

No. 812,762.

PATENTED FEB. 13, 1906.

W. D. MIDDLEBROOK.
MACHINE FOR MAKING SAFETY PINS.

APPLICATION FILED MAR. 25, 1898.

8 SHEETS—SHEET 1.

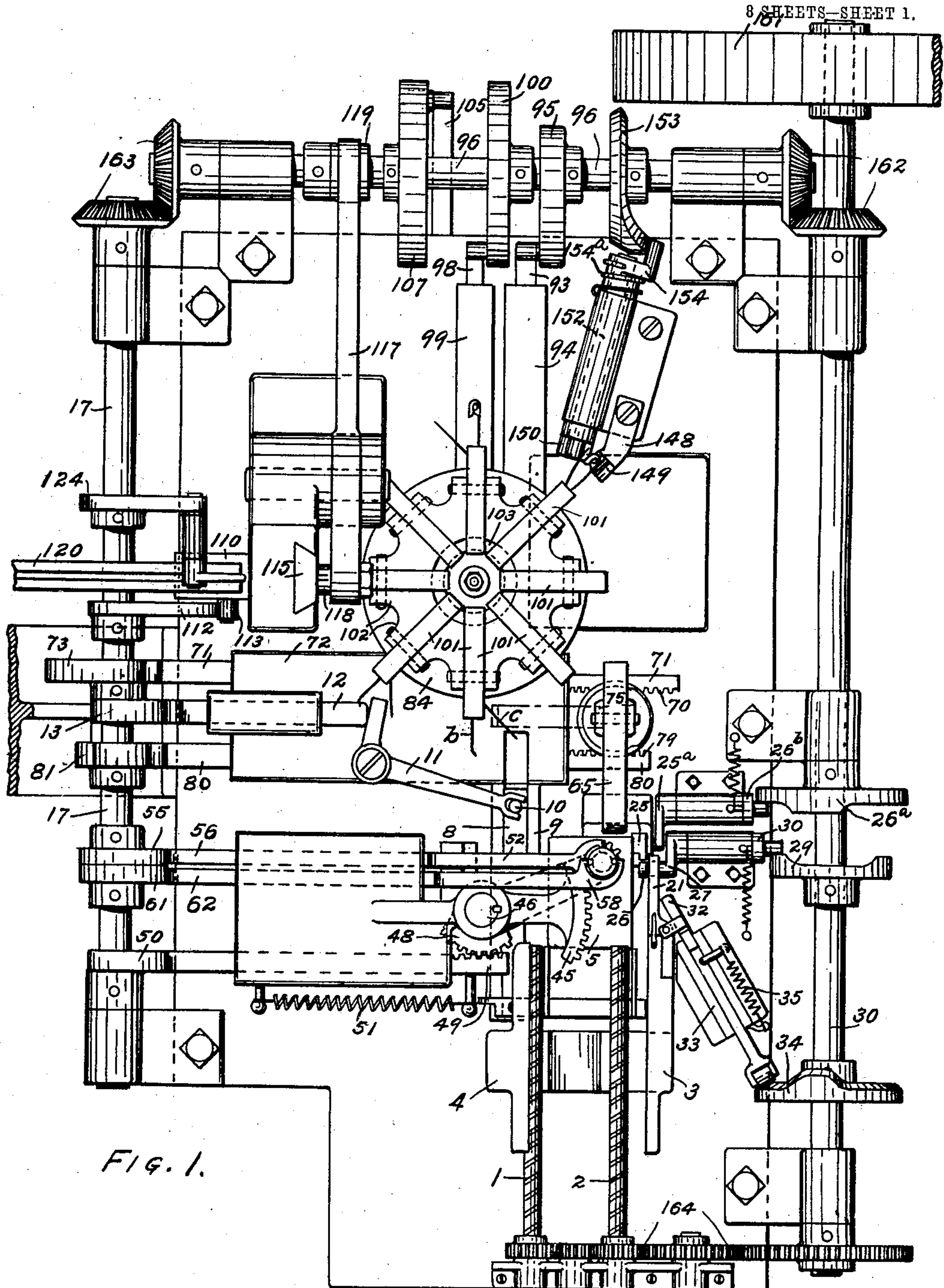


FIG. 1.

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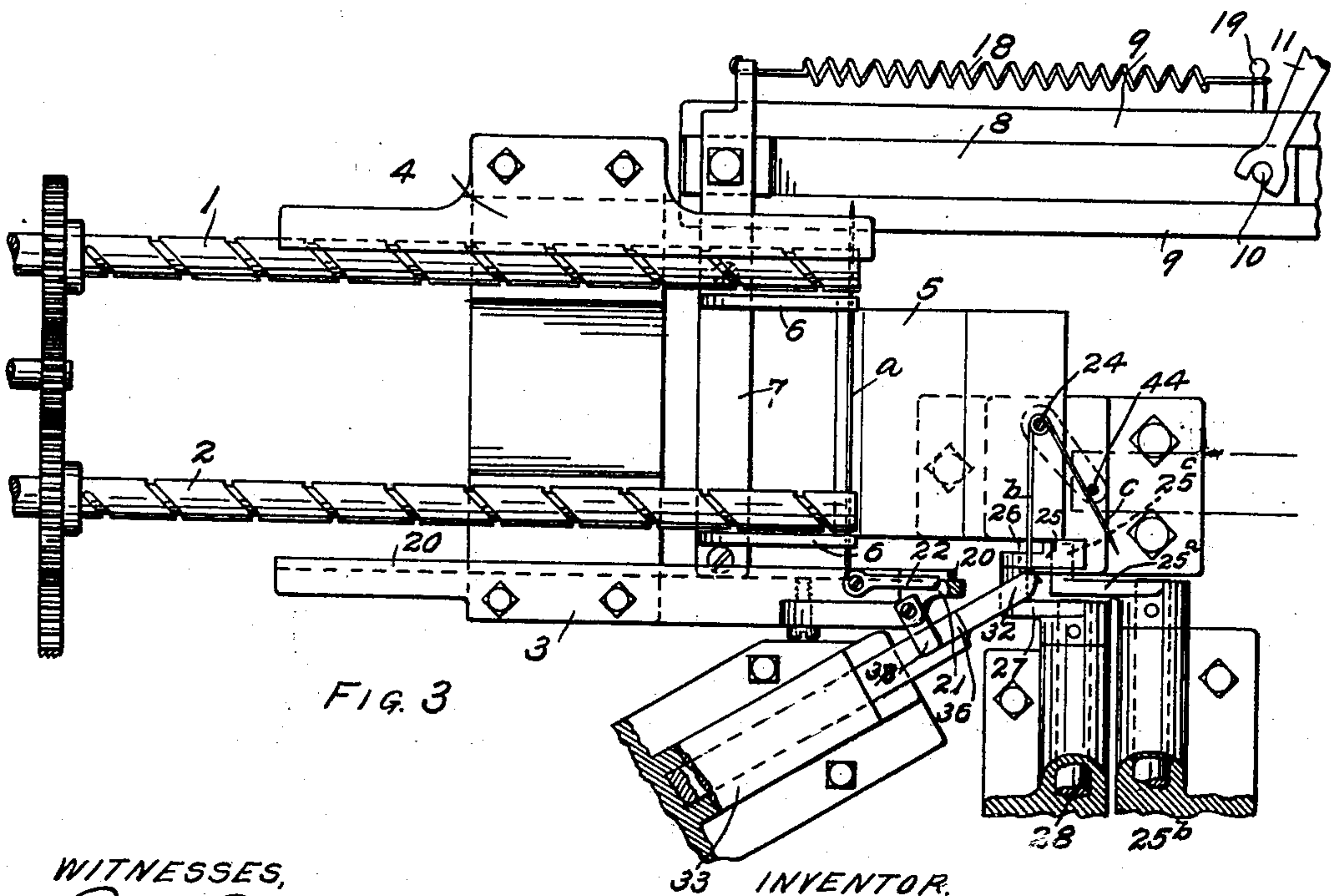
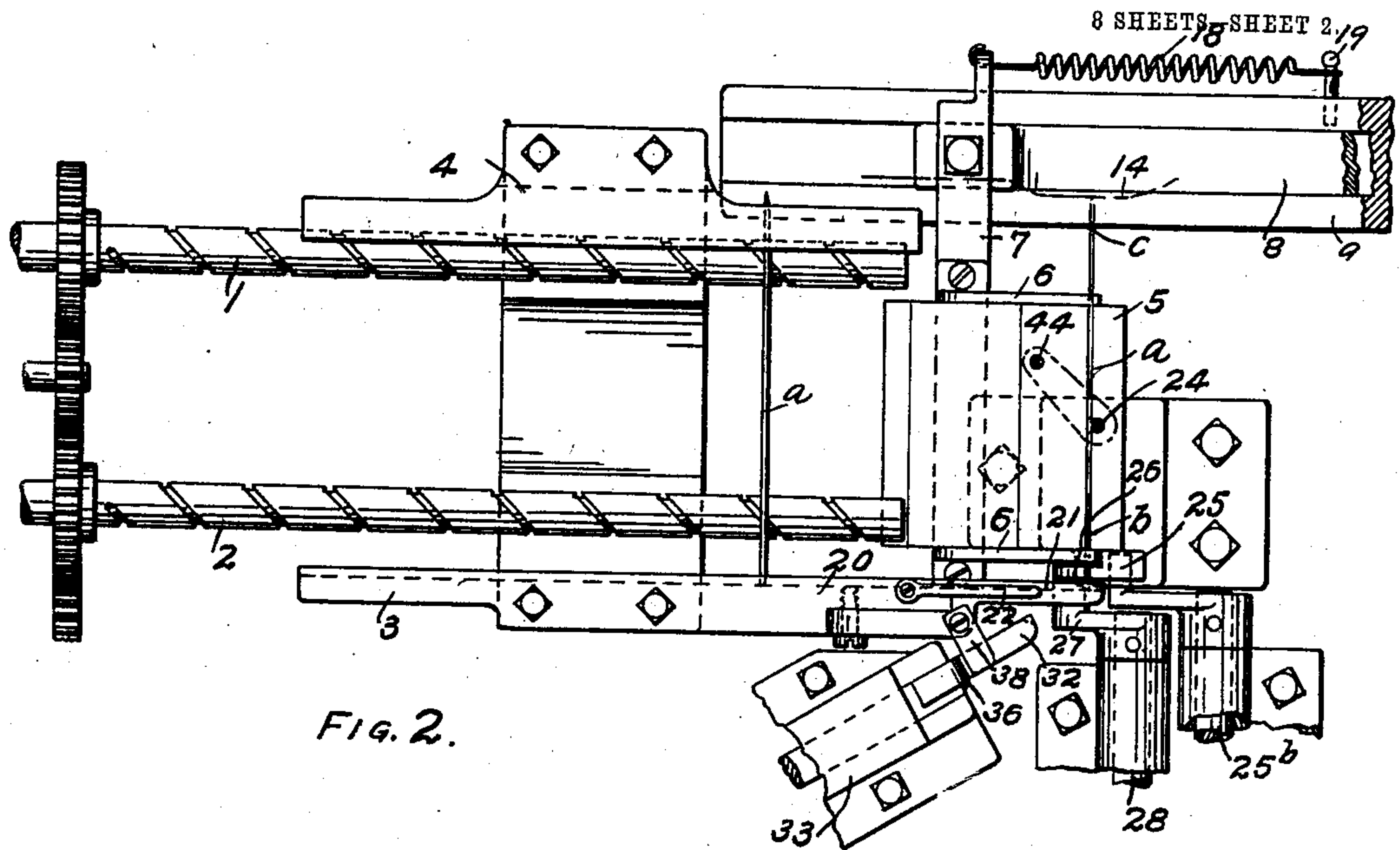
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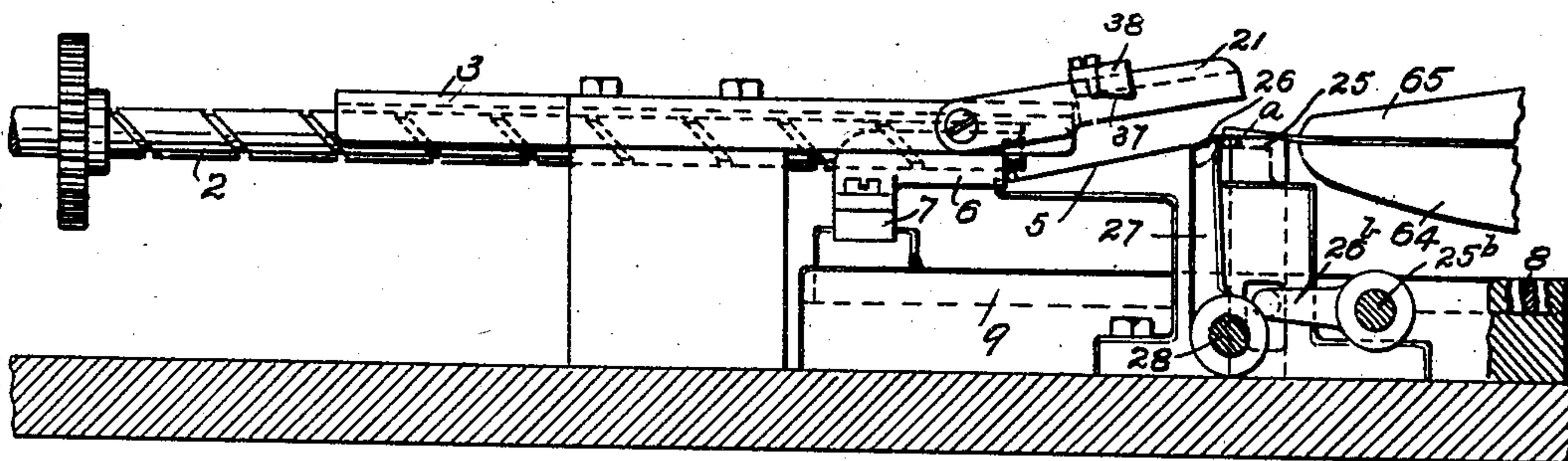


