(No Model.)

2 Sheets—Sheet 1.

J. M. GRIEST.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 332,251. Patented Dec. 15, 1885.

Fig. 1.

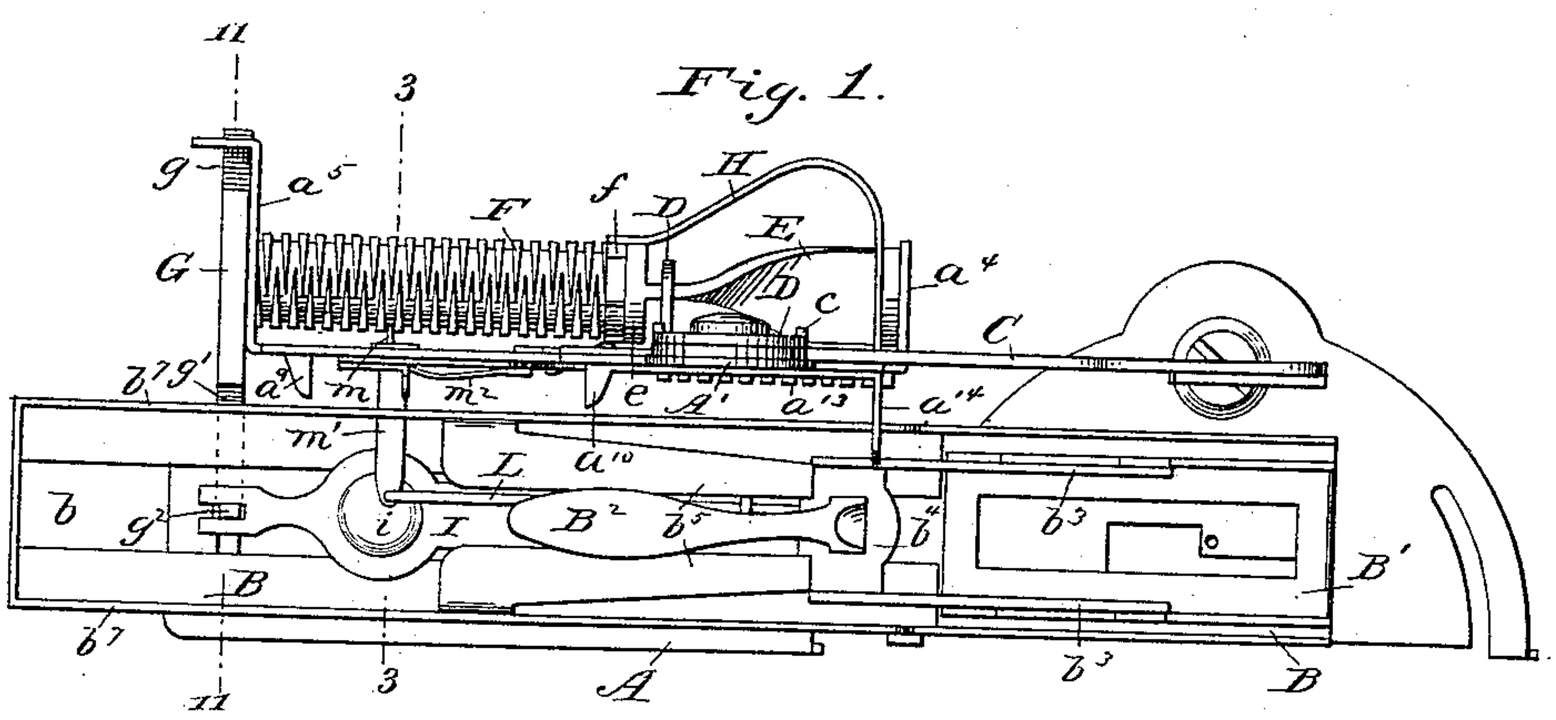


Fig. 4.

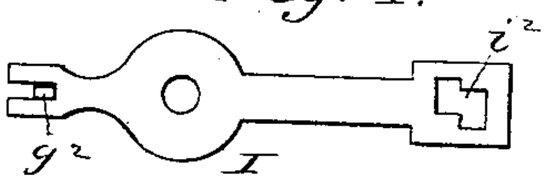


Fig. 2.

