

UNITED STATES PATENT OFFICE.

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BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 440,179, dated November 11, 1890.

Application filed October 16, 1879. (Model.)

To all whom it may concern:

Be it known that I, GEORGE M. MORRIS, of Cohoes, in the county of Albany and State of New York, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention in button-hole attachments for sewing-machines consists, mainly, of certain devices and combinations of parts, hereinafter described and claimed, for reciprocating the work-holder of the attachment transversely to the length of the work-holder and to various distances to form to-and-fro or overedge stitches and to make them of different lengths, for moving the work-holder longitudinal to and fro and to different distances and by steps of various lengths to form to-and-fro rows of the overedge stitches to make the rows of different lengths, and to place the overedge stitches at various distances from each other in each row, for moving the work-holder step by step laterally to and fro at the ends of its longitudinal movements to change the stitching from one side of the button-hole to the other, and thereby bar the ends of the work-holder when the attachment shall be properly arranged on the bed-plate and connected by suitable mechanical devices with the driving mechanism of a sewing-machine having an eye-pointed needle reciprocating through a perforation in a work-supporting plate.

In the aforesaid drawings, Figure 1 is a plan of an attachment which embodies this invention. Fig. 2 is an elevation of one side; and Fig. 3, a section at line *z z* in Figs. 1, 7, and 8 of the same attachment. Fig. 4 represents a button-hole stitched by this attachment when combined with a sewing-machine. Fig. 5 is an elevation of the side opposite to that shown in Fig. 2; Fig. 6, a section at the line *y y* in Figs. 1, 2, 3, and 5, and elevation and partial section of the parts forward of that line; Fig. 7, an elevation and partial section of the rear end portion; Fig. 8, a section at the line *x x* in Figs. 1, 2, 3, 5, and 9; and Fig. 9, a section at the line *w w* in Figs. 1, 7, and 8, all of the same attachment.

A is a base-plate, which supports the other parts of the attachment and is to be properly fastened upon or to the base-plate of a sewing-machine.

B is a lever, through which motion is to be given to the moving parts of the attachment by having that lever engaged by a follower *y'* with a rotary switch-cam, or connected with any other suitable part of the driving mechanism of the sewing-machine in such manner that the lever B shall be moved in one direction just before one descent of the needle through the work-supporting plate and shall be moved in the opposite direction just before the next like descent of the needle.

C is a work-carrying slide furnished with or having a work-holder, which is shown as having a skeleton foot *a'*, mounted on the end of an arm D, hinged to a support C', fast on said slide, and held so as to clamp and hold the button-hole work *v*, Fig. 6, and move it to and fro on the work-supporting plate *u*, and thus present the work to the needle of the sewing-machine. The slide C is fitted to slide to and fro parallel to the lengthwise direction of the slot, as *a*, Fig. 1, in its work-holder, and to slide in or on guides or ways, as *b b*, on a slide E, which is at right angles to and carries the slide C, and is fitted to slide to and fro transversely to the slide C in or on ways or guides, as *c c*, on a driving-slide F, which is mounted to slide to and fro parallel with the slide E and in or on ways or guides, as *d d*, on the base A, and is connected with the slide E, so as to carry it to and fro. Short momentary to-and-fro movements imparted to the slide F, carrying the slide E, which carries the work-carrying slide C, cause the lateral to-and-fro movement of the slide C to make to-and-fro stitches. Step-by-step lengthwise movements to and fro imparted to the work-carrying slide C only cause the formation of to-and-fro rows of the to-and-fro or overedge stitches. Step-by-step movements imparted to the slide E, carrying the slide C in one direction at one end part of the lengthwise movement of the slide C and in the opposite direction at the other end part of the lengthwise movements of the latter slide, change the stitching from either side

of the button-hole to the other side thereof, and cause the barring of the ends of the button-hole.

