No. 692,757.

Patented Feb. 4, 1902.

E. A. BARBER.

STAPLING MACHINE.

(Application filed May 9, 1900.)

(No Model.)

5 Sheets—Sheet 1.

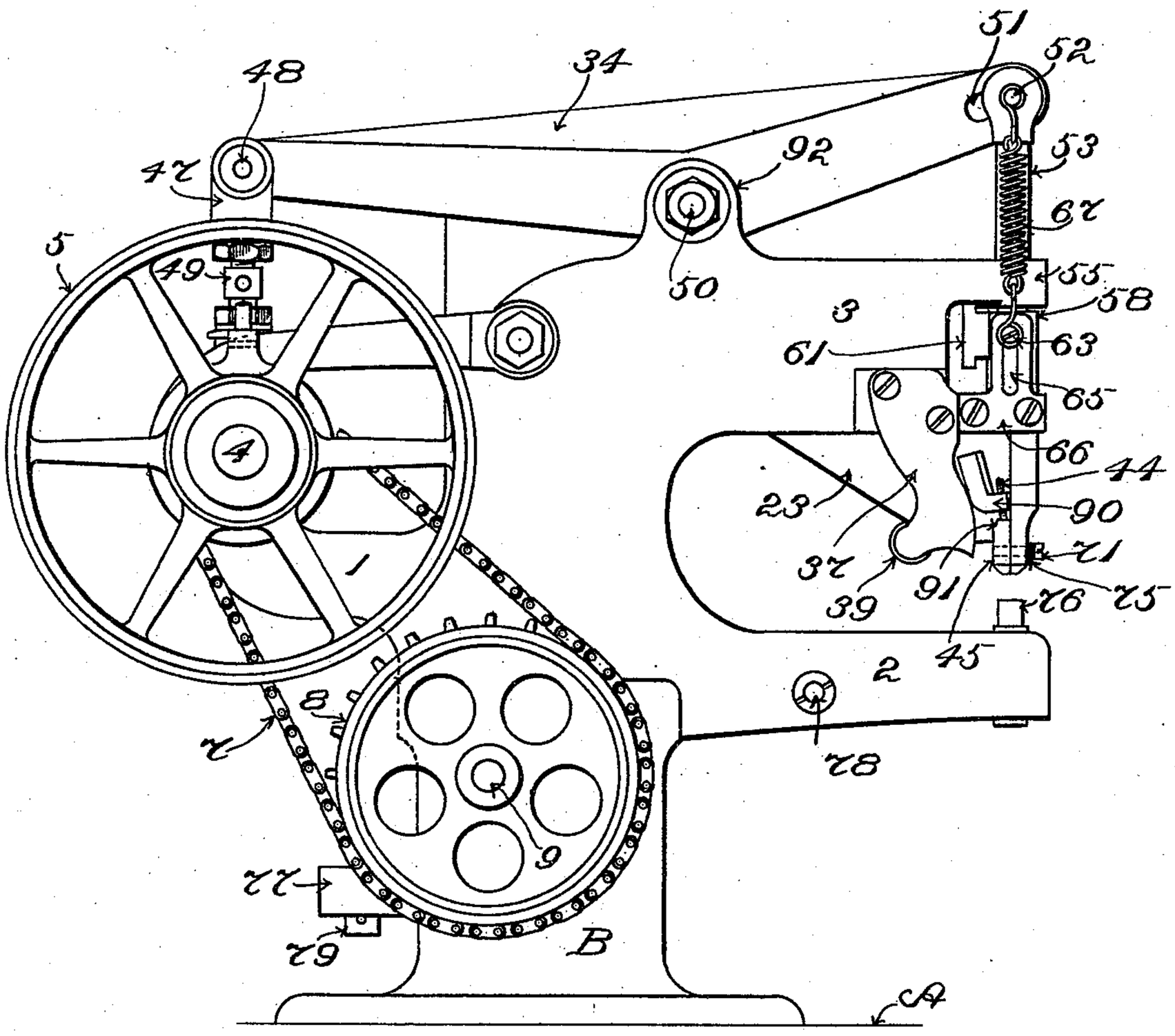

Fig. 1.

Witnesses:
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Alice H. Morrison

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(No Model.) 5 Sheets—Sheet 2.

