(No Model.)

3 Sheets—Sheet 1.

J. M. GRIEST.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 335,126. Patented Feb. 2, 1886.

Fig. 1.

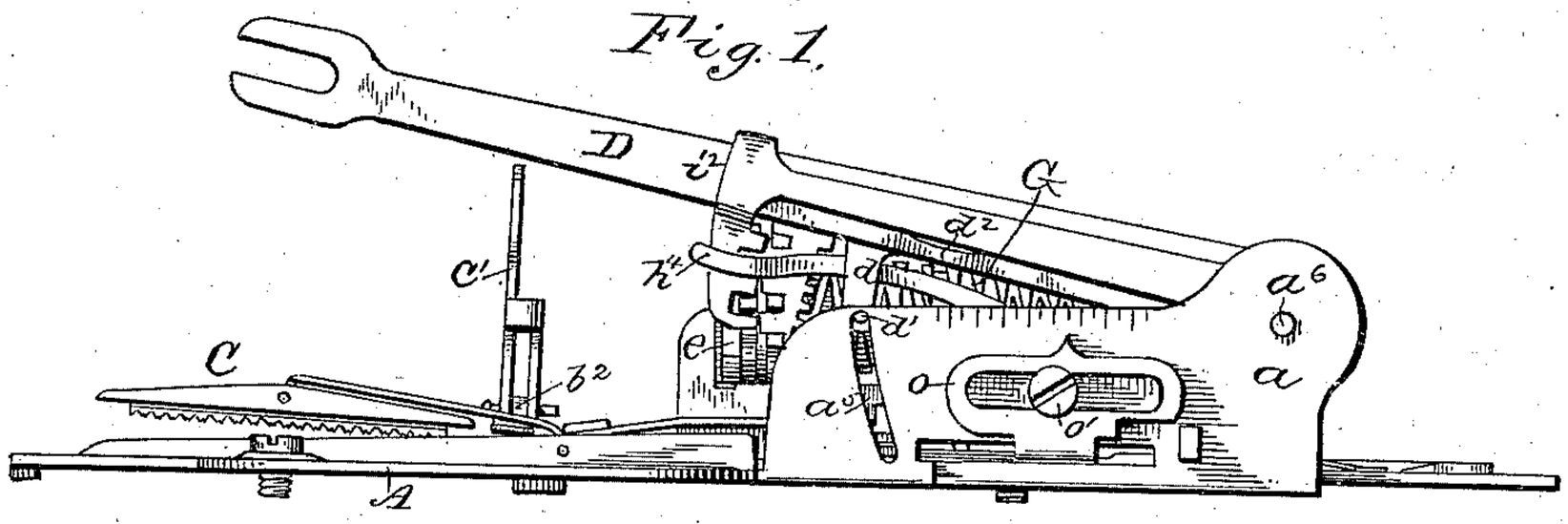


Fig. 2.

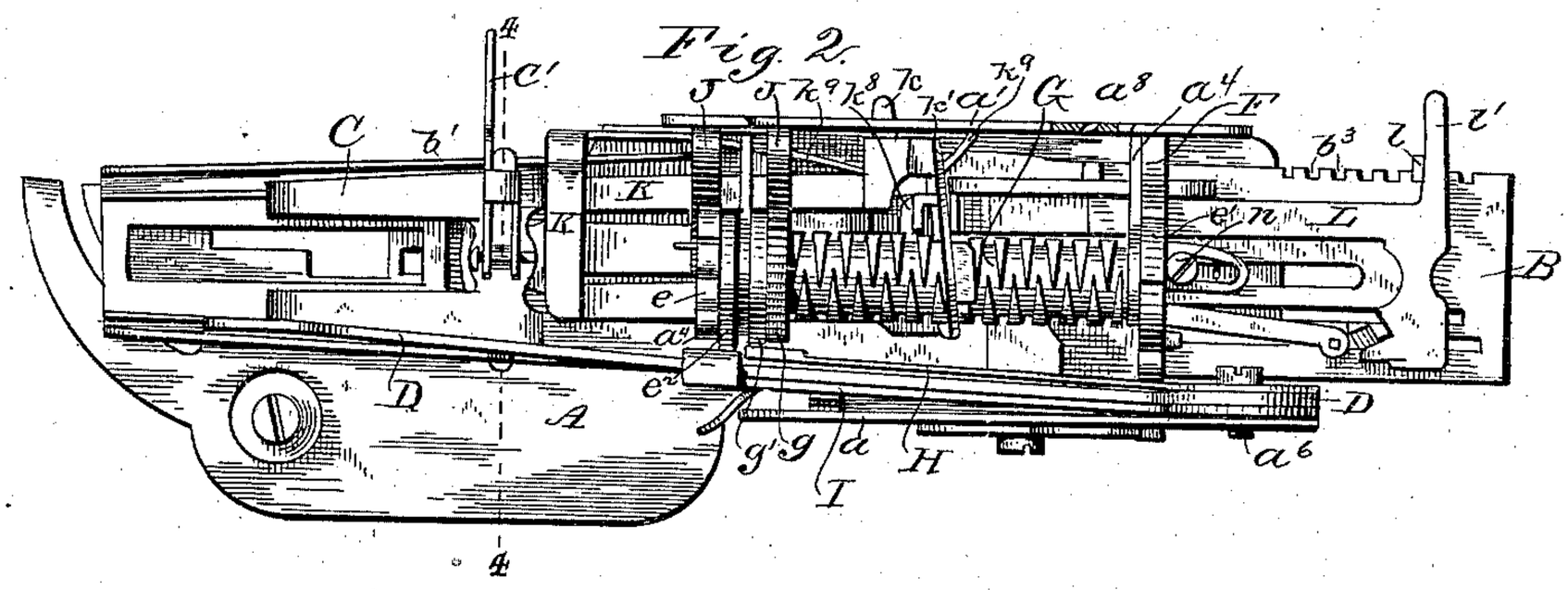


Fig. 3.

