T. F. MORRISSEY.

DRILLING AND NICHING MACHINE.

APPLICATION FILED JULY 22, 1910.

1,089,856.

Patented Mar. 10, 1914.

8 SHEETS—SHEET 1.

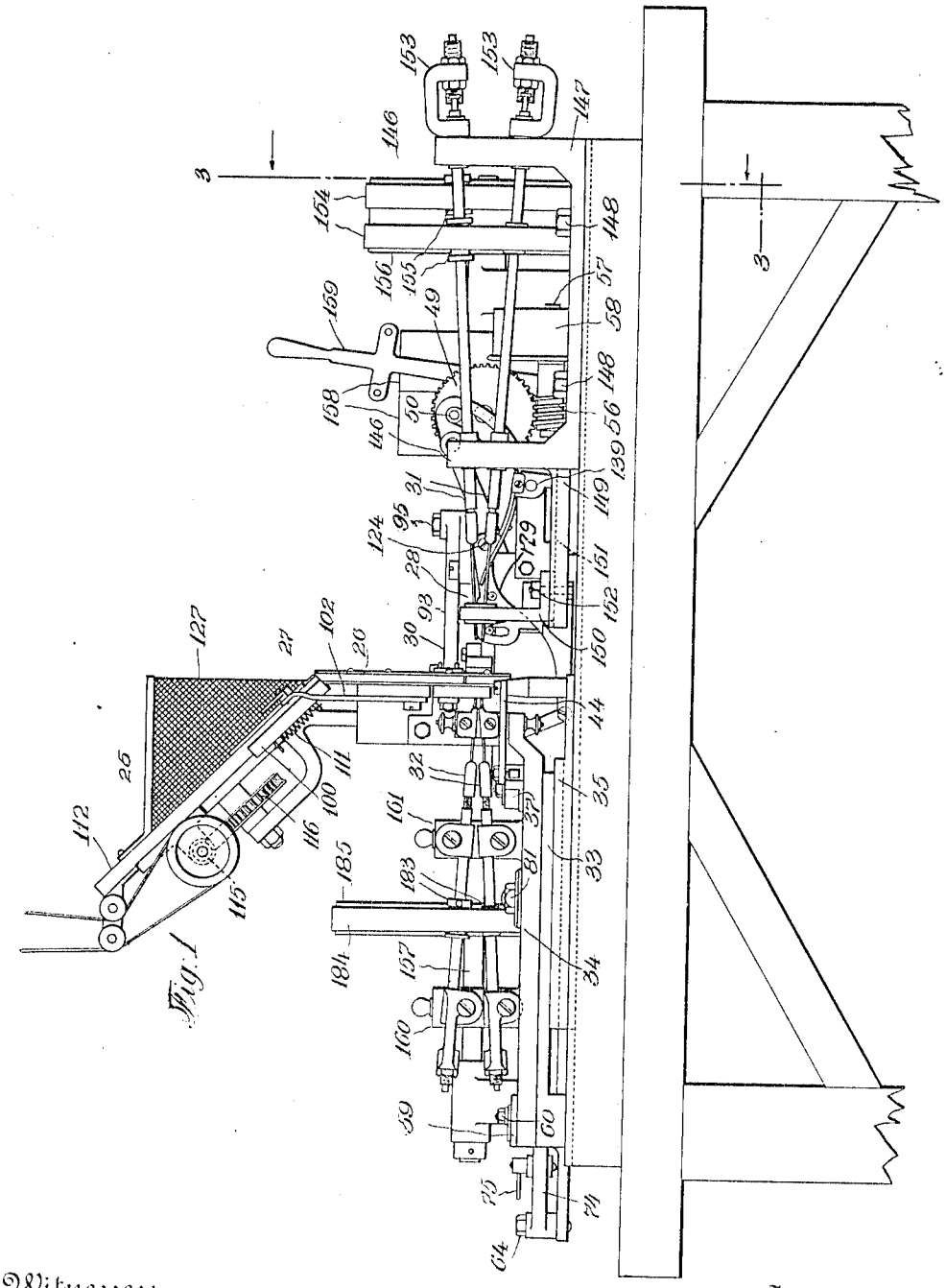


Fig. 1.

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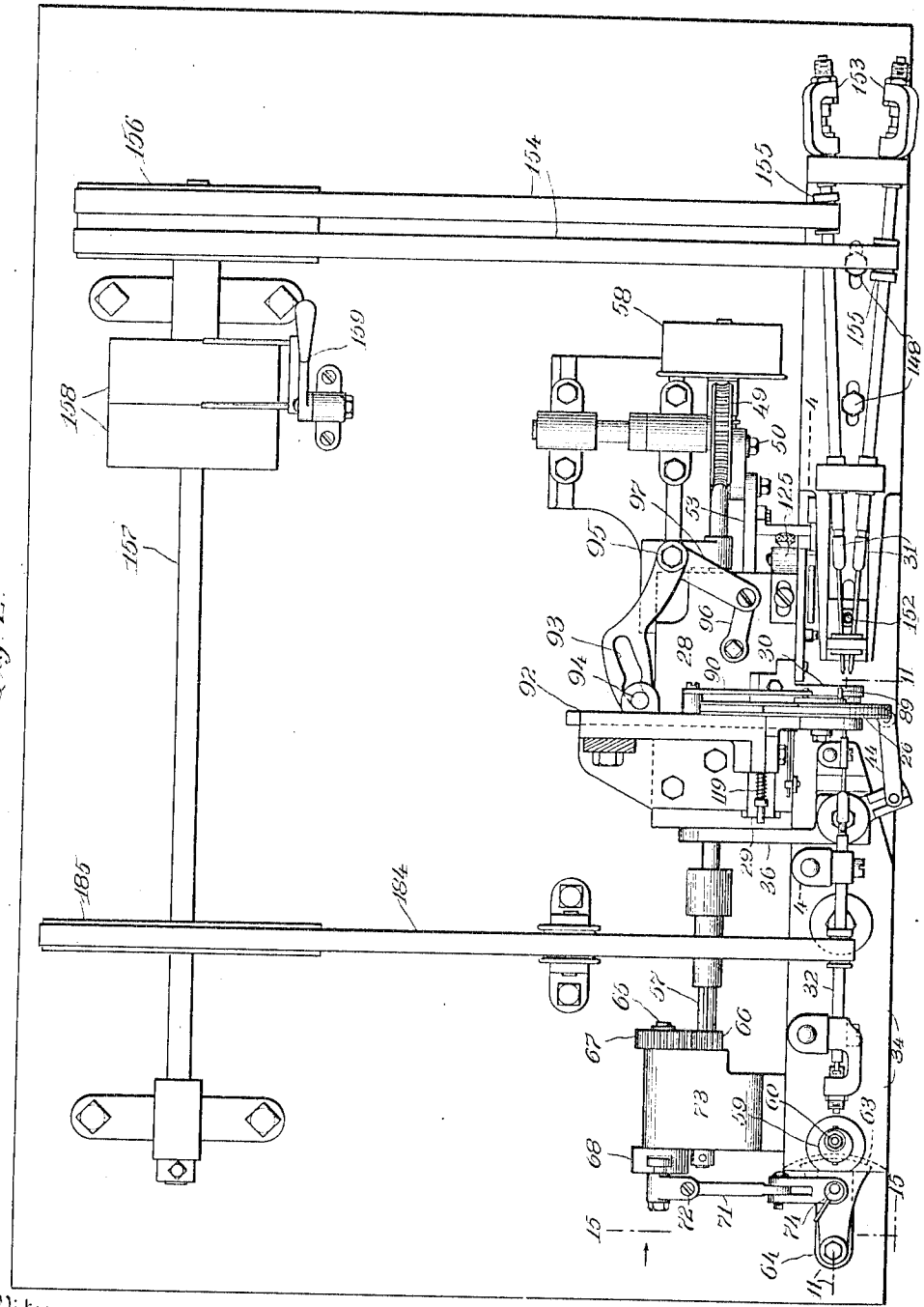
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8 SHEETS—SHEET 2.

