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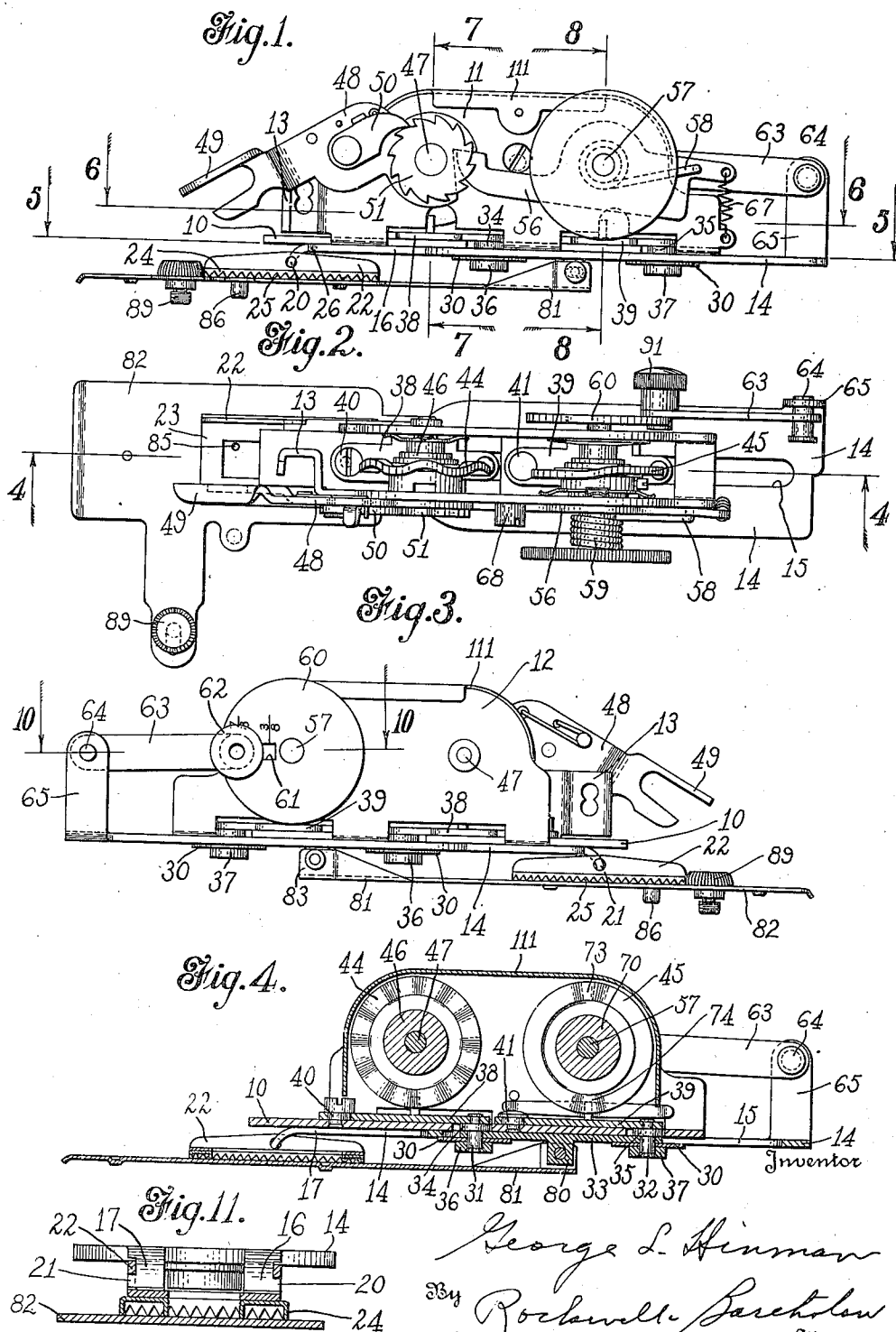
G. L. HINMAN

