

Aug. 18, 1953

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2,649,063

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Oct. 27, 1950

2 Sheets-Sheet 1

Fig. 1.

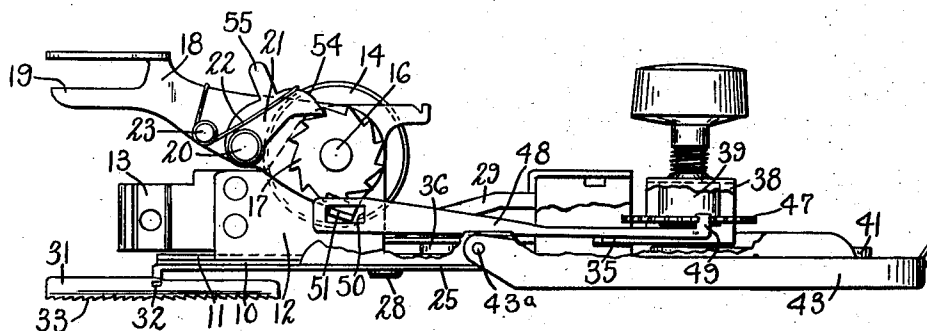


Fig. 2.

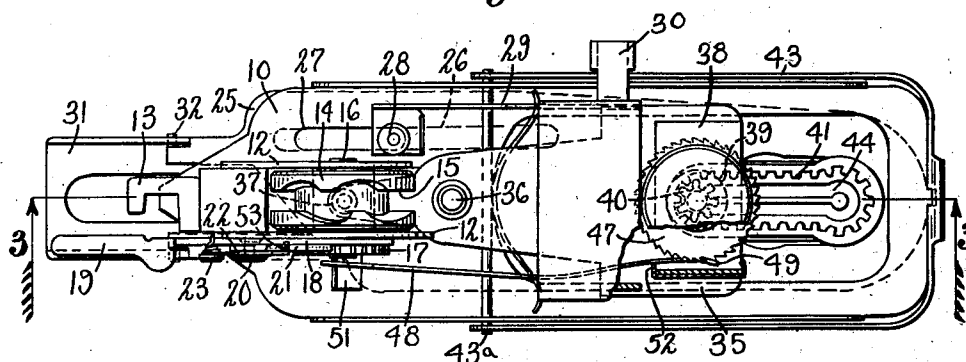
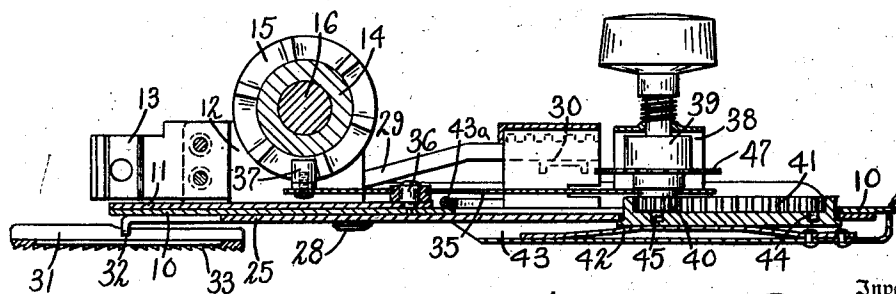


Fig. 3.



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Fig. 4.

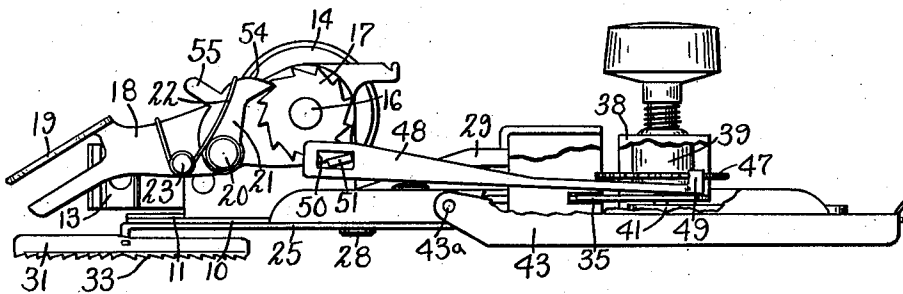


Fig. 5.

