

No. 673,851.

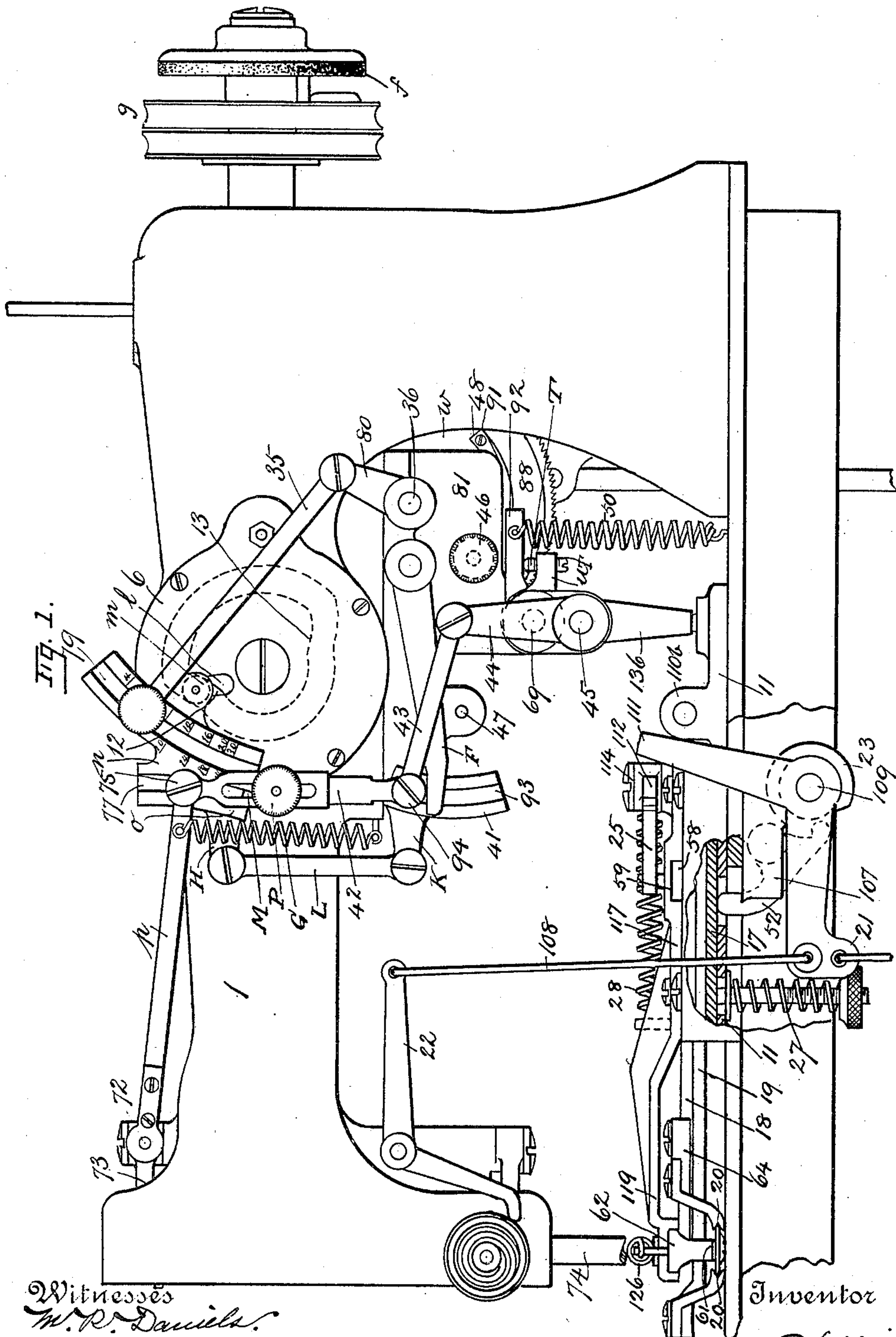
Patented May 7, 1901.

F. T. LEILICH.  
MACHINE FOR SEWING ON BUTTONS.

(Application filed Oct. 20, 1899.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses  
M. R. Daniels.  
Jno A. Daniels

By his Attorney

Inventor  
Francis T. Leilich  
Francis M. Wright

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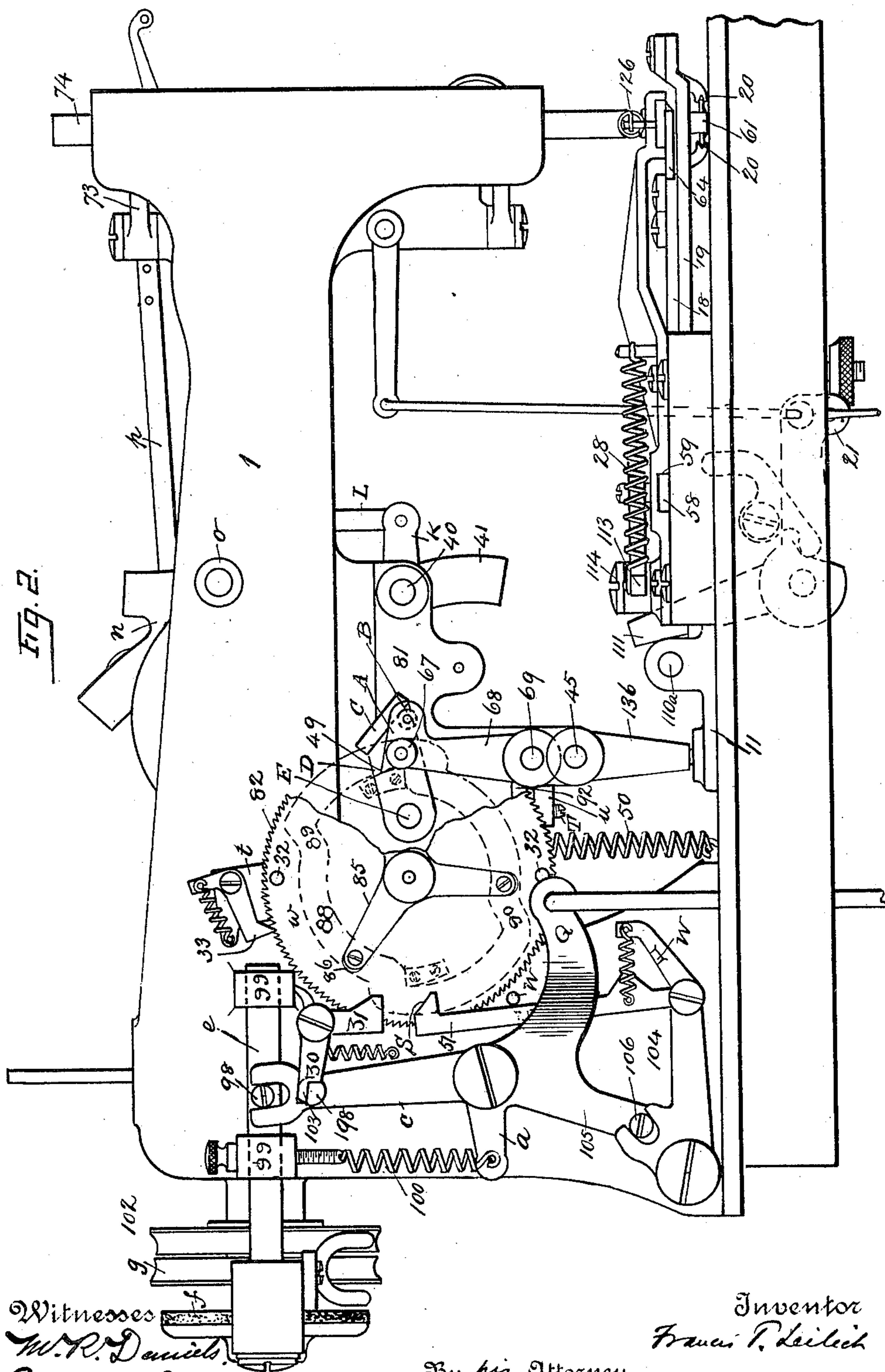
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4 Sheets—Sheet 3.

