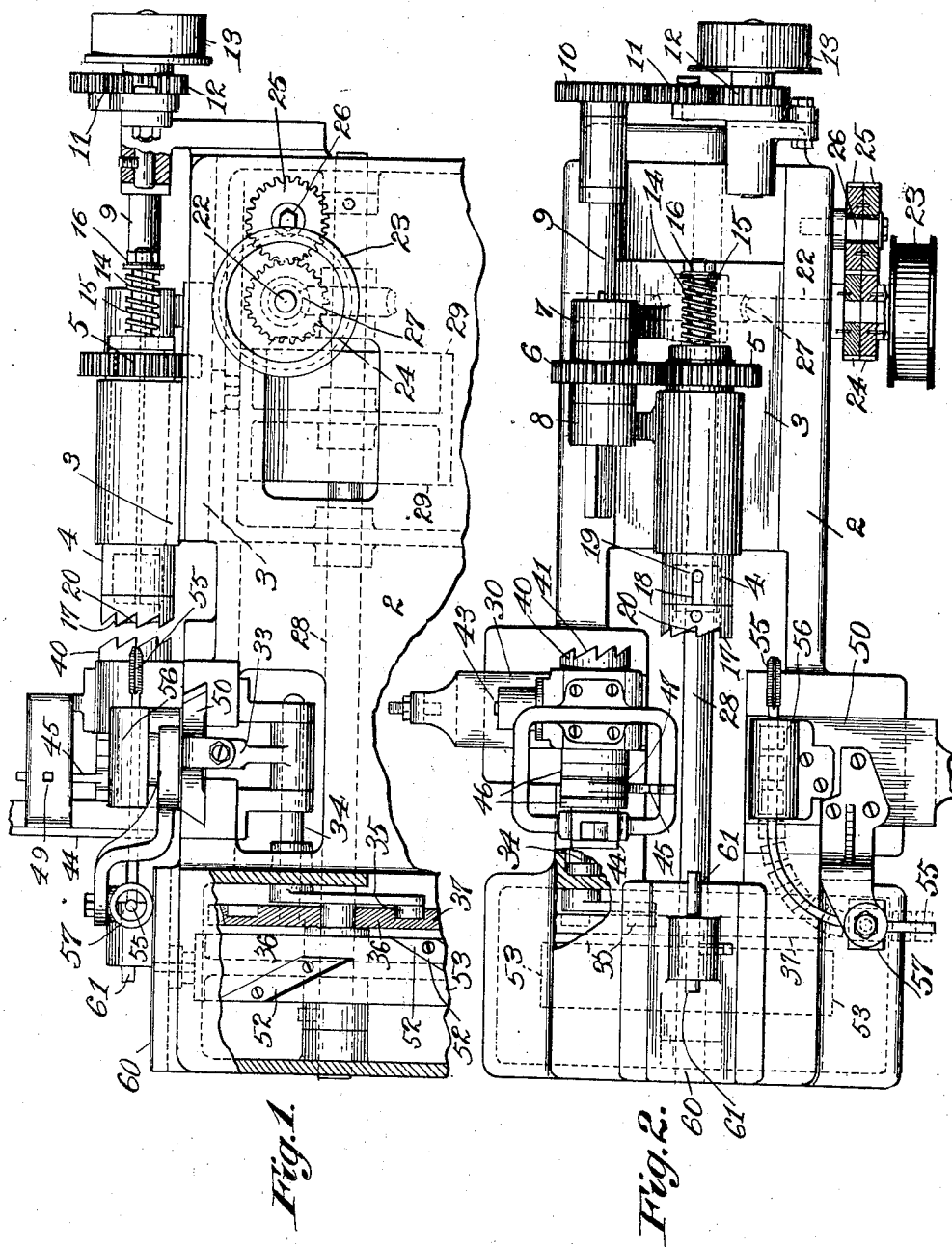


B. F. RINDFLEISCH.
NUT TAPPING MACHINE.
APPLICATION FILED MAR. 25, 1912.

1,056,060.

Patented Mar. 18, 1913.