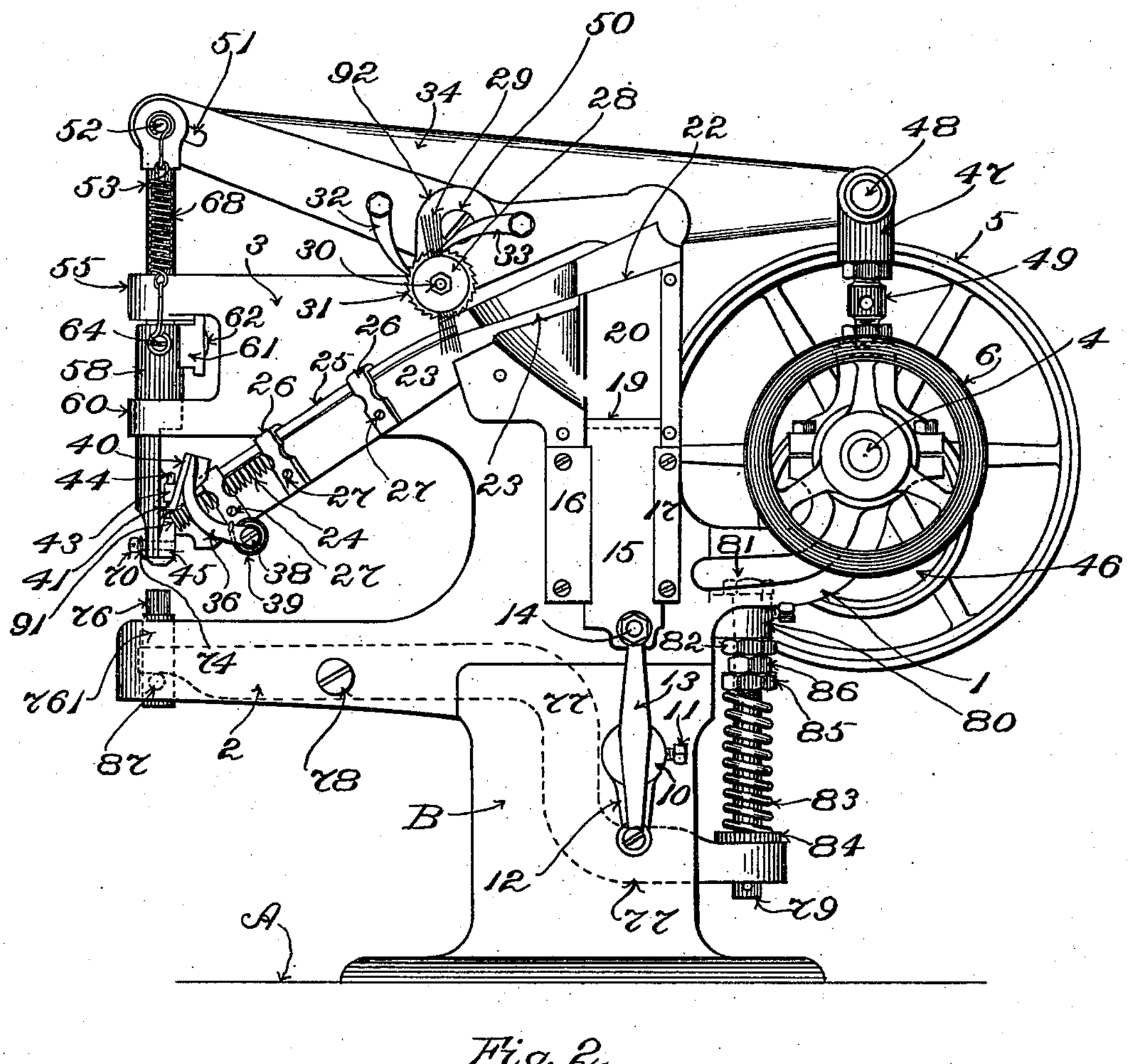

Fig. 2.

Witnesses.
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STAPLING MACHINE.

(Application filed May 9, 1900.)

(No Model.) 5 Sheets—Sheet 3.

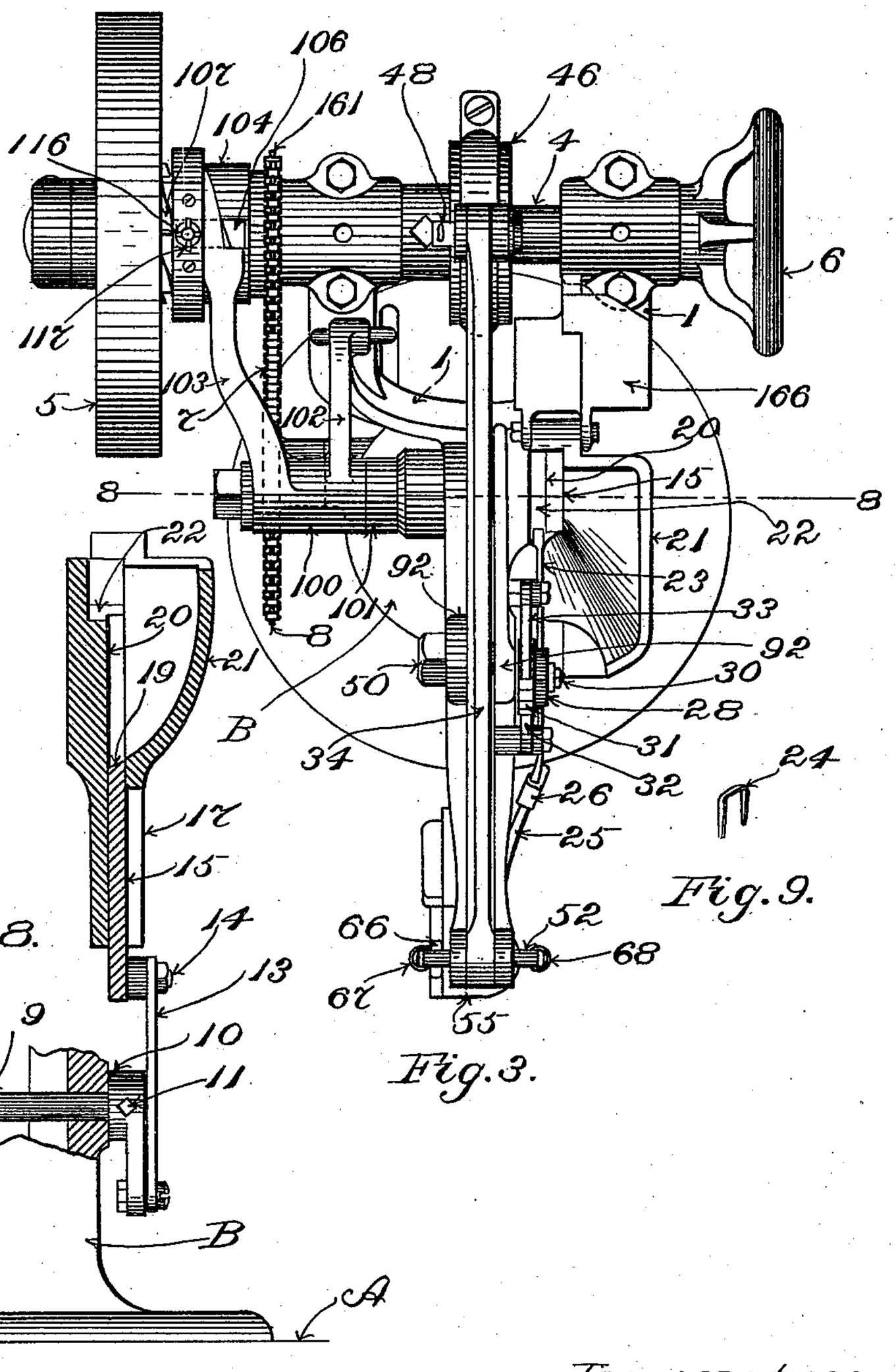

Fig. 8.

