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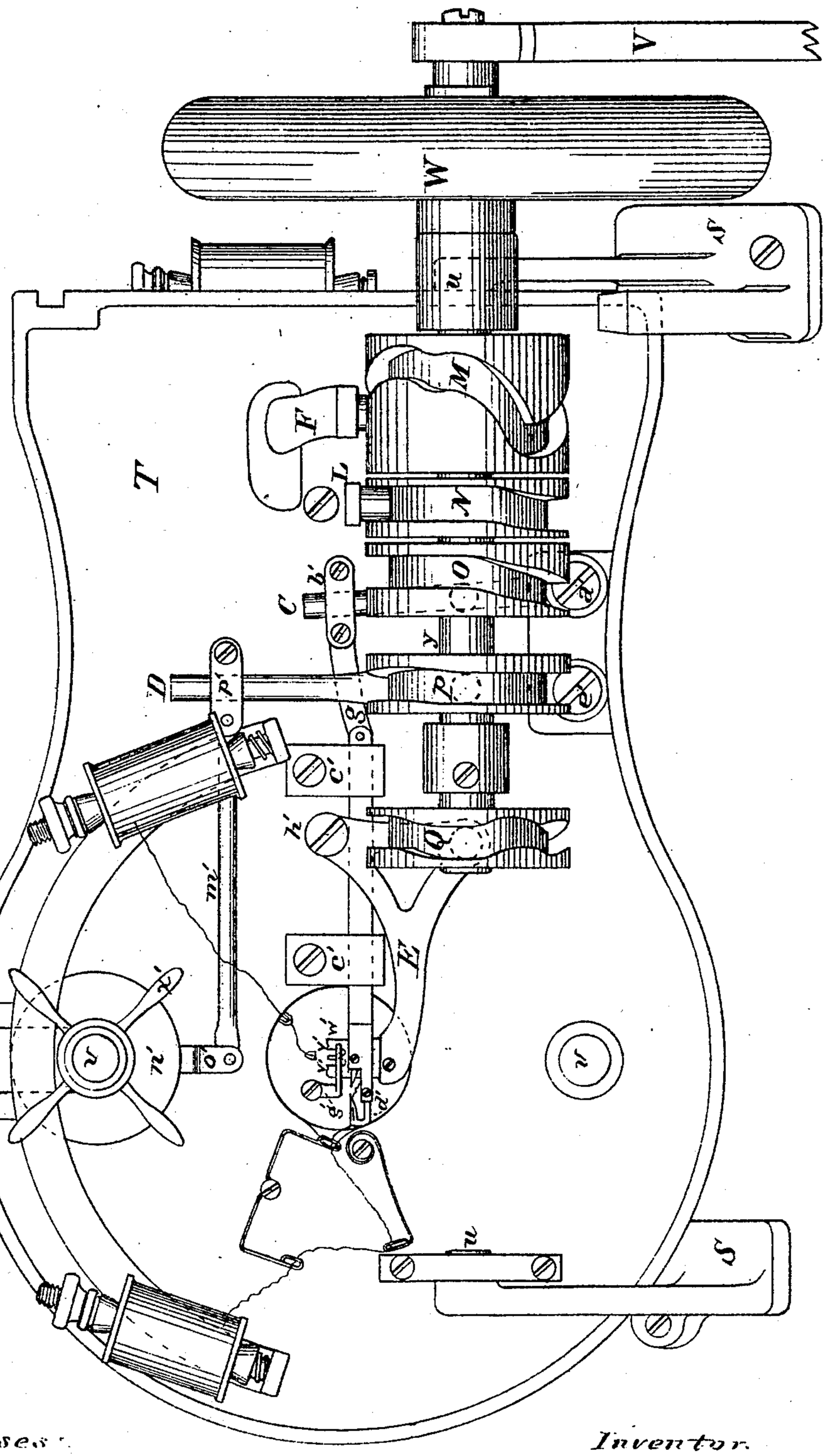
D. W. G. HUMPHREY.

Improvement in Machine for Stitching Button Holes.

No. 123,348. Patented Feb. 6, 1872.



