No. 715,522.

Patented Dec. 9, 1902.

O. TYBERG.

NUT FINISHING MACHINE.

(Application filed Oct. 4, 1899.)

(No Model.)

6 Sheets—Sheet 1.

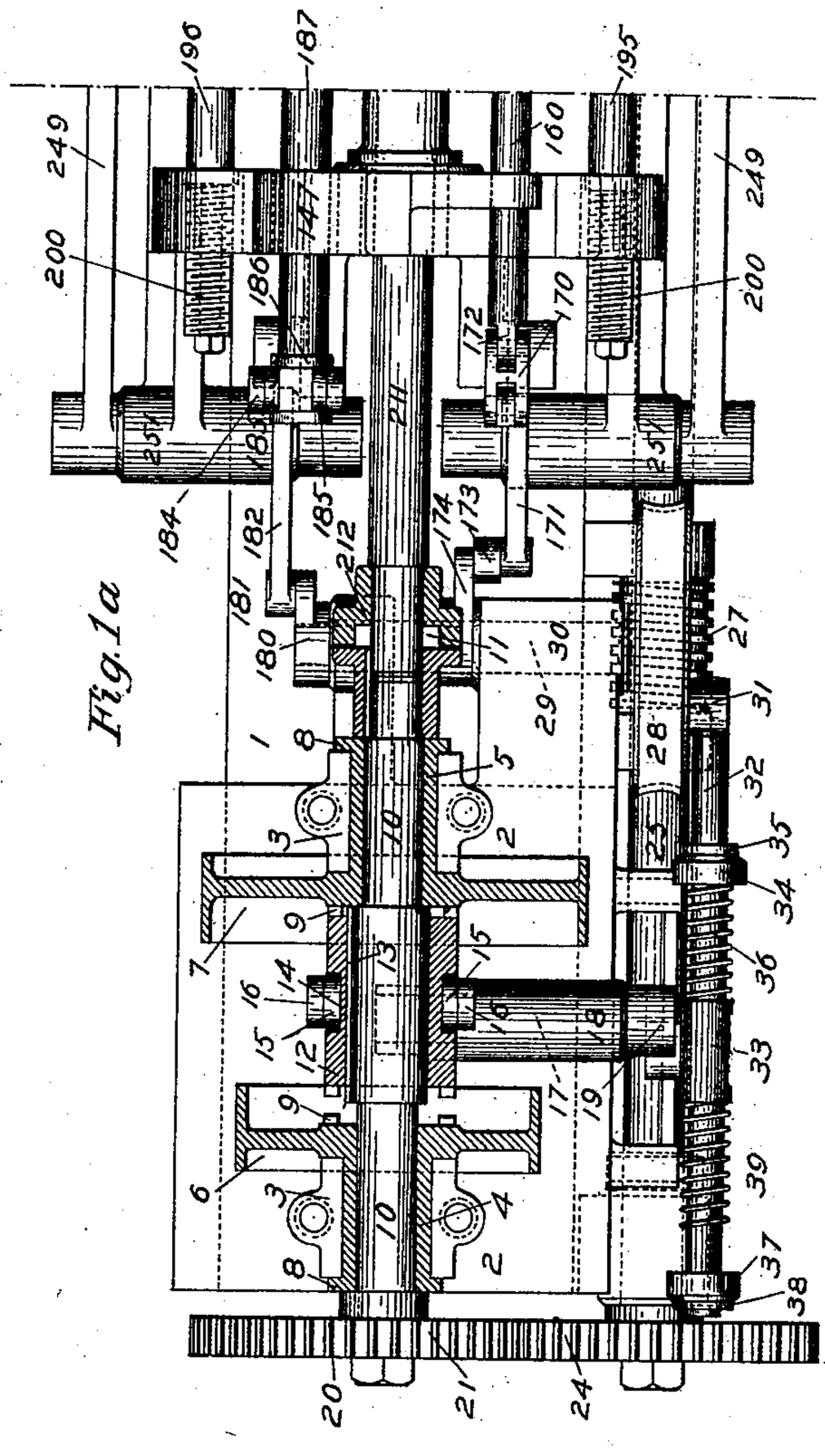

Fig. 1a

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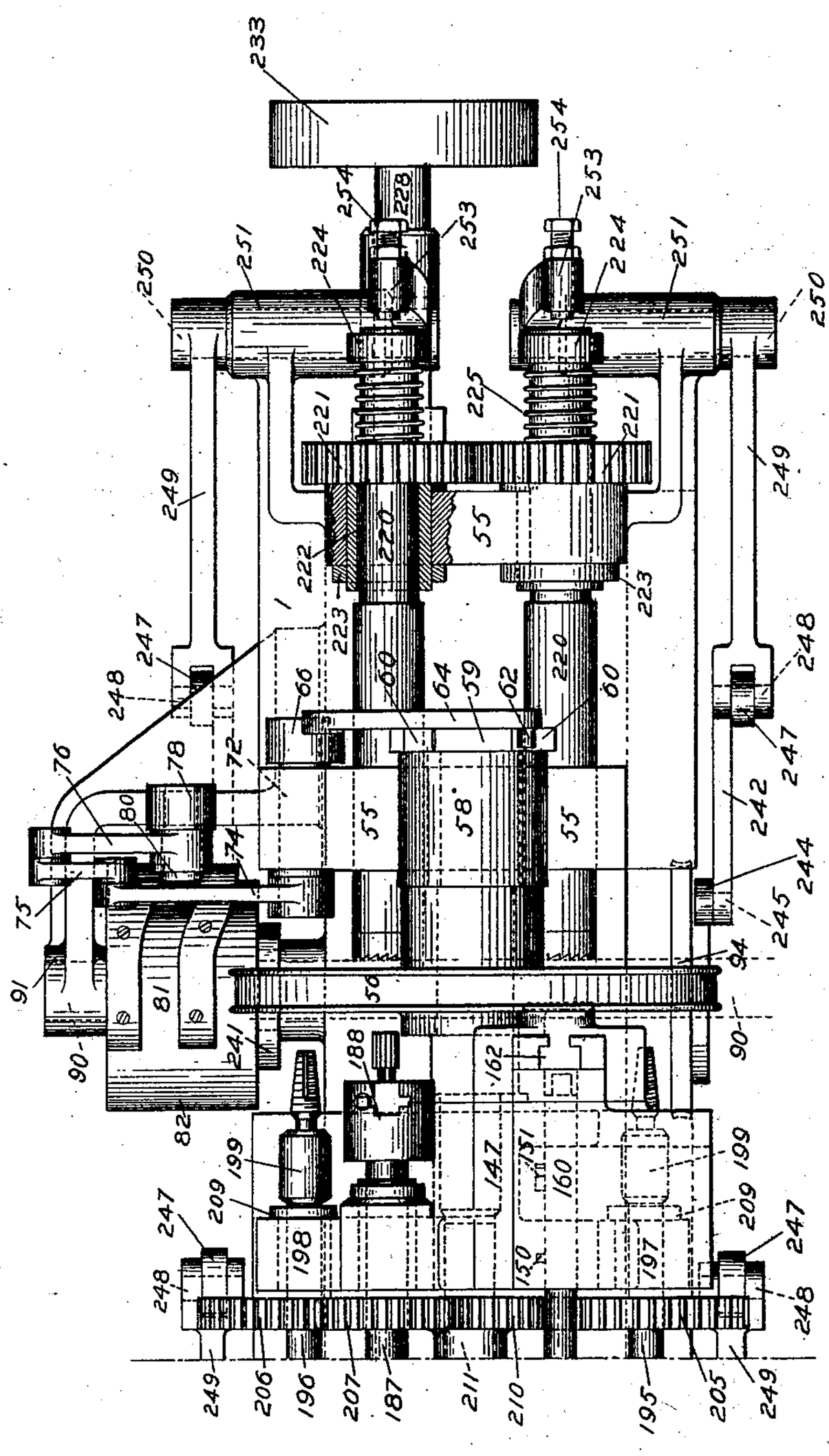
(No Model.) 6 Sheets—Sheet 2.