Fig. 3.

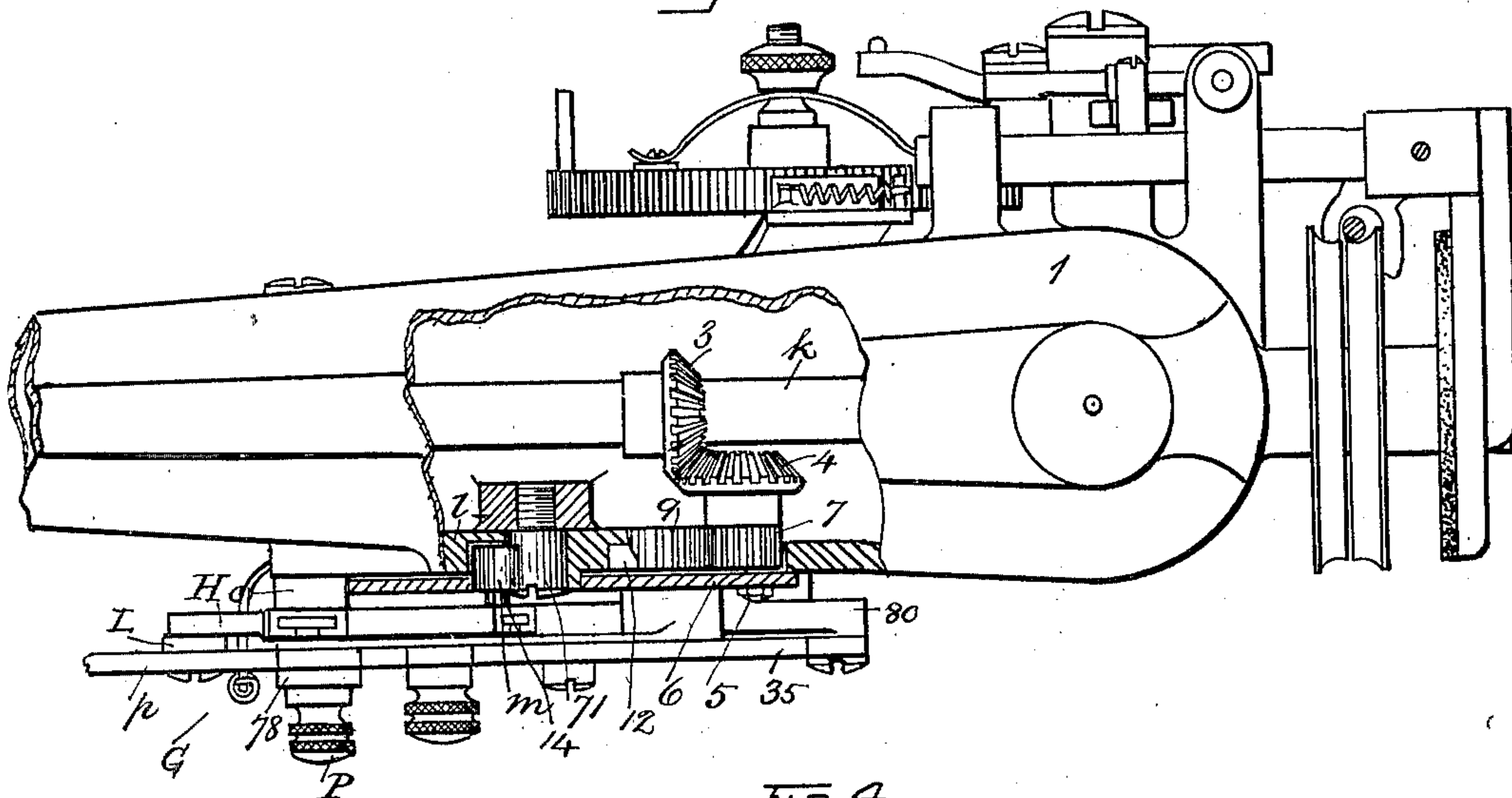


Fig. 4.