FIG. 4.

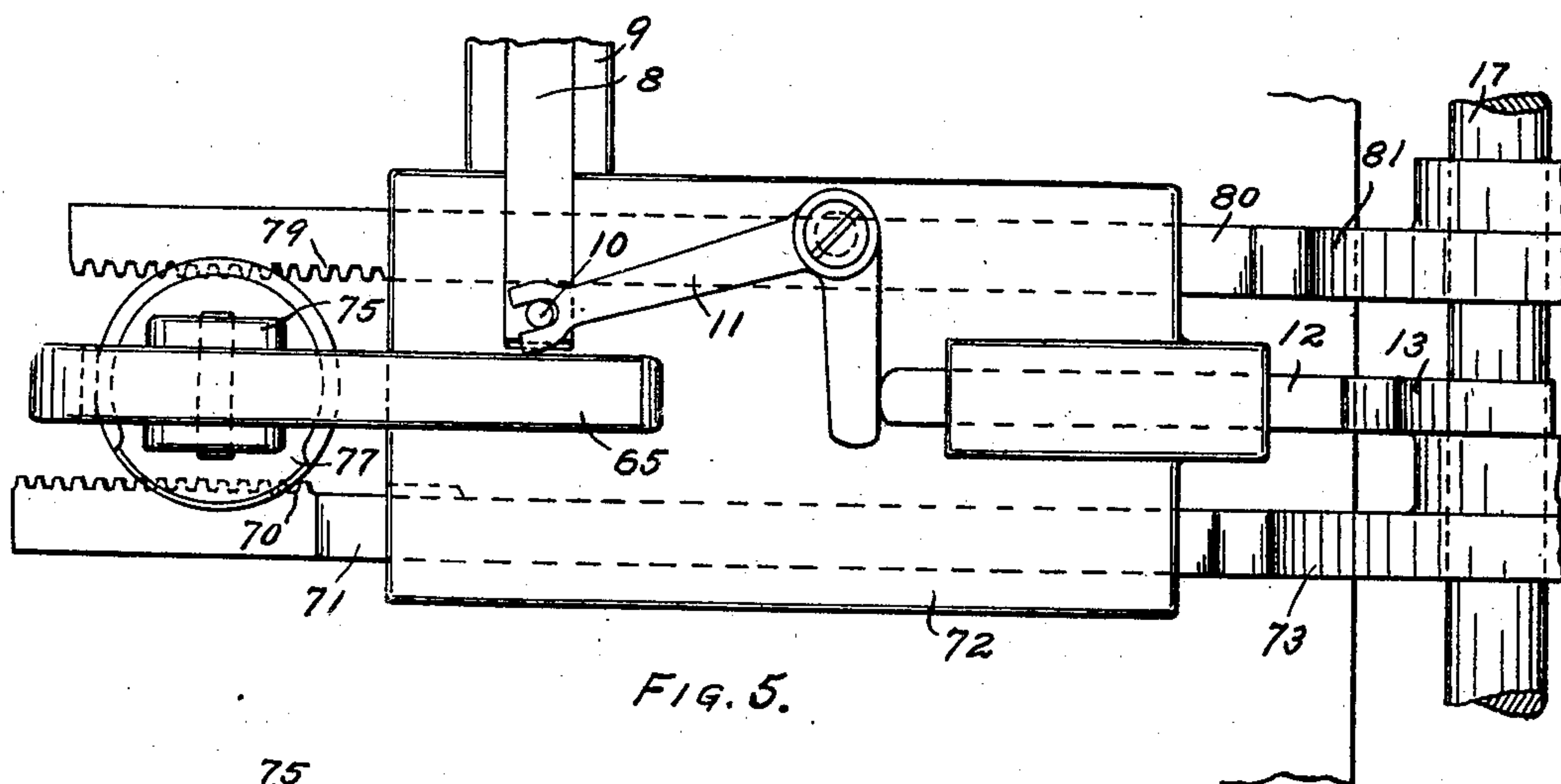


Fig. 5.

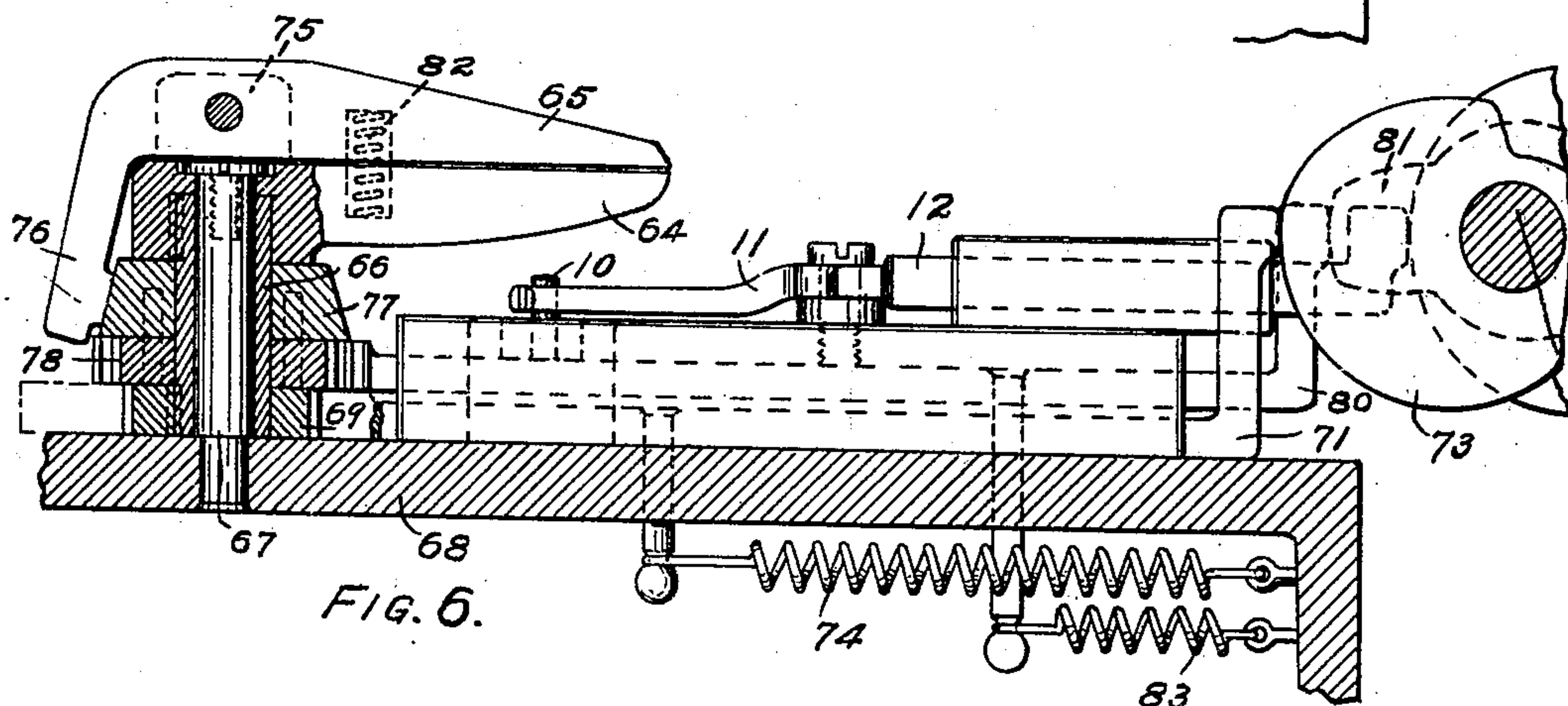


FIG. 6.

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8 SHEETS—SHEET 4.

