(No Model.) 3 Sheets—Sheet 1.

N. B. WOOD.

NUT TAPPING MACHINE.

No. 544,494. Patented Aug. 13, 1895.

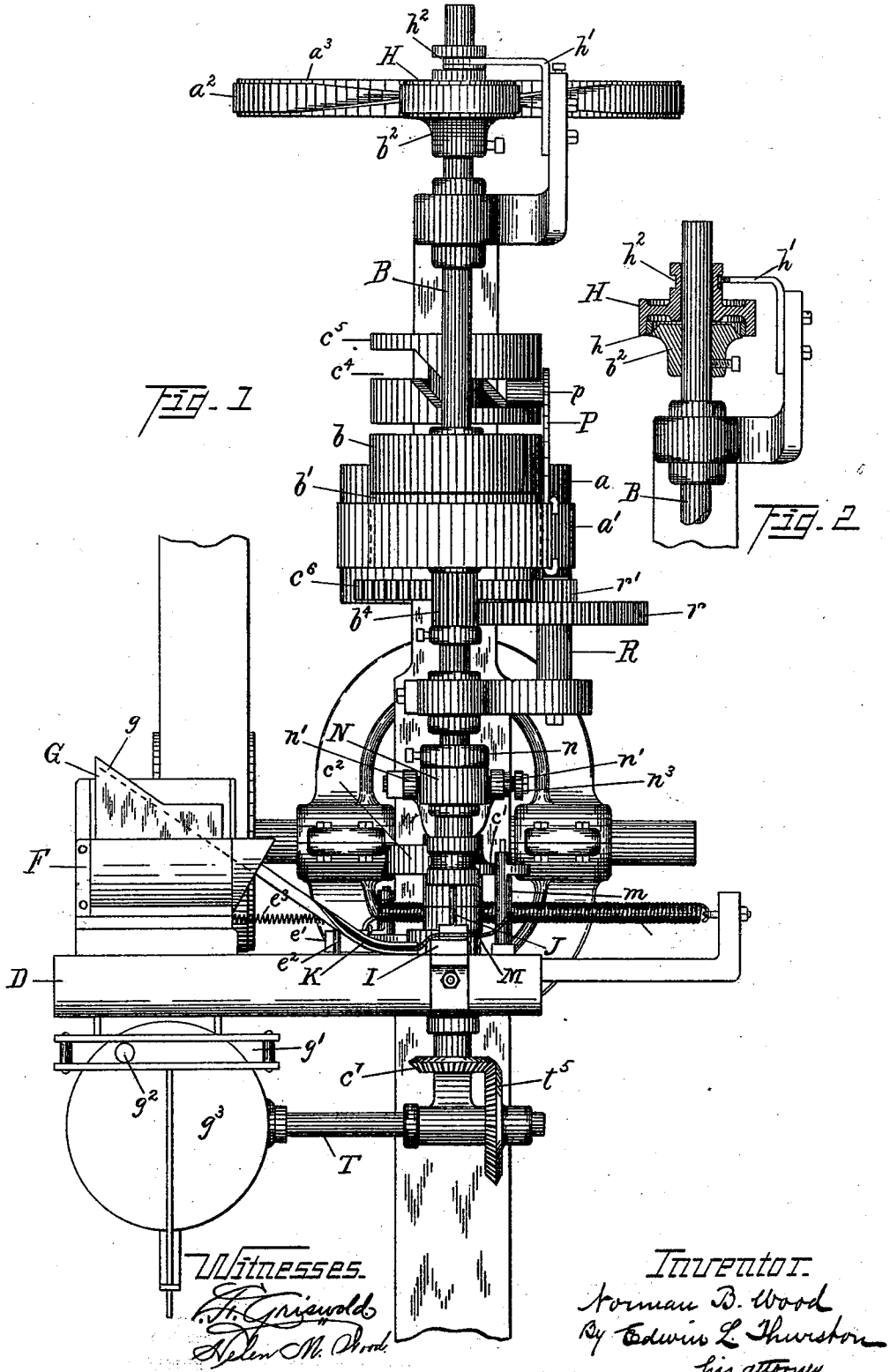

Fig. 1

Fig. 2

Witnesses.
H. Griswold
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Inventor.
Norman B. Wood
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(No Model.) 3 Sheets—Sheet 2.

