

No. 749,776.

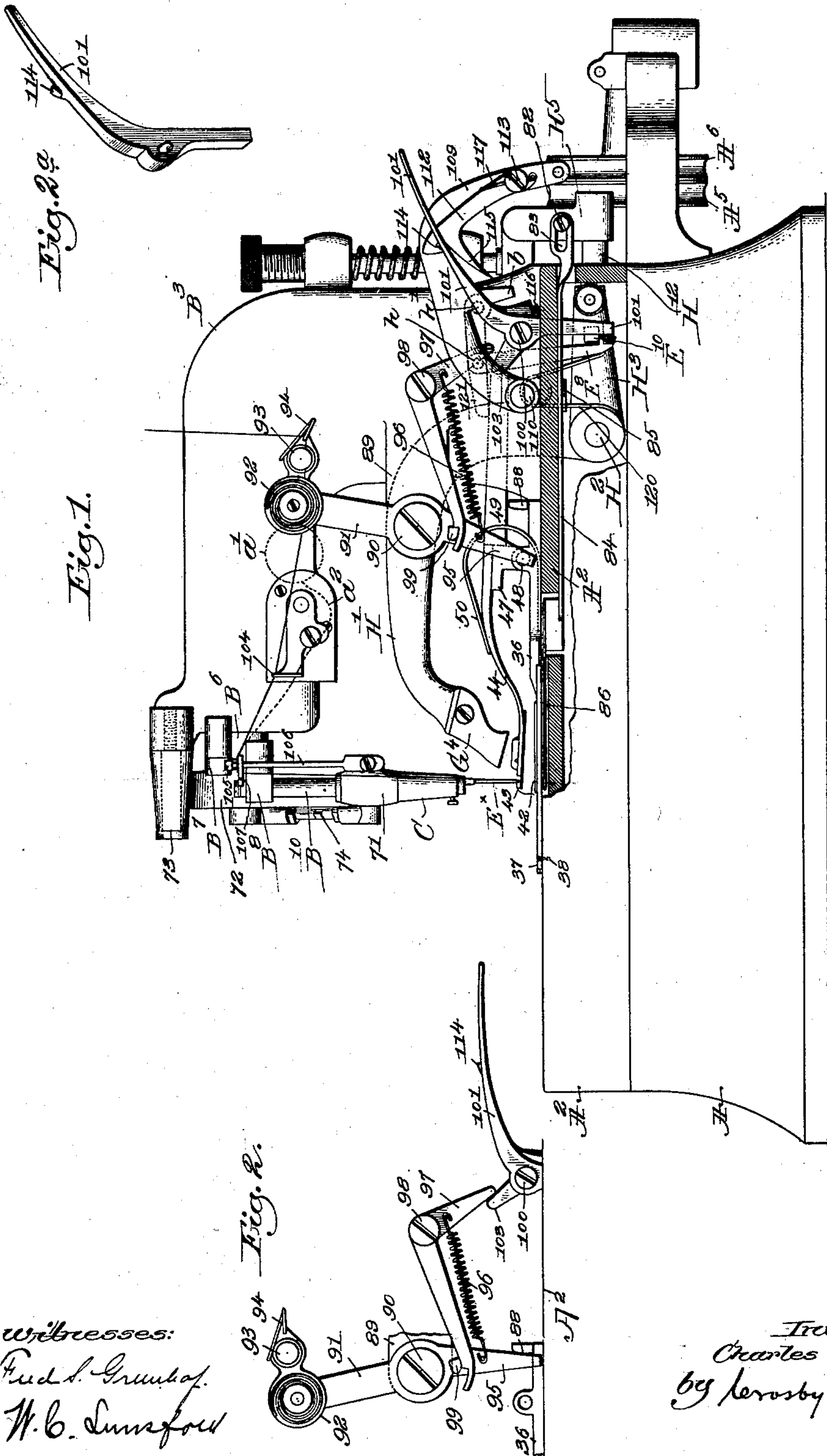
PATENTED JAN. 19, 1904.