Fig. 9.

Fig. 3.

Witnesses:
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STAPLING MACHINE.

(Application filed May 9, 1900.)

(No Model.)

5 Sheets—Sheet 4.

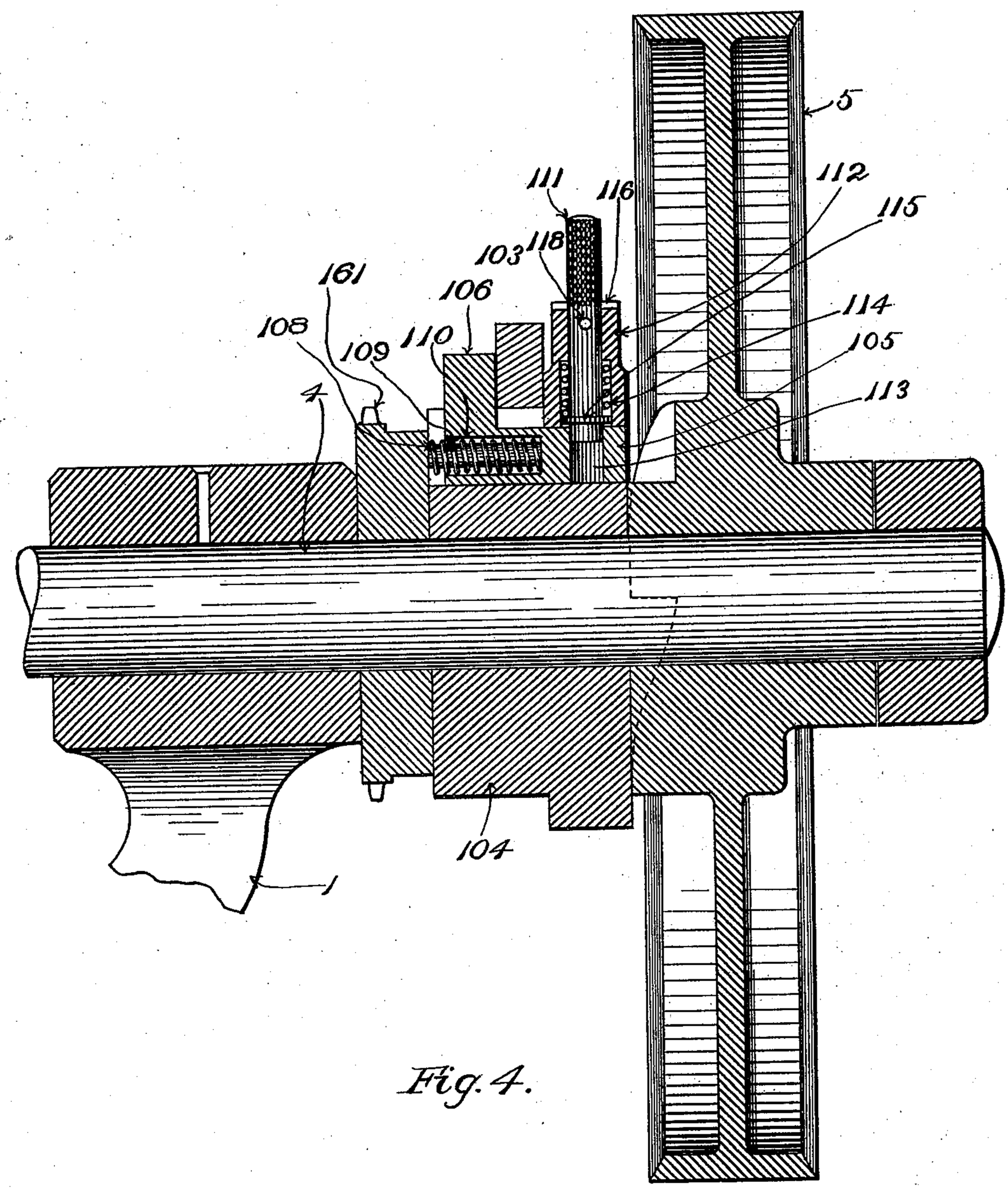

Fig. 4.

Witnesses:
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(No Model.) 5 Sheets—Sheet 5.

