

E. MOREAU.

Button-Holing Attachment for Sewing-Machines.

No. 134,558.

Patented Jan. 7, 1873.

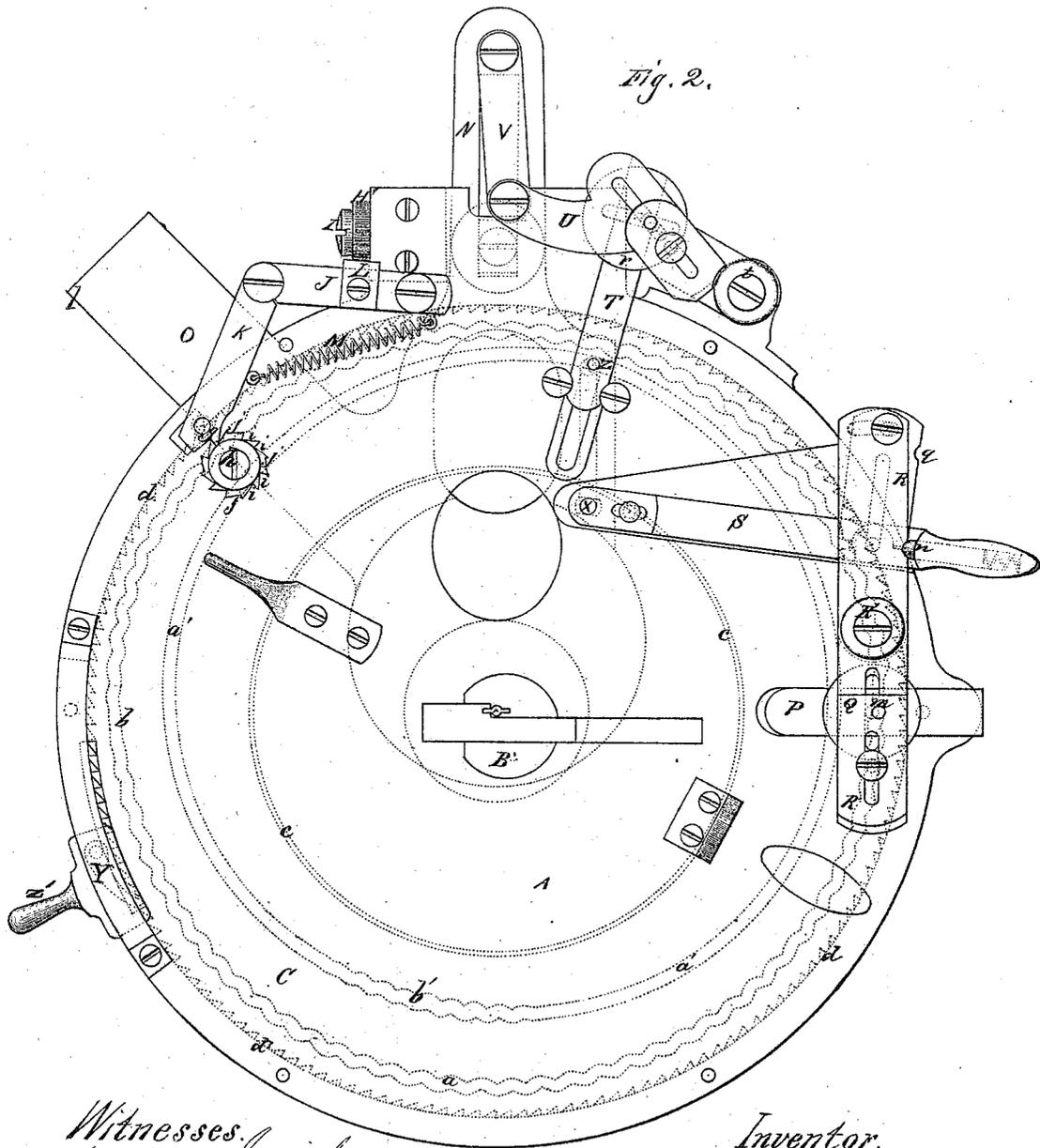


Fig. 2.