Fig. 2.



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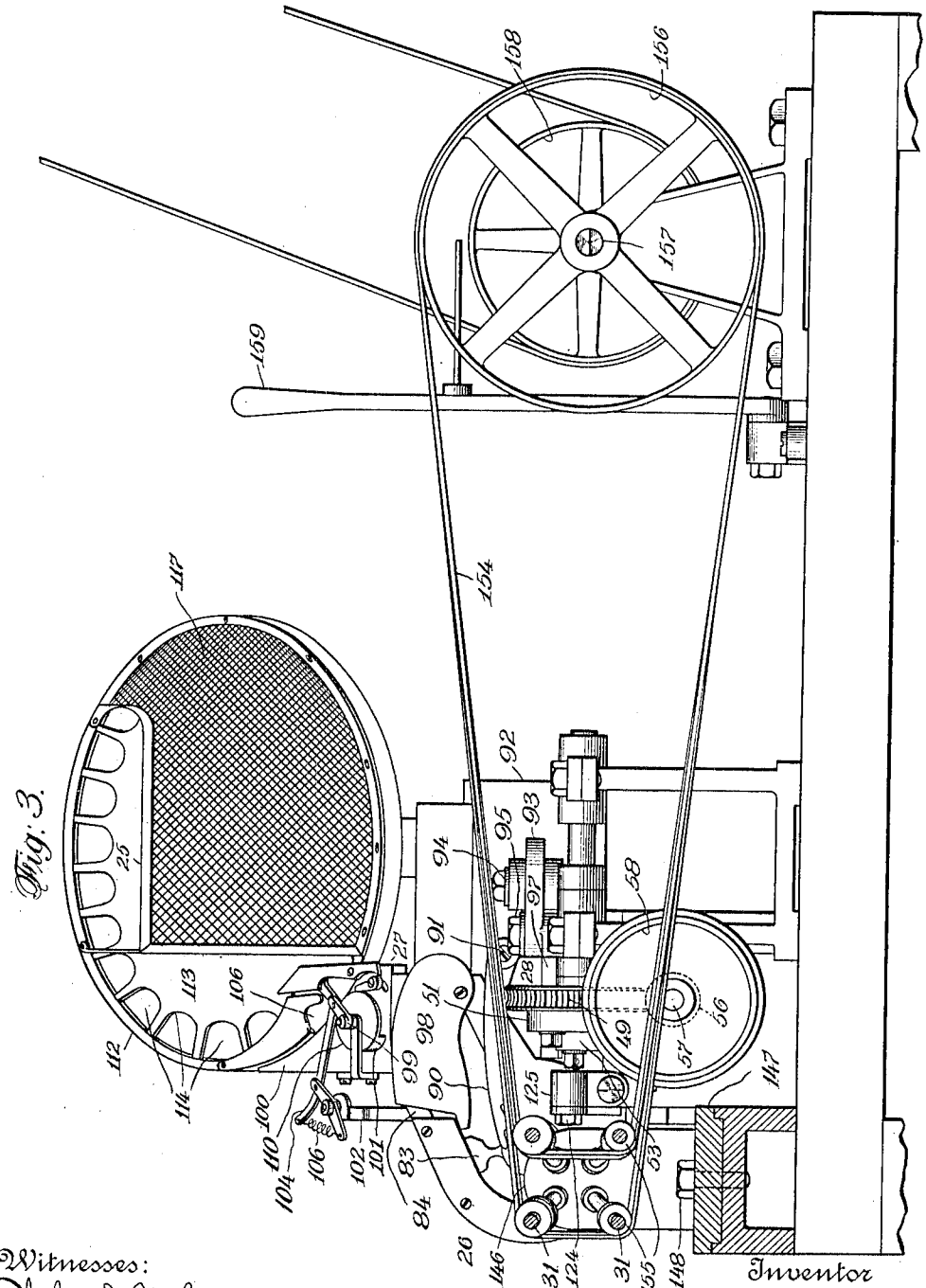


Fig. 3.

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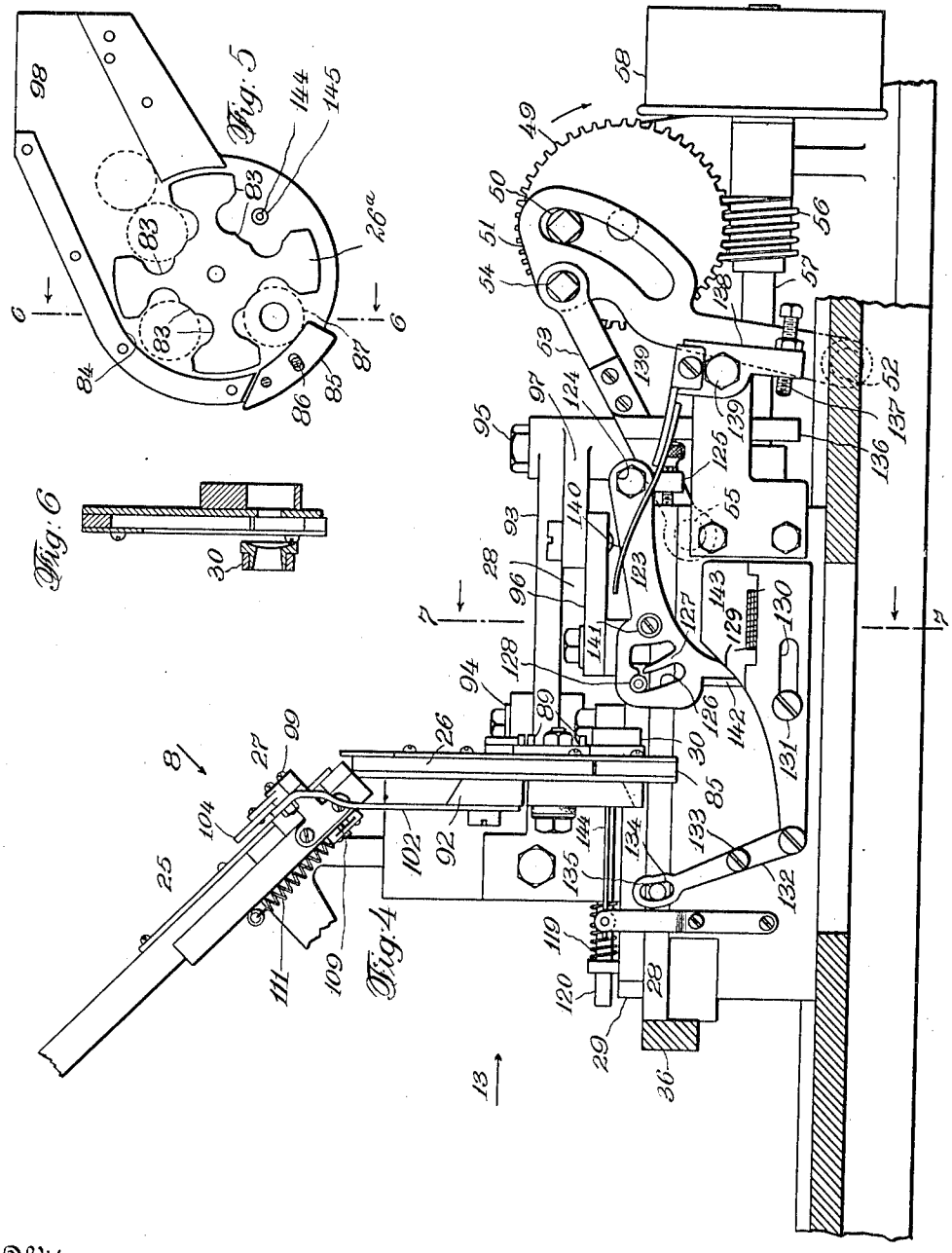
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8 SHEETS—SHEET 4.