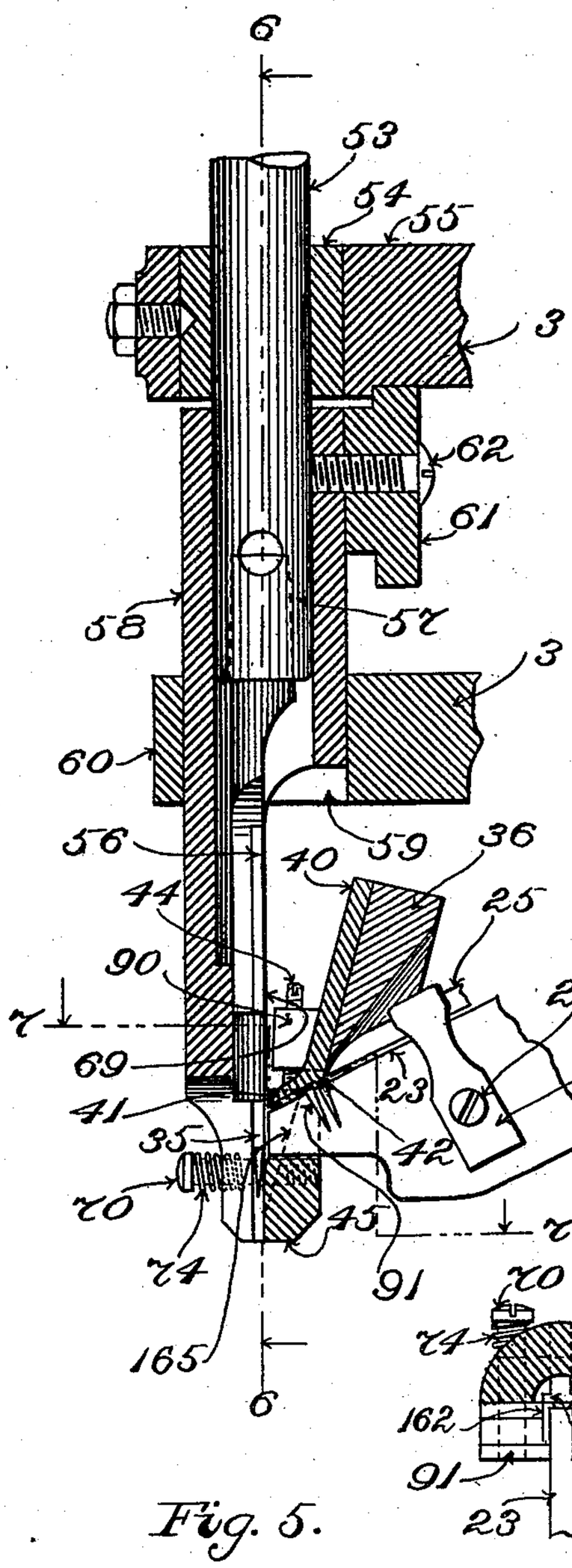

Fig. 5.

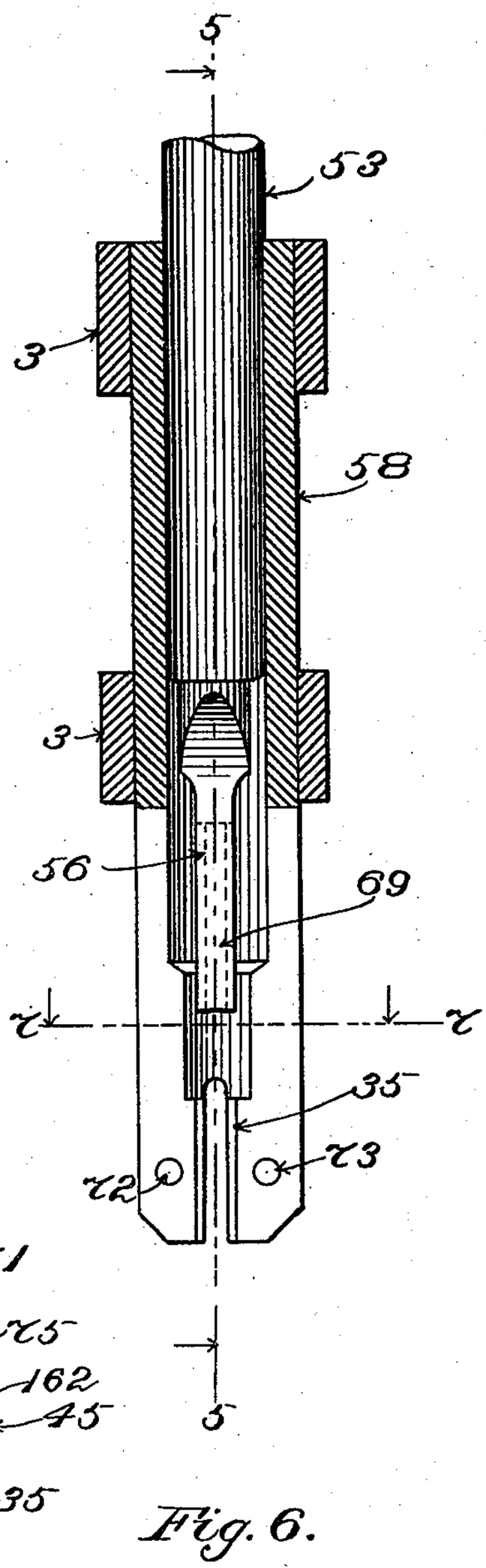

Fig. 6.

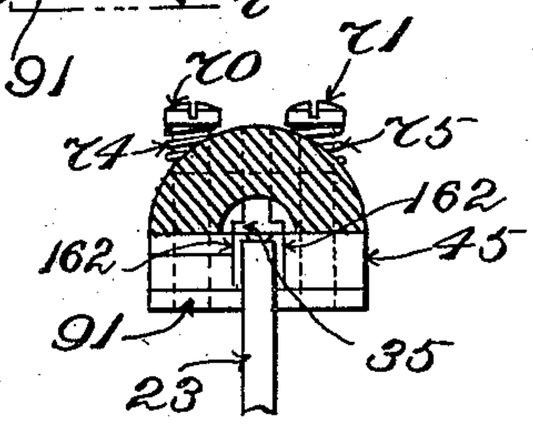

Fig. 7.

Witnesses:
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Alice H. Morrison

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UNITED STATES PATENT OFFICE.

EVERETT A. BARBER, OF QUINCY, MASSACHUSETTS, ASSIGNOR TO THE STANDARD RIVET COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW HAMPSHIRE.

STAPLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 692,757, dated February 4, 1902.

Application filed May 9, 1900. Serial No. 16,051. (No model.)

To all whom it may concern:

Be it known that I, EVERETT A. BARBER, a citizen of the United States, residing at Quincy, in the county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Staple-Setting Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object to provide a simple, durable, and efficient machine for setting staples.

In the following description, taken in connection with the accompanying drawings, I have set forth a machine embodying my invention, and in the claims at the end hereof I have pointed out and clearly defined the novel features thereof.