C. A. DAHL.  
BUTTONHOLE SEWING MACHINE.

APPLICATION FILED JULY 23, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

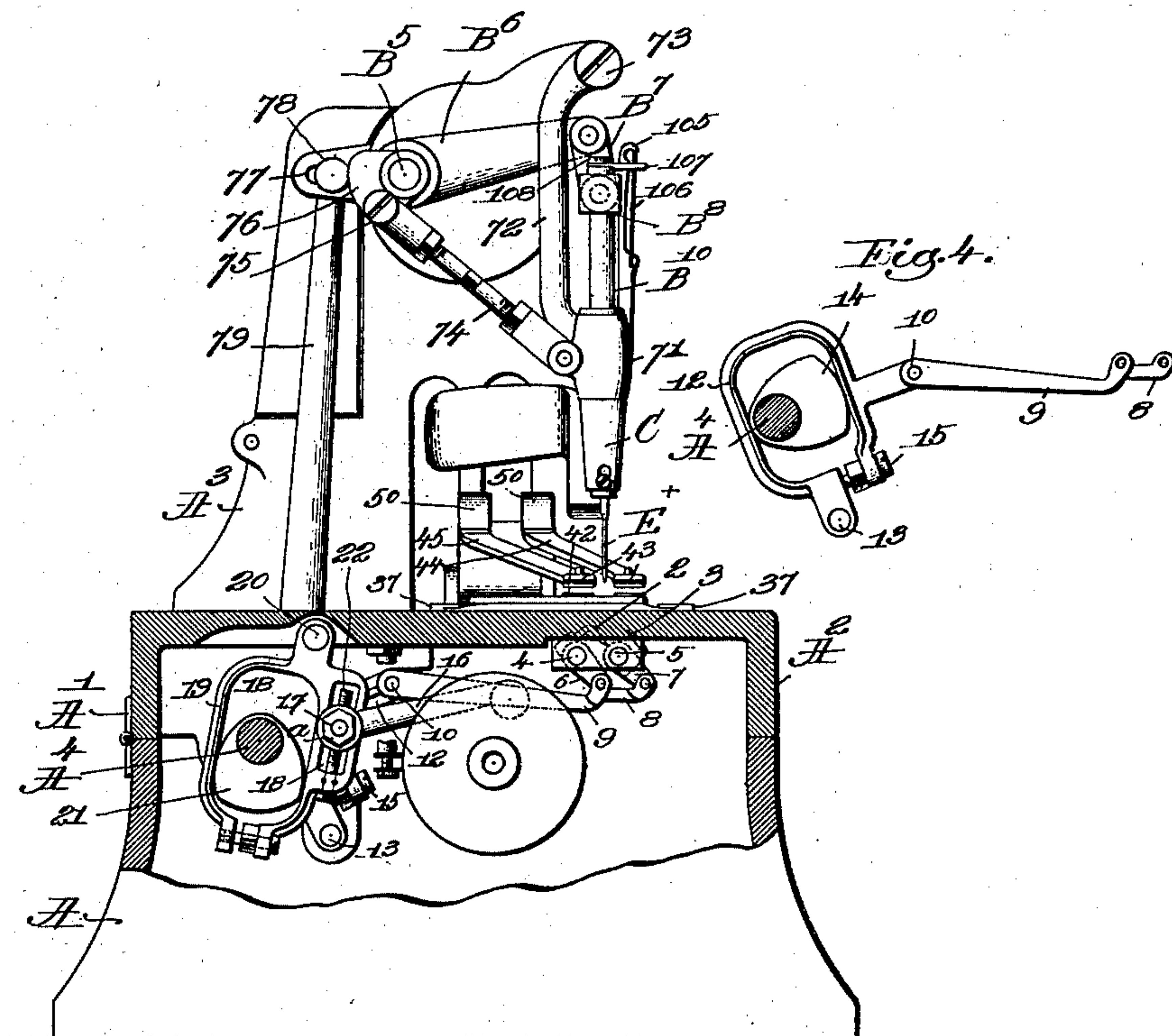


Fig. 4.

Fig. 5.

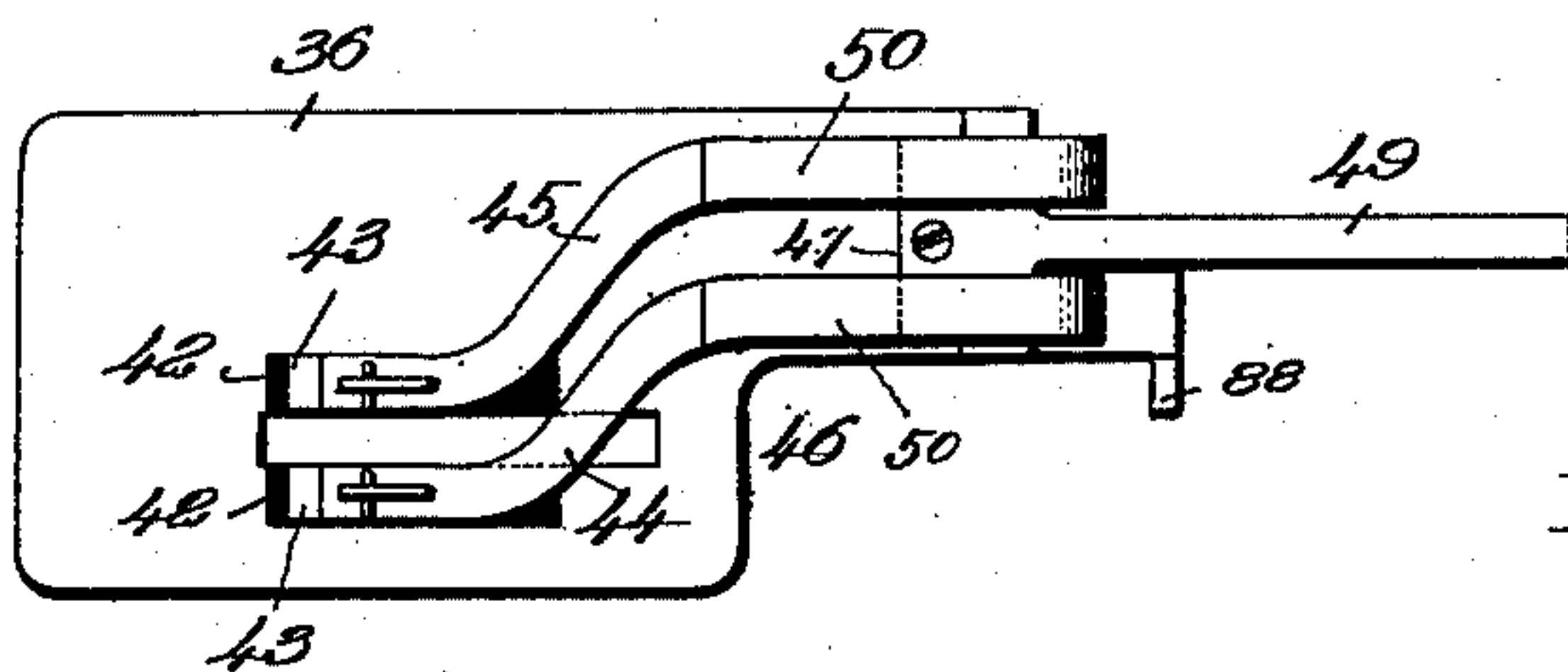
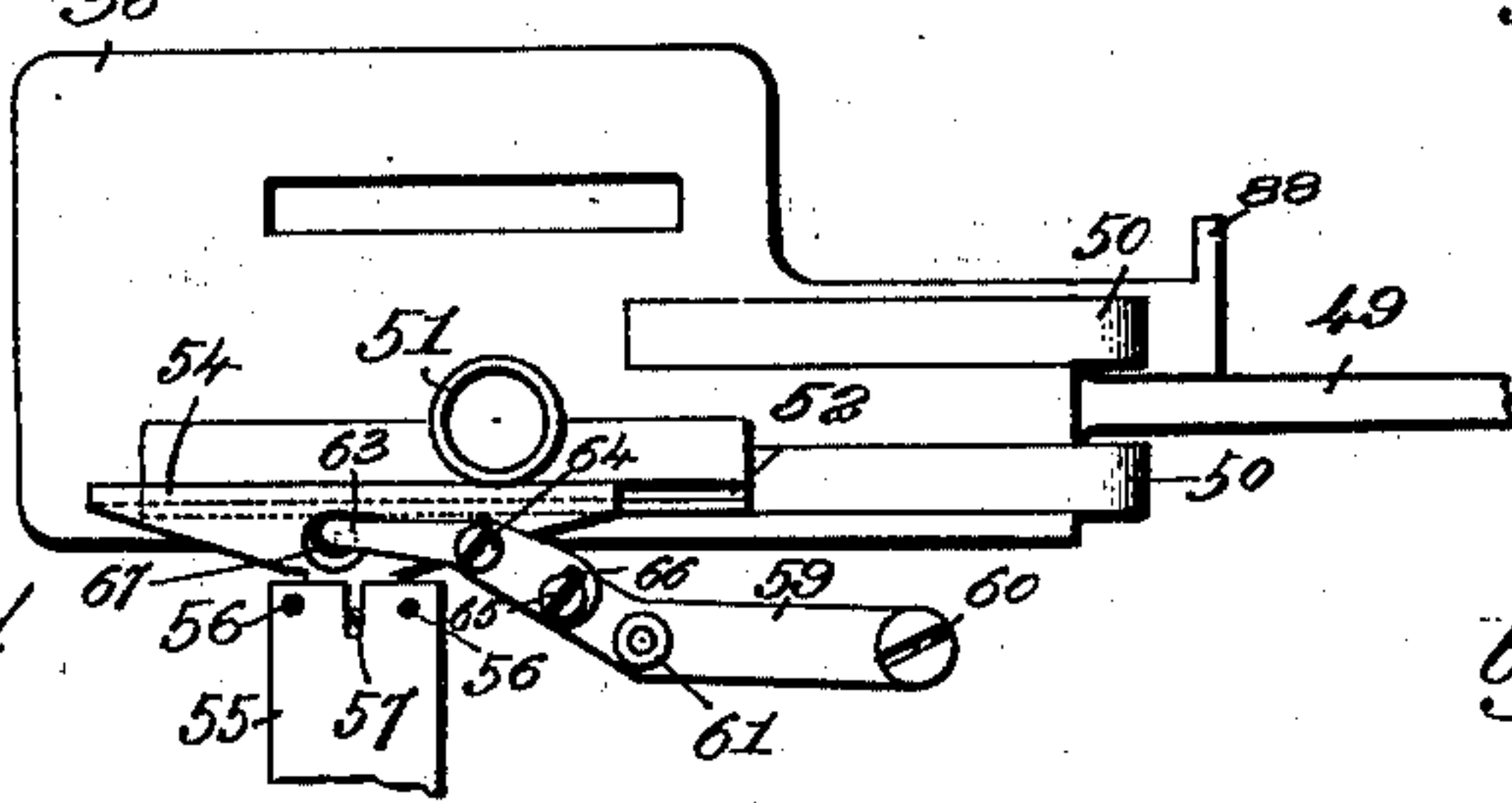