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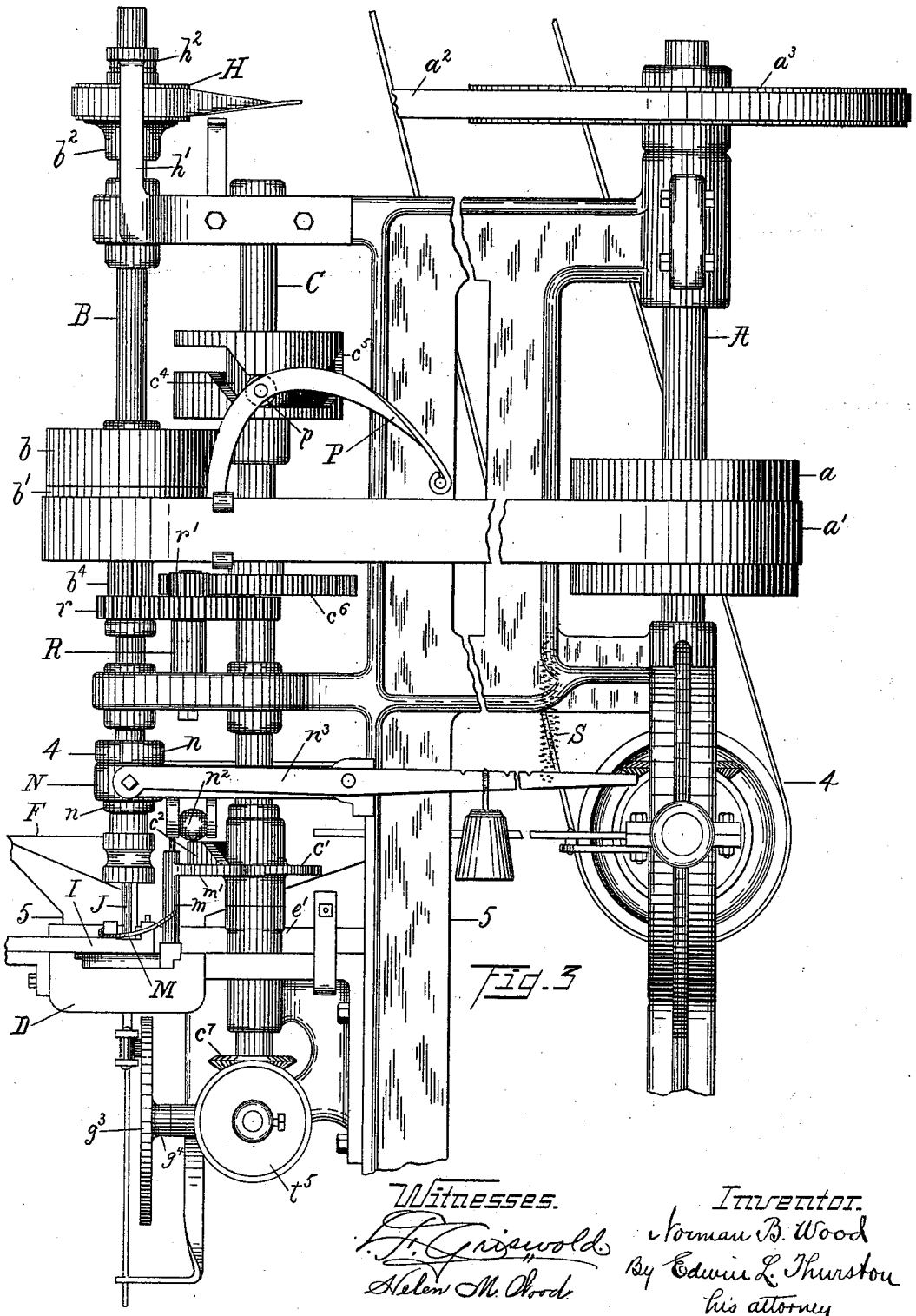

FIG. 3

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(No Model.) 3 Sheets—Sheet 3.

