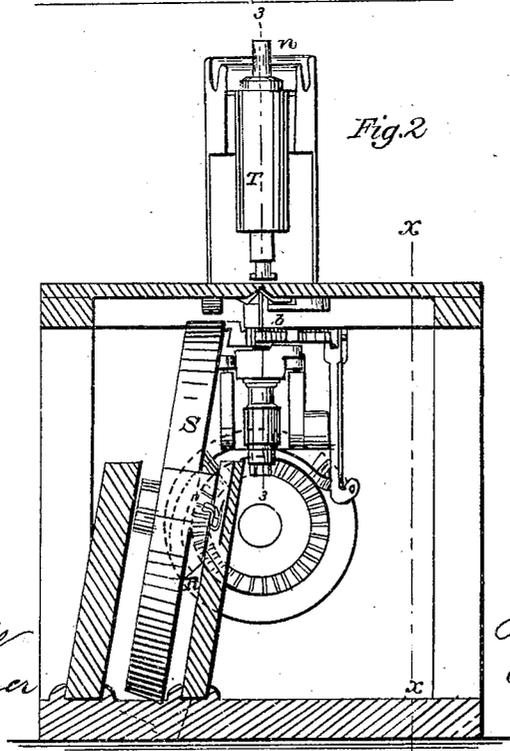
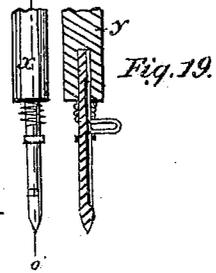
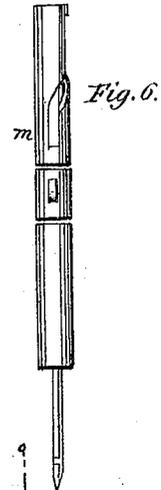
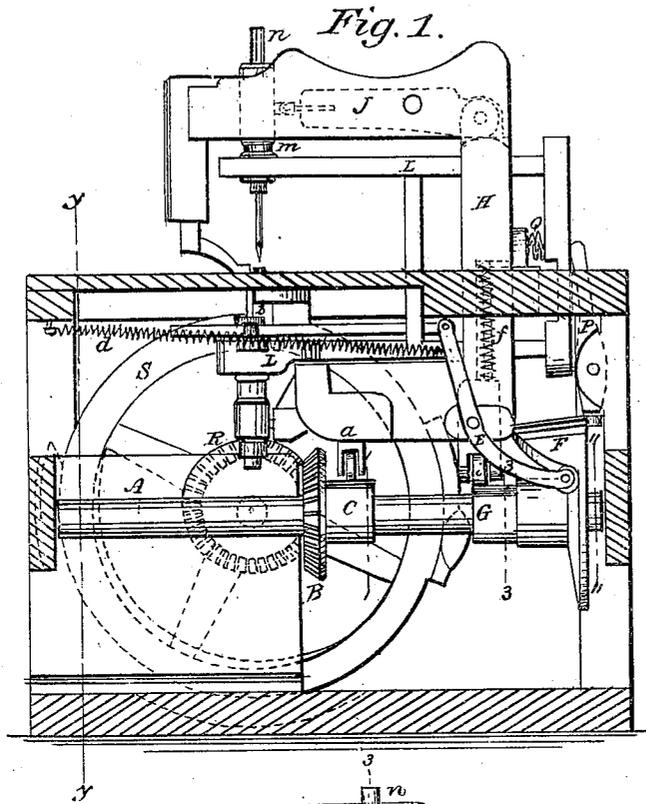


H. E. REYNOLDS.
Sewing Machine.

No. 79,393.

Patented June 30, 1868.