Fig. 1b.



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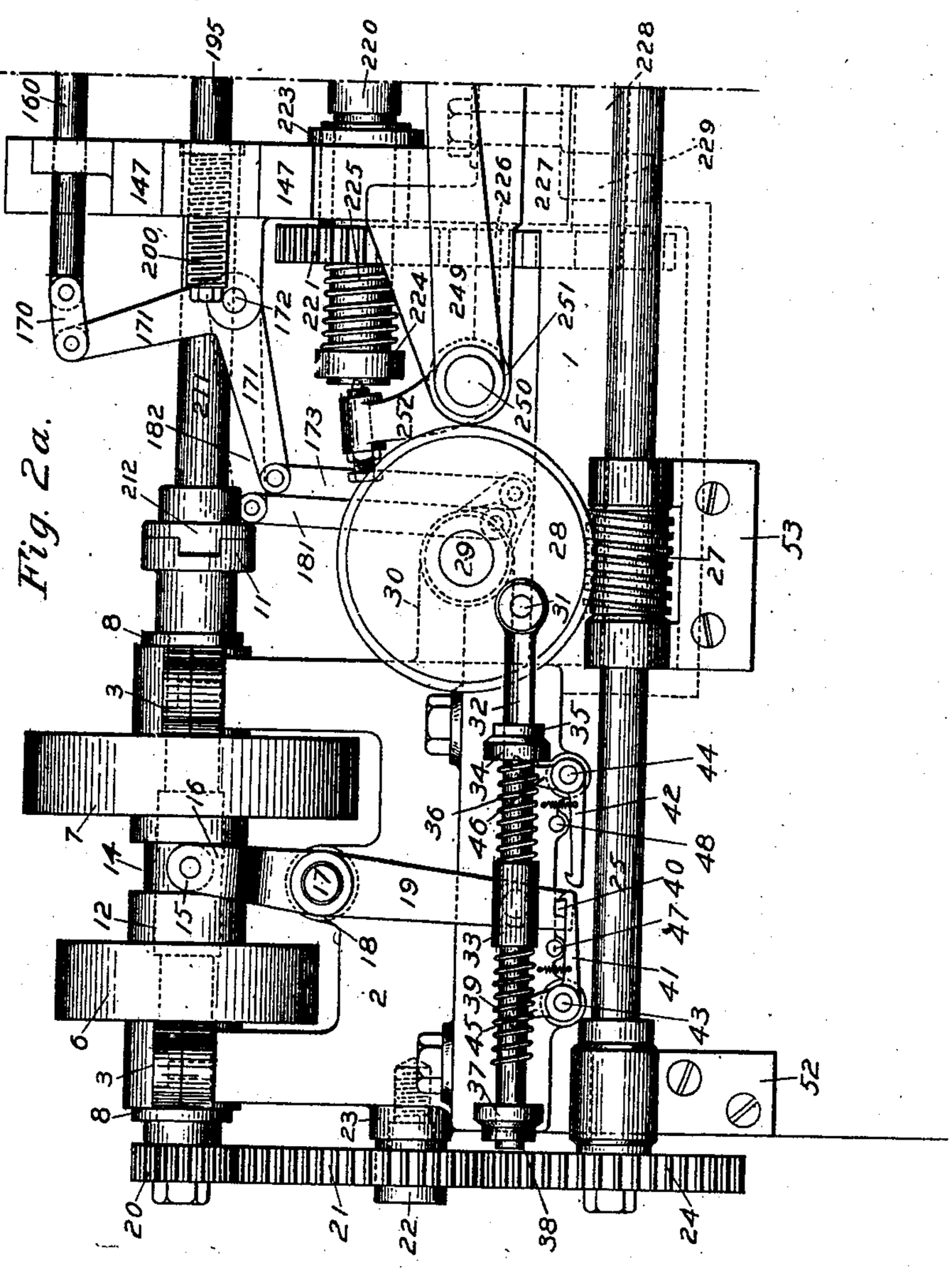
6 Sheets—Sheet 3.

Fig. 2a.