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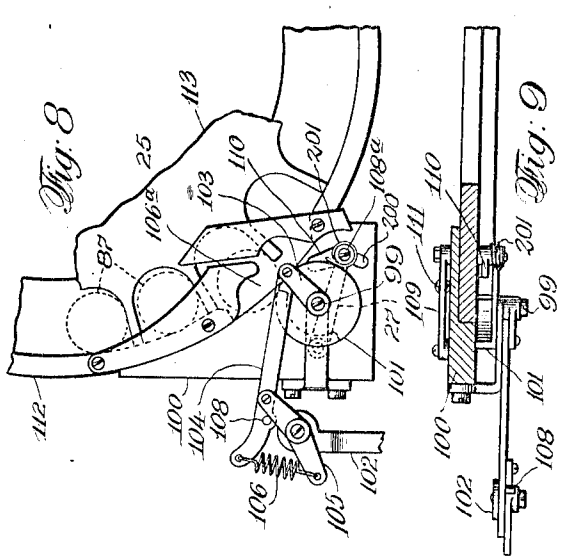
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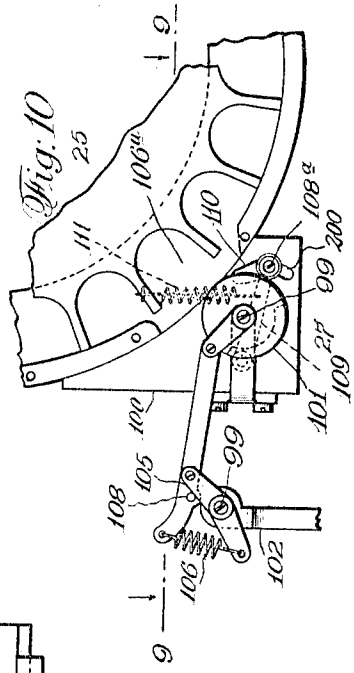
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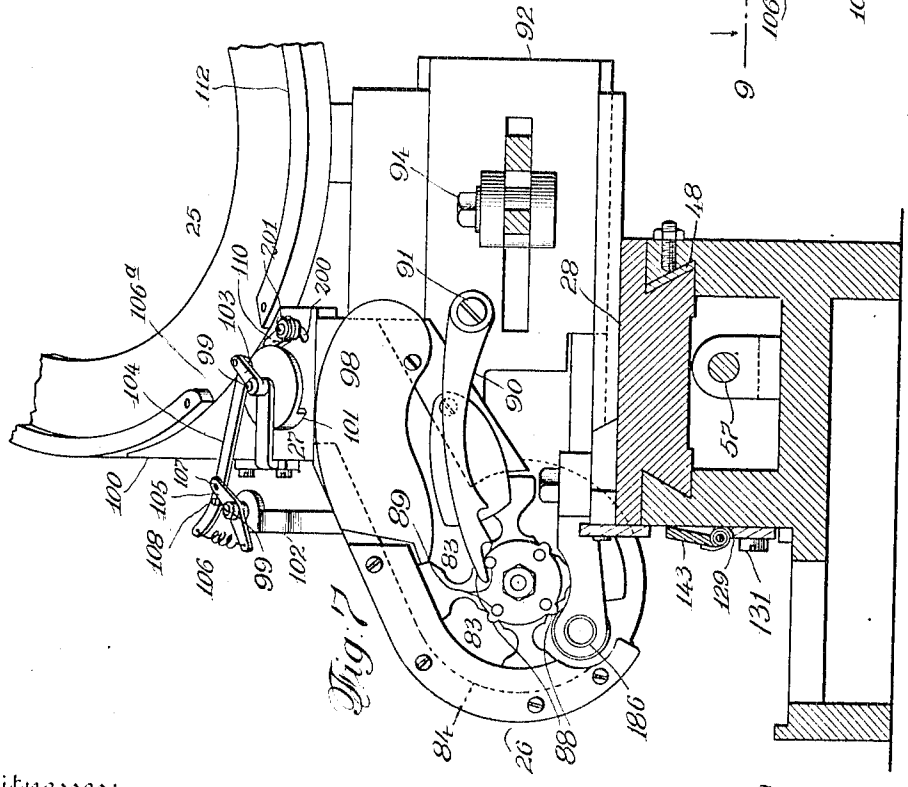
1,089,856.

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8 SHEETS—SHEET 5.







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8 SHEETS—SHEET 6.

