

No. 669,407.

Patented Mar. 5, 1901.

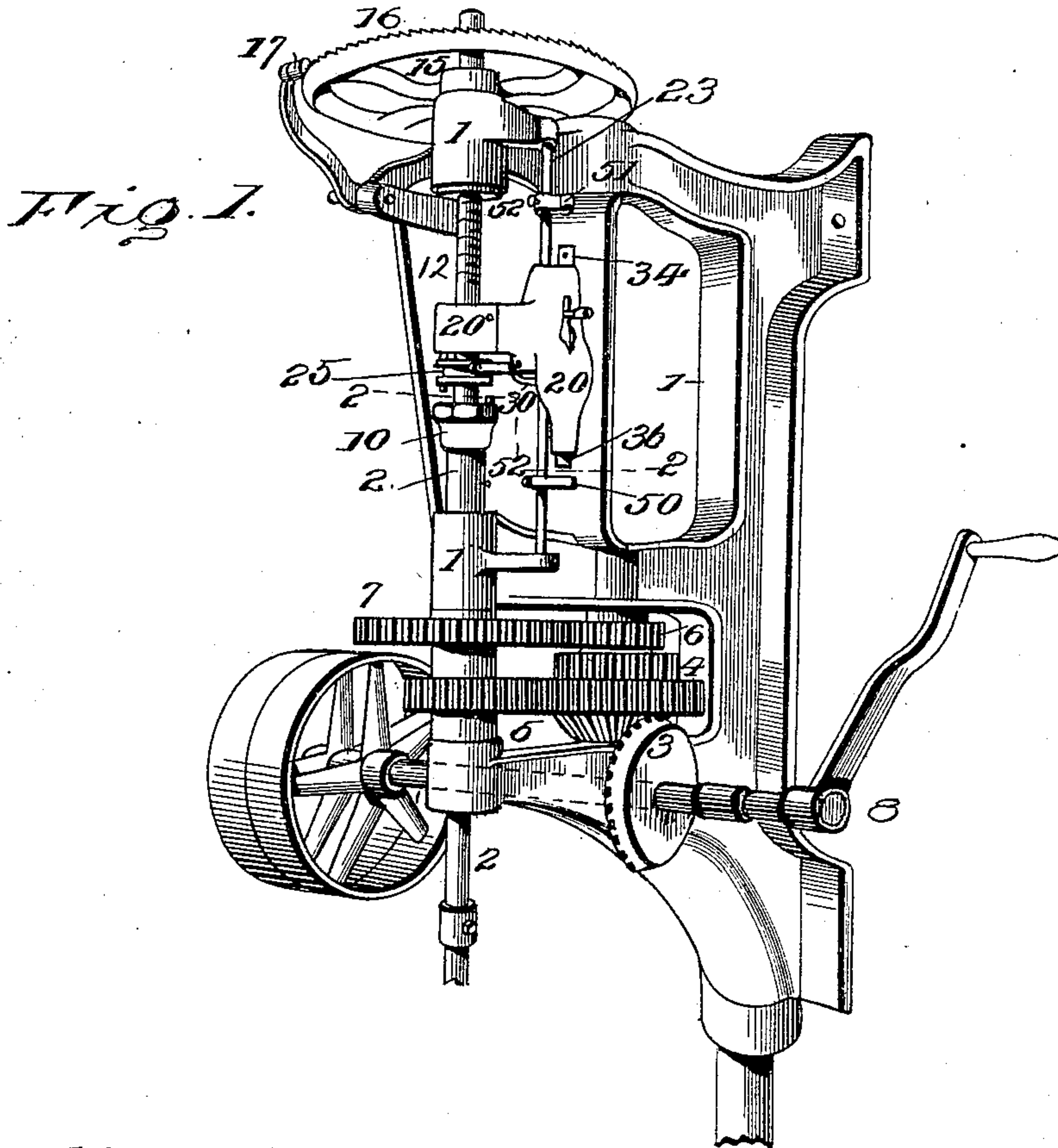
M. BACKSTROM.

FEED MECHANISM FOR DRILLING, BORING, OR LIKE MACHINES.