In the drawings, Figures 1 and 2 are side elevations of the machine viewed from opposite sides thereof. In said Fig. 2 the hopper 21 is removed. Fig. 3 is a plan view of the machine, the cover 166 of the hopper being thrown back. Fig. 4 is an enlarged sectional detail showing a locking device for the clutch mechanism. Fig. 5 is a sectional view, partly in elevation, of the driving and guiding mechanism enlarged, the section being on line 5 5, Fig. 6. Fig. 6 is a sectional view, partly in elevation, of the parts shown, Fig. 5, the section being on line 6 6 of Fig. 5. Fig. 7 is a section on line 7 7, Fig. 5. Fig. 8 is a section on line 8 8, Fig. 3. Fig. 9 is a perspective of a staple such as the machine shown is adapted to set.

The machine is intended to be placed on a suitable bench or support, (indicated at A.) The frame is shown at B and is provided with three projecting arms. The arm 1 is yoke-shaped and projects rearwardly in two branches, serving to support the driving-shaft 4 at two points, as indicated. The arms 2 and 3 project forwardly, the arm 2 being underneath the arm 3 and serving to support the clenching-die, while the arm 3 supports the driver and guideway or throat, as also the raceway and connected mechanism, by means of which the staples are fed one at a time into position to be driven into the stock.

The driving-shaft 4 is journaled in proper bearings at the ends of the two rearwardly-projecting branches of the arm 1 and is provided at one end with a belt-pulley 5, by means of which power may be communicated to the said shaft. At the opposite end of said shaft a hand-wheel 6 is provided for convenience in turning the shaft by hand. Adjacent the pulley 5 on the said shaft 4 I provide a sprocket-wheel 161, which is connected by means of the chain 7 with the sprocket-wheel 8 on the short shaft 9, which latter is journaled in the lower upright portion of the frame. On the shaft 9, at the opposite side of the frame, a boss 10 is secured by means of a set-screw 11. Said boss 10 is provided with a crank-arm 12, to the outer end of which is pivoted one end of a link 13, which is in turn pivoted at the other end at 14 to the lower end of a slide 15. Ways formed by plates 16 and 17 are provided to engage the edges of the slide 15, so that the latter may be reciprocated vertically on the face of the plate 20 as the shaft 9 revolves. The upper edge of the slide 15 is beveled transversely, as shown at 19, Fig. 8, thereby forming a pocket or recess between the said bevel and the face of the plate 20. The plate 20 is secured to the frame B and forms a portion of the rear wall of the hopper 21. The upper portion of the slide 15 passes up through a slot in the bottom of the hopper 21 and through the mass of staples contained in the said hopper. In the upward movement of the said slide 15 a number of staples are carried upwardly in the recess or pocket formed, as above described, by the bevel 19 and the plate 20. As the slide 15 reaches the extreme of its upward movement it passes the forwardly-inclined shoulder 22 of the plate 20, and the staples which are carried up are discharged upon the said shoulder 22, whence they slide downwardly and forwardly onto the raceway 23. The raceway 23 is thin enough to permit a staple to straddle it, and some of the staples in sliding down onto it from the shoulder 22 will straddle it and thence will be caused by the jar of the machine in operation to move downwardly along the said raceway. In this manner the raceway is filled with staples arranged side by side thereon, as are the

staples shown at 24, Fig. 2. To prevent the staples from becoming displaced while on the raceway or while on that portion thereof which is outside the hopper, a fender or top rail 25 is provided, which is secured to supports 26, which are in turn secured to the raceway by screws 27 or in other suitable manner. The said top rail 25 is located a sufficient distance above the raceway 23 to afford a clearance for the heads of the staples which are on the raceway. The upper portion of the raceway 23 above the top rail 25 is preferably located within the hopper in order that staples which are improperly located thereon and are cleared or brushed off will fall back into the hopper. For the purpose of clearing the upper end of the raceway 23 by the removal therefrom of staples which are not properly located thereon I place above the said raceway, and preferably adjacent the upper end of the said top rail 25, a rotating brush 28, which may be provided, as shown, with two oppositely-placed bunches of bristles 29. The brush 28 is set on a stud 30, projecting from the frame of the machine, and is secured to a ratchet-wheel 31, so that the brush may be revolved by revolving the ratchet. For the latter purpose I provide an operating-pawl 32 and a detaining-pawl 33. The pawl 32 is pivoted to the rocking lever 34, by means of which the driver is actuated, and the pawl 33 is pivoted to the frame. The said pawls 32 and 33 are normally held in contact with the teeth of the ratchet by springs in the well-known manner. As the lever 34 rocks on its fulcrum the brush 28 will be rotated, causing the bristles to sweep over that portion of the raceway which lies in their path at regular intervals, dislodging any excess of staples therefrom, as also any staples which may be improperly located thereon. By this means the clogging of the staples on the raceway at the point where they pass under the top rail 25 is prevented.

At the lower end of the raceway 23 I provide an arm or support 37, which is secured to the forwardly-projecting arm 3 of the frame. (See Fig. 1.) At the lower end of the support 37 is secured a stud 38, which projects horizontally under the raceway and is provided at its free end with the curved arm 36. The said arm 36 is normally pressed downwardly by means of a torsional spring 39, encircling the stud 38. The upper end of the arm 36 is so shaped as to project laterally across the raceway above the latter and is provided with a plate 40. The said plate 40 has at the lower end thereof a forwardly-projecting beak 41, which extends parallel with and slightly above the lower end of the raceway, thus serving to prevent the staples which may be on that portion of the raceway from being thrown off or displaced. On the under side of the said beak 41, near the rear portion or heel thereof, I provide a clamping projection 42, which at certain times in the operation of the machine bears on the head of the staple which may be under it on the raceway and serves to detain that staple as also the staples above it on the raceway and prevent them from moving down the latter. It is at this point that successive staples are separated from the continuous mass on the raceway in order that they may be presented one at a time to the driver.