Fig. 7.

Fig. 6.





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3 SHEETS—SHEET 3.

Fig. 8.

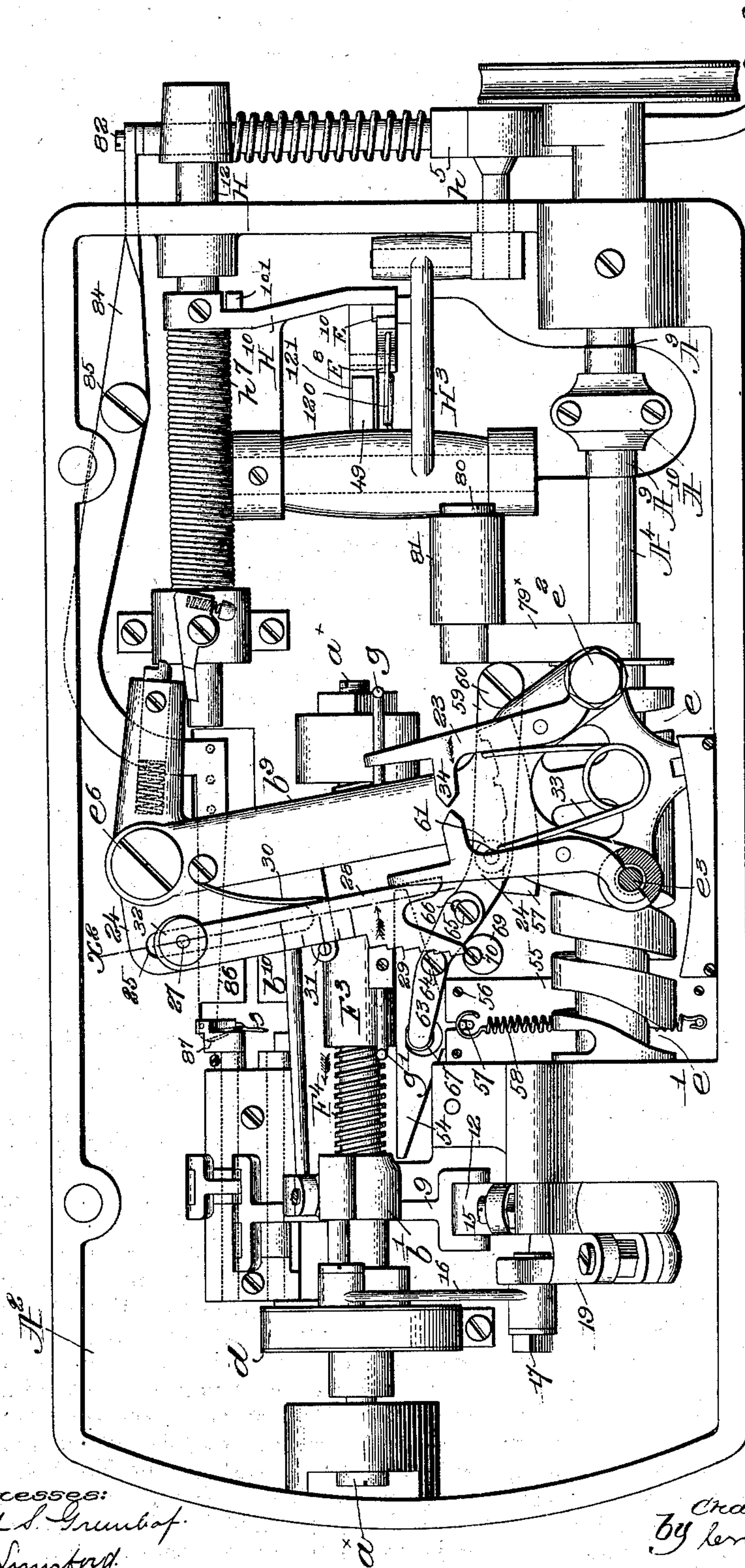


Fig. 11.



Fig. 10.

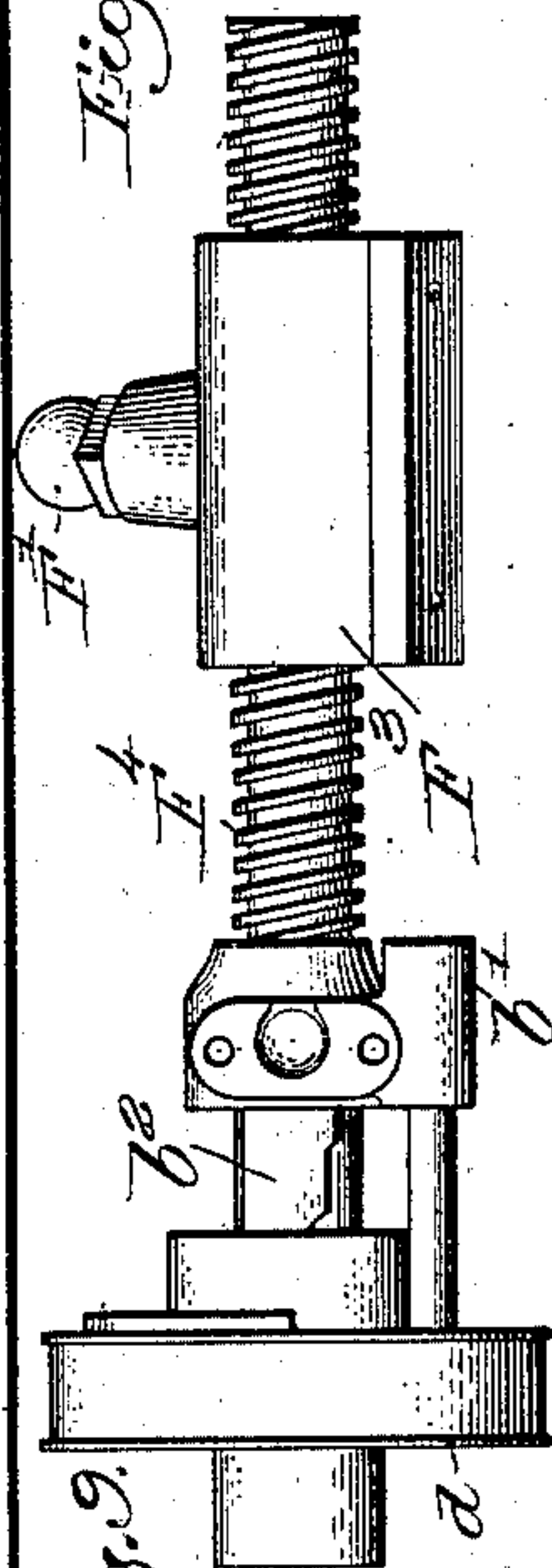


Fig. 9.

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# UNITED STATES PATENT OFFICE.

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## BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 749,776, dated January 19, 1904.

Application filed July 23, 1903. Serial No. 166,661. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. DAHL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Buttonhole-Sewing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object to improve and simplify the machine represented in United States Patent No. 714,284, November 25, 1902, for stitching and barring a buttonhole at a continuous operation.

The improvements to be herein described and claimed relate to the stitch-forming mechanism, the work-holder, and the thread-tension, all of which parts act in combination to perfect the operation of the machine described in said patent.

Figure 1 of the drawings represents a front side view of the machine to be herein described with my improvements added thereto, part of the framework being broken out to disclose parts to be described. Fig. 1<sup>a</sup> shows in plan view the throat-plate detached and part of the bed sustaining the same. Fig. 2 shows the tension device represented in Fig. 1 in another position. Fig. 2<sup>a</sup> shows detached the lever for closing the work-holder and starting the stitch-forming mechanism. Fig. 3 is a left-hand end view and partial section to illustrate the stitch-forming mechanism and means for operating the same. Fig. 4 is a detail to be referred to relating to the complementary under-stitch-forming mechanism coacting with the eye-pointed needle. Fig. 5 shows the work-holder detached. Fig. 6 is an under side view of the work-holder and the slide-bar for moving it laterally. Fig. 7 is a section through the work-holder and the device for moving the same longitudinally. Fig. 8 is an enlarged underside view of the machine; Fig. 9, an enlarged detail of the screw instrumental in reciprocating the work-holder; Fig. 10, a section in the line  $x^2$ , Fig. 8; and Fig. 11, a de-

tail to be referred to, showing the arm with the high and low points.

