the groove k' which is at right angles to the axis of the cam, the slide l remains stationary; but as the spring m is compressed by the forward movement of the slide l it continues to push the work-carriage forward. The nut is thus fed to the tap by a continuous yielding pressure until the tapping operation is completed. As the cam continues to revolve the lug l' enters the diagonal groove on the opposite side of the cam and the slide l is drawn back, relieving the forward pressure on the work-carriage. The spring o then pulls the work-carriage backward, and as the nut remains on the tap it is pulled from the ledge n^4 and held against the opposite wall of the opening n^3. As the spring o continues to pull the work-carriage backward the chuck-spindle is pulled forward from its engagement with the gear d and caused to engage with the gear e. The tap will then be rotated in the reverse direction from that in which it was being rotated, while the nut-carriage will continue to travel backward, gradually drawing the nut from the tap with just sufficient pressure to permit it to unthread itself without danger of stripping the thread. When the nut is freed from the tap, it drops through the opening n^3 into a conveniently-arranged receptacle t.

What I claim is—

1. In a nut-tapping machine, a frame, a tap, means for imparting rotary movement to said tap, a slide, a cam arranged to positively operate said slide in an intermittent backward and forward direction, in line with said tap, a nut holding and feeding carriage, mounted independently of said slide and arranged to move in the path thereof, means substantially as described for holding the nut on said carriage while being tapped, means substantially as described for drawing the nut from said tap and a spring mounted on said slide and arranged to exert a pressure upon said carriage when said slide is advanced toward the tap, substantially as described and for the purpose set forth.

2. In a nut-tapping machine, a tap, means for imparting rotary movement to the same, a work-carriage adapted to slide in a suitable support, a sliding box located in juxtaposition to said work-carriage, a spring located in said sliding box having one of its ends abutting against the end of said box and its other end abutting against a lug projecting from the work-carriage, and means for intermittently reciprocating said sliding box forward and backward, substantially as described and for the purpose set forth.

3. In a nut-tapping machine, a frame, a tap, a driving-spindle for operating said tap, a work-carriage mounted on said frame and adapted to slide thereon, a coiled spring having one end connected to said work-carriage and the other end connected to the frame in the rear of said carriage, a lug depending from said work-carriage, a shaft mounted beneath said driving-spindle, gear-wheels operatively connecting said shaft and said driving-spindle, a cam keyed to said shaft below said work-carriage, a slide between said work-carriage and said cam and operatively connected with said cam, and an elastic medium forming an operative connection between the said slide and the said work-carriage.

4. In a nut-tapping machine, a tap-carrying spindle, suitably-operated driving mechanism for imparting a rotary movement to said spindle, suitably-operated mechanism for reversing the rotary movement of said spindle, a work-carriage adapted to feed the nut onto the tap and draw it off from the tap, and means for operating said work-carriage, comprising a cam rotatably mounted below said work-carriage, a slide located between said work-carriage and said cam and operatively connected with said cam, and an elastic medium forming an operative connection between the slide and the said work-carriage.

5. In a nut-tapping machine, a frame, a tap, a driving-spindle for operating said tap, a work-carriage mounted on said frame and adapted to slide horizontally thereon, a coiled

spring having one end connected to said work-carriage, and the other end connected to the said frame in the rear of said work-carriage, and a positively-driven slide operatively connected to said work-carriage by means of a yielding connection located between said carriage and said slide, substantially as described and for the purpose set forth.

6. In a nut-tapping machine, the combination with a work-carriage, of a device for supplying blanks to said work-carriage, comprising a receptacle secured to springs mounted upon a support located in proximity to said work-carriage, a discharge-conduit leading from said receptacle to said work-carriage, the mouth of said discharge-conduit being located so as to be closed by the upper surface of the work-carriage except when the work-carriage is in its farthest back position, an opening formed in the side of said discharge-conduit, a slide normally closing said opening, a toothed wheel mounted in proximity to said receptacle, means for rotating said toothed wheel, and a lug depending from said receptacle and adapted to engage the teeth of said wheel, substantially as described and for the purpose set forth.

Signed by me at Cleveland, Ohio, this 27th day of February, 1900.

THOMAS FERRY.

Witnesses:
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