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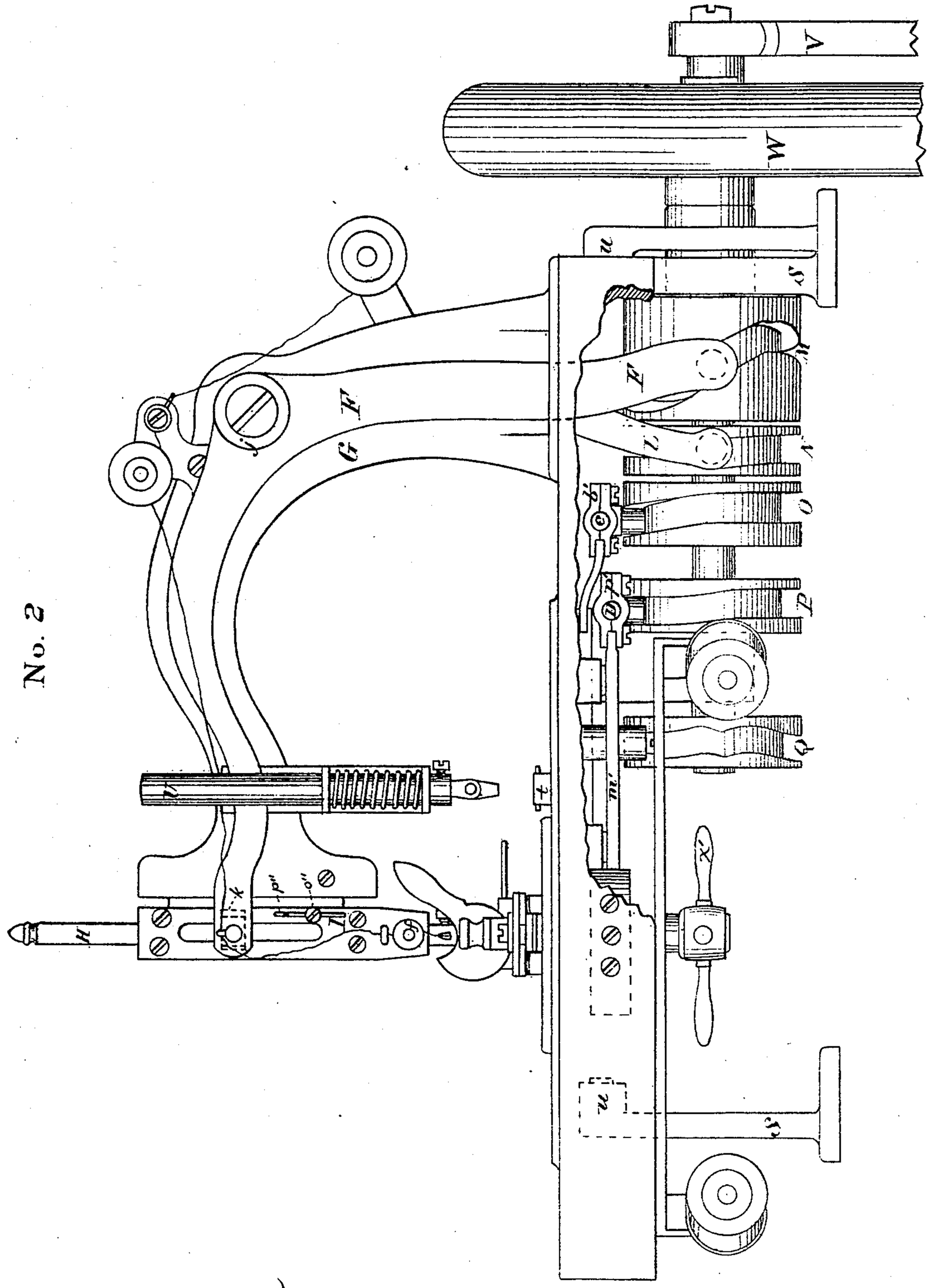

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4 Sheets- Sheet3

D. W. G. HUMPHREY.

Improvement in Machine for Stitching Button Holes.

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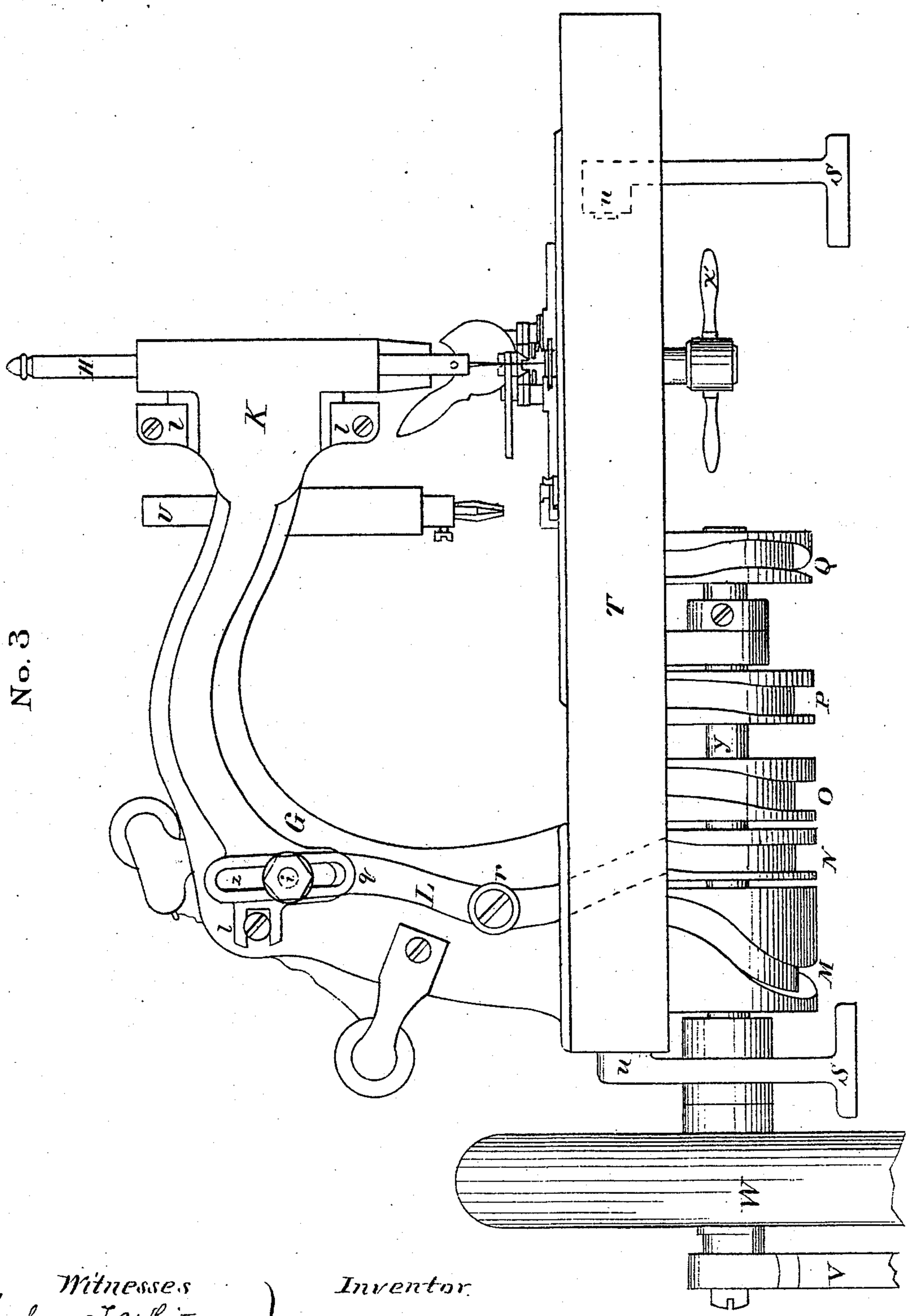

