No. 715,523. Patented Dec. 9, 1902.

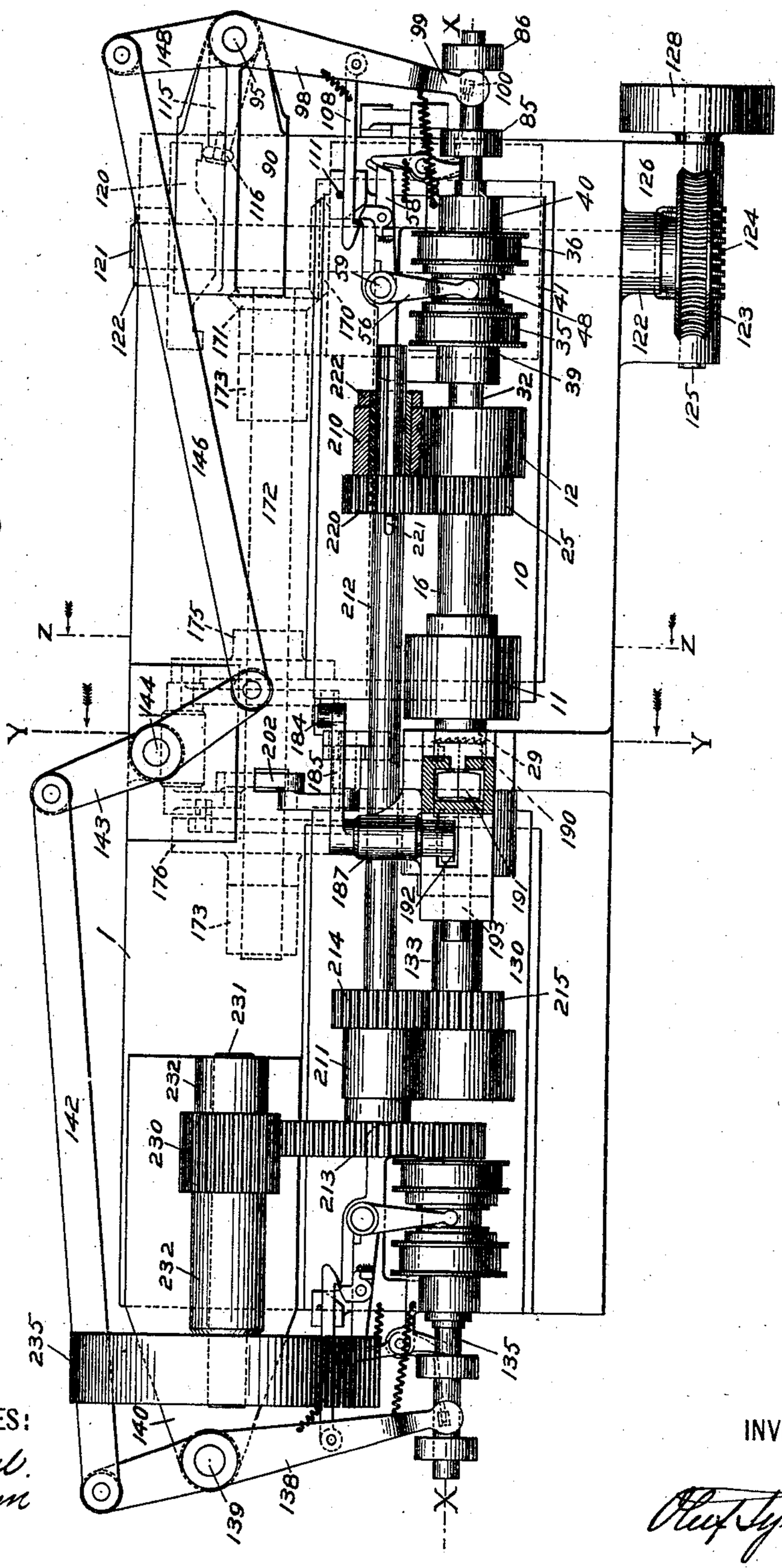
O. TYBERG.

NUT FINISHING MACHINE.

(Application filed Oct. 4, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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5 Sheets—Sheet 2.

Fig. 2.