4 SHEETS-SHEET 1.



Witnesses:
R. M. Pittman
J. B. McNamee

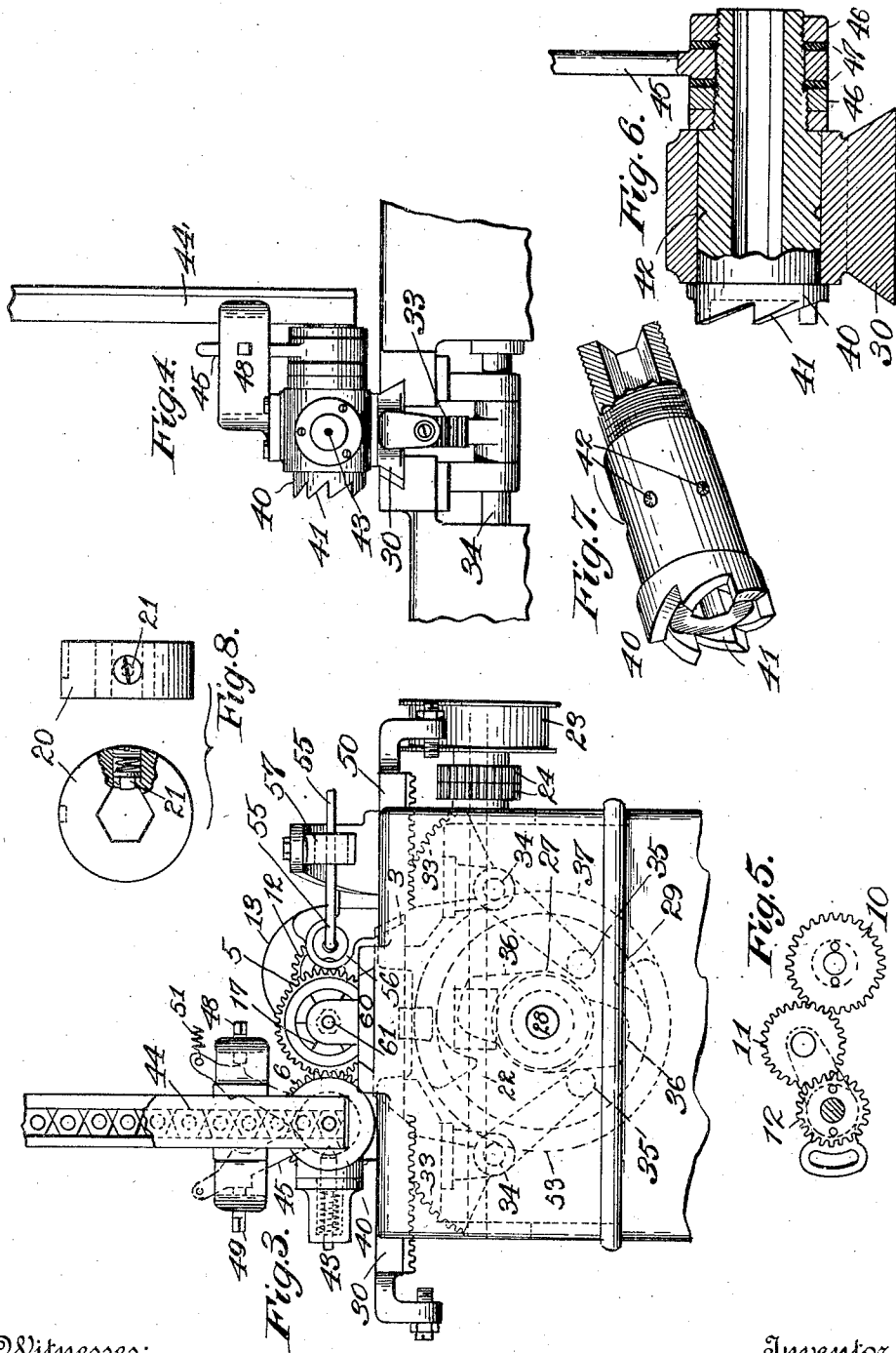
Inventor
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By his Attorney
E. J. Reed

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4 SHEETS—SHEET 2.



Witnesses:
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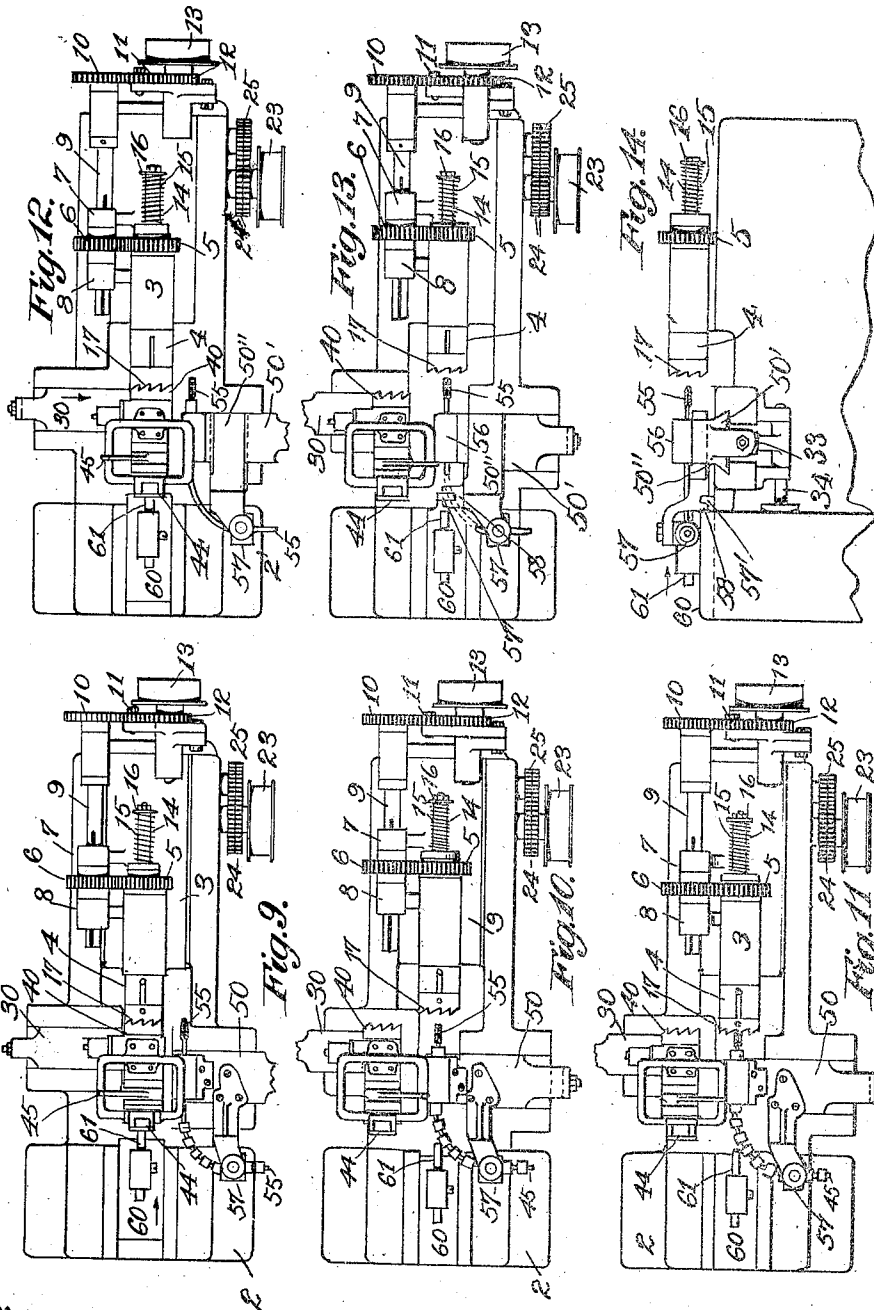
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4 SHEETS—SHEET 3.



