

C. SONNEBORN.
NUT FINISHING MACHINE.
APPLICATION FILED APR. 23, 1906.

934,419.

Patented Sept. 14, 1909.

4 SHEETS—SHEET 1.

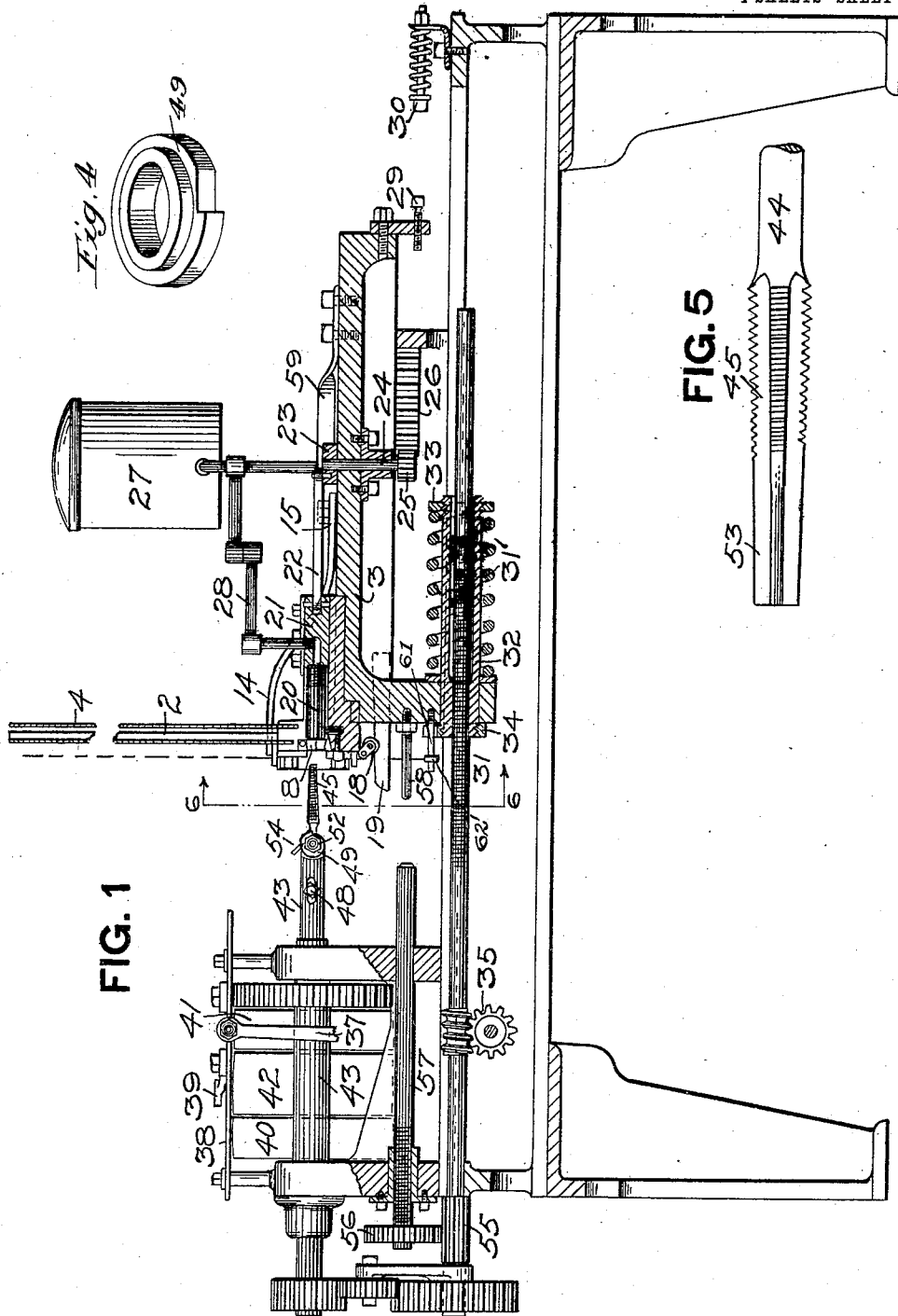


FIG. 1

FIG. 5

WITNESSES

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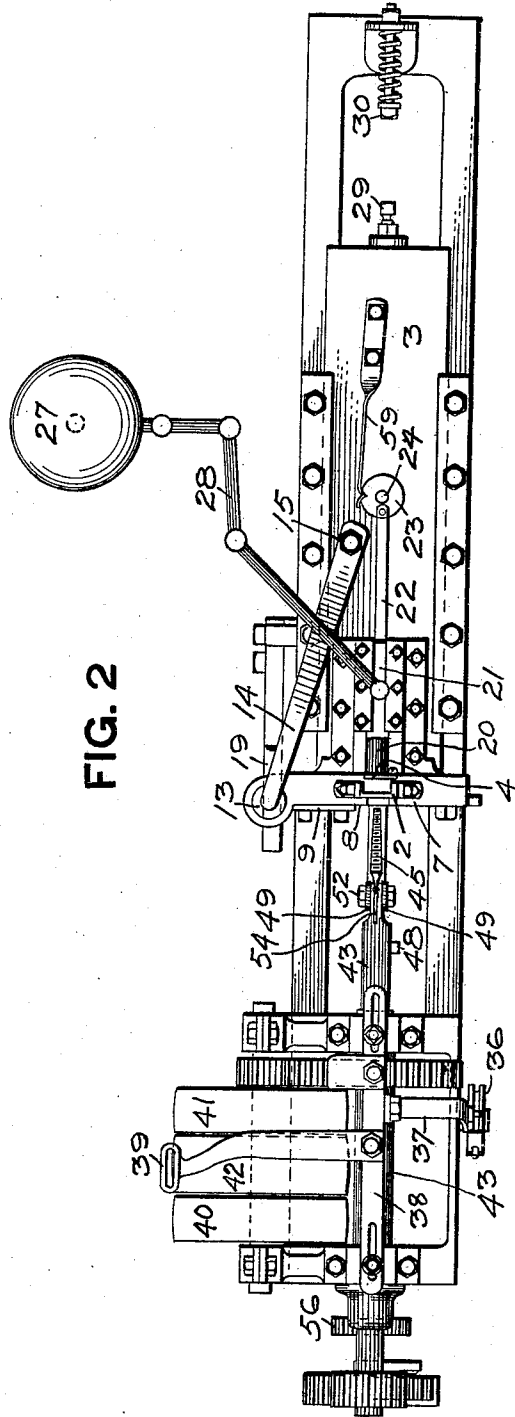


FIG. 2

WITNESSES

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4 SHEETS—SHEET 3.