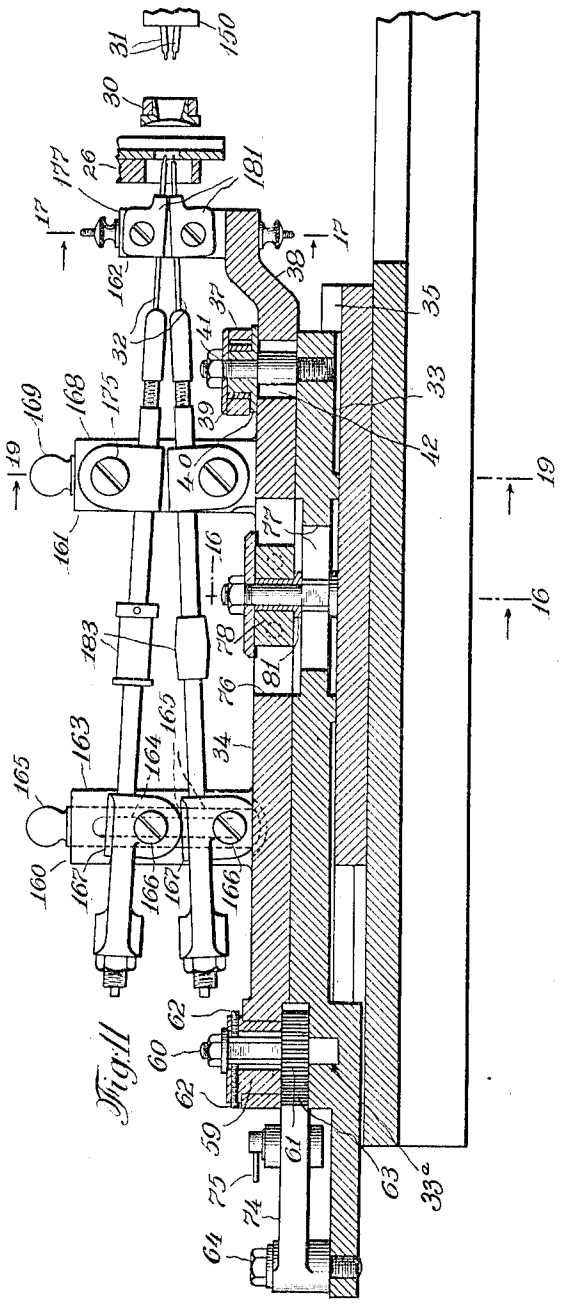


Fig. 11

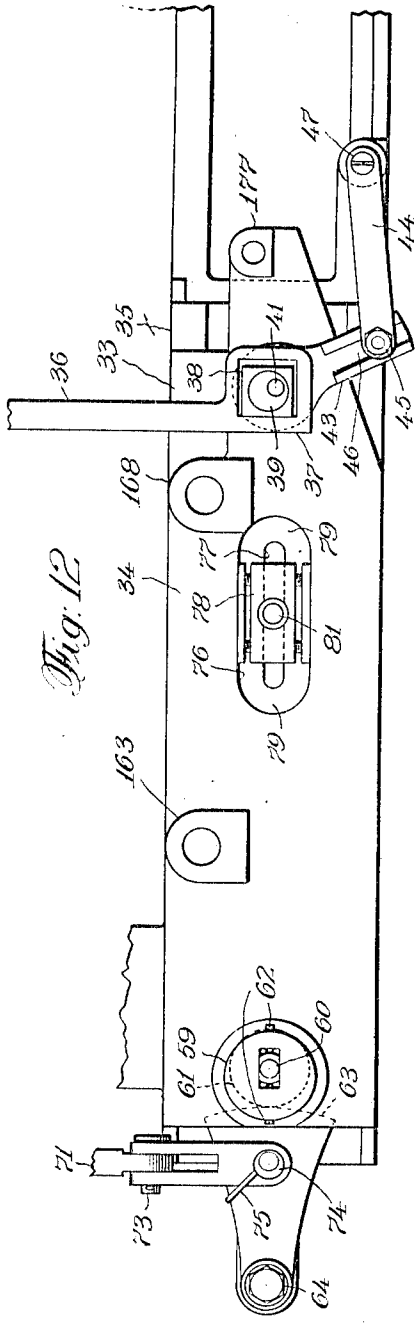


Fig. 12

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DRILLING AND NICHING MACHINE.

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Fig. 13

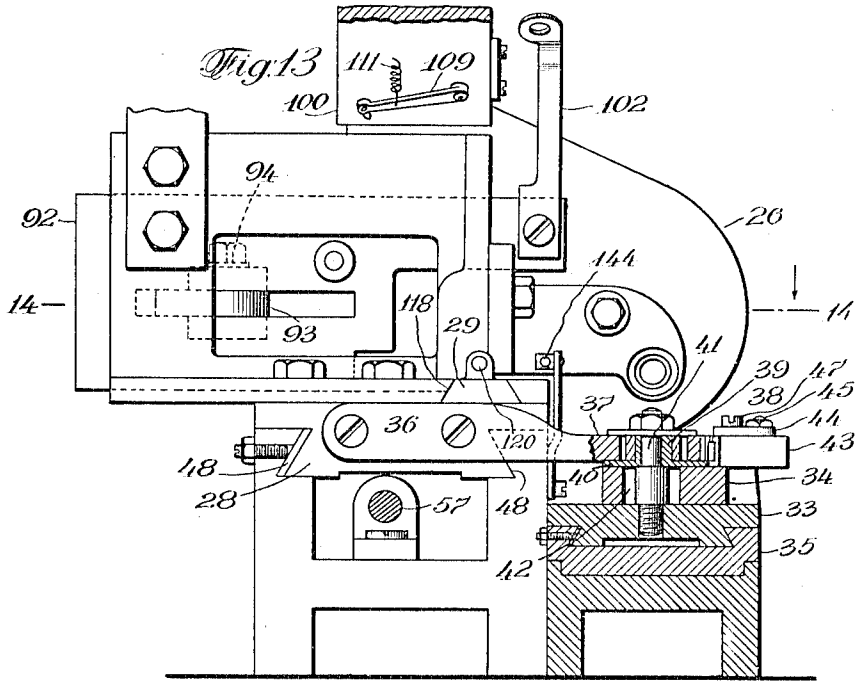
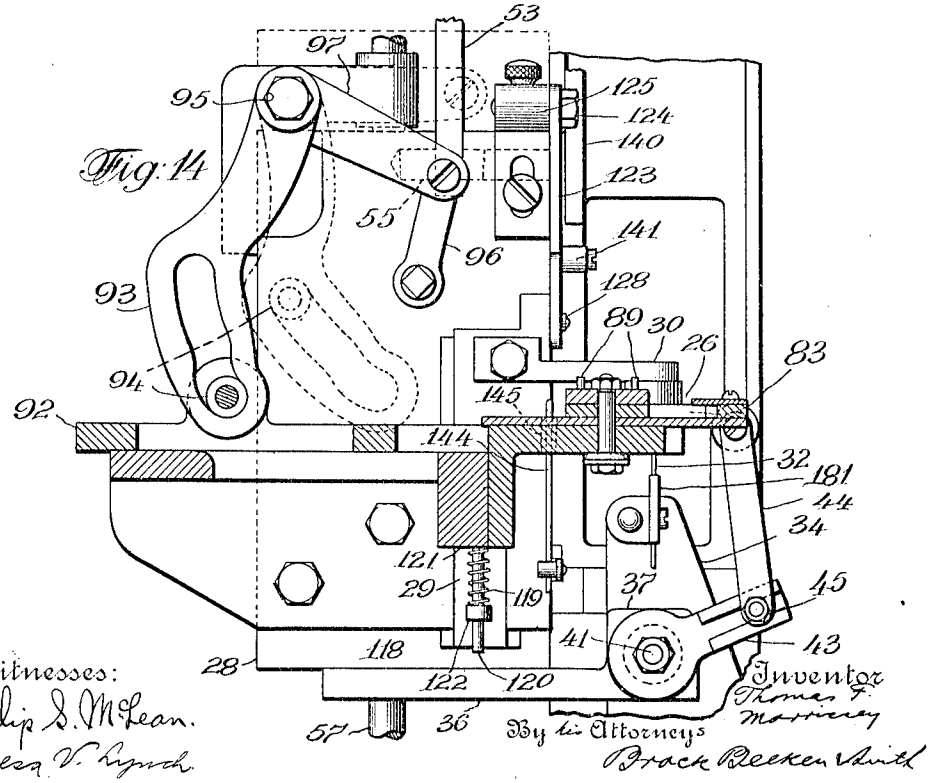


Fig. 14



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Fig. 17.