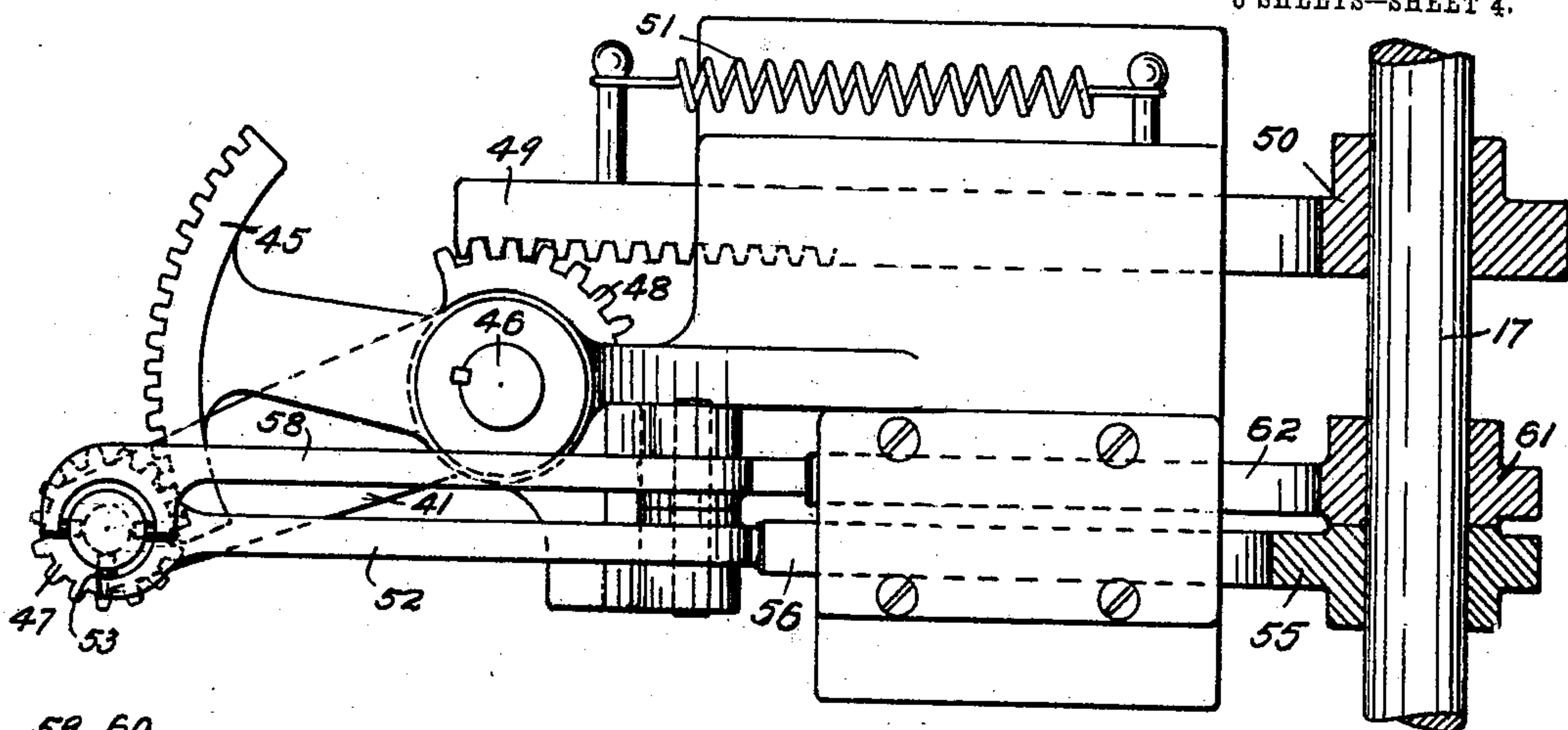


FIG. 7.

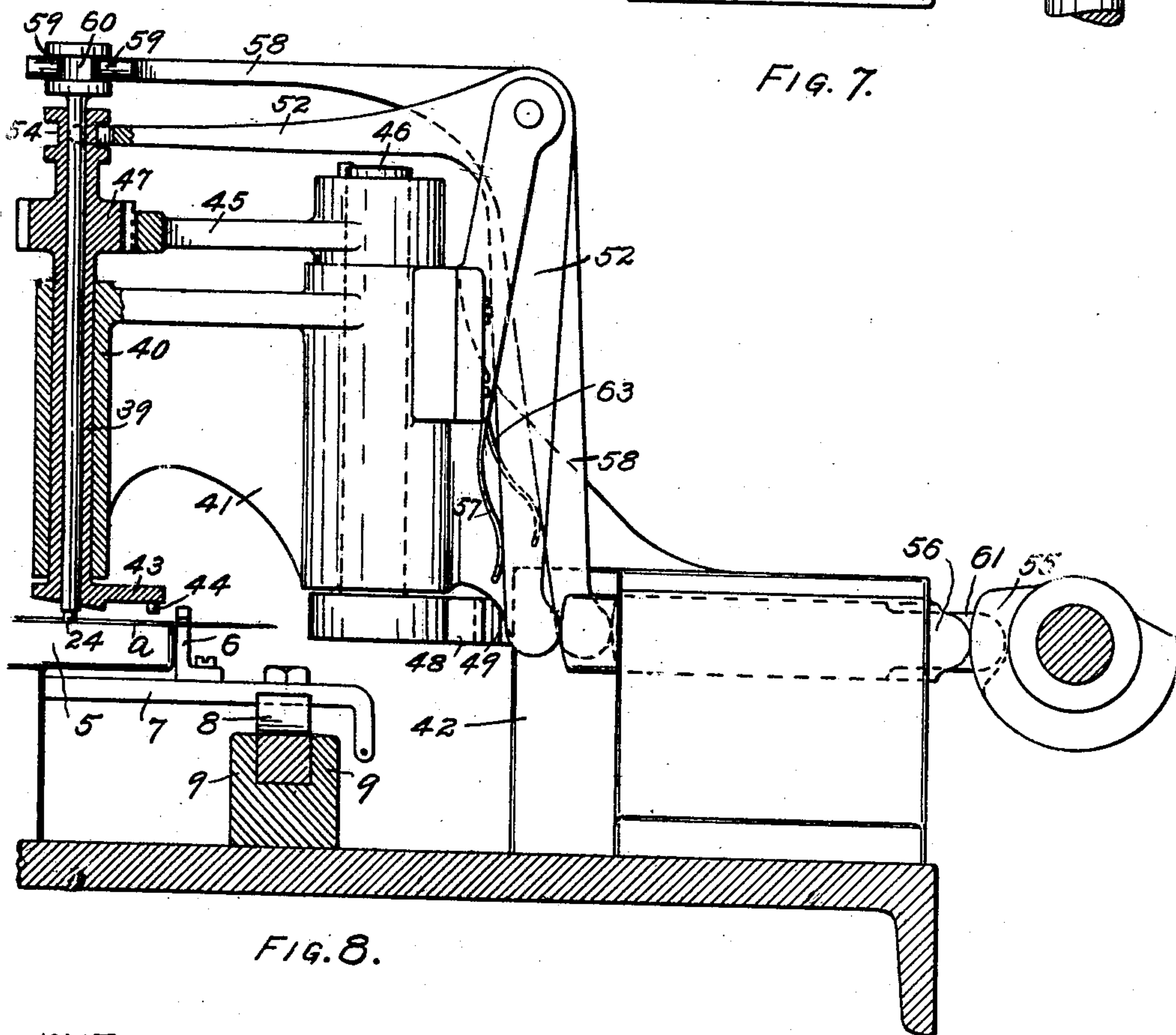


FIG. 8.

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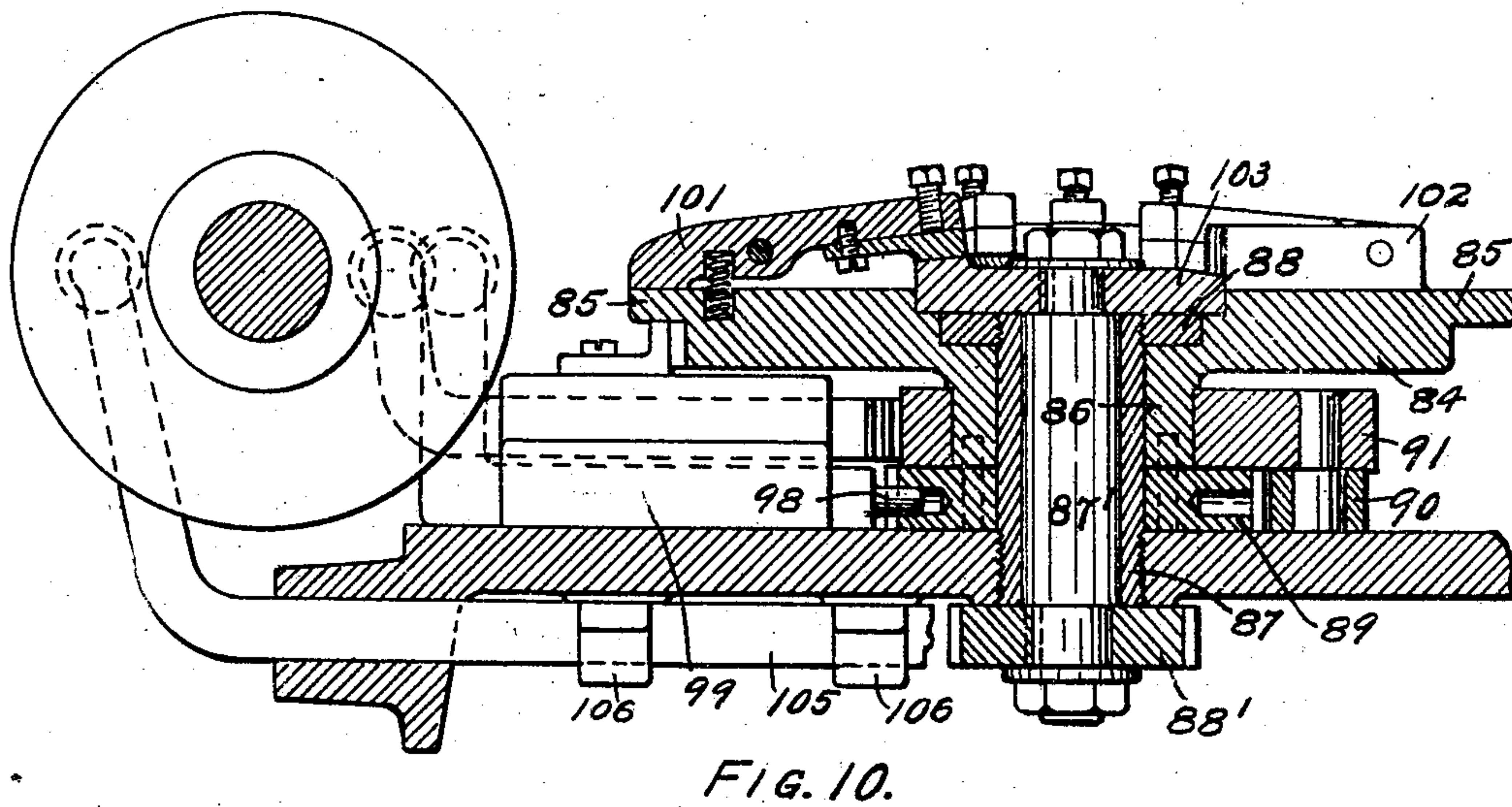
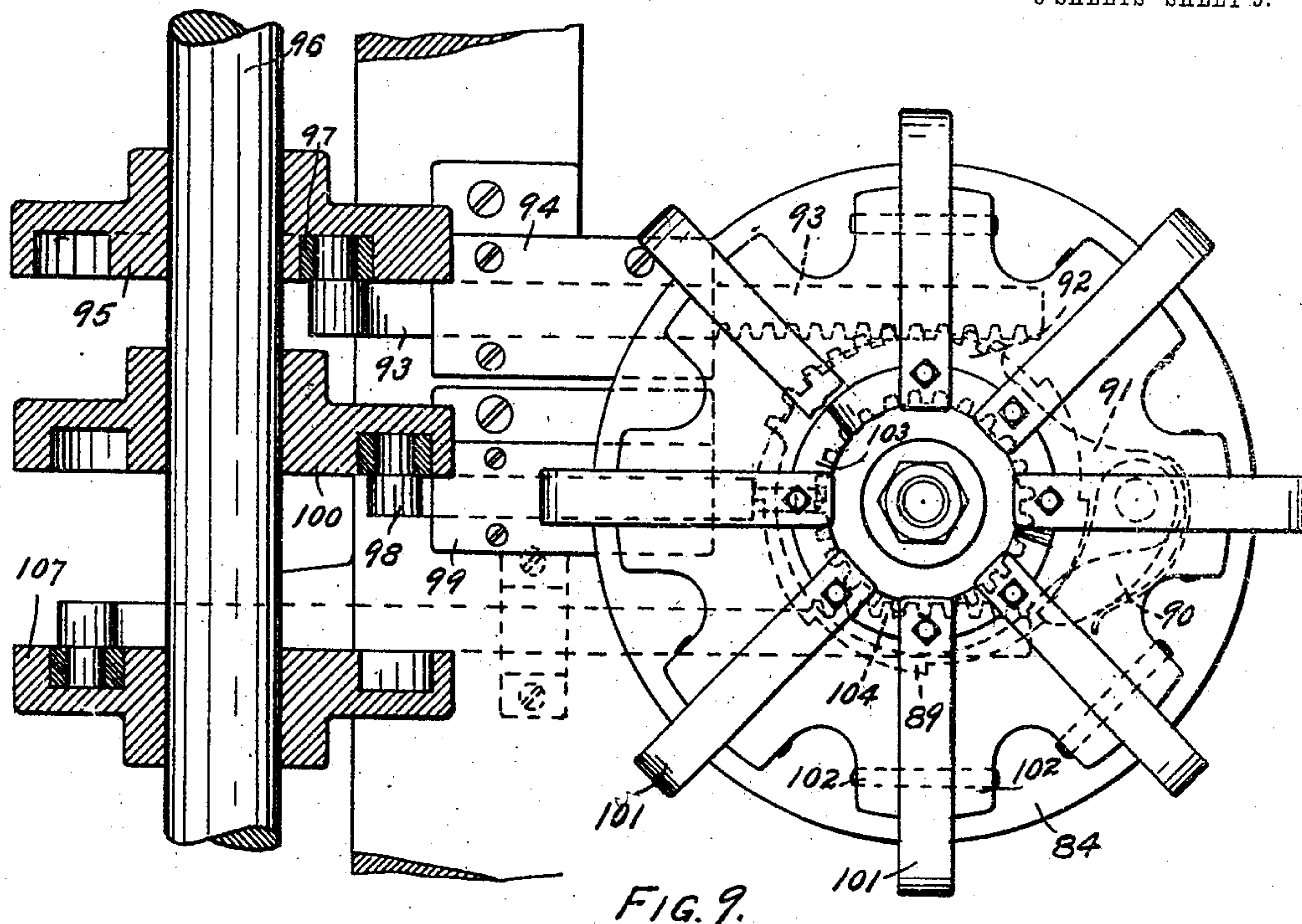
No. 812,762.