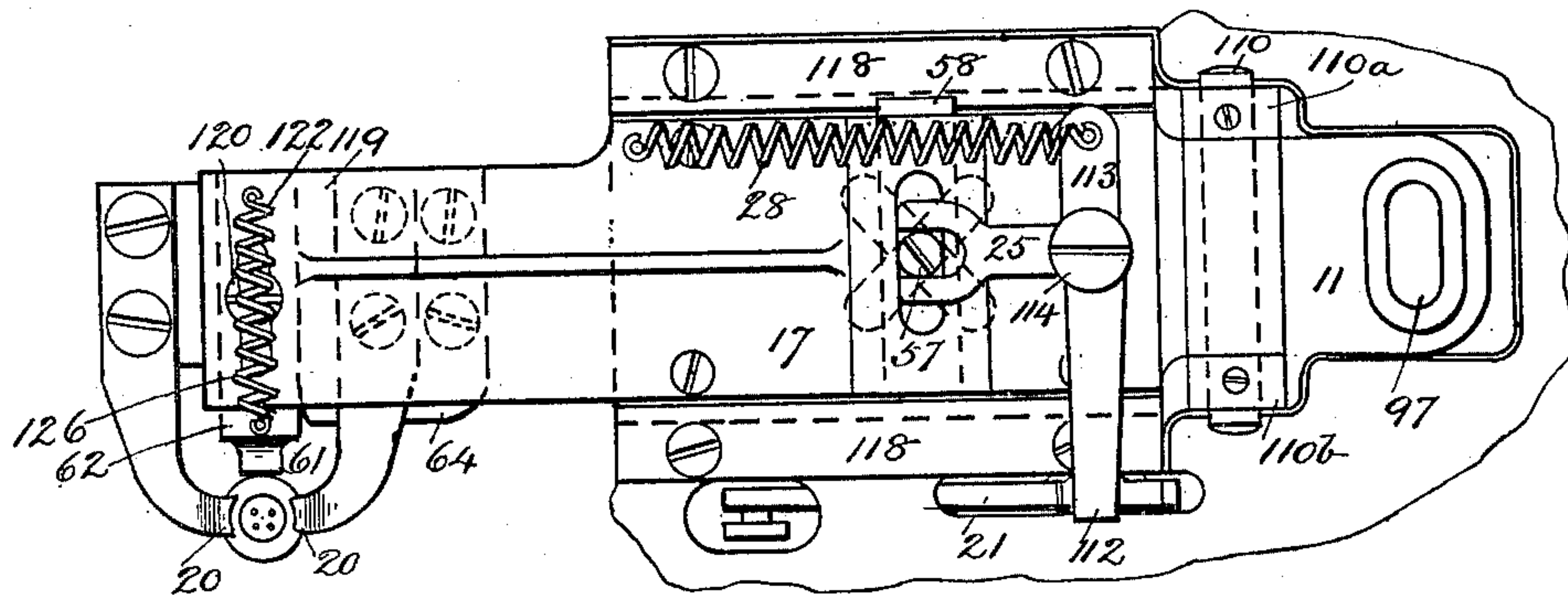


Fig. 5.

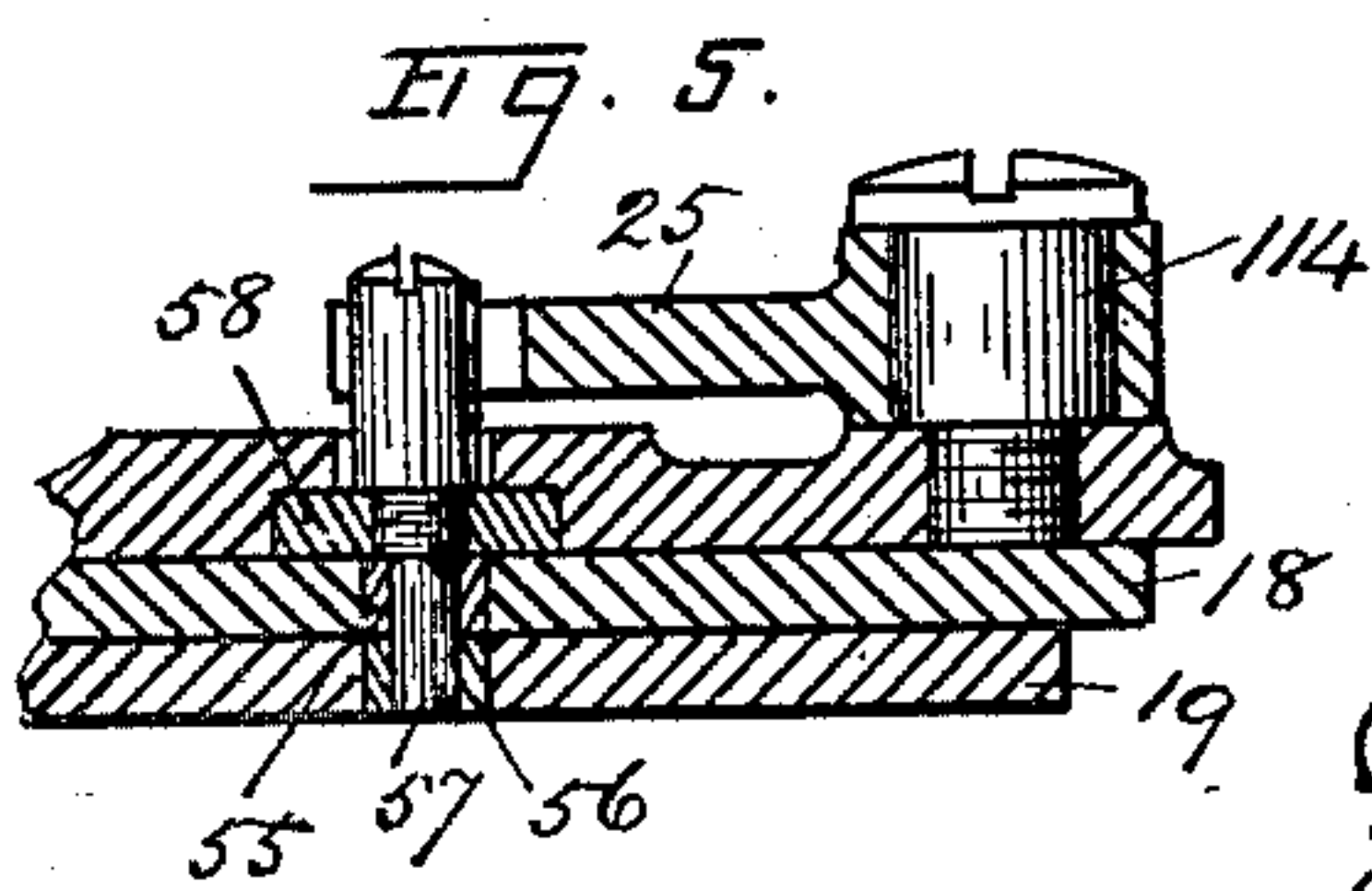


Fig. 6.