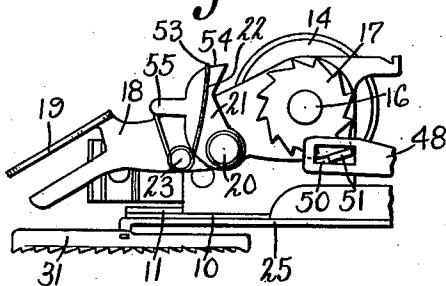


Fig. 6.

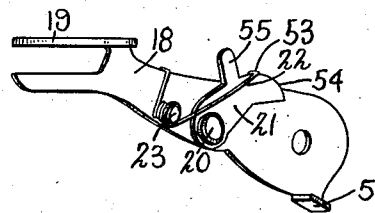
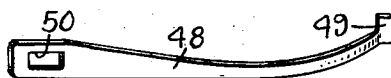


Fig. 7.



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BUTTONHOLE ATTACHMENT FOR
SEWING MACHINES

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Application October 27, 1950, Serial No. 192,430

5 Claims. (Cl. 112—77)

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This invention relates to a buttonhole attachment for sewing machines, and more particularly to a buttonhole sewing attachment which may be employed with the ordinary domestic household sewing machine, and which is capable of functions not normally found in attachments of this kind.

In a device for sewing around buttonholes, there is usually a feed blade which engages the material, and which feed blade is actuated to move the material over an oblong path so as to guide it around the buttonhole. In addition, there is provision for moving the feed blade laterally at each stitch or reciprocation of the needle so that a zig-zag stitch is effected about the oblong path. Thus the operation of such an attachment serves to effect a zig-zag stitching in a closed path entirely around the buttonhole, and this zig-zag stitch is the only stitch of which the device is capable.

It is sometimes desirable, however, to make a straight stitch about the buttonhole. This straight stitch may be employed alone or it may be made in addition to the zig-zag stitch so as to serve as a reinforcement under the zig-zag stitch so that the finished buttonhole will be stronger. In the present invention I have provided a structure by which the usual zig-zag buttonhole stitch may be effected if desired and also a straight stitch may be effected about the buttonhole or a stitch in a straight line, the mechanism being capable of sewing either the zig-zag stitch or the straight-line stitch at the option of the operator.

The mechanism of the present attachment, particularly the mechanism by which the zig-zag stitch is effected, is similar in many respects to that shown in the Almquist Patent No. 2,482,607. In the patented structure, however, the feeding movement of the cloth in an oblong path is incidental to the zig-zag or lateral movements of the feed blade so that the two movements are not independent of each other. In the present mechanism, while use is made of many features of the structure of the Almquist patent, the forward and rear feeding movement of the cloth is obtained independently of the zig-zag motion of the feed blade and cloth so that the latter may be dispensed with and a straight-line movement obtained in an oblong path to sew a straight-line stitch.

One object of the present invention is to provide a buttonhole attachment of improved design which may be employed with the usual household sewing machine.

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A still further object of the invention is to provide a buttonhole attachment for sewing machines capable of making a zig-zag stitch in an oblong path around a buttonhole, and so constructed that the mechanism for effecting the zig-zag stitch may be disconnected to effect a straight-line stitching in an oblong path.

Still another object of the invention is to provide a buttonhole attachment for sewing machines of such construction that either a zig-zag or a straight-line stitch around a buttonhole may be effected.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a side elevational view of a buttonhole attachment embodying my invention, some parts being broken away;

Fig. 2 is a top plan view thereof;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 1 showing the parts in another position;

Fig. 5 is a fragmentary view of the forward portion of the mechanism showing the pawl member in inoperative position;

Fig. 6 is a perspective view of the fork arm and the pawl attached thereto; and

Fig. 7 is a perspective view of the link for effecting the back and forth movement of the feed blade.