Witnesses:
R. M. Ottman
J. B. McQuire

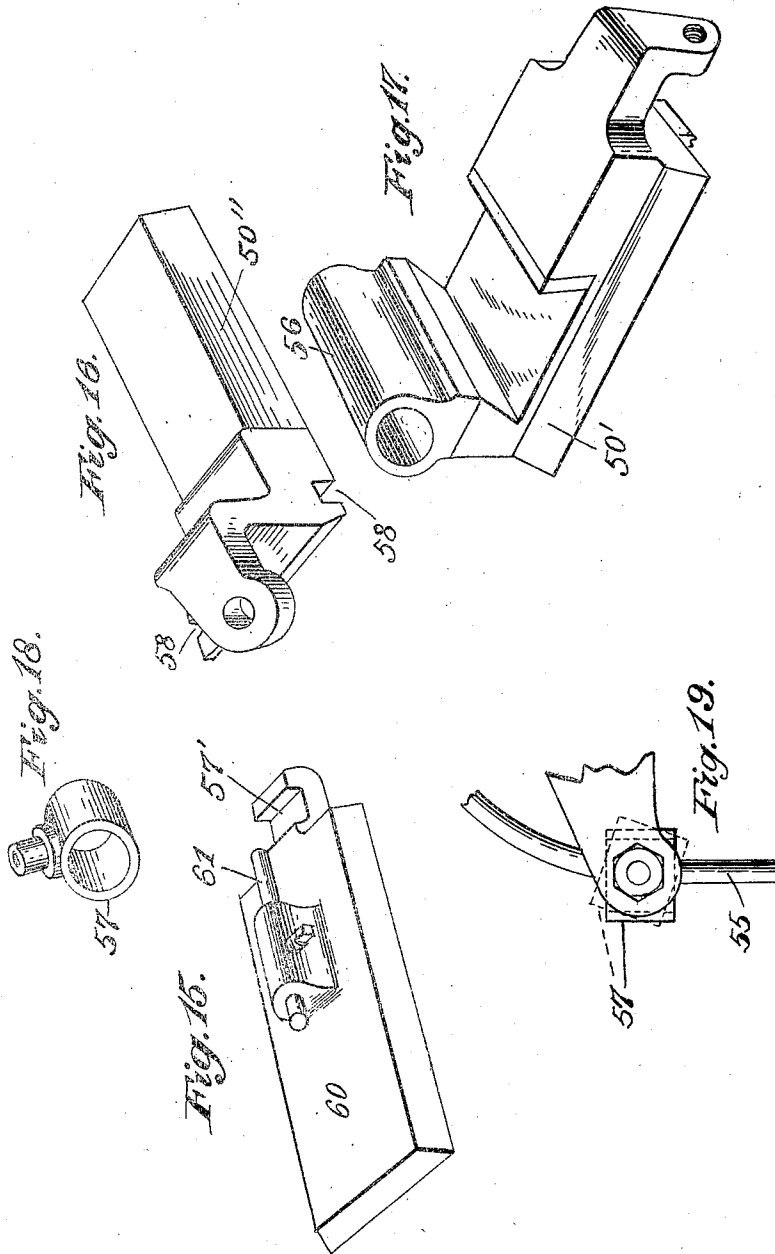
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4 SHEETS—SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

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OHIO.

NUT-TAPPING MACHINE.

1,056,060.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed March 25, 1912. Serial No. 685,937.

To all whom it may concern:

Be it known that I, BENJAMIN F. RINDFLEISCH, 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, of which the following is a specification.

This invention relates to metal working machines, and more particularly to that class thereof known as nut tapping machines, the object of the invention being to provide a nut tapping machine in which angular shaped blanks or pieces, such as square, hexagon or octagon and the like formed blanks may be fed from a normally stationary means to a live spindle, and in which also the tap constitutes the means for removing the completed blank from the machine without the cramping of the blanks upon the tap and in which the various mechanisms will be combined in a simple, and effective manner to efficiently carry on the work for which the machine is designed.

