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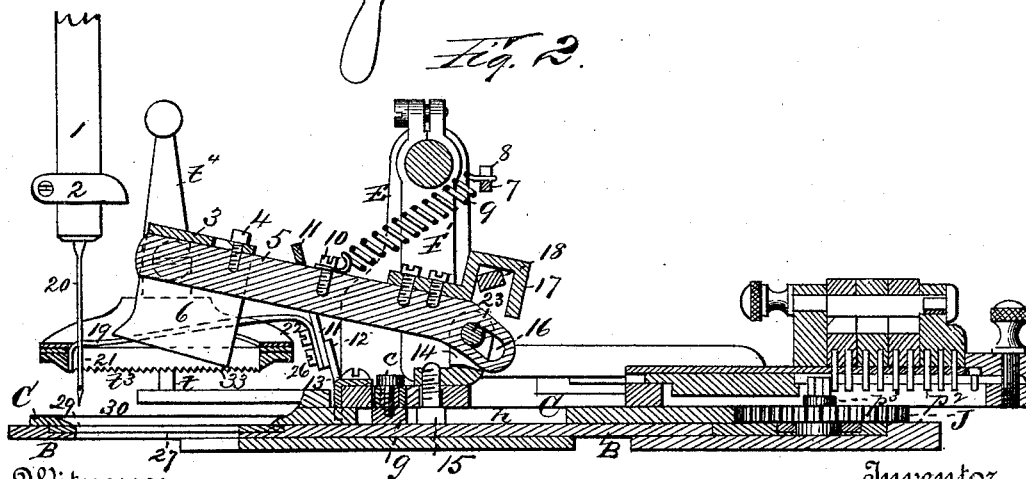
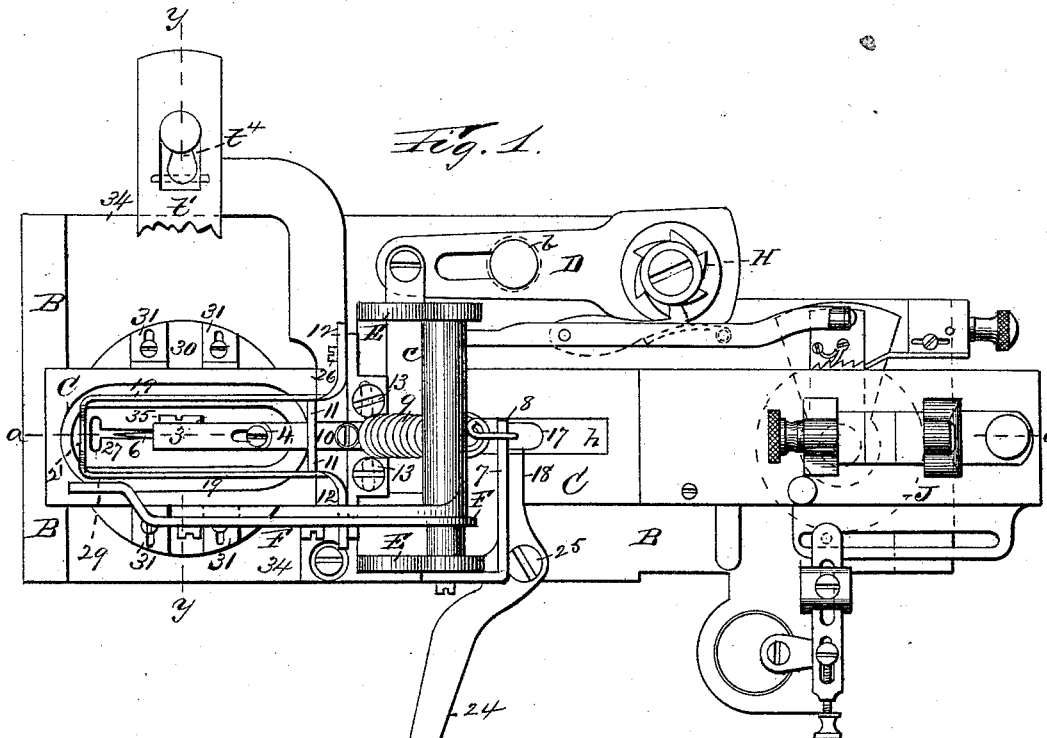
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BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 421,463.

Patented Feb. 18, 1890.