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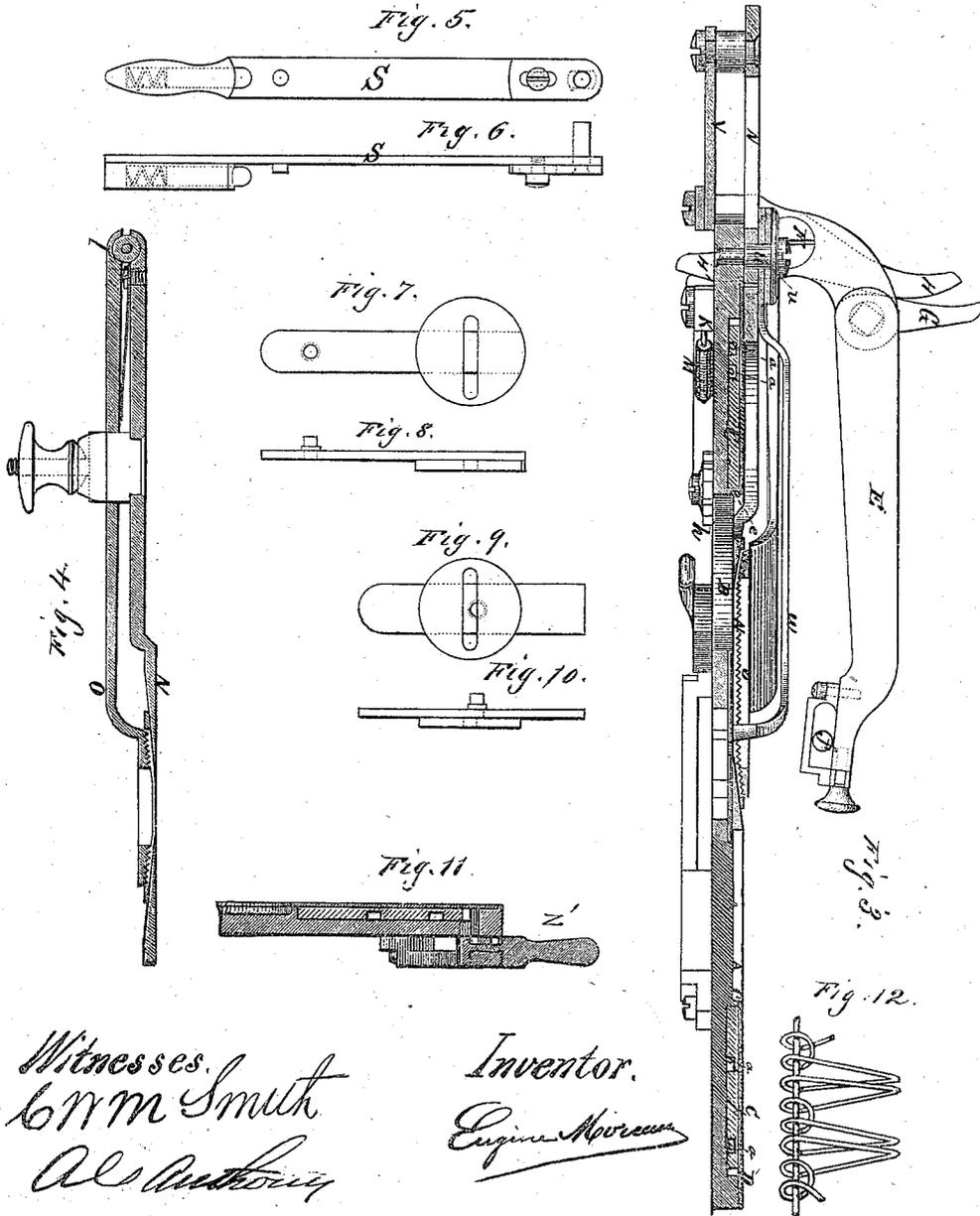
Inventor.
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN BUTTON-HOLING ATTACHMENTS FOR SEWING-MACHINES.

Specification forming part of Letters Patent No. 134,558, dated January 7, 1873.

To all whom it may concern:

Be it known that I, EUGENE MOREAU, of San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Sewing-Machines for Working Button-Holes; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

My present invention relates to that class of sewing-machines which are provided with a frame for holding the cloth, the same to be moved by proper mechanism in different directions while the needle is out of the cloth, for the purpose of embroidering, or stitching button-holes, and is an improvement upon a machine for which Letters Patent of the United States were granted to me, bearing date January 3, 1871, and numbered 110,669. It consists, mainly, in certain details of construction by which the cloth is moved from side to side, so as to form the proper stitch, and at the same time the mechanism advanced toward the head or upper end of the button-hole, at which point the side movement is gradually changed into an end movement, and this again into a side movement after the cloth has passed around and commenced its return movement to finish the other side of the button-hole, as will hereafter more fully appear.