In the drawings accompanying and forming part of this specification, Figure 1 is a side view of a portion of this improved machine; Fig. 2 is a top view thereof; Fig. 3 is a left-hand end view of the machine; Fig. 4 is a detail view of part of the mechanism shown in Fig. 3; Fig. 5 is a detail view of one of the change-gear mechanisms; Fig. 6 is a partly sectional view of the normally stationary spindle; Fig. 7 is a detail view of such spindle; Fig. 8 is a face and side view, the former partly in section, of the blank holder; Figs. 9, 10 and 11 are diagrammatic views illustrating the operation of the several mechanisms shown in the foregoing figures; Figs. 12, 13 and 14 are diagrammatic views intended to illustrate the operation of the several mechanisms in a somewhat different manner; Figs. 15, 16 and 17 illustrate details of the tap carrying slide and pusher slide when assembled in the machine to operate in the manner shown in Figs. 12, 13 and 14; Fig. 18 is a detail view of the swivel member guiding the work around the curved portion of the tap; and Fig. 19 is a view of the swivel showing in dotted lines the action of such swivel.

Similar characters of reference indicate corresponding parts throughout the figures of the drawings.

In the present improvement the machine comprises in a general way a live spindle for rotating the blank during the tapping operation, and which spindle is supported for axial movement; a normally stationary spindle mounted upon a slide supported for transverse movement, and which slide carries a suitable magazine for supplying blanks to the normally stationary spindle; a blank feeder supported for sliding movement toward and from the live spindle; and a movably supported tap carried by a slide which is movable transversely of the machine and in one form of the improvement is also movable toward and from the live spindle, these several mechanisms being actuated by suitable means carried by the bed of the machine and timed to feed a blank from the normally stationary spindle to the live spindle and to tap the same and discharge the tapped blank from the discharge end of the tap.

In the present embodiment the several mechanisms are mounted upon a suitable base or bed 2, and on this bed 2 is located a main slide 3 in which is housed the live spindle 4. At the rear end of this live spindle 4 is keyed a spur gear 5, which is in mesh with a sliding gear 6 supported between two suitable bearings 7 and 8 extending from the main slide 3, this gear being keyed for sliding movement on a driving shaft 9. This construction allows the main slide 3 to move back and forth while the spindle 4 may be constantly rotated. The outer end of the shaft 9, suitably supported in a bearing, is provided with a gear 10 in mesh with suitable companion gears 11 and 12, the last of which is carried by a pulley shaft 13 by means of which motion is imparted to the shaft 9 thereby to rotate the spindle 4.

In the spindle 4 is housed an inner spindle 14, on the extended rear end of which is a coiled spring 15 held in place by a suitable nut and washer 16. The front face of this inner spindle 14 is provided with the desired number of notches or teeth 17, these corresponding in number with the shape of the blank to be tapped. In other words, the number of teeth correspond with the number of sides of the blank. When a four-sided piece is to be tapped the face of the spindle will have 4 teeth or notches, and

when a six-sided or an eight-sided piece is to be tapped the number of teeth on the face of the spindle will correspond therewith. This spindle 14 rotates with the live spindle 4, but not independently thereof, and is supported in such live spindle for traveling movement axially thereof. It is kept from rotating independently of the live spindle and is driven by such live spindle by means of a slot 18 and roller 19 carried one by each of said parts. In the end of the spindle 14 is secured a blank holder 20, (see Fig. 8), provided with a tension plunger 21. This holder is machined to correspond with the shape of the blank to be tapped, and in the present instance it is shown as of hexagonal shape.

Housed on the bed of the machine is a transversely extending worm shaft 22 carrying a driving pulley 23 and several gears 24 of a system of change gears, the remaining gears 25 of which are carried by a stub shaft 26. This worm shaft is in mesh with a worm wheel 27 mounted on a cam shaft 28, and by means of which motion is imparted to the latter. On this cam shaft are keyed all the drums carrying the cams for operating the several slides, the slide 3 being operated by a suitable cam carried on the drum 29, (see Fig. 1), and which cam will engage a roll projecting from the slide 3. From this it will be obvious that according to the formation of the cam carried by this drum 29 the slide 3 will either be moved back and forth or held stationary as occasion may require.

Supported on the bed 2 at each side of the live spindle, are a pair of slides 30 and 50. The slide 30 is supported for transverse movement toward and from the axis of the live spindle and carries the normally stationary spindle and the magazine for feeding blanks to such spindle, while the slide 50 carries the tap. These two slides are shifted alternately toward and from the plane of the axis of the live spindle at the proper time, and for this purpose each of these slides 30 and 50 is provided on its underside, (see Fig. 3), with racks 31 and 32 respectively, in mesh with which racks are teeth of lever segments 33, which are secured on shafts 34, which shafts are suitably supported in bearings carried by extended bosses on the bed. On the other ends of these shafts are secured arms having rollers 35, which are in engagement with grooved cams 36 carried by a cam drum 37 mounted on the cam shaft 28 hereinbefore described. By this mechanism the slides 30 and 50 are alternately shifted transversely of the bed to bring the normally stationary spindle and the tap in axial line with the live spindle and hold each of these parts at such point a predetermined length of time.