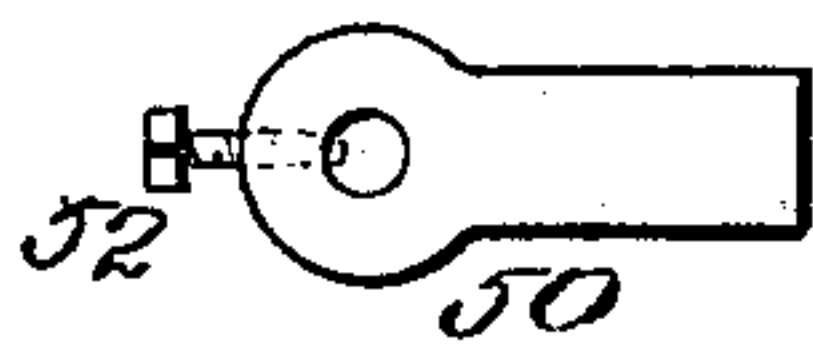
(No Model.)

(Application filed Dec. 3, 1900.)

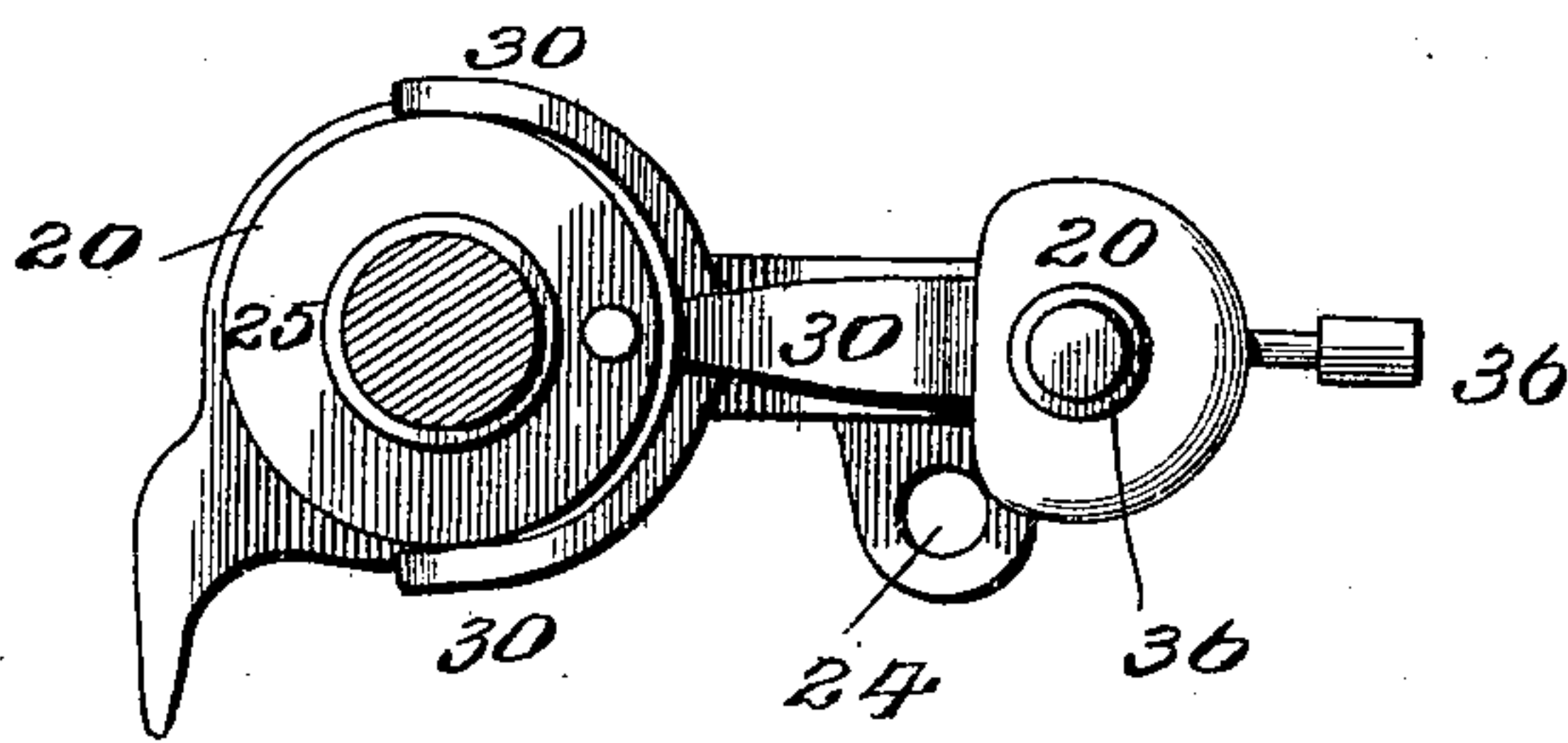
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*Fig. 6.*