2,207,293

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Nov. 24, 1937

4 Sheets-Sheet 1



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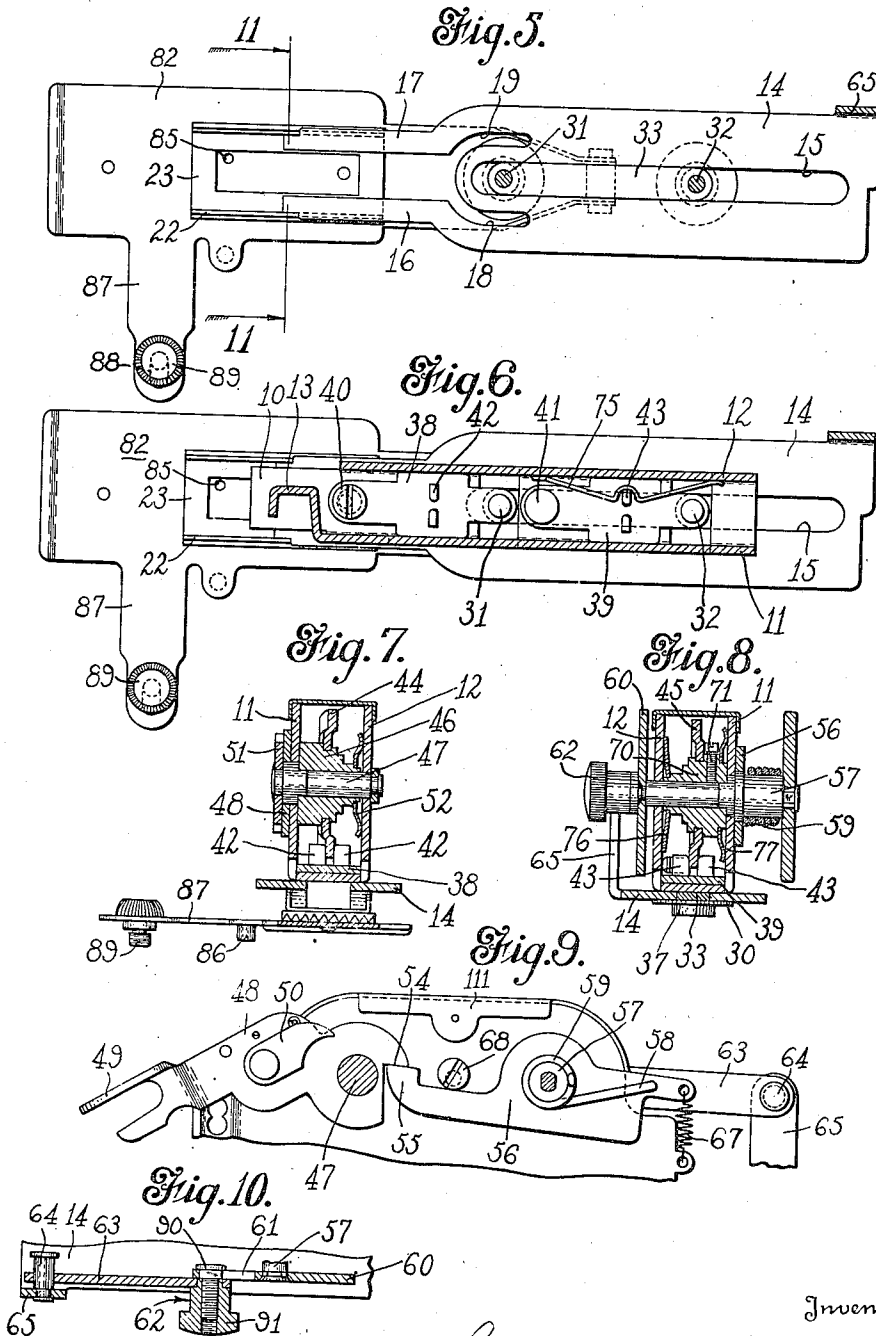
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BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Nov. 24, 1937

4 Sheets-Sheet 2



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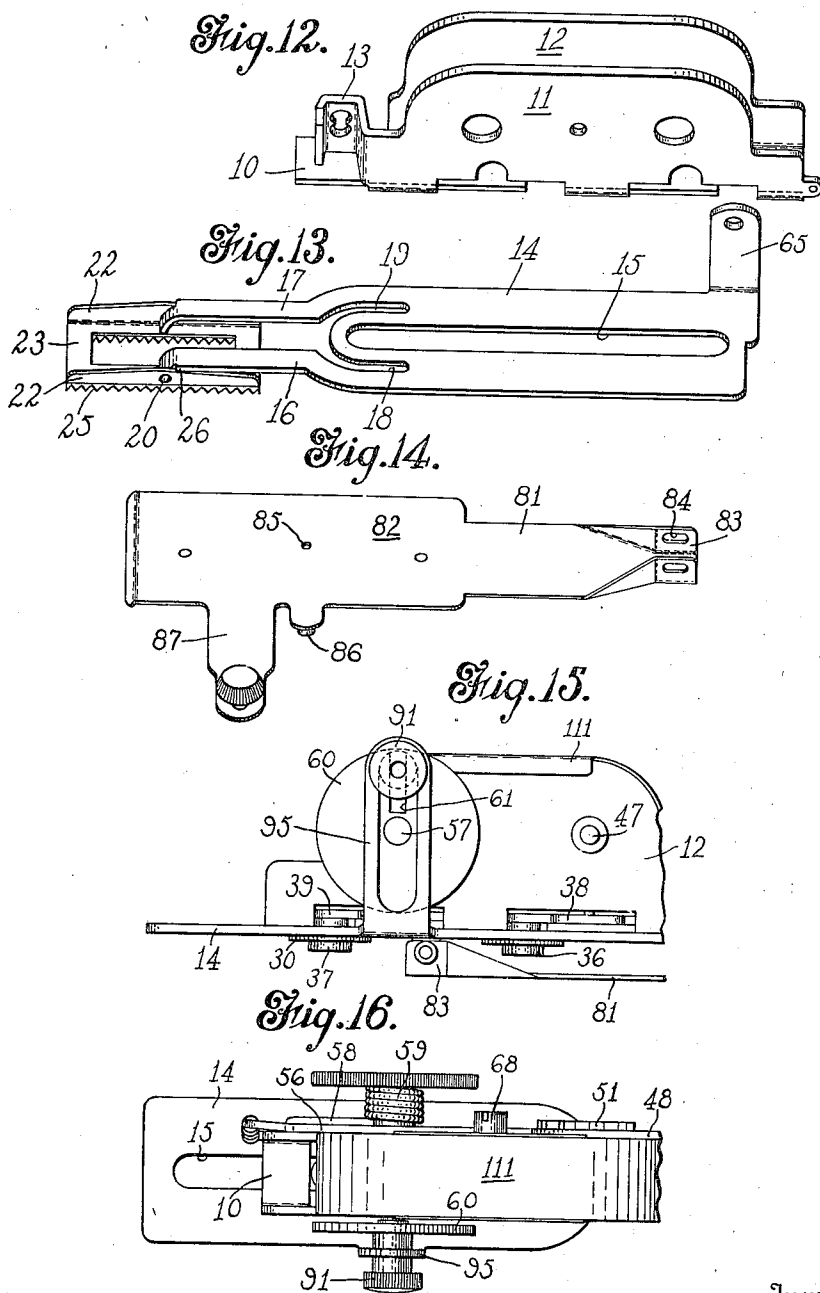
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BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

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4 Sheets-Sheet 3



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BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

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4 Sheets-Sheet 4

Fig. 17.