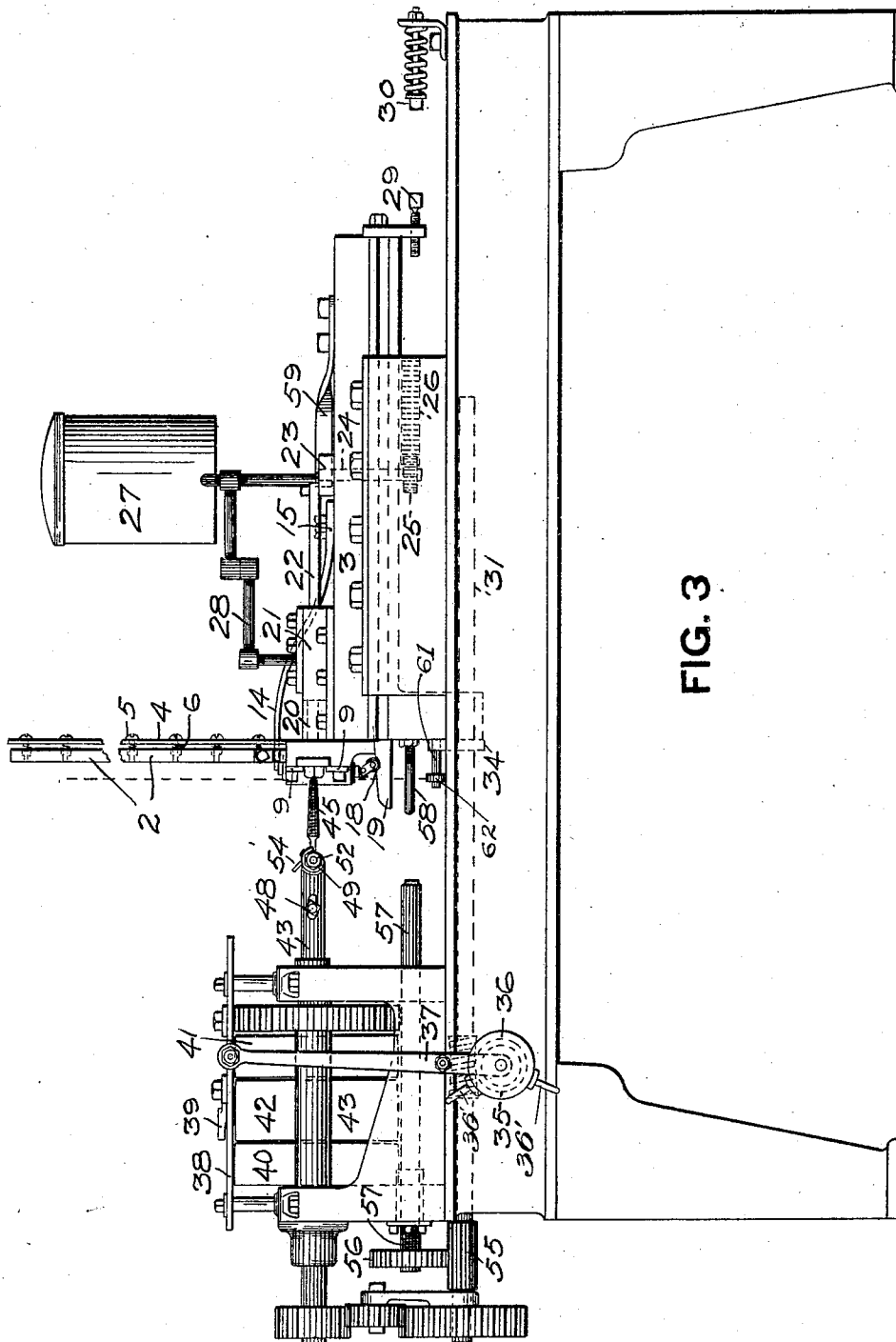


FIG. 3

WITNESSES

