2 Sheets—Sheet 1.

D. W. G. HUMPHREY.

SEWING MACHINE.

No. 36,617. Patented Oct. 7, 1862.

Fig. 1.

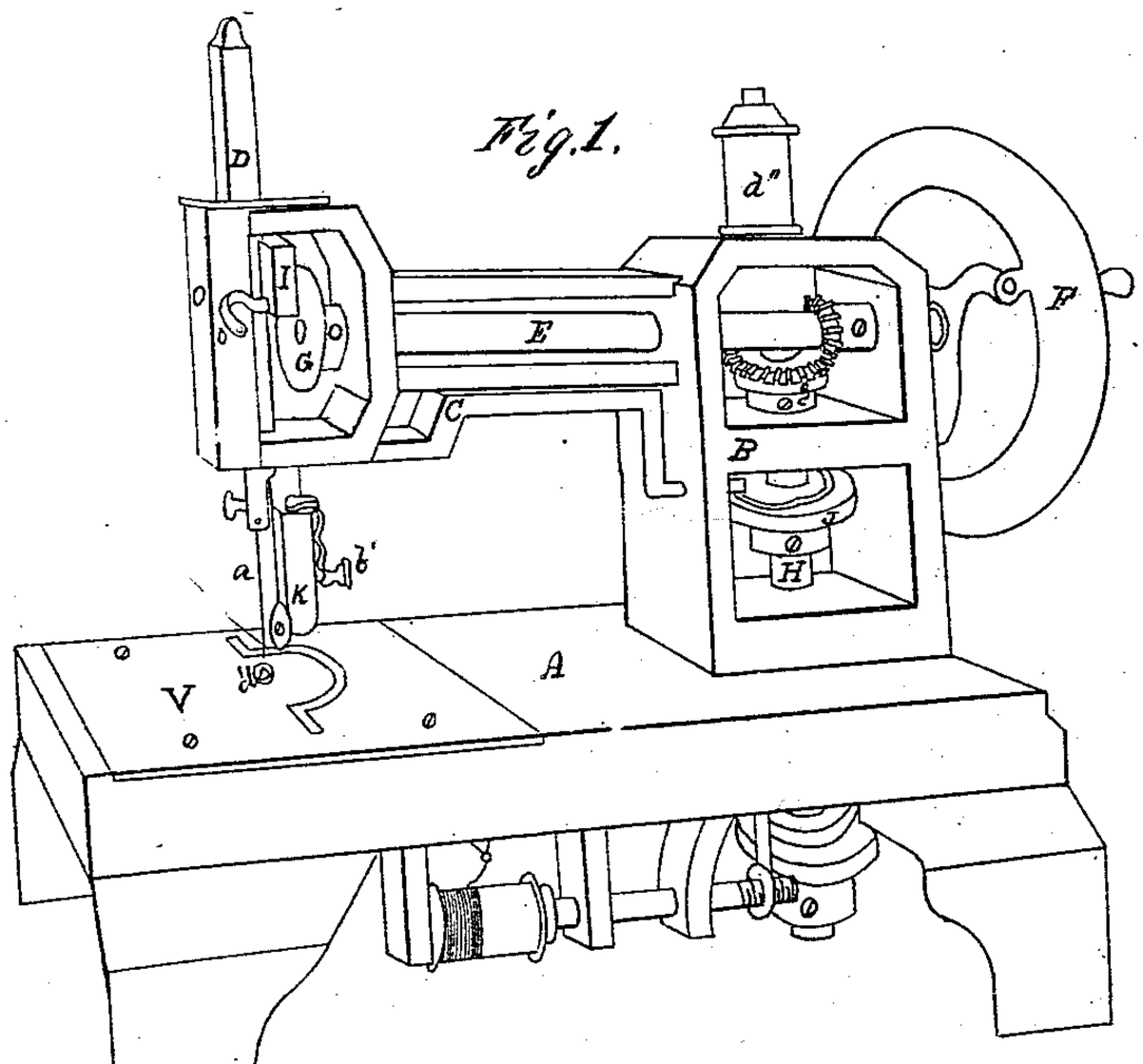


Fig. 2.