Carried by the slide 30 is the normally stationary spindle 40 hereinbefore referred to, which forms the feeding spindle to feed the blanks therefrom to the live spindle 4, and this normally stationary spindle is provided at its forward end with the same number of notches or teeth 41 as is the spindle 14, this spindle 40 being suitably supported for rotary movement when its teeth 41 are in engagement with the teeth 17 of the live spindle 4. At other times such spindle 40, however, is stationary. This spindle 40 is hollow, its bore being shaped to correspond with the shape of the blanks to be pushed therethrough. This hollow spindle 40 is provided around its outside with a series of indentations or notches 42 corresponding in number with the number of teeth carried at the end thereof, (see Figs. 6 and 7), these notches 42 being equally spaced apart. Coöperating with these notches is a spring tensioned detent 43 for holding the feeding spindle in alinement with the blank magazine 44 supported upon the slide 30, the bottom of which magazine is machined to conform with the bore of the feeding spindle and therefore is shown in the present instance as of hexagonal form. The detent 43, however, permits the rotation of the normally stationary spindle with the live spindle at the proper time.

Loosely mounted on the feeding spindle, at the rear thereof, is a lever 45 held between suitable tension nuts 46 and washers 47. For limiting the swinging movement of this lever a pair of stops 48 and 49 are provided. Connected at one end of the lever is a spring 51, the opposite end of which may be secured to any suitable supporting means. The bottom of the magazine is in line with the bore of the feeding spindle when the latter is not being rotated by the live spindle.

For feeding the blanks from the magazine to the feeding spindle suitable means is provided, which in the present instance comprises a feed rod 61 carried by a slide 60 supported on the bed of the machine for movement toward and from the live spindle, the rod 61 being in position to push a blank from the magazine into the bore of the feeding or normally stationary spindle at a certain time, and thus through intermediate blanks push a forward blank from the bore of the normally stationary spindle into the chuck of the live spindle when the two spindles are in engagement. The slide 60 is shifted backward and forward at predetermined times by suitable cams 52 carried upon a cam drum 53 mounted upon the cam shaft hereinbefore described.

The purpose of the lever 45 is to bring the feeding spindle with its bore into alinement with the bore of the magazine should these two bores not be in line after a blank

has been fed from the normally stationary spindle to the live spindle, and the tension nuts at each side of this lever 45 clamp the lever between them just sufficiently to permit the feeding spindle when it engages the live spindle to swing or carry such lever into position to have its end engage the stop 49, (see dotted position of lever, Fig. 3), at which point the lever 45 remains until the feeding spindle is disconnected from the live spindle, whereupon the lever, by means of the spring hereinbefore referred to, is swung toward the opposite stop 48, where it is stopped, thus rotating the feeding spindle so as to align its bore with the bore of the magazine, at which time the locking detent 43 of the feeding spindle enters one of the notches therein and holds it in alignment with the bottom of the magazine and so permits the entire blank to be forced from the magazine into the feeding spindle at the proper time.

The slide 50, as hereinbefore stated, carries the tap 55, which is shown as of angular formation, that is to say it has a curved shank extending at an angle, shown substantially as a right angle, to the cutter end of the tap. This tap is supported by a long bearing 56 carried by the slide 50, and the bore of which is of sufficient size and shape to permit the passage of the tapped blanks along the tap and through the bore. The rear end of this tap is supported by a swinging bearing 57, the bore of which is of sufficient size to permit the passage of the work blanks therethrough. This swinging or swiveled bearing is necessary in order to relieve the strain on the tap when the completed blanks are passing over the shank of the tap. The action of this swinging bearing can be seen in Fig. 19. In other words, when a blank is passing over the threaded portion of the tap it comes into contact with a blank that has previously been threaded and passed over the threaded portion of the tap, so that eventually the shank of the tap will be completely inclosed with tapped blanks. Each blank passing over the threaded portion of the tap and coming into contact with a blank that has just passed over the threaded portion of the tap has to make room for itself on the shank of the tap by forcing the blanks ahead of it along the shank of the tap. If the tap remained in its neutral position during the tapping operation in the bearings carrying it, which neutral position is central with the bores of such bearings, there would be no advantage in providing the swiveled bearing, but as the tap passes through the blank it causes the curved end thereof to advance laterally the length of the threaded portion of the tap, which would cause it to cramp in the swiveled bearing if this were a fixed bearing, so that the blank would not be allowed

to freely pass over the shank of the tap; but by having this bearing swing it automatically changes its position of alignment with the travel of the tap, thus relieving the cramping of the blanks when they are passing over the shank of the tap.