*Fig. 2.*



Witnesses  
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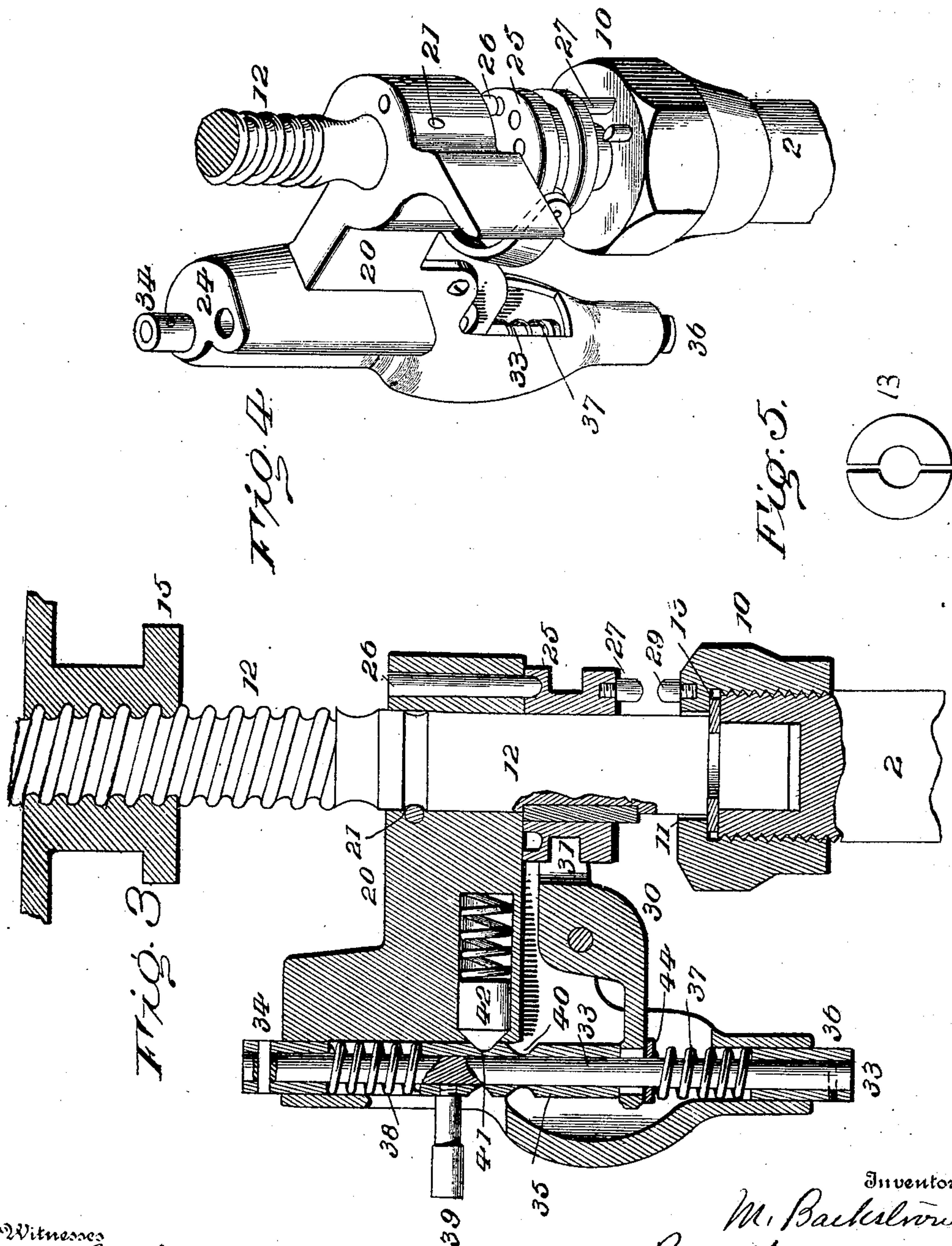
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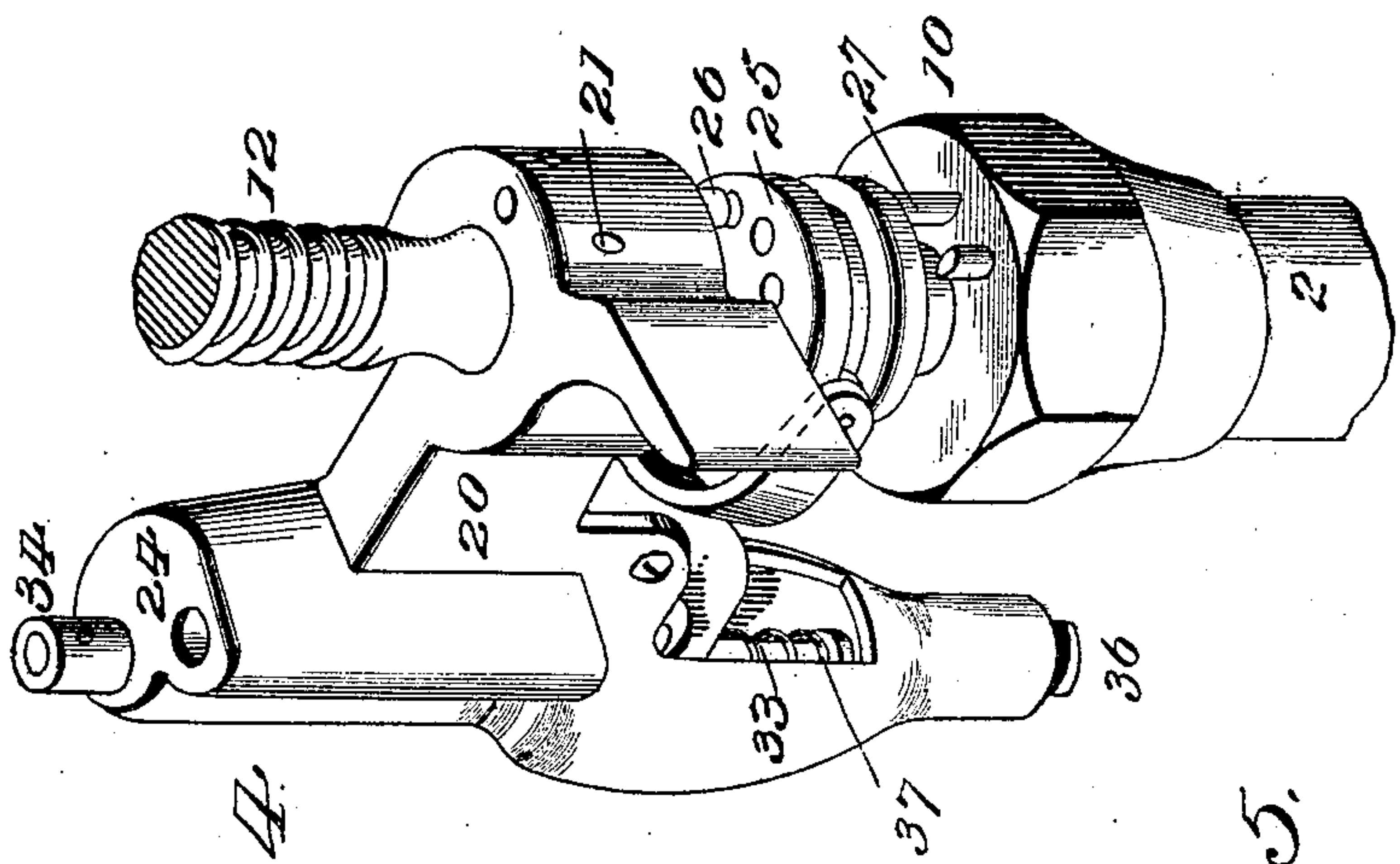
(No Model.)