N. B. WOOD.

NUT TAPPING MACHINE.

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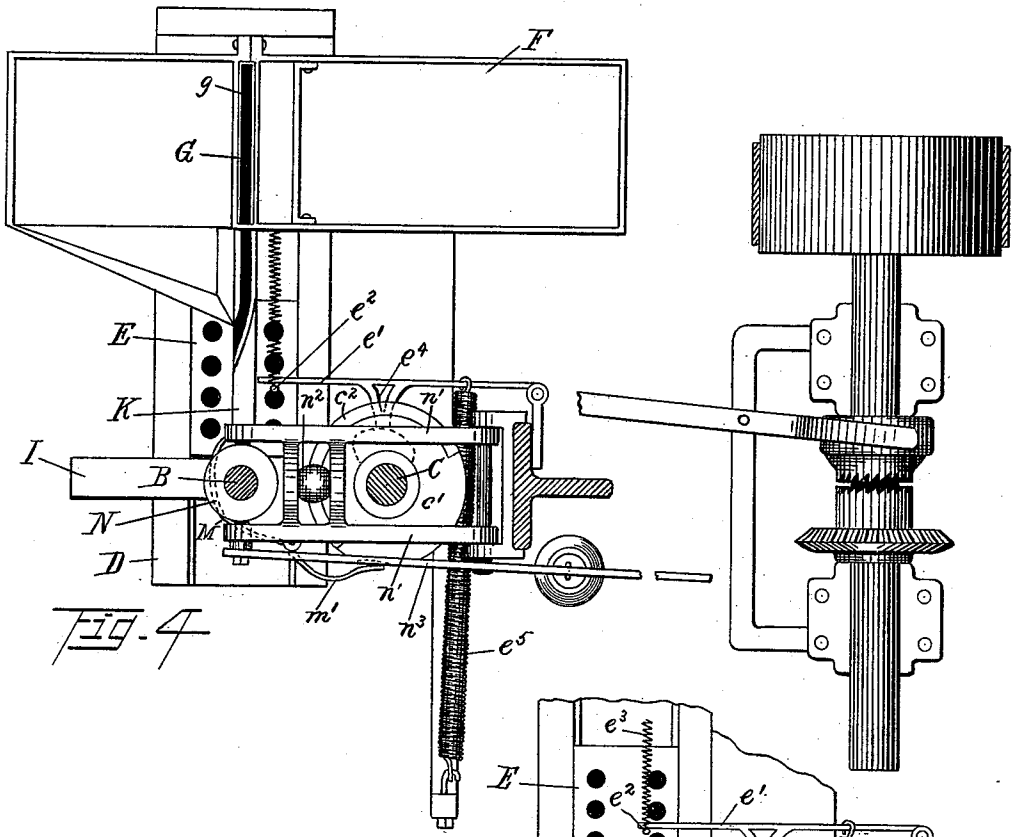