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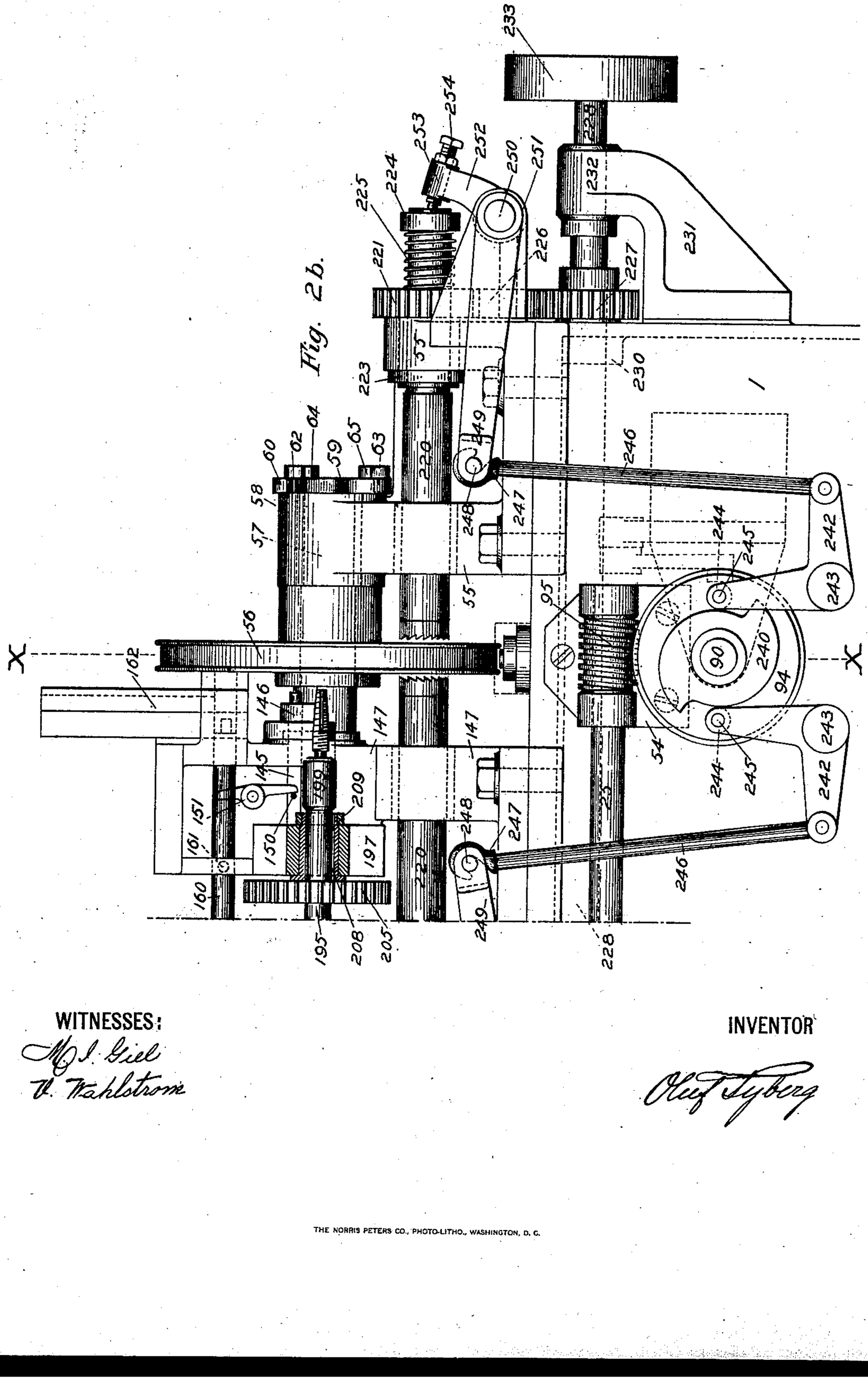
(No Model.) 6 Sheets—Sheet 4.

Fig. 2b.



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(No Model.)

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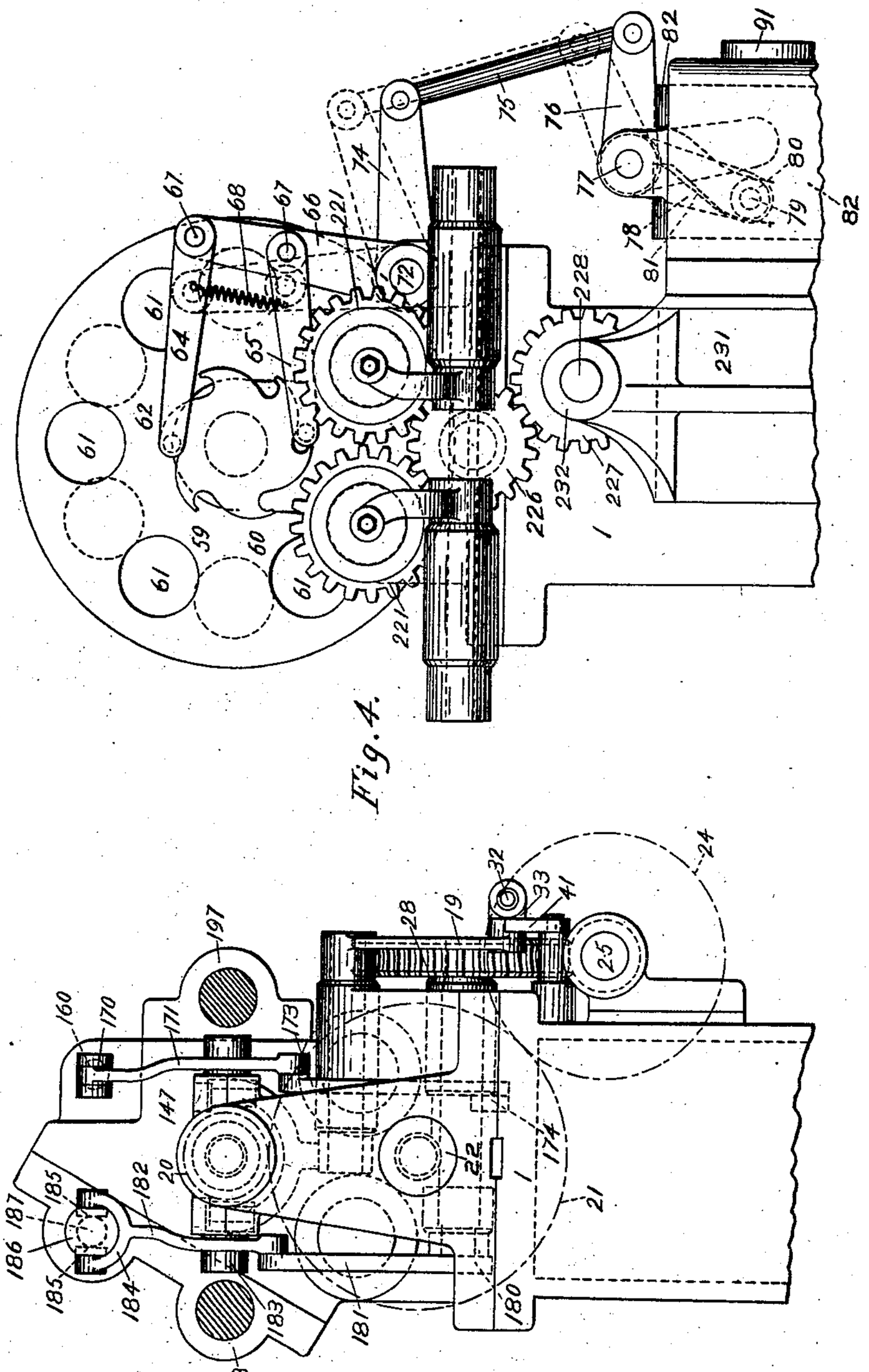

Fig. 4.

Fig. 3.

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(Application filed Oct. 4, 1899.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 5.