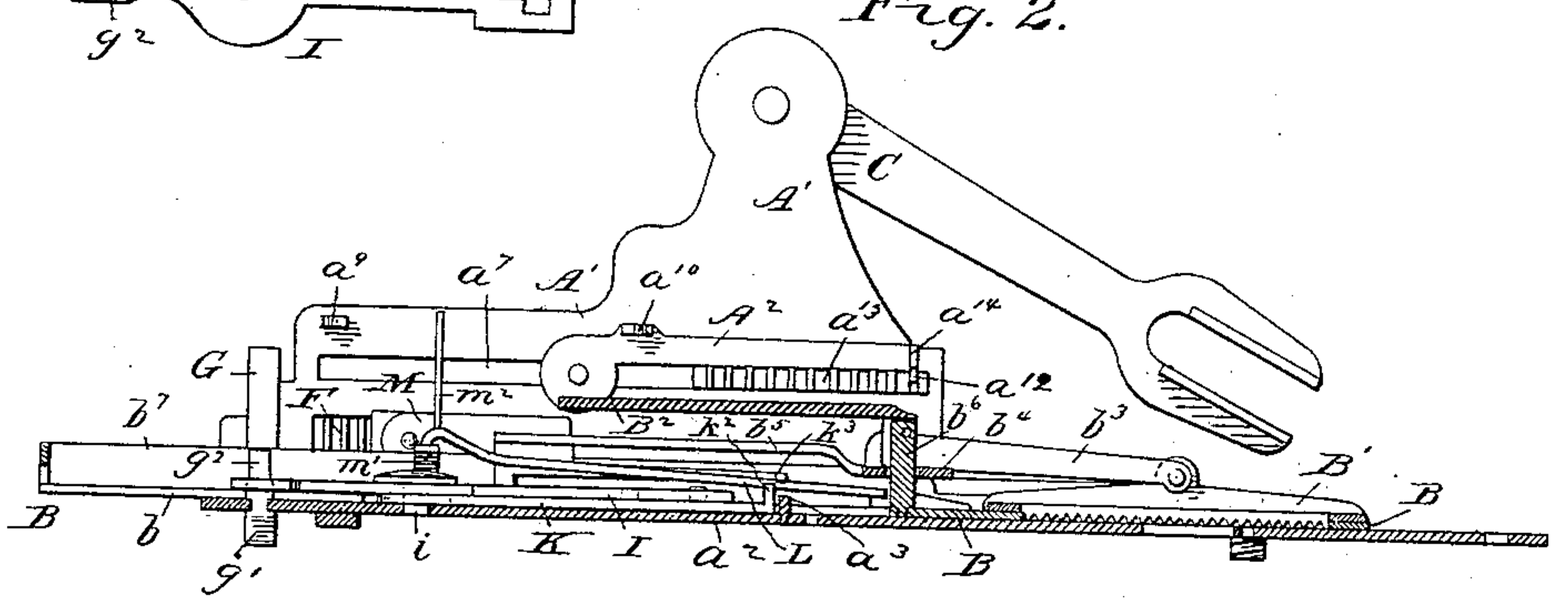


Fig. 5.

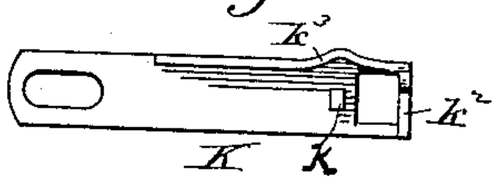


Fig. 6.

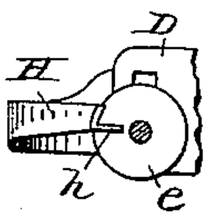
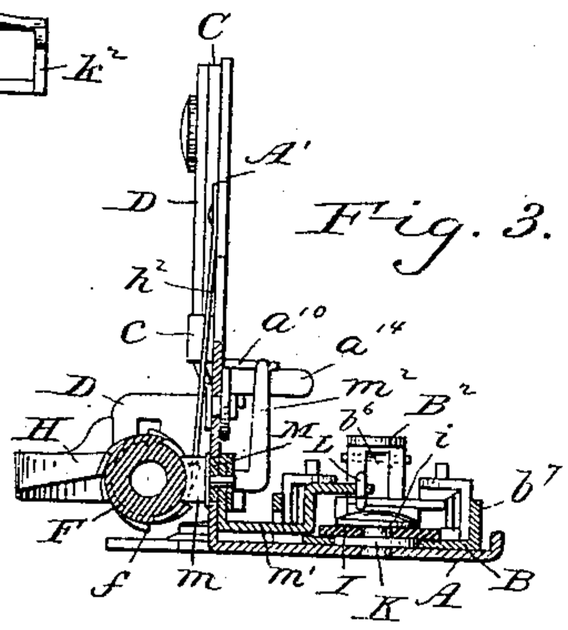