(Application filed Dec. 3, 1900.)

**2 Sheets—Sheet 2.**



File 3



File 7.

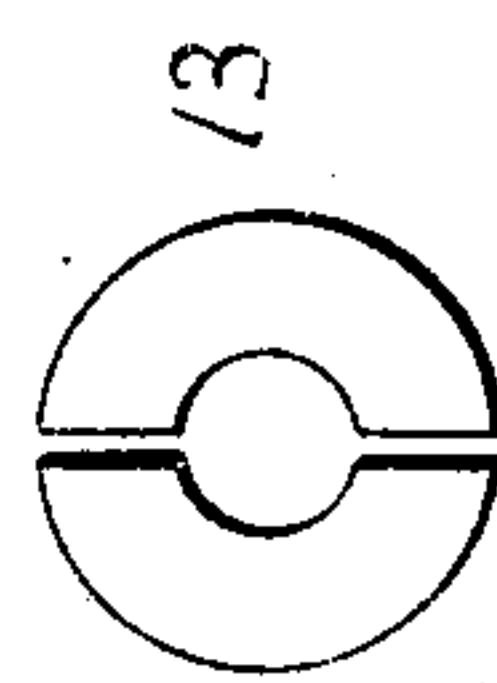


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## FEED MECHANISM FOR DRILLING, BORING, OR LIKE MACHINES.