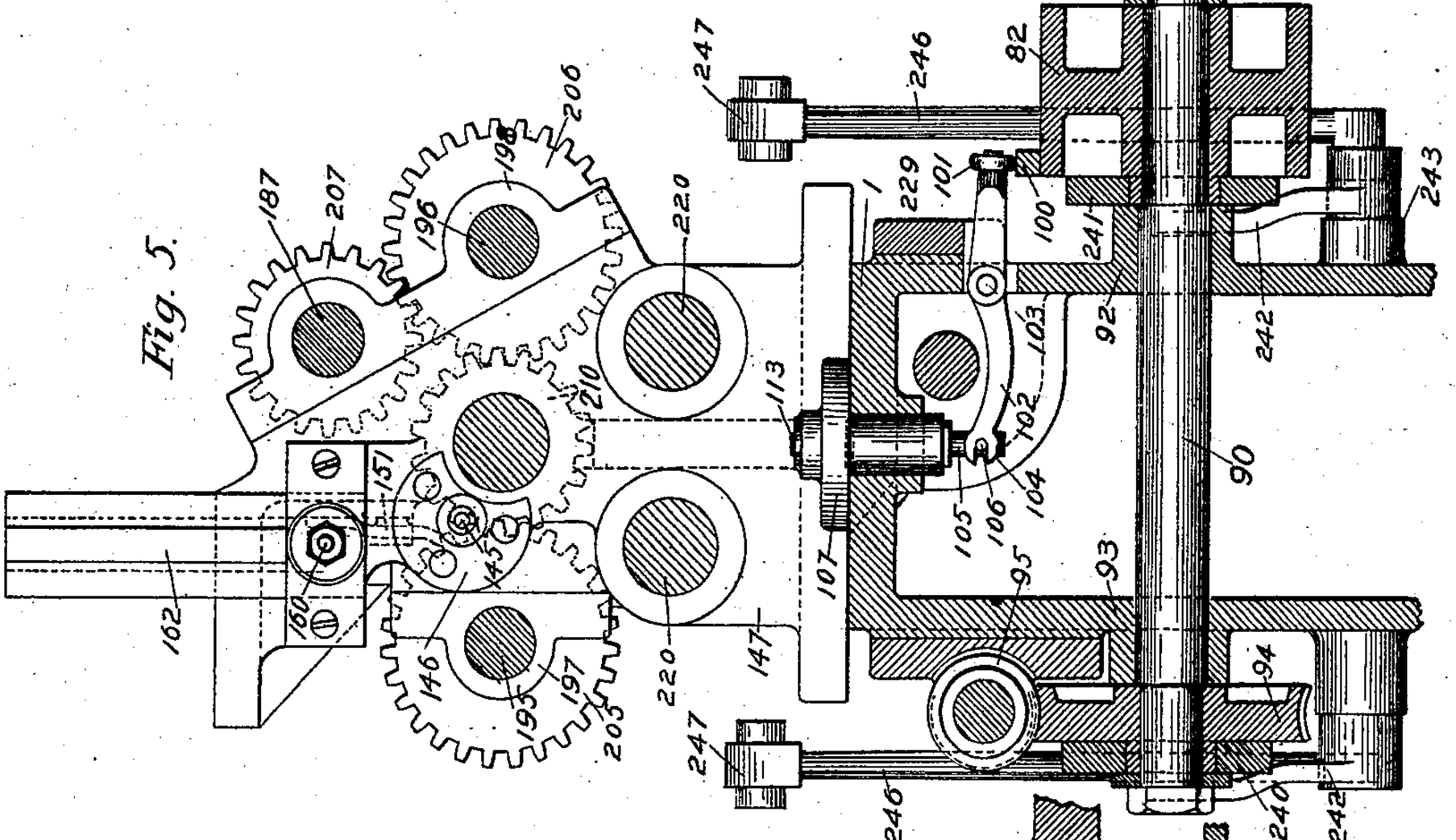


Fig. 7.

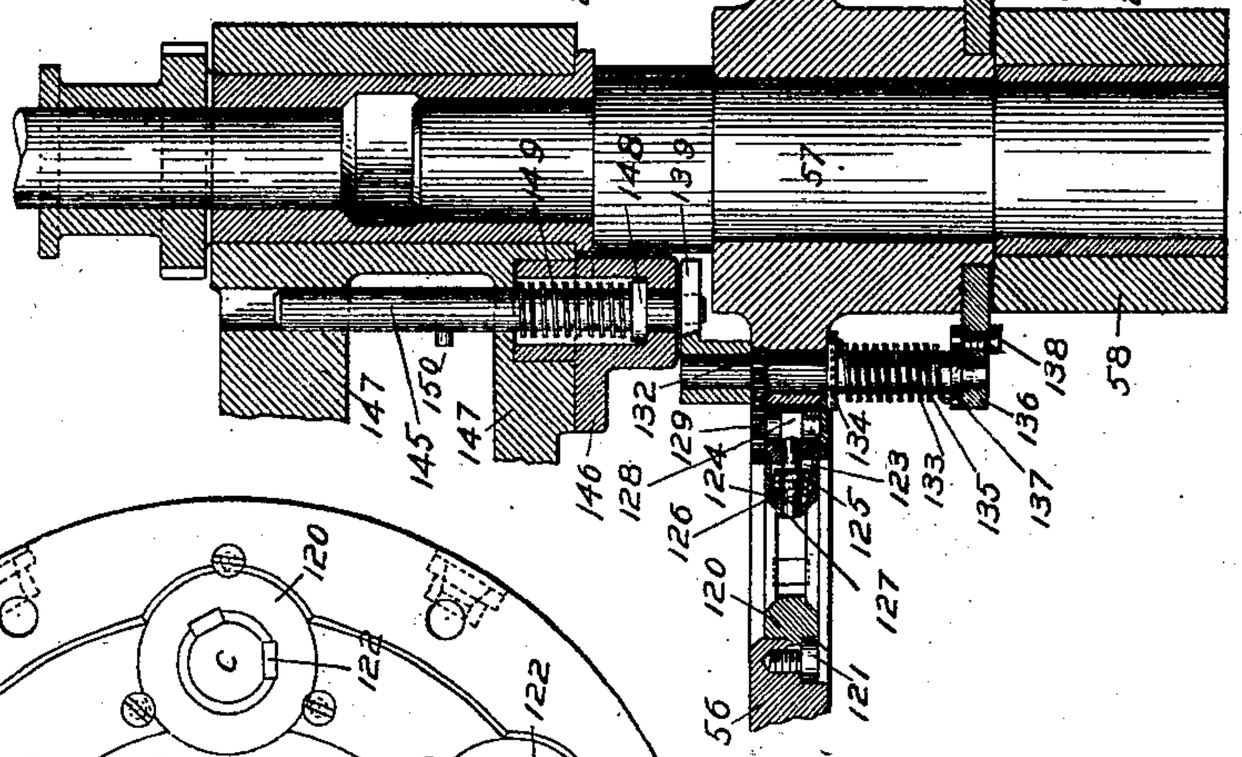
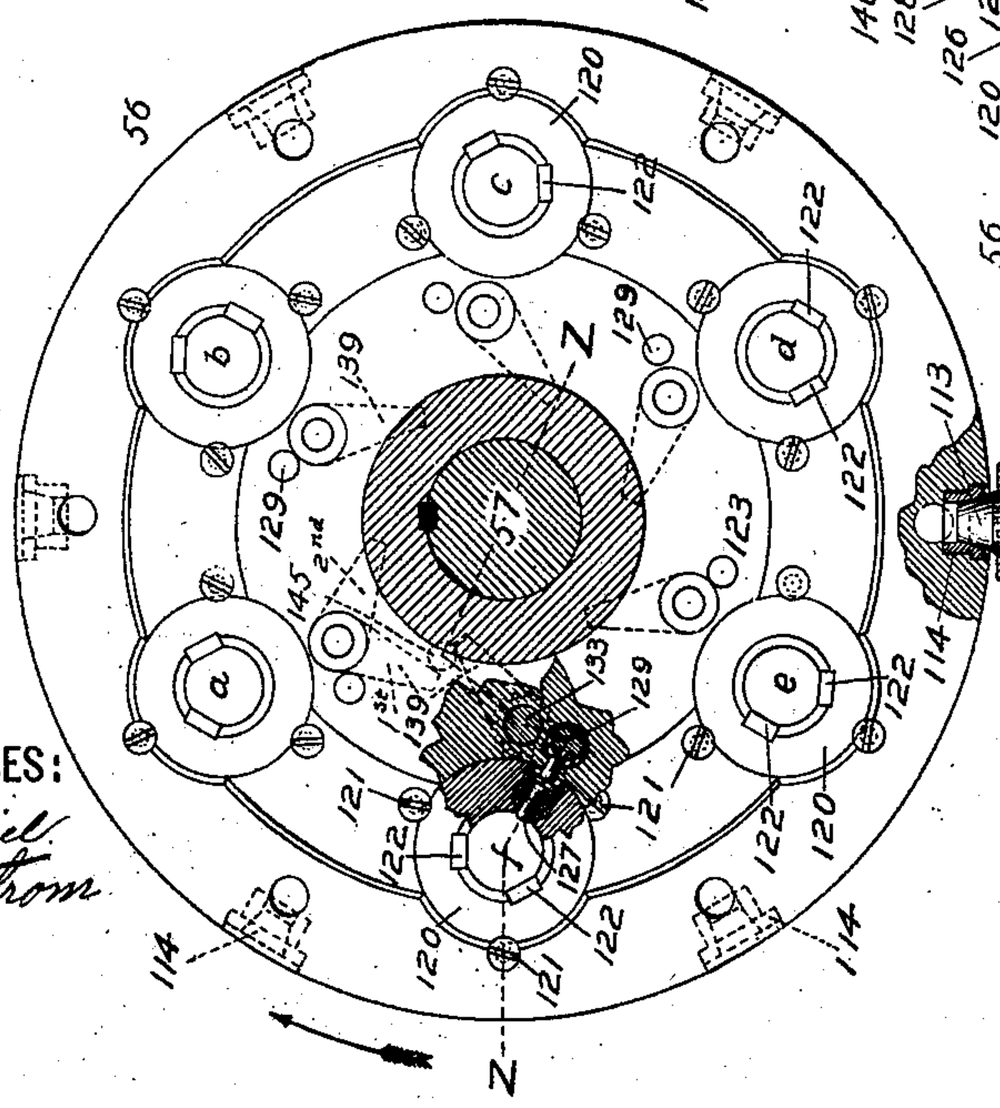