Referring to the drawings, A<sup>2</sup> represents the bed-plate, hinged at A' on a base-frame A. The bed-plate A<sup>2</sup> has rising from it a standard A<sup>3</sup>, provided with an overhanging arm having bearings to sustain a rock-shaft B<sup>5</sup>, having near its rear end an arm (not shown) provided with a crank-pin, said rock-shaft deriving its motion from a crank A<sup>9</sup>, that is embraced by a pitman A<sup>10</sup>, said crank being on a main shaft A<sup>4</sup>. The shaft B<sup>5</sup> at its front end has an arm B<sup>6</sup>, connected by a link B<sup>7</sup> with a stud projecting from a collar B<sup>8</sup>, secured to the upper end of the needle-bar B<sup>10</sup>, the latter being reciprocated in a guide or bushing C and carrying at its lower end an eye-pointed needle E<sup>x</sup>.

The shaft A<sup>4</sup> carries a hub having two spiral grooves  $e$  and  $e'$ , that are entered, respectively, by spring-controlled pins  $e^2$   $e^3$ , carried by levers 23 24, said levers having their fulcrum on a lever  $b^9$ , pivoted at  $e^6$ .

The screw-shaft F<sup>4</sup>, sustained at its opposite ends by pointed screws  $a^x$  and passing through a screw-threaded sleeve F<sup>3</sup> and having an extension provided with a ball-stud F', the feed-wheel  $d$ , fast on the shaft F<sup>4</sup>, said feed-wheel being adapted to be engaged by clutch devices under the control of a saddle  $b'$ , having a cam  $b^2$ , which by its position causes the clutch device to rotate the shaft F<sup>4</sup> in one and then in the opposite direction, the stops  $g$  and  $g'$ , connected with sleeve F<sup>3</sup>, the cutter G<sup>4</sup>, its carrying-lever H', having its fulcrum at H<sup>2</sup>, the backwardly-extending arm H<sup>3</sup> of said lever provided with projection E<sup>10</sup> and connected with the shipper  $h^5$  for actuating said cutter-lever, the rock-shaft H<sup>12</sup>, to which the shipper  $h^5$  is attached, the spring  $h^7$ , surrounding said rock-shaft, the arm H<sup>10</sup>, projecting from said rock-shaft, are and may be all substantially as described in said Patent No. 714,284, so need not be herein further more fully described. I will now describe the parts that I have added to the mechanism shown in said patent.

In the patent referred to an oscillating



double-pointed looper was used below the bed-plate as a complementary device coacting with the eye-pointed needle in the formation of an overedge-stitch.

5 Herein instead of the double-pointed looper there is used two loopers 2 3, mounted on rock-shafts 4 5, each rock-shaft having an arm, as 6 7. These arms are joined by a link 8, and one of the arms, as 6, is moved posi-  
10 tively by a link 9, connected at 10 with a slotted lever 12, having its fulcrum at 13 and entered by a three-pointed cam 14 (see Fig. 4) on the main shaft  $A^4$ , said lever being made adjustable by a set-screw 15 to compensate  
15 for wear between it and the cam.

As the lever 12 is moved by the cam 14 the loopers 2 3, having their points directed oppositely and occupying a position each looper normally at one and the other at the  
20 opposite side of the vertical plane in which the needle reciprocates, are moved so that first one looper enters the loop of needle-thread at one descent of the needle and the other looper the loop of needle-thread at the  
25 succeeding descent of the needle, each looper as it retires from the loop of needle-thread opening and spreading the loop then on it for the entrance of the needle at its next descent, as provided for in application, Serial No.  
30 136,433, filed by me December 24, 1902.

The clutch mechanism, located inside the feed-wheel  $d$  and which may be as fully described in said patent, derives its to-and-fro movement from a link 16, embracing a stud-  
35 screw 17, the rear end of which is shaped to enter a slot 18 in a lever 19, having its fulcrum at 20. This lever embraces, as shown, a three-cornered eccentric 21, also carried by the shaft  $A^4$ . The slot 18 of the lever 19 re-  
40 ceives a screw 22, that enters a threaded hole in the stud-screw by which to adjust the stud-screw in the slot, and thereby vary the extent of reciprocation of the clutch devices for imparting intermitting motion to the feed-wheel  
45  $d$  and the screw  $F^4$ . A nut  $a$  embraces the end of the stud-screw and retains the link 16 thereon.

The lever  $b^9$  is provided with a wing 24, (see Fig. 8,) having a slot 25 that receives (see Fig. 8) a block 26, a portion of which underlies the wing 24 and moves in the slot 25. The block 26 has rising from it a stud 27, on which is fulcrumed a lever 28, having a series of notches 29. A spring 30, carried by the  
55 lever  $b^9$ , acts, normally to keep the notched side of said lever 28 against a stop 31. The lever 28 has scale-marks, as represented at its left-hand edge, Fig. 8, to indicate different lengths of buttonhole, and the stud 31 has a  
60 central line to register with any of the scale-marks on the lever. By unclamping the nut 32 on the screw 27 the block and lever may be moved longitudinally to provide for any desired length of buttonhole.

65 The stops or arms  $g$   $g'$  in their use in this

present invention operate in the following manner: During the stitching of the first half of the buttonhole the sleeve  $F^3$  will be moved by the screw  $F^4$  in the direction of the arrow near it, (see Fig. 8,) and when the buttonhole  
70 has been stitched to the proper length on one side the stop  $g$  meets the lever 23 and turns the same, releasing the spring-pin  $e^2$ , common to said patent, and letting it drop into the starting-point of the spiral groove  $e$ . The  
75 levers 23 and 24 are constructed somewhat differently from the levers designated by the corresponding figures in said patent, and instead of said levers being normally pressed one toward the other by a spiral spring they  
80 are pressed one toward the other by a coiled spring 33, and each lever has a spear-pointed arm 34, and when the lever 23 is moved in the direction of the arrow thereon by the stop  $g$  one of its tapered sides immediately meets  
85 one of the tapers of the spear-pointed arm of the opposing arm 34—as, for instance, the under taper—and locks the arm 24, so that it cannot be possibly moved so long as the pin  $e^2$  of lever 23 is in the groove  $e$ . The pin  
90  $e^2$  is lifted in the lever 23, as provided for in said patent, by the groove  $e$  when the first bar is finished, and the spring 33 immediately reverses the movement of the lever 23 and releases the lever 24, so that it may be turned  
95 at the proper time to enable the pin  $e^2$  to enter the groove  $e'$ . The pin  $e^2$  having been raised from the groove  $e$  after the barring of the first end of the buttonhole is retrained in its elevated position, while the screw  $F^4$ ,  
100 and consequently the sleeve  $F^3$ , is reversed to move the work-holder, to be described, in the direction to enable the stitch-forming mechanism to stitch the second side of the buttonhole. In this movement of the sleeve  $F^3$  the  
105 stop  $g'$  meets one or the other of the notches 29 of the lever 28 immediately after the completion of the over stitching of the second side edge of the buttonhole, according to the adjustment of said lever and the length of the  
110 buttonhole. The movement of the lever 28 in the direction of the arrow turns the lever 24 and releases the pin  $e^2$ , so that it under the action of its spring, as provided for in said patent, enters the groove  $e'$ , and im-  
115 mediately said worm acts to move the lever  $b^9$  in a direction opposite the arrow thereon into its starting position, and during this time the final barring of the buttonhole takes place, as will be described.  
120