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MACHINE FOR MAKING SAFETY PINS.

APPLICATION FILED MAR. 25, 1898.

8 SHEETS—SHEET 5.



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MACHINE FOR MAKING SAFETY PINS.

APPLICATION FILED MAR. 25, 1898.

8 SHEETS—SHEET 6.

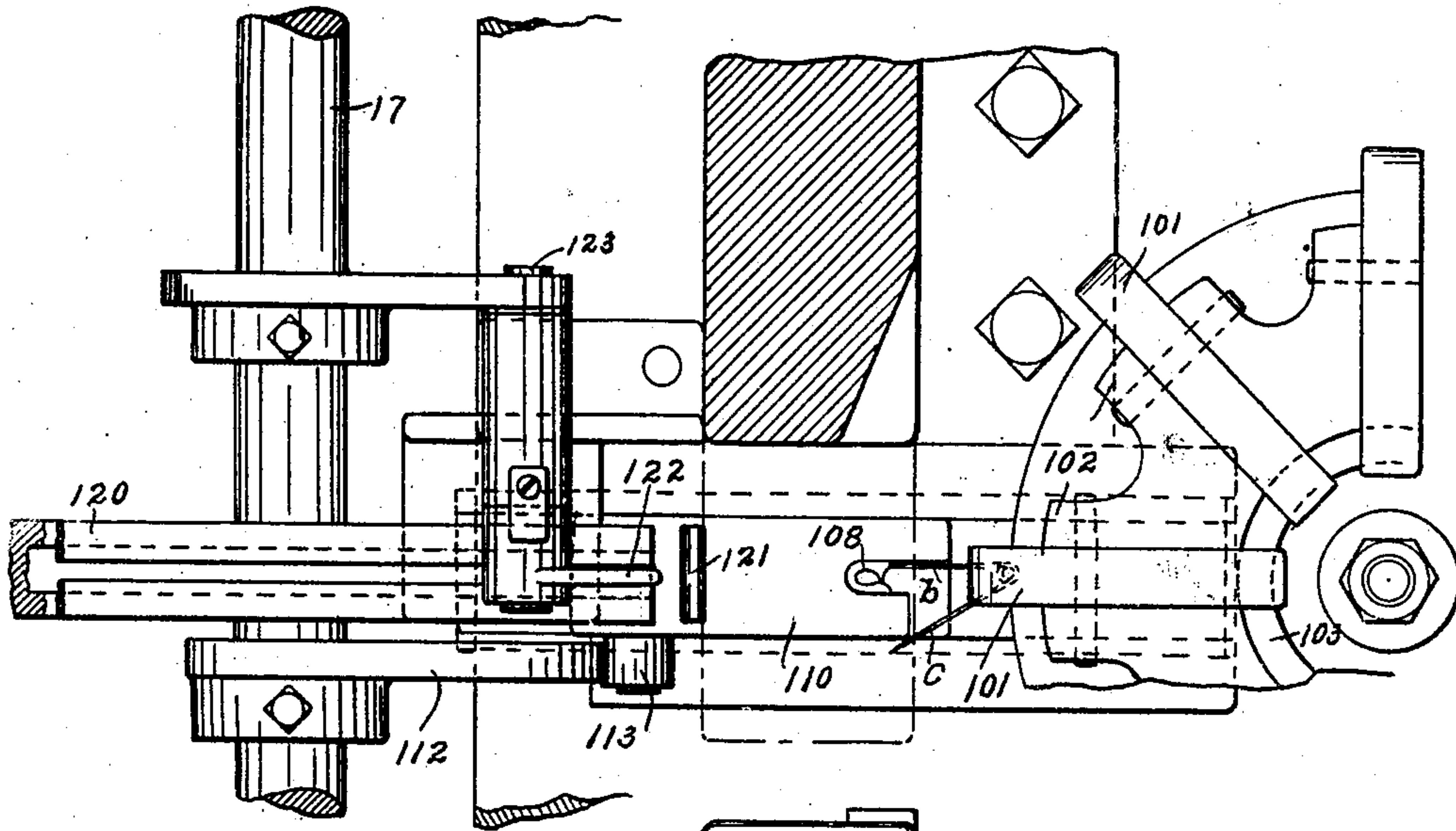


FIG. 11.

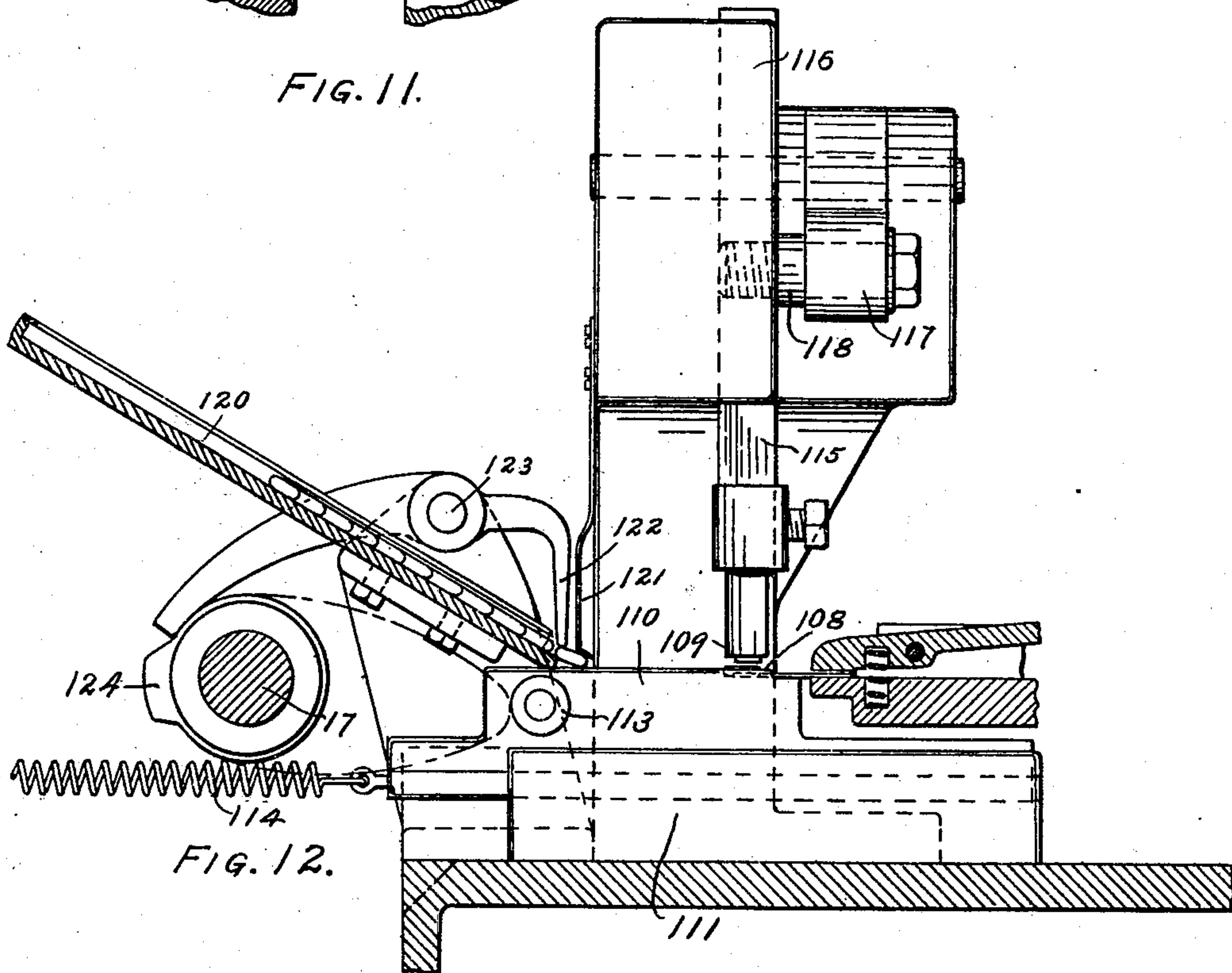


FIG. 12.