The operation of this machine, in the form shown in Figs. 1 to 11 is substantially as follows: The slide 30 is shifted forward until the stationary spindle is in line with the live spindle of the main slide 3, whereupon the latter is shifted toward the stationary spindle and makes connection therewith through the medium of the clutch teeth, whereupon both spindles are rotated by means of the rotation of the live spindle in the manner hereinbefore described and at the same speed. At this time the slide 60 is moved toward the aligned spindles so that the push rod 61 thereof will push a blank from the magazine into the bore of the stationary spindle and thereby, through the medium of intermediate blanks, will push a blank from the front end of the normally stationary spindle into the live spindle. Thereupon the slide 3 moves backward, releasing the clutch teeth of its spindle from the clutch teeth of the normally stationary spindle, and after this slide 3 has receded or during such retraction, the push rod slide 60 is also shifted backward and then the slide 30 is returned to its normal position, whereupon the tap carrying slide 50 is brought into position to have the tap thereof in position to tap a blank carried by the live spindle, and for which purpose the live spindle slide is again carried forward to bring the blank into engagement with the tap. The threading action of the tap draws the spindle 14 forward and out of its spindle 4 until the threaded portion of the tap has passed completely through the blank, whereupon the main slide 3 recedes to its initial position, leaving the tapped blank on the shank of the tap. The spring 15 on the end of the spindle 14 draws this spindle back into its initial position within the spindle 4. When the blank is tapped the slide 50 carrying the tap returns to its normal position and the operations are repeated.

In Fig. 9 the magazine and normally stationary spindle slide 30 are shown shifted forward in line with the normally rotating spindle carried by the slide 3, which likewise has been shifted into position to have its teeth engage the teeth of the normally stationary spindle and the push rod slide 60 has likewise been shifted to push a blank into the normally rotating spindle. In Fig. 10 the slide 3 has been retracted, as has also been the slide 30 carrying the magazine and the push rod slide 60, while the tap slide 50 has been shifted to bring its tap into position to tap a blank. In Fig. 11 the main

slide 3 has been shifted forward again to bring the blank into engagement with the tap.

In this form of the improvement it will be observed that the main slide 3 carrying the normally rotating or live spindle moves forward to receive a blank from the normally stationary spindle when they are in line, then back to release the same and then forward again when the tap is in position to permit the tapping of the blank. It will be observed, however, that instead of shifting the live spindle toward the tap a reversal of this procedure,—that is the shifting of the tap toward the blank while the latter is held by its spindle chuck against other than rotary movement,—could be readily obtained when it is desired to shift the tap toward the blank rather than the blank toward the tap. The tap slide 50 will be made as a compound slide, comprising the main slide 50', (Fig. 17), and the top slide 50'', (Fig. 16). This compound slide will be shifted forward to bring the tap in line with the blank to be tapped in the manner hereinbefore described, but by reason of the top slide 50'', on which of course the tap will be supported by its two bearings hereinbefore described, the tap and its top slide may be shifted toward the blank carried by the spindle of the slide 3, at which time of course the slide 3 will be maintained stationary, this being obtained by merely changing the form of the cams on the cam drum 29 which moves this slide. For shifting the top slide carrying the tap the push rod slide 60, however, is provided with a recessed or grooved projection 57' on its front end adapted to be engaged by a similarly formed portion 58 on the top slide 50'' when the compound slide is shifted transversely of its bed. In other words, when the compound tap slide is shifted by the rack and sector mechanism hereinbefore described into position to have the tap in line with the blank to be tapped the two portions 57 and 58 will engage, and thereupon the push rod slide is again moved forward by the cam carried by the drum which operates it, it being merely necessary to so form the cams thereon as to give this push rod slide two forward movements instead of one, one forward movement being to push the blank from the normally stationary spindle to the live spindle and then, after its return, the next forward movement will shift the top slide 50'' so as to carry the tap into position to tap the blank in a manner which will be readily understood.

In Fig. 12 the positions of the three slides 3, 30 and 60 are shown when a blank is being pushed from the normally stationary spindle into the live spindle.

In Fig. 13 the three slides 3, 30 and 60 have been retracted and the compound

tap slide has been shifted to bring the tap into alinement with the blank in the live spindle, and this figure illustrates the connection between the top slide of the compound slide and the push rod slide, whereby, on the forward movement of the push rod slide, the tap will be moved into position to engage the blank carried by the live spindle thereby to tap it, Fig. 14 illustrating a side view of the mechanism shown in Fig. 13.

I claim as my invention:

1. In a nut tapping machine, the combination with a bed, of a plurality of slides carried thereon, one carrying a normally rotatable spindle, another a normally stationary spindle and another means for pushing a blank from the normally stationary spindle to the normally rotatable spindle, means for shifting said slides, and a tool carrier and means for shifting said tool carrier and normally rotatable spindle slide, one relatively to the other.

2. In a nut tapping machine, the combination with a bed, of a plurality of slides carried thereon, one carrying a normally rotatable spindle, another a normally stationary spindle and another means for pushing a blank from the normally stationary spindle to the normally rotatable spindle, means for shifting said slides, a slide carrying a tap, and means for shifting the same into alinement with the blank to be tapped.

3. In a nut tapping machine, the combination with a bed, of a plurality of slides carried thereon, one carrying a normally rotatable spindle, another a normally stationary spindle and another means for pushing a blank from the normally stationary spindle to the normally rotatable spindle, means for shifting said slides, a slide carrying a tap, means for shifting the same into alinement with the blank to be tapped, and means for shifting the tap into engagement with the blank.

4. In a nut tapping machine, the combination with a bed, of a plurality of slides carried thereon, one carrying a normally rotatable spindle, another a normally stationary spindle and another means for pushing a blank from the normally stationary spindle to the normally rotatable spindle, means for shifting said slides, a slide carrying a tap, means for shifting the same into alinement with the blank to be tapped, and means for shifting the tap into engagement with the blank, said means comprising the same means which pushes the blank from the normally stationary spindle to the normally rotating spindle.