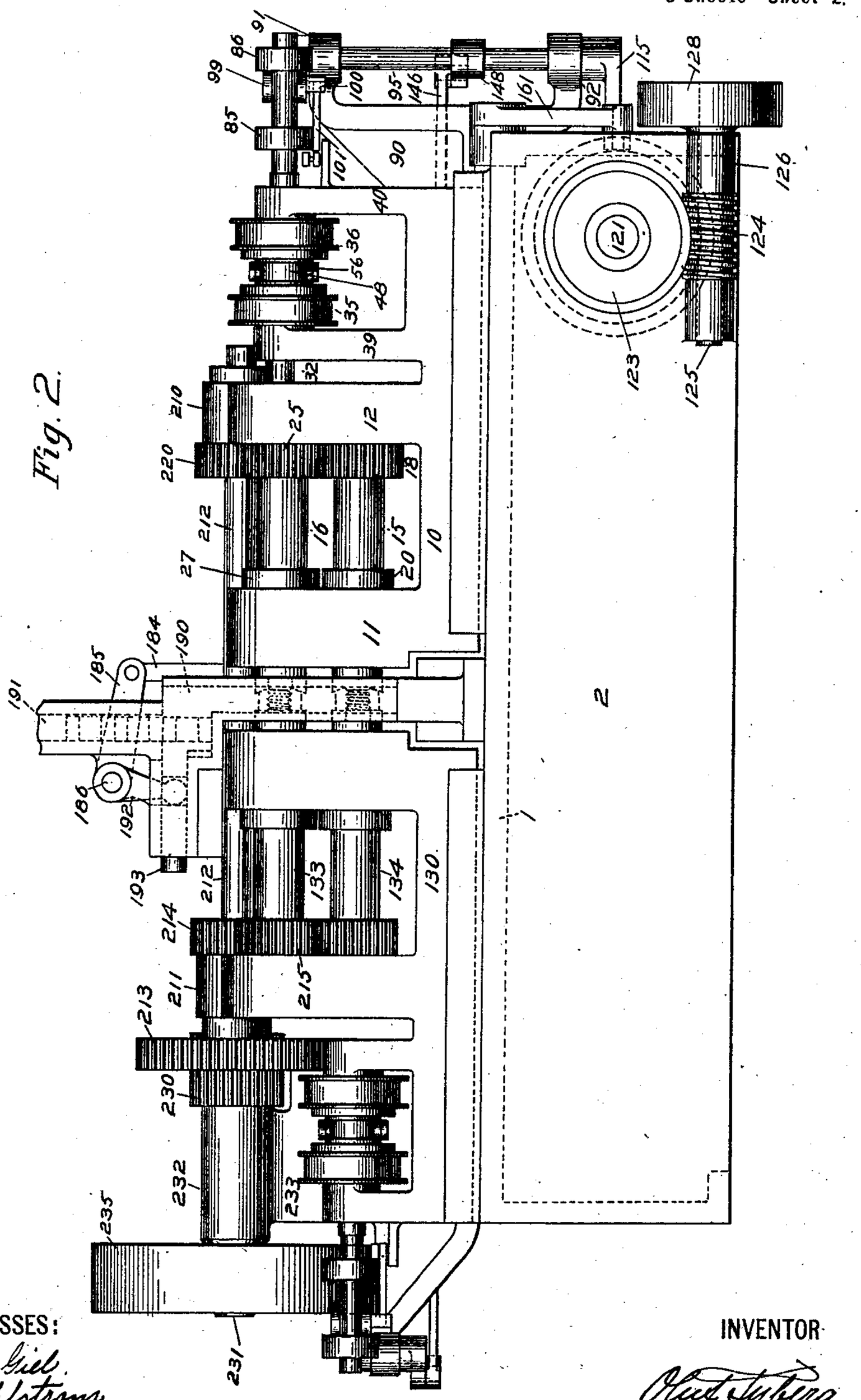

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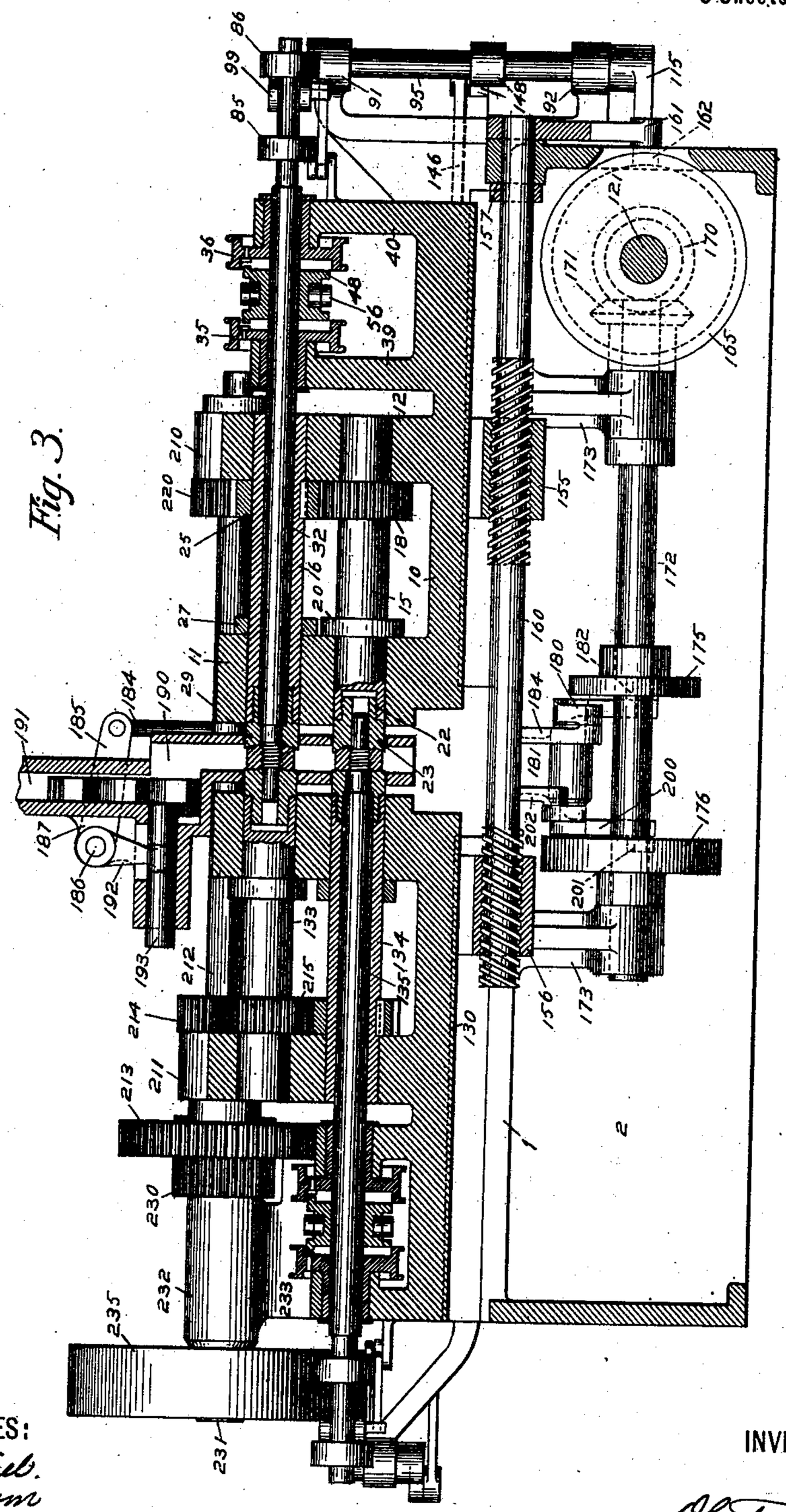
Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