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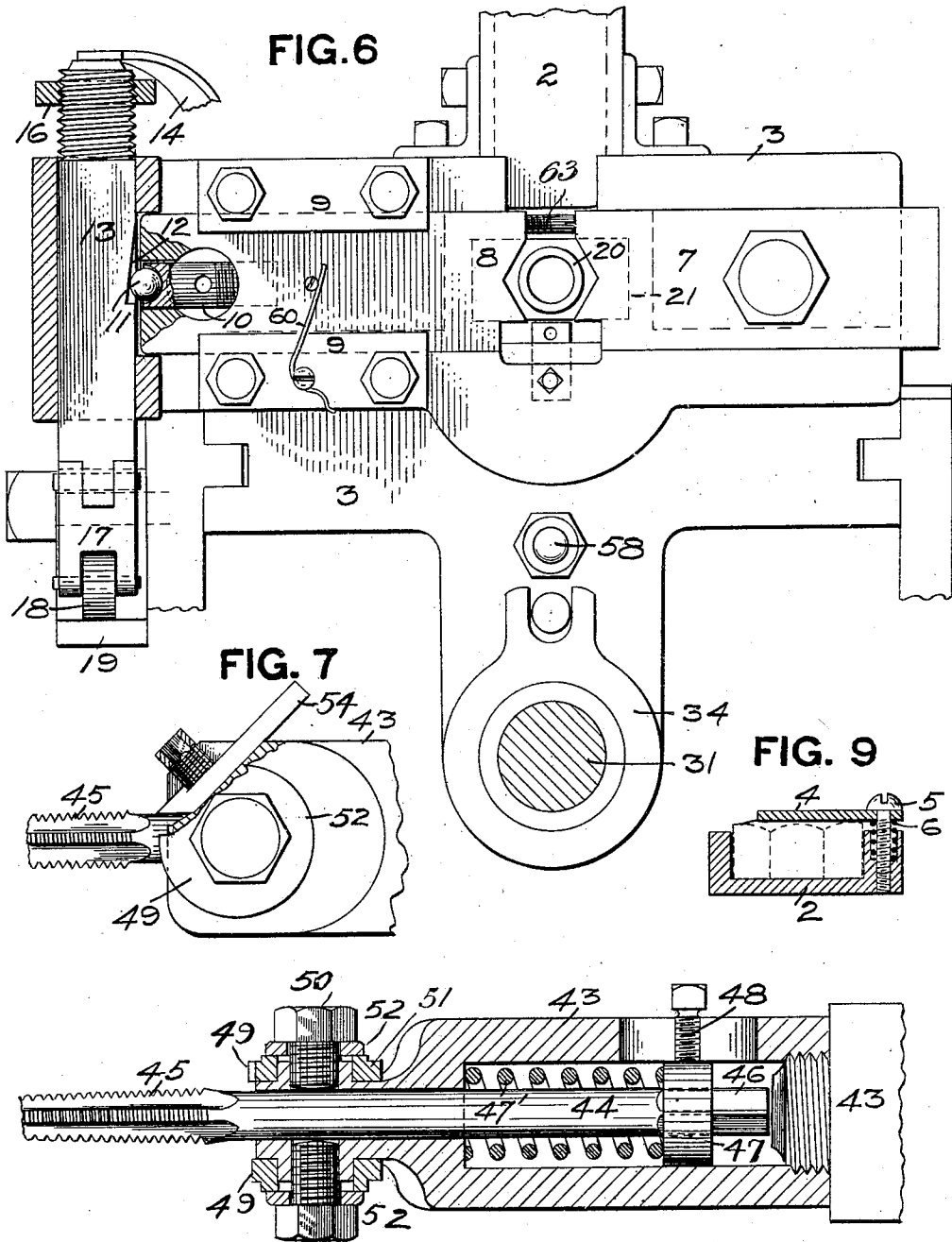