The driving-lever B is connected at its lower end by a pivot at e to a part e' of the slide F, and has a fulcrum-pivot f , Fig. 7, held by a pivot-stock G, engaged with the lever and with an adjacent slotted stationary standard A' on the base A in such manner that by moving the upper end of the lever B uniform distances to and fro the slide F will be uniformly reciprocated. For this purpose and to impart from the lower end of the lever B different lengths of uniform reciprocating movements to the slide F, while the upper end of the lever shall be moved to and fro one and the same distance only by the sewing-machine, I make the fulcrum-stock G adjustable along the lever by means of a suitable clamp—for instance, by having a longitudinal slot b' in the lever and an adjacent longitudinal slot b^2 in the standard A' and forming the fulcrum-stock with two slides c' and c^2 , one fitting in the slot b' and the other in the slot b^2 ; and with a screw-nut f' , fitting upon a screw f^2 , whereby one of the two slides c' c^2 can be clamped fast in one of the two slots b' b^2 at various distances from the pivot e of the lever, while the other of the two slides c' c^2 shall be left free to slide in the other of the two slots b' b^2 , so as to let the lever B in its vibrations move somewhat endwise with or upon the fulcrum-stock, as may be proper, by reason of the end of the lever being pivoted to the slide F. In the drawings the slide c' is shown clamped fast in the slot b' to the lever.

H is a spiral cam fast on a rotary shaft I, and J is a lever, having one end part h fitting in the continuous spiral groove g of the cam H and the other end part h' connected to the slide C, and mounted, so that by rotating said spiral cam in one direction only the slide C will be moved lengthwise with its work-holder equal distances to and fro to form equal lengths of to-and-fro rows of stitches. The cam H can be rotated directly by hand by means of a thumb-piece g' on the shaft I of the cam.

To provide means for imparting from the spiral cam H to the work-carrying slide C different lengths of lengthwise to-and-fro movements corresponding to button-holes of different lengths, I furnish the lever J with a fulcrum-stock K, that is adjustable along that lever, and connect the end part h' of the lever to the work-carrying slide by a stud h^2 and slot h^3 , or by other suitable adjustable connection, so that by adjusting the fulcrum-stock at different distances from the cam H the rotation of the cam will, by the lever J, move the work-carrying-slide lengthwise to and fro different distances.

To insure the giving of proper longitudinal to-and-fro movements to the work-carrying slide C by the lever J from the rotary cam H while that slide is being moved or reciprocated

transversely by the change-slide E, I cause the cam H and lever J to partake of the reciprocating motion of the latter slide, and preferably by having the journal-supports I' I' of the shaft I of the cam H and the fulcrum-stock K of the lever J secured to so as to be surely carried by the change-slide.

The fulcrum-stock is to be made adjustable along the lever J by any suitable means. One means for that purpose consists of a longitudinal slot i^2 in the lever, another slot i^3 in the adjacent part of the slide E, and a stock K, formed with a pivot part j^2 , fitting in and movable along the slot i^2 , and with a headed slide j^3 , fitting in, extending through, and movable along the slot i^3 , and with a screw k^2 and nut k^3 for clamping the slide j^3 fast to the slide E, while the pivot part j^2 is left free in the slot i^2 , so as to let the lever move to and fro endwise and vibrate about that part.

To secure uniform engagement of the lower end h of the lever J with the groove g of the cam H from one extreme of that cam-groove to the other, and thereby cause more even step-by-step motion in the work-carrying slide from end to end of its lengthwise movement, the lever J has a roller-covered lug n , Fig. 3, fitting between suitable guides o o , Figs. 1 and 3, in or on the slide E, on which the cam H is directly mounted.

S is a change-cam fast on the rotary shaft I, which is carried by the change-slide E, and T T are followers, which are applied to opposite sides of said cam and are carried by the reciprocating slide F, as shown in Fig. 9, so as to impart reciprocating movement from the slide F to the slide E, and thereby to the slide C, to make to-and-fro stitches, and so that the rotation of the change-cam S between and in contact with the followers T T causes the movement of the slide E to and fro upon the slide F, and thereby moves the work-carrying slide laterally to and fro, as required, to change the stitching from one side of a button-hole to the other and back again at each revolution of the cam. I so shape the change-cam S and arrange and secure it to the spiral cam H that the two cams shall rotate together, and that at the ends of the to-and-fro movements of the slide C by the cam H and lever J the cam S and followers T T shall gradually move the slide E, and thereby move the slide C laterally in one direction at one end of its lengthwise movements and in the opposite direction at the other end thereof to thus gradually change the stitching from one side of the button-hole to the other at one end thereof and back again at the other end, and thus bar both ends of the button-hole, as indicated at r r in Figs. 1 and 4.