The instrumentalities which directly effect the separation are the clamping projection 42 and the cap 45 at the rear of the throat or guideway. The cap 45 has an inclined face 91, which when the throat is in its highest position is in proximity to the sides of the raceway at a point below the clamping projection 42. When the clamping projection 42 is raised, as hereinafter described, to release the staple under it, the staple released moves downwardly into contact with the inclined face 91, and the succeeding staples on the raceway move downwardly a corresponding distance, bringing the staple next above the one released in position under the clamping projection 42, to be clamped and detained thereby. As will be clear, the space on the raceway between the clamping projection 42 and the inclined face 91 is only sufficient to accommodate one staple. The staple which has been freed from the clamping projection 42 moves down the raceway until it rests against the inclined face 91 of the cap 45. When the guideway or throat moves downwardly, taking with it the cap 45, the said staple is free to slide down to the extreme lower end of the raceway and would slide off the same were it not that at this time the said lower end of the raceway is closed by the driver, which moves down past the raceway before the cap 45 moves down out of contact with the said staple.

The clamping projection 42 is raised to free the staple with which it is in engagement by means of the cap 45 during the upward movement of the latter and just before it reaches the end of said upward movement. To this end I provide the laterally-projecting end or head of the arm 36 with a downward projection 90, which latter projection is on the opposite side of the raceway from the said arm 36. The projection 90 carries an adjusting-screw 44, the lower end of which is in the path of the upwardly-moving cap 45. Before the cap 45 reaches its highest position it makes contact with the screw 44 and overcoming the resistance of the torsional spring 39 raises slightly the lever 36 and the plate 40 and clamping projection 42, freeing the staples on the raceway, as previously described, and permitting the staple which was detained by the clamping projection 42 to pass downwardly into contact with the inclined face 91, as indicated in Fig. 5. The cap 45 is slotted vertically (see Figs. 5 and 7) to receive the lower end of the raceway 23 when the cap is in its highest position. The rear end of the said slot where the latter passes through the inclined face 91 is only

sufficient in width to accommodate the raceway, as will be clear from Fig. 7, where the lower end of said raceway is shown as projecting into said slot. The other portions of the slot (shown at 162, Fig. 7) are wider than the said raceway to allow a sufficient clearance for the prongs of the staple, which is at the extreme lower end of the raceway, when the cap moves upwardly into its highest position, the inclined inner end of the said wider portion being indicated by the dotted line 165, Fig. 5.

The driving mechanism is operated from an eccentric 46 on the main shaft 4 through a connection 47, which is pivoted at 48 to the rear end of the rocking lever 34. The length of the connection 47 may be adjusted by means of the adjusting-screw 49 in the well-known manner. The rocking lever 34 is pivoted at 50 between projections 92 92 on the top of the frame. The forward end of the rocking lever is slotted, as shown at 51, to receive the pin 52, which passes through the upper yoke-shaped end of the driver-bar 53. The driver-bar 53 slides vertically in a bushing 54 in the upper forwardly-projecting portion 55 of the arm 3 of the frame. The driver 56 is secured in the lower end of the driver-bar 53, the shank or upper end of the said driver 56 being placed in the tapering socket or recess 57 in the lower end of the said bar. (See Fig. 5.) The driver-bar 53 reciprocates vertically in a sleeve 58, the lower end of which is cut away rearwardly, as shown, to afford clearance for the lower end of the raceway and the separating mechanism. At the extreme lower end of the sleeve 58 is located the throat or guideway 35, through and out of which the staples are driven into the stock. The sleeve 58 also reciprocates vertically in an opening 59, formed through the projection 60 on the arm 3 of the frame. The vertical movement of the sleeve permits the staple in the throat 35 to be carried down, with the throat, until the latter rests on the surface of the stock, after which the staple may be driven directly from the throat or guideway into the stock without danger of crippling. The said reciprocation also enables the cap 45 to engage the screw 44 and raise the clamping projection 42, while the cap 45 further serves to prevent the staples on the raceway after they are released from the clamping projection 42 from moving downwardly a greater distance than will permit one staple to escape from under the said clamping projection.

The vertical movement of the sleeve 58 is definitely limited by the block 61, which is secured, by means of screws 62, to the rear side of the said sleeve 58. The block 61 is free to reciprocate between the projections 55 and 60, and these latter definitely limit its vertical movement in either direction. Near the upper end of the said sleeve and projecting from opposite sides thereof are two pins 63 and 64. The pin 63 moves vertically in a slot 65 in the plate 66, which latter is secured to the side of the projection 60 of the arm 3 of the frame, as shown in Fig. 1. The pin 63 and slot 65 serve to guide the sleeve and prevent it from turning on its long axis. The sleeve 58 is carried downwardly by the driver at each descent of the latter and is moved in the opposite direction by means of springs 67 and 68, which are secured at their lower ends to the pins 63 and 64, respectively, and at their upper ends to the pin 52 at the forward end of the rocking lever 34.

The cap 45 at the rear of the guideway or throat 35 is yieldingly secured in place by means of the screws 70 and 71 and the springs 74 and 75. The screws 70 and 71 pass through holes 72 and 73, respectively, in the front wall of the guideway or throat (see Fig. 6) and are screwed into the cap 45. The springs 74 and 75 serve to hold the said cap 45 to its seat, while permitting it to recede or yield rearwardly under pressure. The tension of the springs 74 and 75 may be varied by turning the screws 70 and 71, respectively, as will be clear. When the cap 45, which forms the rear wall of the throat or guideway, is on its seat, the guideway is of less width than the staple, so that the latter will not drop through the guideway, but requires to be forced through by the driver. By thus contracting the throat when a staple leaves the end of the raceway it drops into the throat and is detained therein in substantially the position shown in Fig. 5. As will be clear, therefore, the cap 45 requires to yield slightly as each staple is forced through the throat, and to this end it is yieldingly secured in place in the manner above described.