5. In a nut tapping machine, the combination with a bed, of a slide, a normally rotating spindle carried thereby, a slide, a normally stationary spindle and a magazine carried thereby, a slide, means carried there-

by for pushing a blank from the magazine into the normally stationary spindle and through intermediate blanks a blank into the normally rotating spindle, a tap slide, a tap carried thereby, and means for operating said slides in proper sequence thereby to feed a blank from the magazine to the normally stationary spindle and therefrom to the normally rotating spindle and to tap such blank.

6. In a nut tapping machine, the combination with a bed, of a slide, a normally rotating spindle carried thereby, a slide, a normally stationary spindle and a magazine carried thereby, a slide and means carried thereby for pushing a blank from the magazine into the normally stationary spindle and through intermediate blanks a blank into the normally rotating spindle, a compound tap slide, a tap carried thereby, and means for operating said slides in proper sequence thereby to feed a blank from the magazine to the normally stationary spindle and therefrom to the normally rotating spindle and to tap such blank.

7. In a nut tapping machine, the combination with a bed, of a slide, a normally rotating spindle carried thereby, a slide, a normally stationary spindle and a magazine carried thereby, a slide and means carried thereby for pushing a blank from the magazine into the normally stationary spindle and through intermediate blanks a blank into the normally rotating spindle, a tap slide, a tap carried thereby and having a curved shank, means for operating said slides in proper sequence thereby to feed a blank from the magazine to the normally stationary spindle and therefrom to the normally rotating spindle and to tap such blank, and means for swingingly supporting said shank.

8. In a nut tapping machine, the combination with a bed, of a slide, a normally rotating spindle carried thereby, a slide, a normally stationary spindle and a magazine carried thereby, a slide and means carried thereby for pushing a blank from the magazine into the normally stationary spindle and through intermediate blanks a blank into the normally rotating spindle, a compound tap slide, a tap carried thereby and having a curved shank, means for operating said slides in proper sequence thereby to feed a blank from the magazine to the normally stationary spindle and therefrom to the normally rotating spindle and to tap such blank, and means for swingingly supporting said shank.

9. In a machine of the class described, the combination of blank supporting means and tap supporting means, a curved ended tap, swinging means for supporting the curved end of said tap thereby to prevent the cramping of the tapped blanks as they pass along the tap, and means for shifting the

tap supporting means transversely to the axis of the blank supporting means thereby to aline the tap and blank, means for shifting one of said means toward and from the other to effect the tapping operation, and means for imparting relative rotation between the blank and tap.

10. In a machine of the class described, the combination of blank supporting means and tap supporting means, a curved ended tap, swinging means for supporting the curved end of said tap thereby to prevent the cramping of the tapped blanks as they pass along the tap, means for shifting the tap supporting means transversely to the axis of the blank supporting means thereby to aline the tap and blank, means for shifting the tap supporting means toward and from the blank supporting means to effect the tapping operation, and means for imparting relative rotation between the blank and tap.

11. In a machine of the class described, the combination of blank supporting means, tap supporting means, a curved ended tap carried thereby, movable means for supporting the curved end of said tap thereby to prevent the cramping of the tapped blanks as they pass along the tap, means for moving said tap in transverse directions thereby to aline the tap and blank, and means for imparting relative rotation between the blank and tap.

12. In a machine of the class described, the combination of a bed, blank supporting means and tap supporting means carried thereby, a curved ended tap carried by said tap supporting means, swinging means for supporting the curved end of said tap thereby to prevent the cramping of the tapped blanks as they pass along the tap, means for shifting the tap transversely of the bed to aline the tap and blank and also lengthwise thereof, and means for imparting relative rotation between the blank and tap.

13. In a machine of the class described, the combination of a bed, blank supporting means carried thereby, tap supporting means carried thereby, a curved ended tap carried by said tap supporting means, movable means for supporting the curved end of the tap thereby to prevent the cramping of the tapped blanks as they pass along the tap, means for advancing one of said supporting means in transverse directions, and means for imparting relative rotation between the blank and tap.

14. In a machine of the class described, the combination with a bed, of blank supporting means carried thereby, tap supporting means carried thereby and comprising a compound slide consisting of a pair of slides one supported for movement transversely of the other, a curved-ended tap carried by said compound slide, movable means for

- supporting the curved end of the tap thereby to prevent the cramping of the blanks as they pass along the tap, means for shifting the compound slide and thereby the tap, means for advancing one slide of said compound slide and the tap carried thereby independently of the other slide of such compound slide, and means for imparting relative rotation between the blank and tap.
15. In a machine of the class described, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting one spindle toward and from the other, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.
16. In a machine of the class described, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the normally stationary spindle into position to aline with the normally rotating spindle, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.
17. In a machine of the class described, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the normally stationary spindle transversely to the axis of the normally rotating spindle, a tap, and means for shifting the same into position to tap a blank carried by the normally rotating spindle.
18. In a machine of the class described, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the normally stationary spindle transversely to the axis of the normally rotating spindle, a tap, and means for shifting the same into position to tap a blank carried by the normally rotating spindle.
19. In a nut tapping machine, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.
20. In a nut tapping machine, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and comprising a normally stationary spindle, means for alining the two spindles during the transfer of such blanks from one spindle to the other, means for successively transferring the blanks from said blank carrying spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the normally stationary spindle transversely to the axis of the normally rotating spindle, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.
21. In a nut tapping machine, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and including a normally stationary hollow spindle carrying simultaneously a series of blanks, means for alining the two spindles whereby during the transfer of the blanks they will rotate together, a magazine, means for feeding blanks from the magazine to the hollow spindle and thereby feeding, through intermediate blanks, the foremost blank from the hollow spindle to the normally rotating spindle, means for shifting one spindle toward and from the other, a tool carrier, and means for shifting said tool

carrier and normally rotating spindle, one relatively to the other.