Fig. 4.

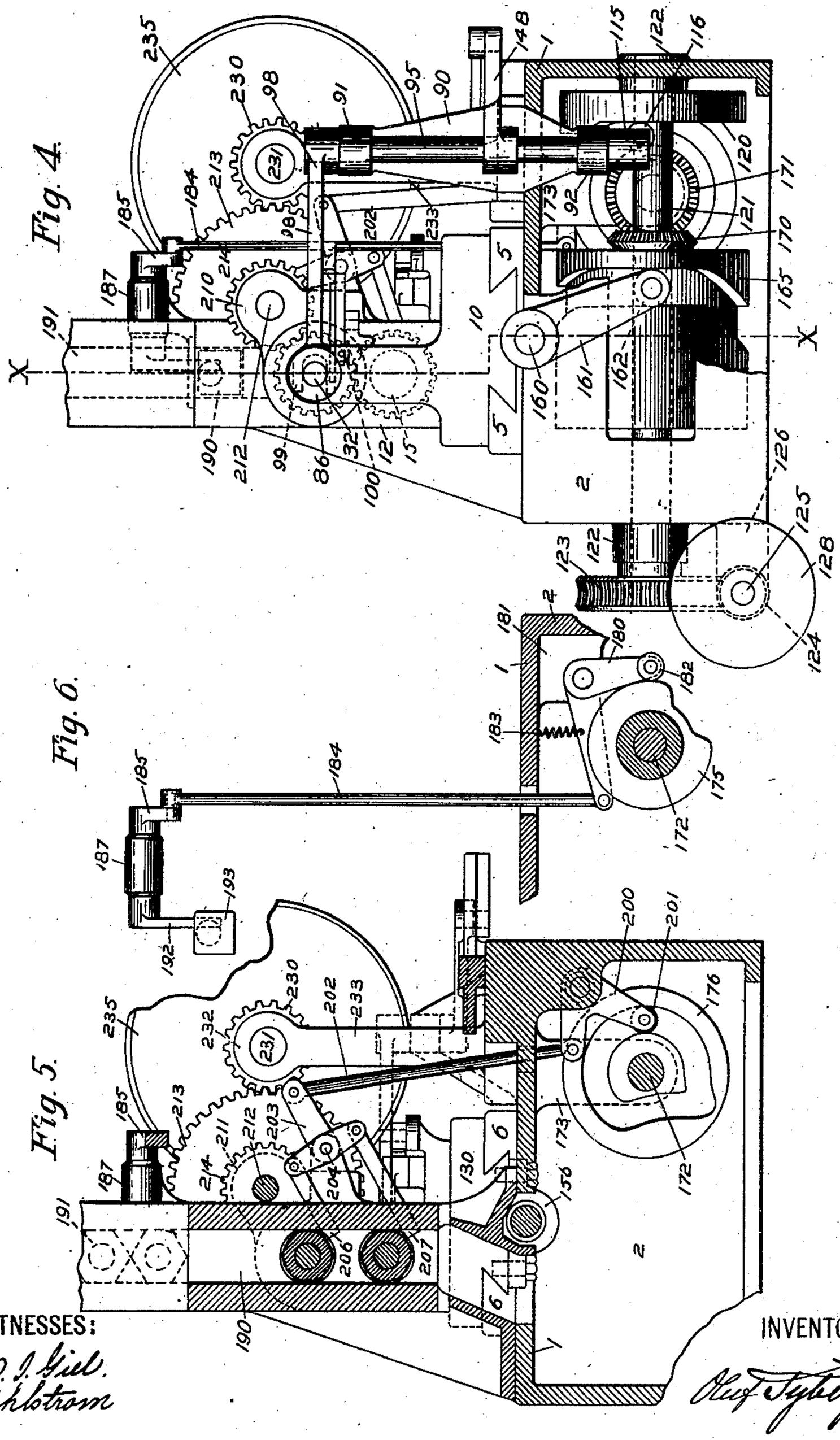

Fig. 6.

Fig. 5.

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(No Model.) 5 Sheets—Sheet 5.

Fig. 7.