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Improvement in Machine for Stitching Button Holes.

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No. 4

Fig. 1

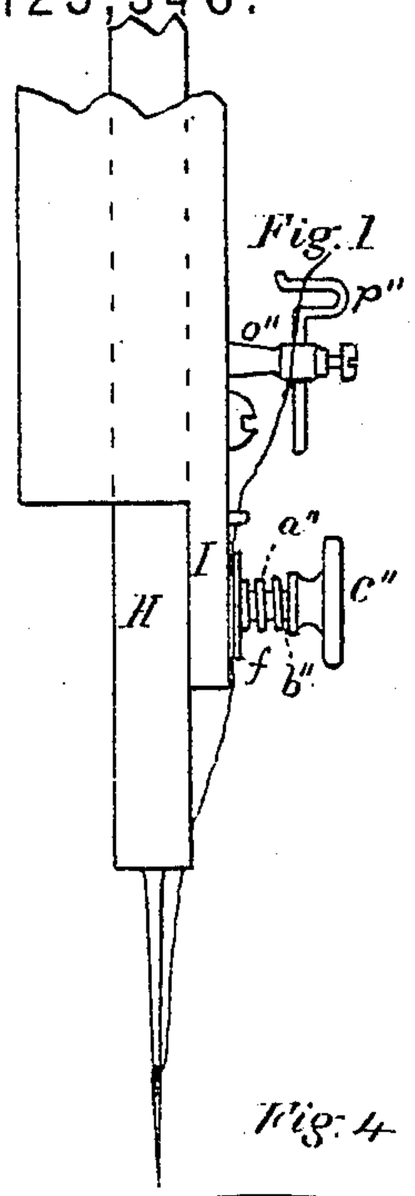


Fig. 2

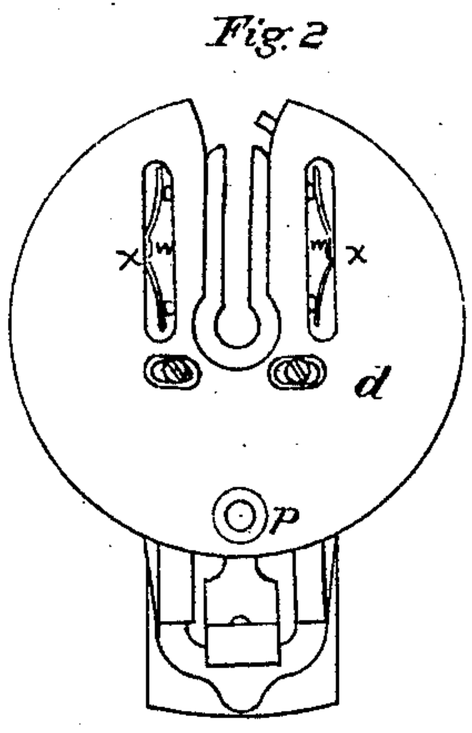