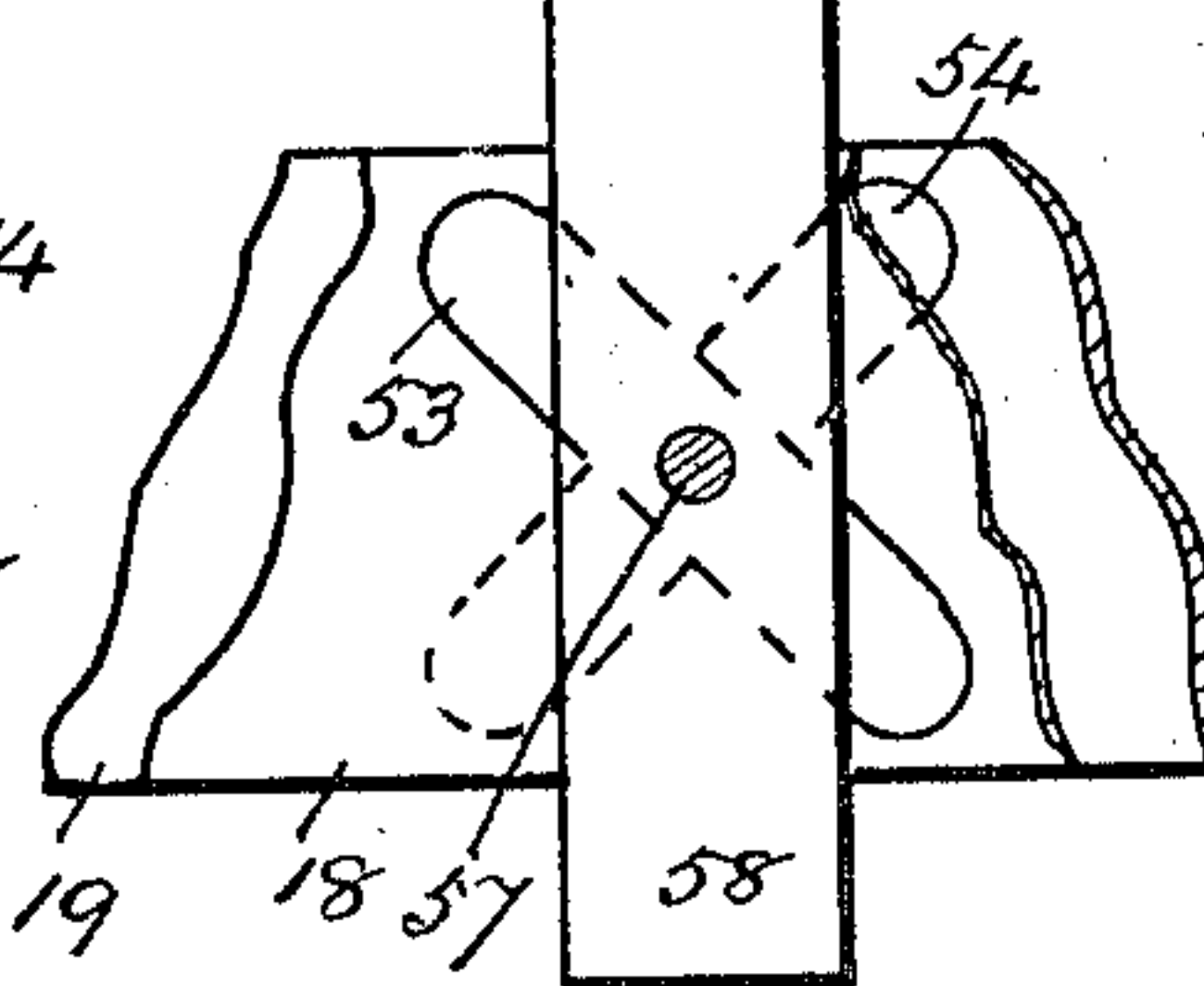
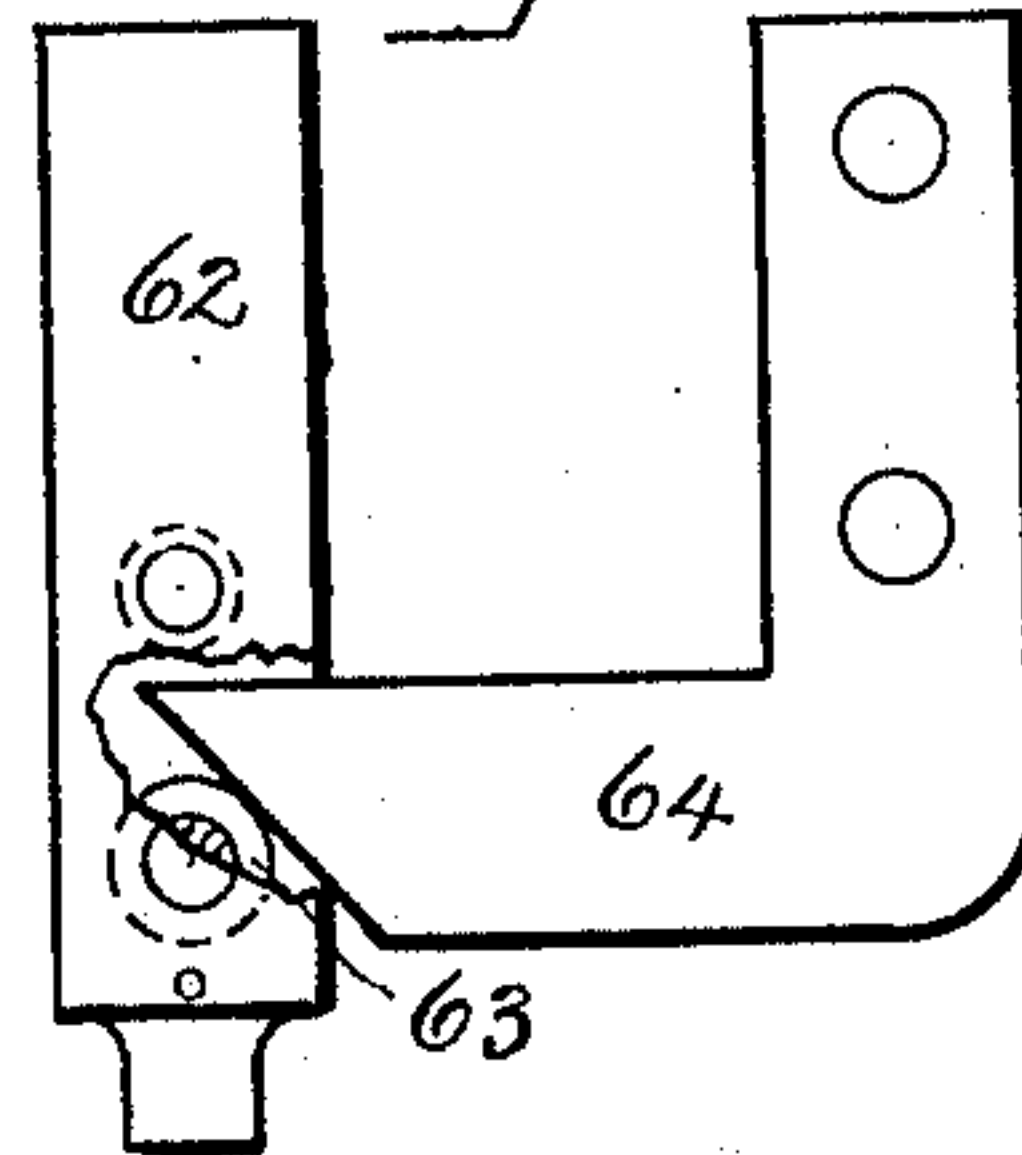


Fig. 7.