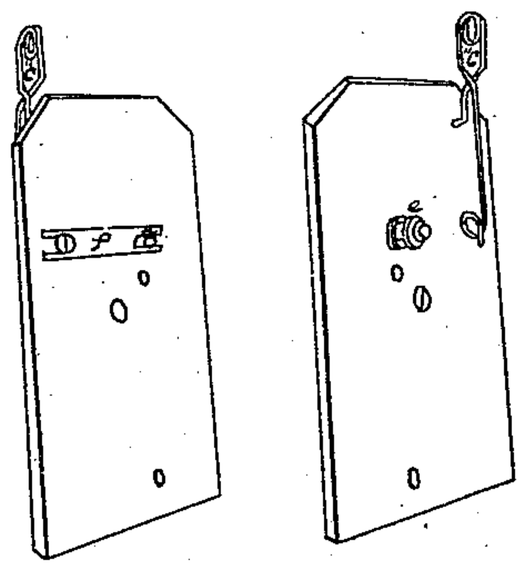


Fig. 4.

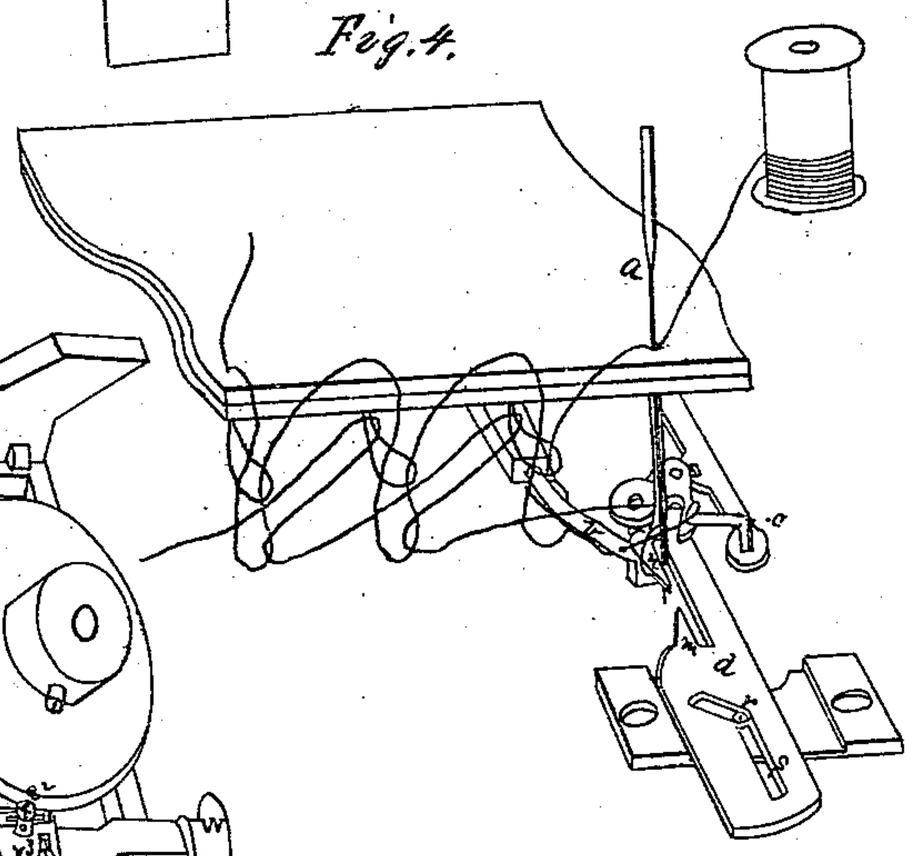
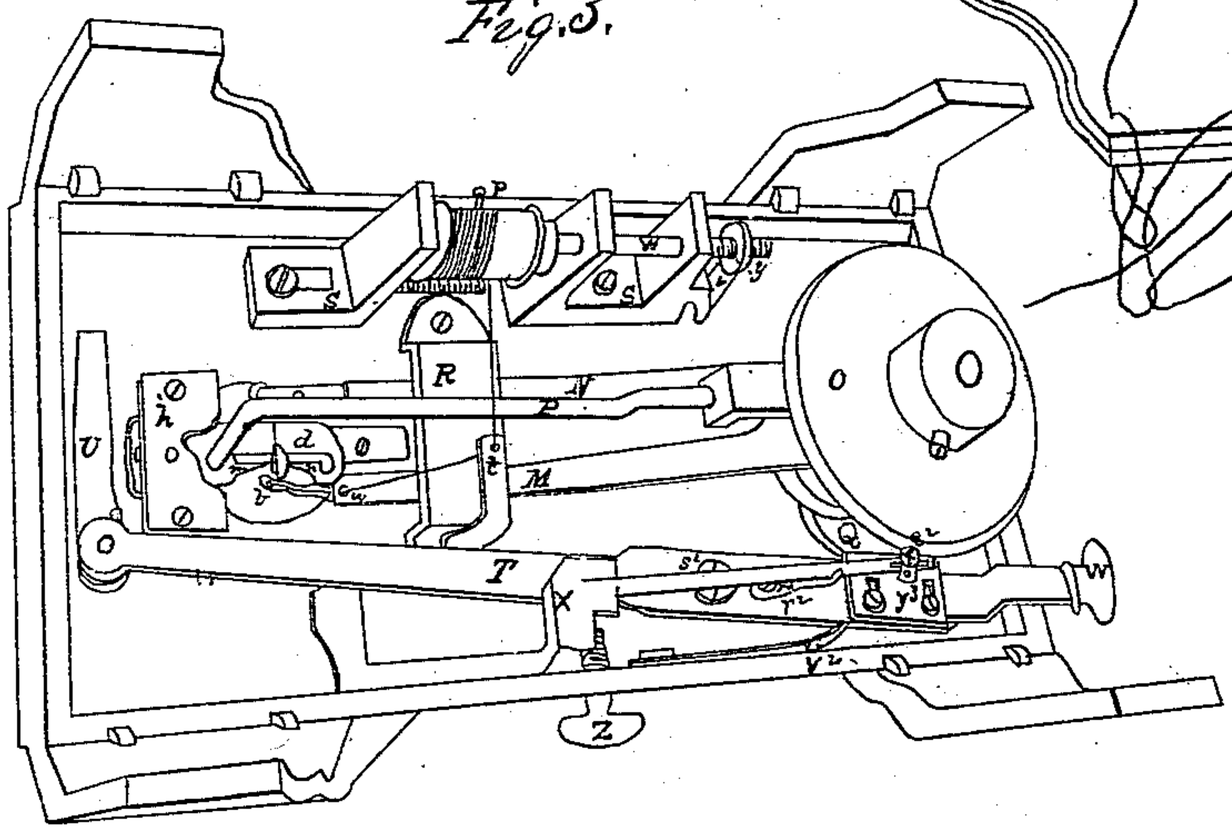