Fig. 6

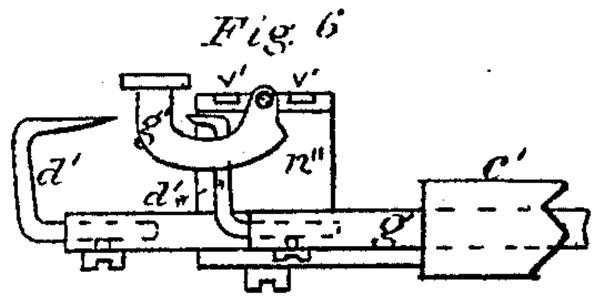


Fig. 3

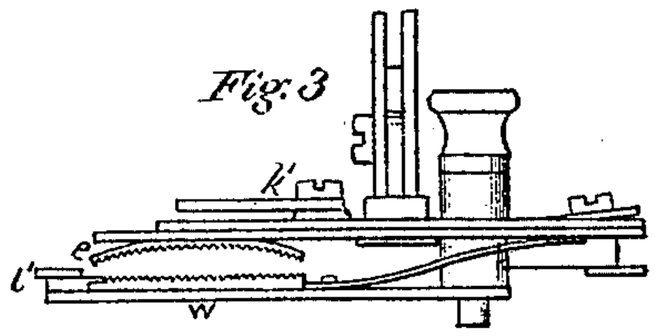


Fig. 7

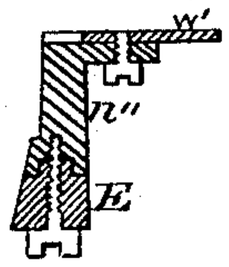


Fig. 4

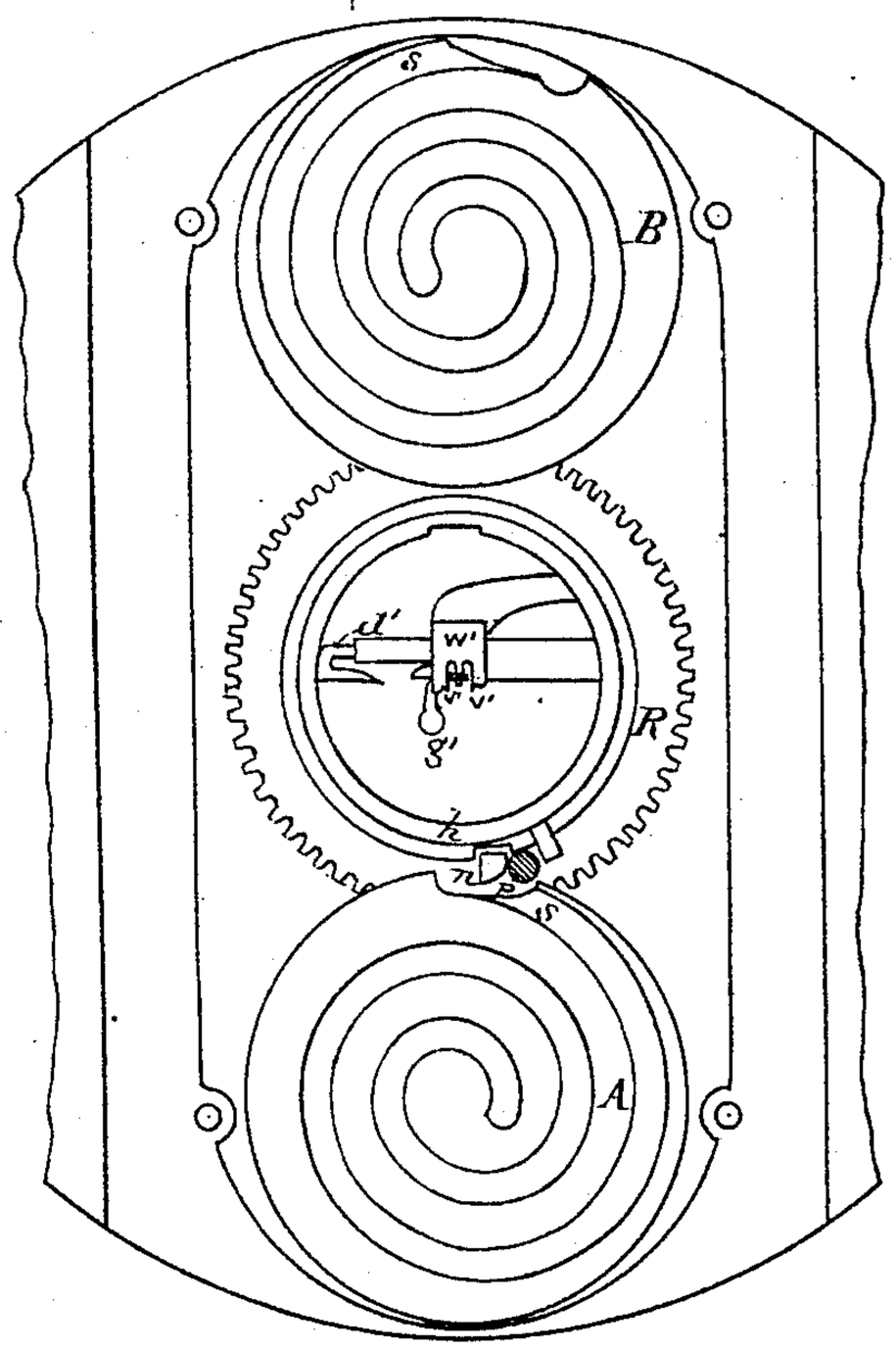
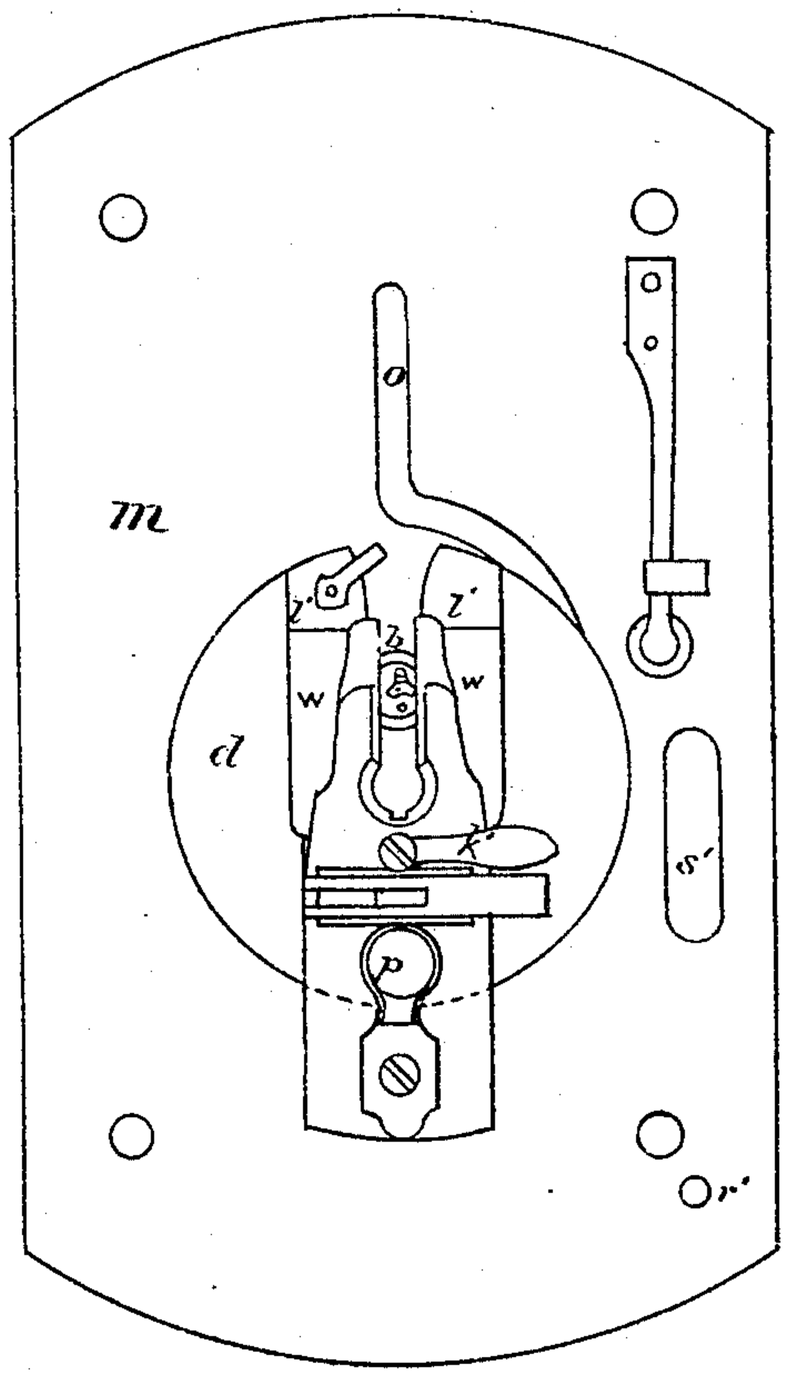