Fig. 4

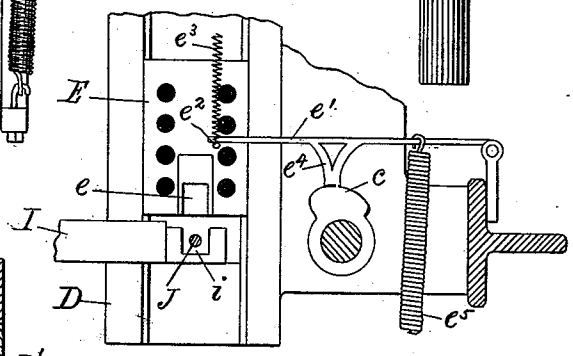

Fig. 5

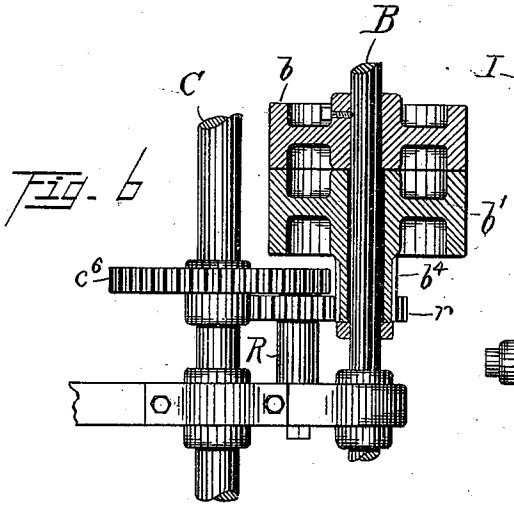

Fig. 6

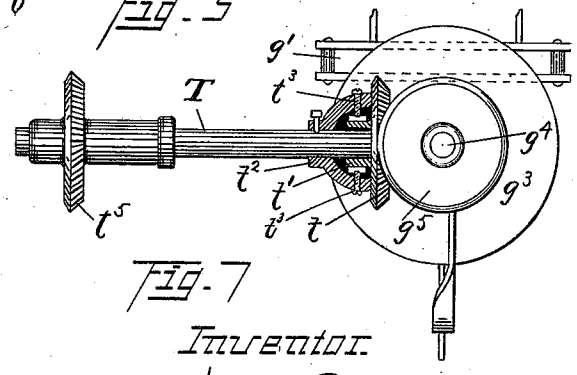

Fig. 7

Witnesses.
F. H. Griswold
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Inventor.
Norman B. Wood
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UNITED STATES PATENT OFFICE.

NORMAN B. WOOD, OF CLEVELAND, OHIO, ASSIGNOR TO THE LAMSON & SESSIONS COMPANY, OF SAME PLACE.

NUT-TAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,494, dated August 13, 1895.

Application filed February 13, 1895. Serial No. 538,306. (No model.)

To all whom it may concern:

Be it known that I, NORMAN B. WOOD, a citizen of the United States, residing at 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 appertains to make and use the same.

My invention relates to improvements in machinery for tapping nuts.

The object of the invention is to provide a machine with which nuts may be automatically and rapidly tapped; and the invention consists in the construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a vertical section of the upper end of the tap-shaft. Fig. 3 is a side elevation thereof. Fig. 4 is a sectional plan view on line 4 4 of Fig. 3. Fig. 5 is a sectional plan view on line 5 5 of Fig. 3. Fig. 6 is a vertical section through the part of the tap-shaft on which the fast and loose pulleys are mounted; and Fig. 7 is a rear view of the mechanism for operating the nut-feeding plate, a part of said connecting mechanism being sectional.

Referring to the parts by letters, A represents the driving-shaft.

B represents the vertical tap-shaft, which is mounted in suitable bearings in which it may have an endwise movement, and in which it may be revolved in either direction.

C represents a constantly-driven shaft, which carries a certain mechanism for causing the movements of the tap-shaft, feed plate, spout, and slide, and other parts, as will be hereinafter described. These several shafts are mounted in suitable bearings in the framework of the machine.

D represents the bed of the machine, and F a hopper, which is adapted to contain a supply of nuts to be tapped.

On the tap-shaft are a fast pulley b and a loose pulley b'. On the shaft A is a pulley a, and a belt a' passes around the pulley a and either of the pulleys b or b', as the case may be.