Fig. 3.



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2 Sheets—Sheet 2.

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SEWING MACHINE.

No. 36,617. Patented Oct. 7, 1862.

Fig. 5.

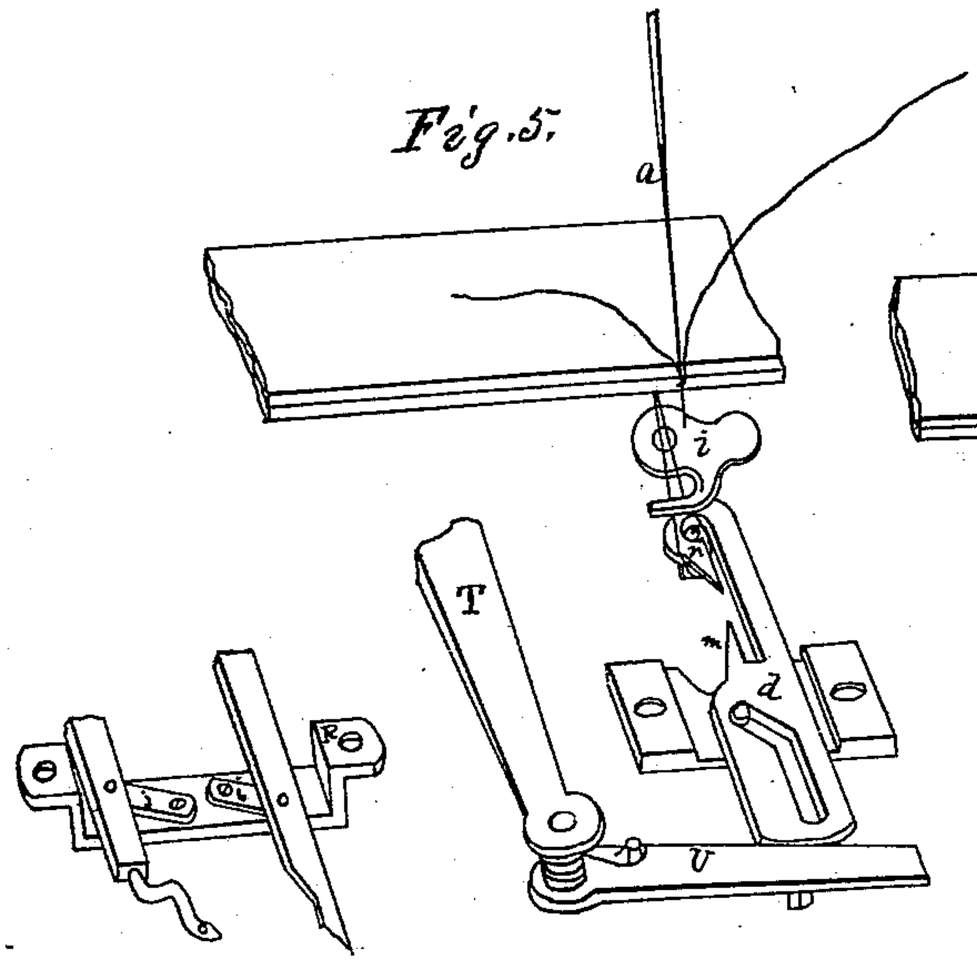


Fig. 6.

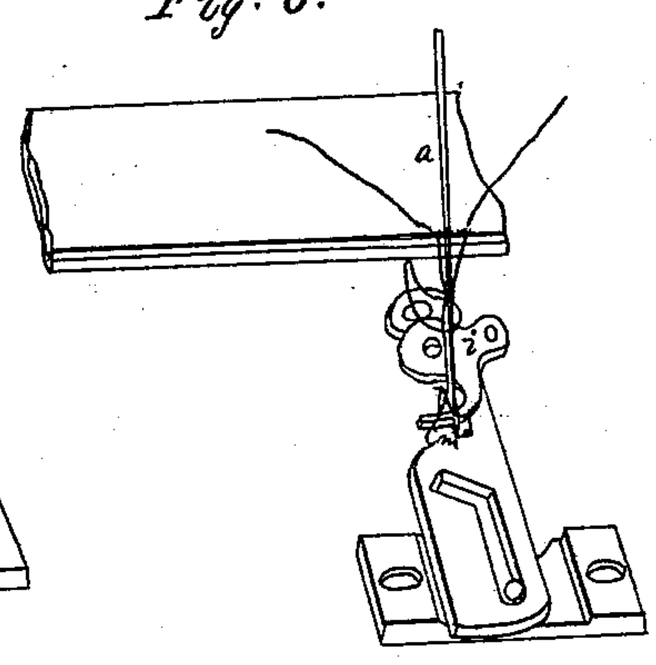
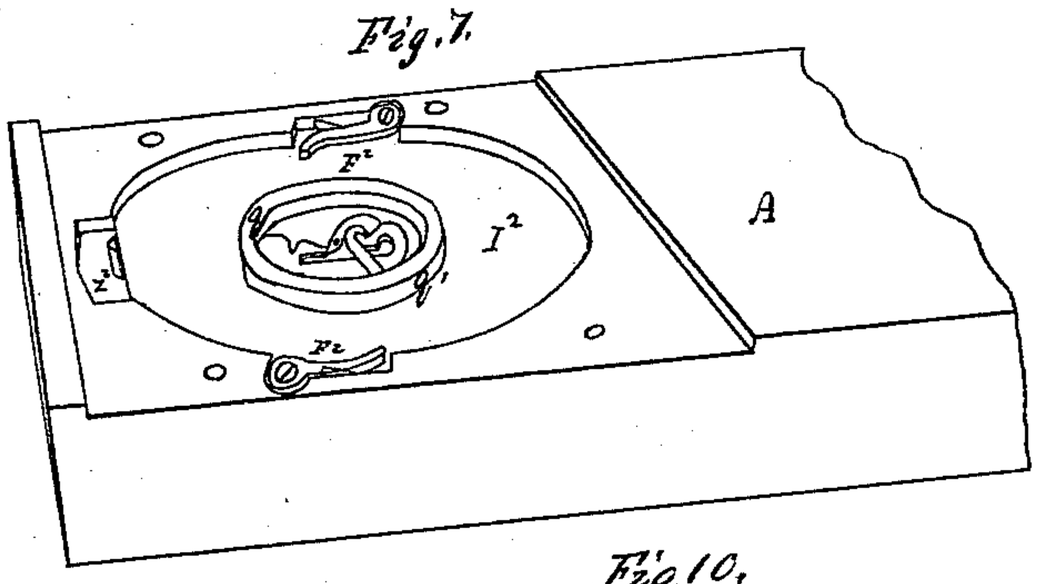