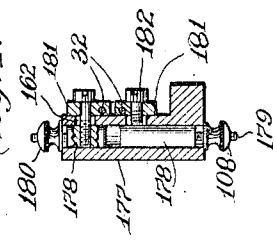


Fig. 19.

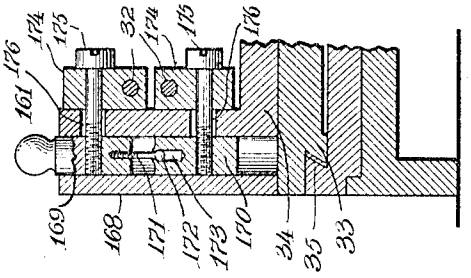


Fig. 16.

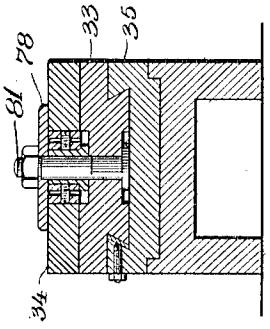


Fig. 20.

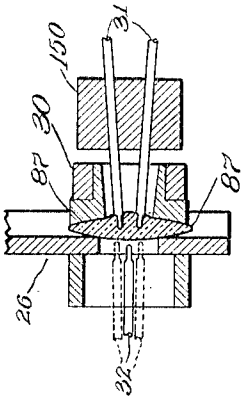


Fig. 22.

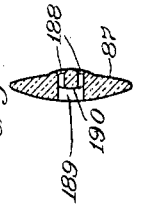


Fig. 21.

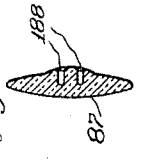


Fig. 15.

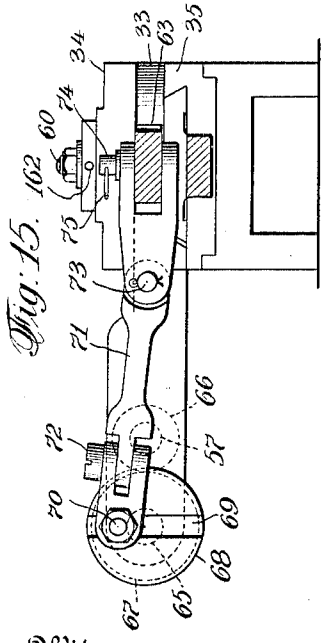
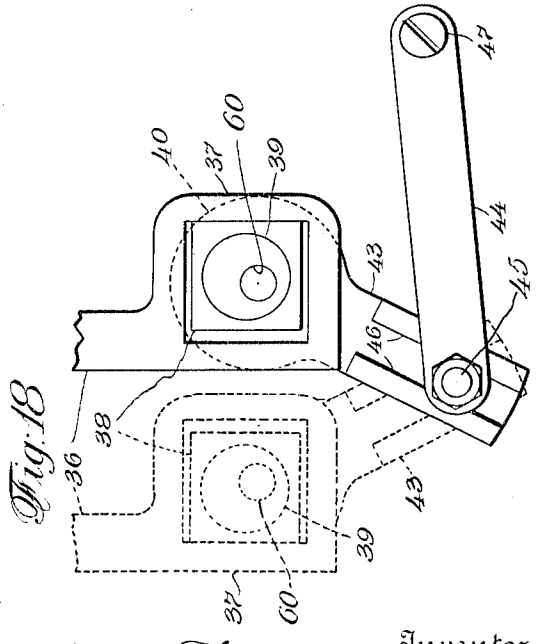


Fig. 18.



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UNITED STATES PATENT OFFICE.

THOMAS F. MORRISSEY, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO UNITED BUTTON COMPANY, A CORPORATION OF NEW YORK.

DRILLING AND NICHING MACHINE.

1,089,856. Specification of Letters Patent. Patented Mar. 10, 1914.

Application filed July 22, 1910. Serial No. 573,241.

To all whom it may concern:

Be it known that I, THOMAS F. MORRISSEY, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Drilling and Niching Machines, of which the following is a specification.

The present invention relates generally to drilling and niching machines, especially for buttons made of ivory nuts, and has for its main object an efficient automatic machine that will properly drill and niche buttons.

One feature of the invention resides in means for bringing a work holder and niching member toward and away from each other, combined with means for imparting a combined oscillating and reciprocating motion to the niching member. This may be accomplished in many ways, but preferably the niching member is mounted on a slidably adjustable pivot, the said niching member oscillating around and vibrating with respect to said pivot, and the said pivot reciprocating. In effect the motion imparted to the niching member is a combined oscillating and longitudinally vibrating motion which is imparted to the niching member a plurality of times in rapid succession to each cycle of the machine.

The "niche" in a button is the slot which is formed in the face of the button and which connects the holes drilled in the button. The object of this "niche" is to provide a thread groove below the face of the button. To avoid wearing the thread, the niche must present no sharp edges to the thread. It is for this reason that the niching tool is given the double oscillating and vibrating motion, the oscillating motion cutting the groove between the buttons and the vibrating motion rounding off the corners where the niche joins the holes.

Other features of construction, arrangement of parts and combination of elements will appear as the specification proceeds.

In the accompanying drawings, the invention is embodied in a concrete and preferred form, but changes of construction may of course be made without departing from the legitimate and intended scope of the invention as set forth in the claims hereof.