The work-holder herein represented comprises (see Figs. 1, 5, and 6) a plate 36, free to be moved longitudinally in a suitable slot cut in the bed-plate, the edges of the plate 36 being overlapped by guide-plate 37, at-  
125 tached to the bed-plates by screws 38. The plate 36 is slotted to embrace the usual cutting-block 39, attached to the bed by a screw 40 and having an elongated needle-hole 41 for the needle  $E^x$  after it passes through the  
130



stock that the loopers may engage the thread of said needle.

The plate 36 at its upper side, at opposite sides of the slot therein, has toothed surfaces 42, that contact with the under side of the work being held in the holder by the pressure against its upper side of feet 43, carried, respectively, by arms 44 and 45, connected with a block 47, mounted on a stud 48 in up-  
turned ears at the rear end of the plate 36. The block has extended backwardly from it an arm 49, and each arm is acted upon by a like spring 50.

The under side of the plate 36 has a hollow pocket 51, in which enters the end of the stud F', before referred to, connected with the sleeve F<sup>3</sup>, and as said sleeve is moved by the screw in one and then in the opposite direction the work-holder is correspondingly moved. The under side of the work-holder also has a groove 52, that is entered by a rib 53 of a slide 54, that has imparted to it a movement at right angles to the length of the buttonhole only during the operation of barring the opposite ends of the buttonhole. The shank of the slide is fitted in a guideway made in the bed-plate and is sustained by a plate 55, attached to the bed-plate by screws 56.

The slide hereinafter designated as the member for imparting lateral movement to the work-clamp has a hook 57, with which is connected a spring 58, that acts normally to keep said slide and work-holder in the position to enable the stitch-forming mechanism to stitch the first side of the buttonhole, said slide remaining in its normal position during the first longitudinal movement of the work-holder in stitching said first side.

To impart to the slide its lateral movement after the stitching of the first side of a buttonhole has been completed, the machine has a lever 59, mounted on a stud-screw 60 and having a roller-stud 61, (see dotted lines, Fig. 8, and in detail, Fig. 11,) that is acted upon by high and low points of an arm depending from the under side of the lever 59, as provided for in application, Serial No. 136,433, filed on the 24th day of December, 1902.

The end of the lever 62 is provided with an arm 63, pivoted thereon by a stud-screw 64 and made adjustable about said stud-screw by a screw 65 in a slot 66. The outer end of said arm has a roller-stud 67, that enters a pocket in the slide, and when said lever is moved by the high and low points moving with the lever 59 the slide and work-holder are moved laterally to not only place the work-holder in the proper position with relation to the stitch-forming mechanism to enable one and then the other side edge of the buttonhole to be stitched, but also to effect longer lateral movements of the work-holder to provide for barring the ends of the buttonhole.

The proper position for the slide 54 and work-holder 36 in stitching a buttonhole may

be established by an adjustable eccentric 69, held by screw 70, and this eccentric may be turned to correctly adjust the work-holder with relation to the path of movement of the upper needle, so that under no circumstances shall the needle strike the work-holder.

In the Patent No. 714,284, referred to, the work-holder was suspended from a point above the needle-bar; but herein the work-holder is sustained wholly by the bed-plate.

The bushing C', embracing the needle-bar, is contained in a tubular portion 71 of a radius-bar 72, having its fulcrum on a stud 73, held in a suitable bracket at the front end of the overhanging arm of the machine.

The lever B<sup>6</sup> for imparting vertical movement of the needle-bar is interposed between the head of the machine and the rear side of the radius-bar. Herein to move the needle-bar laterally between one and its next descent throughout the stitching of a buttonhole and to provide for the lateral movement of the radius-bar, and consequently of the needle-bar, I have connected with the radius-bar a link 74, shown as adjustable as to its length to insure just the correct position of the needle with relation to the throat-plate.

The link 74 is attached by a stud-screw 75 to a rocking sleeve 76, having as its fulcrum the rock-shaft B<sup>5</sup>. The rocking sleeve has a projection 77, having a slot in which is adjustably held a stud-screw 78, with which is connected a link 79, deriving its movement from an arm 79<sup>x</sup>, (see Fig. 8,) having its fulcrum on said stud 80 in a stand 81 at the under side of the bed-plate, said arm embracing a three-cornered cam (not shown) on the main shaft A<sup>4</sup>, the adjustment of the stud-screw 78 in the slot of projection 77 enabling the lateral throw of the needle to be varied to accommodate for any desired width of overedge-stitches. This shaft, arm, link, and sleeve are common to application Serial No. 136,433, so need not be herein more fully described.

In order to economize fully all the time of the machine, and consequently of the workman running the machine, to thereby increase the capacity of the machine, also avoid waste of thread and lessen the work required of the operator, the machine herein illustrated has been provided with a thread-cutting means and a thread-controlling means that I will now describe.

