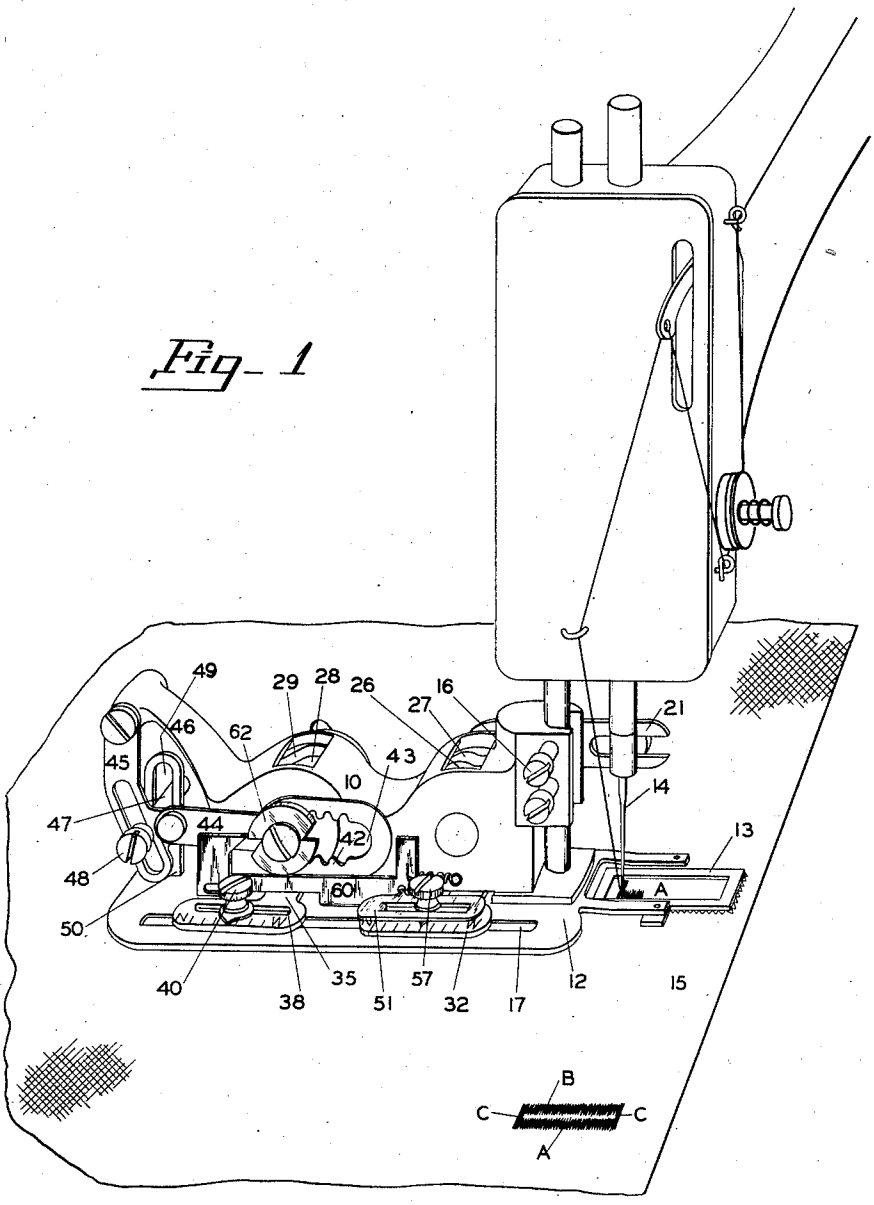
Dec. 23, 1947. J. HICKEY 2,432,992

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Dec. 10, 1945 3 Sheets-Sheet 1

Fig. 1



INVENTOR.
JAMES HICKEY

BY J. R. Geisler.

ATTORNEY

Dec. 23, 1947. J. HICKEY 2,432,992

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Dec. 10, 1945 3 Sheets-Sheet 2