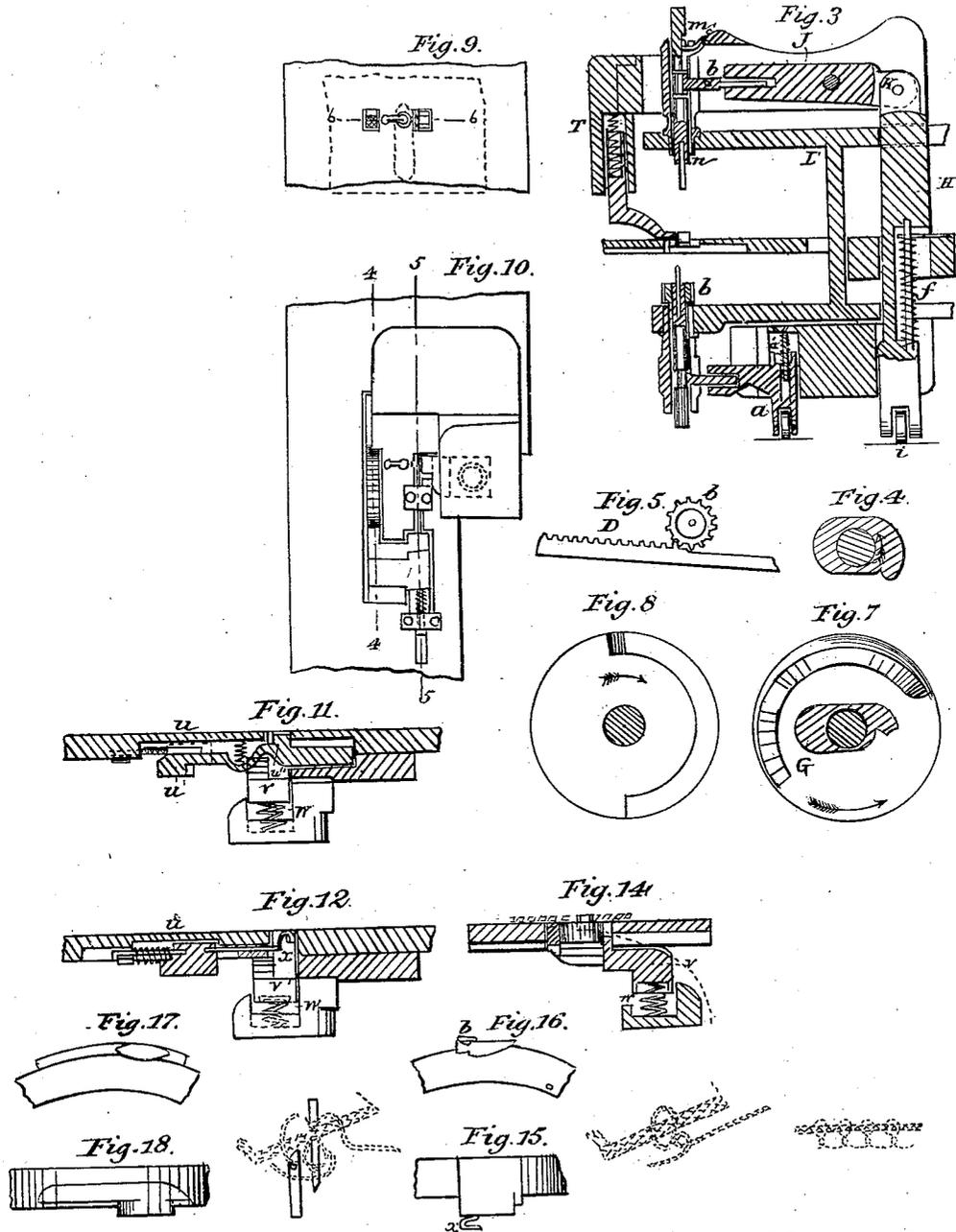
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HENRY E. REYNOLDS, OF BRISTOL, RHODE ISLAND.

Letters Patent No. 79,893, dated June 30, 1868.

IMPROVEMENT IN SEWING-MACHINE FOR BUTTON-HOLES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, HENRY E. REYNOLDS, of the city and county of Bristol, and State of Rhode Island, have invented a new and improved Button-Hole-Sewing Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object I have in view in this invention is to furnish a machine by which button-holes in clothing may be worked and completed with the same facility with which any other kind of sewing is done on the same garments, and in doing this I have succeeded in forming, by machinery, the ordinary hand button-hole stitch, which it is conceded is the best which has ever been discovered for the purpose. And my invention consists in such a construction and arrangement of parts as enables me to accomplish the object in view, as will be hereinafter more fully described.