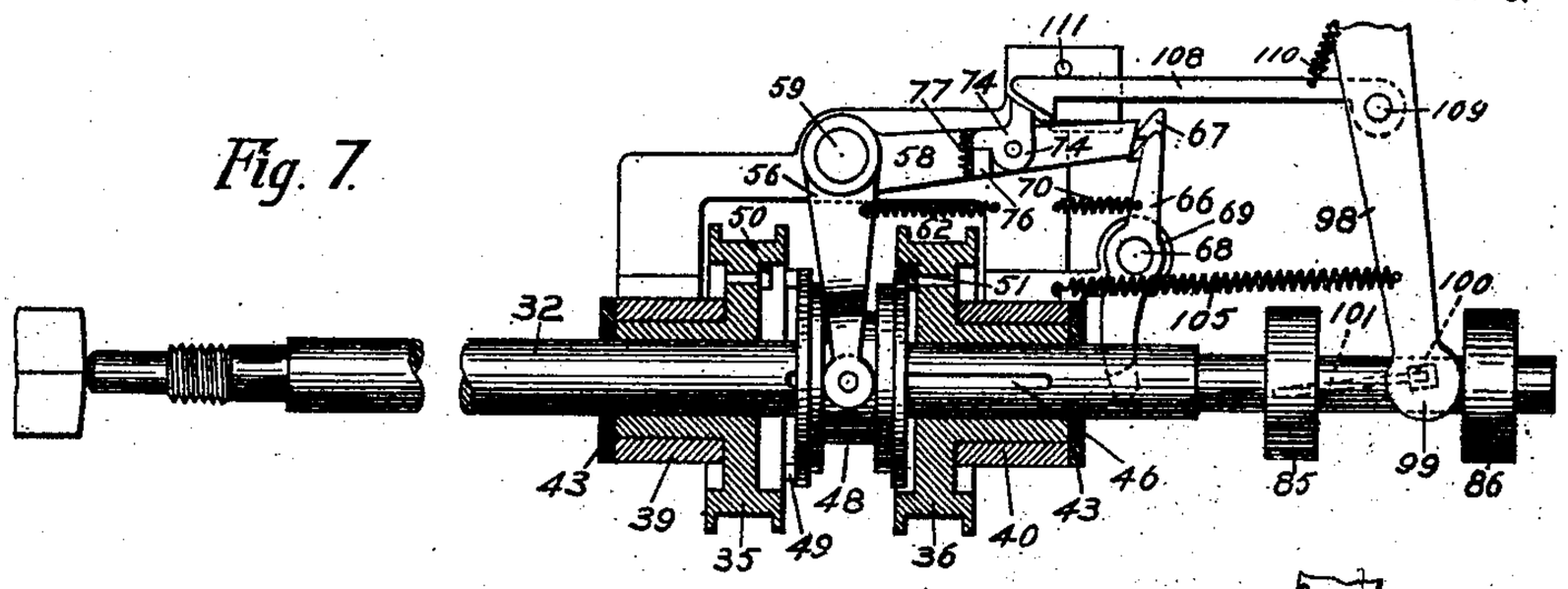


Fig. 8.

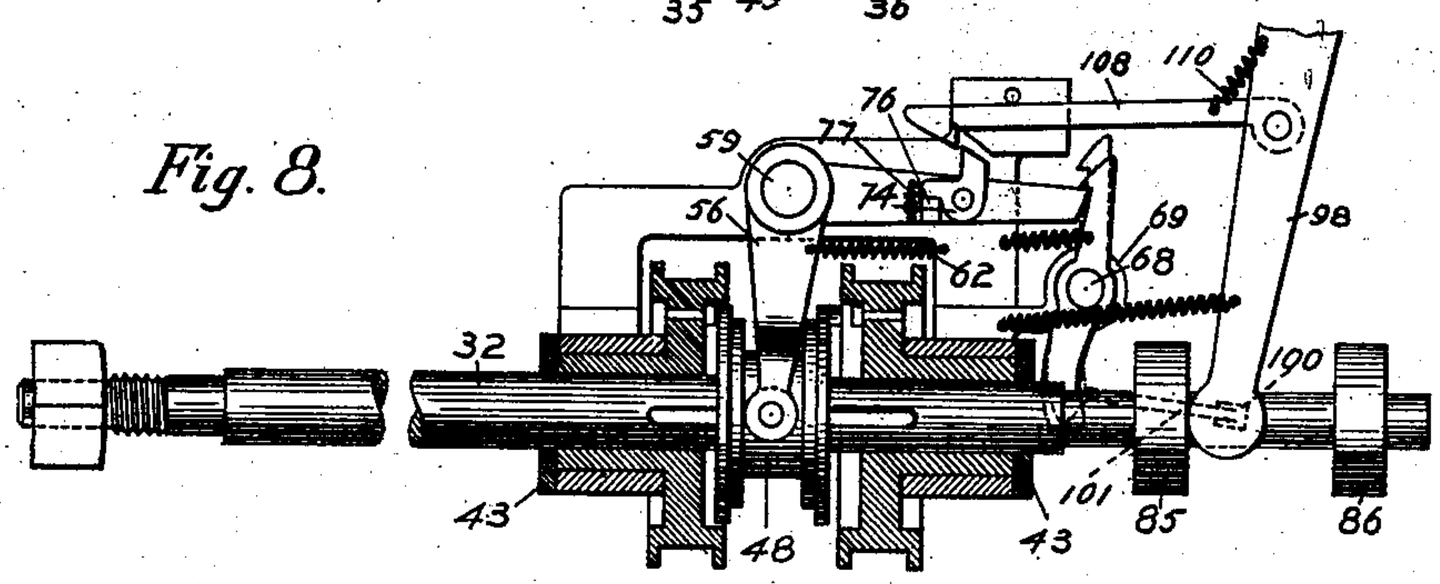


Fig. 9.