Referring to Fig. 8, the shipper-lever h<sup>5</sup> instrumental in actuating the buttonhole-cutting means is provided with a set-screw or projection 82, that enters a slot 83 in the end of a lever 84, pivoted at 85. This lever at its left-hand end is provided with an extension 86, the free end of which is shaped to constitute a thread-cutter 87, that when actuated enters the last loop of needle-thread formed below the cloth in the completion of the barring of the last end of the buttonhole and cuts said loop of thread, leaving the end of the thread connected



with the material dangling below the material usually for about one-eighth of an inch, the thread connected with the needle-bar and extended below the eye therein being withdrawn from the work during the last ascent of the needle-bar before stopping the stitch-forming mechanism, with the needle-bar and needle in elevated position after the completion of a buttonhole. Coacting with this buttonhole-cutting means, which may be of any usual or approved construction, is thread-controlling means that is operated to provide automatically for leaving an amount of needle-thread protruding from the eye of the needle when the machine is stopped, the length of needle-thread so left protruding from the eye of the needle being determined by a movement of the thread-tension backward or away from the eye of the needle after cutting the thread and before stopping the machine, so that when the machine is stopped the tension mechanism occupies its farthest position from the eye of the needle.

On starting the machine, as will be described, the thread tension is moved forward by a spring, as will be described, to give up to the needle during its first descent slack thread sufficient for the formation of the first loop of the first stitch and to avoid any possibility of the first loop not being held in the material. After the first stitch is made and the end of the needle-thread is anchored in the material the tension device is gradually moved rearwardly or away from the needle-bar during each stitch, which results in increasing gradually the length of the needle-thread between the tension device and the eye of the needle. The tension device is moved backwardly, as described, during the over-stitching of the first side of the buttonhole, and it is held substantially in the backward position during the stitching of the last side of the buttonhole and the barring. I will now particularly describe the construction of this novel tension device.

Referring to Figs. 1 and 2, 88 represents a lug shown as attached to the rear end of the work-holder. The overhanging arm is provided with an extension 89, that receives a stud-screw 90, on which is mounted a lever 91, provided at its upper end with any common spring-controlled tension device or wheel 92, and preferably an auxiliary tension 93 and thread-guiding eye 94. The auxiliary tension device is of usual construction and has a spring to exert a slight tension at all times upon the thread going to the usual tension device 92. The lever 91 has a downwardly-projecting arm 95, having a pin with which is connected one end of a spring 96, the opposite end of said spring being connected with a stud on the short arm of a lever 97, having its fulcrum at 98 on the overhanging arm B<sup>3</sup>, the longer arm of said lever having a notch to engage a stop 99 on and hold the arm 95

and tension device in the position Fig. 1, the position in which it is left after stitching the first half of the buttonhole and when the machine is stopped at the completion of a buttonhole. The framework has a stud 100, on which is pivoted a manually-controllable starting-lever 101, which in function and purpose is the same as the lever *o'* in said Patent No. 714,284, it when depressed acting against and moving the lever H<sup>10</sup> to slide the rock-shaft H<sup>12</sup> and cause the latter to turn to the left, Fig. 1, against spring 120, a lever E<sup>8</sup>, pivoted at *h* on the longer arm of a clamp, opening lever 121, pivoted at *h'*, and remove said lever from a projection E<sup>10</sup>, projecting from the extension H<sup>3</sup> from the hub of the cutter-carrying lever. The releasing of the lever E permits the springs 50 to act and close immediately the work-holder to clamp the work which is necessary preparatory to starting the machine. The opening-lever acts on the extension 49 of the work-holder. The manually-controlled starting-lever has also another arm 103, that as the outer end of said lever is depressed in closing the work-holder and through the rod H<sup>12</sup> moving the belt-shipper so that it will put the belt on the fast pulley H<sup>6</sup> to start the machine in operation, meets the short arm of the lever 97, causing its longer arm to be disengaged from the stud 99, permitting the spring 96 to immediately move the tension device to the left, Fig. 1, toward the needle-bar, as represented in Fig. 2. By the time the tension device arrives in its position Fig. 2 or the position represented by the dotted circle *a'*, Fig. 1, the needle-actuating mechanism starts the needle to penetrate the material, and its thread below the material is caught in the making of the first stitch, the tension device in its movement from the full-line position, Fig. 1, into the full-line position, Fig. 2, giving up slack thread, as represented by dotted lines *a''*, Fig. 1, so that the looper may unerringly engage the loop of needle-thread and retain it in the material without any danger of the stitch being skipped by the pulling back of the needle-thread at the first ascent of the needle in the commencement of the stitching of a buttonhole. The first loop having been caught and the stitching having been commenced, the longitudinal movement of the work-holder commences, and the projection 88 of the clamp, acting against the lower end 95 of the lever 91, moves the tension device gradually away from the eye of the needle until finally the projection 99 of said lever is caught by the notch of the lever 97, controlled by the spring 96. The stud 99 is caught just about as the overedge-stitching of the first half of the shortest buttonhole to be made is stitched. If, however, the buttonhole should be longer than provided for the shortest buttonhole, the lever will be turned further, due to the action of the projection 88: but as the work-holder is reversed in its



movement and the projection 88 is moved to the right, Fig. 1, the spring causes the tension-lever to be moved in a direction to move the tension device toward the needle-bar until the projection 99 meets the notch in the lever, and thereafter during the further second or longitudinal movement of the work-holder during the stitching of the second side of the buttonhole the tension device is maintained stationary in the position, Fig. 1, and it occupies such position until the next buttonhole is to be started, when the tension-carrying lever will be released, as has just been described. The needle-thread is led from the tension device forward toward the needle-bar through a suitable eye 104 and thence between a friction device composed of an arm 105 and a spring 106 and through a hole in a guide-eye 107, connected with the upper end of the needle-bar by a screw 108, the needle-thread then going directly to and through the eye of the needle.