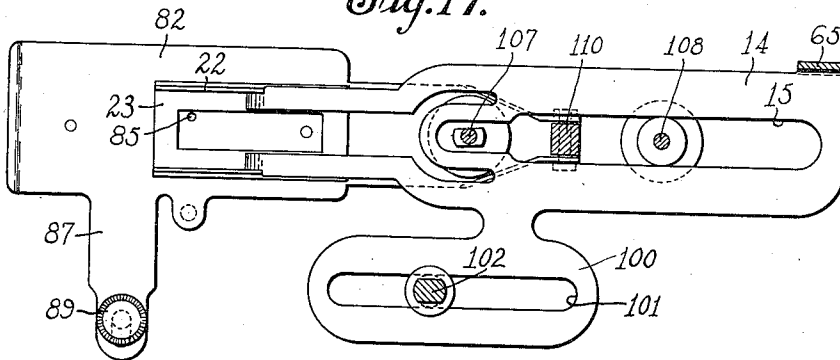


Fig. 18.

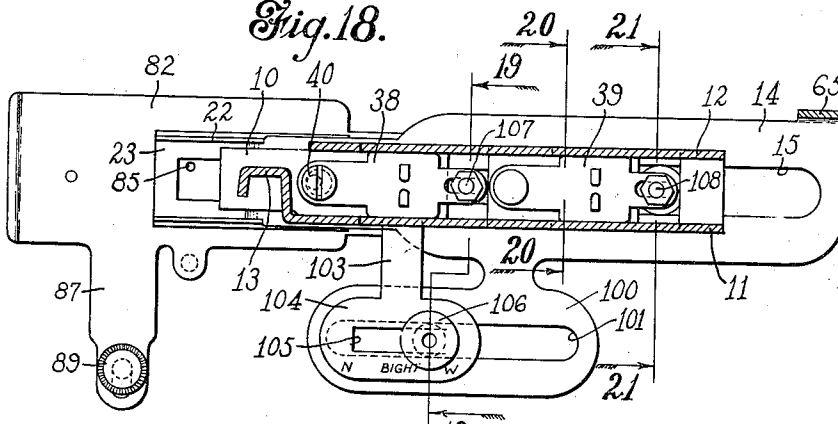


Fig. 19.

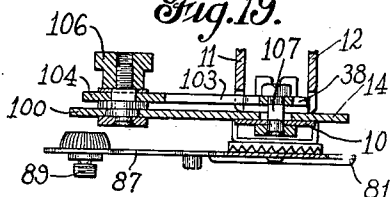


Fig. 20.

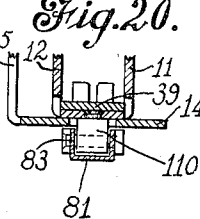


Fig. 21.

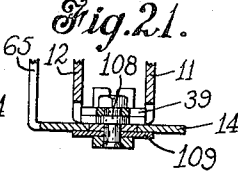
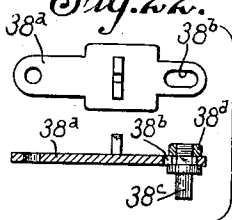


Fig. 22.



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UNITED STATES PATENT OFFICE

2,207,293

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

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Application November 24, 1937, Serial No. 176,240

19 Claims. (Cl. 112-77)

This invention relates to sewing machine attachments, and more particularly to a so-called buttonhole attachment for sewing machines. The invention also relates particularly to the provision of an attachment of this character for use with ordinary household sewing machines, and in the operation of the present device in stitching a buttonhole, the work is reciprocated laterally beneath the needle of the machine for the formation of the buttonhole stitches, and is also fed lengthwise of the buttonhole to stitch along one side thereof. When the stitch reaches the end of the feed, which will be the end of the buttonhole, the work is shifted laterally, and the direction of the feed reversed, so that a line of stitches will be made on the other side of the buttonhole. All of the above operations are performed automatically, so that a continuous line of stitches entirely surrounding the buttonhole will result, without the necessity for any intervention of the operator.

The stitching upon each side of the buttonhole is somewhat in the nature of a zig-zag stitch, and in the use of an attachment of this character it is necessary that the forward feed steps of the attachment be capable of adjustment in order that the stitches may be placed closer together or farther apart, as desired, and it is also desirable to have a very fine and exact feed for the attachment so that the stitches will be even and will be capable of being finely spaced. It is also desirable to have the length of the entire line of stitching adjustable, that is, to be able to adjust the length of the feed between reversals of the goods so that large or small buttonholes may be made.

One object of the invention is the provision of a buttonhole attachment for household sewing machines which will meet all of the requirements necessary and desirable for such devices, but which will at the same time be relatively simple in construction and operation, so that the attachment will not be excessively expensive, and so that it may be readily used by anyone capable of operating a household sewing machine.

Another object of the invention is the provision of a buttonhole attachment for sewing machines which will comprise comparatively few parts, so that there will be little or no lost motion between the parts, and hence the reciprocation of the feed of the goods both laterally of the line of stitching and longitudinally thereof will take place efficiently and positively, and without lost motion.