To illustrate a preferred embodiment of my invention, I have shown in the drawings a buttonhole attachment comprising a frame member or base plate 10, upon the upper surface of which is secured a second plate 11 having spaced up-turned side edges or flanges 12, between which is secured the adapter 13, by which the device may be attached to the presser bar of the sewing machine in the usual manner.

Rotatably mounted between the spaced flanges 12 is a cam wheel 14 having a cam track 15 of sinuous shape, the cam member being mounted on a shaft 16 which extends through one of the plates 12, and is provided on its extended end with a ratchet wheel 17.

A fork arm 18 is pivoted upon the shaft 16 so that it may oscillate thereon, this arm being provided with a bifurcated end portion 19 for attachment to the needle bar of the machine so that upon reciprocation of the needle bar the fork arm will be oscillated in a vertical plane.

Pivoted to the fork arm at 20 is a pawl 21 designed to engage the teeth of the ratchet wheel 17 so that reciprocation of the fork arm will effect

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a step-by-step rotation of the ratchet wheel and of the cam member 14. A spring 22 coiled about a pin 23 upon the fork arm bears against the pawl 21 to urge this pawl against the teeth of the wheel 17, as shown in Fig. 1. As will be later explained, this spring also serves to hold the pawl in a position out of engagement with the teeth of the ratchet wheel.

A feed blade 25 is disposed below the plate 10 and is slidably and pivotally connected to this plate. The feed blade is provided with an elongated slot 26 which registers with a slot 27 in the plate 10, and a pivot pin 28 passing through these slots connects the plates together. The pin 28 may be adjusted in the slot 27 by means of the lever 29 provided with the laterally-extending finger piece 30 and, as will be apparent, the adjustment of the pin 28 varies the pivotal connection between the feed blade 25 and the plate 10 as permitted by the length of the slot 27.

As will be seen, the slot 26 is considerably longer than the slot 27 and the feed blade moves in a longitudinal or front and rear direction with respect to the plate 10, the pin 28 sliding in this slot. A cloth-engaging foot 31 is pivoted to the forward end of the feed blade, as at 32, this foot being serrated, as shown at 33, on its lower face so as to properly engage the goods and effect the feeding of the latter.

An actuating lever 35 is pivoted to the plate 11 at 36, and the forward end of this lever is provided with a roller 37 disposed within the cam track 15 so that rotation of the cam effects oscillation of the lever about the pivot 36. A housing 38 is carried by the rear end of the lever 35, and rotatably mounted on the lever and in the upper portion of the housing 38 is a vertical shaft 39 so that when the lever 35 is oscillated, the housing 38 and shaft 39 will also be oscillated in a horizontal direction.

Upon the lower end of the shaft 39 is a pinion 40 which meshes with the teeth of an internal rack member 41, which rack member is removably mounted in an opening in the feed blade 25. This rack member is held in place by a spring 42 attached to a cover plate 43 pivoted at 43^a to the plate 10. The rack member 41 is provided with a closed recess or groove 44 of oblong shape in which rides a pin 45 projecting from the shaft 39 below the pinion 40. With this construction it will be seen that as the lever 35 and shaft 39 are oscillated in a horizontal plane, the rear end of the feed blade will also be oscillated about the pivot 28 due to the engagement of the pin 45 in the track 44 of the internal rack member 41. This will effect an oscillatory or lateral movement in a back and forth direction of the feeding foot 31 and thus effect zig-zag stitching by the needle of the sewing machine.