SPECIFICATION forming part of Letters Patent No. 669,407, dated March 5, 1901.

Application filed December 3, 1900. Serial No. 38,554. (No model.)

*To all whom it may concern:*

Be it known that I, MARTIN BACKSTROM, residing at Chicago Heights, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Feed Mechanism for Drilling, Boring, or Like Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to feed mechanism for drills, boring-machines, and like machinery wherein a slow feed is desirable in one direction and a quick return in the other direction.

15 By this invention the feed of the tool may be purely automatic. The mechanism can be arranged to feed the tool in one direction, as downward, a given distance, then quickly lift and repeat the down movement, so that  
20 in drilling a large number of holes, such as rivet-holes, the machine may be started and no further attention be paid to the tool, but simply to the adjustment of the work to the tool.

25 The invention consists in certain constructions and combinations of mechanical elements whereby the feed is effected, and is summarized in the claims hereunto appended.

30 Figure 1 is a perspective of so much of a drilling or boring machine as is necessary to illustrate the invention. Fig. 2 is a partial cross-section on line 2 2. Fig. 3 is a vertical section of the reversing mechanism, and Fig. 4 is a broken perspective of the reversing  
35 mechanism. Fig. 5 is a plan of the divided washer. Fig. 6 is a plan of one of the movable stops and its set-screw.

Let 1 indicate the frame of a drill or similar machine of any usual construction.

40 2 indicates the boring-bar, which is driven by a train of gears 3 4 5 6 7, such a train being old and well known, and for this purpose any train of driving mechanism which will rotate the boring-bar with a fair rate of speed  
45 and permit the bar to rise and fall is held to be the equivalent of the train of mechanism shown.

50 The machine, as illustrated, may be driven to rotate the drill by power or by hand connection to shaft 8, and persons skilled in this art will readily understand the construction

of such a driving mechanism, which may have reversing-gear or may not, as desirable, to give rotary movement in reverse direction.

The boring-bar 2 is held to clutch-collar 10, 55 so as to turn the collar with the bar. As illustrated, a screw-thread connection is made between the boring-bar and clutch-collar. Clutch-collar 10 has an inwardly-projecting flange 11. A screw-threaded spindle 12 enters the upper end of the clutch-collar, and for strength and certainty of connection the spindle may enter a recess in the top of the boring-bar, as shown in Fig. 3. A split washer 13 enters a groove in the spindle 12 under  
60 flange 11, and thus couples the boring-bar 2 to spindle 12, but permits complete independence of rotation of the boring-bar and spindle. Thus the boring-bar 2 might rotate, carrying collar 10 with it, without rotating spindle 12  
70 when in the position of Fig. 3. The spindle 12 has a screw-thread at its upper end and passes through a threaded nut or sleeve 15, which is journaled or swiveled in the frame and can rotate therein, but cannot rise and  
75 fall. A ratchet-wheel 16 is connected to the nut 15, and by means of pawl 17, moved in usual manner from the driving power, the nut is slowly rotated. This ratchet-and-pawl  
80 mechanism for turning the feed-nut of a drill or boring-machine is not new. As threaded spindle 12 passes through the journaled feed-nut 15, the rotation of such nut on the screw-thread of the spindle will force the spindle  
85 downward, but at a slow rate and independently of the rotation of the boring-bar. The normal direction of the motion of the drill is such that if the spindle 12 were to rotate with the drill the spindle and boring-bar would be  
90 drawn upward, as the speed of rotation of the boring-bar is very much greater than the speed of rotation of the feed-nut 15.

The spindle 12 carries a headpiece 20, in which the spindle is swiveled to turn freely; but the headpiece is prevented from rising  
95 and falling independently of the spindle, as by pin 21, passing through a hole in the headpiece and engaging a groove in the spindle. The headpiece 20 is prevented from rotating with the spindle by a guide-rod 23, which rod  
100 is fixed in the frame and extends through a hole or mortise 24 in the headpiece. The



headpiece is free to slide up and down on this guide-rod so far as engagement with the rod is concerned.