Referring to the drawing forming a part of this specification, Figure 1, Sheet 1, is a plan view of the cloth-plate of a sewing-machine having this improvement applied thereto; Fig. 2, Sheet 2, is a bottom view of the plate; Fig. 3, Sheet 3, is a section of side elevation of the plate and this improvement; Fig. 4, Sheet 3, is a section of side elevation of the clamp to hold the cloth; Figs. 5 and 6 are views of the pitman used to convey the motion of the outer slide to the cloth-plate, with its adjustable pin and latch; Figs. 7 and 8 are views of the slide transmitting motion from the inside cam-groove; Figs. 9 and 10 are views of the slide transmitting motion from the outside cam-groove; Fig. 11 is a sectional view, showing the construction of the circular slide used to operate the cam-plate independently of the machine; and Fig. 12 is a view showing the stitch formed by this machine.

To enable others skilled in the art to which this invention appertains to make and use the

same, I will now proceed to describe fully this improved device with the appliances for carrying it into effect.

A is the bed-plate, which is secured to the frame of the sewing-machine in any suitable manner. The mechanism here shown is adapted to the Florence sewing-machine, and I have employed the lug and socket ordinarily used for the purpose of attaching the common cloth-plate on that machine.

B is the central opening to receive the bridge of the machine. The upper part of the bed-plate is recessed near its circumference, to receive the cam-plate C, and also at the center, to allow the cloth-holder to work at the desired distance from the bridge of the machine. The cam-plate is a ring in which two grooves, *a a'*, are formed, and the general outline of the inner groove is eccentric to the outer and inner circumference of the cam-plate; and by this groove the cloth-holder is moved forward and back to form the length of the button-hole. The outer groove *a* is also made with wavy or corrugated sides throughout its whole circumference, except for a small distance at one point, *b*, where the corrugations are gradually diminished to a plain curve from each direction, for a purpose to be hereafter described. The inner groove is a plain curve throughout its circumference, except at one point, *b'*, where it is formed into corrugations similar to those in the greater part of the outer groove, their object being also hereafter described. The inner edge of the cam-plate is smooth, and moves freely against the shoulder or flange *c* of the recess in the bed-plate, and the outer edge is provided with ratchet-teeth *d* around the whole circumference, which are engaged by the pawl *e*, and the cam-plate is thus revolved. A cap or top plate, D, is secured to the bed-plate A, and keeps the cam-plate in place. The operating arm or lever E is so mounted as to oscillate about a pin or stud at F, the opposite end being moved by a stud, *f*, from the needle-bar, the stud entering and working in a slot in the arm E, as shown at Fig. 3. A sort of toe or cam, G, is secured to the arm E, and this acts on a double cam, H H', so as to make it oscillate about the pin I on which it is mounted. The lower end H' of this cam strikes a jointed arm, J K, so as to move it forward at each stroke. A piece of hardened steel, L, is se-

cured to the arm J at the point where the cam strikes it, so as to lessen the wear. The end of the arm K is formed into a pawl, *g*, and a projecting piece is bolted to this end so as to form another pawl, *e*, Fig. 1, to one side of or above *g*. The two pawls engage one in the teeth *d* of the cam-plate to revolve it, and the other in a small ratchet-wheel, *h*, as shown at Fig. 2. A suitable spring, M, is secured and attached to the arm K so that the pawls will be retracted, and the arm J will closely follow the cam H' when it moves back, shown at Fig. 2. The ratchet-wheel *h* is formed with two deep teeth, *i*, in succession, followed by one shallow one, *j*, so that when the pawl enters the deep teeth the corresponding pawl for the cam-plate will enter the teeth *d*, and thus move the cam forward one tooth each time; but when the pawl *g* engages the shallow tooth *j* of the ratchet-wheel the other pawl will be raised too high above the teeth *d* to move the cam-plate, which consequently remains stationary. By this device the cloth-holder will be moved so that two stitches will be made on the inside and one on the outside of the button-hole.