Fig. 8.

Fig. 7.



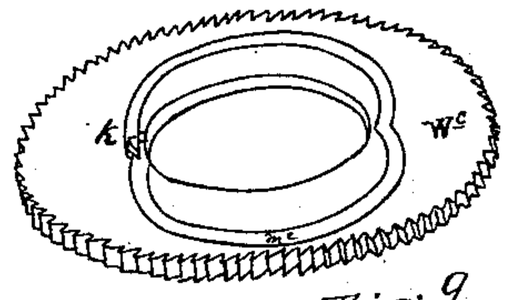


Fig. 9

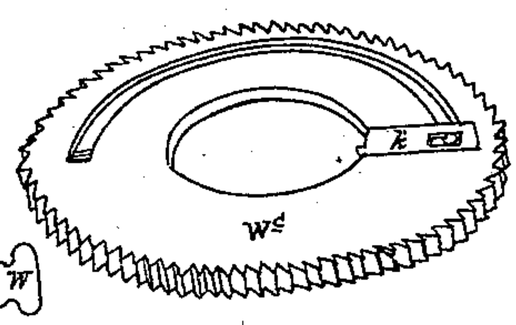


Fig. 10.

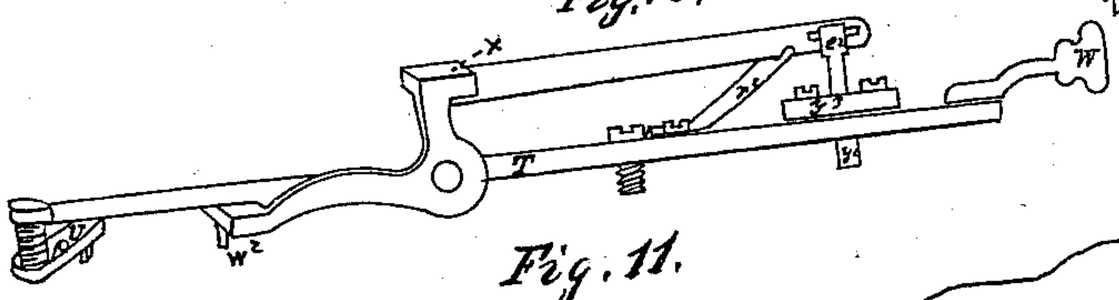


Fig. 11.

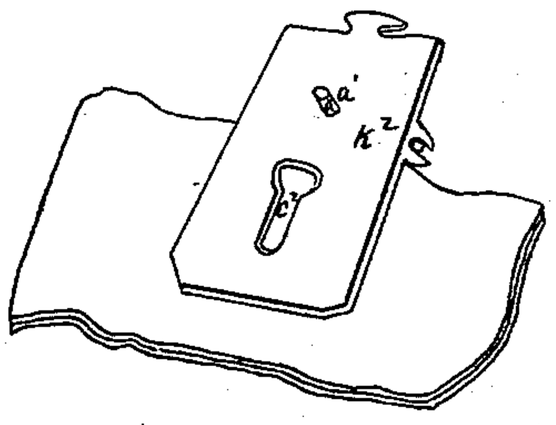
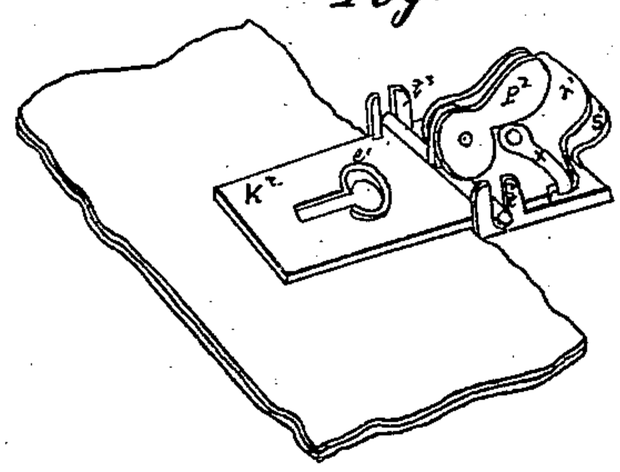