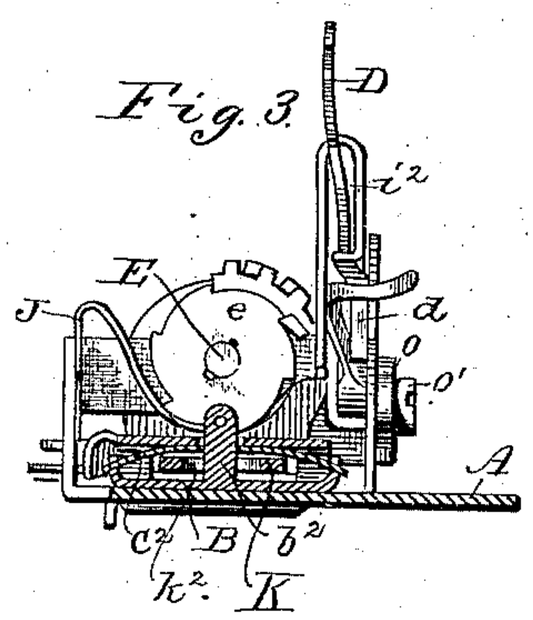
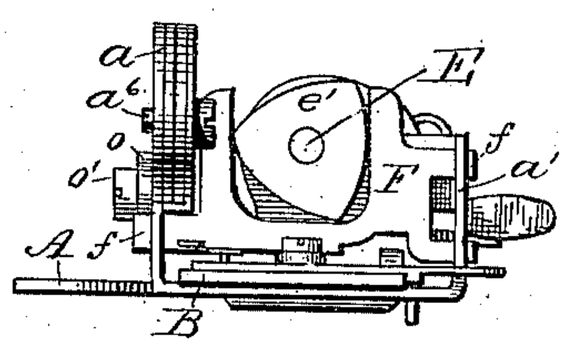


Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

J. M. GRIEST.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 335,126. Patented Feb. 2, 1886.

Fig. 5.

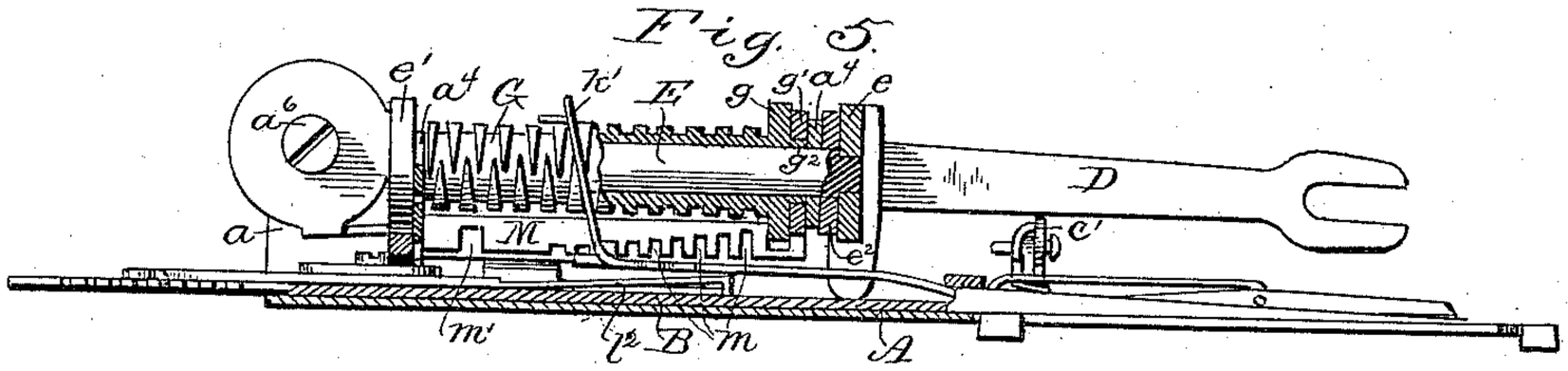


Fig. 6.