Fig. 5



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123,348

UNITED STATES PATENT OFFICE.

DANIEL W. G. HUMPHREY, OF CHELSEA, ASSIGNOR TO EUGENE HUMPHREY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR STITCHING BUTTON-HOLES.

Specification forming part of Letters Patent No. 123,348, dated February 6, 1872.

I, DANIEL W. G. HUMPHREY, of Chelsea, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements upon the Button-Hole-Stitching Machine patented by me October 7, 1862, which are designed to be used in connection with the improvements patented by me June 13, 1871, for the production of the edge-finish or button-hole stitch also patented by me October 7, 1862, and to facilitate the practical working of button-holes in garments with said stitch.

My present invention, which is represented in the accompanying drawing, consists in new mechanical devices, and in new arrangements and combinations of mechanical devices, for accomplishing in a more practical and better manner the results sought to be accomplished by my said original machine.

Drawing No. 1 represents my new machine turned back upon its journal-stands so as to expose the mechanism of the under side to view. Drawing No. 2 is a front-side elevation of the machine with a portion of the bed or table broken away so as to show a part of the under work in connection with the upper. Drawing No. 3 is a back-side elevation of the machine. Drawing No. 4 represents detached views, of which—

Figure 1 is a portion of the needle-bar and its carrier, and shows the thread-friction and take up attached to the needle-bar cap. Fig. 2 is a bottom view of my improved clamp; Fig. 3, a side view of a section of said clamp; Fig. 4, a plan of the feeding mechanism, (patented June 13, 1871;) and Fig. 5, a top view of the plate and clamp as taken off from Fig. 4. Fig. 6 shows more fully the mode of attaching the looper-points *d' d'* to the looper-lever *g*, and is a top view of the same when the machine is turned back on its stands. Fig. 7 is a section of the spreader *w'*, spreader-block *n''*, and spreader-lever E, showing the manner in which the same are connected.