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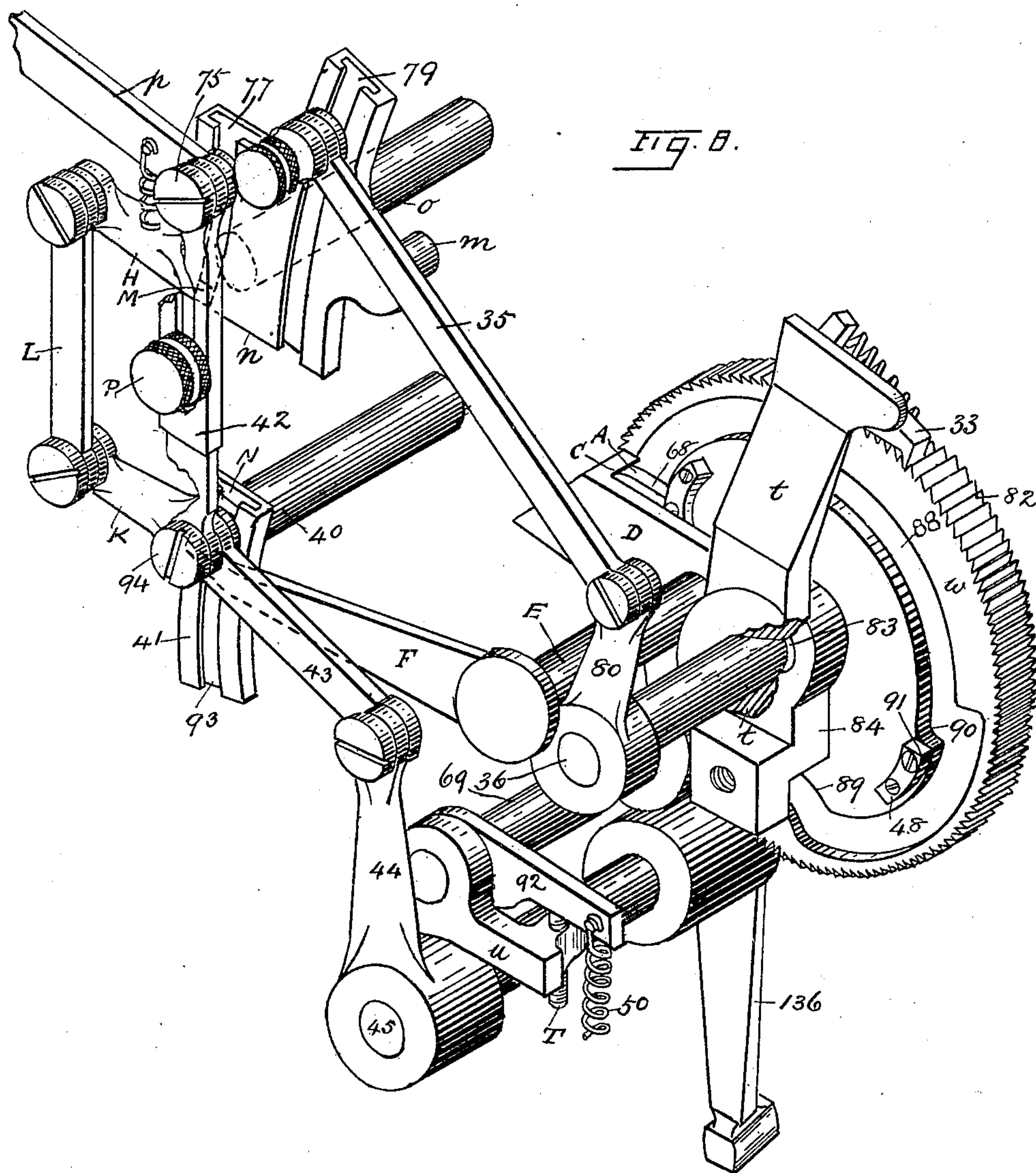
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4 Sheets—Sheet 4.



Witnesses  
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Geo. A. Daniels.

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# UNITED STATES PATENT OFFICE.

FRANCIS T. LEILICH, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE CLIMAX MANUFACTURING COMPANY, OF SAME PLACE.

## MACHINE FOR SEWING ON BUTTONS.

SPECIFICATION forming part of Letters Patent No. 673,851, dated May 7, 1901.

Application filed October 20, 1899. Serial No. 734,238. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS T. LEILICH, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Button-Sewing Machines, of which the following is a specification.

This invention relates to improvements in button-sewing machines, the object of my invention being to provide a machine for sewing on buttons having four eyes by stitches first through one pair of diagonally opposite eyes of the four and then through the other pair of diagonally opposite eyes, so that the second series of stitches crosses the first series and the result resembles a button sewed by hand.

My invention also resides in the novel construction, combination, and arrangement of parts herein fully specified, and particularly pointed out in the claims.

In the drawings, Figure 1 is a front elevation of a button-sewing machine constructed in accordance with this invention. Fig. 2 is a rear elevation thereof. Fig. 3 is a plan view of the arm and driving mechanism of the machine, the frame being cut away in parts to show mechanism in its interior. Fig. 4 is a plan view of the button-clamp mechanism. Fig. 5 is a vertical detail section to show the slots in the clamp-slides. Fig. 6 is a horizontal section to show the same. Fig. 7 is a horizontal detail section to show the mechanism for operating the third jaw. Fig. 8 is a perspective view of certain parts as they would appear removed from their supports.

The hollow arm 1 of the machine is in general form of the usual construction and carries within it the main driving-shaft *k*, which by a mechanism common to this class of machines reciprocates the needle to make the stitches. From said driving-shaft there is actuated mechanism for shifting the needle from one eye of the button to another to sew the button onto the cloth, and such mechanism is as follows: Said driving-shaft has mounted thereon a miter-wheel 3, meshing with a miter-wheel 4 on a stud 5, extending inwardly from a cover-plate 6, said wheel 4 driving, by means of a pinion 7, a gear 9,