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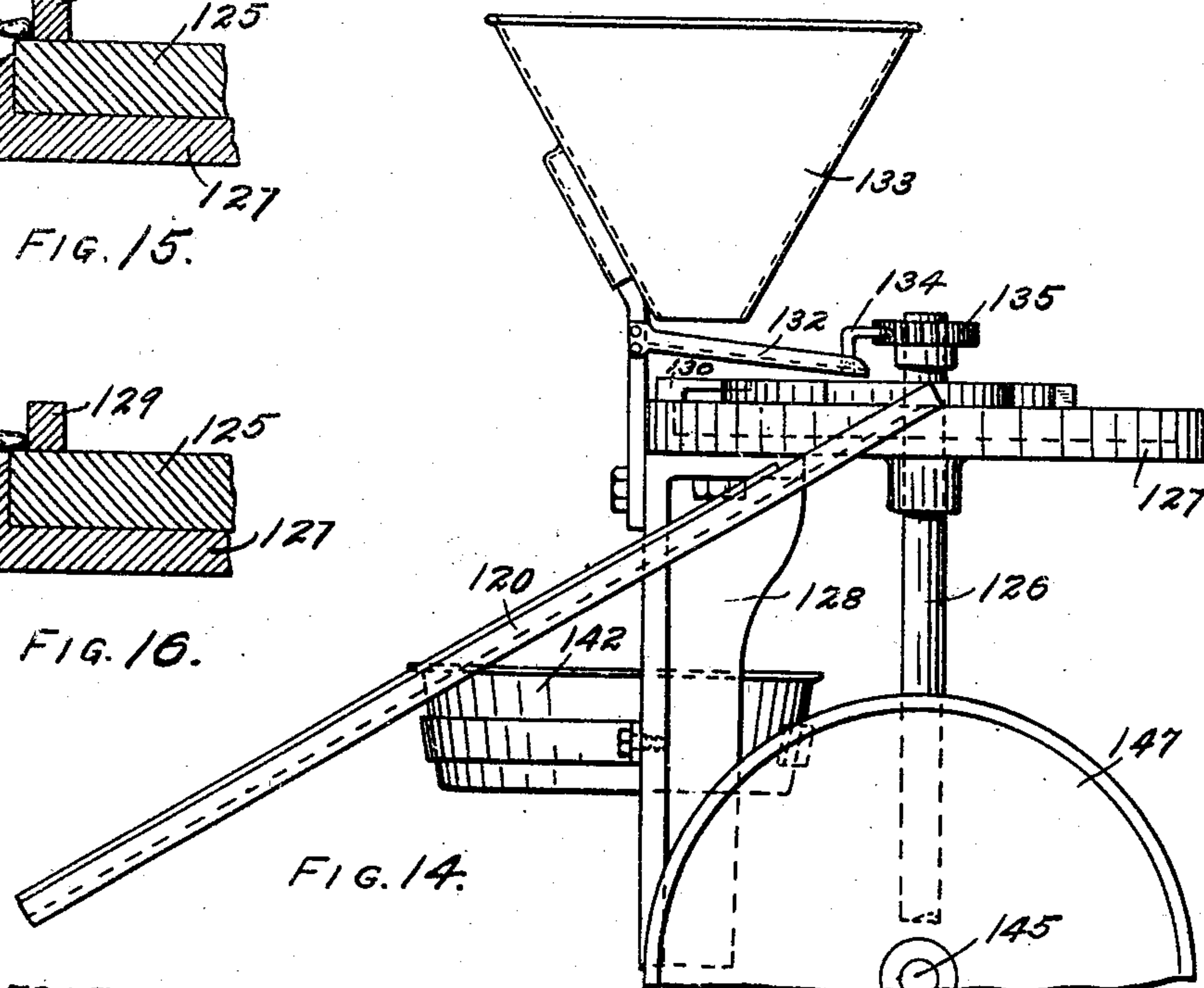
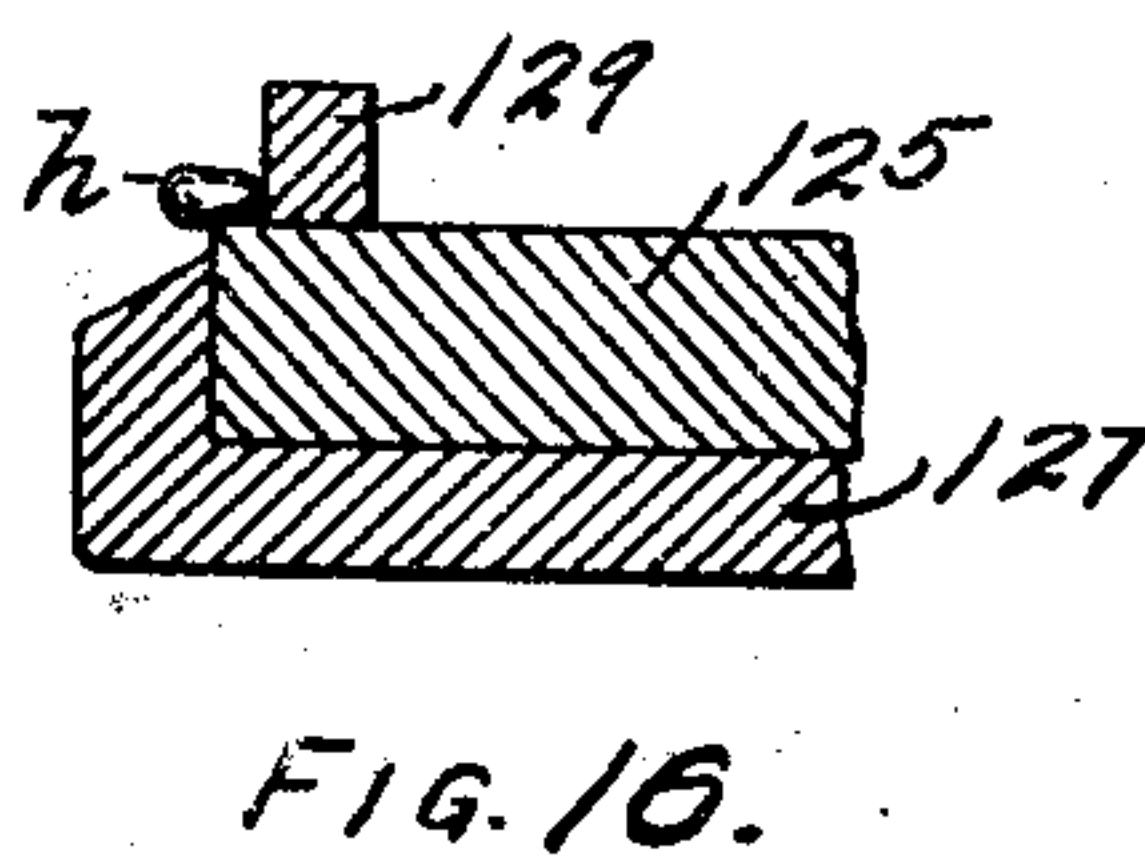
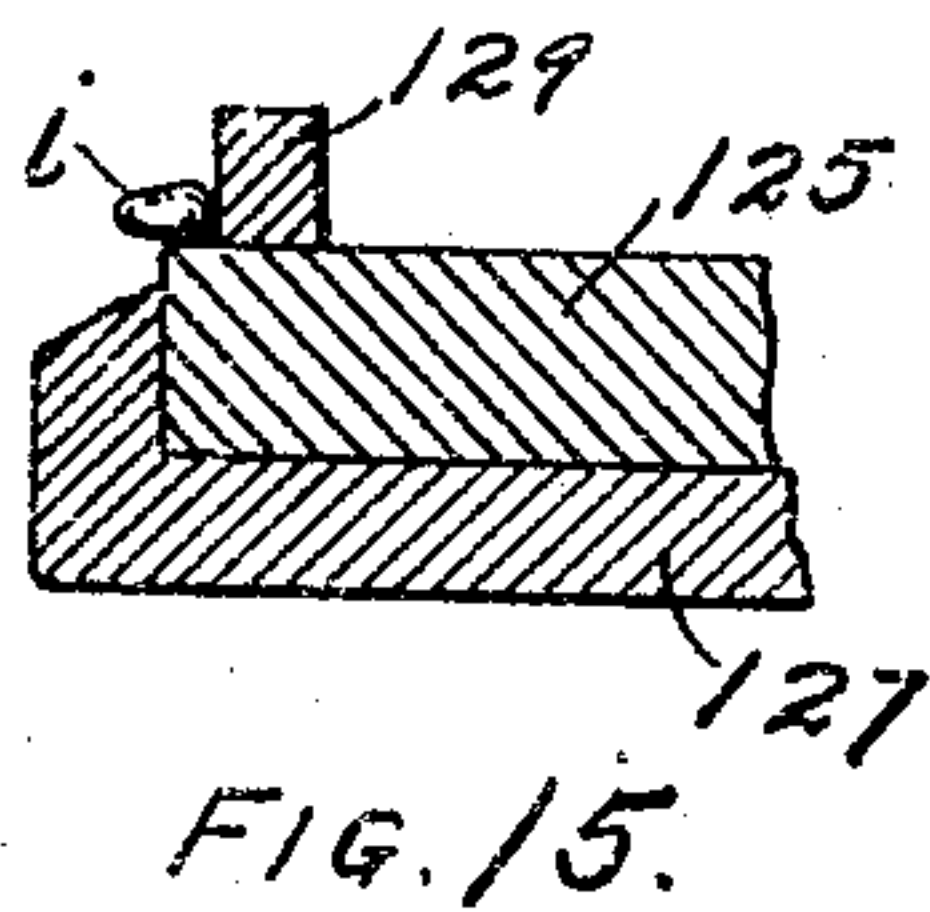
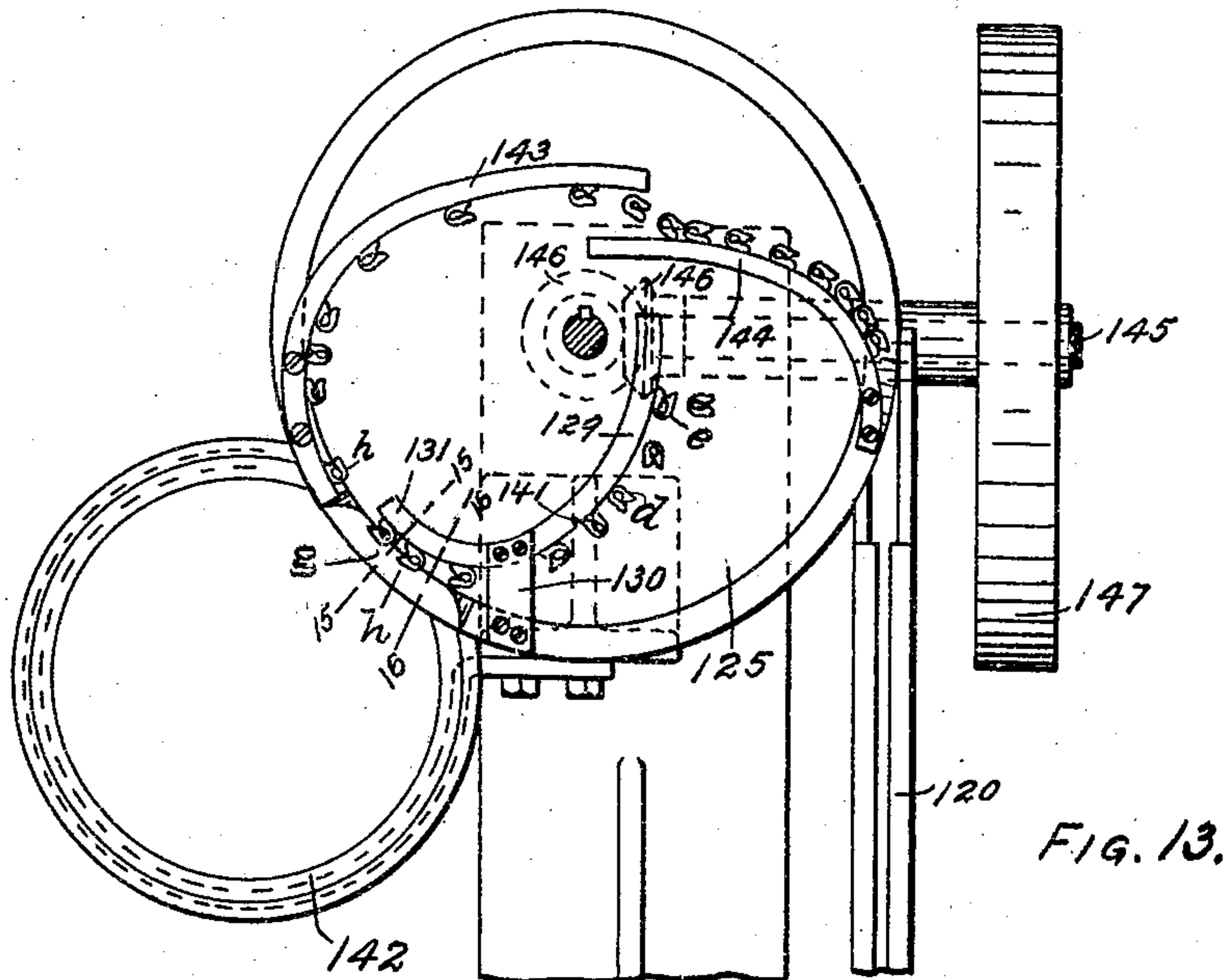
No. 812,762

PATENTED FEB. 13, 1906.