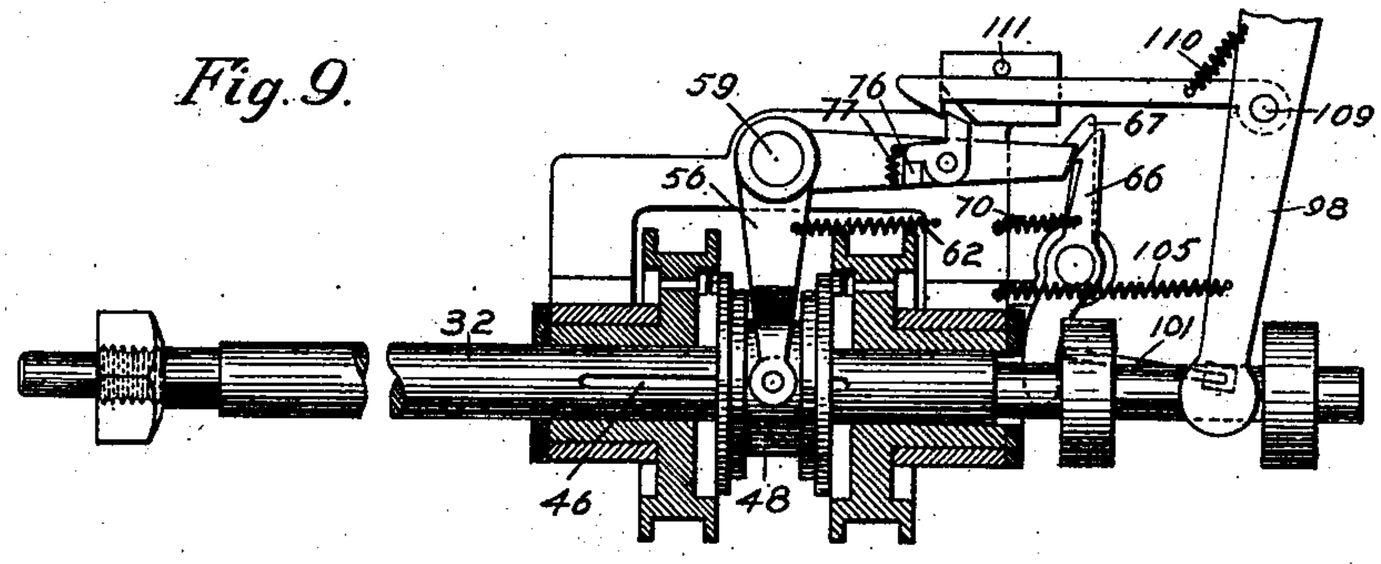
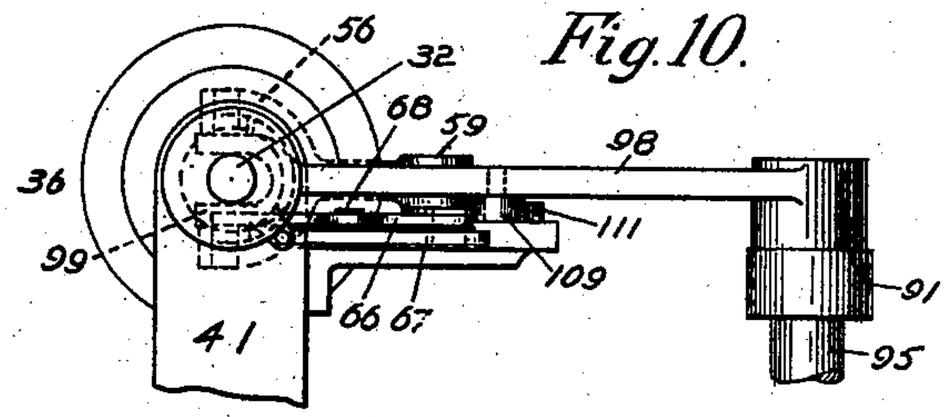


Fig. 10.



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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. 715,523, dated December 9, 1902.

Application filed October 4, 1899. Serial No. 732,538. (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 its object is to produce an automatic device for simultaneously finishing the top and bottom of tapped nuts true with the thread of said nuts.

The invention consists, primarily, in the employment of two parallel sets of revolving milling-spindles, each set being in line with each other, and means for holding the nuts to be acted upon on threaded mandrels between said milling-spindles, said mandrels having an independent revolving and axial movement in and through said revolving spindles.

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

In the accompanying drawings, Figure 1 is plan view of the device, one of the gear-shaft bearings being shown in section. Fig. 2 is a front elevation. Fig. 3 is a section on the line X X in Figs. 1 and 4. Fig. 4 is a right end view, partly broken away. Fig. 5 is a section on the line Y Y in Fig. 1. Fig. 6 is a section on the line Z Z in Fig. 1, showing only the actuating mechanism of the plunger. Fig. 7 is an enlarged detail plan, partly sectional, of the mandrel-controlling mechanism, showing the clutch locked to the reversing-pulley and the mandrels out of engagement with the nut. Fig. 8 is a similar view showing the clutch locked to the feeding-pulley and the mandrel ready to be screwed on the nut. Fig. 9 is a similar view showing the clutch out of engagement with both pulleys, the mandrel at rest with the nut on the mandrel. Fig. 10 is an end view of the same on the same scale.