Fig. 6.



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UNITED STATES PATENT OFFICE.

OLUF TYBERG, OF BROOKLYN, NEW YORK, ASSIGNOR TO RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY, OF PORT CHESTER, NEW YORK, A CORPORATION OF NEW YORK.

NUT-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 715,522, dated December 9, 1902.

Application filed October 4, 1899. Serial No. 732,537. (No model.)

To all whom it may concern:

Be it known that I, OLUF TYBERG, a citizen of the United States of America, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Nut-Finishing Machines, of which the following is a specification.

This invention relates to an improvement in nut-finishing machines, and has for its object the production of a machine of this class in which the various operations of reaming, tapping, and finishing the top and bottom of the blank nuts are accomplished automatically and at the same time.

The invention consists, primarily, in the employment of an intermittently-rotated turret having a series of chucks for holding nut-blanks and automatic means for feeding nut-blanks to the chucks, retaining said blanks in the chucks while they are being finished, and releasing and expelling them when finished and in the employment of automatic mechanism for rotating and locking the turret, as well as for operating the various tools.

The invention will be hereinafter fully described, and specifically set forth in the annexed claims.

In the accompanying drawings, Figure 1^a is a plan of the rear half of the machine, partly sectional. Fig. 1^b is a plan of the front half of the machine, partly sectional. Fig. 2^a is a side elevation of the rear half of the machine. Fig. 2^b is a side elevation of the front half of the machine, partly sectional. Fig. 3 is a rear end view with the turret and pulleys removed and the worm-shaft gearing shown by broken pitch-lines. Fig. 4 is a front end view of the turret-revolving mechanism with the pulley for driving the milling-spindle removed. Fig. 5 is a section on the line X X in Fig. 2^b with the turret removed. Fig. 6 is an enlarged detail elevation of the turret, partly sectional; and Fig. 7 is a section on the broken line Z Z in Fig. 6.

In the construction of my machine I employ a supporting-frame 1, the lower part of which is not shown in the drawings. Upon the rear end of this frame (see Figs. 1^a and 2^a) the head-stock 2 is mounted, and this head-stock carries two bearings 3 3, in which are rotatably mounted the elongated hubs 4 and 5 of the pulleys 6 and 7, respectively. Each of these hubs is in the form of a sleeve, having a flange 8 at its outer end to prevent longitudinal movement of said sleeve in the bearings. The inner faces of both hubs are provided with the female clutch members 9 9. The shaft 10 is journaled in the hubs 4 and 5 and projects forwardly beyond the flange 6 of the pulley 7, and upon this projection the female clutch member 11 is fixed. The portion of the shaft 10 between the pulleys is slightly enlarged, and upon this enlarged section the double male clutch member 12 is mounted and adapted to slide longitudinally on the spline 13 into engagement with either of the female clutches 9 on the hubs of the pulleys, thereby locking the shaft to one of said pulleys. An annular groove 14 is cut on the periphery of the clutch 12, and in this groove the rollers 15 15, carried by the yoke 16, rotate. The yoke is fixed on one end of a rock-shaft 17, mounted in a suitable bearing 18, carried by the head-stock 2. A lever 19 is fixed to the outer end of the rock-shaft 17, the function of which will be presently explained. Upon the rear end of the shaft 10 a pinion 20 is fixed, which meshes with an idle gear 21, journaled on a pin 22, fixed in the boss 23 on the rear of the head-stock directly under the pinion 20. (Shown by broken lines in Fig. 3.) This idle gear meshes with the gear 24, fixed on the end of the worm-shaft 25, which is mounted in bearings 52 53 54, fixed to the side of the frame 1. In the bearing 53 a worm 27 is keyed on the worm-shaft 25, and this worm meshes with the rocking worm-wheel 28, which is keyed on the shaft 29, journaled in the bearing 30, said bearing being projected forwardly from the base of the head-stock 2. To a pin 31 in the outer face of the worm-wheel 28 the rod 32 is pivoted. This rod is adapted to be reciprocated by the rocking movement of the worm-wheel. Adjacent to the lower end of the lever 19 a slidable collar 33 is mounted upon the rod 32, and this collar is pivoted to said lever 19. A collar 34 is mounted on the rod 32 between