22. In a nut tapping machine, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and including a normally stationary hollow spindle carrying simultaneously a series of blanks, means for alining the two spindles whereby during the transfer of the blanks they will rotate together, a magazine, means for feeding blanks from the magazine to the hollow spindle and thereby feeding, through intermediate blanks, the foremost blank from the hollow spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the latter transversely to the axis of the former, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.

23. In a nut tapping machine, the combination of a normally rotating spindle and means for feeding blanks thereto without stopping the rotation of such spindle and including a normally stationary hollow spindle carrying simultaneously a series of blanks, means for alining the two spindles whereby during the transfer of the blanks they will rotate together, a magazine, means for feeding blanks from the magazine to the hollow spindle and thereby feeding, through intermediate blanks, the foremost blank from the hollow spindle to the normally rotating spindle, means for shifting the normally rotating spindle toward and from the normally stationary spindle, means for shifting the latter transversely to the axis of the former, each of said spindles being carried by a slide, a tap slide, a tap carrier thereby, and means for shifting the latter transversely to the axis of the normally rotating spindle.

24. In a nut tapping machine, the combination of a normally rotating spindle adapted to receive and hold a blank to be operated upon, a normally stationary hollow spindle for simultaneously carrying a series of blanks and delivering the same successively to the normally rotating spindle, means for effecting temporarily the coincident rotation of said two spindles on a common axis by the engagement of one with the other prior to the transfer of the blank, means for feeding a blank from one spindle to the other through the medium of companion blanks, means for shifting both of said spindles in different directions, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.

25. In a nut tapping machine, the combination of a normally rotating spindle, means for feeding an angular formed blank thereto

without stopping

the normally rotating spindle toward and from the blank feeding means, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.

26. In a nut tapping machine, the combination of a normally rotating spindle, means for feeding an angular formed blank thereto without stopping the rotation of such spindle, means for shifting the normally rotating spindle toward and from the blank feeding means, means for shifting the blank feeding means transversely to the axis of the normally rotating spindle, a tool carrier, and means for shifting said tool carrier and normally rotating spindle, one relatively to the other.

27. In a nut tapping machine, the combination of a normally rotating spindle, means for feeding an angular formed blank thereto without stopping the rotation of such spindle, means for imparting relative shifting movement between the normally rotating spindle and the blank feeding means, means for shifting the blank feeding means transversely to the axis of the normally rotating spindle, a nut tap, and means for shifting it transversely to the axis of the normally rotating spindle.

28. In a nut tapping machine, the combination of a normally rotating spindle, means for feeding an angular formed blank thereto without stopping the rotation of such spindle, means for imparting relative shifting movement between the normally rotating spindle and the blank feeding means, means for shifting the blank feeding means transversely to the axis of the normally rotating spindle, a nut tap, means for shifting it transversely to the axis of the normally rotating spindle, and means for shifting it toward and from the normally rotating spindle.

29. In a machine of the class described, the combination of blank supporting means, tap supporting means, a curved-ended tap carried thereby, means for moving said tap in transverse directions, and means for imparting relative rotation between the blank and tap.

30. In a machine of the class described, the combination of blank supporting means, tap supporting means, a curved-ended tap carried thereby, means for moving one of said means in transverse directions, and means for imparting relative rotation between the blank and tap.

31. In a nut tapping machine, the combination with a bed, of a plurality of slides carried thereon, one carrying a blank holder, another a magazine and another a tap, means for pushing a blank from the magazine to the blank holder, means for operating said slides first to feed a blank from the magazine to the blank holder and then

to tap said blank, and means for imparting relative rotation between the blank and tap.

32. In a nut tapping machine, the combination with a bed, of a plurality of slides
5 carried thereon, one carrying a blank holder, another a magazine and another a tap, means for pushing a blank from the magazine to the blank holder, means for operating
10 said slides first to feed a blank from the magazine to the blank holder and then to tap said blank, said operating means for the magazine and tap slides comprising rack and gear mechanism, and means for imparting relative rotation between the blank
15 and tap.

33. In a nut tapping machine, the combination with a bed, of a plurality of slides

carried thereon, one carrying a blank holder, another a magazine and another a tap, means for pushing a blank from the magazine to the blank holder, means for operating
20 said slides first to feed a blank from the magazine to the blank holder and then to tap said blank, and means for rotating one of said parts during the tapping operation.
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Signed at Cleveland, in the county of Cuyahoga and State of Ohio, this 21st day of March, 1912.

BENJAMIN F. RINDFLEISCH.

Witnesses:

ALBERT E. HENN,

WILLIAM K. MITCHELL.