All the drawings are half size, with the exception of Figs. 1, 6, and 7 of the last-named drawing.

Beginning with Drawing No. 1, the general description of my new machine is as follows: T is the bed or table of the machine, to which the operating parts are attached, and is hung upon the journal-stands S S at the points *u u*, so that it can be easily turned back to get at its under side. V is a section of the connecting-rod from the treadle to the driving-wheel. W is the driving or balance wheel fixed on the horizontal shaft *y*, which, when rotated, communicates motion to all the operating parts of the machine through the cylindrical cams M N O P Q. These cams are secured in position on said horizontal shaft by set-screws, and are so grooved that when they are revolved by said shaft, in connection with the several levers whose trundles run in their grooves, they impart the requisite movements to the various operative devices for making and spacing the stitches on the edges of the button-hole as desired. Cam M gives motion to the needle-bar H through the lever F, (Drawings No. 1 and 2,) which lever is pivoted to the neck G of the machine at *j*. This lever has a recessed head, into which is fitted a block, as indicated by the dotted lines *k*. Into this block projects a pin from the needle-bar H, through which a vertical motion is imparted to said bar, and said block is given sufficient end play in its recess to allow it to accommodate itself to the circular movement of the lever F and the vertical and lateral movements of the needle-bar. Cam N gives motion to the lever L, (Drawings No. 1 and 3,) which is pivoted to the neck of the machine at *r*, and through said lever to the needle-bar carrier K, whereby a regular lateral motion is given to said needle-bar, causing the needle to pass alternately through and over the edge of the material sewed in forming said button-hole stitch. The outward throw of said carrier, carrying the needle over the edge of the goods, is always the same; but the inward throw, by which the needle is made to pass through the edge of the goods, it is very desirable to be able to regulate, so that it may be made to take more or less hold of the edge, according to the nature of the material which is being stitched. This desirable adjustment of the lateral movement of the needle I have provided for in the construction and mode of operating my needle-bar carrier. The carrier K is attached to the neck of the machine, and slides on its bearings at the points *l l l*, and has a slot, *z*, corresponding with the slot *q* on the lever L. Through these slots passes the movable stud *i*, which is held in position by a

nut screwed onto its outer end, (the stud having a shoulder against the back side of the lever, and allowing a free movement to the carrier,) and forms the connection between the said carrier and lever. When said carrier and lever are thus connected, if the movable stud were fixed at the upper extremity of the slot *z*, then the inward throw of the needle-bar would be its furthest and greatest throw or scope; but when the said stud connects the lever and carrier at the lower extremity of said slot and nearer the pivot *r*, on which said lever turns, it will give the narrowest gauge or least inward throw. By sliding said stud up and down said slots the stitch may be gauged to any intermediate depth in the edges of the button-hole. Cam O, Drawing No. 1, gives motion to the looper-lever C, to which the looper *d'* is connected by a jointed bar, *g*, and adjustable clasp, *b'*. The jointed bar slides under and is held in position by the caps *c' c'*. The looper-lever C is pivoted to the table of the machine at *a'*, and has a trundle working in the groove of the cam O, as indicated by the dotted circle on said cam. When the needle has passed down through the edge of the material being stitched to a point below the looper *d'*, and has started back and thrown out a loop of the upper thread, and while it halts a little in this position, the right-hand point of the looper *d'* passes into said loop of the upper thread; and while the needle goes up—to move over laterally and come down again through the button-hole and through this loop—said point of the looper carries it forward to the left far enough to allow the needle in its descent to pass through it. Then, as the needle again throws out a loop of the upper thread, the other point of the looper, which is threaded with the under thread, as shown, passes into said loop of the upper thread, and carries it to the right far enough to secure the next descent of the needle through its own loop of the under thread, which has just passed through the loop of the upper thread. Thus the points *d' d'* alternately enter and carry the loops of the upper thread in the process of stitching. Cam P gives motion to the feed-lever D. This lever is pivoted to the table at *e'*, and has a trundle working in said cam, as indicated by the dotted circle. On the shaft *v* of the feed-wheel A, Drawings No. 1 and 4, Fig. 4, which projects down through the table of the machine, there is fitted a wheel, *n'*, having a bar or clutch, *o'*, so arranged in connection therewith that when said bar is moved to the left it passes freely around said shaft *v* without moving the same; but when turned in the opposite direction it gripes the wheel *n'* and moves the same, together with the shaft *v*, to which said wheel is attached, and thus puts in motion the whole feeding mechanism, shown in said Fig. 4. The bar or clutch *o'* is connected with the feed-lever D by the rod *m'* and adjustable clasp *p'*. This mode of connecting the device for imparting an intermittent rotary movement to the feed-wheels with a lever pivoted and operated as shown enables me to easily regulate the movement of the feed-wheels, and consequently the spacing of the stitches, by giving more or less vibrating movement to the rod *m'*, connecting the device used for turning the shaft of the feed-wheels A with the feed-lever, by simply slipping the clasp *p'* up and down on the lever D. When the clasp is slipped down toward the axis *e'*, on which said lever turns, the throw or vibration of the rod *m'* is less than when said clasp is slid toward the outer end of said lever, and further from said axis or pivot. Therefore, by slacking the screw or clasp *p'*, and sliding the same along said lever in either direction, a greater or less amount of movement of the feed-wheels may be obtained at each vibration of the lever, and consequently the number of stitches taken in the edges of the button-hole may be varied, and adapted to the different sizes of twist used and to the material sewed. There is also on said shaft *v* a hand-wheel, *x'*, to enable the operator to turn the feeding mechanism by hand, independently of the movement of the driving-shaft of the machine, for the purpose of moving the clamp into proper position for stitching button-holes of various lengths, or for any other purpose in which a movement of the clamp independently of the stitching mechanism is desired. Cam Q gives motion to the spreader-lever E, which is pivoted to the table above the looper-bar at *h'*, and has a trundle working in said cam, as indicated by the dotted circle. The spreader *w'* vibrates at nearly right angles to the looper *d'*, and its office is to spread the loops formed in stitching alternately on its points *v' v'*, to insure the passage of the needle through them in its descent. When the right-hand point of the looper *d'* carries forward a loop of the upper thread, as before described, the left-hand point of the spreader *w'* takes one side of the loop, and, while the needle is ascending and moving over laterally to descend again through said loop, it carries the thread so taken up, above the point of the looper, to the position in which it is shown, thus spreading or widening out the loop between its own point and that of the looper, so that the needle in its descent is sure to pass through the same. And when the other point of the looper *d'* carries forward its loop, as before described, the right-hand point of said spreader takes the thread passed through said loop by said threaded looper-point, and carries that thread up in like manner and for the same purpose as in case of the other point of the spreader just described. The mode of attaching the spreader *w'* to a grooved block, *n''*, and securing said block to the tongued end of lever E by a set-screw passing through a slot in said lever into said block, as shown, Fig. 7, is new and advantageous, in that it allows the spreader to be adjusted laterally with reference to the lateral movements of the needle, and makes the construction of the spreader more simple and cheap than as hitherto constructed.