In Fig. 9 the parts of the cam S from m to m' and from m^2 to m^3 are shown in the forms of arcs of circles concentric with the shaft I and of different radii to insure the formation of straight rows of stitches along the sides of the button-hole, as indicated in Fig. 4; but such opposite side parts of the cam S are to

be of whatever forms and relative sizes shall be proper to make the rows of stitches conform to the side edges of the button-holes to be stitched, whether the button-holes shall be straight, oval, wedge form with an eyelet end, or of other shape. The cam S is shown removably secured to the cam H by screws *l'* to permit different shapes of the cam S to be secured to the cam H and used in connection therewith.

To impart step-by-step rotary movement to the spiral cam H or to the change-cam S, or to those cams from a lever, as B or P, having pivot-connections with the driving-slide F and a stationary support, as A' or A², I secure to the cam or cams a ratchet-wheel, as L, and furnish it with a driving-pawl, as M, and a pawl-carrier, as M', and have a rod, as N or N', connecting the pawl-carrier with said lever.

O is a check-pawl to prevent or limit backward turning of the ratchet-wheel.

When the pawl-carrier M' is connected to the lever B by a link or rod, the latter can be pivoted to the lever at different distances from its fulcrum, as indicated by the dotted lines N' N' in Fig. 2, so as to thereby give different lengths of uniform steps to the ratchet-wheel L and cam H, and thence by the lever J to the slide C, and thus place the to-and-fro stitches at different uniform distances apart in each row, while the lengths of the movements of the lever B remain equal.

The lever P is shown connected at one end by the rod N to the pawl-carrier M' and pivoted at the other end to a stationary standard A² on the base A, and as having an intermediate pivot-connection Q with the part F' of the driving-slide.

To make the pivot-connection or fulcrum-stock Q adjustable along the lever P to impart different lengths of to-and-fro movement to the pawl-carrier through the rod N, I have a longitudinal slot *i* in the lever P and another slot *i'* in the part F', and have the stock Q formed with a pivot *j*, Fig. 3, fitting in the slot *i*, and a headed slide *j'*, fitting in the slot *i'*, and with a screw *k* and nut *k'* for clamping the stock Q fast to and loosening it upon the part F', and with a screw-nut or follower *l*, engaging with a thumb-screw R, journaled to turn in either direction without endwise movement in the part F', so that when the nut *k'* shall be loosened the stock Q can be very gradually moved in either direction along the lever P and part F' by turning the screw R, and can be fastened in any adjustable position on the part F' by tightening the nut *k'*, while the pivot *j* of the stock Q is left free in the slot *i* to let the lever P vibrate freely.

The work-carrying slide C has preferably a thin spring-plate *a*², arranged to fit upon the work-supporting plate *u* of a sewing-machine and having an oblong opening through which the button-hole work *v*, Fig. 6, is to be closely

pressed upon the plate *u* by the toothed skeleton foot *a'*, pivoted to the end of the arm D, that is hinged or pivoted to a raised part C' of the slide C and furnished with an elevating-spring D'; but the plate *a*² can sometimes be omitted.

To provide improved means for depressing, holding down, and releasing the arm D with the foot *a'* upon the work, I combine with the slide C and arm D a slotted standard U, secured to the slide C and extending above said arm, a hand-cam V, having a pivot-stem *p*, extending into or through the slot *d'* in the standard and fitting to slide up and down in that slot, and a connecting rod or link W, secured at its upper end to the standard by a pivot-stud X and at its lower end to the cam V by a pivot *q*, arranged at a point distant from the pivot *p* of the cam and far to one side of a line *v' v'*, connecting the centers of the pivots X and *p* when the cam V is turned up to release the arm D, as shown in full lines in Fig. 3, and so that when the cam is turned down and depresses the arm D, as shown in full lines in Fig. 2, the axis of the pivot *q* of the link W is then a little to the other side of the center line *v' v'* of the pivots X and *p*, so as to thereby prevent the turning of the cam upward by the upward pressure of the spring-arm and securely retain that arm in its depressed position until it shall be released by forcibly turning up the cam V, as by hand.