W. D. MIDDLEBROOK.
MACHINE FOR MAKING SAFETY PINS.

APPLICATION FILED MAR. 25, 1898.

8 SHEETS—SHEET 7.



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PATENTED FEB. 13, 1906.

W. D. MIDDLEBROOK.
MACHINE FOR MAKING SAFETY PINS.

APPLICATION FILED MAR. 26, 1893.

8 SHEETS—SHEET 8.

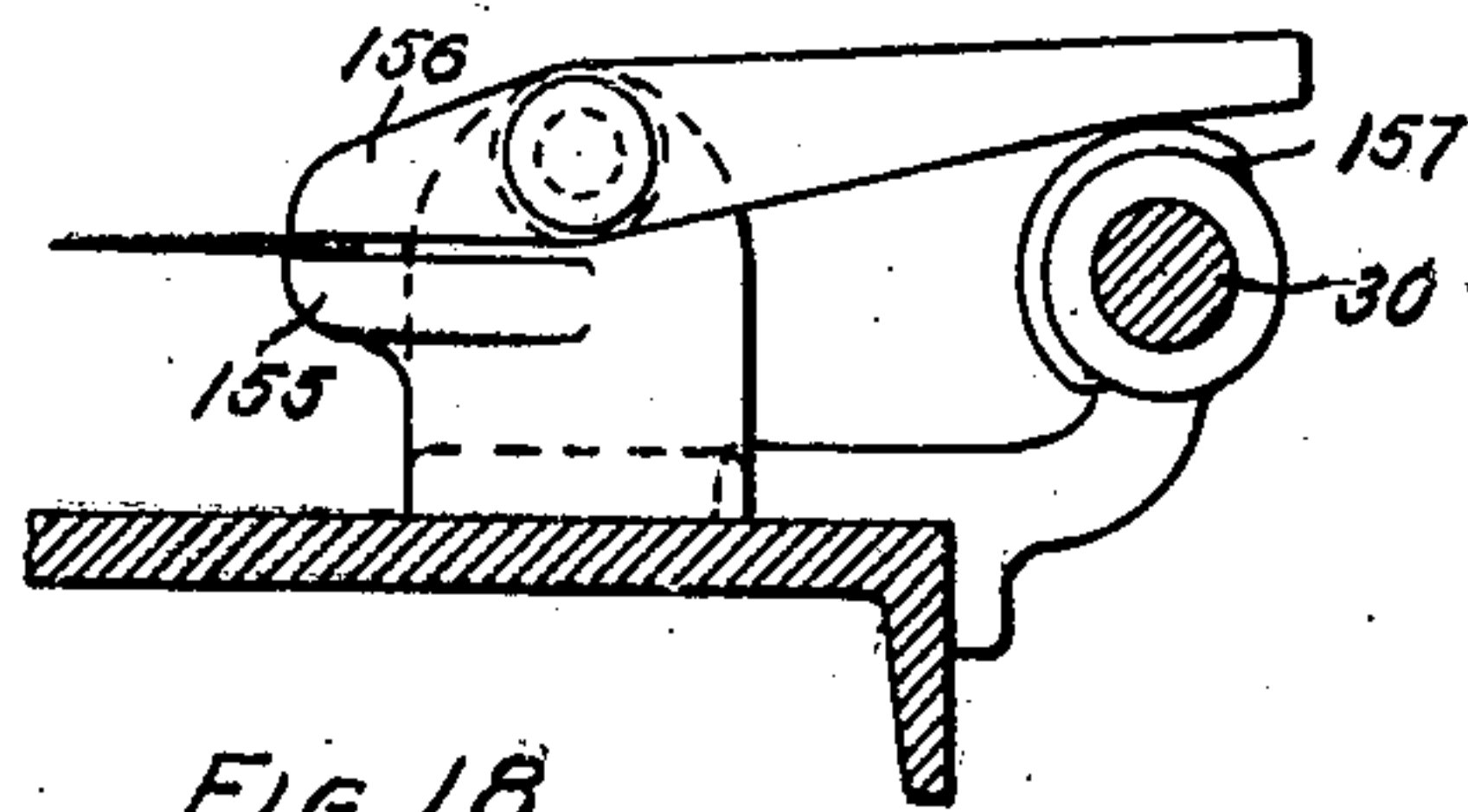


FIG. 18.

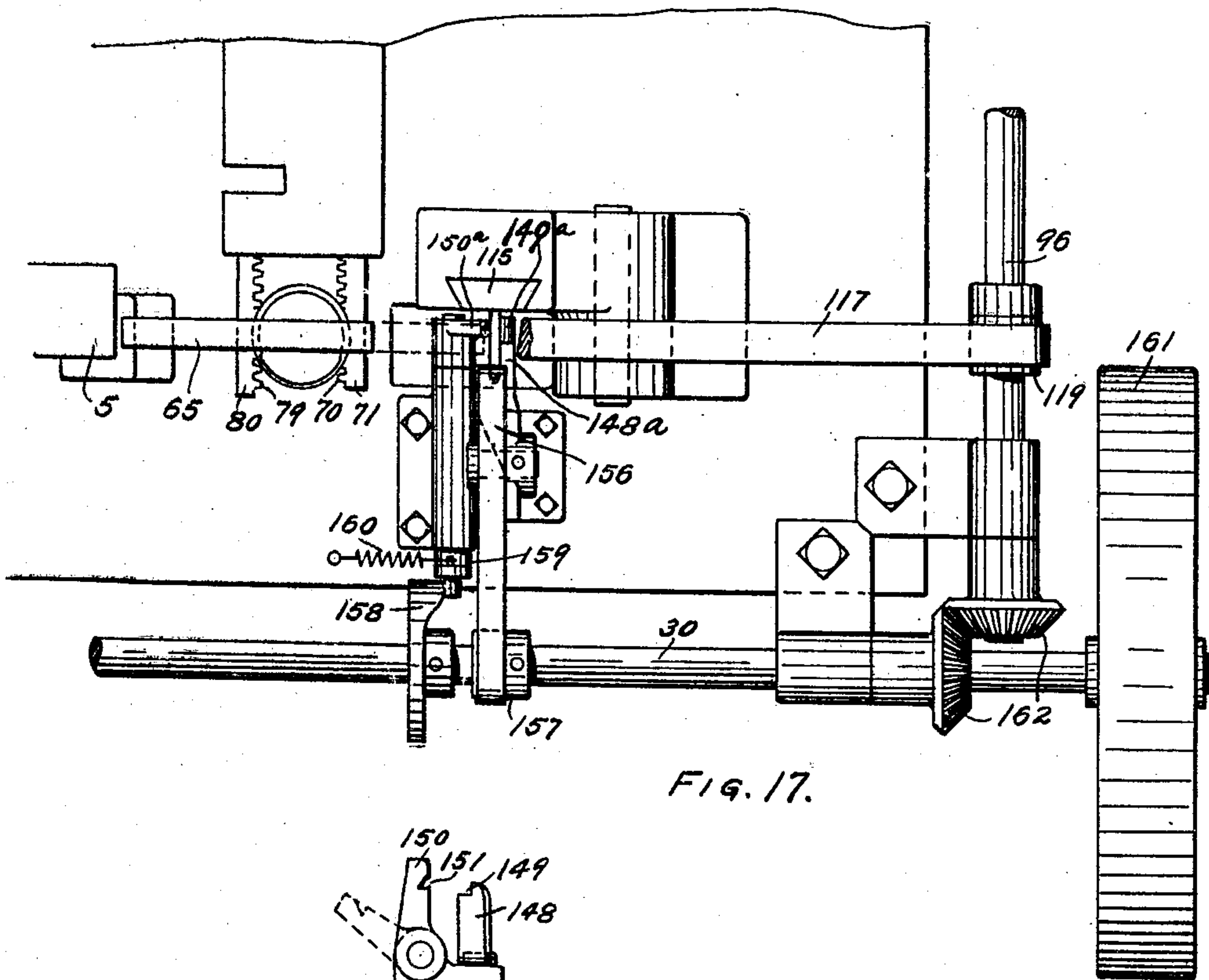


FIG. 17.

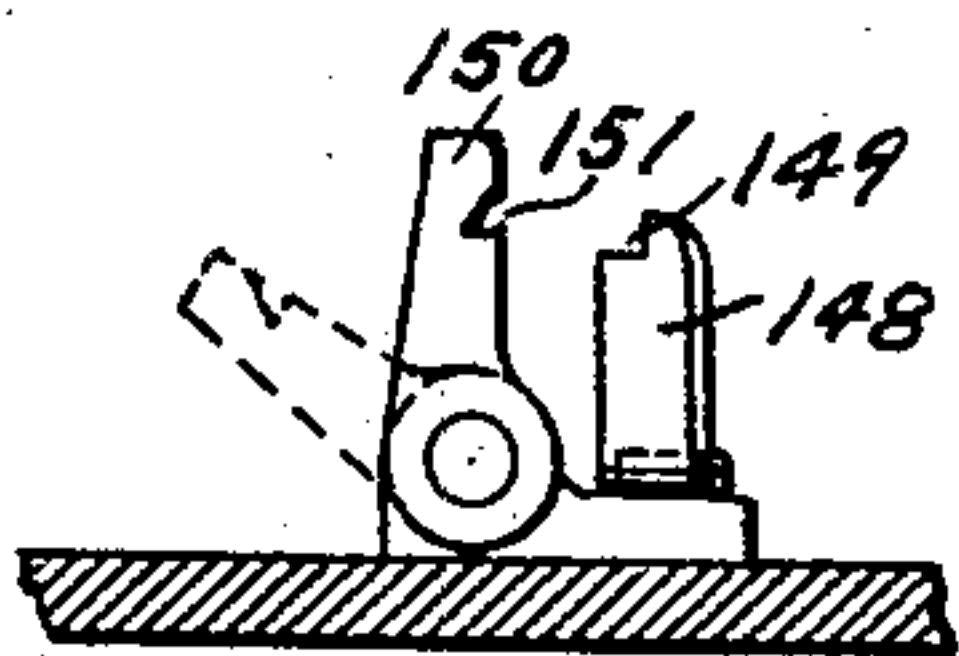


FIG. 19.

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UNITED STATES PATENT OFFICE.

WILLIAM D. MIDDLEBROOK, OF WATERBURY, CONNECTICUT, ASSIGNOR
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MACHINE FOR MAKING SAFETY-PINS.

No. 812,762.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed March 25, 1898. Serial No. 675,073.