FIG. 7

FIG. 9

FIG. 8

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UNITED STATES PATENT OFFICE.

CHARLES SONNEBORN, OF WEST PITTSBURG, PENNSYLVANIA, ASSIGNOR TO GARLAND NUT & RIVET COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

NUT-FINISHING MACHINE.

934,419.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed April 23, 1906. Serial No. 313,321.

To all whom it may concern:

Be it known that I, CHARLES SONNEBORN, of West Pittsburg, Lawrence county, Pennsylvania, have invented a new and useful Nut-Finishing Machine, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:—

Figure 1 is a sectional side elevation of my improved machine in its preferred form; Fig. 2 is a top plan view, and Fig. 3 a side elevation of the machine; Fig. 4 is a detail view hereinafter referred to; Fig. 5 is a detail view of the tap; Fig. 6 is a cross-section on the line VI—VI of Fig. 1; Figs. 7 and 8 are detail views of the support for the tap, the burring and facing tools; and Fig. 9 is a cross-section of the magazine.

My invention relates to the finishing of nuts, and is designed to provide a simple and cheap machine which will carry out operation or operations at a single station or without moving the nut to different tools located in different positions. The machine may be used for reaming and facing the nut, for reaming, tapping and facing the nut, for tapping and facing the nut, or for tapping alone or reaming and tapping; also for shaving the opposite face of the nut. By the term "finishing" therefore, I mean the operation or operations which follow the tapping. The machine may be employed for hot pressed nuts, but is primarily intended for the finishing of cold punched nuts, as there is no demand for a faced hot pressed nut.

In the form shown in the drawing, in which I show the machine arranged for reaming, tapping and facing the nut, as well as removing the bur on the thread, 2 represents a vertically extending U-shaped magazine, which is mounted upon a reciprocating slide 3. The magazine is shown in cross-section in Fig. 9, and as there shown is preferably provided at one side with a holding plate 4, which is allowed a slight movement on the stem of the securing screw 5, by a spiral spring 6. Variations in the thickness of the nuts to be finished may thus be allowed for.