The driver 56 is formed of proper shape to enter the guideway or throat 35 and engage the head of the staple, the lower end of the driver corresponding in shape with the head of the staple to be driven.

The clutch mechanism by means of which the machine may be stopped and started is in general of well-known construction. I have added, however, thereto some novel features. Said clutch mechanism will be clear from Figs. 3 and 4. Referring to Fig. 3, 100 is a sleeve which is set on a stud 101, which latter projects horizontally from the frame of the machine. Said sleeve 100 is provided with an arm 102, with which a connecting-rod and treadle-lever, the latter being located in convenient proximity to the foot of the operator, is connected in the usual manner. By depressing the treadle the arm 102 is raised, rocking the sleeve 100 and raising the shipper-arm 103, which is also secured to the said sleeve 100. The rearward beveled and shouldered end of the arm 103, which is normally held in contact with the periphery of the hub or boss 104, fast on the main shaft, operates in the revolution of the said boss to cause the retraction of the bolt 105, (see Fig. 4,) the wedge or beveled end of the said arm 103 lying in the path of movement of a projection 106 on the said bolt 105. The said bolt 105 may

slide lengthwise of the main shaft in a slot in the said boss or hub 104. When the said bolt 105 is retracted, as shown in Fig. 4, the pulley 5 is free to revolve loosely on the main shaft 4. If, however, the treadle of the shipper mechanism be depressed by the operator, thus raising the arm 103 out of contact with the periphery of the boss 104 and also out of contact with the projection 106, the bolt 105 is thrown into engagement with the hub of the pulley 5, said hub being notched in the usual manner, as shown at 107, so that when the end of the bolt 105 is projected into one of said notches the main shaft is caused to revolve with the pulley. The said bolt 105 is thrown forward by means of a spiral spring 108, Fig. 4, which encircles a stud 109, set in a recess 110 lengthwise of the said bolt 105 and at the rear end thereof. One end of the said spiral spring bears against the face of the sprocket-wheel 161, and the other end thereof bears against the bottom of the recess 110 in the said bolt 105. It will be clear, therefore, that if the treadle of the clutch mechanism is depressed, raising the arm 103, the pulley 5 will be made fast with the main shaft, and if the pressure be removed from the treadle of the clutch mechanism the arm 103 will be brought into contact with the periphery of the hub 104 and when the shaft completes one revolution will operate to withdraw the bolt 105 and free the pulley 5 from the shaft. It is desirable to render the pulley 5 loose on the shaft 4 and to maintain it in this condition for a greater or less length of time. For the purpose of doing this I provide a locking-pin 111, (shown in Fig. 4,) which is placed in a radial hole in a projecting portion 112 of the boss or hub 104. A continuation of the said radial hole (shown at 113) is formed in the bolt 105, so that the inner end of the pin 111 may project into said hole 113, and thus serve to hold the bolt 105 in its retracted position. The pin 111 is normally pressed inwardly toward the bolt 105 by means of a spiral spring 114, which encircles the said pin 111, said spring bearing at its lower end against a collar 115 on the pin 111 near the inner end thereof. The projection or housing 112 for the pin 111 is provided with grooves 116 and 117 on different levels. These grooves receive a cross-pin 118, which projects through the said pin 111. The upper end of the pin 111 projects outwardly, as shown in Fig. 4, so that it may be seized by the thumb and finger. As shown in said figure, the pin 111 is in engagement with the hole 113 in bolt 105 and serves to lock the bolt in its retracted position. At this time the cross-pin 118 is in the slot or groove 117, the latter being deeper than the groove 116. If now the pin 111 be raised and rotated through a quarter of a circle, the pin 118 may be placed in the slot 116, and the lower or inner end of the pin 111 will be held out of contact with the bolt 105, thus permitting the said bolt 105 to be operated by means of its spring 108, which will cause the bolt to be thrown into engagement with one of the notches on the face of the hub of the pulley 5. To permanently render the pulley 5 loose on the shaft, it is only necessary to retract the bolt 105, seize the pin 111, raise it slightly, turn it through a quarter of a circle, and allow its inner end to pass into the hole 113 in the said bolt 105.

In the operation of setting a staple the points of the prongs usually pass through the stock, and it is desirable to turn or clench the said points on the under side thereof. To this end the stock is placed on an anvil 76, which is provided on its surface with recesses into which the points of the staple-prongs project when they pass through the stock and which serve to turn the said points inwardly and clench them on the lower surface of the stock. To permit the said anvil to yield slightly under heavy pressure, which is desirable, I mount it at the forward end of a lever 77, which is pivoted at 78 in the arm 2. The said lever projects rearwardly and is curved downwardly, as shown in Fig. 2. The rear end of the said lever is slotted to receive the lower end of a rod 79, the upper end of which passes through a hole in the lug 80, which projects from the frame of the machine. On the rod 79, above the said lug, is a nut 81 and below the said lug another nut 82, which serves to hold the rod firmly in position. A strong spiral spring 83 encircles the rod 79 and bears at its lower end against a washer 84, resting on the top of the lever 77 and at its upper end against a nut 85 on the rod 79. A check-nut 86 serves to hold the nut 85 in a given position. By screwing down the nut 85 the spring 83 is compressed, and a greater pressure can then be applied to the anvil 76 without depressing it, as will be clear. The anvil-bar 761 is slotted vertically to receive the forward end of the said lever 77, and a screw 87 is placed through the said bar, below the said lever, to prevent the anvil-bar from rising out of contact with the said lever.

The form of staple commonly used in the machine above described is designated at 24 and is shown in Fig. 9.