In the said drawings: Figure 1 is a side elevation of a machine embodying the invention. Fig. 2 is a plan view with the button feeding means removed. Fig. 3 is a transverse vertical section on line 3—3 of Fig. 1. Fig. 4 is a front elevation of the main reciprocating carriage and adjacent elements, with the drilling and niching tools removed, and partly in section on the line 4—4 of Fig. 2. Fig. 5 is a detail view of the work holder and the button chute. Fig. 6 is a section on line 6—6 of Fig. 5. Fig. 7 is a vertical transverse section on line 7—7 of Fig. 4 with the button feeding means broken away and removed. Fig. 8 is a detail view of the button feeding dial and hopper, looking in the direction of the arrow 8 of Fig. 4, showing the parts in a neutral position. Fig. 9 is a sectional view on the line 9—9 of Fig. 10. Fig. 10 is a view similar to Fig. 8, showing the parts in the position occupied when ready to receive a button. Fig. 11 is a vertical section through the niching tool on line 11—11 of Fig. 2. Fig. 12 is a plan view of Fig. 11 with the niching drills removed. Fig. 13 is an end view of the main reciprocating carriage looking in the direction of the arrow 13 of Fig. 4, showing also a section of the niching slide, but with the niching tools removed. Fig. 14 is a plan view in horizontal section on line 14—14 of Fig. 13. Fig. 15 is a vertical sectional transverse view on line 15—15 of Fig. 2. Fig. 16 is a vertical sectional view on line 16—16 of Fig. 11. Fig. 17 is a vertical sectional view on line 17—17 of Fig. 11. Fig. 18 is a diagrammatic view showing the throw of the eccentric 39 of the niching slide. Fig. 19 is a vertical section on line 19—19 of Fig. 11. Fig. 20 is a horizontal section through a part of the work holder, the button and the clamp, showing the relative position of the drilling and niching tools. Fig. 21 is a section through the button showing the action of the drilling tools. Fig. 22 is a section similar to Fig. 21, showing the action of the niching tools.

Similar characters of reference indicate corresponding parts in the different views.

25 indicates the button feeding means, 26 is the work carrier or holder and 27 is the intermediate button delivery member which transfers the button from the feeding means to the work carrier or holder.

28 is the main reciprocating carriage on

which the foregoing members are mounted, and carrying also a reciprocating clamp slide 29 having the clamp 30.

The drilling tools are denoted by 31 and the niching tools by 32. These latter are mounted on the supporting member 34 of the niching tool slide 33 which moves in the guides 35. The slide 33 is operated from the main reciprocating carriage by means of the connection 36 secured to said carriage as shown in Fig. 13 and provided at the end adjacent to the slide 33 with a square collar 37 fitting loosely on the block 38 which is supported on the eccentric 39. This eccentric has a flange 40 resting on the supporting member 34. Passing through the eccentric 39 is a bolt 41 secured to the slide 33. The supporting member 34 is provided with an aperture 42 so as to allow the said supporting member to oscillate and vibrate in a manner hereinafter to be described. The eccentric 39 is provided with an arm 43 secured to the lever 44 by means of the set screw 45 adjustable in the slot 46. The lever 44 is pivoted at 47 to a stationary part of the frame.

The main reciprocating carriage 28 slides in the guides 48 and receives its motion from the worm gear 49, by means of the crank pin 50, cam 51, pivoted at 52 to the framework, and connecting rod 53 pivoted at its respective ends 54 and 55 to the cam 51 and slide 28. The worm gear 49 receives its motion from the worm 56 on the shaft 57, which latter receives its motion in any suitable manner, as by means of the pulley 58.

As the main reciprocating carriage advances toward the drilling tools 31, the slide 33 will follow, owing to the connection 36. This movement, however, causes the lever 44 to turn the eccentric 39 thereby causing the slide 33 to lag behind advancing movement of the main reciprocating carriage. When the main reciprocating carriage returns, the slide 33 will lag in the other direction.

The supporting member 34 is attached to the slide 33 by means of a slidably adjustable pivot constructed as follows: The supporting member 34 is provided with a slot 76 and the slide 33 has a slot 77 somewhat narrower than the slot 76. Seated in the slot 76 is a slidably adjustable block 78 in contact with the sides of the slot but small enough to leave the end spaces 79 unoccupied. A pivot bolt 81 passes through the block 78 and is adjustable therewith.

Mounted on the supporting member 34 is the eccentric 59 through which passes the bolt 60 on which is the pinion 61, said bolt 60 having a bearing in the socket 33ª of the slide 33. The bolt 60 is adjustable in the eccentric 59 by means of the two set screws 62 whereby the eccentricity of the pinion can be varied. Meshing with the pinion or gear 61 is a sector 63 mounted to oscillate on the stud 64. The gear sector 63 is operated from the countershaft 65 which receives its motion from the shaft 57 by means of the pinion 66 and gear 67. The shaft 65 carries a disk 68 having a slot 69 to which is attached a stud 70 of the connection 71 which latter is provided with universal joint 72 and 73. The connection 71 is secured to the gear sector 63 by means of the eccentric stud 74 which is adjustable by means of the handle 75. The stroke of the sector is adjusted by moving the stud 70 in the slot 69.

The action of the sector 63 causes the pinion 61 to oscillate, and, with it, the eccentric 59. The oscillation of the eccentric causes the supporting member 34 to oscillate around the pivot 81, and also to vibrate longitudinally of the block 78, in quick succession a plurality of times to each stroke of the slide 33.

The work holder 26 has a rotatable member 26ª mounted on the main reciprocating carriage 28 and interposed between the drilling and niching tools, and rotates in a plane at right angles to the movement of the said carriage. This rotatable member is provided with pockets 83 and is partially surrounded by a stationary peripheral raceway 84 having a cam 85 which is adjustable by means of the screw 86 and is adapted to engage the buttons 87 to move the same radially inward to center them with respect to the tools. The member 26 is further provided with projections 88 to prevent the edge of the buttons from moving sidewise, and carries pins 89 by means of which it is rotated. This rotating motion is imparted intermittently by means of the pawl 90 pivoted at 91 to the transverse slide 92. The transverse slide obtains its motion from the main reciprocating carriage 28 by means of the slotted link 93 engaging with the roll 94 on the transverse slide and pivoted at 95 to a stationary part of the machine.

96 is an arm carried by the main reciprocating carriage and connected by means of the link 97 to the slotted link 93. The motion of the reciprocating carriage 28 thus moves the transverse slide 92.

The raceway 84 is provided with a chute 98 located adjacent to the intermediate button delivery member 27. The member 27 is pivoted at 99 on the bracket 100 and is provided with a supporting shoulder 101. Mounted on the transverse slide 92 is an upright 102 which is connected to the member 27 by the following means: 103 is an arm on the pivot 99 connected to a link 104. This link is connected to a pivoted lever 105 on the upright 102 by means of the spring 106 and by means of a pivot 107.

108 is a stop on link 104.

When the transverse slide 92 moves, it will, through the connections just described,

cause the member 27 to oscillate, the stop 108 normally preventing the spring 106 from exerting its force to bring the outer ends of the link 104 and lever 105 together, but if a button is jammed so as to prevent the member 27 from completing its oscillating motion, the lever 104 will yield and the spring 106 will take up the motion imparted by the transverse slide. When the member 27 turns in one direction the shoulder 101 will uncover the feeding opening 106[a] in the button feeding means 25, and a button will drop into the said intermediate member 27 and will be supported by said shoulder. When the intermediate mechanism 27 turns in the opposite direction the shoulder 101 will move from underneath the button, and the latter, being no longer supported will drop down the chute 98. At the same time the shoulder 101 will close the feeding opening 106[a].