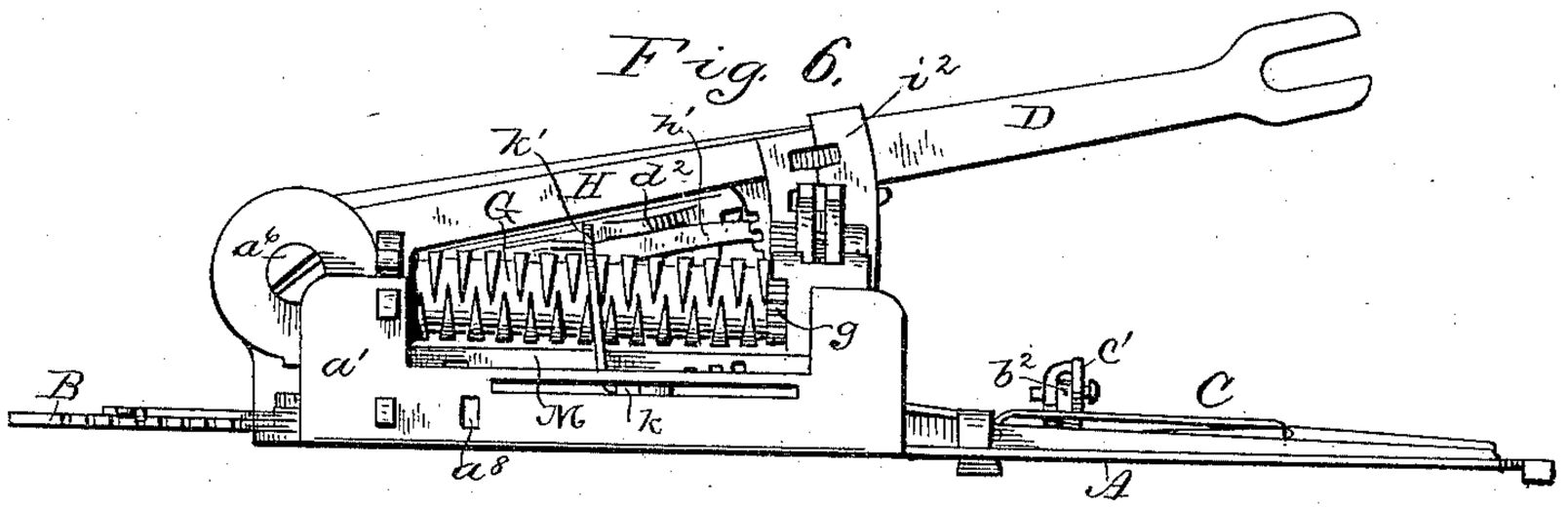


Fig. 7.

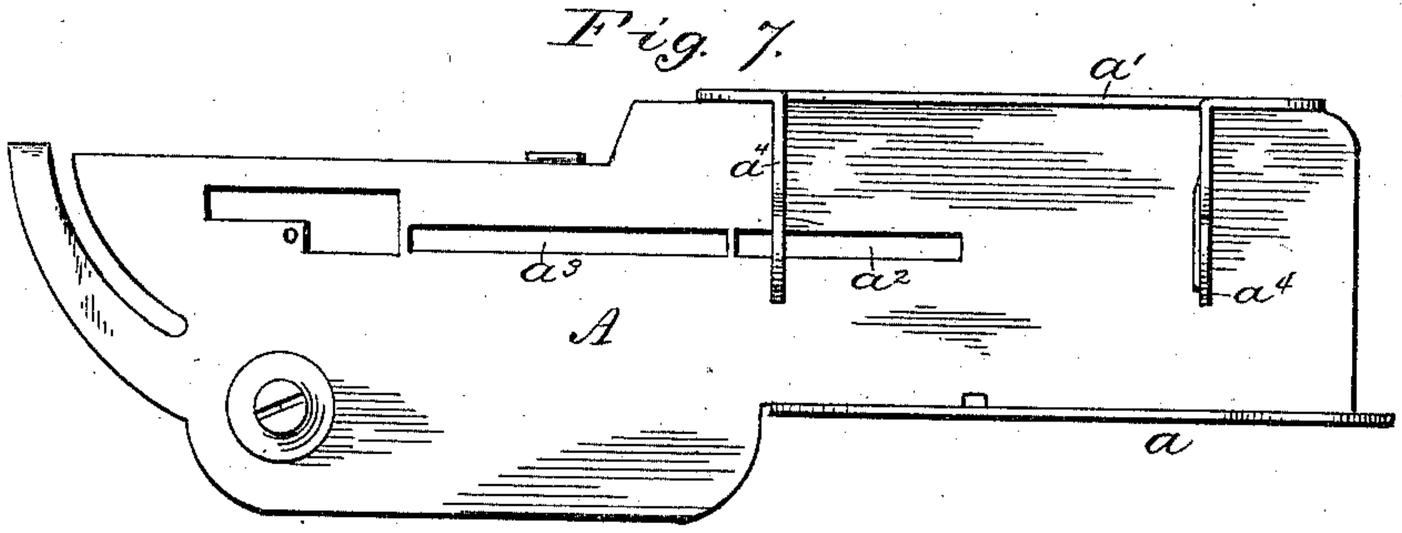
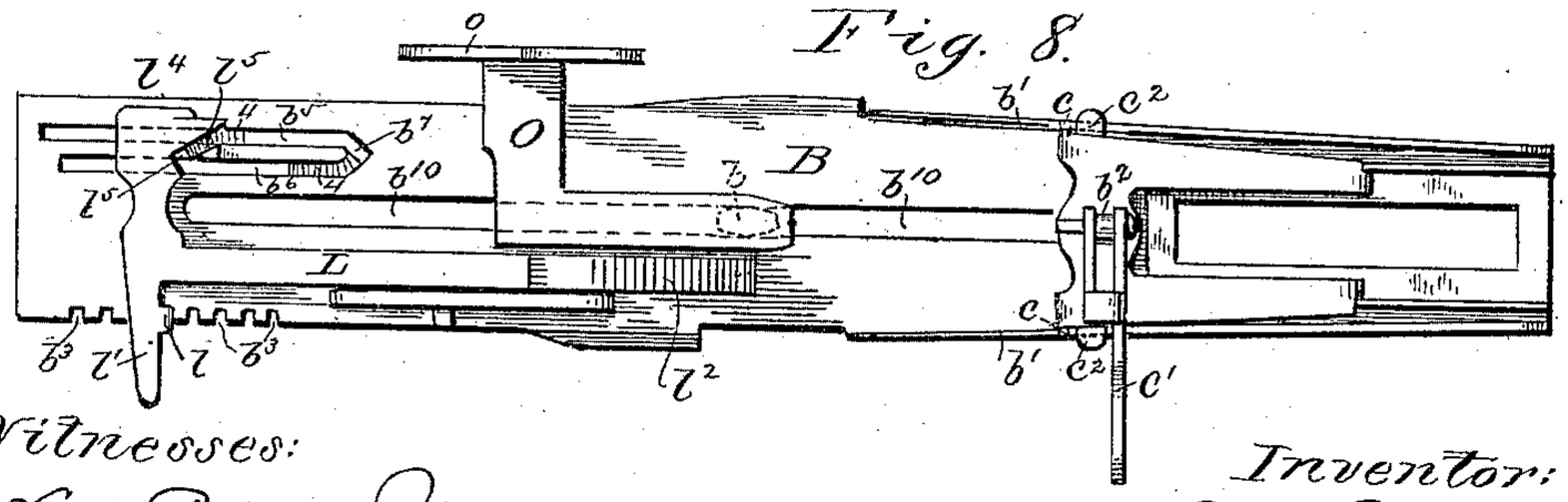