formed on a cam-wheel *l*, revolving on a stud 71. Said cam wheel has in its front face the cam-groove 12, having high and low dwells connected by two inclines 13, and in said groove rides the roller *m*, mounted on a stud 14, extending through the plate 6, said plate having an aperture elongated radially from the center of the cam-wheel to permit the movement to and from said center of the roller *m* as it rides up and down the inclines 13 in the cam-groove. Said stud 14 is carried by a bell-crank lever *n*, pivoted at *o* in the frame of the machine, another arm of said lever being connected by a link *p* with an arm 72 of the horizontally-swinging carrier 73 of the needle-bar 74 to vibrate the same. The connection of the link *p* with the bell-crank lever *n* is made by means of a flat-headed screw 75 passing through the end of said link, the head of which may be moved in a T-slot 77, formed in said lever *n* in an arc of a circle having the link *p* for radius, and said head is secured by said screw 75 to a link 42, the lower end of which is supported in the manner hereinafter described. As the cam-wheel revolves the needle is shifted from one position, in which it can penetrate one eye of the button, to another position, in which it can penetrate the other eye, the button having been held stationary in the meantime, and by reason of the adjustability of the end of the link *p* over the T-slot 77 a greater or less distance from the pivot *o* the amount of shift may be varied as desired to suit different distances between the eyes of the button. The gear 9 is of four times the diameter of the pinion 7, and as the cam-wheel *l* thus makes one revolution for every four revolutions of the main driving-shaft—that is, for every four stitches made by the needle—it follows that this shifting of the needle from one eye of the button to the other takes place after every two stitches and a return is made to the first eye after the next two stitches. By this construction a double-hitch stitch may be made by which a double loop or twist is given to the under thread, so that there is formed what is, in effect, a knot, preventing unraveling of the thread. Upon the bell-crank lever *n* is also formed a second T-slot 79, in which there is



secured adjustably in like manner as the end of the link *p* in the T-slot 77 the end of a link 35, the outer end of which is pivotally connected to a crank 80 on a rock-shaft 36.

5 Said rock-shaft 36 extends from the front to the rear of the machine and is journaled in a bracket 81, which is secured to the under side of the frame 1 of the machine. At the rear of the machine said rock-shaft carries

10 fixed thereon an upwardly-extending pawl-carrying arm *t*, upon the end of which is pivoted a spring-actuated pawl 33, the tooth of which is by said spring constantly pressed into engagement with ratchet-teeth 82, formed

15 on the periphery of a cam-wheel *w*. Said wheel *w* is pivoted on a stud 83, extending from a bracket 84, secured on the rear of the bracket 81, and on the rear end of said stud is secured a spring 85, having arms carrying

20 friction-shoes 86. This prevents the wheel *w* from going forward by its own momentum after the pawl has ceased to act. The amount of pressure from said friction-shoes may be varied by adjusting the position of the spring

25 on the screw. The rocking of the shaft 36, communicated through the link 35 from the rocking of the lever *n*, will thus impart a rotary movement in a uniform direction to the cam-wheel. Said cam-wheel has a cam-groove

30 88, having two high dwells and two low dwells connected by ascending inclines 89 and descending inclines 90, and in said groove rides a roller 67 on the end of an arm 68, pivoted on a shaft 69, having a bearing in the lower

35 portion of the bracket 81. Thus by the rocking of the lever *n* said arm 68 is rocked in toward the center of the cam-wheel twice in each revolution of said wheel.

By mechanism hereinafter described the

40 rocking of the arm 68 sets in motion the mechanism which vibrates the button-clamp. Before, however, describing the mechanism for this purpose it may be here observed that the adjustability of the end of the link 35 along

45 the T-slot 79 permits a variation of the number of stitches to be made in each button. In proportion as the end of the link 35 is secured near to or away from the center of the bell-crank *n* so will the amount of throw given to

50 the pawl 33 for each vibration of the bell-crank lever *n* be greater or less, and likewise will be the distance through which the cam-wheel rotates for each such vibration, and thereby the number of stitches made through

55 the cam-wheel as it travels through the distance from one to the other of the inclines 89 will be greater or less. The T-slot 79 is marked at the proper positions with the number of stitches to be made in the button if

60 the end of the link 35 is clamped in the proper positions.

In the usual construction of a cam in which a roller descends from a high to a low dwell as the cam-wheel revolves such complete descent occupies an appreciable fraction of the whole time of revolution of the cam-wheel.

65 Thus if the arc through which the pawl ro-

tates the cam-wheel in making one stitch is less than the arc through which the cam-wheel has to move to transfer the roller from 7c the high dwell to the low dwell then the needle will reciprocate before the transference has been completely effected and the needle will strike the button. To avoid this result, there is provided the following construction: 75

Upon the wall of the cam-wheel, at the corner of each descending incline 90, which inclines are preferably made sharp, is secured a block 48, having a sharp corner 91, and the arm 68 has a sharp or square point 49 on the 80 inner side of its end. The engagement of the pointed end 49 with the block 48 will hold the roller 67 to the high dwell until such a point has been reached in the revolution of the wheel that said roller can drop instantaneously to the low dwell, and when the said 85 pointed end 49 has passed the sharp corner 91 of said block 48 the roller will so drop instantaneously, being actuated by a spring 50, secured between the bed of the machine and 90 an arm 92, loose on the shaft 69, bearing upon a screw T in an arm *u*, tight on said shaft 96. This will insure an instantaneous shift of the button-clamp from the position in which it is held when the needle is being vibrated—that 95 is to say, midway of the terminal positions of said button-clamp's subsequent reciprocation—to one of said terminal positions before the needle has time to make the next reciprocation. The arm 68 carries on an extension 100 A thereof a roller B, which when the roller 67 is on a high dwell of the groove 88 abuts against the under side of an inclined plane C, formed on a crank-arm D on a shaft E, extending from the rear to the front of the 105 bracket 81, and there carrying an arm F. When the roller is moved inward from the high dwell to the low dwell by the pressure of the spring 50, the roller B is drawn inward under the inclined plane C and the crank-arm D drops, and therefore also the arm F drops. The end of the arm F supports the end of the link 42, connected by the screw 75 with the link *p*, and thus the dropping of the arm F permits a spring G, secured to the link 115 *p* and to a fixed point in the frame of the machine, to depress the end of said link, and therefore also of the link 42. The lower end of the link 42 is connected by a screw 94 with a link 43, connected at its other end with a 120 crank 44 on a shaft 45, extending from front to rear of the bracket 81 and carrying at its rear end the arm 136. The head of the screw 94 moves in a T-slot 93 in a bell-crank lever 41, pivotally mounted at 40 in the bracket 81. 125 The levers *n* and 41 have arms H and K rigidly extending therefrom and connected by a link L, so that said levers *n* and 41 always rock synchronously; but when the roller 67 is in the high dwell and the arm D is upheld 130 by the roller B the end of the arm F upholds the end of the link 42 (and therefore also the end of the link 43) exactly over the pivotal center 40 of the lever 41. In this position,