Fig. 3.



Witnesses:
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E. D. Smith

Inventor.
John M. Griest,
by Henry J. Cahoon
Atty

(No Model.)

2 Sheets—Sheet 2.

J. M. GRIEST.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 332,251. Patented Dec. 15, 1885.

Fig. 7.

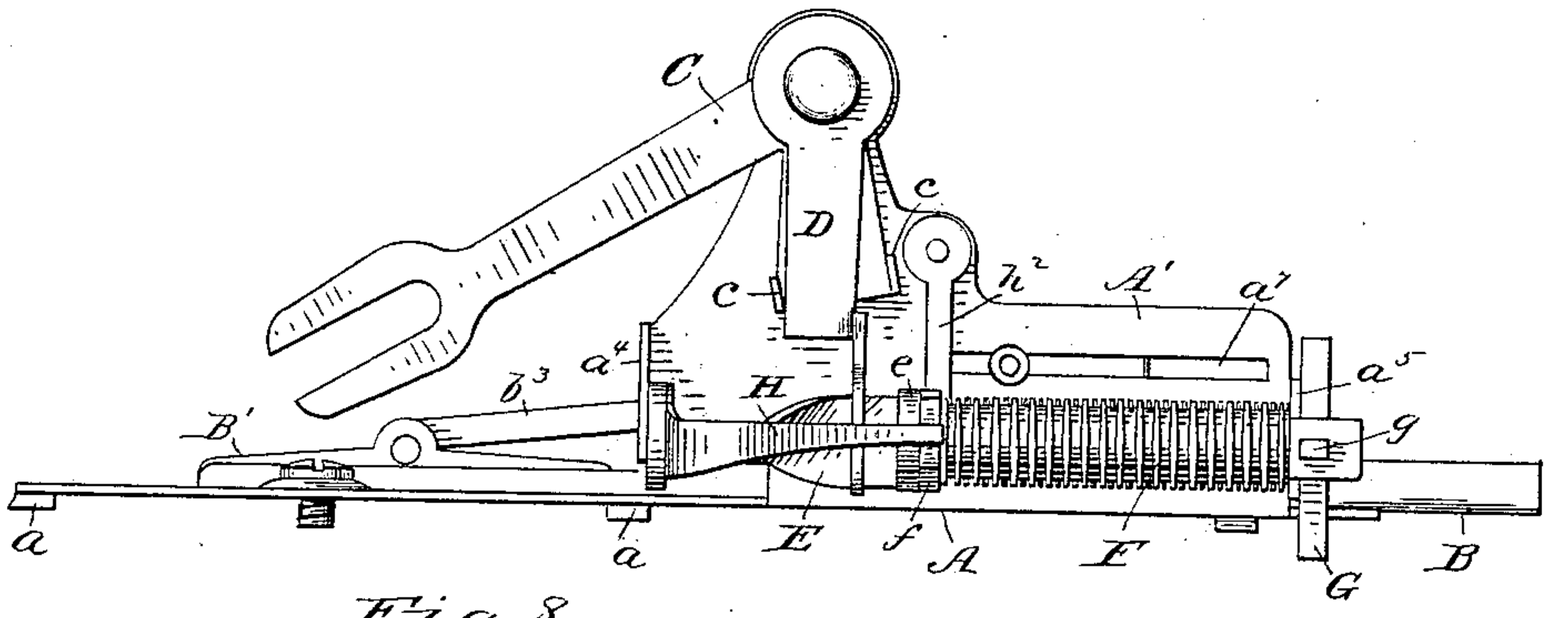

Fig. 8

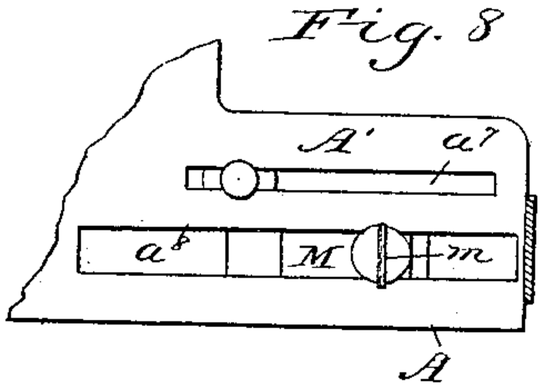

Fig. 9.

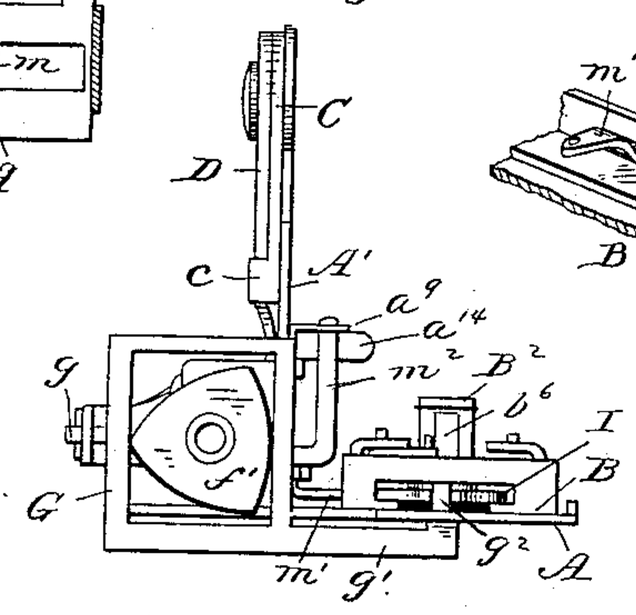

Fig. 10.

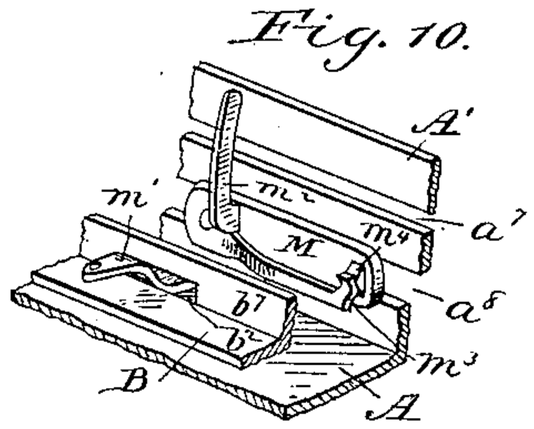

Fig. 11.

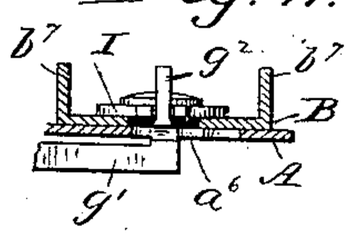

Fig. 12.