The forward and rear movements of the material for effecting a stitch in a substantially oblong path around the buttonhole are obtained by the mechanism which will now be described. It will be apparent that if the pinion 40 is rotated, engagement of this pinion with the teeth of the internal rack member 41 will cause the feed blade to travel forwardly and rearwardly in an oblong path, this movement being permitted by the sliding of the pin 28 in the slot 26 of the feed blade. A ratchet wheel 47 is secured to the shaft 39, and a link 48 (Fig. 1) is provided with an up-turned end 49 in engagement with the teeth of this wheel. The lower end of this link lies within the casing 38, while the forward end extends to a point adjacent the ratchet wheel 17 and is there provided with a

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slot 50, within which is loosely engaged a lug 51 secured to the fork arm 18 (Fig. 6) so as to provide a certain amount of lost motion between the lug and the link.

As shown in Figs. 2 and 7, the link 48 is curved laterally and it is of resilient material so that its rear end may be held inwardly adjacent the ratchet wheel by a flange 52 upon a wall of the casing 38. The link is sufficiently resilient so that when it is moved rearwardly from the position shown in Figs. 1 and 2 by the downward movement of the fork arm 18, it will slide over the teeth of the ratchet 47 and engage rearwardly of a succeeding tooth. Upon upward movement of the fork arm 18 the link 48 will be moved forwardly and the ratchet wheel will be rotated in a clockwise direction, as shown in Fig. 2. This rotation will, of course, be effected in a step-by-step movement, one step being effected at each complete oscillation of the fork arm.

It will be seen, therefore, that the mechanism for effecting the back and forth feeding movement of the material is independent of that for effecting the zig-zag movement. The latter is effected by rotation of the cam wheel 14 which actuates the lever 35, while the forward and rear movement of the feed blade is effected by movement of the fork arm 18 to which the link 48 is directly connected. Therefore, if means are provided for breaking the connection between the fork arm and the ratchet wheel, the forward and rear movements of the feed blade may be effected without the zig-zag movements and thus straight-line stitching obtained.

As previously stated, the pawl 21 is pivoted upon the fork arm and held in engagement with the ratchet wheel 17 by the spring 22. As shown in Figs. 1, 4 and 5, the spring is provided with a laterally turned end 53 which extends over the upper portion 54 of the pawl. This portion of the pawl is so shaped that when the pawl is moved rearwardly about its pivot 20 by the finger piece 55 to the position shown in Fig. 5, the spring will engage the upper portion of the pawl frictionally and hold it in the position to which it has been moved out of engagement with the teeth of the ratchet wheel 17. It will be noted that the spring 22 tends to move forwardly about the pin 23 as an axis, while the pawl swings about the pin 20. As these two pins are not concentric, and as the portion 54 of the pawl is somewhat cam-shaped, the spring will tend to hold the pawl in its inoperative position, as shown in Fig. 5, while when the parts are in the position shown in Fig. 4, the spring will bear against the rear surface of the pawl and urge it into engagement with the teeth of the ratchet wheel 17.

When the pawl is in the position shown in Fig. 5, operation of the sewing machine and the resulting reciprocation of the needle bar will, of course, continue to effect oscillation of the fork arm. This will not serve to rotate the shaft 16, however, and hence the cam wheel 14 will remain stationary as will also the oscillatable actuating lever 35 so that the feed blade 25 will not be oscillated about the pivot pin 28 and zig-zag stitching will not be effected. At this time, however, the oscillation of the fork arm 18 will effect reciprocation of the link 48. This will effect step-by-step rotation of the ratchet 47 and of the pinion 40 which, by its engagement with the teeth of the rack 41, will effect forward and rear movement of the material in an oblong path so as to effect straight stitching around the buttonhole.

If it is desired to use a combination of straight

and zig-zag stitching about the buttonhole, the pawl 21 will be moved to the position shown in Fig. 4 after the straight stitch has been made, and continued operation of the machine will effect a zig-zag stitching over the straight stitch. If zig-zag stitching alone is desired, the pawl will simply be left in the position shown in Fig. 4.