To all whom it may concern:

Be it known that I, WILLIAM D. MIDDLEBROOK, of Waterbury, county of New Haven, and State of Connecticut, have invented a certain new and useful Machine for Making Safety-Pins; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The invention relates to the manufacture of that class of safety-pins which are formed of wire bent to form the legs of the pin and provided with a metallic cap secured to one of the legs and forming a guard or catch with which the pointed leg may be engaged to close the pin. When employing all the features of the present invention, the pointed wires are fed to the machine, are bent to form the legs of the pins, the caps or guards are arranged in the same relative position, are fed to the machine and secured to the wire, and the completed pins are closed and delivered. It will be understood, however, that certain features, if desired, may be used without using the other features and that certain features may be used in machines of a different class. Thus, for instance, the means for arranging the caps in the same relative position may be used in various classes of machines and for operating upon different forms of articles. Again, the capping and bending devices may be used without employing the closing devices and the finished pins delivered in an open condition.

Any suitable mechanisms may be used for bending the wires, securing the caps to the wires, or closing the pins, and any suitable mechanism may be used for arranging the caps in the same relative position and feeding them to the capping devices, and the particular construction of any or all these mechanisms is not material to the broad invention, which resides in the combinations of mechanisms set forth in the claims, without regard to the specific structure of said mechanisms.

In the accompanying drawings, in which is illustrated a machine embodying the features of the invention in their preferred form, Figure 1 is a plan view of a machine for manufacturing safety-pins embodying the various features of invention in their preferred form. Fig. 2 is a detail plan view of the devices for

feeding the wire to the bending mechanism. Fig. 3 is a similar view with the parts in a different position. Fig. 4 is a side elevation of the same. Fig. 5 is a plan view of the carrier for delivering the bent pin from the bending mechanism. Fig. 6 is a side elevation of the same. Fig. 7 is a plan view of the bending mechanism. Fig. 8 is a sectional elevation of the same. Fig. 9 is a plan view of the carrier for the pins. Fig. 10 is a sectional view of the same. Fig. 11 is a plan view of the capping mechanism. Fig. 12 is an elevation of the same. Fig. 13 is a plan view of the devices for arranging the caps in the same relative relation. Fig. 14 is an elevation of the same. Fig. 15 and Fig. 16 are sectional details on lines 15 15 and 16 16, respectively, Fig. 13. Fig. 17 is a plan view of a modification, and Figs. 18 and 19 are details.

The devices shown in the drawings for arranging the caps in the same relative position are especially designed to handle caps which are heavier upon one side than upon the other, and this peculiarity is taken advantage of in arranging the caps. It will be understood, however, that other forms of devices may be used for this purpose and that the form of devices used may vary with the peculiarities of the caps being handled.

Referring now to the specific machine shown and the drawings in detail, the pointed wires *a* from which the pins are made are delivered from the pointing devices or by any suitable feed upon two spiral conveyers 1 and 2, which are of a type common in machines for manipulating wire. The wires are carried forward by the conveyers, being guided by guides 3 and 4, and are delivered upon an inclined plate 5 in front of two reciprocating fingers 6, by which the wires are presented to the bending devices. The fingers 6 are secured upon an arm 7, extending from a slide 8, mounted in a guide 9 and provided with a pin 10. A bell-crank lever 11 has one end slotted to engage the pin 10, and the other end of said lever is engaged by a reciprocating bar 12, operated by a cam 13, secured to a shaft 17. A spring 18, having one end connected to a stationary pin 19 and the other to the end of arm 7, serves to hold the end of lever 11 against the end of bar 12 and to hold said bar in engagement with the cam.

The guide 3 has an overhanging flange 20

and said guide is provided with a pivoted section 21 at its forward end, which is held in its normal position by a spring 22. As the wire is carried forward by the fingers 6 its pointed end *c* engages a leaf-spring 14, (indicated in dotted lines, Fig. 2,) which forces the other end of the wire against the guide 3. As the wire *a* reaches the pin 24 of the bending mechanism the end *b* of the wire engages the edge of a vertically-movable bar 25 and is clamped against the edge of said bar by a jaw 26 at the end of an arm 27, secured to a rock-shaft 28. The rock-shaft 28 is operated at the proper time to clamp and release the end of the wire by means of a cam 29, secured to a shaft 30 and engaging the end of an arm 31, secured to said rock-shaft. The end of the wire extending beyond the clamps 25 and 26 is bent laterally by means of a bender in the form of a sliding bar 32, which is guided in a standard 33 and forced forward by a cam 34, secured to shaft 30 and against which the end of the bar is held by a spring 35. As the slide 32 moves forward to bring its end against the end *b* of the wire *a* the pivoted section 21 of the guide 3 is raised out of the path of the bender by a cam 36 on the slide, which cam engages an incline 37 on an arm 38, secured to the section 21, and lifts said section. The slide 25 is withdrawn to allow the removal of the bent wire by means of an arm 25^a, secured to a rock-shaft 25^b and provided with a pin 25^c, which engages a slot in said slide. The rock-shaft is operated at the proper time by a cam 26^a, which engages a pin on the end of an arm 26^b, secured to the end of the rock-shaft.

As the end of the wire is being bent by the slide 32 the wire is also acted upon by the devices for bending the wire to form the legs of the pins, which are as follows, Figs. 7 and 8: The pin 24, about which the wire is bent or coiled, is mounted to move vertically in a sleeve 39, mounted in a bearing 40, formed in the arm 41 of a standard 42. The sleeve 39 is provided at its lower end with a horizontal arm 43, carrying a depending pin 44 for engaging the wire and bending or coiling it about the pin 24. The sleeve is rotated to bend or coil the wire about the pin 24 by means of a segment 45, secured to the upper end of a rock-shaft 46 and engaging a pinion 47 on the sleeve. A second segment 48 is secured to the lower end of rock-shaft 46 and is engaged by a rack-bar 49, reciprocated by a cam 50, against which the end of the rack-bar is held by a spring 51. The sleeve is lifted to allow the wire to be passed under the pin 44 and against the pin 24 by means of a bell-crank lever 52, having pins 53 at one end which engage a groove 54 in the upper end of the sleeve 39. The bell-crank lever is rocked by means of a cam 55, secured to shaft 17, which cam engages the end of a slide 56, the other end of which engages the end of the

bell-crank lever. The lever is held against the end of slide 56 by a spring 57. The pin 24 is raised to allow the removal of the bent wire by means of a bell-crank lever 58, having pins 59 at one end which engage a groove 60 at the upper end of the pin 24. The lever 58 is operated by a cam 61, secured to shaft 17 and engaging the end of a slide 62, the other end of which engages the lever 58. A spring 63 holds the lever against the end of slide 62.

After the wire has been bent to form the legs of the pin and the end *b* has been bent laterally the pin 24 and the sleeve 39 are raised, the slide 25 drawn down, and the bent wire is removed from the plate 5 and transferred to the devices for securing the cap or guard to the end *b* of the wire. The means for thus transferring the bent wire is as follows: When the wire has been bent, the pointed leg stands in the position shown in Fig. 3 and is seized by an oscillating carrier comprising the jaws 64 and 65, by which said wire is withdrawn from the plate 5 and delivered to one of a series of grippers mounted on an intermittently-revolving carrier provided with a series of grippers. The stationary jaw 64 of the oscillating carrier is secured to a sleeve 66, mounted on a stud 67, rising from the base-plate 68. A gear 69 is secured to the lower end of the sleeve 66 and is engaged by a rack 70, formed on a bar 71, guided in a plate 72 and engaged by a cam 73, secured to shaft 17, Figs. 1, 5, and 6. A spring 74 acts to hold the end of bar 71 in engagement with the cam 73. The movable jaw 65 is pivoted between lugs 75 on the stationary jaw and is provided with a depending arm 76, which rides on the surface of a cam 77, loosely mounted on the sleeve 66 and secured to a gear 78. The gear 78 is engaged by a rack 79, formed on a bar 80, guided in the plate 72 and acted on by a cam 81, secured to shaft 17. A spring 82 is interposed between the jaws of the carrier and tends to hold said jaws open. The bar 80 is held in engagement with the cam 81 by a spring 83. The oscillations of the carrier and cam 77 are so timed that the jaws are open as the carrier swings into the position shown in full lines, Fig. 1, to bring the jaws upon the opposite sides of the wire. The jaws are then closed and the carrier swung into the dotted-line position, Fig. 1, to carry the coiled or bent portion of the wire between the jaws of one of the grippers on the rotary carrier. The jaw 65 is then opened and the carrier swings back to get another wire, while the rotary carrier advances a step to bring a new gripper into position to receive a bent wire from the oscillating carrier.

The rotary carrier, by which the bent wires are presented to the capping mechanism, consists of a disk 84, provided with a series of projections 85, forming the stationary jaws

of a series of grippers. The disk 84 is provided with a hub 86, which is mounted on a hollow stud 87, rising from the base-plate, said disk being held in place on said stud by a nut 88, screwed onto the end of the stud. A ratchet-wheel 89 is secured to the lower end of hub 86 and is engaged by a spring-pressed pawl 90, pivoted to a pawl-carrying disk 91, loosely mounted on the hub 86 above the ratchet-wheel. The pawl-carrying disk is provided with gear-teeth at 92, which are engaged by a rack on a bar 93, guided in a plate 94 and reciprocated by a cam 95, secured to a shaft 96 and engaging a roll 97 on the end of bar 93. The disk 84 is locked in position after each forward movement by locking-bolt 98, guided in a plate 99 and reciprocated by a cam 100, secured to shaft 96. The movable jaws 101 of the grippers are pivoted between lugs 102 on the disk 85, and the tails of said jaws ride upon a horizontal cam-disk 103, which is secured to the end of a rock-shaft 87', mounted in the stud 87 and having a gear 88' secured to its lower end below the base-plate. The cam-disk is oscillated at the proper times to open and close certain of the grippers by a rack 104, formed on a bar 105, guided in bearings 106 and reciprocated by a cam 107, secured to shaft 96 and engaging a roll on the end of said bar.

The capping devices to which the bent wires are presented by the rotary carrier consists of a reciprocating female die 108, which brings the cap over the bent end *b* of the wire, and a reciprocating male die 109, which is located above the die 108 when said die is in its forward position. When the die 109 descends, the cap or guard is bent about the wire by the action of the dies and is thus secured to the wire, Figs. 11 and 12. The dies then move back and the rotary carrier advances a step to carry the completed pin from between the dies and to present a new wire to the capping devices. The die 108 is formed in the top of a block 110, guided in a plate 111 and reciprocated by a cam 112, secured to shaft 17 and acting upon a roll 113, secured to the side of said block. The roll 113 is held against the cam 112 by a spring 114. The die 109 is secured to the end of a plunger 115, guided in a bracket 116 and reciprocated by a lever 117, which engages a stud 118, secured to the plunger, and is acted upon by a cam 119, secured to shaft 96, Fig. 1.

The caps may be supplied to the die 108 by hand, if desired; but it is preferred to feed the caps to said die automatically. As shown in Figs. 11 and 12, the caps are fed to the die from a chute or magazine 120, the lower end of which is arranged just above the block 110. When the block 110 is advanced, the end cap in the chute 120 rests against the top of the block and is held in the chute by a stop plate or finger 121. When the block is

drawn back, the die 108 is brought under the end of the chute and the end cap is forced down into the die by a separating-finger 122, which separates the end cap from the caps above it in the chute and also holds said caps in check until the die has moved forward, when said separating-finger rises and allows the caps to move down against the stop-finger 121. The separating-finger 122 is pivoted at 123 and is rocked at the proper time by a cam 124, secured to the shaft 17.