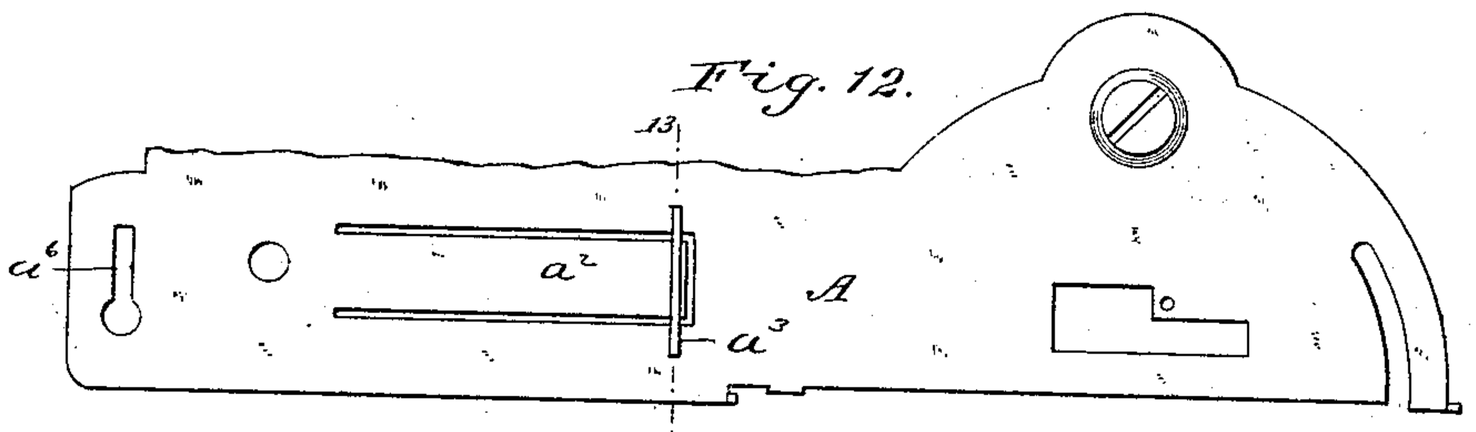

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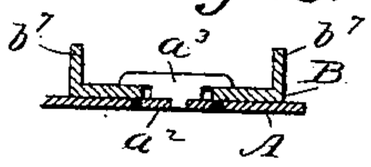
Fig. 13.



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Inventor.

John M. Griest

by Henry J. Colver Atty.

UNITED STATES PATENT OFFICE.

JOHN M. GRIEST, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY OF NEW JERSEY.

BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 332,251, dated December 15, 1885.

Application filed March 17, 1885. Serial No. 159,219. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. GRIEST, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of button-hole attachments for sewing-machines having a vibratory and longitudinally-movable feed-plate carrying a cloth-clamp, and operated by mechanism receiving its movements from the needle-bar of the machine, the object of my invention being to produce a simple and cheaply-constructed but effective device of the class referred to, in which all of the movements necessary to work both sides and to bar both ends of a straight button-hole will be automatic.

In the drawings, Figure 1 is a plan view of a button-hole attachment embodying my invention. Fig. 2 is a sectional elevation thereof. Fig. 3 is a cross-section on the line 3 3, Fig. 1. Fig. 4 is a detail plan view of the vibrator, and Fig. 5 a similar view of the operating-plate. Fig. 6 is a detail showing the connection of the spring-pawl and its disk. Fig. 7 is an elevation from the side opposite to that seen in Fig. 2. Fig. 8 is detail view showing the switch and slide by which the feed bar or plate is operated from the screw-shaft. Fig. 9 is an end elevation of my attachment. Fig. 10 is a detail perspective view showing the reversing-lever and adjacent parts. Fig. 11 is a section on line 11 11, Fig. 1, showing the connection of the yoke and vibrator. Fig. 12 is a plan view of the base-plate, and Fig. 13 a section of the base-plate on line 13 13, Fig. 12, showing also the feed-plate in section and the overhanging lug by which the feed-plate is connected to the spring-tongue on the base-plate, in elevation.

A indicates the base-plate of the attachment, said base-plate in the present instance being provided with lugs *a*, and a hole for a set-screw to adapt it for attachment to the throat-plate of a "Singer" sewing-machine; but it will be understood that said base-plate may be differently constructed to adapt the device to be used in connection with different machines. The base-plate is slotted to form a spring-tongue, a^2, the free end of which is provided with a T-shaped or overhanging lug, a^3, extending upward through a slot, *b*, in the feed-plate B, the arms of said lug projecting over said plate, as shown in Fig. 13, and thus serving to secure the latter to the base-plate A, the spring-tongue a^2 forming a yielding connection for these parts, to enable one to move freely on the other, but securing a proper frictional contact between them. The base-plate A is provided with a standard, A′, to which is pivoted a bell-crank lever, C, the longer arm of which is slotted for engagement with the needle clamp-screw on the needle-bar, the shorter or vertical arm of said lever having lugs *c c* arranged on opposite sides of a driving-lever, D, pivoted to the fulcrum-pin of the lever C, and slotted or forked at its lower end to embrace a spiral shaft, E. One end of the shaft E is journaled in a lug, a^4, on the standard A′, and the other end thereof is pivotally connected with the forward end of a screw-shaft, F, journaled at its rear end in a lug, a^5, on the standard A′. The shaft F has a double or right-and-left spiral groove or screw-thread extending in the present instance the entire length of said shaft, and the latter is provided at its forward end with a ratchet-wheel, *f*, having six teeth, and at its opposite end with a three-pointed cam, *f′*, working in a sliding yoke, G.