In constructing my device I employ a rectangular bed-plate 1, which is mounted upon or integral with a suitable pedestal 2. Upon the top of said bed-plate are mounted slideways 5 and 6, in which the slides 10 and 130 are mounted in line with each other. The slide 10 has two uprights 11 and 12, in which the spindles 15 and 16 are journaled one over the other. The lower spindle 15 has a spur-gear 18 and a collar 20 fixed thereon, which prevent longitudinal movement of the spindle in its bearings. The left end of the spindle 15 is provided with a socket 22, Fig. 3, in which the refinishing-tool 23 is secured. This tool projects beyond the left face of the upright 11. The spur-gear 25, which meshes with the gear 18, is fixed upon the upper spindle 16 and with the collar 27 prevents longitudinal movement of said spindle in its bearings. The spindle 16 is hollow throughout its length, and it carries at its left end a finishing-tool 29, which is similarly secured in the end of the spindle. This finishing-tool also projects beyond the left face of the upright 11 very slightly less than the refinishing-tool immediately below it.

In the bore of the spindle 16 a mandrel 32, Figs. 3 and 7, is rotatably and slidably mounted. This mandrel has a reduced forward end, and upon this reduced end a thread adapted to fit the nuts to be finished is cut, and has a further reduced end beyond said thread adapted to fit into the tool carried by the opposite spindle. The free end of the mandrel 32, projecting to the right beyond the bearing 40, has two collars 85 and 86 fixed thereon and spaced apart. The mandrel 32 has two pulleys 35 and 36 loosely mounted thereon. The pulleys 35 and 36 have elongated hubs, which are rotatably mounted in the bearings 39 and 40, carried by the slide 10. Flanges 43 43 are fastened to the free ends of the pulley and bear against the face of the bearings 39 and 40, preventing longitudinal movement of the pulleys in their bearings. The mandrel 32 is provided with an elongated spline 46, and upon the mandrel and this spline and between the pulleys 35 and 36 the double clutch 48 is mounted, so that it revolves with the mandrel, but allows the mandrel to slide freely through it during the longitudinal movement of the mandrel.

The clutch 48 is provided on opposite faces with spurs 49 49, which are adapted to intermittently engage the pins 50 and 51, fixed upon the inner face of the pulleys 35 and 36, respectively. The clutch 48 has an annular groove cut in the periphery thereof, and in this groove the arms of a yoke 56, spanning the clutch from the rear side, carry rollers, which engage the walls of the groove. The yoke 56 forms a part of the bell-crank 58, which is fulcrumed at 59 to a projection on the rear side of the bearing 39. A spring 62 normally holds this crank 58 in the position shown in Fig. 7, locking the clutch to the pulley 36. The free end of the crank 58 projects to the right beyond the end of the bracket 41, and its end is adapted for engagement with the pawl 66 or the pawl 67, immediately below the pawl 66. Both these pawls are fulcrumed on the pin 68, which is carried by a lug 69 of the bearing 40. Springs 70 hold the pawls against the end of the crank 58. The opposite ends of the pawls 66 and 67 project forwardly to points under the mandrel 32, the lower pawl 67 being a little shorter than the upper pawl 66. A latch 74 is pivoted to the upper side of the free arm of the bell-crank 58 and is normally held against the block 76, fixed on said bell-crank 58, by the action of the spring 77. The object of this mechanism will be presently explained.

At the right end of the bed-plate, near its rear side, an upright 90 is fixed, Figs. 1, 2, and 4. This upright 90 carries two bearings 91 and 92, in which this vertical shaft 95 is journaled. Upon the upper end of this shaft 95 the arm 98 is fixed, the free end of which terminates in a fork 99, which spans the mandrel 32 between the collars 85 and 86. A spur 100 on the under member of the fork 99 carries a rod 101, adapted for intermittent contact with the lower pawl 67, while the upper pawl is actuated by contact with the collar 85 in a manner to be hereinafter explained. A spring 105 normally holds the arm 98 toward the left. A pawl 108 is pivoted at 109 to the arm 98 and is adapted to engage the latch 74. The spring 110 holds the latch 108 against the fixed pin 111. The action of these parts will be hereinafter described.

Upon the lower end of the shaft 95 an arm 115 is fixed, Figs. 1, 2, and 4. This arm carries on its free end a roller 116, which contacts with the face of the cam 120. This cam is fixed upon the cam-shaft 121, mounted in bearings 122 122 in the pedestal 2. The cam-shaft 121 overhangs the front bearing 122, and upon its end the worm-wheel 123 is fixed. This worm-wheel is actuated by the worm 124, fixed on the worm-shaft 125, which is journaled in the bracket 126. A pulley 128 is fixed upon the overhanging end of the worm-shaft 125 and is driven by a belt from the line-shaft. (Not shown.)

Referring again to Figs. 1, 2, and 3 at the left side of the machine the slide 130 carries the spindles 133 and 134 in line with the axis of the spindles 16 and 15, respectively, and in the spindle 134 the mandrel 135 is mounted. The construction of these spindles and the mandrel 135, with its clutch mechanism, is exactly like that of the right spindle-head, but with their relative positions reversed, and for this reason need not be described in detail. The clutch mechanism of the left head is actuated by the lever 138, which is fulcrumed at 139 to the bracket 140, projected from the left end of the bed-plate. The free end of this lever is pivoted to the rod 142, which is pivoted to one end of the lever 143, fulcrumed at its center to the bed-plate 1 at 144 near the center of the rear side of the machine. Another rod 146 is pivoted to the opposite end of the lever 143 and is also pivoted to the arm 148, which is fixed upon the shaft 95 between its bearings. This connection operates the mechanism controlling the screw-mandrels at each end of the machine simultaneously in a manner hereinafter to be described.

