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2,717,565

BUTTONHOLE ATTACHMENTS

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Fig. 1.

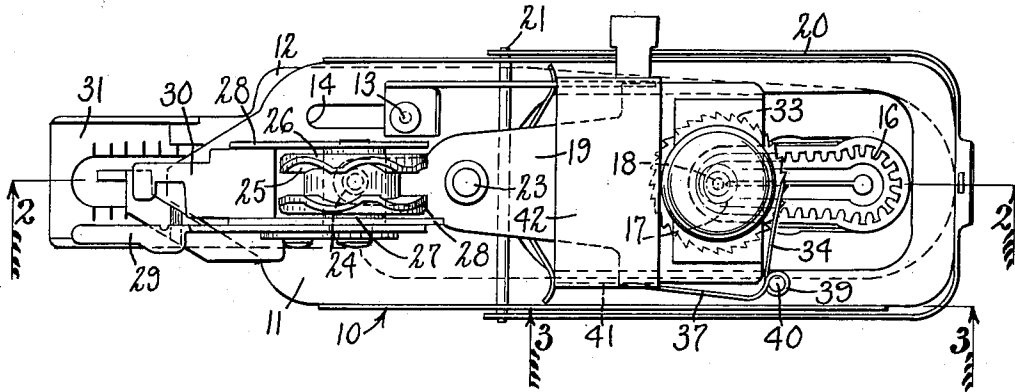


Fig. 2.

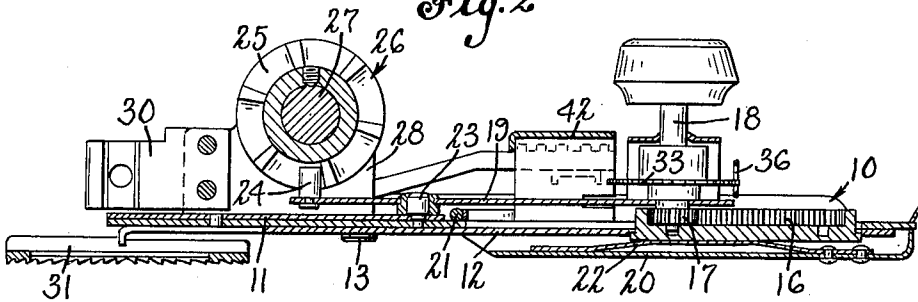


Fig. 3.

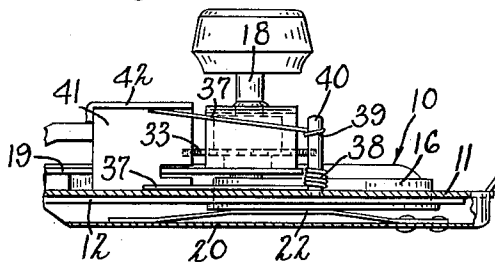
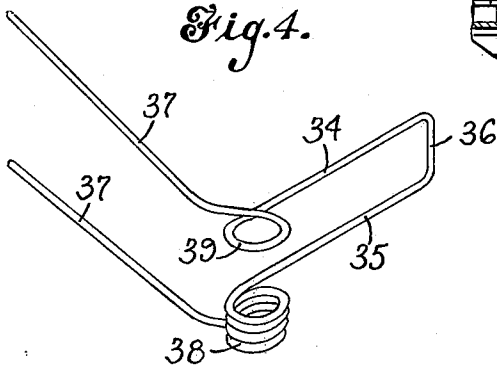


Fig. 4.



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BUTTONHOLE ATTACHMENTS

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5 Claims. (Cl. 112—77)

This invention relates to sewing machine attachments and more particularly to an improvement in a buttonhole attachment or a device for sewing around a buttonhole. As illustrated, the improvement is applied to a buttonhole attachment similar to that shown in the Alquist Patent No. 2,482,607 granted September 20, 1949.

In a buttonhole attachment of the type shown in the patent referred to there is a feed blade which engages the material to move it laterally or in a zigzag fashion to make the stitches and also to move it longitudinally so as to sew entirely around the circumference of the buttonhole. Therefore, this feed blade is mounted for lateral movement about a pivot and also for longitudinal movement over an oblong path.

These movements are obtained by means of a lever pivoted on the frame, which lever is oscillated by a cam wheel which is in turn actuated by the usual fork arm which is connected to the needle bar. The rear end of the lever is connected to the rear end of the feed blade so that oscillation of the lever will cause oscillation of the feed blade.