Attached to the plate of the machine, and projecting in front of and across the spreader, is a needle-guard, *g'*, for the purpose of causing the loop of the upper thread to be thrown toward the looper *d'*.

By the use of cylindrical cams so arranged upon a horizontal shaft, and working in combination with levers pivoted as shown and described, I am enabled to adjust said cams separately, either in a lateral or rotary direction, and thus gain great practical advantages in regulating the movements of the several parts operated by said cams with reference to each other. For example, if I wish to make the looper-points *d' d'* move a little further either to the right or left, I can accomplish it without interfering with the time of their movements relatively to the other parts by sliding the cam O laterally on its shaft to right or left. A similar adjustment of other parts can be made by sliding the cams on the shaft in like manner. This improvement in the combination and arrangement of the parts gives my present machine great advantages over any original machine which is not susceptible of such adjustments, and consequently requires more labor, skill, and expense in putting the machine together in good working order, and is much more difficult and expensive to keep so when put into practical use. By attaching the looper-points *d' d'* to a jointed bar, and connecting with the lever C by an adjustable sliding clasp, as shown and described, I also gain a practical advantage in the facility with which I can regulate the vibrations of said looper-points, and adapt their movements to the throw of the needle-bar carrier, giving them a greater or less reciprocating movement, according to the position of said clasp on the lever C, on the principle of adjustment already explained in reference to the feed-lever D. I gain another practical advantage by using looper-points *d' d'* inserted in the looper-bar and secured by set-screws, as shown, Fig. 6, whereby both of said points can be easily adjusted relatively to each other and to the upper needle, and are more cheaply constructed than the loopers hitherto used.

On the needle-bar cap I, Drawing No. 2, a simple constant thread-friction is used in place of the complicated device hitherto used on the old machine, which latter consists of a nipper-lever operated intermittently by a cam against two springs attached to the needle-bar cap, between which the thread is passed, and worked in connection with a sliding take-up wire and spring. The friction now used, which is more fully shown in Drawing No. 4, Fig. 1, consists of two thin circular plates, *f*, of steel, with a hole in their centers, through which a pin, *a''*, projects from the cap I; and on said pin, and against said plates, is placed a light spiral spring, *b''*. The pin has a thread on its outer end, on which is screwed a nut, *c''*, against the spring to produce the proper pressure on said plates, between which the thread passes to the eye of the needle. In connection with the movements of the needle-bar and the stationary take-up *p''*, this comparatively inexpensive appliance serves the purpose of enabling the upper thread to form a loop when the needle (having descended to its lowest point) starts back to its halting position, and also assists in drawing up the loops formed in stitching while the needle is descending. The stationary take-up *p''* performs a very important part in this connection by assisting in slacking and tightening the thread at the proper times to enable the loop of the upper thread to form as perfectly when the needle is in the goods as it does when the needle passes down through the button-hole, thus remedying a defect which has always existed in the old machine, and has given trouble, particularly on certain classes of thick heavy work.