To these and other ends the invention consists

in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a side elevational view of a buttonhole attachment embodying my invention;

Fig. 2 is a top plan view of the same;

Fig. 3 is a side elevational view opposite to that shown in Fig. 1;

Fig. 4 is a sectional view on line 4-4 of Fig. 2;

Fig. 5 is a horizontal sectional view on line 5-5 of Fig. 1;

Fig. 6 is a horizontal sectional view on line 6-6 of Fig. 1;

Figs. 7 and 8 are vertical sectional views respectively on lines 7-7 and 8-8 of Fig. 1;

Fig. 9 is a view of the feed of the attachment, some parts being omitted for the sake of clearness;

Fig. 10 is a sectional view on line 10-10 of Fig. 3;

Fig. 11 is a sectional view on line 11-11 of Fig. 5;

Fig. 12 is a perspective view of the frame of the device;

Fig. 13 is a perspective view of the feed blade;

Fig. 14 is a perspective view of the cover plate;

Fig. 15 is a view of a modified form of connection between the feed crank and the feed blade;

Fig. 16 is a top plan view of the parts shown in Fig. 15;

Fig. 17 is a view similar to Fig. 5, but showing a modified form of my invention;

Fig. 18 is a view similar to Fig. 6 of the modification shown in Fig. 17;

Figs. 19, 20 and 21 are sectional views on lines 19-19, 20-20, and 21-21 respectively of Fig. 18; and

Fig. 22 shows a plan and sectional view of one of the throw levers employed.

To illustrate a preferred embodiment of my invention, I have shown a buttonhole attachment comprising a main frame consisting of a substantially U-shaped structure having a base portion 10 and upstanding side walls 11 and 12. Upon one of the walls is an extension 13 bent into substantially U-shaped form for attachment to the presser foot of the sewing machine, so that the attachment will be held down upon the goods by the stress of the usual presser bar spring. Slidably mounted below the base portion 10 of the main frame just described is a feed blade 14, the construction of which is shown more especially in Fig. 13. This feed blade is provided with a longitudinal slot 15, and with a pair of forwardly extending arms 16 and 17 at its front end. It will

be noted that while these arms are formed integrally with the blade 14, slots 18 and 19 are provided between the arms and the blade at the forward end of the latter, so that the arms 16 and 17 will have a greater effective length, and therefore greater resilience to bend or turn laterally slightly in order to accommodate the feed blade foot to the goods.

At their forward ends the arms 16 and 17 are turned downwardly and are provided with lateral extensions 20 and 21 more or less in the form of pins which are pivotally connected with side flanges 22 upstanding from the upper face of a member 23 of hollow rectangular shape, which constitutes the upper portion of the feed blade foot. Upon the lower surface of the member 23 is secured the feed foot proper 24, which is also of hollow rectangular shape and U-shaped in cross-section, the down-turned edges being serrated, as shown at 25, to positively engage the goods employed. It will be apparent from Figs. 11 and 13 that the feed blade foot consisting of the parts 23 and 24 will rock freely upon the pivots 20 and 21, except as limited by the shoulders 26 on the arms 16 and 17. It will thus be seen that this foot not only has a rocking motion about a transverse axis through the pivots 20 and 21, but, due to the resilience of the arms 16 and 17, is capable of a limited rocking movement about an axis longitudinal to the blade 14.

As previously stated, the blade 14 is secured directly below the base 10 of the main frame, and is slidably held in this position by washers 30 provided upon pins 31 and 32, which pins are rotatably attached to a bar 33, this bar being located within the slot 15. These pins 31 and 32 are provided with shouldered portions 34 and 35 above the bar 33, and their lower ends may be riveted over or be provided with nuts 36 and 37 to hold the pins assembled with the washers 30 and the bar 33. The shouldered portions 34 and 35 of these pins rest in slots in the base 10 of the main frame, so that the upper ends of these pins above the shoulder project through the base of the frame to be attached to levers 38 and 39 pivoted at 40 and 41 to the base 10, as shown more especially in Fig. 4. It will be apparent that with this construction the feed blade 14 is held firmly at the lower side of the base 10 of the frame, but is permitted both longitudinal and lateral sliding movements, as will be hereinafter explained. It will also be noted that the slot 15 is considerably longer than the bar 33, so that the movement of the feed plate in a longitudinal direction will not be unduly restricted.

The form of the levers 38 and 39 are shown more especially in Fig. 6. In this view it will be seen that the pivot pin 40 is provided with a bearing eccentric to the portion of the pin entering plate 10. By turning this pin, the lever 38 may be adjusted laterally to some extent to properly align the parts with the needle opening. Upon the upper surface of the levers 38 and 39 are provided pairs of upstanding lugs 42 and 43, the lugs of each pair being spaced slightly to receive therebetween the peripheries of cam wheels 44 and 45.

The cam wheel 44, referring particularly to Figs. 1, 2 and 7, is secured upon a hub 46 carried in turn by a shaft 47 rotatably mounted in the uprights 11 and 12 of the main frame. Pivotally mounted upon the extended end of this shaft is a lever 48 having a forked end 49 designed to engage with a nut or pin on the needle bar. Pivoted to this lever is a pawl 50 designed to cooper-

ate with a ratchet wheel 51, which is secured to the end of the shaft 47 just outside of the pivot of the lever 48. It will be seen that the ratchet wheel 51 is secured against a shoulder on the shaft 47, so that it will be rigidly attached to this shaft, but will leave room between the ratchet wheel and the frame member 11 for the free oscillation of the lever 48. A spring 52 bearing against the frame member 12 acts upon the hub 46 so as to hold the hub and cam wheel 44 in the proper position.