A clutch-ring 25 on spindle 12 is splined to the spindle to partake of any rotary movement of the spindle 12, but free to move lengthwise of said spindle. This clutch-ring, as shown in Figs. 3 and 4, has a number of cups at its upper end. When the ring 25 is pressed up against the headpiece 20, the pin 26, fixed in said headpiece, enters one of these cups and the clutch-ring can no more rotate than can the headpiece, and as the clutch-ring is splined to spindle 12 spindle 12 cannot rotate while the clutch-ring is in this position—i. e., the position shown in Fig. 3 of the drawings.

Clutch-ring 25 has a pin 27 at its lower end, and clutch-collar 10 has a projecting pin 29 projecting upward at a like distance from the center of spindle 12. When clutch-ring 25 is slipped down out of engagement with pin 26, as in Fig. 4, the clutch-collar 10 (being always in rotation with the boring-bar) brings pin 29 into contact with pin 27 and causes clutch-ring 25 to rotate with the boring-bar. This rotates spindle 12 (splined, as it is, to clutch-ring 25) and rapidly runs the spindle 12 upward by means of its screw engagement with nut 15, although the said nut is acting to force the spindle downward, but at a slower speed. The upward movement of spindle 12 carries head 20 with it.

From the foregoing it should appear that were the operator to shift the clutch-ring 25 by hand downward to engage collar 10 the rotation of said collar (with the boring-bar) would drive the spindle 12 to lift the spindle, clutch-head, and boring-bar, while if he shifts the ring 25 to engage the head 20 the spindle 12, being then held against rotation, is forced down by the rotation of nut 15. (If spindle 12 were not held against rotation, it might turn with nut 15 and so remain inert as to the screw action.)

As it is generally undesirable to shift ring 25 by hand, mechanism is provided by which this movement is made automatic.

A lever 30 is pivoted to the headpiece 20, and one end of said lever, which is preferably forked, enters the groove 31, surrounding the ring 25. The other end of lever 30 loosely embraces shifting bar or rod 33. Rod 33 is in a seat or recess in the headpiece 20 and has sleeves 34 and 36 secured to the rod, near its ends, by pins. The end sleeves 34 and 36 hold buffer-springs 37 and 38 against sleeve 35 on the rod 33 and serve as cushions. If rod 33 be shifted upward from the position in Fig. 3, the spring 37, bearing on washer 44, forces up that end of lever 30, thus moving down the other end of lever 30, and ring 25 with it, thus uncoupling ring 25 from the headpiece 20 and coupling it with clutch-collar 10. Then a downward pressure on rod 33 causes spring 38 to move collar 35 and again reverse the lever 30 and clutch-ring 25. Sleeve 35 has notches 40 and 41. A spring-

pressed bolt 42, seated in the headpiece, has a tapered nose or point to enter one of these notches. If the rod be partly shifted, this bolt will enter one or the other of these notches and so compel the rod to shift as far as the distance between notches and will not permit the rod to stop in intermediate position. As collar 35 on rod 33 engages one face of lever 30 and as washer 44 on the rod engages the other face, the shifting of rod 33 always shifts ring 25 and by the clutch engagement of the ring, as described, causes a quick lifting or a slow down feed of spindle 12 and connections. A pin 39, entering sleeve 35, serves as a handle to effect the feed-shift by hand when desirable. Secured to the guide-rod 23 or to other fixed part in line with the shifting rod 33 are the shifting stops 50 and 51. These stops may be held to any adjusted position by set-screws 52. Now suppose these stops 50 and 51 to be properly adjusted to give the amount of feed desired to the device. For the purpose of illustration, suppose the feed to be one inch. The machine being started from raised position, nut 15 rotates and presses down the spindle 12 and the boring-bar. Head 20, moving down with the spindle, brings the lower end of shifting rod 33 or its sleeve 36 against stop 50. This shifts rod 33 and rocks lever 30. Lever 30 moves ring 25 until its clutch member or pin engages the clutch member on collar 10, and this serves to screw back the spindle 12 and lifts the same, together with the head and boring bar or drill. When the head 20 carries the rod 33 up against stop 51, the rod is shifted in the other direction and lever 30 and ring 25 are moved until ring 25 engages head 20, when the spindle 12 ceases to lift the head and boring-bar and begins to move them down under action of nut 15.