My improvement in the clamp, which holds the goods to be stitched, consists in a new mode of constructing and spreading the jaws of the same, as shown in Drawing No. 4, Figs. 2, 3, and 5. I make curved elastic jaws *e*, Fig. 3, upon the upper arms of the clamp, which, when pressed down upon the work, adapt themselves by springing to the inequalities of thickness and uneven surfaces of the goods clamped, and thus secure a firmer hold on the same. The under jaws *w w* are constructed to slide laterally in opposite directions on the base *d* of the clamp and parallel with each other, and are held down upon the base of the clamp at one end by the caps *l' l'* and at their opposite ends by screws turned into them through slots in the base of the clamp, as shown in Fig. 2. The springs *x x* in the long slots in the base of the clamp, whose outer ends bear against pins or stops which project from said slides down into said slots, serve to place and keep said slides in proper position when the clamp is not holding and spreading the goods. When two or more thicknesses of goods, through which a button-hole is cut, are placed in the clamp, and the upper jaws are firmly pressed down upon the same, the pressure upon the jaws *w w* and the friction between the thicknesses of goods clamped are sufficient to spread the under jaws, together with the goods in immediate contact with them, uniformly with the spread of the upper jaws, (and the intermediate goods,) which are operated with the spreader-cam *k'*. This manner of constructing and spreading the under jaws of the clamp is much more simple and less expensive than the mode hitherto adopted, whereby both sets of upper and under jaws are spread by a cam. The feed-wheels A B, Fig. 4, being smaller than the wheel heretofore used, my table is so constructed as to allow me to apply a simple and convenient cutting attachment to my present machine, by means of which the button-hole may be cut after the material is placed in the clamp and securely fastened, which has been found to be very desirable in many kinds of goods. This improvement consists in a cutter-block, *t*, Drawing No. 2, resting firmly on the table, and secured thereto by a screw up through the un-

der side of the table into said block, and otherwise fastened by a slot in the plate of the machine, which fits down over and around said block. Over said block, and attached to the neck of the machine, is a hanger, into which is fitted a cutter-bar, U, which slides vertically, and has a flange on its back side fitted into the hanger to prevent its having any rotary movement. A spiral spring keeps it up from the block, as shown. A cutter is inserted in the lower end of the bar and secured by a set-screw. When the clamp is in the working position, shown in Drawing No. 4, Fig. 5, and the goods to be cut and stitched are placed between its jaws and firmly secured, it is then withdrawn from the plate-button *b* by raising the guide-pin *p* out of the slot *o* in the plate, and drawing the clamp back far enough to release it from the flanges of said button, which project into the channels in the edges of its base; then the clamp is moved sidewise and slid on over the cutter-block, which projects up through the slot *s'*. The cutter-block fills the opening in the base of the clamp, and has a pin through it transversely, as shown in Drawing No. 2, which projects on either side far enough to enter the channels made for the flanges of the plate-button, and thus secures the clamp upon the block, while the guide-pin *p* springs down into the hole *r* in the plate, and further secures the clamp in its position under the cutter. A blow is now given to the top of the cutter-bar with a mallet, which causes the cutter to descend and cut the button-hole centrally in the clamp. When the hole is thus cut, a more nice and uniform stitch is obtained than it is practical to make when the hole is first cut and then placed in the clamp and set by the eye of the operator, especially in heavy garments; and goods that "fray" easily are much more satisfactorily stitched when cut in the clamp, as above described.

I claim as my invention—

1. The carrier K and lever L, connected and adjusted by the stud *i*, as described, when used in combination with devices consisting of a clamp, feeding mechanism, and slotted plate, for holding, moving, and guiding the goods to be stitched, substantially as shown and described.

2. In combination with the needle and looper-points *d' d'*, the take-up *p''* and thread-friction, consisting of plates *f*, pin *a''*, spring *b''*, and screw-nut *c''*, substantially as and for the purposes specified.

3. The jointed looper-bar *g*, when constructed, combined, and arranged to operate and be adjusted substantially as and for the purposes specified.

4. In combination with the elements of the preceding clause, I claim the adjustable looper-points *d' d'*.

5. The vibrating lever D and pivoted adjustable rod *m*, in combination with the feeding-bar *o'*, wheel *n'*, feed-wheels A and B, and ring R, all working together substantially in the manner and for the purposes specified.

6. In combination with spreader *w'*, the lever E, block *n''*, and cam Q, when combined and arranged to operate and be adjusted substantially as shown and described.

7. The arched elastic jaws *e*, in combination with the upper arms of the clamp, substantially as described and shown.

8. The lower jaws *w w*, having a lateral sliding movement on the base of the clamp, and constructed and adapted thereto, as described and shown, and for the purposes specified.

9. In combination with the bed of the machine and the clamp, the stationary cutter-block *t*, with its transverse pin or equivalent, for the purposes described.

10. The hand-wheel *x'*, in combination with the shaft *v* of feed-wheel A, for the purpose of operating the clamp, as described.

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