It will be seen that, as the needle bar of the sewing machine reciprocates, the fork arm or lever 48 will also reciprocate and serve to move the ratchet wheel 51, and with it the shaft 47 in a step-by-step movement. This imparts a step-by-step movement to the cam wheel 44. The circumference of this wheel is provided with a wavy outline, as may be seen in Fig. 2, that is, its periphery is alternately displaced to the right and left, so that as this wheel turns, due to the engagement of its rim between the lugs 42, it will cause the lever 38 to be swung laterally about the pivot 40. As the other end of this lever is pivoted to the forward end of the bar 33 by the pin 31, this end of the bar will also be reciprocated laterally or transversely of the base member 10. As the side edges of this bar are snugly engaged in the slot 15, the feed blade will be reciprocated in a lateral direction, and thus, by means of the foot 24, effect lateral movement of the goods to effect zig-zag stitches therein.

The longitudinal feed of the goods through the machine will now be described. Referring particularly to Fig. 9, it will be seen that the fork arm 48 is provided rearwardly of the shaft 47 with a shoulder 54 designed to contact an arm 55 of a lever 56 pivoted on a shaft 57, the latter construction being shown particularly in the sectional view in Fig. 8. The shaft 57 is pivoted in the upstanding portions 11 and 12 of the frame, the lever 56 being positioned just without the frame portion 11. Secured to the lever 56 is one end of a spring 58. The other end is coiled about the end of the shaft 57 which projects beyond the lever 56, the coiled end of the spring being shown at 59. Upon the opposite end of shaft 57 is a crank disk 60 provided with a slot 61 in which is adjustably mounted a crank pin 62, and a pitman 63, pivoted at one end to this crank pin, has its other end pivoted at 64 to an upstanding arm 65, secured to or formed integrally with the feed blade 14.

From the above-described construction it will be apparent that, as the crank disk revolves, the pitman 63 will move the feed blade in a direction longitudinally of the attachment, and that it will move it in one direction during one half of the revolution of the disk 60, and in the opposite direction during the other half of the revolution of this disk, so that the direction of movement of the feed blade will be reversed during the rotation of the crank disk to feed the goods in one direction a distance equal to the feed in the opposite direction. Movement is imparted to this disk by the shaft 57, which in turn is rotated by the lever 56 through the coiled spring 59. With reference to Fig. 9, it will be seen that as the fork arm 48 moves upwardly, its shoulder 54 will move downwardly the end 55 of the lever 56, causing the opposite end of this lever, to which is attached the end 58 of the spring, to move upwardly. This serves to tighten the coiled spring 59 about the shaft 57, so as to cause this spring to turn the shaft and with it the crank disk 60. When the

fork arm moves downwardly with the needle bar, the lever 56 is caused to follow by the small coil spring 67, but as this movement tends to loosen the coils of the spring 59 about the shaft 57, the latter will not be rotated in a reverse direction. This action of the lever 56 and spring 59 serves to impart a fine step-by-step rotary movement to the shaft 57 and disk 60, so as to produce a positive and even feed of the goods through the machine. This feed may be adjusted by means of the eccentrically mounted screw 68, which may be turned to any position desired to limit the upward movement of the end 55 of the lever 56, so that the throw of this lever by the shoulder 54 will be regulated. In this manner a fine or coarse feed may be employed as desired.

It will be appreciated that, as the direction of feed is reversed during the operation of the attachment through a complete cycle of its movement, provision must be made for shifting the cloth laterally at the end of the feed in one direction, or the feed in the other direction would cause the second line of stitches to be made directly over the first. Provision is made, therefore, for shifting the goods laterally, so that the second line of stitching will be spaced laterally from the first, to leave room for the buttonhole between the two. As this lateral shifting of the goods must be coordinated with the end of the feeding movement, it will be found desirable to effect it by means of the main feed shaft 57. Upon this shaft is secured a hub 70 by the screw 71, to which hub is secured the cam wheel 45 previously referred to.

This cam wheel 45 is generally disk-shaped and is provided with oppositely disposed offset portions 73 and 74 in its periphery, so that one half of the peripheral rim of the wheel lies in one plane and the other half in a plane spaced from and parallel to the first. The periphery of this cam engages the upstanding lugs 43 of the lever 39, and it will be obvious that twice during the rotation of this wheel the lever is caused to be shifted laterally about its pivot 41, first in one direction and then in the other. As the free end of this lever is connected with the bar 33 by the pin 32, the shifting of the lever will likewise shift the bar, and therefore shift the feed blade 14 due to the fact that this bar rides in the slot 15 of the feed blade. The cam portions 73 and 74 of this wheel are so arranged that they will act upon the lever 39 when the pitman 63 is at the end of its stroke, so as to cause the goods or cloth to be shifted laterally at the end of the line of stitching. That is, if the cloth is being fed forwardly, this shifting will take place at the end of the forward feed just prior to the beginning of the feed in the opposite direction, while shifting in the opposite direction will occur at the end of the feed in a rearward direction. One of the lugs 43 on the lever 39 is held against the surface of the cam wheel 45 at all times by the spring 75, shown more especially in Fig. 6, which spring bears against one of these lugs at its central portion, and bears against the frame member 12 at its ends. The shaft 57 is held in place by means of a spring washer 76 bearing upon one face of the hub 70, and a spring spider 77 bearing upon the other face thereof. This shaft is otherwise free to move in its bearings in the frame members 11 and 12. It may here be stated that when the rear end of the bar 33 is moved by the lever 39, this bar will be moved about the pin 31 as a pivot, as this pin will momentarily be stationary and serve as the fulcrum or pivot for this move-

ment of the feed blade. Similarly, when the front end of the bar 33 is moved by the lever 38, the pin 32 will act as a pivot, and the feed blade will be moved about this pin as a center.