Fig. 8.



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(No Model.)

3 Sheets—Sheet 3.

J. M. GRIEST.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 335,126. Patented Feb. 2, 1886.

Fig. 9.

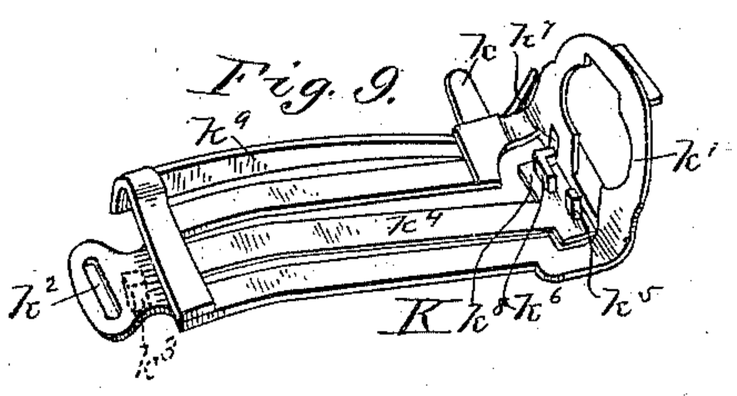


Fig. 10.

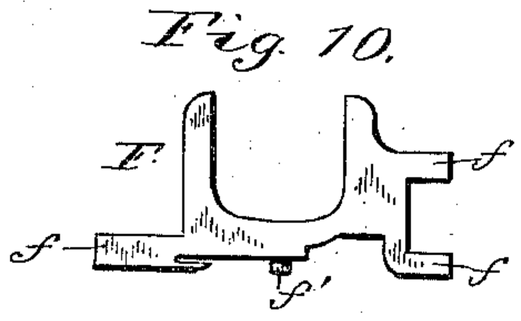


Fig. 11

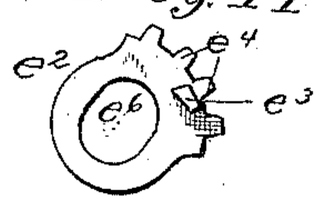


Fig. 12.

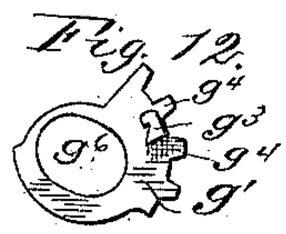


Fig. 9a.

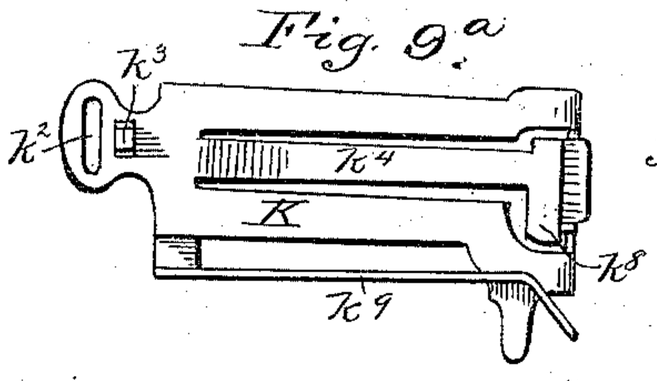


Fig. 13.

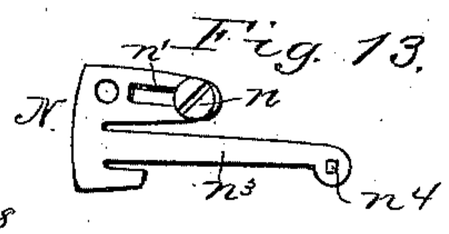


Fig. 13a.