I have described the mechanism as now employed by me; but it is obvious that numerous changes in details may be made without changing the general ideas of my invention. Thus the mechanism has been described as working vertically; but it would also work in horizontal position. The buffer-springs and sleeves on shifting rod or pin 33 are for convenience, not necessity. Many mechanical changes might be made without departing from the spirit of the invention, which is defined by the following claims.

I claim—

1. In a drilling or similar machine, the combination of a boring-bar driven continuously in one direction and a spindle non-rotatively connected to said bar and having a screw-thread, a swiveled nut engaging the screw-thread, means for turning the nut for feeding the spindle in one direction, and means for coupling the boring-bar to the spindle whereby the rotation of the bar turns the spindle back through the nut, substantially as described.

2. In a drilling-machine, the combination of a swiveled nut and means to turn it, a



screw-threaded spindle passing through the nut, a headpiece swiveled to a non-threaded part of the spindle, a guide by which the headpiece is held against rotation, a rotating boring-bar connected to the headpiece, and clutch mechanism by which the spindle can be held to the headpiece, against rotation, or coupled with the boring-bar and compelled to rotate therewith, substantially as described.

3. In a boring or drilling machine as described, the combination of a slowly-moving nut, a threaded spindle fed forward by said nut, a rapidly-rotating bar pressed forward by said spindle, and means for coupling the boring-bar to said spindle, to move the same rapidly backward notwithstanding the forward movement caused by the nut, substantially as described.

4. In a machine as described, the frame, a swiveled nut therein and means for rotating the nut in one direction, a threaded spindle passing through the nut, a headpiece swiveled to said spindle and held against rotation therewith by a suitable guide, a rotating boring-bar connected to the headpiece, and a shifting clutch by which the spindle may be held in fixed relation to the headpiece or in relative relation to the boring-bar, all combined whereby a slow forward movement is effected by the nut-feed, and a quick return by the screw movement in opposition to the nut-feed, substantially as described.

5. In a boring or drilling machine, a swiveled nut and a threaded spindle passing through the same, whereby the nut rotation propels the spindle forward, a boring-bar connected to the spindle but driven to rotate at higher speed than the nut, and automatic clutch mechanism, whereby the forward movement of the spindle engages it with the boring-bar to drive it rapidly backward, substantially as described.

6. In a machine of the character described, a swiveled nut and a threaded spindle passing through the same, a guided non-rotating headpiece carried by the spindle, a rotating boring-bar in line with the spindle, and an automatic clutch by which the spindle may be held in non-rotative engagement with the headpiece, substantially as described.

7. In a machine as described, the combi-

nation of the feed-nut, threaded spindle, headpiece, and fixed guide, the boring-bar and a clutch by which the spindle is held in engagement either with the bar or headpiece, mechanism by which the clutch is shifted, and adjustable stops by which the clutch-shifting mechanism may be controlled, all substantially as described.

8. In a machine as described, the feed-nut, spindle, guided headpiece, and boring-bar connected as described, a clutch-ring splined on the feed-spindle, and constructed for engagement either with the headpiece or boring-bar, a lever pivoted in the headpiece and operatively engaging the clutch-ring, and a slide-rod carried by the headpiece for operating said lever, all combined substantially as described.

9. In a machine as described, the feed-nut, spindle, guided headpiece and boring-bar connected as described, the clutch-rings splined to the spindle, and adapted to engage with the headpiece or the boring-bar, a lever pivoted in the headpiece by which the clutch-ring is moved, a slide-rod by which the lever is shifted, and stops with which said rod engages to automatically reverse the clutch-coupling and thereby the feed movement, all substantially as described.

10. In a machine as described, the feed-nut, spindle, headpiece and boring-bar, the shifting clutch by which the spindle is held to the headpiece or boring-bar, the shifting lever and slide-rod, buffers on the slide-rod, and adjustable stops by engagement with which the slide-rod is shifted, in combination, substantially as described.

11. In a machine as described, the feed-nut, spindle, headpiece, and boring-bar, the shifting clutch and its operating-lever, the slide-rod by which said lever is shifted, and a spring-pressed bolt bearing on inclines of the slide-rod to insure the completion of the shifting movement, all combined substantially as described.

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

MARTIN BACKSTROM.

Witnesses:

F. B. FURNISS,

WALTER SCHMINCKE.