Upon the lower face of the bar 33 is a lug 80 to which is somewhat loosely pivoted a cover plate 21, shown more particularly in Figs. 1, 2 and 14. This plate comprises a substantially flat body portion 82 having upturned flanges 83 at its rear end provided with elongated openings 84 to receive the pivot pin passing through the lug 80. This plate covers the usual feed mechanism of the machine with which the attachment is used, as, when the attachment is employed, the feeding of the material is effected entirely by the feed blade foot 24. The portion 82 of the cover plate is provided with a needle opening 85, and upon its lower surface carries a downwardly projecting pin 86 designed to enter an opening in the bed plate of the sewing machine. The pin 86 is fixed to the plate, as the opening in the bed plate in which it is received is a standard distance from the needle opening. Therefore, the distance from the pin 86 to the opening 85 is controlled by this standard measurement.

In order to secure the cover plate in place, it is provided with a laterally extending arm 87 having an elongated slot 88 (Figs. 5 and 6) within which is received a screw 89 designed to be received in a threaded opening usually provided in the bed plate of a sewing machine. As the particular position of this opening may vary in different machines even of the same make, the slot 88 provides for such variation with respect to the needle opening 85.

The crank pin 62 has already been described as adjustable in a slot 61 in the crank disk 60. This is shown more particularly in the sectional view of Fig. 10, wherein, as illustrated, the crank pin consists of a threaded member 90 passing through the slot 61 and receiving upon its end a nut 91, whereby the member 90 may be clamped in any desired adjusted position within the slot 61. It may also be noted that, as shown in this view, the connection between the pitman 63 and the pivot pin 64 provides for lateral movement of the pin relatively to the pitman, so as to allow for lateral movement of the feed blade to which the arm 65, carrying the pin 64, is connected.

It may be found desirable to provide a slight adjustment in the width of the zig-zag stitch about the buttonhole, and also adjustment of the throw of the feed blade by the cam 45 to adjust the distance between the two lines of stitches. A factory adjustment of this character may readily be accomplished by employing a lever such as that shown at 38^a in Fig. 22, in place of the levers 38 and 39. The lever 38^a is provided with an elongated slot 38^b to receive the pin 38^c, which connects the lever with the bar 33. In this instance the pin 38^c will be provided with a nut 38^d, so that the pin may be adjusted in the slot in the lever and secured in adjusted position. This adjustment is intended principally to be made in the factory in case the variation in the parts of the attachment as manufactured should effect a variation in the width of the stitches such that an adjustment of this character might be desirable.

Instead of effecting the forward and reverse speed of the goods by means of the pitman arrangement shown in Figs. 3 and 10, this may be effected by the modified arrangement shown in Figs. 15 and 16, wherein the feed blade 14 is provided with an upstanding slotted plate 95, 75

which snugly receives the body of the nut 91. Otherwise the structure of the parts shown in Figs. 15 and 16 is like the corresponding parts shown in the figures of the drawings previously described, and the operation of the parts will be substantially the same. This construction does provide, however, for a fewer number of parts, and consequently a smaller number of connections between the parts, and hence there will be less likelihood for lost motion in the operation of the attachment.

A further modification is shown in Figs. 17 to 21 of the drawings. According to the construction thus far described, there has been no provision for regulating the width of the zig-zag stitch except the factory adjustment provided for in the lever 38^a shown in Fig. 22. It may be desirable, however, to provide for an adjustment of the width of the zig-zag stitch, so that the user of the device may effect a fine or coarse stitch, as desired. Such an adjustment is effected in the modification now to be described. In this modification the bar 33 is omitted, and the connection between the levers 38 and 39 and the feed blade is obtained in a different way. For this purpose the feed blade is provided with a laterally offset portion 100 provided with a slot 101, in which slot is slidably mounted a threaded pin 102, which pin is provided with square sides to prevent it turning in the slot. The lever 38 is also provided with a laterally extending arm 103 terminating in a plate portion 104 provided with a slot 105 registering with the slot 101. The pin 102 also passes through the slot 105, and is provided with a threaded nut 106, so that it may be clamped tightly to the plate 104 while sliding freely at all times in the slot 101. This pin serves as the connection between the lever 38 and the feed blade, and it will be obvious that as the pin is moved to one end or the other of the slot 105, the distance of this pin from the pivot 40 of the lever 38 will be varied, and therefore the throw of the feed blade by the lever 38 will be varied. For example, as shown in Fig. 18, the pin 102 is at the right-hand end of the slot 105, which is the most remote from the pivot 40, and hence a wide stitch will be effected. If the pin is moved to the opposite or left-hand end of the slot 105, a narrow stitch will be effected.

The omission of the bar 33 makes necessary certain other changes in the construction of the attachment, particularly with reference to holding the feed blade in position against the lower surface of the base member 10 of the frame. This is effected by means of a pin 107 passing through the lever 38 and carrying at its lower end a washer 107^a, which bears against the lower face of the feed blade 14. A similar arrangement is provided at the rear end of the lever 39, wherein the pin 108 and washer 109 serve to clamp the feed blade against the frame. Also, in order to hold the cover plate 81 in position, a lug 110 is secured to the frame base member 10 and projects downwardly through the slot 15 of the feed blade, where it is embraced by the ears 83 of the cover plate.

A sheet metal cover 111, properly formed to fit over the upstanding frame members 11 and 12, may be provided to rest upon these members and enclose the working mechanism mounted between these members.