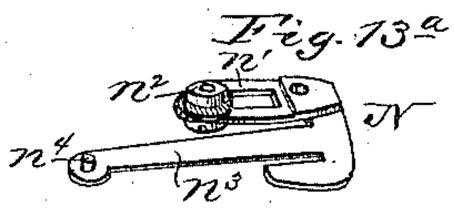


Fig. 14.

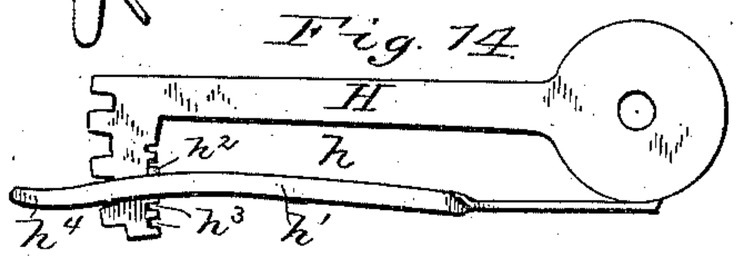


Fig. 15.

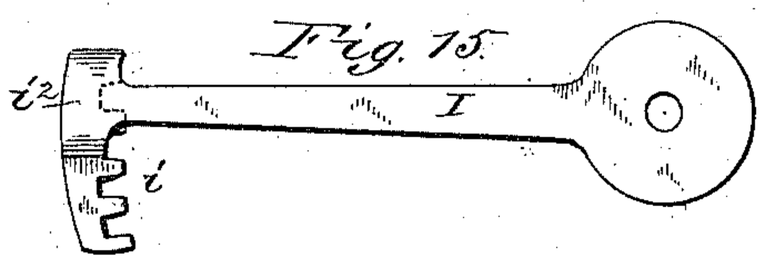
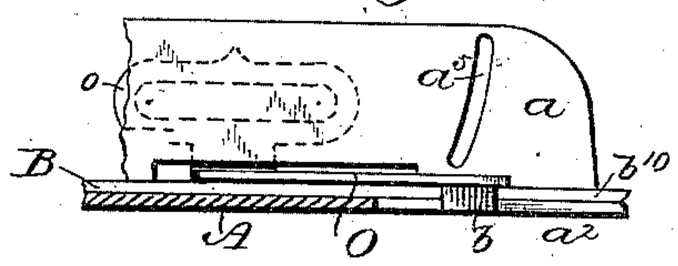


Fig. 16.



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Inventor:

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by Henry J. Galvin,

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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. 335,126, dated February 2, 1886.

Application filed September 29, 1885. Serial No. 178,568. (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 a button-hole attachment similar in construction and operation to that embraced by my application No. 159,219, filed March 17, 1885, the present invention relating to certain improvements on my former attachment, whereby the ends of the button-holes are better finished, and certain adjustments not provided for by my former device can be made.

In the drawings forming part of this specification, Figure 1 is a front side elevation of my improved attachment, and Fig. 2 is a plan of the same. Fig. 3 is a front end elevation, partly in section on the line 4 4, Fig. 2. Fig. 4 is a rear end elevation. Fig. 5 is a longitudinal section showing some parts in elevation, and Fig. 6 is a rear side elevation. Fig. 7 is a plan view of the base-plate. Fig. 8 is a detail plan view showing the feed-bar, the slide carrying the adjustable fulcrum-pin for said bar, and the regulator for varying the lengths of the button holes. Fig. 9 is a perspective view of the slide by which the feed-bar is moved longitudinally, and Fig. 9^a is a bottom view of the same. Fig. 10 is a detail view of the sliding yoke by which the feed-bar is vibrated laterally. Figs. 11 and 12 are detail views of the oscillating pawls. Fig. 13 is a plan view of the shipper-lever, and Fig. 13^a is a perspective bottom view of the same. Figs. 14 and 15 are detail views of the operating-levers for the double screw and the cam-shaft, and Fig. 16 is a detail section showing the adjustable fulcrum for the feed-bar.

Similar letters refer to corresponding parts in the different figures.

A denotes the base-plate by which the attachment is secured to the work-plate of the sewing-machine, said base-plate being provided with upwardly-projecting ribs or standards a and a', and with slots a^2 and a^3.

B is the vibrating and longitudinally-reciprocating feed-bar, pivoted near its center on an adjustable pin or lug, b, passing through the central longitudinal slot, b^{10}, in said bar, and entering the steadying-slot a^2 in the base-plate, said pin being carried by an adjustable arm or slide, O, having a loop, o, by which it is adjustably secured to the standard a by a set-screw, o'. The feed-bar carries at its forward end the cloth-clamp, the movable upper jaw, C, of which is pivoted by means of pins c on the outer sides of the rear end of said jaw, entering holes in ribs b' on the outer edges of the feed-bar. The clamping-lever c' is pivoted to the post b^2, attached to the feed-bar, a transverse spring, c^2, placed beneath the rear end of the jaw C, and having an opening through which the post b^2 passes, serving to lift said jaw to release the work when the outer end of the clamping-lever is raised.