The connection between this lever and the feed blade consists of a toothed rack member of oblong shape which is carried by the feed blade and a pinion rotatably carried by the lever and engaged with the teeth of the rack member. On the shaft of the pinion is a ratchet wheel, and this ratchet wheel is, of course, oscillated with the lever which carries the pinion. Means are provided to engage the ratchet wheel during its oscillation and rotate it in a step-by-step manner which serves to rotate the pinion. As the pinion is in engagement with the teeth of the oblong rack member this effects longitudinal movement of the rack member to sew around the buttonhole.

The present invention deals particularly with the mechanism for effecting step-by-step rotation of the ratchet wheel during the oscillation of the latter by the lever. As the member which engages the ratchet wheel must move from one tooth to another at each oscillation of the lever which occurs at each reciprocation of the needle bar, it is subject to considerable wear. It is, therefore, desirable, that this element be so constructed that it will withstand the wear to which it is subjected and that this wear be reduced to a minimum so far as is possible. Also there is apt to be an objectionable noise or click when the member moves from one tooth to another in the ratchet wheel, and it is desirable to so form this member that there be a minimum of noise in the operation of the device.

One object of the present invention is to provide a sewing attachment of the character described with a ratchet-wheel-engaging detent which will operate efficiently and noiselessly and which will withstand the continual wear to which it may be subjected.

Another object of the invention is to provide a sewing machine attachment of the class described with a ratchet-wheel-engaging member of such construction that it will

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be subject to a force of tension rather than compression during its operation.

Still another object of the invention is to provide a sewing machine attachment of the character described with a ratchet-wheel-engaging detent which will operate without objectionable noise and which at the same time may be economically manufactured and assembled and capable of giving satisfactory service.

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 top plan view of a buttonhole attachment embodying my invention;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a partial sectional view on line 3—3 of Fig. 1; and

Fig. 4 is a perspective view of the spring ratchet engaging detent or pawl.

To illustrate a preferred embodiment of my invention I have shown a buttonhole attachment comprising a frame 10 having a base plate 11 upon the underside of which is mounted a feed blade 12. The feed blade is pivoted to the plate by the pivot pin 13 slidably adjustable in a slot 14 in the plate so that the throw of the forward end of the feed blade may be varied.

Secured to the feed blade 12 is an endless rack 16 of oblong shape, the teeth of which are engaged by those of a pinion 17 secured to a shaft 18, which shaft is rotatably carried by an actuating lever 19. The rack member 16 may be held in place by a cover plate 20 hinged to the frame at 21 and provided with a flat spring 22 which engages the underside of the rack member.

The actuating lever 19 is pivoted upon the base plate at 23 so that it oscillates in a horizontal plane, and the forward end of this lever is provided with a pin 24 which acts as a cam follower and is disposed in the cam track 25 of a cam wheel 26, the cam wheel being secured to a shaft 27 rotatably mounted in spaced up-standing frame members 28. This shaft together with the cam wheel is rotated in a step-by-step manner by the usual fork arm 29. Also secured to the base plate 11 is the usual adapter 30 to attach the device to the presser bar of a usual household sewing machine.

It will be obvious from the above arrangement that as the cam wheel 26 is rotated the lever 19 will be oscillated in a horizontal plane as will also the pinion 17 carried at the rear end of this lever, and the engagement of this pinion with the teeth of the rack 16 will effect oscillation of the feed blade and thereby effect lateral movements of the work. A work-engaging foot 31 is carried at the forward end of the feed blade to engage the work and move it with the blade.

The mechanism thus far described moves the feed blade to effect a zigzag stitch but does not effect longitudinal back-and-forth movements of the feed blade. These latter movements are effected by mechanism now to be described.

Secured to the shaft 18 is a ratchet wheel 33, and means are provided to rotate this ratchet wheel in a step-by-step manner during the oscillation of the feed blade. The rotation of this ratchet wheel will rotate the shaft 18 to which it is secured and likewise rotate the pinion 17 thereby causing the rack to travel in an oblong path as the pinion travels over the teeth of the rack. As the rack is secured to the feed blade this gives the feed blade a back-and-forth longitudinal movement.

To effect step-by-step rotation of the ratchet wheel a pawl member is provided to engage a tooth of the ratchet wheel and pull the latter through a small arc as the lever 19 upon which it is mounted is reciprocated. This pawl is in the form of a U-shaped spring member shown in

Fig. 4. The U-shaped body portion of this spring is provided with leg members 34 and 35 and a bight portion 36, and between this portion of the spring and the free ends 37 are provided coils 38 and 39 adapted to be mounted upon a post 40 secured to the base plate 11. The free ends 37 of the spring are adapted to bear against the side wall 41 of a housing member 42 on the frame and the tension of the spring is such that the bight portion 36 will be urged in a counter-clockwise direction, as shown in Fig. 1, or toward the teeth of the ratchet wheel 33.