Fig. 2

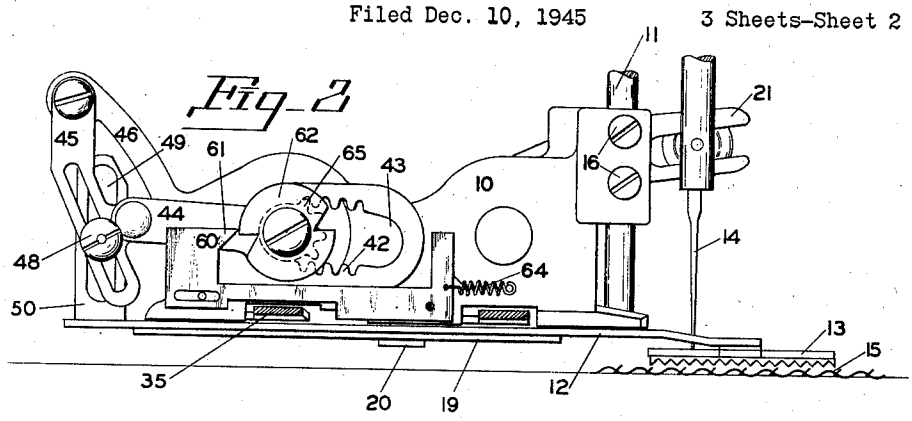


Fig. 3

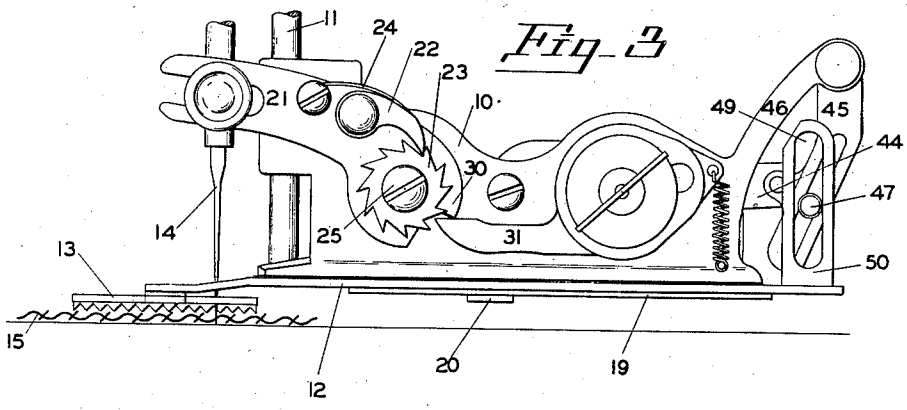


Fig 4

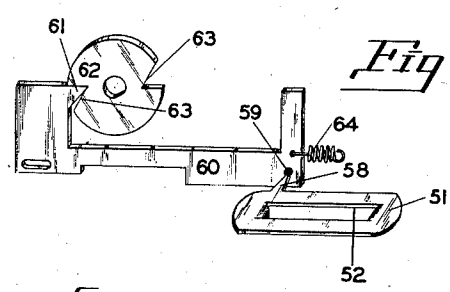
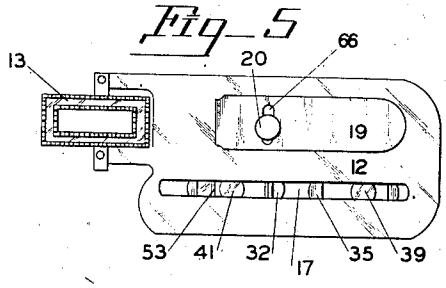


Fig. 5



INVENTOR.
JAMES HICKEY

BY F. R. Fensler

ATTORNEY

Dec. 23, 1947. J. HICKEY 2,432,992

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Dec. 10, 1945 3 Sheets-Sheet 3