The magazine is secured at its lower end to a chuck device, which is of double width of the magazine. This chuck device which is carried on the slide 3 is provided with

a stationary chuck 7 having its inner end shaped to fit the nut. In the present case, where it is arranged for hexagon nuts, this inner end is cut into triangular form. The opposing gripping chuck 8 is formed as a slide moving in guide-ways 9, 9, having in its rear end an adjustable screw 10 with an end recess containing an anti-friction device 11, which is shown as a ball. This ball is acted upon by the inclined cam face 12 on a vertically moving slide-rod 13, which is normally forced downwardly by a strong leaf-spring 14 secured to the slide at 15. The rod is screw-threaded near its end and provided with adjustable collar 16 which limits its downward movement. At its lower projecting end a pivotal link 17 is provided with a roller 18 which moves upon cam bar 19 projecting from the front end of the frame. In one part of this cam near the slide is provided a notch or recess which will receive and momentarily arrest the movement of the roller on the return movement of the slide. As the roller 18 moves down the very slight angle of the cam plate 19 toward the tools it drops into the notch, and its lower part is arrested. The part 13, however, continues to move forward and down, thus bringing the parts 13 and 17 to an angle with each other, this resulting in a sudden collapse of part 13 which closes the jaw 8. When the slide is moving back away from the tools, the parts 13 and 17 are brought into line by the roller 18 striking the cam plate 19 before beginning to travel up the incline. On account of the nature of the joint, no collapse can take place on the return travel when the roller 18 enters the notch. The point of the sudden gripping may be changed by adjusting the plate 19 longitudinally.

The blanks are successively ejected from the chucks and the next nut forced into gripping position by a reciprocating tube 20 mounted on a slide 21 moving in bearings on the main slide 3. The slide 21 is actuated by link 22 connecting to crank 23, secured on the short vertical shaft 24. The shaft 24 is provided with a pinion 25 intermeshing with a stationary rack 26 secured on the frame-work. Movement of the main slide 3 therein will actuate the slide 21 as long as the rack is engaged with the pinion. In order to supply oil to the nut during the operations I preferably employ the reservoir 27 having

flexible or jointed pipe connection 28 leading to the ejector tube 20. The rear end of the slide 3 is preferably provided with an adjustable buffer 29 which limits the backward travel of the slide by contact with a spring buffer 30 on the frame at the end of the return movement.

The main slide 3 is actuated by a screw 31 extending longitudinally of the frame and acting upon a collar or bushing 32. A spring 31' is provided, one end of which abuts against a washer on the slide 3 while the other end abuts against an adjustable nut or washer 33 on the bushing 32 which is slidable and is splined to the frame 3. 34 is a clamp nut at the front end of the sleeve. The shaft 31 is shown as rotating a worm wheel 35 which drives the belt shifting fork. The worm wheel shaft has a tappet disk 36 with adjustable tappets 36' which act upon a lever 37, which in turn acts upon a sliding bar 38 carrying the belt shifter 39. This tappet system is an old device which automatically shifts the belts to reverse the movement.

The machine is provided with two belts and three pulleys, the outer pulleys 40 and 41 being idlers, while the intermediate pulley 42 is the driving pulley. The shifting of the belts not only reverses the machine, but gives a return motion of greater speed than the forward feed, this being arranged by the size of the pulleys over which the belts pass on the driving shaft for the machine.

The rotary shaft 43 is driven by the usual lathe gearing, and is preferably of tubular form to receive the shank 44 of the tap 45. This shank is preferably provided with a squared portion 46 extending through a squared hole in the ring 47 and secured by set-screw 48 which projects through a slot in the tubular shaft. A spiral spring 47' bears against the ring or collar 47, thus allowing a slight endwise movement of the tap. This slight movement is provided for in order to allow proper reengagement of the tap with the threads on the return motion, thus preventing stripping or mutilating of the threads formed during the forward feed.

The facing tools 49 are secured on opposite sides at the rear end of the tap by screws 50 having washers 52 and entering hubs 51 around which the tools fit. The tap is preferably provided with a reamer 53 at its front end which will ream out the hole in the nut preparatory to the tapping operation.

54 is a burring tool which is secured within an angular slot in the tap chuck or head and which acts to remove the bur formed by the tap.

On the shaft 31 is an elongated pinion 55, which intermeshes with a toothed wheel 56 mounted on a rotary shaft 57 in the head of

the machine. This shaft 57 is in line with an adjustable rod 58 projecting forwardly from the slide 3. During the tapping operation, the slide 3 is fed forward at the proper speed for tapping. This speed of feeding must be slower during the facing operation; and after tapping the rod 58 strikes the end of the shaft 57, which has a different speed, and thus slows down the feed of the slide 3 to that desirable for facing. During this movement the spring 31' is compressed, thus allowing for the difference in feed of the slide 3.