The slides 10 and 130 have the threaded bearings 155 156, respectively, projected downwardly from their bases, Figs. 3 and 5, and in these bearings and in a bearing 157 at the right end of the bed-plate the screw-shaft 160 is mounted. This screw-shaft is provided with a right-hand thread engaging the bearing 155 and a left-hand thread engaging the bearing 156, so that when the shaft 160 is rotated in one direction the slides 10 and 130 will approach each other, and when rotated in the opposite direction the slides will separate. An arm 161, Figs. 3 and 4, is fixed upon the shaft 160 outside the end of the bed-plate, and the free end of this arm carries a roller 162, engaging the groove in the cam-drum 165, which is fixed on the cam-shaft 121. Between said slides is mounted on the top of the bed the feed-tube 190, into which the nuts are fed. This feed-tube is of a size adapted to permit the passage of the nuts therethrough, but preventing their turning therein. Above the spindles this feed-tube has an offset, in which offset the plunger 193 is mounted, the purpose of the plunger being to push the nuts from the upper section 191 of the feed-tube to the lower section 190. The nuts may be fed automatically or by hand into the upper section of the feed-tube. The lower section of the feed-tube has apertures in the walls thereof opposite the spindles, and in these apertures the revolving tools enter. The cam-shaft 121 also carries a bevel-gear 170, Figs. 1, 3, 4, which meshes with another bevel-gear 171, fixed on a second cam-shaft 172, which is perpendicular to the cam-shaft 121 and mounted in suitable bearings 173 and 173, fixed to the under side of the bed-plate. Upon this cam-shaft 172 the cams 175 and 176 are fixed. A bell-crank 180, Fig. 6, fulcrumed to the lug 181, carries a roller 182, contacting with the periphery of the cam 175 and held in contact therewith by the action of the spring 183. The free arm of the

crank 180 is pivoted to the rod 184, the upper end of which is pivoted to the arm 185, fixed upon the rear end of the shaft 186. This shaft 186 is journaled in a bearing 187, supported by the base of the upper section 191 of the feed-tube. Upon the other end of this shaft 186 an arm 192 is fixed, and this arm operates the plunger 193, which reciprocates in the offset in the channel of the feed-tube 190. (See Fig. 3.) A bell-crank 200, (see Fig. 5,) fulcrumed to the opposite side of the hanger 181, carries a roller 201, engaging the groove in the cam 176, and its free arm is pivoted to the lower end of a rod 202. The upper end of this rod 202 is pivoted to the T-lever 203, which is fulcrumed at 204 to a spur extended from the rear side of the feed-tube 190 below the offset. To the arms of the T-lever 203 the pawls 206 and 207 are pivoted. These pawls are adapted to reciprocate in suitable slots in the rear side wall of the feed-tube 190 below the offset and below the axis of the spindles which are adapted to enter the feed-tube through suitable apertures in the end walls of the feed-tube at these points. The action of these movements will be hereinafter described. (See Figs. 1 to 5.) The upright 12 of the right slide 10 and the left upright of the left slide have bearings 210 211 projected therefrom, and in these bearings the gear-shaft 212 is journaled. This shaft has a large gear 213 and a smaller gear 214, both fixed upon said shaft on each side of the bearing 211. The gear 214 meshes with and drives the gear 215, fixed on the spindle 133. A gear 220 has an elongated hub slidably mounted on a spline 221 on the shaft 212 at its opposite end, and this hub is journaled in the bearing 210 and provided with a collar 222 to hold it in place. The gear 220 meshes with and drives the gear 25 on the spindle 16. The large gear 213 meshes slidably with the gear 230, which is carried by a shaft 231, journaled in the bearings 232 232, supported by the bracket 233, which is fixed upon the left end of the bed-plate. A pulley 235 is fixed upon the end of the shaft 231 and is driven by a belt from the line-shaft.

The operation of the machine is as follows: The various elements being in the position shown in Figs. 1 to 6 and 9 and the milling-cutters being at work finishing the nuts carried on the mandrels, as soon as this finishing is accomplished the arm 98 is moved to the left until the rod 101 trips the pawl 67. The spring 62, acting on the bell-crank 56, then causes the clutch 48 to move to the right and engage the reversing-pulley 36. The mandrel 32 then revolves left-handed and unscrews from the nut in the channel of the feed-tube 190, the mandrel sliding through the revolving clutch. When the pawl 67 has been tripped, the arm 98 is moved to the right, allowing the pawl 108 to trip the latch 74 without moving the crank 58. Then when the mandrel has entirely unscrewed from the nut the arm 98 moves quickly back, carrying the mandrel with it by pushing against the collar 86 until the end of the mandrel is clear of the nut, as shown in Fig. 7, which illustrates the position of the mechanism at the end of the reversing movement. It is obvious that both mandrels are withdrawn from their respective nuts in the same manner and at the same time. When the clutch mechanism is in the position shown in Fig. 7, the screw-shaft 160 comes into action and the spindle-heads move back clear of the nuts, leaving them resting on the pawls 206 and 207. (See Fig. 5.) The T-lever 203 then comes into action, and the pawl 206 advances into the feed-tube, while the pawl 207 retreats, and the lower refinished nut drops through the bed-plate. Immediately the pawl 207 advances and the pawl 206 retreats, permitting the finished nut to drop to the pawl 207, the refinishing position. The pawls 206 and 207 then assume the normal position. (Shown in Fig. 5.) After this action has taken place the plunger 193 pushes a nut from the feed-tube above the offset to the edge of the lower section of the tube and the nut drops and comes at rest on the pawls 206, opposite the finishing-cutters. The slides then advance and steady the nuts, while the mandrels are advanced by the action of the arm 98 to the position shown in Fig. 8, in which the pawl 108 has pushed the inclined face of the latch 74 downward and carried the bell-crank 58 with it until the end of said bell-crank is caught by the pawl 66, and the clutch 48 engaged with the right-hand pulley 35. The mandrel then screws into the nut, and the collar 85 advances until when the mandrel is sufficiently screwed in the collar 85 trips the pawl 66, and the crank 58 is caught by the pawl 67 and the clutch held in inoperative position, as shown in Fig. 9. The cutters are then brought into action by the converging movement of the slides actuated by the right and left threads on the screw-shaft 160, which is oscillated by the arm 161, engaging the groove in the cam-drum 162.