notwithstanding the rocking of the lever 41, there is no motion of the link 43 or of the arm 136; but when the roller B is drawn inward under the inclined plane C and the end of the arm F drops then the connected ends of the links 42 43 drop below the pivotal center of the lever 41 and immediately the rocking of the lever *n*, through the arm H, link L, arm K, lever 41, link 43, crank 44, and shaft 45, rocks the arm 136. Said arm 136 has a knob-like end, which engages a recess 97 in a plate 11, reciprocating between gibs 118, secured to the frame of the machine, which plate 11 carries upon it the clamp-box 17, containing the arm 18 19 of the button-holding jaws 20, so that the rocking of the arm 136 reciprocates the button-clamp, and the period of reciprocation is the same as was that of the vibration of the needle-bar carrier. The vibration of the needle-carrier ceases simultaneously with the commencement of reciprocation of the button-clamp. This is occasioned by the fact that a stop M is provided, which when the link 42 drops stops the movement of the upper end of the link 42 over the T-slot 77 at such a point that the end of the link *p* is exactly over the pivotal center *o* of the lever *n*. Evidently under such conditions the rocking of the lever *n* no longer vibrates the needle. A similar stop N limits the upward motion of the screw-head 94 in the T-slot 93, so that the end of the link 43 when moved upward by transference of the rollers 67 from the low to the high dwell is stopped exactly over the pivotal center 40 of the lever 41, and then the rocking of the lever *n* no longer reciprocates the button-clamp. The lengths of the various levers are such that the distance through which the button-clamp reciprocates is equal to the distance through which the needle is vibrated. By this construction, then, it is provided, first, that when the needle is being vibrated the button-clamp is stationary; secondly, that when the button-clamp reciprocates the needle no longer vibrates horizontally; thirdly, that the extent of vibration of the needle is the same as the extent of reciprocation of the button-clamp, and, fourthly, that the change from a vibrating needle and stationary button-clamp to a non-vibrating needle and reciprocating button-clamp automatically takes place after a predetermined number of stitches.

The link 42 is made in two slidable sections adjustably clamped by the nut P. This permits the end of the link *p* to be adjusted as desired to give a greater or less vibration to the needle-carrier for different distances between the eyes; but whatever variation is made of the amount of vibration of the needle-carrier an equal change will thereby be made in the amount of reciprocation of the button-clamp, since the distance of the end of the link *p* from the center *o* when the end of the link 43 is over the center 41 will always be equal to the distance of the end of the link 43 from the center 41 when the end

of the link *p* is over the center *o*. The drop of the end of the arm F is sufficiently great to permit extension of the link 42 to its maximum length, if desired.

The mechanism for automatically stopping the machine when a predetermined number of stitches have been made will now be described. The cam-wheel *w* has secured on its rear face two pins 32 diametrically opposite to each other, and in the revolution of the wheel each of the pins will in turn engage a spring-pressed arm 31 of a bell-crank lever, the other arm 30 of which normally rests against a pin 198 on a lever C, the forked end of which engages a pin 98, extending laterally from a rod sliding longitudinally of the machine in guides 99. Said pin 198 is normally pressed against the end of said arm 30 by means of a spring 100, which pulls upward an arm *a* of said lever C. When one of the pins 32 raises the arm 31, the arm 30 is moved away from the pin 198, and the spring 100 moves forwardly the rod *e*, thereby bringing a friction-disk *f* against the tight pulley *g* and shifting the belt 101 from said tight pulley to the loose pulley 102, thus stopping the machine. When the machine is to be started again, the operator raises, by any suitable foot device, an arm Q, extending from said lever, and thereby draws back the rod *e*, moving the friction-disk *f* away from the tight pulley *g*, shifting the belt 101 onto said pulley *g*. At the same time the arm 30 is moved by its spring in front of the pin 198, being arrested there by an extension 103 abutting against said pin and remaining there until pushed aside by the other pin 32 of the same wheel. Also at the same time the cam-wheel is given a rotary movement through a considerable arc, the object of which and the means for accomplishing which are as follows: Immediately before the machine is stopped the roller 67 is on the low dwell. It is therefore necessary to bring it to the high dwell again for the first part of the operation of sewing on the next button—that is, the needle-vibrating mechanism must be started and the button-clamp-reciprocating mechanism stopped. For this purpose there is provided a spring-actuated dog 51, working on a rocking arm 104, which dog when the machine was stopped has moved rearward through a considerable arc of the cam-wheel *w*, motion being imparted by a downwardly-extending arm 105 of the bell-crank lever *b* engaging by means of the pin 106, a fork on said arm 104. If now the machine was stopped at the end of the operation of sewing on a button in the usual way by the engagement of one of the pins 32 with the arm 31, then this pin 32 is in such a position that it will engage an inclined nose S of said dog 51 and will move it outward, so that its tooth can engage said pin 32. If, however, the machine was stopped before the end of the operation of sewing on a button, not automatically by the en-



gagement of one of the pins 32 with the arm 31, but directly by the operator, then the pin 32 will not be in this position to engage the nose of the dog and the dog will not engage a stop-pin 32 and will be entirely inoperative. Limit-stops W guide said dog 51 in the proper path to be engaged by the pin 32; but in case the machine was stopped at the end of the operation and the dog 51 has engaged the stop-pin 32 then upon the restarting of the machine this dog 51 now being moved forward, being operated by the rearward movement of the rod *e*, will automatically move the cam-wheel *w* a sufficient distance to carry the roller from the low dwell to the high dwell of the cam-groove. The roller B will then raise the arm F, and the end of said arm will raise the end of the links 42 43 and will thus throw out of operative connection the mechanism which reciprocates the button-clamp and bring into operative connection the mechanism which vibrates the needle, and this movement being instantaneous the button-clamp will be moved to its stationary intermediate position before the needle has been carried to either terminal position of vibration and before its point has descended to the eye of the button.

The mechanism for holding the button will now be described. The machine having stopped automatically in the manner just described, the operator will now by any suitable foot or knee device depress an arm of a lever 21, pivoted in a bracket 107, depending from the bed, and will thereby also, through a connection 108, actuate a bell-crank 22 to strike between and relieve the pressure of the jaws of the tension device. The depression of the arm of the lever 21 will rock the shaft 109 of said lever, and thus will actuate a cam 23 of said shaft to rock a lever 52, also pivoted in said bracket 107, the other arm of which passes upward through an opening in said bed and through a slot in the plate 11, and said arm will thus abut against the under surface of the box 17, pivoted at 110 between lugs 110<sup>a</sup> 110<sup>b</sup> of said plate 11, and will raise said box and with it the clamping-jaws 20. Immediately after the box 17 is raised an arm 111 of the lever 21 will rock a horizontal arm 112 of a spring-resisted lever 113, pivoted at 114 on the cover of the box 17, and will thus by means of an arm 25 of said lever having a forked end engaging a pin 57 move said pin rearwardly. The pin 57 is guided in its rearward movement by a guide-block 58, in which it is secured, sliding in a channel 59, undercut in the cover, and below said block said pin carries, one beneath the other, two rollers 55 56, of which the upper one, 55, rolls in a slot 53, cut in the upper clamp-slide 18, and the lower one in a slot 54 in the lower clamp-slide 19. The upper slot 53 extends obliquely to the left rearwardly, so that when the pin 57, with its roller 55, is moved rearwardly the engagement of said roller 55 with the slot 53 will move the