Fig. 6

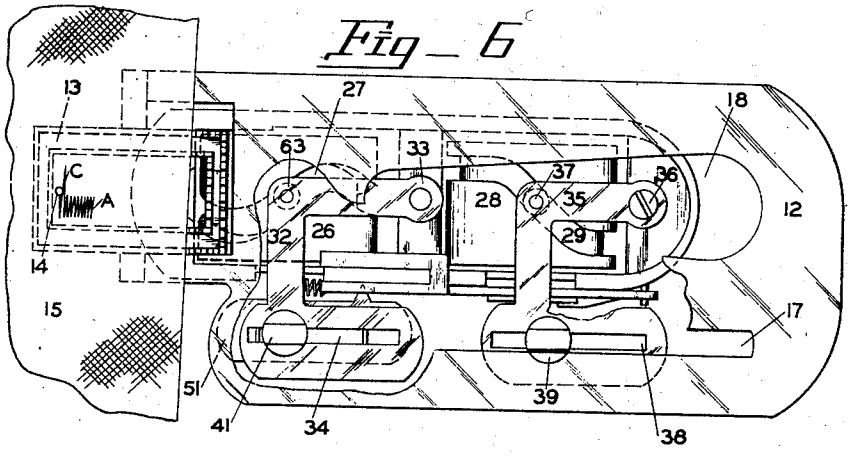


Fig. 7

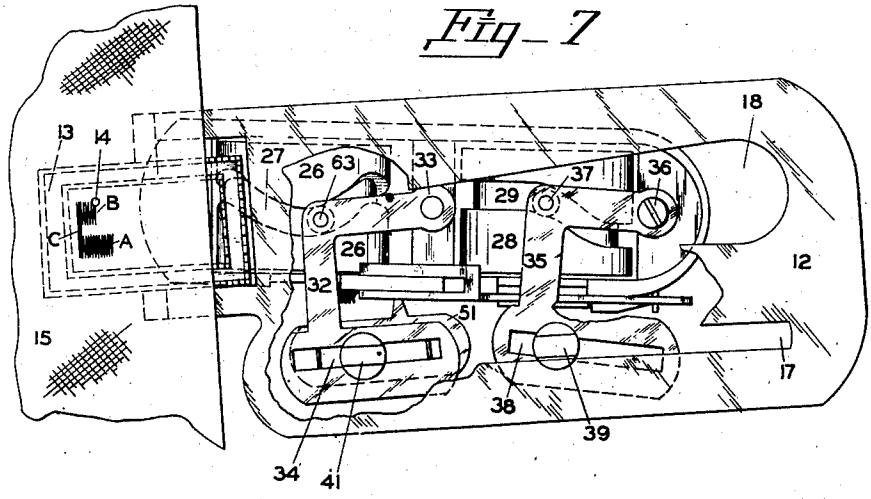
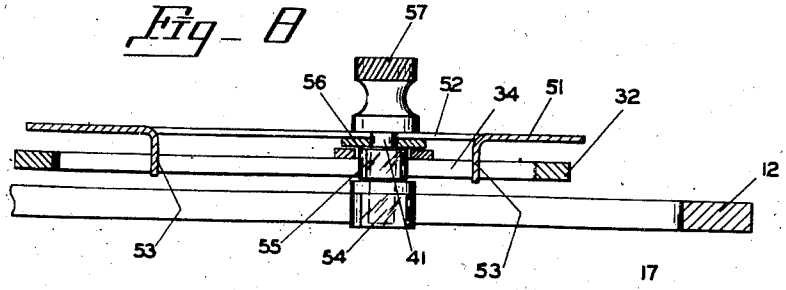


Fig. 8



INVENTOR
JAMES HICKEY
BY
K. H. Geisler.
ATTORNEY

Patented Dec. 23, 1947

2,432,992

UNITED STATES PATENT OFFICE

2,432,992

BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

James Hickey, Portland, Oreg.

Application December 10, 1945, Serial No. 633,955

4 Claims. (Cl. 112—77)

1

The present invention, like that described in my pending application Serial No. 563,221, now Patent No. 2,405,253, issued August 6, 1946, relates to a device, adapted to be attached to an ordinary sewing machine, and, when so attached, to perform the zig-zag stitching ordinarily required around a buttonhole.

An object of this invention is to provide a simple, improved means for performing such zig-zag stitching which will automatically cause double length stitches to be made at each end of the buttonhole so as to produce the desirable reinforcing and finishing at each end of the buttonhole.

A further object is to provide a simple and practical attachment of this nature in which will also be combined the usual adjustment means for altering the size of the zig-zag stitching.

The manner in which these objects are attained will be hereinafter briefly explained with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a view, in isometric perspective, of the portion of an ordinary sewing machine head with my improved attachment secured in place, and also showing a piece of cloth on which the desired buttonhole stitching has been performed;

Fig. 2 is a side elevation showing the near side of the attachment of Fig. 1, but with the two scale adjusters broken away for the sake of clarity;

Fig. 3 is an elevation of the opposite side of the attachment;

Fig. 4 is a detail, in isometric perspective, of some of the coacting elements which automatically cause double-length stitches to be produced by the attachment at predetermined periods;

Fig. 5 is a bottom plan view of the device drawn to a smaller scale;

Fig. 6 is a bottom plan view, drawn to larger scale, with the bottom cover plate removed and with a portion of the feed blade broken away;

Fig. 7 is a bottom plan view similar to Fig. 6 but illustrating the feed blade and associated members in another position; and

Fig. 8 is an enlarged fragmentary vertical section of the connection between the feed blade and forward oscillating arm.