D is the operating-lever, pivoted at its rear end to the standard a by the pin a^6, and forked at its forward end for engagement with the needle-bar screw, as is usual. The lever D is provided with an arm, d, having a pin, d', entering a guiding-slot, a^5, in the standard a, said arm and pin thus serving to steady said lever and limit its movement. The standard a' sustains transverse supports a^4, in which is journaled the shaft E, carrying at its forward end the operating ratchet-wheel e, having six teeth, and at its rear end the three-pointed cam e', working in the transversely-sliding yoke F, having lugs or ears f passing through openings in the standards a and a', said yoke being connected with the feed-bar, as will be described, so as to impart lateral or vibrating movements thereto. The ratchet-wheel e and cam e' are both rigidly secured to the shaft E, so as to rotate therewith.

On the shaft E is journaled the double screw G, made in the form of a sleeve, and to said sleeve is attached the ratchet-wheel g, by which it may be intermittingly rotated by means of an oscillating pawl, g', loosely pivoted on the hub g^2 of the said sleeve. The pawl g' is provided with a lug, g^3, for engaging the teeth of the ratchet-wheel, and with teeth g^4, for engagement with the toothed outer end of the lever H, pivoted on the pin a^6, and operated by the lug d^2 on the lever D. The lug d^2 enters a slot, h, between the main portion of the

said lever H and an adjustable spring-arm, h', having a small lug, h^2, for engagement with the notches h^3 on the lever H. By pressing outward on the finger-piece h^4 of the arm h' the lug h^2 will be disengaged from that one of the notches h^3 in which it rests, and the said arm will then be free to be raised or lowered to vary the distance between the same and the main portion of the lever H, so that there will be more or less lost motion between the lug d^2 on the lever D and the lever H. By virtue of the construction just above described the amount of rotation of the screw-sleeve G at each stroke of the needle-bar may be varied, although operated from the uniformly-moving lever D.

The ratchet-wheel e is operated by the oscillating pawl e^2, pivoted loosely on the shaft E, and having a lug, e^3, for taking into the teeth of the said ratchet-wheel, and being also provided with teeth e^4, for engagement with the rack i of the lever I, pivoted on the pin a^6, and having a loop, i^2, embracing the lever D, so as to be operated thereby. The loop i^2 loosely embraces the lever D laterally, as shown in Fig. 3, so that a slight lateral movement of the lever I may occur as the latter vibrates vertically with the lever D. The levers H and I are both constructed so that they will have a tendency to spring toward the pawls g' and e^2, respectively, and the openings g^6 and e^6 in said pawls are slightly elongated, as shown in Figs. 11 and 12, so that slight lateral movements of said pawls are possible. Thus as said pawls are oscillated the operating-lugs g^3 and e^3 thereon will slide over the teeth of the ratchet-wheels, but will be held in constant engagement therewith by the resilience of the spring-levers H and I. The longer diameters of the openings g^6 and e^6 are arranged at an inclination to a vertical plane, so that when said pawls engage their ratchet-wheels they will be held in contact therewith to rotate the wheels until released therefrom by the reverse or downward movement of the lever D. Backward movements of the ratchet-wheels e and g are prevented by the forked detent-spring J engaging both of said wheels.

K is a slide having a projection, k, working in a guiding-slot in the standard a', said slide having a yoke, k', engaging the double screw G and running between the threads thereof, the opening in said yoke through which said screw passes being sufficiently large so that the yoke may be shifted laterally to bring one side or the other thereof into engagement with said screw. When one side of the yoke is in engagement with the screw, it will run in a thread running in one direction; but when the opposite side of the yoke is engaged with the opposite side of the screw said yoke will engage a thread running in the other direction, and the movement of the slide will thus be reversed.

The slide K is provided with a slot, k^2, through which passes the post b^2 on the feed-bar, and the longitudinal movements of the said slide are thus imparted to the said feed-bar, and owing to the slot k^2 at the point of connection of those parts the feed-bar is capable of vibrating laterally independently of the slide, the latter being held from lateral movements at its forward end by the lug k^3, which travels in the slot a^3 in the base-plate. The slide K has in its center a spring-tongue, k^4, provided with a stud, k^5, and a lug, k^6, the latter engaging a slot, k^7, in the lower part of the yoke k', thus forming a connection between the yoke and the tongue, so that they will move laterally together, but permitting the tongue to move vertically to a limited extent independently of the yoke.

L is the regulator for varying the lengths of the button-holes, said regulator being adjustably connected to the feed-bar by means of the lug l on the arm l', which lug is adapted to engage one of the notches b^3 in the side of the feed-bar, said arm being vertically movable to disengage said lug from said notch. The regulator L is provided at its forward end with an incline, l^2, extending beneath a lateral projection, k^8, on the spring-tongue k^4, said tongue being thus slightly lifted as it passes over said incline.

M is a small bar rigidly attached to the supports a^4, and provided with a series of notches, m, of varying heights, and near its rear end with another notch, m', these notches being of proper width to admit of the passage through them of the stud k^5 on the spring-tongue k^4.