To the spiral shaft E is attached a pawl, H, having an outwardly-curved arm to permit of the free movement of the slotted or forked end of the driving-lever D, said pawl having a lip, *h*, entering a small slot in a disk, *e*, formed on the shaft E, the end of said pawl projecting beyond said disk and engaging the teeth of the ratchet-wheel *f*. By reason of the engagement of the lip *h* of the pawl H with the slot in the disk *e* of the shaft E the said pawl is steadied or stiffened, so that it will not be in danger of being bent or twisted in turning the ratchet-wheel with the spiral shaft, the lip *h* being of sufficient length so that it will not be disengaged from said slot when the pawl rides backward over the teeth

of the ratchet-wheel. A detaining-pawl, h^2, attached to the standard A′ prevents the backward rotation of the ratchet-wheel. The yoke G is provided with arms g and g', the former of which extends through an ear on the lug a^5, and the latter engages, by an upward projection or pin, g^2, a slot, a^6, in the bed-plate A, the pin g^2 entering the forked rear end of the vibrator I. The said vibrator has its fulcrum on the pin i attached to the base-plate, said pin also serving as the fulcrum of the bed-plate B, said vibrator being provided at its forward end with an irregular slot, i^2, having two offset portions.

K is an operating-plate arranged beneath the vibrator I in the slot b in the feed-plate B, said operating-plate having a lug, k, extending upward into the slot i^2 of the vibrator. The plate K is slotted at its rear end for the passage of the pin i, and is thus adapted to have a limited lengthwise movement relative to the vibrator to bring the lug k into different parts of the slot i^2 for the purpose of varying the vibrations of the feed-plate, as will be explained. The standard A′ is provided with two slots, a^7 and a^8, in the latter of which is a slide, M, carrying a pivoted switch, m, engaging the spiral grooves of the screw-shaft F, said slide being provided with an arm, m', passing loosely through a slot, b^2, in an upturned lip on one side of the feed-plate. The arm m' serves as a connection between the feed-plate and the slide M, so that the movements of the latter will be imparted to the former, the slot b^2 being, however, large enough to permit the said arm to pass loosely through the same, thus providing for a little "lost motion" when the direction of movement of the slide is changed, so that the feed-plate may momentarily remain stationary while the ends of the button-holes are being barred. The switch m is carried by a stud, which is pivoted in the slide M, and to the end of said stud, on the side of the standard A′ opposite to said switch, is attached a reversing-lever, m^2, one arm of which projects upward, so as to strike against stops a^9 a^{10}, attached to the standard A′. The reversing-lever m^2 is of spring metal, and the outer end of its horizontal arm is provided with a finger, m^3, adapted to engage a projection, m^4, Fig. 10, on the slide M, the contiguous faces of said finger and projection being inclined, so that the former will be retained in position when on either side of the latter. The stop a^9 is fixed to the standard A′, but the stop a^{10} is carried by a movable adjusting-lever, A^2, the pivot of which is adapted to slide in the slot a^7, said adjusting-lever being held in place by a lug, a^{12}, on said lever, fitting between the teeth of a rack, a^{13}, on the standard A′. By lifting the free end of the adjusting-lever by the handle a^{14} the lug a^{12} will be disengaged from the rack a^{13}, and said lever will then be free to be moved to adjust the movable stop a^{10} to any desired distance from the fixed stop a^9, according to the length of button-hole to be worked. When in the movements of the slide M the vertical arm of the reversing-lever strikes against either of the stops a^9 a^{10}, the said lever m^2 will be slightly moved, and the position of the finger m^3 will be changed to the side of the projection m^4 opposite to that which it previously occupied, this movement of the lever changing the inclination of the switch m, so that it will run in the reverse spiral groove of the double screw F, and thus reverse the movement of the slide M. The feed-plate B forms the lower jaw of the cloth-clamp, and the upper jaw, B′, thereof is pivoted to arms b^3, extending forward from a plate, b^4, which in turn is connected by spring-arms b^5 with the feed-plate B. The feed-plate B is preferably formed with upturned edges or flanges b^7, struck up from the body of the plate, to give sufficient stiffness, and the arms b^5 are preferably attached to said flanges, thus forming a convenient connection of these parts. A clamping-lever, B^2, is pivoted to a post, b^6, attached to the feed-plate B, said lever having projections which impinge against the plate b^4 when clamping, forcing the jaw B′ downward against the stress of the spring-arms b^5, which latter serve to lift said jaw as soon as the clamping-lever is turned to disengage its projections from the plate b^4. The operating-plate K is provided with an upwardly-projecting lug, k^2, and also with a spring-arm, k^3, between the free end of which and the said lug passes a friction rod or bar, L, which is attached to the arm m' of the slide M, the end of said arm and the upper end of the said lug being recessed to form jaws embracing said friction-bar. This frictional connection of the slide M and the operating-plate enables the latter to be moved lengthwise for a limited distance when the direction of movement of the slide is changed for the purpose of changing the position of the lug k on the operating-plate in the slot i^2 of the vibrator I.