H represents a pulley concentric with the tap-shaft, and in the construction shown it is mounted loosely upon the upper end of the tap-shaft, and it is connected by a crossed belt a^2 with a pulley a^3 on the main shaft. A clutching device is provided for connecting the pulley H to the tap-shaft, for the purpose to be presently explained, when said shaft is lifted. The clutching device employed in the machine, as shown, consists of a cone b^2 fast on the tap-shaft, and a correspondingly-shaped recess h in the under side of said pulley H. The pulley H is prevented from having an endwise motion by means of the fixed arm h', secured to the frame, and having a forked end which embraces and lies in a groove h^2 in the hub of the pulley H.

Secured to the bed of the machine is a wrench I having an angular aperture i, and the tap J, which is secured to the lower end of the tap-shaft, enters and operates in said aperture.

E represents a slide mounted in suitable ways on the bed-plate. It has a recess e in its top side adapted to receive a nut as it drops down from the feed-spout K, and to prevent the revolution of said nut when the tap is operating upon it. This slide reciprocates between a position where the middle of said recess is directly below the tap and a position where a nut may drop from said spout into said recess.

The mechanism provided for moving the slide in the path described is as follows: A lever e' is pivoted to a fixed point and its forward end engages behind a pin e^3 on the slide E. This lever is moved back from said pin by a cam c on the shaft C, which engages with a lug e^4 on said lever, whereupon a spring e^5 draws the slide back to the spout K. When the cam c passes away from said lug, a spring e^5 draws the lever forward against the pin e^2, and the slide is thereupon moved to the other end of its path of travel—viz., so that the nut which lies in the recess e is beneath the tap. The bottom of the hopper inclines downward from both directions, and in the lowest part

of said hopper is a slot which extends from one side to the other thereof. Through this slot a vertically-reciprocating feed-plate G passes, which has in its upper side a groove g, which is of a width suitable to contain the nuts on edge. This groove is inclined downward toward the side adjacent to the tap, where is placed an inclined feed-spout K. This feed-spout is so disposed that when the feed-plate is raised the nuts may slide by gravity from the groove g into the upper end of said spout.

In the lower part of the feed-plate G, which projects below the hopper, is formed a horizontal slot g', in which a crank-pin g^2 lies and operates. This pin, as shown, projects from a disk g^3 secured to the shaft g^4, which may be revolved by any suitable mechanism, but is preferably revolved by the means which I will presently explain. When the plate G is down, the nuts slide by gravity into the groove g. When it is raised, said nuts slide into the mouth of the spout K, but rest therein on their edges. This spout is given a quarter-turn, as shown, whereby at its lower or delivery end the nuts lie therein upon their bottoms. The nuts drop one by one from the delivery end of said spout into the recess e in the feed-slide E, by which they are carried beneath the tap. A spring-finger M enters a slot in one side of the feed-spout and bears against the lowest nut therein and keeps it and the nuts behind it from falling out. This finger is secured to a short vertical rock-shaft m, having an arm m', which engages with the edge of a cam c'. This cam is secured to the shaft C, and it acts against the arm m' to so turn the shaft as to force the spring-finger M against the nut in the spout; but for an instant, while the slide is at the left end of its path of travel, a notch (shown by dotted lines in Fig. 4) in the edge of cam c' permits the rock-shaft m to move a very little, so as to relieve the pressure, whereupon one nut drops from the spout into the recess e. A sleeve N loosely surrounds the shaft B, lying between the two fixed collars n n. Two levers n' n' are pivoted to the frame and their ends are connected with the sleeve N. On the under side of a yoke connecting the levers a friction-roller n^2 is mounted, which roller bears upon the top of a cam c^2 on shaft C. As this cam pushes the lever n' upward, the tap-shaft is lifted, and when the cam ceases to so act the shaft will descend either by its own weight or by the action of a spring S. (Shown in dotted lines in Fig. 3.) A counterbalanced lever n^3 may also be provided to relieve the tap of the whole weight of the shaft when a nut is being threaded. When it is so employed, it is pivoted concentrically with the levers n' n', and is likewise pivoted to the sleeve N on the same pivot with one of the levers n'. If a small tap is being used, the counterbalanced lever is used for the purpose specified and the position of the weight thereon is changed as required. When a very large tap is being used, the weight on the lever may be removed and the spring S may be connected as described. When medium-sized taps are being used, the weight and spring may both be dispensed with. The counterbalanced lever and spring afford means for exactly regulating the pressure upon the tap.