Any suitable devices may be used for supplying the caps to the chute 120, or the caps may be inserted in the end of the chute by hand; but it is preferred to use for this purpose a mechanism which in itself forms one feature of invention. This feature of invention is not limited in its application to use in connection with devices for securing the caps to the wire of safety-pins, but may be used in other machines in which it is desirable to present a succession of articles, such as caps, in the same relative relation. The means preferably employed for presenting the caps in the same relative relation consists of a traveling surface for supporting and carrying forward the caps and a stationary guide arranged across said traveling surface at an inclination to the direction of travel and extending to within a distance of the edge of the surface less than the width of the caps. Other guides may be used for directing the caps to any desired point, as will be more fully explained. Any suitable form of traveling supporting-surface may be used, as a traveling belt, table, or disk; but it is preferred to employ a traveling surface in the form of a horizontal revolving disk. In Figs. 13 to 16, inclusive, is shown the preferred form of devices for selecting and arranging the caps, which devices are as follows:

A disk 125 is secured to a revolving shaft 126 and rotates within a recess formed in a plate 127, secured to a bracket 128, the edge of the plate being substantially flush with the upper surface of the disk. A curved guide 129 is mounted above the disk 125 and is arranged at an inclination to the direction of movement of the surface of said disk. The guide is supported from an overhanging arm 130, secured to the plate 127. The end 131 of guide 129 is substantially parallel to the edge of the disk 125 and is located at a distance from said edge less than the width of the caps. The caps are supplied to the disk 125 in front of guide 129 from a chute 132, which is supplied from a hopper 133. The chute is vibrated to loosen and separate the caps and scatter them upon the disk 125 by means of finger 134, secured to the side of the chute and riding over the teeth of a gear 135 on the end of shaft 126. The caps which fall upon the disk are carried against the guide 129 and travel along said guide. When the curved or closed end of a cap strikes the

guide, as at *d*, the cap will turn on said curved end and the side of the cap will engage the guide. If a cap strikes the guide with its curved end in front, as at *e*, the cap will turn on its curved end as it moves along the guide, and the open end will be brought in front. Should the open end *c* of a cap strike the guide, said cap would be carried along the guide in this position and would drop off the disk at the point *g*. It is preferred, however, to provide means for turning such caps, and this is done by forming one or more notches or recesses 141 in the guide 129, which will be engaged by the end of the cap and arrest said end, so that the cap will turn to bring the side against the guide and will then turn on its rounded end to bring the open end foremost. Thus all the caps will come to the point *g* with their open ends foremost. The caps are heavier on the side *h* than they are on the side *i*, and the distance from the guide 129 to the edge of the disk 125 is such at the point *g* that those caps which have the heavy side against the guide will remain on the disk, while those which have the light side toward the guide, Fig. 16, will drop off the disk into a receptacle 142. Thus all the caps which pass the point *g* will be in the same relative position and may be directed to the chute 120 in any desired manner. In the devices shown the caps are directed to the chute 120 by two guides 143 and 144. The guide 143 is placed beyond the point *g* and directs the cap inward toward the center of the disk 125. The caps pass from this guide to the guide 144, which directs away from the center of the disk and delivers them to the chute 120. Should any of the caps which pass the point *g* turn to bring the open end against the guide 143 by reason of contact with the end of the guide or for any other reason, they will pass along said guide in this position. As their curved ends strike the said guide 144, however, they will turn to bring the open side in front again. Since the guide 144 extends from near the center of the disk outward, the caps near the delivery end of said guide will travel faster than those at the receiving end and the caps will therefore be separated as they pass toward the edge of the disk. The guide 129 will have the same separating action and the caps will be separated as they pass to the point *g*.

The shaft 126 may be continuously driven from a drive-shaft 145, to which it may be connected by bevel-gears 146. The drive-shaft is provided with a pulley 147, through which power may be applied to rotate said shaft.

The finished pins may be delivered from the machine as soon as the caps are secured to the wire; but it is preferred to provide means for bringing the points of the pins into engagement with the guards or caps, so that the pins will be delivered in a closed condi-

tion. The means for closing the pins (shown in Figs. 1 and 19) consists of a block 148, provided with a shoulder 149, into engagement with which the guard of a pin is brought by the rotary carrier, and an oscillating closing-arm 150, provided with a notch 151. After the cap or guard is brought against the shoulder 149 the closer-arm is rocked and the notch 151 engages the pointed leg of the pin and carries the point into the cap or guard. The gripper holding the pin is then opened, and the pin drops through an opening in the base-plate as the rotary carrier moves forward to bring a new pin into position to be closed. The closer-arm 150 is secured to the end of a rock-shaft 152, which is rocked by a cam 153, engaging the end of an arm 154, secured to said shaft. A spiral spring 154^a holds the end of arm 154 against the cam 153, which is secured to shaft 96.

In Figs. 17 and 18 is shown a modified form of mechanism for presenting the bent wire to the devices for securing the caps thereto and of the closing devices. In this embodiment of the invention the oscillating carrier swings through an arc of one hundred and eighty degrees instead of through ninety degrees and presents the bent or coiled portion of the wire to a stationary holder comprising the jaws 155 and 156. The movable jaw 156 is pivoted to the stationary jaw 155 and is operated by a cam 157, secured to shaft 30. The holder holds the bent end *b* of the wire in position under the plunger 115 and in position to receive the cap when the movable die 108 moves forward. After the die moves back the closer-arm 150^a engages the pointed leg of the pin and carries the point into engagement with the guard or cap, the backleg of the pin resting against a shoulder 149^a in a block 148^a while the pin is being closed. After the pin is closed the jaw 156 is opened, and the pin falls through an opening in the base-plate. The closer-arm 150^a is secured to the end of a rock-shaft, which is rocked at the proper time by a cam 158, engaging the end of an arm 159, secured to said rock-shaft. A spring 160 holds the end of arm 159 against cam 158, which is secured to shaft 30.

The shaft 30 is driven by power applied to a pulley 161, secured to said shaft, and shaft 96 is driven from shaft 30 by means of intermeshing bevel-gears 162. The shaft 17 is driven from shaft 96 by the gears 163. The conveyers 1 and 2 are driven from the shaft 30 through gearing 164.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, mechanism for securing a cap or guard to one end of said wire, and means for closing the pin, substantially as described.

2. In a safety-pin machine the combination of mechanism for securing a cap or guard to one leg of a safety-pin, mechanism for feeding caps or guards to said capping mechanism, and means for closing the pin, substantially as described.

3. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, mechanism for securing a cap or guard to one of said legs, and means for transferring the bent wire from the bending mechanism to the capping mechanism, substantially as described.

4. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of the pin, mechanism for securing a cap or guard to one leg of the pin, a holder for presenting the bent wire to the capping mechanism, and a conveyer for transferring the bent wire from the bending devices to the holder, substantially as described.

5. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of the pin, mechanism for securing a cap or guard to one leg of the pin, a holder for presenting the bent wire to the capping mechanism, a conveyer for transferring the bent wire from the bending mechanism to the holder, and means for closing the pin, substantially as described.

6. In a safety-pin machine, the combination of a mechanism for securing a cap or guard to one of the legs of a safety-pin, a holder for presenting the bent wire to the capping mechanism, and means for closing the pin, substantially as described.

7. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, a holder, means for transferring the bent wire to the holder, a reciprocating die for carrying the cap over the end of the wire, and a cooperating die for bending the cap about the wire, substantially as described.

8. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, mechanism for securing a cap or guard to one of said legs, a stationary holder for presenting the bent wire to the capping mechanism, and an oscillating carrier for transferring the bent wire to the holder, substantially as described.

9. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, mechanism for securing a cap or guard to one of said legs, a stationary holder for presenting the bent wire to the capping mechanism, an oscillating carrier for transferring the bent wire to the holder, and means for closing the pin, substantially as described.

10. In a safety-pin machine, the combination of mechanism for bending the wire to form the legs of a safety-pin, mechanism for

securing a cap or guard to one of said legs, and mechanism for arranging the caps in the same relative relation and feeding them to the capping mechanism, substantially as described.

11. In a safety-pin machine, the combination of mechanism for bending a wire to form the legs of a safety-pin, mechanism for securing a cap or guard to one of said legs, mechanism for arranging the caps in the same relative relation, and feeding said caps to the capping mechanism, and means for closing the pin, substantially as described.

12. The combination with mechanism for securing a cap or guard to a wire, of means for arranging the caps in the same relative relation, and means for feeding said caps to the capping mechanism, substantially as described.

13. The combination with a male die, of a female die, a magazine for supplying caps to said female die, means for moving the female die from the magazine to the male die, and means for feeding the caps from the magazine to the female die, substantially as described.

14. The combination of means for holding a safety-pin, a pivoted closer for engaging the pointed leg of the pin, and carrying the point into the guard or catch, substantially as described.

15. The combination of means for holding a safety-pin, a shoulder for engaging the back of the pin, and means for engaging the pointed leg of the pin and carrying the point into the guard or catch, substantially as described.

16. The combination of a plate onto which the wire is delivered, reciprocating fingers for moving said wire over said plate, mechanism for bending said wire to form the legs of a safety-pin, a pivoted guide at one side of said plate, a bender-slide for bending the end of one of said legs, and a cam on said slide for lifting said guide, substantially as described.

17. The combination of a plate onto which the wire is delivered, reciprocating fingers for moving said wire over said plate, a vertically-reciprocating block, a clamping-jaw cooperating with the edge of said block, to clamp the end of the wire and a bender for bending the end of the wire, substantially as described.

18. The combination of a plane traveling surface for freely supporting the articles to be acted upon, a guide arranged at an inclination to the direction of travel of the supporting-surface and extending to within a distance from the edge of the supporting-surface less than the width of the articles, substantially as described.

19. The combination of a plane traveling surface for freely supporting the articles, a stationary guide arranged at an inclination to the direction of travel of the supporting-surface, and extending to within a distance of

the edge of the supporting-surface less than the width of the articles and stationary guides beyond the end of said former guide, substantially as described.

5 20. The combination of a traveling surface for supporting the articles to be acted upon, a guide arranged at an inclination to the direction of travel of said surface, and extending to within a distance from the edge of said surface less than the width of the articles, and one or more notches in said guide, substantially as described.

15 21. The combination of a rotary disk having a plane upper surface, a guide extending toward the edge of said disk, and to within a distance from the edge of said disk less than the width of the articles to be acted upon, substantially as described.

20 22. The combination of a rotary disk, a guide extending toward the edge of said disk, and to within a distance from the edge of said disk less than the width of the article to be acted upon, and one or more notches in said guide, substantially as described.

25 23. The combination of a rotary disk, a guide extending toward the edge of said disk and to within a distance from the edge of said disk less than the width of the articles to be

acted upon, a second guide beyond said former guide extending toward the center of said disk, and a third guide extending to the edge of said disk, substantially as described. 30

24. The combination of a rotary disk, a guide extending toward the edge of said disk, and to within a distance from the edge of said disk less the width of the articles to be acted upon, a second guide extending toward the center of said disk, a third guide extending to the edge of said disk, and a chute into which the articles are directed by said third guide, substantially as described. 35 40

25. The combination of a plane traveling surface, for freely supporting the articles to be acted upon, a guide arranged at an inclination to the direction of travel of said surface, and extending to within a distance from the edge of said surface less than the width of said articles, a chute for delivering the articles upon said surface in front of said guide, and means for agitating said chute, substantially as described. 45 50

WILLIAM D. MIDDLEBROOK.

Witnesses:

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FLORENCE NELSON.