In some cases it is very desirable to start the machine by the action of a treadle under the bench on which the machine sets. This enables the operator to have the use of both hands. To so start the machine, I have added what I call a "foot-starting" device, represented as a lever 109, having its fulcrum at 110 and provided with a latch-dog 112, having its fulcrum at 113 on said lever 109. This dog when used engages a suitable shoulder 114 on the manually-controlled lever 101, said shoulder being shown in the detail view 1<sup>a</sup>, and when said lever 109 is depressed the notch of the hook 112 engages the shoulder and turns the lever 101, that it may operate in releasing the clamp and starting the machine, as before described. The final depression of the lever 109 causes the projection 115 of the dog 112 to contact with the shipper *h*<sup>5</sup>, which turns the dog 112 to the right, viewing Fig. 1, and releases the shoulder 114 of the lever 101, permitting the latter to resume its normal position, said lever being returned to its normal position by a spring 116. A spring 117 acts normally to keep the notched part of the dog toward the shoulder 114, and to limit the extent of the descent of the power-controlled starting-lever 109 the latter has been provided with a stop *b*, that meets the bed-plate A<sup>2</sup>. After a buttonhole has been cut and the cutter-lever H' is returning into its inoperative position the stud E<sup>10</sup> on the arm H<sup>3</sup> meets the notch of lever E<sup>8</sup> and moves lever 121 to open the work-holder.

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

1. In a buttonhole-sewing machine, a needle-bar, means to reciprocate and vibrate the same for overedge-stitching, and complementary means including two loopers to engage loops of needle-thread at alternate descents of the needle, a looper-shaft for each looper, an arm

on each looper-shaft, a link connecting said arms, and means to actuate positively one of said looper-shafts, the link actuating the other looper-shaft and looper.

2. In a buttonhole-sewing machine, a work-holder, a radius-bar pivoted at its upper end on the head of the machine, and having at its lower end a tubular bearing, a needle-carrying bar located in said bearing and adapted to carry an eye-pointed needle, a rock-shaft having an arm, a link carried by said arm and connected with said needle-bar for reciprocating the same in said bearing, a sleeve sustained loosely on said rock-shaft, a connection between said sleeve and radius-bar, and means to rock said sleeve and move the radius-bar about its pivot between one and the next descent of the needle.

3. In a buttonhole-sewing machine, a work-holder, a radius-bar pivoted at its upper end on the head of the machine, and having at its lower end a tubular bearing, a needle-carrying bar located in said bearing and adapted to carry an eye-pointed needle, a rock-shaft having an arm, a link carried by said arm and connected with said needle-bar for reciprocating the same in said bearing, a sleeve sustained loosely on said rock-shaft, a connection between said sleeve and radius-bar, a link connected adjustably with an arm of said sleeve, and means to move said link to turn said sleeve and move the radius-bar about its pivot between one and the next descent of the needle.

4. In a buttonhole-sewing machine, a work-holder, a screw, a sleeve surrounding said screw and connected loosely with said work-holder, means to rotate said screw intermittently step by step in one and then in an opposite direction to move longitudinally the work-holder step by step in one direction while stitching one and then the opposite direction while stitching the opposite side of a buttonhole, a vibratable lever, a right and left worm for moving said vibratable lever, stops carried by said sleeve, pin-carrying levers carried by said vibratable lever, and a regulating-lever carried by said vibratable lever, the adjustment of which thereon determines the length of buttonhole being stitched.

5. In a buttonhole-sewing machine, a work-holder, stitch-forming mechanism to form overedge-stitches, means to close the work-holder on the work to be stitched, a tension device, means to lock the same at a distance from the needle-bar while the work-holder is opened, means to release said tension device and move it toward the needle-bar when the work-clamp is closed prior to starting into operation the stitch-forming mechanism, the movement of the tension device as described giving slack thread to the needle to insure the making of a stitch at the first descent of the needle-bar.

6. In a buttonhole-sewing machine, a lever and a needle-thread tension device thereon,



combined with a work-clamp to turn said lever and move the tension device step by step in one direction while the machine is in operation to enable the tension device to deliver and store up thread between itself and the needle to be delivered to the needle after the machine had been stopped and during the first descent of the needle-bar and needle as sewing is again resumed.

7. In a buttonhole-sewing machine, stitch-forming mechanism to form a series of overedge-stitches, a work-holder, stopping means to stop the stitch-forming mechanism after the production of a buttonhole, a tension device for the needle-thread, and means to move said tension device in one direction while a series of successive stitches are being made, such movement of said tension device increasing the length of the needle-thread between said tension device and the eye of the needle, and means to move said tension device in the opposite direction to form slack thread and give it up immediately to the needle when desired.

8. In a buttonhole-sewing machine, a needle-bar and needle, means to reciprocate the same for stitching, a lever, a tension device carried by said lever, means to turn said lever to move the tension device during the insertion of a series of stitches for the production of a buttonhole, in a direction to increase gradually the amount of thread between said tension device and the eye of the needle, means to lock said lever in the desired position, and means to release and then turn said lever in the opposite direction that the tension device may immediately give up to the needle the

thread accumulated between the tension device and the eye of the needle while stitching the buttonhole, substantially as described.

9. In a buttonhole-sewing machine, stitch-forming mechanism, a tension device, means to move said tension device progressively in one direction during the formation of a series of overedge-stitches, and means operable after a buttonhole has been stitched for moving said tension device in the opposite direction while the stitch-forming mechanism is at rest, thread-cutting mechanism, means to operate the same between the complete stopping of the stitch-forming mechanism and the restarting of said stitch-forming mechanism.

10. In a buttonhole-sewing machine, stitch-forming mechanism to make overedge-stitches, a work-holder having a longitudinal groove and a pocket at its under side, a slide-bar having a projection to enter the longitudinal groove of the work-holder, a screw and a sleeve having a projecting stud to enter said pocket, means to actuate the screw and sleeve to move the holder longitudinally of the buttonhole, and means to move said slide-bar and with it said work-holder laterally with relation to the length of the buttonhole, to permit barring-stitches to be made at the ends of the buttonhole.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES A. DAHL.

Witnesses:

JOHN C. EDWARDS,  
MARGARET A. DUNN.