the collar 33 and the pin 31 and is adjustably held in place by means of the nut 35. A spiral spring 36 is loosely mounted on the rod between the collars 33 and 34. Another collar 37 is adjustably mounted on the free end of the rod 32 and is held in place by the nut 38. A spiral spring 39 is loosely mounted on the rod between the collars 33 and 37. A spur 40 is fixed to the lower end of the lever 19 and is adapted to be caught and held by either one of the latches 41 or 42, mounted on the studs 43 and 44, which are fixed to the frame 1. Spiral springs fixed to said latches and to the frame normally keep the latches against the pins 47 and 48. The latches 41 and 42 are respectively provided with the projected arms or dogs 45 and 46, these dogs normally lying alongside the rod 32 and out of contact with the springs 36 and 39. In the operation of this part of the device the power is taken from a line-shaft, an open belt driving the large pulley 7 and a crossed belt driving the small pulley 6 in the opposite direction. The object of using pulleys of different diameters is to run the machine slowly while the tools are feeding and to reverse running rapidly while the tools are backing out. This feeding operation will be hereinafter more particularly described.

As shown in Figs. 1^a and 2^a, the shaft is locked to the large pulley 7, just beginning to feed ahead slowly. Through the medium of the pinion 20, the idle gear 21, and the gear 24 the worm-shaft is relatively slowly rotated. The worm 27 causes the worm-wheel 28 to turn to the left, drawing the rod 32 through the collar 33, which is held stationary at this time by its connection with the lever 19, which is held by the latch 41. When the rod has moved far enough, the collar 37 comes in contact with the spring 39 and compresses it, this action continuing until the collar reaches the dog 45. It pushes this along and trips the latch 41. Then the compressed spring 39 forces the collar 33 over toward the worm-wheel until the clutch 12 has released the pulley 7 and locked the reversing-pulley 6. When the collar 33 is thus forced over by the action of the spring 39, the spur 40 is caught and held by the latch 42 until the tools (which will presently be described) have all backed out and the turret has begun to make one-sixth of a revolution, when the reversing operation is repeated automatically. Fixed upon the front end of the frame 1, Figs. 1^b and 2^b, is the turret-head 55, upon the rear side of which the turret 56 is mounted, its shaft 57 being rotatably mounted in a bearing 58 in the upper part of the turret-head 55. A ratchet-wheel 59 is fixed upon the front end of the turret-shaft 57. The ratchet-wheel has a set of teeth 60 60 (see Fig. 4) equal in number to the number of nut-holding chucks 61 61 of the turret. Wrist-pins 62 63 are fixed in the ends of the arms 64 65, respectively, and these wrist-pins engage the teeth of the ratchet-wheel. The arms 64 65 are connected with the upright lever 66 by means of the pivots 67 67. A spring 68, connecting said arms, tends to retain the wrist-pins in contact with the ratchet-wheel. The upright lever 66 is fixed to one end of a shaft 72, which is mounted in the side of the turret-head 55. To the other end of this shaft the lever 74 is fixed. This lever projects over the side of the machine and is pivotally connected with the connecting-rod 75. This connecting-rod is pivotally connected with the bell-crank 76, fulcrumed at 77 to an arm 78, carried by the frame below the bed on the side of the machine. A wrist-pin 79 is fixed in the free end of the bell-crank 78, and upon this wrist-pin a roller 80 is mounted. The roller 80 engages the channel 81 in the cam-drum 82, which rotates with a rocking motion. The channel 81 is straight throughout the greater part of its length, so that the bell-crank and connected levers and arms are held in the position shown by the dotted lines in Fig. 4, which is its normal position. When the end of the rocking motion of the cam-drum is nearly reached, however, the bell-crank is quickly moved out from its normal position and on the reversing of the cam again returned to that position. This rocking movement of the lever 66 produces in the turret one-sixth of a revolution, one-half of which is accomplished by the action of the upper arm moving in one direction and the other half by the action of the lower arm moving in the opposite direction, the device being shown in Figs. 1^b, 2^b, and 4 at the time the tools begin to feed forward and the turret is in the act of rotating and while the tools are entirely out of engagement with the turret. The cam-drum 82 is mounted on the shaft 90, (see Figs. 5 and 1^b,) between the bed and the bracket 91. The shaft 90, which extends across the machine transversely, is mounted in bearings 91, 92, and 93. Upon the end of this cam-shaft 90, opposite the cam-drum 82, a worm-wheel 94 is fixed, said worm-wheel 94 being actuated by a worm 95, fixed on the worm-shaft 25 in the bearing 54. Fixed upon the inner edge of the periphery of the cam-drum 82 is a block 100. This block is positioned so that the roller 101, contacting with the periphery of the cam-drum, will reach the said block just before the roller 80, carried by the bell-crank 76, reaches the offset in the channel 81. The roller 101 is mounted on the end of the lever 102, fulcrumed in the side of the frame at 103, and which projects into the frame and terminates in a yoke 104, spanning the lock-bolt 105 under the center of the turret. The arms of this yoke are slotted and in engagement with the pin 106, fixed in the lower end of the lock-bolt 105. This lock-bolt is adapted to move vertically in a housing 107, (see Fig. 6,) mounted in the bed, directly under the center of the turret. A chamber 108 is provided in this housing, and a nut 110 threads into the lower end of this

chamber and is provided with a central aperture 111, in which the lock-bolt 105 slides. An open coiled spring 112 is inserted in the chamber and bears against the head 109 of the lock-bolt and against the inner face of the nut 110, normally holding the lock-bolt in the position shown, locking the turret. The head 109 has a tapered end 113, contacting with the bushing 114, inserted in a radial recess in the periphery of the turret. The number of recesses corresponds with the number of chucks in the turret. In the operation of this part of the device, which goes into action during the interval when the tools are clear of the turret, the roller meets and is raised by the block 100, thereby forcing the lock-bolt 105 down, compressing the spring 112, and releasing the turret. As soon as this is accomplished the bell-crank roller meets the offset in the cam-drum channel and the turret is rotated one-sixth of a revolution. The roller 101 then leaves the block 100, and the spring 112 again raises the lock-bolt, and thus locking the turret in the next position.