P represents a pivoted lever, which serves as a belt-shifter to move the belt a' from the fast pulley b to the loose pulley b', and vice versa. Projecting from said lever P is a pin p, which enters a cam-groove c^4 in the edge of the disk c^5 on shaft C, whereby said lever is operated.

I have heretofore described the shaft C as one which is constantly driven, and obviously it will perform all of its functions if so driven by any means; but I prefer to employ the following means to drive it, viz: A pinion b^4 is formed on the extended hub of the loose pulley b'. This meshes with a gear r on the intermediate shaft R. A pinion r' on said shaft meshes with a gear c^6 on the shaft C. The loose pulley b' is of such width and the movement of the belt a is so regulated that said belt never wholly leaves said pulley. It either engages wholly with the loose pulley b' when in its lowest position, or with both pulleys b and b' when in its highest position. Consequently the loose pulley b' is always revolving, and through the gears and pinions referred to it produces the continuous revolution of the shaft C, although at a slow speed.

The crank-shaft g^4 which operates the feed-plate is driven from the shaft T by means of the meshing bevel-gears t and g^5. In order to prevent anything from being broken, if the nuts get jammed in the hopper, the bevel-gear t is secured to the shaft by means substantially as shown, which permits said gear to revolve upon said shaft in case of unusual strain. The gear is mounted loosely upon the shaft, and it has a rigid hub t' which projects into a shell t^3 which is rigidly secured to the shaft. A friction-band embraces the hub t' and is caused to embrace it more or less closely, as desired, by means of the said set-screws t^3 which screw through the shell and into dents or depressions in said friction-band. The shaft T is driven by means of the bevel-gear t^5 which meshes with a bevel-gear c^7 on the lower end of shaft C.

The operation of the machine is as follows: When the feed-slide E with a nut in the recess e moves beneath the tap, the tap-shaft is being held in a raised position by the action of the cam c^2 on the levers n' n'. As the cam continues to revolve the tap-shaft is permitted to fall by its own weight. The tap enters the hole in the nut and cuts the thread therein. The cam c^2 then lifts the tap-shaft through said arms n' n', and the nut on the tap is carried into the hole in the wrench by which its revolution is prevented. At ap-

proximately the same time that the shaft B is raised the belt a' is moved by the shifter P off of the fast pulley b onto the loose pulley b'. The upward movement of said shaft causes the pulley H to be clutched or connected thereto, whereupon the said shaft B is revolved in the contrary direction, with the result of unscrewing the nut from the tap, and the nut falls from the embrace in the wrench into a suitable receptacle provided for it. Immediately after the tap-shaft is raised the feed-slide is moved back by the action of cam c to the point where a nut may drop from the feed-spout into the recess e, which nut is carried beneath the tap immediately after the nut last threaded has dropped out of the wrench, and this operation is rapidly repeated. The feed-plate is moved up and down in the hopper by the mechanism provided for this purpose. In its upward movement it carries up in the inclined groove in its top one or more nuts which slide into the feed-spout when the plate is at its highest point.

Having described my invention, I claim—

1. In a nut tapping machine, in combination, a longitudinally movable tap shaft adapted to be revolved alternately in opposite directions, fast and loose pulleys on said shaft, a driving belt, a belt shifter, means for operating the latter, and means for reversing the motion of the shaft, a device for feeding the nuts one by one beneath said shaft, and a fixed wrench, a cam shaft receiving motion from the tap shaft, a cam thereon, and a pivoted lever operated by the said cam and engaging with and moving said tap shaft longitudinally, substantially as and for the purpose specified.