In order to hold the ejector tube in its forward position, I preferably provide a leaf spring 59 which is provided with a bend to engage a notch in the crank disk 23, as shown in Fig. 2, when the parts are on a dead center.

In the use of the machine the blanks are fed into the magazine in a vertical row. On the backward movement of the slide 3 the gripping chuck is released and the ejector is retracted to allow the next nut to drop to position; at the beginning of the next forward movement the ejector rod pushes the finished nut forwardly and at the same time forces the lowest nut of the row into operating position. At this same moment the roller 18 drops into the notch on the cam 19 and the gripping chuck is quickly snapped forward to grip the nut.

60 is a spring for effecting the opening movement of the chuck. At a certain point in the rearward movement, the tappet on disk 36 shifts the belts and the direction of movement of the slide 3 is changed. During this forward movement the tap will act to form the screw-threads in the nut and at the end of the tapping operation the slower feed begins, at which time the nut has passed the tap and the facing tools begin to act.

The change in the speed of the feed from that required for reaming and tapping to the slower movement suitable for burring or facing, constitutes a most important feature of my invention. The difficulty of providing practical means for automatically obtaining these two movements has retarded the introduction of automatic machines for carrying out these different operations.

The burring tool acts to remove the bur of the screw-thread after the nut has passed the tap and turns loosely around the tap. At the proper moment the other tappet on the rod 36 again shifts the belts and a quick return is given. On reengagement of the tap with the nut the spring device on the tap shank will allow a slight give in order to properly reengage the tap and threads. The tap is thus screwed out of the nut, and in the last portion of the return movement the finished nut is ejected and the next one fed into place as before.

In order to stop the machine, in case a

blank nut is fed into the magazine by mistake, I provide a projecting rod 61 on which is loosely mounted a ring 62 from which a cord (shown in dotted lines) extends to the lever by which the machine is started into operation. In this case the nut will be forced off the end of the rod 61 by the relative movement of the collar 32 and the slide 3, and a spring will then throw the actuating clutch for the machine, so as to stop the machine.

The pin 63 shown between the jaws 7 and 8 in Fig. 6 is to prevent the jaw 8 from sliding up against jaw 20 when the magazine is empty, and the machine in operation. This might happen if the machine were working empty when the part 13 drops to its lowest position, to close the jaw, and while the spring 60 might prevent this, it would not be safe practice.

If the nuts are not to be faced, the facing tools may be omitted and also the slow-feed device. The tap may or may not be provided with a reamer, or the machine may be used for reaming without tapping. In this case, there would be no reversal of movement of the reamer-carrying shaft, and no slow feed if the facing operation is not carried out.

The advantages of my invention will be apparent to those skilled in the art. The use of a turret or circular head which carries the nut blank to different stations is done away with, and the operation or operations carried out with one position of the nut. The nut is positively held by side grips during the operation, and its forward feed is slowed down where facing is employed so as to give proper relative speeds for tapping and for facing. The operations of reaming, tapping, burring, and facing, or any one or more of them, may thus be carried out cheaply and economically, while giving a large output from the machine. The operations are automatic and do not require skilled labor. As the oil is forced through the nut against the tap it carries away the chips through the tap grooves and lengthens the life of the taps.

It will be noted that the chuck members do not form a stop extending in front of the nut, but merely frictionally grip the sides of the nut. This enables the nut to be forced outwardly, and prevents injury to the machine which might result from a positive stop to the forward movement of the nut. The crank 23 is on dead center during the operations, thus preventing any backward movement. The nut may be turned over and its opposite face shaved by the use of this same machine.

Many variations may be made in the form and arrangement of the feeding device, the gripping mechanism, and the connections for giving movement to the nut. The tap or

tool may be moved forwardly through the nut instead of feeding the nut over the tool, and many other variations may be made in the form and arrangement of the parts without departing from my invention.

I claim:—

1. In a nut-finishing machine, a nut holder, a tap, another immovable finishing tool arranged to come into action after the tap has finished its operation, a common carrier for the tap and tool arranged to permit the tap to pass entirely through the nut, means for moving the nut holder and carrier relatively to each other to give the successive operations of the tools during one relative movement of the nut holder and tools, and means for permitting the tap to yield as it is withdrawn; substantially as described.