The cloth-holder N is formed, as shown in Fig. 4, with a clamp, *o*, hinged to it at *l*, so that it can be shut down to hold the cloth firmly in place. Two grooves are made in the bed-plate A, and in one of them moves a slide or plate, P, which is operated by a short pin or stud, *m*, which projects from its end and enters the outer cam-groove *a* in the plate C. A disk, Q, is riveted to the slide, as shown. R is a lever arranged to oscillate about a point of support at R', and it has a pin connecting it with a slot in the disk Q, so that it receives motion from the slide P. The pitman S has a latch, *n*, and this is operated by a spring, as shown at Figs. 5 and 6. The latch fits into notches *q* in the lever R, and when the end of the button-hole is reached the lever is moved from one notch to the other, the catch *n* holding it in place. This movement doubles the throw and permits the needle and thread to pass clear across the opening to the other side. The pitman also connects the lever with the cloth-holder by a pin or stud, which enters a slot at one side, and by this means the groove *a* in the cam-plate gives a side motion to the cloth to form the peculiar stitch while moving up the side of the button-hole. When the head of the button-hole is reached it will be necessary to gradually change the motion so as to form the stitch correctly around this head, and for this purpose a second slide, T, is constructed, moving in a slot nearly at right angles with the slide P. This slide is connected by a stud or pin, Z, with the inner cam-groove *a'*. A disk, *r*, is secured to the slide T, and a lever-arm, U, is pivoted at *t* so as to extend across the disk to which it is pinned, and thus receives motion from the slide. The end of the arm U is connected by a link, V, with the cloth-holder, and as the eccentric groove *a'* moves the slide forward or back the

necessary travel will be given to the cloth-holder so as to form the button-hole. The slide and cloth-holder have only this regular motion until the head is reached. At this point the wavy outline or corrugations of the groove *a* commence to decrease until the curve becomes plain, as at *b*, while the groove *a'* begins to assume a wavy appearance, as at *b'*, so that as the movement of the cam-plate carries the cloth around at the head the side movement will constantly decrease, while the end movement will increase in proportion until the stitch begins to form down the other side, when the motions are again reversed until the side movement entirely prevails again. The outer end of the cloth-holder is provided with a slot to which a box is fitted. The box moves freely on a stud, *u*, made fast to the bed-plate, so that the cloth-holder can take at will a longitudinal sliding motion or a transverse vibrating motion. The lower part of the cloth-holder is bent down so as to reach the level of the recess in the center of the bed-plate, as shown at Fig. 3, and has an elongated slot, *y*, of the shape of an enlarged button-hole, and the upper surface is made concave so as to come to a knife-edge all around, thus bringing the work close to the bridge. *w w* are two arms oscillating on the stud *u* secured to the bed-plate. The outer ends of these arms are brought together at the edge of the opening for the button-hole, and are kept constantly in contact with it by a spring, *u'*. When the cloth-holder moves and the needle rises the ends of the arms *w* push the cord formed by the coils around the upper thread to the inside of the button-hole, thus giving it the same appearance as that of a button-hole made by hand. The upper part of the clamp, corresponding with the eyelet or enlarged part of the button-hole, has a cam-shaped aperture, 5, which serves to guide the arms *w w* when the head of the button-hole is being formed.

A scale, *w'*, may be formed on the plate so as to determine the length of the button-hole.

As will be seen, it will be necessary to enlarge the opening in the guiding-plate of the arms *w w* where it incloses the head of the button-hole so as to allow the arms to spread at this point and not interfere with the stitch.

The operation of this machine is as follows: The lever-arm E being connected with the oscillating needle-bar, as before described, it will receive the same motion, and will, in turn, communicate it to the cam or toe G. This cam is so formed that when the needle is clear of the cloth it will strike the double cam H H', and cause its lower end to strike the lever J, thus forcing forward the pawls *g* and *e* on the lever *k*. The pawl *e* engages with the ratchet-teeth *d* of the cam-plate C, and thus moves it around. The inner groove *a'* of this cam-plate, being eccentric, will, by means of the stud or pin Z, cause the slide T to be moved out or in, and this will move the cloth-plate N by means of the lever U and link V. This movement of the cloth-plate is intended to be

as great as the largest button-hole to be made, and is a regular motion at all points except where the needle is passing around the head of the button-hole, when the corrugated portion *b'* of the groove *a'* will have engaged the operating-pin *Z*, and the motion will then be that necessary to form the stitch, as will be hereafter described. The cloth is placed in the holder, and firmly secured by the clamp, as before described, the button-hole having been previously cut; or the cloth may be left whole, as desired, when the machine is set in motion.