2. The combination of a shaft B, fast and loose pulleys thereon, a belt for driving them, and a belt shifter adapted to move the belt substantially as described so that it will drive the loose pulley alone or both pulleys together, a shaft C, and intermediate connections between the loose pulley and said shaft, whereby the latter is constantly driven, substantially as and for the purpose specified.

3. In a nut tapping machine, in combination, a longitudinally movable tap shaft, a fast and loose pulley thereon, a belt for driving them, a loose pulley constantly driven in a fixed plane in the opposite direction, a clutching device for connecting said pulley with the shaft, a belt shifter, means for operating it, and mechanism for moving the tap shaft longitudinally, substantially as and for the purpose specified.

4. In a nut tapping machine, in combination, a longitudinally movable tap shaft, fast and loose pulleys thereon, a pinion rigid with the loose pulley, a cam shaft, gears connecting said pinion and cam shaft, a driving belt, a belt shifter adapted to move said belt off of the fast pulley and onto it again without moving it off of the loose pulley, a cam on the cam shaft for operating the belt shifter, mechanism for moving the tap shaft, and a cam on the cam shaft for operating said mechanism, substantially as and for the purpose specified.

5. In a nut tapping machine, in combination, a longitudinally movable tap shaft, fast and loose pulleys thereon, a belt for driving them, a belt shifter, a pulley concentric with said shaft and constantly driven in one direction, a friction clutching device on said pulley and shaft, a constantly driven cam shaft, a cam thereon operating said belt shifter, a cam and intermediate mechanism for moving said tap shaft longitudinally and causing the engagement of said friction clutching device, substantially as and for the purpose specified.

6. In a nut tapping machine, in combination, a tap shaft, means for alternately revolving the same in opposite directions, a reciprocating feed slide having in its top side a recess to receive a nut, a feed spout adapted to discharge into said recess, a pressure finger entering said spout, and means for actuating said finger so as to release one nut at a time, substantially as and for the purpose specified.

7. In a nut tapping machine, in combination, a tap shaft, means for alternately revolving the same in opposite directions, a reciprocating feed plate, a feed spout, a pressure finger entering said spout, and a revolving cam for operating said finger, substantially as and for the purpose specified.

8. In a nut tapping machine, in combination, a longitudinally movable vertical tap shaft, means for alternately revolving said shaft in opposite directions, mechanism for raising said tap shaft, a feed spout adapted to discharge the nuts singly into the feed slide, a reciprocating feed slide having a recess into which the nuts drop from the feed spout, mechanism for moving said slide back and forth between the feed spout and tap shaft, and a wrench adapted to engage with the nut on the tap, when said tap shaft is raised, substantially as and for the purpose specified.

9. In a nut tapping machine, in combination, a tap shaft, means for alternately revolving the same in opposite directions, a hopper, a vertically reciprocating feed plate therein having an inclined groove in its top edge, a reciprocating feed slide having in its top side a recess to receive a nut, and a feed spout adapted to receive the nuts from the feed plate and to discharge them one by one into said recess in the feed slide, substantially as and for the purpose specified.

10. In a nut tapping machine, in combination, a hopper, a feed plate vertically movable through the bottom of said hopper, a crank shaft for actuating said plate, a driving shaft, a bevel gear fixed to one of said shafts, a shell f^2 secured to the other shaft, a bevel gear mounted on said shaft having a hub which projects into said shell, a friction band surrounding said hub, and set screws

passing through said shell and engaging with said band, substantially as and for the purpose specified.

11. In a nut tapping machine, a longitudinally movable vertical tap shaft and mechanism for alternately revolving the same in opposite directions, mechanism for periodically raising said shaft, a sleeve loose upon said shaft, a fixed collar above said sleeve, and a counter-balanced lever engaging with said sleeve, substantially as and for the purpose specified.

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

NORMAN B. WOOD.

Witnesses:
E. L. THURSTON,
L. F. GRISWOLD.