2. In a nut finishing machine, a nut holder, a plurality of finishing tools arranged to act successively upon the nut, said tools including a tap, a carrier common to and carrying all of the tools, and means for moving the nut holder and tools relatively to each other to give a plurality of successive finishing operations during one relative movement of the nut holder and tools, the tap being arranged to operate first and to pass entirely through the nut, and means for enabling the tap to yield as it is withdrawn, substantially as described.

3. In a nut-finishing machine, a tap and a finishing tool arranged one ahead of the other, a nut holder, actuating means for moving the tools and nut holder relatively to each other to cause them to act successively upon the nut during one relative movement of the nut holder and tools, and means for varying the speed of such movement whereby the feed is more rapid during the time one tool is acting than it is during the action of another tool; substantially as described.

4. In a nut finishing machine, a nut holder, a tool holder having a plurality of tools arranged to operate successively upon different portions of the nut during the same advance or feeding movement of the machine, means for feeding said holders relative to each other, and connections for reducing the speed of movement at a predetermined time during the advance or feeding stroke; substantially as described.

5. In a nut finishing machine, a nut holder, a tool holder having a plurality of tools arranged to operate successively upon different portions of the nut during the same advance or feeding movement of the machine, means for feeding said holders relative to each other, connections for reducing the speed of movement at a predetermined time during the advance or feeding stroke, and mechanism for automatically reversing the direction of movement of the holders; substantially as described.

6. In a nut-finishing machine, a nut holder

comprising a stationary chuck, a movable chuck, mechanism for actuating the movable chuck to grip a nut between it and the stationary chuck, a nut magazine, and a combined feeding and ejecting device for feeding the nut blanks from the magazine to the chucks, and for ejecting the finished blanks, and mechanism for operating the movable chuck and the feeding and ejecting device in time relation to each other; substantially as described.

7. In a nut finishing machine, a nut holder, another holder in line therewith, and having a plurality of tools arranged one ahead of the other, and means for feeding the nut holder successively toward said tools and mechanism for automatically changing the speed of the forward feed at a predetermined time; substantially as described.

8. In a nut-finishing machine, a nut-holder, a movable member upon which the holder is mounted, a holder having a tool in line with the nut, operating connections for moving the said member toward and away from the tool holder, and a combined feeding and ejecting device having a movement on said support toward and away from the nut holder and having means for ejecting a finished nut by the same movement by which it feeds a blank to the holder; substantially as described.

9. In a nut-finishing machine, a nut holder, a plurality of tools arranged one ahead of another, means for moving the nut holder and tools relatively to each other to bring the tools into successive operation upon the nut during the same relative movement of the nut holder and tools, and means for varying the speed of such movement during different operations thereof, substantially as described.

10. In a nut finishing machine, a reciprocating nut holder, a magazine supported thereon, and nut feeding and ejecting devices and actuating mechanism therefor for ejecting and bringing fresh nut blanks into

position during the reciprocating movements of the nut holder; substantially as described.

11. In a nut finishing machine, a reciprocating nut holder having a chuck, means for moving said chuck to positively grip and to release the nut, a nut magazine, and an ejector arranged to force out the finished nut and feed a fresh nut into the chuck together with a tool for operating upon the nut while it is gripped in said chuck; substantially as described.

12. In a nut finishing machine, a reciprocating slide having a nut holder, a reciprocating ejector mounted on said slide, and mechanism for moving the ejector relative to the slide; substantially as described.

13. In a nut-tapping machine, a tap, means for holding said tap rigidly while it is acting, means for permitting said tap to yield as it is withdrawing from the nut, and means for reversing the direction of rotation of the tap, substantially as described.

14. In a nut-finishing machine, a holder having a tap arranged to be rigidly held while it is cutting but to yield during its reversing movement, and another tool mounted on said holder and arranged to act after said tap has finished its cutting action, substantially as described.

15. In a nut finishing machine, a nut holder, another holder in line therewith, and having a plurality of tools arranged one ahead of the other, means for moving the two holders relatively to each other to bring the tools into successive operation, and mechanism for automatically changing the speed of the forward feed at a predetermined time, substantially as described.

In testimony whereof, I have hereunto set my hand.

CHARLES SONNEBORN.

Witnesses:

JOHN MILLER,
H. M. CORWIN.