Fig. 12.



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UNITED STATES PATENT OFFICE.

D. W. G. HUMPHREY, OF CHELSEA, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **36,617**, dated October 7, 1862.

To all whom it may concern:

Be it known that I, D. W. G. HUMPHREY, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and useful Machine for Button-Hole or Edge Finishing or Stitching; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view with the side of the arm removed for the purpose of showing the internal arrangement of the parts. Fig. 2 shows the opposite sides of the part removed from the arm with the tension arrangement attached. Fig. 3 is a perspective view of the under side of the table. Figs. 4, 5, and 6 show how the threads are interlooped to form the stitch. Fig. 7 is a section of the table with the plate V and the cam-wheel W^c, Fig. 8, removed. Fig. 8 shows the upper face of the cam-wheel W^c and groove by which the feed-clamp is moved. Fig. 9 shows the under face of the cam-wheel W^c and groove which operates rocker X. Fig. 10 is a section of the feed mechanism. Fig. 11 is an under side view of the feed-clamp K^2. Fig. 12 is a view of the upper side of feed-clamp K^2.

A, Fig. 1, is the table; B, the arm; C, the needle-bar carrier; D, the needle-bar, and E a horizontal shaft, on which is the balance-wheel F and the crank-wheel G, which drives the needle-bar. This shaft connects by bevel-gears with the cam-shaft H in such a manner that the latter makes but one revolution while the shaft E makes two. J is a cam which gives to the needle-bar carrier C a lateral motion, by which the needle *a* is carried alternately through and over the edge of the material worked upon. I is a slotted cam attached to the needle-bar. In this cam a pin on the face of the cam-wheel G works, thus giving the needle-bar the proper vertical motion. *o'* is a thread-guide attached to cam I. K is the clamp-presser. *b'* is a latch by which the clamp-presser is raised.

c, Fig. 2, is a thread-guide and tension, through the upper eye of which passes the thread from the spool *d''*, thence around the wire according to the tension required, and through the lower eye, thence through the eye of the thread-clamp *e*, hereinafter described, through the eye of the thread-guide *o'*, then through the eye in the lower end of the needle-bar, and through the eye of the needle *a*. *f* on the inner side of Fig. 2 is a spring which holds the thread-clamp *e*. When the plate shown in Fig. 2 is screwed onto the arm in its place the point of the thread-clamp at *e* is intermittently operated upon to relieve the thread by cam *g*, attached to hub of bevel-gear on shaft H. The thread-clamp *e* is a hollow screw with a piston working within it. The screw is turned by a wrench into the side of the arm, as shown in the plate at the right, Fig. 2. On the outward end of the piston is a shoulder which, to clamp the thread, is drawn against the face of the screw by the spring *f*, attached near to the end of the piston, which is operated upon by cam *g*, as described. The eye of the clamp through which the thread passes is through the piston close to its shoulder. The draft or tension on the thread may be increased by turning the screw backward or diminished by turning it forward.

Fig. 3, *d* is the loop-carrier, which is connected by the bar P to cam O, which gives it motion. The points *m* and *n* work alternately and enter the loops from opposite directions. It is held in its place by the cap *h'*, over which it slides, having a lateral motion produced by the slot S working on the pin *r*, Fig. 4. M, Fig. 3, is a bar carrying the lower needle, *b*, for the binding-thread, and receives motion from a cam on shaft H. N is a bar carrying hook *e* for spreading the loop of the binding-thread. It also operates the loop-check *i*, Fig. 4, and receives motion from cam on shaft H. M and N are connected to cap R by the sweeps *j* and *l*, Fig. 5, which give the needle and hook a curved motion. S S, Fig. 3, is a spool-stand. Sliding rod *w* holds one end of the spool. On the opposite end of the rod is a screw for the wheel *y*. Spring *v* presses against wheel *y*, and by turning wheel *y* more or less against spring *v* the tension is regulated. The binding-thread passes from the spool through the eye of spring P, (which takes up the slack thread,) then through guides *t* and *u*, through the eye of the needle *b*, thence up through the plate V.