Figure 1 is a sectional side elevation of the machine; the section being through the line $x x$ of fig. 2.

Figure 2 is a sectional end elevation, the section being through the line $y y$ of fig. 1.

Figure 3, Sheet II, is a section through the line $z z$ of fig. 2.

On Sheet II there are a number of other views, showing in detail the different parts of the machine, which parts will be referred to hereafter.

Similar letters of reference indicate corresponding parts.

This machine does not sew from a spool, but from a single thread, of the length required for the button-hole, or the same as by hand.

It operates with an upper and a lower needle, which needles have slotted or open eyes, and work in a perpendicular position, but the upper needle only goes through the cloth.

Motion is imparted to the machine from a revolving horizontal shaft, marked A.

B is a driving-gear wheel on this shaft, the hub of which wheel is a cam, marked C, a cross-section of which is seen on Sheet II, at Figure 4, through the line 1 1 of fig. 1.

This cam gives the lower needle its up and down motion through the traversing-roll and arm seen at a , figs. 1 and 3. The arm, carrying the needle-bar with it, is thrown up by the cam, and depressed, to follow the surface of said cam, by a spiral spring, a'

The bar of the lower needle has a fine cogged pinion-wheel upon it, a sectional view of which is seen at b , figs. 1, 2, and 3.

D is a rack, which engages with this pinion, which action serves to turn or partially rotate the lower needle.

A detached view of this rack and pinion is seen in fig. 5, on an enlarged scale. The rack D is attached to an arm, E, which arm has a friction-roll upon its end, which is held in contact with the cam F on the main shaft A, by a spiral spring, d .

There is another cam on the main shaft, marked G, by which the up and down motion of the upper needle is caused.

H is a vertical rod, upon the lower end of which there is a roll, z , which is held in contact with the cam G by the spring f . This rod passes through a slot in the table, and is notched to receive the spring f , which bears against the under side of the table, and against a shoulder formed by the notch in the rod.

The rod H connects with a lever, J, at k , and imparts vertical motion to the needle-bar by a jointed finger-connection, as seen in fig. 3 at l .

m is a sleeve, which contains and supports the upper needle-bar n . This upper needle is turned or partially rotated by an oblique groove in the bar, an enlarged view of which bar and groove is seen in Figure 6, Sheet I.

o' is a fixed point or finger, which enters the groove in the needle-bar, and causes the partial rotation back and forth as the needle rises and falls.

Both needles have a lateral or horizontal motion for every stitch. To cause this motion, the bars of both

needles are attached to a frame, L, which frame is given a lateral motion by an upright lever, P, fig. 1, which is operated by a cam on the back of the large cam F.

Figure 8 represents the back of this cam from the line 11 11 of fig. 1.

The side of the cam F has an offset, as indicated in the figure.

The frame L is held in contact with the upper end of this lever P by a spring, marked Q, as seen in fig. 1.

Figure 7 is a view of the other side of the cam F, as seen from the line 3 3.

R is a bevel-gear wheel, which is driven by the wheel B, with which it engages, as seen in figs. 1 and 2. Rigidly attached to the shaft of this wheel is a cam-wheel, marked S. This wheel stands in an inclined position, as seen in fig. 2, for the purpose of throwing its upper portion nearer the needles, as the hook which catches and draws the thread, as well as the cams which actuate the feed of the machine, are attached to this wheel.

A sectional top view of the table (under the upper needle) is seen in Figure 9, Sheet II.

The arrangement for holding the cloth to the table is seen in fig. 3, at T.

The cams on the wheel S, which operate the feed, also operate a hook and slide, (seen in Figure 10,) which unthreads or draws the thread from the needles.

The feed-dog is shown at *u'*, Figure 11, and consists of a short curved bar, pivoted to the shank of the hook *t*, and working backward and forward with said hook as the latter is operated by the cam upon the wheel S. The feed-dog also works in a groove in the under side of the table, and is provided with a lug, *u''*, projecting through the table, and upon which the cloth rests.

The method of feeding up the cloth and operating the hook, and the action by which the thread is carried to the proper position for threading and unthreading, is seen more plainly in fig. 10, of which fig. 11 is a section through the line 4 4, and Figure 12 a section through the line 5 5. The motion of the cloth, in being fed in, carries the thread into the open eye of the needle.

v is a slide, which is raised by the spring *w*, as shown in figs. 11 and 12, and depressed by the cam on the wheel S.