The operation of the attachment may now be briefly described. With the parts in the position shown in Figs. 1, 2 and 3, for example, wherein

it is seen the pitman 63 is at the rear end of its stroke, the material in which the buttonholes are to be made is placed in proper position below the feed foot 24, and the attachment lowered upon the goods by the lowering of the presser bar. The screw 68 is set to effect the length of the forward feed steps desired between the stitches, and likewise the pin 62 is set at the proper position in the slot 61 to effect the proper length of the entire forward feed according to the length of the buttonhole to be made. The sewing machine is then operated, and the up-and-down movement of the needle bar will cause the oscillation of the fork arm 48, which, through the pawl 58 and ratchet wheel 51, will effect movement of the cam wheel 44 to move the material laterally in alternate directions between stitches. At the same time, through the lever 56 and coil spring 59, the crank disk 60 will be turned in a step-by-step movement to effect a forward feed of the material by means of the pitman 63 and arm 65 connected to the feed blade. This operation will continue until the disk 60 has rotated through one-half of a revolution, when the forward feed of the material will have been completed, and, as will be obvious, further revolution of the disk 60 will effect a feed in a reverse direction. At this time one of the cam surfaces 73 or 74 is in position to engage the lugs 43, and hence shifts the feed blade, and therefore the material, laterally with respect to the direction of the feed. This, of course, takes place at the time of the reversal of the feed effected by the crank pin 62 and pitman 63. Upon further operation of the machine, the material is fed in a reverse or rearward direction, and a second line of zig-zag stitching is produced parallel to and spaced from the first, thus effecting a line of stitching entirely around the buttonhole.

It will be apparent that the entire operation is automatic, both as to the lateral shifting of the goods between the two lines of stitching, and also with respect to the reversal of the feed of the material. It will also be apparent that the device is of relatively simple character, and is comprised of parts which may be readily and economically made, thus providing an attachment of this character which will not be excessive in cost.

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

What I claim is:

1. A buttonhole attachment for sewing machines comprising a frame, a feed blade attached to said frame for sliding movement relatively thereto, means for effecting feeding movement of said blade comprising a shaft rotatably mounted in the frame and operatively connected to the blade, a lever pivoted on the frame, a spring having one end connected to said lever and its opposite end coiled about said shaft, and means to actuate said lever from the needle bar of the sewing machine.

2. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movement relatively thereto, means to effect movement of said blade comprising a shaft rotatably mounted in the frame and operatively connected to the blade, a member coiled about said shaft and designed

to grip the surface of said shaft when moved in one direction and release its grip upon said shaft when moved in the opposite direction, means actuated by the needle bar of the sewing machine to move said member in the direction in which it grips said shaft to effect a feeding movement of the shaft, a crank disk on said shaft carrying a crank pin, and means connecting said crank pin to the blade.

3. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movement relatively thereto, means to effect movement of said blade comprising a shaft rotatably mounted in the frame and operatively connected to the blade, a member coiled about said shaft and designed to grip the surface of said shaft when moved in one direction and release its grip upon said shaft when moved in the opposite direction, means actuated by the needle bar of the sewing machine to move said member in the direction in which it grips said shaft to effect a feeding movement of said member, a crank disk on said shaft carrying a crank pin, and means connecting said crank pin to the blade.

4. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movement relatively thereto, means to effect movement of said blade comprising a shaft rotatably mounted in the frame and operatively connected to the blade, a member surrounding said shaft and designed to grip said shaft when moved in one direction and release its grip upon said shaft when moved in the opposite direction, and means actuated by the needle bar of the sewing machine to move said member in the direction in which it grips said shaft to effect a feeding movement of the shaft, said needle-bar-actuated means comprising a lever pivoted on the frame to which one end of said member is secured.

5. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movement relatively thereto, means to effect movement of said blade comprising a shaft rotatably mounted in the frame and operatively connected to the blade, a member surrounding said shaft and designed to grip said shaft when moved in one direction and release its grip upon said shaft when moved in the opposite direction, means actuated by the needle bar of the sewing machine to move said member in the direction in which it grips said shaft to effect a feeding movement of the shaft, said needle-bar-actuated means comprising a lever pivoted on the frame to which one end of said member is secured, and means for varying the throw of said lever by the needle bar to vary the length of the feed step.

6. A buttonhole attachment for sewing machines comprising a frame, a feed blade slidably connected to said frame, means to effect longitudinal movement of said feed blade relatively to the frame, means to effect oscillating movement of said feed blade transversely of the frame to produce a zig-zag stitch, said last-named means comprising a lever pivoted to the frame and operatively connected to the blade, a cam wheel having sinuous side faces adjacent its periphery, means on said lever engaging opposite faces of said cam wheel, means to rotate said cam wheel, a bar slidably engaged with the feed blade, and said lever being connected to said bar.

7. A buttonhole attachment for sewing ma-

chines comprising a frame, a feed blade connected to the frame for sliding movements relatively thereto, means for effecting a feeding movement of said blade longitudinally of the frame, means for effecting an oscillatory movement of the blade transversely of the frame to produce a zig-zag stitch including a cam wheel having a sinuous peripheral portion, and means for effecting a shifting movement of the blade to change the position of the line of stitching including a second cam wheel having one portion of its peripheral portion displaced laterally with respect to the other, a pair of levers each of which is pivoted to the frame and operatively engaged with the peripheral portion of one of said cam wheels, a bar slidably engaged with the feed blade, and said levers being pivotally engaged with said bar.

8. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movements relatively thereto, means for effecting a feeding movement of said blade longitudinally of the frame, means for effecting an oscillatory movement of the blade transversely of the frame to produce a zig-zag stitch including a cam wheel having a sinuous peripheral portion, and means for effecting a shifting movement of the blade to change the position of the line of stitching including a second cam wheel having one portion of its peripheral portion displaced laterally with respect to the other, a pair of levers each of which is pivoted to the frame and operatively engaged with the peripheral portion of one of said cam wheels, said feed blade being provided with an elongated longitudinal slot, a bar slidably positioned in said slot, and said levers being pivotally engaged respectively with the ends of said bar.

9. A buttonhole attachment for sewing machines comprising a frame, a feed blade connected to the frame for sliding movements relatively thereto, means for effecting a feeding movement of said blade longitudinally of the frame, means for effecting an oscillatory movement of the blade transversely of the frame to produce a zig-zag stitch including a cam wheel having a sinuous peripheral portion, and means for effecting a shifting movement of the blade to change the position of the line of stitching including a second cam wheel having one portion of its peripheral portion displaced laterally with respect to the other, a pair of levers each of which is pivoted to the frame and operatively engaged with the peripheral portion of one of said cam wheels, said feed blade being provided with an elongated longitudinal slot, a bar slidably positioned in said slot, said levers being pivotally engaged respectively with the ends of said bar, and the length of said bar being less than that of the slot to provide for longitudinal movement of the feed blade relatively to the bar.

10. A buttonhole attachment for sewing machines comprising a frame, a feed blade mounted for sliding movement at the under side of said frame, said mounting means comprising a bar attached at the under side of the frame, and said blade being provided with an elongated slot within which the bar is snugly received to provide a long bearing surface for the blade.

11. A buttonhole attachment for sewing machines comprising a frame, a feed blade mounted for sliding movement at the under side of said frame, said mounting means comprising a bar attached at the under side of the frame, and said blade being provided with an elongated slot within which the bar is snugly received to provide a long

bearing surface for the blade, and means secured to the bar at each end thereof to engage the blade to hold the parts in assembled position.

12. A buttonhole attachment for sewing machines comprising a frame having a base, a feed blade slidably connected to the frame at the under side of the base, means to effect longitudinal movement of said blade relatively to the frame, means to effect a movement of said feed blade transversely to the frame comprising a lever pivoted directly to the upper surface of the base of the frame and connected to said blade, means for effecting movement of said lever to move the blade, and the connection of said lever with the frame being adjustable to vary the normal position of the blade with respect to the frame and being substantially midway between the side edges of the frame.

13. A buttonhole attachment for sewing machines comprising a frame, a feed blade slidably mounted beneath the frame, means for moving said feed blade laterally with respect to the frame comprising a pair of levers each pivoted to the frame adjacent one end, means connecting the free ends of said levers with the blade comprising a bar slidably engaged with the blade and having the free ends of the levers connected thereto, cam wheels rotated by the action of the needle bar of the sewing machine and engaged with said levers to actuate the same, and said cam wheels being substantially centered above the feed blade transversely of the width thereof, and said levers being connected to the blade at points directly below said cam wheels.

14. A buttonhole attachment for sewing machines comprising a frame, a feed blade slidably mounted beneath the frame, means for moving said feed blade laterally with respect to the frame comprising a pair of levers each pivoted to the frame adjacent one end, means connecting the free ends of said levers with the blade, cam wheels rotated by the action of the needle bar of the sewing machine and engaged with said levers to actuate the same, a bar to which said levers are connected, and said blade being provided with a longitudinally extending slot formed substantially centrally of the blade in which said bar is received.

15. A buttonhole attachment for sewing machines comprising a frame, a feed blade mounted for sliding movement at the under side of the frame, said mounting means comprising a bar attached at the under side of the frame, and said blade being provided with an elongated slot within which the bar is snugly received to provide a long bearing surface for the blade, and

means for moving said blade laterally comprising a lever attached to the bar and actuated from the needle bar of the sewing machine.

16. A buttonhole attachment for sewing machines comprising a frame, a feed blade mounted for sliding movement at the under side of the frame, said mounting means comprising a bar attached at the under side of the frame, and said blade being provided with an elongated slot within which the bar is snugly received to provide a long bearing surface for the blade, and means actuated by the needle bar of the sewing machine for moving the blade laterally of the frame.

17. A buttonhole attachment for sewing machines comprising a frame, a feed blade mounted for sliding movement at the under side of the frame, said mounting means comprising a bar attached at the under side of the frame, and said blade being provided with an elongated slot within which the bar is snugly received to provide a long bearing surface for the blade, a lever pivoted to said bar and to the frame, and means actuated by the needle bar of the sewing machine for oscillating said lever.

18. A buttonhole attachment for sewing machines comprising a frame, a feed blade slidably mounted at the lower portion of the frame and provided with a foot adapted to engage the material, means for imparting longitudinal feeding movements and lateral movements to said blade, a cover plate carried by the attachment below said blade having a needle opening therein, and a plurality of members on said plate adapted to engage the bed of the sewing machine and fix the plate thereto, and one of said members occupying a fixed position with respect to the needle opening while the other of said members is adjustable with respect thereto.

19. A buttonhole attachment for sewing machines comprising a frame, a feed blade slidably mounted at the lower portion of the frame and provided with a foot adapted to engage the material, means for imparting longitudinal feeding movements and lateral movements to said blade, a cover plate carried by the attachment below said blade having a needle opening therein, means adjustably mounted on said plate for securing it to the bed of a sewing machine, and additional means on said plate occupying a fixed position with respect to said needle opening to engage the sewing machine bed and insure registration of the machine needle with the needle opening.

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