The slide K is provided with a spring, k^9, connected to said slide, at the forward end of the latter, the free rear end of said spring, when the parts are in the position shown in Fig. 2, pressing against the standard a', and thus having a tendency to force the rear end of slide K and the yoke k' carried thereby away from said standard, or toward the operating-lever D. This tendency is, however, for a time counteracted by the stud k^5, which is pressed against the bar M by said spring, said stud, while on the side of said bar nearest said spring, holding the front side of the yoke k' in engagement with the front side of the double screw G, as in Fig. 2, until the stud reaches a notch of proper height to permit it to pass under the bar M, when the stud is forced to the other side of the bar, bringing the rear side of the yoke in engagement with the rear side of the screw, and thereby reversing the movement of the slide and of the feed-bar connected therewith.

As the feed-bar in its backward movement approaches the rear end of the button-hole, the bent free end of the spring k^9 passes outward through a small opening, a^8, in the standard a', thus reversing the stress of the spring, so that when the stud k^5 reaches the notch m' it will be pulled through the same by said spring, by reason of the hold which the bent or inclined free end thereof will have at this moment in the slotted standard a', and the slide and yoke will thus be brought to their first position, in readiness to

move the feed-bar forward again. The lengths of the button-holes are increased by sliding the regulator L and the incline l^2 thereon rearward, or away from the cloth-clamp, thus lifting the spring-tongue k^4 slightly, so that the stud k^5 thereon will pass by the lower of the notches m, and will not be forced under the bar M until it reaches one of the higher notches toward the forward end of said bar, while by moving the regulator in the opposite direction, so that the stud k can pass under one of the lower notches m, the button-holes will be shortened.

The sliding yoke F is indirectly connected with the feed-bar B through the shipper-lever N, said yoke having a pin, f', entering a hole in the said lever, and serving as a fulcrum therefor, the lever having an adjustable connection with the feed-bar by means of the screw n, which secures the arm n' of said lever to a small block, n^2, entering the slot b^{10} in the feed-bar B, and thus permitting said bar to slide longitudinally, while the shipper-lever remains relatively stationary. The feed-bar is also provided with shipping slots or grooves b^5 b^6, communicating at their forward ends by the doubly-inclined switch groove or slot b^7, and the shipper-lever is provided with a spring-arm, n^3, having at its outer end a guiding-stud, n^4, entering the said slots or grooves. The regulator L is provided at its rear end with an arm, l^4, having a steadying-lug fitting the groove b^5, said arm having a small doubly-inclined switch-groove, l^5, corresponding in form to the groove or slot b^7. Just before passing the points of the switch grooves or slots the stud n^4 is preferably lifted slightly by small inclines, as 4, in the bottoms of these grooves or slots, so that said stud can pass said points easily and be properly guided in its reverse movements.

The shipper-lever N is ordinarily held rigid relative to the feed-bar B by being connected with said bar at two points by the stud n^4 and block n^2, so that the lateral movements of the sliding yoke F are communicated to said bar through the said lever; but when the position of the latter is changed, as the stud n^4 passes from one of the slots or grooves b^5 b^6 to the other the position of said feed-bar will be shifted, so that when one side of the button-hole has been worked the other side thereof will be brought in proper position beneath the needle of the sewing-machine. This shifting of the feed-bar laterally occurs while the needle is making several stitches, half of the lateral or shifting movement being made before the feed is reversed, (this reversal being sudden,) and the other half occurring afterward, thereby strongly barring and neatly finishing the ends of the button-holes.

Owing to the adjustable connections of the shipper-lever and feed-bar by means of the screw n, block n^2, and slotted arm n', the shipping or lateral movement of the feed-bar may be varied to alter the distance between the two rows of stitching on the opposite sides of the button-holes, and thereby adapt the work to different kinds of fabrics. Thus by moving the adjusting-screw n nearer to the yoke F, the pin f' on which forms the fulcrum of the lever N, the shipping movement will be diminished, while by moving said screw farther from said yoke the said movement will be increased.

The lengths of the vibrations of the feed-bar to increase or diminish the depths or lengths of the overseaming stitches may be varied by adjusting the pivot-pin b of the feed-bar toward or from the cloth-clamp, the length of the overseaming-stitches being increased as the said pivot-pin is moved toward the yoke F, from which the feed-bar receives its vibrating movements, and the said overseaming-stitches being diminished in extent as the said pin is adjusted in the opposite direction, or toward the cloth-clamp.

The longitudinal movements of the feed-bar, by which the distance apart of the overseaming-stitches is determined, may be varied by adjusting the arm h' relative to the lever H in the manner hereinbefore described, so as to make more or less lost motion between the said lever and the operating-lever D, as fully stated, thereby varying the rotation of the screw-shaft G to make the longitudinal or feeding movements of the feed-bar B faster or slower, as may be desired.

The lengths of the button-holes may be varied by shifting the regulator L back and forth to vary the distance of the switch-groove l^5 on the arm l^4 of said regulator from the switch-groove b^7 in the feed-bar, this movement of the regulator also simultaneously changing the position of the incline l^2, for the purpose already stated. Thus my present device has four adjustments, so that it is capable of a great range of work.

The operation of my invention will be readily understood from the foregoing. Motion being imparted to the lever D, the levers H and I, moving therewith, will impart intermittent rotary movements to the shafts E and G through the pawls and ratchet-wheels for said shafts. As the ratchet-wheel e on the shaft E has six teeth and the cam e' on said shaft has three points or actuating parts, it is obvious that the sliding yoke F will be reciprocated by said cam, so that the lateral position of said bar will be changed at each upward movement. The movements of the yoke F are imparted to the feed-bar, to vibrate the latter, through the shipper-lever N, as has been described.