It will here be observed that there will be two motions of the cloth-holder—one a regular feeding motion, as has been described, and which is imparted by the inner or eccentric groove *a'*; while the other is the motion for forming the stitch, most of which is communicated by the outer corrugated groove *a'* of the cam-plate. This groove operates the pin *m* on the slide *P*, and from this, through the lever *R* and pitman *S*, the motion is conveyed to the cloth-holder, as has been previously described, so that the slide or stitch movement is made. These movements take place between the stitches, and it will be manifest that the cam-plate and the cloth-holder will remain stationary while the stitch is being taken. The peculiar stitch to be taken will govern the particular movement of the cloth-holder.

For the present illustration the button-hole stitch is shown and explained; but the device is applicable to other embroidery stitches.

The side movement is made at the proper time by means of the ratchet-wheel *h*.

When the pawl *g* falls into the deep teeth *i* the pawl *e* will be allowed to fall into a tooth, *d*, of the cam-plate, and thus rotate it; but when the pawl *g* falls into a shallow tooth, *j*, the pawl *e* will not reach low enough to move the cam-plate. It will therefore be easily understood that, by arranging the place and number of the shallow teeth in the small ratchet-wheel, the cam-plate can be made to remain motionless at any one or several vibrations of the needle-arm, and in any order, according to the necessities of the stitch.

The cloth-holder can take either a longitudinal or a transverse motion, and it is the combination of these two movements which at every vibration of the needle-arm sets the cloth in the proper place underneath the needle, so that when the cams have made one entire revolution the perforations in the material present together the shape of a button-hole or of the design, as in the case of embroidering.

To explain the stitch in detail, the cloth-holder is so placed that the needle will go down inside the button-hole at the point or lowest end. The little ratchet *h* will be so placed that the pawl *g* rests in a deep tooth preceding a shallow one. The first stitch taken will coil the under thread around the upper one, as shown at Fig. 12, and the pawl *g* then falls into a shallow tooth, *j*, and the

second stitch, being in the same place, coils the under thread again around the upper one. At the third vibration of the needle-arm the pawl *g*, again working into a deep tooth of the ratchet *h*, will allow the pawl *e* to engage a tooth of the ratchet *d*, and thus revolve the cam one tooth. This movement changes the position of the cloth-holder, and the next stitch will be taken on the outside edge of the button-hole, the under thread being coiled, as before, around the upper one. The next vibration again presents the inside edge to the needle, but the lower thread has been drawn up by the tension of the upper thread, so that I now have the first complete stitch composed of the upper thread lying straight along the edge of the hole with three coils of the under thread around it. This is continued until the button-hole is finished. The handle *Z'* is for the purpose of moving the cam-plate independently of the vibrations of the needle-arm by means of the pawl *Y*, which engages the teeth *d* of the cam-plate.

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

1. The ratchet-wheel *h*, with its deep and shallow teeth *i* and *j*, substantially as and for the purpose described.
2. In combination with the double-grooved cam-plate *C* and the peculiar ratchet-wheel *h*, the double pawls *e* and *g* with the operating-lever *J K*, substantially as herein described.
3. The operating mechanism, consisting of the arm *E* with its toe *G* and the double cam *H H'*, together with the levers *J* and *K* and the retracting-spring *M*, or equivalent devices, substantially as herein described.
4. The slide *P* and disk *Q*, with the lever *R* and the pitman *S*, in combination with the grooved cam-plate *C*, when connected with the cloth-plate and operating to produce a transverse vibrating motion, substantially as herein described.
5. The slide *T*, with its disk *r* and the lever *U* and link *V*, in combination with the grooved cam-plate *C*, when connected with the cloth-plate to produce a longitudinal motion and the necessary throw for the stitch, substantially as herein described.
6. The arms *w w*, with their spring *u*, when formed to rest on the cloth and throw the cord formed to the inside edge of the button-hole, substantially as described.
7. The combination of the upper clamp, having a cam-shaped slot, *5*, with the arms *w w*, as described, for the purpose set forth.
8. The pitman *S* and latch *n*, in combination with the lever *R* and slotted disk *Q*, as and for the purpose described.

In witness whereof I hereunto set my hand and seal.

EUGENE MOREAU. [L. S.]

Witnesses:

C. W. M. SMITH,
A. G. ANTHONY.