Referring first to Figures 1, 2 and 3, the buttonhole attachment has a main body portion 10, the forward end of which is secured to the sewing machine presser foot bar 11, by screws 16, in the usual manner, after the cloth-engaging element has been removed from the base of the presser foot bar. The attachment has a bottom feed

2

blade 12 to which is secured a special cloth-engaging element 13. This cloth-engaging element 13 is in the usual form having a hollow rectangular opening and the sewing machine needle 14 passes through the same. The hollow rectangular opening in this cloth-engaging element 13 is wide enough to allow for the maximum length of zig-zag stroke, as the cloth 15 is moved back and forth under the needle 14 by the attachment, and this opening is long enough to extend slightly beyond the ends of the desired buttonhole. The cloth-engaging element 13 also has the usual serrated bottom (as shown in Figures 2 and 3), for gripping the cloth 15 and moving it under the needle of the sewing machine so as to cause the zig-zag or buttonhole stitching to be performed.

The shape of the feed blade 12 is shown in Figures 1, 5, 6 and 7. It contains a longitudinal slot 17 at one side, the purpose of which will be explained later. Also it is formed with a central elongated opening 18 over which a bottom cover plate 19 (Fig. 5) extends. A suitable screw 20 holds the cover plate 19 secured in place and attached to the main body 10. This screw 20 extends through a slot 66 in the cover plate and permits the cover plate 19, and therewith the feed blade, to be oscillated laterally. Suitable engaging means (not shown) permit the feed blade to move longitudinally in either direction above the cover plate while being supported by the cover plate.

A lever arm 21, pivotally mounted on the main body portion for up and down movement in a vertical plane, (shown more clearly in Fig. 3), has the usual forked end which is adapted to be connected to the needle carrier in the customary manner and thus be reciprocated with the up and down movement of the needle carrier and needle. A pawl 22, carried on the lever arm 21, engages a ratchet 23 and is held in engagement with the ratchet by a wire spring 24. The ratchet 23 is secured to a shaft (not shown) extending transversely through the main body portion and a screw 25 holds the ratchet 23 on the end of the shaft. The lever arm 21 is pivotally supported on the same shaft, and a cylinder 26, (shown in Figs. 1, 6 and 7), having a cam groove 27, is rigidly secured to the same shaft. Thus up and down movement of the lever arm 21 produces rotation of the cylinder 26.

A second similar cylinder 28 (Figs. 1, 6 and 7), having a special cam groove 29, is also mounted on a horizontal shaft in the main body portion. A shoulder 30 (Fig. 3), at the rear end of the lever

arm 21, engages a ratchet member 31, which latter member is connected by means (not shown) to the shaft on which the second cylinder 28 is mounted. These parts are so arranged as to cause the second cylinder to rotate as the lever arm 21 is reciprocated, but to cause the second cylinder to rotate more slowly than the first cylinder 26.

A flat U-shaped, stitch-control arm 32 (Figs. 6 and 7), having its inner end pivoted to the main body portion at 33, carries a cam groove follower 63 (shown in broken lines in Figs. 6 and 7), which is engaged by the cam groove 27 of the cylinder 26. The outer leg of the U-shaped arm 32 has a slot 34 overlying the slot 17 of the feed blade 12.

A second similar U-shaped arm 35 (Figs. 6 and 7), pivoted to the main body portion at 36, carries a cam groove follower 37 which engages the cam groove 29 of cylinder 28. The outer leg of this U-shaped arm 35 has a slot 38.

A threaded pin 39 carries a pair of engaging members, arranged one above the other, which are adapted to engage and ride in the slots 17 and 38 respectively. A clamping nut 40 (Fig. 1), is mounted on the top of the pin 39 and the pin and its members are so arranged that the pin may be clamped firmly at any desired location in slot 38 but will still be free to slide in slot 17. A similar pin 41 (Figs. 6 and 7), carries similar members sliding in slots 34 and 17.

The cam groove 27 of the cylinder 26 (Figs. 6 and 7), is intended to produce fairly rapid lateral reciprocation of the feed blade 12 as the needle moves up and down, and thus causes the stitching to be performed in zig-zag manner. The cam groove 29 of the cylinder 28 is provided with only two offset portions so that the cam groove follower 37 will be located near one end of the cylinder 28 during nearly half the time the cylinder 28 is rotating and will be located near the other end of the cylinder 28 for a corresponding length of time. The cam groove 29 serves to control the position of the feed blade 12 so that the zig-zag stitching will be performed along one side of the buttonhole for one period during the rotation of the cylinder 28 and will be performed along the other side of the buttonhole during a subsequent equal period. This arrangement is old and well known in the art.