In the device embraced by my former application the cam for vibrating the feed-bar was rigidly attached to the screw-shaft by which the longitudinal or feeding movements were imparted to the feed-bar, so that no means were provided for varying the distance apart of the stitches; but in the present device the double screw is formed in a sleeve rotating independently of the cam-shaft, so that the feed may be adjusted by varying the lost motion between the levers D and H, as above stated.

As the screw-shaft G rotates, the yoke k', one

side of which is in engagement therewith, and which is integral with or secured to the slide K, moves the said slide and the feed-bar, which is connected with said slide, longitudinally until the stud k^5 on the spring-tongue k^4 of said slide is forced by the spring k^9 to one side or other of the bar M, through one of the notches m or m' in said bar, thereby bringing the opposite side of the yoke in engagement with the opposite side of the double screw, and thus reversing the movement of the slide and feed bar. At the time this reversal of the movement of the feed-bar occurs the said bar, while continuing its lateral vibrations to form the over-edge stitches, is being gradually shifted laterally by the shipper-lever, in the manner hereinbefore described, and the feed-bar continues its movements to its first position to complete the button-hole.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a button-hole attachment for sewing-machines, the combination, with the feed-bar and its cloth-clamp, of a cam connected with said bar to vibrate the same laterally, a double screw rotating independently of said cam and connected with said bar, for feeding the latter longitudinally, and mechanism for intermittingly rotating said cam and screw.

2. In a button-hole attachment, the combination, with the feed-bar and its cloth-clamp, of a shaft having a cam and a ratchet-wheel, a sliding yoke connected with said feed-bar, in which said cam works, a double screw connected with said feed-bar and adapted to rotate independently of the cam-shaft, a ratchet-wheel for operating said double screw, pawls for rotating said ratchet-wheels, an operating-lever, and two levers connected with the said operating-lever for actuating said pawls, as set forth.

3. In a button-hole attachment, the combination, with the feed-bar and its cloth-clamp, of the cam and screw shafts connected with said feed-bar and provided with ratchet-wheels, pawls for intermittingly rotating said wheels, an operating-lever, and two levers connected with the said operating-lever, but adapted to spring horizontally as they vibrate vertically, substantially as set forth.

4. In a button-hole attachment, the combination, with the feed-bar, cloth-clamp, screw and cam shafts connected with the feed-bar, and ratchet-wheels on said shafts, of two pawls having teeth, two actuating-levers having teeth engaging the teeth of the pawls, and an operating-lever for vibrating the pawl-actuating levers, substantially as set forth.

5. In a button-hole attachment, the combination, with the laterally-vibrating feed-bar and its cloth-clamp, of a screw for feeding said bar longitudinally, a ratchet-wheel attached to said screw, a pawl, an operating-lever, and a lever for actuating said pawl, adapted to impart variable movements to the latter from the uniformly-vibrating operating-lever, substantially as set forth.

6. In a button-hole attachment, the combination, with the laterally-vibrating feed-bar and its cloth-clamp, of an intermittingly-rotating double screw and a yoke connected with said feed-bar and embracing said screw, said yoke being laterally adjustable to bring its opposite sides into engagement with the opposite sides of said double screw, substantially as set forth.

7. In a button-hole attachment, the combination, with the slotted base-plate and the feed-bar having a central longitudinal slot, of an adjustable arm or slide carrying a pivot-pin for said feed-bar, said pin passing through the said slot in the latter and entering a steadying-slot in the said base-plate, substantially as set forth.

8. In a button-hole attachment, the combination, with the slotted base-plate, the vibrating feed-bar, and its cloth-clamp, of a slide having a pin or lug passing through a lateral slot in the feed-bar into a steadying-slot in the base-plate, said slide having also a yoke, and an intermittingly-rotating double screw embraced by said yoke, substantially as set forth.

9. In a button-hole attachment, the combination, with the laterally-vibrating feed-bar and its cloth-clamp, of an intermittingly-rotating double screw, a slide having a yoke loosely embracing said screw, a spring, as k^9, and a spring-tongue having a stud, a bar having a series of notches of varying heights, and a regulator having an incline for lifting said tongue, substantially as set forth.

10. In a button-hole attachment, the combination, with the feed-bar having the communicating shipping-slots b^5 b^6, and mechanism for vibrating and longitudinally reciprocating said feed-bar, of a shipper-lever having an arm connected with said feed-bar, and a second arm provided with a stud adapted to traverse said slots, substantially as set forth.

11. In a button-hole attachment, the combination, with the feed-bar having the shipping-slots b^5 b^6, communicating at one of their ends, and mechanism for operating said feed-bar, of a shipper-lever connected with said feed-bar and engaging said shipping-slots, and a regulator grooved to form a switch-connection for the other ends of said slots, and adjustable to vary the working length thereof to adapt them for different lengths of button-holes, substantially as set forth.

12. In a button-hole attachment, the combination, with the vibrating and longitudinally-reciprocating feed-bar having communicating shipping-slots, of a shipper-lever having two arms, one of which is adjustably connected with said feed-bar, and the other of which engages said slots, substantially as set forth.

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

JOHN M. GRIEST.

Witnesses:

JAS. VAN BUREN,

I. P. JOHNSON.