upper slide 18 to the right, and in like manner as the lower slot 54 extends to the right rearwardly the lower slide will be moved to the left. The lower and upper slides carry jaws 20, engaging the button on the left and right, so that when the above-described movement takes place the button is released from said jaws. In addition to these jaws there is a third jaw 61, adapted to support the button on the rear, the construction and operation of which is as follows: The cover 117 is secured by screws to the top of the box and has an extension 119, which has cut in its inner surface at its end a transverse channel. In said channel slides the jaw 62, being supported therein by a screw 120, passing upward therefrom through a slot 122 in the extension parallel with the channel, the head of said screw resting on the extension. The slide 62 carries the jaw 61 at its front end and is moved into position to hold the button by a cam-arm 64, secured to the upper slide 18 and moved to the left therewith. When said arm is so moved to the left, the cam end thereof engages a roller 63, mounted on the under side of the slide 62, and moves said slide forward. A spring 126, suitably secured between the extension and the slide, serves to withdraw said jaw when the arm 64 moves to the right. The end of the cam-arm 64 is inclined to said arm at an angle of forty-five degrees. Therefore the amount of movement given to the jaw 61 is always equal to that of the jaw carried by the upper slide, and inasmuch as the slots 53 54 have the same obliquity as each other to the direction of motion of the pin 57 the movements of the two slides 18 19 are always equal. Hence there are provided three button-holding jaws, which must always move uniformly away from a common center, and will therefore hold buttons of all diameters with uniform exactitude. When the operator releases the pressure, springs 27 28 serve to restore the parts to their former position, in which the jaws 20 and 61 clamp and support the button. The button-holding jaws 20 are made rigid and divergent or V-shaped in vertical section. They will thus hold effectually buttons of various thicknesses.

The above clamping mechanism is the subject of a separate application filed January 15, 1900, Serial No. 1,529, patented September 18, 1900, No. 658,016.

To adjust the machine for sewing buttons with two holes or with a bar, the arm F is held up in the position in which it supports the link 42 by means independent of the roller B. For this purpose there is provided a threaded hole 47 in the bracket 81 in such a position that a screw 46, screwed thereinto, will support the arm F in the position in which it holds the ends of the links 42 43 over the pivot 40 of the lever 41. When said arm is so supported, then, notwithstanding the movement of the roller 67 into the lower dwell and the withdrawal of the roller B, the link 42 will not



drop, and thus there will be no interruption or change in the vibratory movement of the needle until the machine is automatically stopped.

5 I claim—

1. In a sewing-machine, the combination of a reciprocating needle-bar carrier, a reciprocating clamp mechanism, two rock-shafts vibrating in unison, alternately-operative connections from the rock-shaft to the needle-bar carrier and the clamp mechanism respectively, and means for simultaneously rendering one of said connections operative and the other inoperative, substantially as described.

15 2. In a sewing-machine, the combination of two rock-shafts, an arm vibrated by each shaft, said arms being connected to vibrate in unison, a link reciprocated by the vibration of each arm, the ends of the links being movable  
20 along the arms to vary the extent of reciprocation, a rod connecting said link ends, a needle-bar carrier and a clamp mechanism respectively reciprocated by the other ends of said links, and means for shifting the ends of  
25 said links along the arms, substantially as described.

3. In a sewing-machine, the combination of two rock-shafts, an arm vibrated by each shaft, said arms being connected to vibrate in unison, a link reciprocated by the vibration of each arm, the ends of the links being movable  
30 along the arms, to vary the extent of reciprocation, an extensible rod connecting said link ends, a needle-bar carrier and a clamp mechanism respectively reciprocated by the other  
35 ends of said links, and means for shifting the ends of the links along the arms, substantially as described.

4. In a button-sewing machine, the combination of a suitably-driven rock-shaft, a second rock-shaft connected with the first to rock  
40 synchronously therewith, an arm on the end of each shaft, a link reciprocated by the vibration of each arm, the ends of the links being movable along the arms to vary the extent  
45 of reciprocation, a rod connecting said links, a needle-bar carrier and a clamp mechanism respectively reciprocated by the other ends of said links, a device for shifting the  
50 ends of the links along the arms, and means, brought into action after a predetermined number of vibrations of the driven rock-shaft, for actuating said device to shift said ends, substantially as described.

55 5. The combination of two arms vibrating in unison, links having ends movable respectively therealong, a needle-bar carrier reciprocated by one link and a button-clamp reciprocated by the other link, a rod connecting said link ends so that they move in unison  
60 along said arms, means for moving them in either direction along said arms, and stops arresting one or the other of the link ends over the pivot of the corresponding arm, substantially as described.

6. In a sewing-machine, the combination of two rocking arms, extending in opposite directions from their respective pivots, means for constraining said arms to rock synchronously, a link shiftable along said arms and  
65 having its ends adjustably secured thereon, and reciprocating devices connected with the respective ends of the link, whereby the extent of reciprocation of either device decreases correspondingly with an increase of  
70 that of the other, substantially as described.

7. In a sewing-machine, the combination of two rocking arms, substantially in line, but extending in opposite directions from their respective pivots, means for constraining said  
80 arms to rock synchronously and equally, a link shiftable along said arms and having its ends adjustably secured thereon, and reciprocating devices connected with the respective ends of the link, whereby the extent of  
85 reciprocation of either device decreases correspondingly with an increase of that of the other, substantially as described.

8. In a sewing-machine, stitch-forming mechanism, a work-holder and means for controlling the relative position of said stitch-forming mechanism and work-holder comprising a cam-wheel having a high and low dwell, a roller riding therein, a shifting device operated by the passage of the roller from one  
90 dwell to the other to shift the relative position of the stitch-forming mechanism and work-holder, a stopping device automatically brought into operation by the cam-wheel in its revolution, and mechanism for advancing  
100 said cam-wheel a sufficient distance to return the roller to its original dwell, said cam-wheel being provided with means to engage said mechanism to render the same operative, only when it is in the position assumed on stopping  
105 automatically, as aforesaid, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANCIS T. LEILICH.

Witnesses:

FRANCIS M. WRIGHT,  
ZUA A. DANIELS.