Mounted on the pivot 108[a] of the bracket 100 is a yielding guard consisting of an arm 109 provided with the finger 110 adjacent to the feeding opening 106[a]. This guard is normally held in its uppermost position by the spring 111, and when a button becomes jammed in the feeding opening 106[a] the guard will yield, and then push the button back into the button feeding device 25 as soon as it is free to do so.

The button feeding means 25 may be of any suitable construction and consists of a casing 112 having a rotatable dial 113, with pockets 114, in front of which is a hopper 117. The rotatable dial is driven by the worm 115 and worm gear 116. This button feeding means may be provided with means for turning the buttons right side up as shown in Patent No. 547,571.

The auxiliary slide 29 which carries the clamp 30 for the work holder extends longitudinally of the main reciprocating carriage 28 and is mounted in the guides 118. Normally the clamp 30 is held closed against the work holder by means of the expansion spring 119 seated on the stem 120 and bearing against the abutment 121 of the carriage and the shoulder 122 of the auxiliary clamp slide 29. Means are provided for opening said clamp, in this instance constructed as follows: 123 is a cam lever pivoted at 124 to the adjustable bracket 125 of the reciprocating carriage 28. This cam lever has a cam slot 126, one side of which is resilient on account of the spring tongue 127, the said slot engaging with a roll 128 on the auxiliary slide 29. 129 is a cam provided with a slot 130 sliding on the stud 131 of the framework. One end of this cam is connected to a rocking lever 132 pivoted on the framework at 133 and provided with a slot 134 engaging the stud 135 of the reciprocating carriage 28. As the reciprocating carriage 28 travels in one direction the cam lever 123 will ride up on the cam 129, which latter is then, owing to its connections, moving in a direction opposite to that of the reciprocating carriage. The cam slot 126 acts on the roll 128 to move the auxiliary slide 29 independently in the reciprocating carriage 28 sufficiently to open the clamp 30. As the cam lever 123 passes the end of the sliding cam 129, the member 136 on the reciprocating carriage 28 engages with the stop 137 on the arm 138 pivoted on the framework at 139. This arm has a spring 140 which engages the stud 141 on the cam lever 123 and moves it down quickly behind the cam 129, thus allowing the spring 119 to close the clamp 30. On the return stroke of the reciprocating carriage 28 the beveled surface 142 of the cam lever 123 moves the hinged leaf 143 of the cam 129 to one side so that the clamp remains closed and permitting the cam lever 123 to pass the cam 129.

144 is an ejector which passes through the aperture 145 in the carriage 28 and expels or loosens the finished button.

The drilling tools 31 and niching tools 32 are of any suitable construction, but the particular arrangement preferred is as follows: The converging drilling tools 31 are mounted in the bearings 146 on the slide 147 which is adjustable by means of bolts 148. On the slide 147 is a bracket 149 supporting the steady rest 150 adjustable in the guides 151 of the bracket 149 by means of the bolt 152. 153 indicates turnbuckles whereby the tools 31 are adjusted. Motion is imparted to the tools by means of the belts 154 passing over the pulleys 155 and 156. The pulleys 156 are on the power shaft 157 which carries the fast and loose pulleys 158 adjacent to which is a belt shifter 159.

The niching tools 32 are carried in the bearings 160, 161 and 162 mounted on the supporting member 34, and converge in the same manner as the drilling tools.

The bearing 160 consists of a casing 163 having a vertical slot 164. Within the casing is a stem 165 which receives the screws 166, passing through the slot 164. These screws 166 carry the brackets 167, through which the tools 32 pass.

The bearing 161 comprises a casing 168 having two spindles 169 and 170 connected together by means of the pin 171 screwed into 169 and having a head 172 sliding in the slot 173 of spindle 170. The tools 32 pass through two brackets 174 which are secured respectively to the spindles 169 and 170 by means of the screws 175 passing through the holes 176 in the casing.

The bearing 162 is formed of a casing 177 having two independent spindles 178, each provided with a threaded stem 179 having a thumbscrew 180. The tools 32 pass through the brackets 181, which latter are attached to the spindles 178 by means of

screws 182. Rotation is imparted to the niching tools 32 by means of the pulleys 183, belt 184 and pulley 185 on the power shaft 157.

The operation of the machine is as follows: Upon motion being imparted, the reciprocating carriage travels toward the drilling tools 31, thereby causing the clamp 30 to be opened. The work holder 26 is then rotated so as to position a button blank in line with the drilling and niching tools. This position is indicated in Fig. 7 by 186. At this time also the oscillating intermediate device 27 delivers another button blank to the work holder. The dial 113 is rotating constantly and is always ready to deliver a blank to the intermediate device 27. As soon as the work holder 26 has been turned one step, the clamp 30 moves against the work holder 26 and clamps the button. All during this period the main reciprocating carriage 28 has been approaching the drilling tools, and the niching tools have followed it, but owing to the eccentric 39, the niching slide 33 lags behind and the niching tools 32 have receded in time to permit the rotation of the work holder 26. The drills now engage the button 87, entering the said button from the back and drilling the holes 188 in the button partway through. The reciprocating carriage 28 now begins its return stroke and moves the button out of engagement with the drills. The niching tools also move backward, but, owing to the eccentric 39, at a less rate of speed than the carriage 28, and the result is that the niching tools engage the face of the button and remove the material in line with and between the holes 188 by cutting the niche or thread groove 189. The niching tools oscillate and vibrate continuously by reason of the eccentric 59 so that the niche is cut on a curved line 190 shown in Fig. 22. The oscillating and vibrating movement of the niching tool is shown in Fig. 20 where the two dotted positions of the tool are shown nearer the button blank than the full line central position. The line 190 in Fig. 22 approximately shows the line of movement of the niching tool. As the carriage 28 reaches the end of its movement, the ejector 144 enters the aperture 145 in the carriage 28, and ejects the button in line with said ejector. This button was acted upon by the drilling and niching tools during the cycle preceding the one I have described and was moved into position in alinement with the ejector when the work holder was rotated during the forward movement of the carriage 28.

What is claimed is:

1. In a machine of the character set forth, a reciprocating slide, a supporting member on said slide, a niching tool on said supporting member, a pivot mounting said supporting member on said slide, an eccentric carried by said supporting member, and means for oscillating said eccentric thereby causing the supporting member to oscillate around said pivot and to vibrate with respect thereto.

2. In a machine of the character set forth, a reciprocating slide, a supporting member on said slide, a niching tool on said supporting member, a pivot mounting said supporting member on said slide, an eccentric carried by said supporting member, a gear on said eccentric, and means for oscillating said gear.

3. In a machine of the character set forth, a reciprocating slide, a supporting member on said slide, a niching tool on said supporting member, a pivot mounting said supporting member on said slide, an eccentric carried by said supporting member, a gear on said eccentric, a gear sector for oscillating said gear, and means for varying the throw of the gear sector.

4. In a machine of the character set forth, a reciprocating slide, a supporting member on said slide, a niching tool on said supporting member, and means for oscillating and longitudinally vibrating the supporting member a plurality of times to each reciprocation of the slide.