To provide means for pressing down the arm D to a greater or less extent, as may be required to hold and carry different kinds or thicknesses of button-hole work, I make the upper pivot-stud X of the link W adjustable to different heights on the standard U by having the stud X formed with a headed slide *s'*, Fig. 6, extending through the slot *d'* in the standard, and with a screw *t'*, furnished with a clamping-nut *u'*, or with an equivalent clamping device.

I claim as my invention—

1. In a button-hole attachment for sewing-machines, the combination, with a work-carrying slide furnished with a work-holder, a change-slide at right angles to and carrying the work-carrying slide, and means for giving said slides reciprocations transversely to the length of the work-carrying slide, of a spiral cam carried by said change-slide, means for rotating said cam, and a lever connecting said spiral cam with said work-carrying slide, substantially as set forth.

2. In a button-hole attachment for sewing-machines, the combination, with a work-carrying slide having a work-holder, a change-slide at right angles to and carrying the work-carrying slide, and means for giving said slides reciprocations transversely to the length of the work-carrying slide, of a spiral cam carried by said change-slide, means for rotating said cam, and a lever connecting said cam with said work-carrying slide and having its

fulcrum carried by said change-slide and adjustable along said lever, substantially as set forth.

3. In a button-hole attachment for sewing-machines, the combination, with a work-carrying slide furnished with a work-holder, means for moving that slide lengthwise to and fro, and a change-slide at right angles to and carrying said work-carrying slide, of a reciprocating slide parallel to and carrying said change-slide, a change-cam carried by said change-slide, followers carried by said reciprocating slide and in contact with opposite sides of said cam, and means for rotating said cam, substantially as set forth.

4. In a button-hole attachment for sewing-machines, the combination, with a work-carrying slide having a work-holder and a change-slide at right angles to and carrying the work-carrying slide, of a reciprocating slide parallel to and carrying said change-slide, a spiral cam and a change-cam secured together and carried by said change-slide, means for rotating said cams, followers carried by said reciprocating slide and in contact with opposite sides of said change-cam, and a lever connecting said spiral cam with said work-carrying-slide, substantially as set forth.

5. In a button-hole attachment for sewing-machines, the combination, with a work-carrying slide having a work-holder and a change-slide at right angles to and carrying said work-carrying slide, of a reciprocating slide parallel to and carrying said change-slide, a stationary support for said reciprocating slide, a spiral cam, a change-cam, and a ratchet-wheel, all three secured together and carried by said change-slide, a lever connecting said spiral cam with said work-carrying slide, followers in contact with opposite sides of said

change-cam and carried by said reciprocating slide, a driving-pawl applied to said ratchet-wheel, and a pawl-driving lever connected with said driving-pawl and having pivot-connections with said reciprocating slide and its said stationary support, substantially as set forth.

6. A button-hole attachment for sewing-machines, having, in combination, a work-carrying slide furnished with a work-holder, a change-slide at right angles to and carrying the work-carrying slide, a reciprocating slide parallel to and carrying said change-slide and mounted on a stationary support, means for operating said change-slide and work-carrying slide, an upright driving-lever pivoted at its lower end to said reciprocating slide and having a lengthwise slot, a stationary standard having an upright slot adjacent to said slot of the lever, and a fulcrum-stock of the lever fitting in said slots and having a clamp by which it can be adjusted along the lever, substantially as set forth.

7. In a button-hole attachment for sewing-machines, a work-holder having, in combination, a work-holding foot, an arm D, carrying said foot, a slotted standard U, extending above said arm, a hand-cam V, applied to said arm and having a sliding pivot *p*, guided by said standard, and a rod W, pivoted at one end to said standard and at the other end to said cam at a distance from its said sliding pivot, substantially as set forth.

In testimony whereof I hereunto set my hand, in the presence of two subscribing witnesses, this 13th day of October, 1879.

GEORGE M. MORRIS.

Witnesses:

JAMES H. SLADE,

JAMES T. GOODFELLOW.