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 opposed concentric tools for finishing the top and bottom faces of a nut and a mandrel movable axially within one of the tools and independently of both tools and upon which the nut is held while operated upon by the tools.

2. In a nut-finishing machine, the combination of opposed concentric tools for simultaneously finishing the top and bottom faces of a nut and a mandrel movable axially within one of the tools and independently of both tools and upon which the nut is held while operated upon by the tools.

3. In a nut-finishing machine, the combination of opposed concentric tools for finishing the top and bottom faces of a nut and a threaded mandrel movable axially within one of the tools and independently of both tools and upon which the nut is held while operated upon by the tools.

4. In a nut-finishing machine, the combination of sets of opposed concentric tools for simultaneously finishing and refinishing the top and bottom faces of nuts and a mandrel for each set movable axially within one of the tools of its set independently of both of them and upon which the nuts are held.

5. In a nut-finishing machine, the combination of opposed concentric tools for simultaneously finishing the top and bottom faces of a nut, a mandrel movable axially in one of the tools independently of both of them and upon which the nut is held and means for automatically placing the nut on and removing it from the mandrel.

6. In a nut-finishing machine, the combination of sets of opposed concentric tools for simultaneously finishing and refinishing the top and bottom faces of nuts, a mandrel for each set movable axially in one of the tools of its set independently of both tools and upon which the nuts are held and means for automatically placing the nuts on and removing them from the mandrel.

7. In a nut-finishing machine, the combination of opposed concentric tools for finishing the top and bottom faces of a nut, a threaded mandrel arranged axially with reference to the tools, means for delivering a nut opposite the mandrel, means for rotating and advancing and retracting the mandrel to screw the nut thereon and to unscrew it therefrom when finished, and means for operating the tools to finish both faces of the nut.

8. In a nut-finishing machine, the combination of opposed concentric tools for finishing the top and bottom faces of a nut, a threaded mandrel arranged axially with reference to the tools, means for delivering a nut opposite the mandrel, means for rotating and advancing and retracting the mandrel to screw the nut thereon and to unscrew it therefrom when finished, and means for simultaneously operating the tools to finish both faces of the nut.

9. In a nut-finishing machine, the combination of sets of opposed concentric tools for simultaneously finishing and refinishing the top and bottom faces of nuts, a mandrel for each set movable axially in one of the tools of its set independently of both tools and upon which the ends are held and means for transferring a nut from the mandrel of the finishing-tools to the mandrel of the refinishing-tools.

10. In a nut-finishing machine, the combination of sets of opposed concentric tools for simultaneously finishing and refinishing the top and bottom faces of nuts, a mandrel for each set movable axially in one of the tools of its set independently of both of them and upon which the nuts are held, means for placing the nuts on and removing them from the mandrels and means for transferring them from one mandrel to the other.

11. In a nut-finishing machine, the combination of concentric opposed tools for finishing the top and bottom faces of a nut, a mandrel movable axially in one of the tools independently of both of them, an automatic nut-blank feed and means for automatically placing a fed nut on and removing it from the mandrel.

12. In a nut-finishing machine, the combination of concentric opposed tools for simultaneously finishing the top and bottom faces of a nut, a mandrel movable axially in one of the tools independently of both of them, an automatic nut-blank feed and means for automatically placing a fed nut on and removing it from the mandrel.

13. In a nut-finishing machine, the combination of sets of opposed concentric tools for simultaneously finishing and refinishing the top and bottom faces of nuts, a mandrel for each set movable axially in one of the tools of its set independently of both tools and upon which the nuts are held, an automatic nut-blank feed, means for automatically placing a fed nut on and removing it from the mandrel of the finishing-tool and transferring it automatically when finished onto the mandrel of the refinishing-tool.

14. In a nut-finishing machine, the combination of two heads, each carrying a revolving tool for simultaneously finishing the top and bottom of a nut, means for feeding said tools by moving said heads to and from each other, and a mandrel movable in said tools for holding a nut between said heads to be acted upon by said revolving tools.

15. In a nut-finishing machine, the combination of two heads, each carrying a series of revolving tools for simultaneously finishing and refinishing the top and bottom of nuts, means for feeding said tools by moving said heads to and from each other, and mandrels movable in said tools for holding nuts between said heads to be acted upon by said revolving tools.

16. In a nut-finishing machine, a channel

or passage-way through which fed nuts pass, two sets of concentric opposed tools arranged one below the other and whose axes are transverse to the channel, means for advancing the tools from opposite sides into the channel, two movable stops projecting into the channel arranged respectively below the axes of the upper and lower sets of tools and so arranged and operated that when the upper stop is withdrawn from, the lower stop is projected into the passage-way and means for holding the nuts concentrically between the respective tools of each set while operated upon by the tools, means for then releasing the nuts and means for operating the stops to permit the nut between the upper tools to fall into position against the lower stop between the tools of the lower set.

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

OLUF TYBERG.

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