Fig. 4 represents the stitch produced by the mechanism herein described, and, together with Figs. 5 and 6, shows the operation of the parts in producing it. Fig. 4, needle *a* carries a loop of the finishing-thread through the cloth, which loop is entered by the point *n* of the

loop-carrier. *a* then retreats, leaving its loop on point *n*, Fig. 5. The loop-carrier moves farther forward, and at the same time laterally far enough to receive the needle *a* as it descends over the edge of the cloth and through the loop on point *n* at *z*. The loop-check *i* holds the loop in a position to insure the passage of needle *a* through it. As soon as needle *a* carries a loop over the edge of the cloth and through the next preceding loop, which was carried through the cloth, the loop-check *i* and the loop-carrier *d* retreat, leaving the loop carried through the cloth over needle *a*, and free to be drawn up at the next descent of the needle. The needle *a* then continues its descent over the edge, forming another loop, which is entered by the point *m* of loop-carrier, Fig. 6. The needle *b*, Fig. 4, then passes a loop of the binding-thread through the over-edge loop, point *m* and needle *a* then retreat, leaving a loop of the finishing-thread over needle *b*. Hook C seizes the loop of the binding-thread and holds it open until needle *a* carries another loop through the cloth and enters its point into this loop of the binding-thread, when the needle *b* withdraws from the over-edge loop and at the same time the hook C releases its hold upon the binding-thread, leaving its loop around the needle *a* near its point. The farther descent of the needle *a* draws up the over-edge loop. As needle *a* starts upward it forms another loop, which is entered by the point *n*, as before described, and thus the stitch is completed. The feed may operate when the needle *a* is up and free from the cloth, either every time after it has carried its loop through the cloth or every time after it has carried its loop over the edge.

Fig. 3, T is the feed-lever with the sliding piece U hinged to it. Through these the cam Q moves the cam-wheel, Fig. 8, coming in contact with it through the slot z^2, Fig. 7. After the sliding piece U, Fig. 10, which is held against the cam-wheel by a spring around the standard, which connects it to lever T, has moved the cam-wheel forward, the noise which would be occasioned by allowing it to come in contact with the teeth of cam-wheel while moving back is prevented by the loop-carrier *d*, Fig. 5, which moves it away from the teeth, and against the end of which it slides back to its place. Fulcrum of lever T is at s^2. v^2 is a spring which keeps the end of lever forward that it may come in contact with cam Q. This cam works against lever T at point y^2. Z, Fig. 3, is a screw for regulating the feed. When feeding the rounded part of the button-hole the cam-wheel must move faster than when feeding the straight parts of it, else the stitches will be too much crowded in the rounded part. The necessary change of feed is produced as follows: Y^3, Fig. 3, is an adjustable plate attached to lever T, and is fastened to the lever by screws through slots, that it may be moved farther from or nearer to cam Q, by which the feed of the rounded part may be regulated. Through Y^3 the piston e^2 works. While feeding the rounded part of the piston e^2 is dropped down forward of y^2, coming nearer to cam Q and in contact with it, thus giving more vibration to lever T. Piston e^2 is raised and depressed by the arm of rocker X. Rocker X is operated upon by the groove in the under side of cam-wheel, Fig. 9. When stitching the straight part of the button-hole point w^2 of rocker, Fig. 10, rests in the groove on the under side of cam-wheel. When stitching the rounded part it is raised to the surface, thus raising and depressing piston e^2 at the proper time to effect the changes of feed. Spring r^2 keeps rocker X in contact with the cam-wheel. Arm of rocker X should be made of thin plate or with a joint in it, that it may yield to the vibration of lever T. Handle W on the end of lever T is for the purpose of operating the feed without moving any other part of the machine.