It will, therefore, be seen that with this attachment either a straight buttonhole stitch or a zig-zag buttonhole stitch or a combination of the two may be effected by positioning the pawl in the position shown in Fig. 5 or in the position shown in Fig. 4 or by using the device with the pawl in both positions.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A buttonhole attachment for sewing machines comprising a frame, a feed blade carried thereby for oscillatory and sliding movements relatively thereto, a rack member fixedly secured to the blade, a pinion engaged with the teeth of the rack member, means carried by the frame for supporting said pinion for rotating movement and for oscillating movement about a point remote from its axis, a ratchet wheel secured to the shaft of the pinion, a fork arm pivoted on the frame, a link directly connecting the fork arm to said ratchet wheel to rotate the latter and the pinion upon actuation of the fork arm, means for connecting said fork arm to said pinion to oscillate the same about said point, said last-named means including a second ratchet wheel and a pawl cooperating therewith, and means for holding said pawl out of engagement with said second ratchet wheel.

2. A buttonhole attachment for sewing machines comprising a supporting frame, a lever pivotally mounted thereon, means for oscillating said lever in a substantially horizontal plane comprising a fork arm pivoted on the frame, means connecting the fork arm to the lever including a pawl and ratchet wheel, and means for holding said pawl out of engagement with the ratchet wheel, a feed blade, means connecting said feed blade to the frame for oscillatory and sliding movement, cooperating means carried by said lever and feed blade for effecting oscillating movement of the blade, comprising a pinion carried by the lever, a rack on the feed blade with which said pinion is engaged, and means for rotating said pinion by movement of the fork arm independently of the actuation of said lever to effect sliding movement of the blade, said last-named means comprising a link connected to the fork arm to be reciprocated thereby and connected to said pinion to effect rotation thereof.

3. A buttonhole attachment for sewing machines comprising a supporting frame, a lever pivotally mounted thereon, a feed blade, means

connecting said feed blade to the frame for oscillatory and sliding movement relatively thereto, cooperating means for effecting oscillating movement of the blade, comprising a shaft carried by the lever, a pinion on said shaft, a rack on the feed blade with which said pinion is engaged, a cam member rotatably mounted on the frame with which said lever is engaged, a ratchet wheel secured to said cam member, a fork arm pivoted on the frame, a pawl pivoted on the fork arm and adapted to be engaged with the ratchet wheel, a link connected with said fork arm, a ratchet wheel on said pinion shaft with which said link is engaged, and means for holding said pawl out of engagement with said first-named ratchet wheel.

4. A buttonhole attachment for sewing machines comprising a supporting frame, a lever pivotally mounted thereon, a feed blade, means connecting said feed blade to the frame for oscillatory and sliding movement relatively thereto, cooperating means for effecting oscillating movement of the blade, comprising a shaft carried by the lever, a pinion on said shaft, a rack on the feed blade with which said pinion is engaged, a cam member rotatably mounted on the frame with which said lever is engaged, a ratchet wheel secured to said cam member, a fork arm pivoted on the frame, a pawl pivoted on the fork arm and adapted to be engaged with the ratchet wheel, a link connected with said fork arm, a ratchet wheel on said pinion shaft with which said link is engaged, and means for holding said pawl out of engagement with said first-named ratchet wheel, said means comprising a spring which also urges said pawl into engagement with the ratchet wheel.

5. A buttonhole attachment for sewing machines comprising a supporting frame, a lever pivotally mounted thereon, a feed blade, means connecting said feed blade to the frame for oscillatory and sliding movement relatively thereto, cooperating means for effecting oscillating and sliding movements of the blade, comprising a shaft carried by the lever, a pinion on said shaft, a rack on the feed blade with which said pinion is engaged, a ratchet wheel on said pinion shaft, a second ratchet wheel rotatably mounted on the frame and connected to the lever to actuate the same about its pivot, a pawl member engaged with each of said ratchet wheels, each of said pawl members being actuated by the fork arm, and spring means for holding the associated pawl member out of engagement with said second ratchet wheel.

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