The operation of my device will be readily understood from the foregoing. The material in which the button-hole is to be worked being placed in the cloth-clamp, and the attachment being secured in position on the sewing-machine, with the bell-crank lever C in engagement with the clamping-screw of the needle-bar thereof, the said bell-crank will be set in motion, and its movements will be transmitted to the spiral shaft E through the forked lever D. The loose connection of the levers C and D, by reason of the space between the lugs c on the former being somewhat greater than the width of the latter, admits of a certain amount of lost motion between these two levers, so that as the needle-bar rises the needle can clear the work before the shaft E will be moved to operate the screw-shaft F and its cam f. One-sixth of a revolution will be given to the shaft F at each upward movement of the needle-bar, and thus the cam f will cause the yoke G to slide to the right and left at each alternate stroke of the needle-bar, the movements of the yoke being trans-

mitted to the vibrator I through the pin g^2 on said yoke. The vibrator engages, by its slot i^2, with the lug k on the operating-plate K, and the latter plate, fitting in the slot b of the feed-bar B, causes said bar to vibrate on its pivot-pin i with the vibrator, to form the overedge-stitches of the button-hole. As the screw-shaft F turns the switch m follows the spiral groove thereof and moves the slide M, and the latter in turn, through its arm m', forces the feed-plate and its cloth-clamp along to space the stitches. When the vertical arm of the reversing-lever m^2 strikes one of the stops a^9 or a^{10}, said lever is moved, as before explained, to reverse the position of the switch m and cause it to follow the oppositely-running spiral groove, thus reversing the movement of the slide M. Owing to the loose connection between the arm m' of the slide M and the feed-plate the latter remains at rest for a few stiches when the movement of the slide is reversed, and during this period of suspension of the longitudinal movement of the feed-plate the friction-bar L, connected to the said slide, will move the operating-plate along to change the lug k on said plate from one part of the irregular slot i^2 in the vibrator to the other. The width of each part of the said slot is such that the entire movement of the vibrator I is not imparted to the operating-plate and the feed-plate during the time when the sides of the button-hole are being worked; but during the time when the lug k is moving from one part of the slot i^2 to the other the said lug will be in engagement with the with the side walls of said slot, forming the neck or connection between the two parts thereof, and as long as said lug thus touches any part of said neck (which is only wide enough to permit the lug to pass through easily) the entire movements of the vibrator will be imparted to the feed-plate, which will double the vibrating movement of the latter, so as to form stitches entirely across the end of the button-hole, and thus strongly bar the same. As soon as the lost motion between the slide M and feed-plate is taken up the feeding movements of the latter will be resumed, and by this time the lug k will be entirely within the other part of the slot i^2, and the normal vibrations of the feed-plate and cloth-clamp will be resumed to form the proper overedge-stitches along the side of the button-hole opposite to that which has just been worked. When the other end of the button-hole is reached, the barring operation again takes place and the button-hole is then completed.