The bight portion 36 of the spring will, therefore, be engaged by one of the teeth of the ratchet wheel. As the spring 36 is fixed upon the frame by its connection with the pin 40, it will, when the lever 19 is oscillated by the cam wheel 26, exert a pull on the tooth of the ratchet wheel which it engages and will rotate the ratchet wheel through a partial revolution when the latter is moved away from the post 40 or in an upward direction, as shown in Fig. 1. When the lever 19 and ratchet wheel carried thereby is moved in the opposite direction or toward the post 40 the bight portion 36 of the spring will ride over the next adjacent tooth of the ratchet wheel and drop into the space behind this tooth so as to be in a position for a subsequent operation.

If the movement of the rear end of the lever 19 is so related to the number of teeth provided in the ratchet wheel 33 that the bight portion 36 of the spring pawl moves over only one tooth of the ratchet wheel upon the oscillation of the lever, then the ratchet wheel and shaft 18 may be moved through the distance of one tooth at one step. This, as will be seen, will result in a step-by-step rotation of the ratchet wheel 33 and the pinion 17, and as the latter engages the teeth of the rack 16, this will effect a backward and forward sliding movement of the feed blade.

It may be noted that the pawl spring exerts a pulling action upon the ratchet wheel so that it is subject to tension during its operation rather than compression. Moreover, the spring can be made of the proper material and is of circular cross section so that it will ride easily and smoothly upon the teeth of the pawl without objectionable noise. It will, therefore, give long service in operation and operate in a satisfactory manner.

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 a sewing machine comprising a frame having a lever pivotally mounted thereon, means for oscillating said lever, a feed blade, means for connecting the feed blade to the frame for oscillatory and sliding movement, means connecting said lever to the feed blade including a vertically disposed shaft rotatably mounted in the lever, a ratchet wheel secured to said shaft, and means for rotating said ratchet wheel from the oscillations of said lever comprising a U-shaped spring member secured to the frame and having its bight portion engaged with the teeth of the ratchet

wheel to exert a pull on the ratchet wheel when the latter is moved in a direction away from the point of securement of the spring.

2. A buttonhole attachment for a sewing machine comprising a frame having a lever pivotally mounted thereon, means for oscillating said lever, a feed blade, means for connecting the feed blade to the frame for oscillatory and sliding movement, means connecting said lever to the feed blade including a vertically disposed shaft rotatably mounted in the lever, a ratchet wheel secured to said shaft, and means for rotating said ratchet wheel from the oscillations of said lever comprising a U-shaped round wire spring member carried by the frame, the bight portion of which is engaged with the teeth of the ratchet wheel in position to exert a pull thereon.

3. A buttonhole attachment for a sewing machine comprising a frame having a lever pivotally mounted thereon, means for oscillating said lever, a feed blade, means for connecting the feed blade to the frame for oscillatory and sliding movement, means connecting said lever to the feed blade including a vertically disposed shaft rotatably mounted in the lever, a ratchet wheel secured to said shaft, and means for rotating said ratchet wheel from the oscillations of said lever comprising an upstanding post mounted on the frame, a wire spring member of U-shaped form having its bight portion engaged with the teeth of the ratchet wheel, the legs of said spring member being coiled about said post and having extended ends bearing against a part of the frame to urge said spring member toward the ratchet wheel.

4. A buttonhole attachment for a sewing machine comprising a frame having a lever pivotally mounted thereon, means for oscillating said lever, a feed blade, means for connecting the feed blade to the frame for oscillatory and sliding movement, means connecting said lever to the feed blade including a vertically disposed shaft rotatably mounted in the lever, a ratchet wheel secured to said shaft, and means for rotating said ratchet wheel from the oscillations of said lever comprising a U-shaped spring member, of circular form in cross section, carried by the frame having its bight portion engaged with the teeth of the ratchet wheel, said spring member being placed under tension when actuating said ratchet wheel.

5. A buttonhole attachment for a sewing machine comprising a frame having a lever pivotally mounted thereon, means for oscillating said lever, a feed blade, means for connecting the feed blade to the frame for oscillatory and sliding movement, means connecting said lever to the feed blade including a vertically disposed shaft rotatably mounted in the lever, a ratchet wheel secured to said shaft, and means for rotating said ratchet wheel from the oscillations of said lever comprising a U-shaped member, of circular form in cross section, mounted upon the frame having its bight portion engaging the teeth of the ratchet wheel and exerting a pull thereon, and means for urging said member toward the ratchet wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

2,482,607 Almquist Sept. 20, 1949