Fig. 7, I^2 is the recess of the table A in which the cam-wheel W^c works around the collar *q* as its axis. f^2 f^2 are pawls. z^2 is a slot through which the slide U moves the cam-wheel. When the cam-wheel is placed into the recess and in proper position to commence work that point of its groove marked m^2 should rest directly under point n^2 of Plate V, Fig. 1.

Fig. 11 is the under side of the feed-clamp. The use of this clamp is to hold the cloth or other material to be stitched. By clamping two or more thicknesses in this way their edges are held even and smooth through the process of feeding, neither side of the cloths being directly acted upon by feed or friction to draw or displace them. The inner or holding surfaces of the clamp may be rough or smooth, as the material worked upon may require.

Fig. 12 is an upper view of the feed-clamp. The upper and lower plates are held in their relative position by the arms of the upper plate fitted to the slots in the standards t^3 of the under plate. *x* is a spring riveted at the middle to the upper plate. Its ends bend downward and rest upon the lower plate, thus raising the end of the plate to which it is attached and making a stronger pressure on the cloth when the plates are pressed together by the lever p^2. c^2 is a slot through the clamp and through which the needle works. This slot should be long enough for the longest button-hole, and its width in the lower plate should be equal to the diameter of the circular projection *d'*, (under the needle on Plate V, Fig. 1,) over which it works. The end of the slot in which the rounded part of the button-hole is placed must be enlarged in proportion to the enlargement in the button-hole. The slot in the upper plate should be of such width that the needle, passing down through the material or cloth, shall work close to the edge of it. The rim *e'* on the upper plate, when feeding through the round part of the button-hole, comes in contact with the presser-wheel, which keeps the edge of the lower plate close to the circular projection *d*. This rim is not necessary in working a straight button-hole, in which case the slot c^2 should not be enlarged at the

end. To place the clamp on the machine in position to commence work, raise the needle to its highest point; also raise the clamp-presser. Then place the clamp under, so that slot c^2 shall rest over the circular projection d', and that the pin a' on the under side of the clamp shall drop through the slot in plate V at point n^2 and into the groove of the cam-wheel at m^2. As the cam-wheel is moved forward the clamp, guided by the slot in plate V, is fed along in a straight line while one side of the button-hole is being stitched. As the pin a' of clamp enters the circular part of the slot in plate V it reaches that point of the groove in the cam-wheel nearest to its center and there rests until the wheel has fed it through the circular part of the slot while the rounded part of the button-hole is being stitched. While the pin a' is passing through the circular part of the slot it is moved forward in contact with a point on slide k' of cam-wheel and at the point where it enters the other straight part of the slot there is a recess in the collar q, Fig. 7, around which the cam-wheel works. Into this recess the end of slide k' is pressed by the pin a', leaving the groove open until the slide k' has passed forward of pin a'. The cam-wheel then carries the pin a' through the other straight part of slot in plate V while the other side of the button-hole is being stitched. The feed-clamp may then be removed, leaving the cam-wheel in the same position as at the beginning. To make a shorter button-hole than would be made by starting the pin at point m^2, as described, feed the clamp along by operating with the hand the lever T at W until that point is brought under the needle where it is desirable to commence.

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

1. The needle-bar carrier C, operated as described, whereby a regular lateral motion is imparted to needle a, carrying it alternately through and over the edge of the material worked upon to form an edge-finish or button-hole stitch.

2. The combination of the needle-bar carrier C, the loop-carrier d, needle b, hook c, and loop-check i with needle a, arranged and operated as described, whereby the button-hole stitch represented is produced.

3. The cam-wheel W^c, employed to feed the material to be stitched, when such material is held and directed by or acted upon through plates, clamps, or their equivalents, the said cam-wheel being moved by any suitable mechanism.

4. The slotted plate V for the purpose of giving direction to the feed-clamp in stitching any form of button-hole, in combination with the cam-wheel W^c for the purpose of moving the said feed-clamp, both arranged and operating substantially as specified.

5. The feed-clamp K^2, constructed substantially as described, for the purpose of holding the material to be worked upon while it is being fed and directed by the cam-wheel W^c, in combination with the slotted plate V, or by any other suitable mechanism.

6. The employment of the rocker X, piston e^2, adjustable plate Y^3, and spring r^2, in combination with the lever T, operated as and for the purpose specified.

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