This slide raises the thread, and holds it for the hook to draw the thread into the eye of the needle.

Figure 14 is a section through fig. 9, at 6 6.

The hook *t* is seen at Figures 15 and 16, attached to one of the cams on sections of the wheel S.

Figures 17 and 18 are sections of the same wheel, showing another view of the cams.

In Figure 19, Sheet I, is seen a modification of the needle in two views.

In this figure a slide is seen, which closes the opening in the eye of the upper needle, which slide may be operated by any proper mechanical means to prevent the thread from slipping from the eye, should such a provision be found necessary. These two views are marked *x y*, and *y* is a section of *x* through the line *o o*.

On Sheet II, in red color, will be seen three perspective views of the stitch made by this machine, the thread being seen looped around the cord, and in the different positions which it assumes while the stitch is being made.

The operation of forming a stitch is as follows: The thread, of the required length for the button-hole, is secured to the edge of the cloth, and its free end passed over the top of the slide *v*, hanging beneath the table. The machine is now put in motion, and the lower needle-bar, in moving up through the medium of the cam C and arm *a*, is turned by the rack and pinion in such a manner as to bring its edge upon the same side, and in a line with the eye of the upper needle, which is moved down simultaneously with the forward movement of the lower needle, under the influence of the cam G. The upper and lower needles are, at this stage, in the slot, forming the button-hole. The upper needle is rotated to bring the eye into the position above described by means of the pin *o'* and curved slot in the needle-bar. As this movement is completed, the cam upon the wheel S retracts the sliding-hook *t*, through which the thread has been passed, drawing the thread into the eyes of both needles. The cloth at the same time being fed forward parallel to the slide, completes the threading.

The needles are now receded from each other by the arms H *a*, and cams C G, and are turned in opposite directions by pin *o'*, and rack and pinion D *b*, the upper needle, carrying the thread in the form of a loop, one quarter round, and the lower needle carrying the same three quarters round, to form a loop for the passage of the upper needle and loop in its second descent. When the needles are farthest apart, the frame L is moved forward by the cam upon the back of the cam F, and the lever P, carrying both needles by the edge of the cloth, and freeing the upper needle-bar from the pin *o'*, the needles are again approached towards each other by the mechanism described, but this time without rotation, the upper needle carrying its loop through the edge of the cloth, and through the loop in the lower needle.

In again receding, the upper needle leaves the loop sufficiently loose below the cloth to be caught by the hook *t'* upon the wheel S, which disengages it from the eye of said needle, drawing the thread against the loop through which it has passed, and removing the loop from the lower needle. The wheel continuing to revolve, the hook *t'* carries the thread in the form of a loop over the top of the slide U, which is depressed for that purpose by means of a cam upon the wheel S, beneath the hook.

As soon as this cam has passed over the slide, the latter is thrown back to its place by the spring *w*, holding the thread in position for another stitch. The wheel, continuing to revolve, clears the hook from the loop as soon as it reaches the end of the thread, which, it will be remembered, is only sufficiently long to work a button-hole, or the ordinary length employed in a hand-needle.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent—

1. The adjustable frame L, carrying the reciprocating needle-bars, in combination with the lever P, and cam upon the shaft A, substantially as described for the purpose specified.

2. The combination of the lower needle-bar with the right-angular spring-arm α and cam C, substantially as described for the purpose specified.

3. The combination of the lower needle-bar, arm α , pinion b , rack D, spring-arm E, and cam F, substantially as described for the purpose specified.

4. The combination of the cam G, rod H, arm J, upper needle-bar, having the curved slot, and the pin o' , substantially as described for the purpose specified.

5. The cam-wheel S and hook t' , in combination with the spring-slide v , spring-hook t , and upper and lower rotating needles, substantially as described for the purpose specified.

6. The slide v , adapted to raise and hold the thread in a button-hole-sewing machine during the formation of the stitch, substantially as described for the purpose specified.

7. The method, herein described, of threading the needle, by means of the spring-hook and the movement of the cloth.

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