5. In a machine of the character set forth, a work holder, a tool, means for reciprocating both the work holder and tool and for causing the work holder and tool to approach each other while both are traveling in the same direction and for causing the work holder and tool to recede from each other while both are traveling in the opposite direction.

6. In a machine of the character set forth, a work holder, a tool, means for reciprocating the work holder, means for reciprocating the tool from the work holder and for causing the tool to approach the work holder while traveling in the same direction as the latter and for causing the tool to recede from the work holder while both are traveling in the opposite direction.

7. In a machine of the character set forth, a reciprocating carriage, a slide, a connection between the carriage and slide to cause the latter to reciprocate with the former and for causing the slide to lag behind the movement of the reciprocating carriage.

8. In a machine of the character set forth, a reciprocating carriage, a slide, a lever between the carriage and slide to cause the latter to reciprocate with the former, an eccentric in said lever, and means for turning said eccentric as the slide reciprocates thereby causing the slide to lag behind the movement of the reciprocating carriage.

9. In a machine of the character set forth,

a reciprocating carriage, a slide, a lever between the carriage and the slide to cause the latter to reciprocate with the former, and means in said lever for causing the slide to have a movement unequal to that of the reciprocating carriage.

10. In a machine of the character set forth, a reciprocating carriage, a slide, a lever between the carriage and the slide to cause the latter to reciprocate with the former, an eccentric in said lever, and means for turning said eccentric as the slide reciprocates thereby causing the slide to have a movement unequal to that of the reciprocating carriage.

11. In a machine of the character set forth, a relatively stationary tool, a reciprocating tool, a reciprocating work holder intermediate the tools adapted to bring the work into engagement with the relatively stationary tool when traveling in one direction to act on one side of the work, and means whereby the work holder and reciprocating tool approaching each other when the work holder moves in the opposite direction to bring the reciprocating tool into engagement with the other side of the work.

12. In a machine of the character set forth, a relatively stationary drilling tool, a reciprocating niching tool, a reciprocating work holder intermediate the tools adapted to bring the work into engagement with the relatively stationary tool when traveling in one direction to act on one side of the work, and means whereby the work holder and reciprocating tool approaching each other when the work holder moves in the opposite direction to bring the reciprocating tool into engagement with the other side of the work.

13. In a machine of the character set forth, a relatively stationary tool, a reciprocating work holder, a reciprocating tool on that side of the work holder which is opposite to the stationary tool, means for causing the reciprocating tool to travel in the same direction as the work holder, and, when the latter approaches the relatively stationary tool, to recede from the said work holder, and to approach the said work holder when the latter recedes from the relatively stationary tool.

14. In a machine of the character set forth, a relatively stationary drilling tool, a reciprocating work holder, a reciprocating niching tool on that side of the work holder which is opposite to the stationary tool, means for causing the reciprocating tool to travel in the same direction as the work holder, and, when the latter approaches the relatively stationary tool, to recede from the said work holder, and to approach the said work holder when the latter recedes from the relatively stationary tool.

15. In a device of the character set forth, a reciprocating carriage, an intermittently rotatable work holder mounted on said carriage and rotating transversely thereof, a clamp for said work holder, an auxiliary slide on said reciprocating carriage mounting said clamp and sliding substantially parallel of the reciprocating carriage, means for normally holding said clamp closed against the work holder, means for moving said auxiliary slide independently of the reciprocating carriage to open the clamp, and means for intermittently rotating the work holder when the said clamp is in its open position.

16. In a device of the character set forth, a reciprocating carriage, a work holder mounted on said carriage, a clamp for said work holder, an auxiliary slide on said reciprocating carriage mounting said clamp, means for normally holding said clamp closed against the work holder, a member moving with said reciprocating carriage, and means extraneous of said carriage for moving said member to actuate said member for moving said auxiliary slide independently of the reciprocating carriage to open the clamp.

17. In a machine of the character set forth, a reciprocating carriage, a work holder mounted on said carriage, a clamp for said work holder, an auxiliary slide on said reciprocating carriage mounting said clamp, means for normally holding said clamp closed against the work holder, a member moving with said reciprocating carriage, and a cam adapted to be actuated by the movement of the reciprocating carriage in a direction opposite thereto for actuating the member on the carriage to move said auxiliary slide independently of the reciprocating carriage to open the clamp.

18. In a device of the character set forth, a reciprocating carriage, a rotatable work holder mounted on said carriage and adapted to rotate transversely of the movement of the carriage, a clamp for said work holder, means for normally holding said clamp closed against the work holder, means for opening the said clamp, a transverse slide on the reciprocating carriage, and means for intermittently causing said transverse slide to rotate the work holder when the clamp is open.

19. In a device of the character set forth, a reciprocating carriage, a rotatable work holder mounted on said carriage and adapted to rotate transversely of the reciprocating movement of the carriage, a clamp for said work holder, an auxiliary slide on said reciprocating carriage mounting said clamp, means for normally holding said clamp closed against the work holder, means for moving said auxiliary slide independently

of the reciprocating carriage to open the clamp, a transverse slide on said reciprocating carriage, and means for causing said transverse slide to rotate the work holder intermittently when the clamp is open.

20. In a device of the character set forth, a reciprocating carriage, a rotatable work holder mounted on said carriage and adapted to rotate transversely of the movement of the carriage, a clamp for said work holder, means for normally holding said clamp closed against the work holder, means for opening the said clamp, a transverse slide on the reciprocating carriage, means for intermittently causing said transverse slide to rotate the work holder when the clamp is open, and means for operating said transverse slide by the movement of the reciprocating carriage.

21. In a device of the character set forth, a reciprocating carriage, a rotatable work holder mounted on said carriage and adapted to rotate transversely of the reciprocating movement of the carriage, a clamp for said work holder, an auxiliary slide on said reciprocating carriage mounting said clamp, means for normally holding said clamp closed against the work holder, means for moving said auxiliary slide independently of the reciprocating carriage to open the clamp, a transverse slide on said reciprocating carriage, means for causing said transverse slide to rotate the work holder intermittently when the clamp is open, and means for operating said transverse slide by the movement of the reciprocating carriage.

22. In a device of the character set forth, a rotatable work holder having pockets for receiving the work, a peripheral raceway adjacent to the rotatable carrier, and a cam surface on said raceway for moving the work inwardly in the pockets of the work holder.

23. In a device of the character set forth, a rotatable work holder, a button feeding device, an oscillating intermediate member for delivering the work from the button feeding device to the work holder, a reciprocating slide, and means for intermittently rotating said work holder and oscillating said intermediate device from said slide.

24. In a device of the character set forth, a rotatable dial, an intermediate delivery member mounted on a fixed pivot, a reciprocating member, a lever connected to oscillate said delivery member, a link pivotally connected to the reciprocating member and lever, and a yielding connection interposed between the free ends of the lever and link.

Signed at Springfield in the county of Hampden and State of Massachusetts this 6th day of July A. D. 1910.

THOMAS F. MORRISSEY.

Witnesses:
C. J. SPILL,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."