Referring to Figs. 6 and 7, the turret is a circular plate having a series of six nut-chucks 61 61, equidistant from the center of the turret and from each other. Each of these chucks is provided with a bushing 120, held in place by means of the screws 121 121. The bushings are provided with two flat bearing-faces or jaws 122 122, spaced one hundred and twenty degrees apart, the faces being adapted to contact with two of the faces of a hexagonal nut. One hundred and twenty degrees from these bearing-faces the bushing is provided with a chamber 123, in which the movable jaw or pin 124 is radially mounted. This pin 124 has a collar 125 fixed thereon near the rear wall of the chamber 123, and an open coiled spring 126 contacts with this collar and the front wall of the chamber, normally retaining the point 127 of the pin flush with the inner periphery of the bushing. The rear end of the pin contacts with the eccentric central section 128 of an elongated cylindrical pinion-hub 129, mounted transversely in the turret adjacent to the bushings. This pinion meshes with a second pinion 132, cut on a spindle 133, mounted in the turret adjacent to the pinion 129 and the turret-hub and parallel with the axis or shaft 57 of the turret. A collar 134 is fixed to this spindle, contacting with the face of the turret, and to this collar a spiral spring 135 is secured. The spindle projects forwardly through the coils of the spring 135, and its end has a bearing in the flange 136, secured to the front face of the turret-hub. A loose collar 137 surrounds the spindle and rests against the flange 136, to which it is secured by means of the screw 138. One end of the spring 135 is secured to this collar 137, the action of the spring being to normally hold the spindle in the position shown, whereby the pin 124 is held in its extended position and the nut securely held in the bushing. An arm 139 is fixed upon the rear end of each of the spindles 133 and is adapted to come in contact with a pin 145, placed almost directly beneath the feed-tube 162 and the plunger 160, which will be directly described. The object of this pin 145 is to get into the path of the arm 139 as the turret makes a partial revolution, and swing the arms from the position indicated "2nd," Fig. 6, to the position indicated "1st," thereby opening the chuck, which will stop directly opposite the plunger 160. The pin 145 is slidably mounted in a housing 146, secured to the spindle-head 147 close to the turret. The spindle-head 147 is secured to the bed 1 between the head-stock 2 and turret 56. The pin 145 is provided with a collar 148 within the housing, and an open coiled spring 149 contacts with said collar and the rear wall of the housing and normally holds the pin in the extended position shown. Between the two bearings of the pin a spur 150 is fixed to the pin 145. A lever 151, Fig. 2^b, is fulcrumed to the spindle-head above the pin 145, and its lower arm, which is longer than its upper arm, rests against the forward side of the spur 150. Its upper arm is in close proximity to the plunger 160, which has a pin 161 fixed therein. The plunger 160 is directly in line with the bottom of the nut-feed tube 162, through which the unfinished nuts are fed into the machine. The function of the plunger 160 is to push the nuts from the feed-tube into the chucks of the turret to position the nuts in the chucks and to cause the finished nuts to be expelled from the opposite side of the turret. As the turret revolves the arms 139 successively engage the pin 145, and when one arm 139 thus engages the pin the corresponding chuck is unlocked; but as the plunger 160 moves forward the pin 161 comes in contact with the lever 151, which in its turn pushes the pin 145 back and out of engagement with the arm 139, which will then by the action of the spring 135 swing about into the "2nd" position, as indicated in Fig. 6, thus locking the nut as soon as it has been pushed into the chuck. The plunger operates to position the nut-blanks in the chucks so that they will extend from opposite sides thereof in order that their top and bottom faces may be operated upon by tools on opposite sides of the turret, and inasmuch as the jaws of the chuck are narrower than the nuts when a new nut-blank is inserted a finished nut is displaced.

Referring again to Figs. 1^a and 2^a, the rear end of the plunger 160 is pivoted to a link 170, which is pivoted to the bell-crank 171, fulcrumed to the spindle-head at 172. The other end of this bell-crank is pivoted to a connecting-rod 173, which is in turn pivoted to an arm 174, fixed upon the worm-wheel shaft 29 close to the bearing 30. Fixed to the extreme end of the shaft 29, opposite the worm-wheel 28, is another arm 180, to which is pivoted the connecting-rod 181. The upper end of this rod 181 is pivoted to the

bell-crank 182, (see Figs. 1ª and 3,) fulcrumed at 183. The free end of the bell-crank 182 is provided with a yoke 184, carrying the rollers 185 185, which engage the double-flanged head 186 of the reamer-spindle 187 and are adapted to move said spindle longitudinally. The reamer-spindle is rotatably mounted in suitable bearings in the spindle-head 147 in the same horizontal plane as the plunger 160. A chuck 188, Fig. 1ᵇ, adapted to hold a reamer, is fixed upon the free end of this spindle. In the horizontal plane of the shaft 10 and the center of the turret the tap-spindles 195 and 196 are mounted in the bearings 197 and 198, fixed on opposite sides of the spindle-head. Each of these spindles is provided with a chuck 199, in which the taps are fitted. The opposite ends of the spindles are provided with the chasers 200 200, Fig. 1ª, working in the rear upright of the spindle-head 147. Spur-gears 205, 206, and 207, Figs. 1ᵇ, 2ᵇ, and 5, each having elongated hubs mounted as sleeves in the forward bearing of the spindles 195, 196, and 187, respectively, are carried on splines 208 on the spindles, so that the said spindles may be rotated while the spindle is being fed forward. Collars 209 are fixed on the free end of these hubs and prevent longitudinal movement of the gears in their respective bearings. This train of gears is actuated by the pinion 210, fixed on the shaft 211, which is connected with the pulley-shaft 10 by means of the male clutch member 212, fixed thereon and which engages the female clutch member 11. There is no longitudinal movement of the shaft 211, and the clutch is not a necessity, but merely a convenience in setting up the machine. The pinion 210 meshes with the gears 205 and 206 and the gear 206 meshes with the gear 207. Four end milling-spindles 220 220 220 220, all alike, are arranged in pairs upon opposite sides of the turret and all in the same plane below that of the taps and in line with the two lower chucks of the turret. Each of these spindles 220 is mounted in bearings in the turret-head and spindle-head, respectively, and each is rotated by means of a spur-gear 221, having an elongated hub mounted as a sleeve on a spline 222, carried by the spindle. A collar 223, fixed on the free end of the hub, prevents longitudinal movement of the gear in its bearings. Upon the outer end of each spindle 220 a collar 224 is fixed, and an open coiled spring 225 is interposed between this collar and the gear-hub, normally holding the milling end of the spindle out of engagement with the nuts carried by the turret. The pair of gears 221 221, at each end of the machine, are driven by an idle gear 226, mounted on a suitable bearing fixed to the turret-head 55 and the spindle-head 147, respectively. These idle gears 226 226 are each driven by a pinion 227, fixed upon the shaft 228, which is journaled in a bearing 229 under the bed at the front end of the machine. A bracket 231, fixed to the front end of the frame, carries another bearing 232 outside of the pinion 227. Upon the overhanging end of this shaft 228 a pulley 233 is placed, and this pulley is driven by a belt from the line-shaft. A double cam 240 is fixed upon the end of the cam-shaft 90, close to the worm-wheel 94. A similar double cam 241 is mounted on the shaft 90 close to the cam-drum 82 on the other side of the machine. Bell-cranks 242 242 are fulcrumed at 243 to the side of the frame. Their upper ends are provided with rollers 244, contacting with the cam 240, mounted on wrist-pins 245. Connecting-rods 246 246 are pivoted to the outer arm of these bell-cranks, and the free end of these connecting-rods are provided with hooks 247, adapted for engagement with pins 248 in the yoked levers 249, which are fixed upon the outer ends of the rock-shafts 250, which are mounted in bearings 251, carried by the turret-head and spindle-head. Arms 252 are fixed upon the inner ends of the rock-shafts 250, and these arms are provided with heads 253, having adjusting-screws 254 therein which contact with the outer ends of the milling-spindles 220. The cams are so positioned on the cam-shaft that the milling-cutters advance upon opposite sides of the same nuts at the same time that the reamer and taps are being fed to other nuts carried by the turret. At the same time that the latter reverse and back out it is obvious that the milling-spindles will retreat, without reversing, however, since their motion is not derived from the pulley-shaft 10, while the cam motion is produced by the action of the pulley-shaft 10.