A gear wheel 65, (shown in dotted lines in Fig. 2), having teeth on only half of its periphery, is secured to the shaft on which the cylinder 28 is mounted. As the cylinder 28 rotates, the teeth of the half gear 65 engage with teeth 42 (Figs. 1 and 2), located along the top and bottom of a slot 43 in a link 44. The arrangement of the gear and teeth in the link 44 is such that the rotation of the gear 65 will cause the link 44 to move first in one direction and then in the opposite direction. The link 44 is pivotally connected to a slotted arm 45 which in turn is pivoted at the top to a rear bracket extension 46 of the main body. A pin 47 (Figs. 1 and 3), adjustably secured to the slotted arm 45 by means of the clamp nut 48, is adapted to engage either of the vertical sides of a slot 49 in an upstanding leg 50 rigidly secured to the feed blade 12, the diameter of the pin 47 being slightly less than the width of the slot 49. Thus rotation of the cylinder 28 results in the feed blade 12 being moved longitudinally first in one direction and then in the other. At the same time the rotation of the cylinder 28, through the medium of the cam groove 29 and U-shaped adjustment arm 35, causes the feed blade to position the cloth so that the zig-zag stitching will

take place along one side of the buttonhole while the feed blade is moving forwardly and along the other side of the buttonhole while the feed blade is moving rearwardly, and during all this time the stitching follows the zig-zag pattern due to the rotation of the forward cylinder 26 acting through the medium of the cam groove 27 and the U-shaped adjustment arm 32.

The mechanism thus far described is old and its mode of operation is familiar to those versed in the art. It will also be understood from Figures 6 and 7 that the width of the zig-zag stitching along each side of the buttonhole will be determined by the position of the pin 41 in the slot 34 of the arm 32. Thus when the pin 41 is at the left hand end of the slot 34 (as viewed in Fig. 6), a greater extent of lateral reciprocal motion will be imparted to the feed blade 12 by the cam groove 27 of the cylinder 26 than when the pin 41 is in the opposite or right hand end of groove 34. Thus the positioning of the pin 41 in the groove of the U-shaped stitch control adjustment arm 32 will determine the width of the zig-zag stitching. Similarly the position of the pin 39 in the slot 38 of the arm 35 will determine the spacing between the two parallel rows of zig-zag stitching. These features are also known in the art.

Thus far I have described how the zig-zag stitches A and B (Figs. 1 and 7), on each side of the buttonhole are made and controlled. I shall now describe how the desired double length stitching C is automatically performed at each end of the buttonhole.

A stitch control plate 51 (Figs. 1, 4 and 8), is positioned above the U-shaped stitch control arm 32 and supported on the pin 41 (Fig. 8). The stitch control plate 51 has a longitudinal slot 52 of approximately the same width as slot 34 of arm 32 but slot 52 is shorter than slot 34. A pair of tongues 53, projecting downwardly from the ends of slot 52 into slot 34, hold the control plate 51 with its slot 52 in registration with slot 34 while permitting longitudinal movement of the control plate 51 with respect to arm 32. Engaging members 54 and 55 (Fig. 3), are carried by the pin 41 and are adapted to slide in the slots 17 and 34 respectively. A washer 56 is placed above the top member 55 and the stitch control plate 51 rests on the washer 56 and is firmly secured to the pin 41 by the clamp nut 57. Thus the pin 41 and its engaging members are free to slide in the slots 17 and 34 when the plate 51 is moved longitudinally.

The control plate 51 has a pointed engaging finger 58 (Fig. 4), which is at all times in engagement with an aperture 59 in a slide bracket 60. This slide bracket 60 is slidably mounted on the side of the main body portion 10, as shown in Figs. 1 and 2. The rear portion of the slide bracket 60 carries a pointed tongue 61. A notched disk 62 (Figs. 2 and 4), is secured to the end of the shaft on which the cylinder 28 (Fig. 1) is mounted and is rotated with cylinder 28. The disk 62 has two diametrically opposite notches 63 (Fig. 4). The pointed tongue 61 of the slide bracket 60 is held in constant contact with the disk 62 by a spring 64 (Fig. 2). The notched disk 62 is so arranged with respect to the gear 65 (which engages the link 44), that one of the notches 63 of the disk 62 will register with the tongue 61 whenever the link 44 reaches the end of its travel in either direction. In other words, the slide bracket 60 is permitted to slide forward for a brief period whenever the link 44, and with it the feed blade 12, reaches the end of the for-

ward or rearward travel. This of course occurs when the stitching is being performed at the ends of the buttonhole.