The operation of the machine is as follows: The driver, sleeve 58, and cap 45 being in their highest positions, as shown in Fig. 5, the clamping projection 42 is raised out of contact with a staple on the raceway. The driver moves downwardly until it engages the head of the staple in the throat 35. The pressure of the driver as it engages the staple carries downward the sleeve 58 until the throat rests on the stock. As the cap 45 moves downwardly the clamping projection 42 engages the second succeeding staple on the raceway. The lowermost staple on the raceway moves down the latter until it reaches the extreme end of the raceway, where it is stopped by the rear flat face of the driver, which at this time serves to close the end of the raceway.

The continued descent of the driver after the throat has come to rest upon the stock forces the staple through the throat and drives it into the stock. The sleeve 58 and throat and the driver then rise together until the block 62 is in contact with the projection 55. Just before this occurs—that is, during the last portion of the ascent of the sleeve 58—the cap 45 engages the screw 44, raising the clamping projection 42 and permitting the staples on the raceway to move downward until the lowermost staple is in engagement with the inclined face 91. The driver continues to ascend until its lower end is above the lower end of the raceway, when the staple, which has been detained at that point by the driver, drops from the lower end of the raceway into the throat 35, in position to be engaged by the driver in its next descent. This operation is repeated as each succeeding staple is set in the work.

The machine is reliable, efficient, and speedy in operation, automatically adjusts itself to stock of varying thicknesses, is durable, easy to keep in repair, and does not require a specially-skilled operator.

What I claim is—

1. In a staple-setting machine, in combination, a raceway for staples, a driver, a throat-piece constructed to retain a staple in its passage-way until forced therethrough by the driver and movable toward the work under pressure of the driver against said staple, and detents operatively connected with the said throat-piece and caused thereby to act alternately in feeding the staples successively to the throat-piece.

2. In a staple-setting machine, in combination, a driver, a raceway for staples, a detent to engage with a staple on said raceway adjacent the delivery end of the latter, a throat-piece constructed to retain a staple in its passage-way and movable toward the work under pressure of the driver against said staple, a second detent, operated by the said throat-piece, and serving to hold the staple after its release from the detent first mentioned, means to raise the throat-piece as the driver ascends, and means to operate the detent first mentioned from the throat-piece.

3. In a staple-setting machine, in combination, a driver, a raceway for staples, a detent to engage with a staple adjacent the driver, a throat-piece movable toward the work under pressure of the driver against a staple therein and provided with an elastically-held portion to retard the movement of the staple through its passage-way, and also provided with means to hold the staple last released from the detent until the descent of the throat-piece and then free the same, the said throat-piece acting in the ascent thereof to operate the detent, and means to raise the throat-piece as the driver ascends.

4. In a staple-setting machine, in combination, a driver, a raceway for staples, a holding-clamp to press against a staple adjacent the driver, a throat-piece movable toward the work under pressure of the driver against a staple therein, means to raise the said throat-piece as the driver ascends, and means to operate the clamp from the throat-piece, substantially as described.

5. In a staple-setting machine, in combination, a driver, a raceway leading toward the driving-point in the machine, a clamp to engage a staple at the delivery end of said raceway adjacent the driver, and a throat-piece movable in unison with the driver and provided with means to raise the clamp in the ascent of the driver to thereby release the staple held by the clamp, and also with means to hold the released staple until the driver and throat-piece descend in unison in the driving of the preceding staple, substantially as described.

6. In a staple-setting machine, in combination, a driver, a raceway for staples, a detent to engage with a staple adjacent the delivery end of the raceway, a throat-piece movable toward the work under the pressure of the driver against a staple therein and provided with a detent to arrest the staple just released by the detent first mentioned until after the driving of the previous staple, means to raise the said throat-piece as the driver ascends, and means to operate the first detent from the throat-piece, substantially as described.

7. In a staple-setting machine, in combination, a driver, a raceway for staples, a clamp to engage with a staple adjacent the delivery end of the raceway, a throat-piece movable toward the work under pressure of the driver against a staple therein and provided with a detent to arrest the staple just released from the clamp until after the driving of the previous staple, means to raise the said throat-piece as the driver ascends, and means to operate the clamp from the throat-piece, substantially as described.

8. In a staple-setting machine, in combination, a driver, a raceway for staples, the spring-actuated clamp to press against a staple adjacent the driver and provided with a projection to prevent displacement of the staple from the raceway after being released, the throat-piece provided with an elastically-held portion to retard the movement of a staple through its passage-way, movable toward the work under pressure of the driver against such staple, and provided with a detent to hold the staple last released from the clamp until the descent of the throat-piece, the said throat-piece acting in the ascent thereof to raise the clamp, and means to raise the said throat-piece as the driver ascends, substantially as described.

9. In a staple-setting machine, the combination of a driver, a raceway for staples, a detent adjacent to the driver and provided with a projection extending into proximity to the driver to prevent displacement of the staple from the raceway after being released, and

connections between the driver and detent for operating them in unison.

10. In a staple-setting machine, in combination a raceway shaped to be straddled by staples, a fixed receptacle or hopper having therein a forwardly-inclined surface in continuation of the upper portion of the raceway, a lifter-plate moving at the side of said surface and having a transversely-beveled upper end to lift from the bottom of the fixed hopper a portion of the staples therein and discharge the uplifted staples laterally onto said surface, and means to operate the said lifter-plate, substantially as described.

11. In a staple-setting machine, in combination, a raceway shaped to be straddled by staples, a fixed receptacle or hopper having therein a forwardly-inclined shoulder 22 in continuation of the upper portion of the raceway, a lifter-plate sliding vertically in said hopper and having a transversely-beveled upper end to lift from the bottom of the fixed hopper a portion of the staples therein and discharge the thus-uplifted staples laterally onto said shoulder, and means to operate the said lifter-plate, substantially as described.

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

EVERETT A. BARBER.

Witnesses:

WM. A. MACLEOD,

ALICE H. MORRISON.