In the general operation of the device the blank nuts are fed to the feed-tube 162. The machine starts up and the plunger 160 advances and pushes the blank nut at the bottom of the feed-pipe into the chuck at position *a*, Figs. 5 and 6, where it is locked by the action of the spindle 133. If there were no nut-blanks in the turret, the reamer, taps, and millers would advance and then retreat without doing any work. The turret-revolving mechanism then causes it to turn one-sixth of a revolution, when the first nut-blank inserted in the turret will be carried to position *b*, and another blank is forced by the plunger into the chuck at position *a*. Again, the reamer, taps, and millers will advance; but only the reamer at position *b* will be in action. When the blank reaches position *c*, in like manner it is tapped. At position *d* one set of milling-cutters attack it from opposite sides and rough-finish the faces. At *e* the other set of milling-cutters finish the faces of the blank, and at *f* a second tap is run through the finished nut to remove burred edges. When the completed nut again reaches position *a*, it is forced out of its pocket by the action of the plunger in pushing a new blank into its place.

It is obvious that the operation of reaming, tapping, and finishing will after the turret is full of blanks be going on all the time and that the machine will discharge a finished nut thereafter at each one-sixth of a revolution.

It is to be understood that the mechanism by which the various operations carried out by this machine are performed may be widely varied in construction and arrangement. Other constructions may be substituted for some of those now employed and the relative movement of some of the parts with respect to others may be effected not only by moving the parts described in the machine, but by moving the other parts or by moving both parts. It will also be understood that some of the mechanism may be used in structures in which other parts of the mechanism are not employed and that the independent use of such mechanism is contemplated. The invention is not, therefore, to be restricted to the particular mechanism or the precise details of construction herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a nut-finishing machine the combination of a turret or nut-holder, a series of automatically-operated chucks open front and back and mounted in openings in the turret, and an automatic nut-blank feed acting in line with the axes of the chucks to introduce a nut-blank through one side of an open chuck, to position it therein, and to discharge a finished nut from the opposite side thereof while said chuck is passing the feed-point.

2. In a nut-finishing machine the combination of a turret or nut-holder, a series of automatically-operated chucks open front and back and mounted in openings in the turret, an automatic nut-blank feed acting in line with the axes of the chucks to introduce a nut-blank through one side of an open chuck, to position it therein, and to discharge a finished nut from the opposite side thereof while said chuck is passing the feed-point, means for opening the chucks as they successively reach the feed-point, and devices operated by the nut-blank feed for closing the chuck at the feed-point as soon as a nut-blank has been introduced and positioned in said chuck, and a finished nut has been discharged therefrom.

3. In a nut-finishing machine the combination of a turret or nut-holder, a series of automatically-operated chucks open front and back and mounted in openings in the turret, an automatic nut-blank feed acting in line with the axes of the chucks to introduce a nut-blank through one side of an open chuck, to position it therein, and to discharge a finished nut from the opposite side thereof while said open chuck is passing the feed-point, and finishing-tools operating on the nut-blanks on opposite sides of the feed-point and on opposite sides of the turret.

4. In a nut-finishing machine the combination of a turret or nut-holder, a series of chucks open front and back and located in openings in the turret, each comprising stationary jaws and a movable jaw, a cam carried by the turret for closing the movable jaw, a spring-turned spindle also carried by the turret and gearing with the cam, and devices for turning the spindle against the force of its spring.

5. In a nut-finishing machine the combination of a turret or nut-holder, a series of chucks open front and back and located in openings in the turret, each of said chucks comprising stationary jaws located wholly within an opening in the turret, a movable jaw or pin also located wholly within the opening, a spring for moving said pin in one direction, a cam for moving it in the opposite direction, a spring-turned spindle gearing with the cam, and devices for turning the spindle to open the chuck.

6. The combination of a turret, a ratchet-wheel connected therewith, a locking-bolt adapted to engage with the turret, a rock-shaft, a cam thereon, rocking with the shaft, a lever carrying arms engaging the ratchet, connections between said lever and the cam whereby when the cam is rocked the levers cause the arms to move the turret by means of the ratchet, a lever connected with the locking-pin, and a cam on the turret-operating cam for operating said last-mentioned lever to withdraw the locking-bolt just before the mechanism is operated to turn the turret.

7. The combination of a main driving-shaft, carrying large and small pulleys, a clutch for alternately connecting the pulleys with the shaft, a worm-shaft gearing with the main driving-shaft, a worm-wheel gearing with said worm-shaft, a clutch-operating lever, spring-catches for holding the lever alternately in two positions, a rod connected with the worm-wheel and reciprocated thereby, connections between the rod and the clutch-operating lever, another worm-wheel gearing with the worm-shaft, a shaft on which said worm-wheel is mounted, a cam carried by said last-mentioned shaft, a turret or nut-holder, and connections between said cam and said turret whereby as the cam is rocked the turret is step by step moved.

8. The combination of a worm-shaft, means for rocking it, a worm-wheel gearing with said shaft, a cam connected with said worm-wheel, a turret or nut-holder, means connected with said worm-shaft for rotating the turret step by step, milling-tools on opposite sides of the turret placed end to end, springs for moving said tools away from the turret, and levers operated by said cam and connected with the milling-tools whereby the milling-tools are moved toward each other and toward the turret to act on opposite sides of a nut carried thereby.

9. In a nut-finishing machine the combination of a turret or nut-holder, a series of automatically-operated chucks open front and

back and mounted in openings in the turret, an automatic nut-blank feed acting on one side of the turret in line with the axes of the chucks to successively introduce and position a nut-blank in an open chuck and discharge a finished nut from the opposite side of the turret each time that a chuck passes the feed-point, a tapping-tool, means for rotating it and moving it back and forth through the chucks as they are successively presented, finishing or milling tools arranged end to end on opposite sides of the turret, means for moving the milling-tools toward and from each other to act upon the opposite sides of a nut and to withdraw therefrom, and another tapping-tool operating similarly to that first mentioned for removing burs from the nut before it is discharged.

Signed by me this 29th day of September, 1899.

OLUF TYBERG.

Witnesses:
U. WAHLSTROM,
M. I. GIEL.