However, when the slide bracket 60 is permitted temporary forward movement by the engagement of the tongue 61 with one of the notches in the disk 62, the control plate 51 will also be moved forwardly by the slide bracket 60, causing the pin 41, which is clamped to the control plate 51, to slide forward in the slots 34 and 17 (Figs. 6, 7 and 8). Thus, assuming the position of the pin 41 to be that shown in Fig. 7 while the stitches on one side of the buttonhole are being made, the forward movement of the control plate 51 just described will then cause the pin 41 to move into the position shown in Fig. 6. But when the pin 41 is in the position shown in Fig. 6 the oscillation given to the feed blade 12 will be increased since the pin 41 is further away from the pivotal point 33 of the U-shaped adjustment arm 32. In other words, the wider zig-zag stitching *c* will be performed as long as this condition prevails. When the pin 41 again returns to the position shown in Fig. 7, the narrower zig-zag stitching will again be resumed.

When the tongue 61 drops into one of the notches 63 of the slowly rotating disk 62, causing wider zig-zag stitching temporarily to be performed, the longitudinal movement of the feed blade 12 will momentarily cease while the direction of travel of the link 44 is being reversed, due in part to the slight play permitted the pin 47 in slot 49. During this moment the tongue 61 rides out of the notch and causes the zig-zag stitching to become narrower until, when the feed blade starts its reverse movement, the zig-zag stitching will again be at the narrower width desired for the sides of the buttonhole.

Thus by automatically changing the position of the pin 41 in the slot of the U-shaped stitch control arm 32 at each end of the buttonhole, when the feed blade has reached the end of its travel forwards or backwards, the desired double width stitching is provided for finishing and reinforcing the ends of the buttonhole.

Other means associated with the longitudinal travel of the feed blade 12 for changing the position of pin 41 in the slot 34, could be used in carrying out my invention, and it is not my intention to limit my invention specifically to the means described. The means which I have described, however, I have found to be very satisfactory, as well as simple, inexpensive and practical.

I claim:

1. In a buttonhole attachment for a sewing machine, a feed blade mounted for longitudinal and lateral movement, a laterally-oscillating arm, means connecting said feed blade with said arm, a manually adjustable element included in said means for varying the extent of normal oscillation imparted to said feed blade by said arm, mechanism for moving said feed blade longitudinally in alternate directions, and means associated with said mechanism and connected to said adjustable element for moving the relative position of said element temporarily whenever said

feed blade nears the end of its longitudinal travel in either direction, whereby the extent of lateral oscillation transmitted to said feed blade through said element and first mentioned means will be temporarily increased.

2. In a buttonhole attachment for a sewing machine, a feed blade mounted for longitudinal and lateral movement, a slot extending longitudinally along one side of said feed blade, a laterally-oscillating, pivotally-mounted arm, a slot in said arm capable of registration with said slot in said feed blade, an adjustable connecting element slidable in said slots, mechanism for moving said feed blade longitudinally in alternate directions, and means associated with said mechanism and connected to said element for moving said element in said slots a greater distance from the pivotal point of said arm temporarily whenever said feed blade reaches the end of its longitudinal travel in either direction, whereby to increase the extent of lateral oscillation of said feed blade at such times.

3. In a buttonhole attachment of the character described, a feed blade mounted for longitudinal and lateral movement, a slot extending longitudinally along one side of said feed blade, a laterally-oscillating, pivotally-mounted arm, a slot in said arm capable of registration with said slot in said feed blade, a stitch control plate, a pin carried by said stitch control plate, said pin slidable along said slots in said arm and feed blade, mechanism for moving said feed blade longitudinally in alternate directions, and means associated with said mechanism and connected to said stitch control plate for moving said plate and therewith said pin further away from the pivotal point of said arm whenever said blade reaches the end of its longitudinal travel in either direction.

4. In a buttonhole attachment of the character described, a feed blade mounted for longitudinal and lateral movement, a slot extending longitudinally along one side of said feed blade, a laterally-oscillating arm, a slot in said arm capable of registration with said slot in said feed blade, a stitch control plate, a pin carried by said stitch control plate, said pin slidable along said slots in said arm and feed blade, a spring controlled slide bracket, means for moving said slide bracket against the force of said spring whenever said blade reaches the extent of its longitudinal travel in either direction, said stitch control plate connected to said bracket, whereby the position of said plate and therewith said pin will automatically be moved by the movement of said bracket.

JAMES HICKEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,558,118	Serafini	Oct. 20, 1925