Owing to the irregular form of the slot i^2 the feed plate will vibrate on one side of a central line (which will correspond to the slit of the button-hole) when the lug k is in one offset portion of said slot; but when said lug is in the other portion of said slot said feed-plate will be shipped over to the other side of said central line, to bring the other side of the button-hole beneath the needle of the sewing-machine. The friction rod or bar L will slide through the friction-jaws afforded by the lug k^2 and the spring-arm k^3 on the operating-plate K after the position of said plate has been changed by said rod and friction-jaws to shift the lug k on said plate from one part of the slot i^2 to the other. Thus it will be clear that the entire operation of working both sides and barring both ends of the button-hole is automatically effected when the device is once set in operation.

I claim as my invention—

1. In a button-hole attachment for sewing-machines, the combination, with a feed-plate and a cloth-clamp, of a double screw, a reversible switch, a slide in which said switch is pivoted, an arm or projection on said slide for engaging said feed-plate, and mechanism for intermittingly rotating said screw, substantially as set forth.

2. In a button-hole attachment, the combination, with a cloth-clamp and a feed-plate, of a double screw connected with said feed-plate, a spiral shaft having a pawl-and-ratchet connection with said screw, and mechanism adapted to operate said spiral shaft from the needle-bar of a sewing-machine, substantially as set forth.

3. In a button-hole attachment, the combination, with a cloth-clamp and a feed-plate, of a double screw connected with the latter, a three-pointed cam operated by said screw and connected with said feed-plate, and mechanism for intermittingly rotating said screw, substantially as described.

4. In a button-hole attachment, the combination, with a cloth-clamp and a feed-plate therefor, of a double screw, a slide carrying a switch engaging said screw, a three-pointed cam connected with said feed-plate, a ratchet-wheel, a spiral shaft, a pawl movable with said shaft and engaging said ratchet-wheel, and a lever for actuating said spiral shaft, substantially as set forth.

5. In a button-hole attachment, the combination, with a cloth-clamp and its feed-plate, of a double screw connected with said feed-plate, a spiral shaft having a pawl-and-ratchet connection with said screw, a driving-lever forked to engage said spiral shaft, and a bell-crank lever loosely connected with said driving-lever, substantially as set forth.

6. In a button-hole attachment, the combination, with a cloth-clamp and a feed-plate therefor, of a screw-shaft, mechanism for intermittingly rotating said shaft, a three-pointed cam, a yoke connecting the latter to said feed-plate, a vibrator operated by said yoke, and an operating-plate adapted to receive motion from said vibrator and to oscillate said feed-plate, substantially as set forth.

7. The combination, with the cloth-clamp and its feed-plate, of the vibrator I, having the irregular slot i^2, the operating-plate K, adapted for endwise movement and having the lug k, the slide M, and the bar L, attached to said slide and having a frictional connec-

tion with said operating-plate, substantially as set forth.

8. The combination, with the cloth-clamp and its feed-plate, of the double screw and mechanism for operating the latter, a slide connected with said feed-plate, a reversible switch carried by said slide, a reversing-lever connected with said switch, and stops for operating said lever, substantially as set forth.

9. The combination, with the cloth-clamp, the feed-plate, and the slide M, provided with the projection m^4, of the reversing-lever m^2, pivoted to said slide and having the finger m^3, and stops for changing the position of said lever relative to said projection, substantially as set forth.

10. The combination, with the cloth-clamp and its feed-plate, of the slide M, the switch m, the reversing-lever m', and fixed and adjustable stops for changing the position of said lever to reverse the said switch, substantially as set forth.

11. The combination, with the cloth-clamp, the feed-plate, the standard A′, having the slot a^7 and the rack a^{13}, of the adjustable lever A^3, having the stop a^{10}, and the lug a^{12} for engaging said rack, substantially as set forth.

12. The combination, with the feed-plate B, having the flanges b^7, of the spring-arms b^5, attached to said flanges, and the upper clamping-jaw, B′, connected with said arms, substantially as set forth.

13. The combination, with the base-plate A, having a spring-tongue, a^2, provided with the T-shaped or overhanging lug a^3, of the feed-plate B, yieldingly attached to said base-plate by said lug, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN M. GRIEST.

Witnesses:
HENRY CALVER,
E. D. SMITH.