Witnesses

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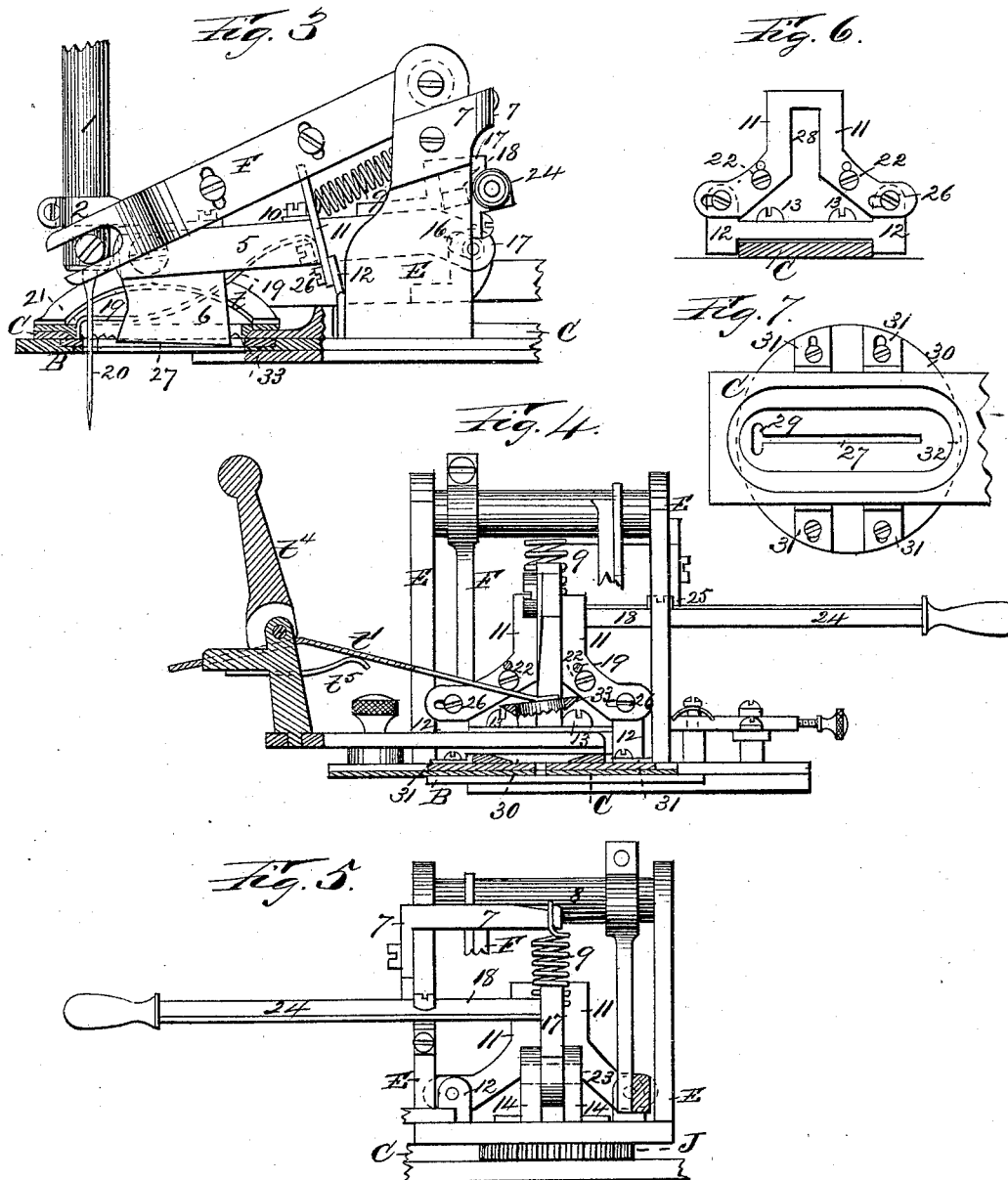
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# UNITED STATES PATENT OFFICE.

HENRY JOHN WILLIAMS, OF NEW YORK, N. Y., ASSIGNOR TO HENRY J. DAVISON, OF SAME PLACE.

## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 421,463, dated February 18, 1890.

Application filed June 4, 1889. Serial No. 313,077. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY JOHN WILLIAMS, a citizen of the United States of America, residing in the city, county, and State of New York, have invented and made certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description and specification of the same, reference being had to the drawings herewith, forming part of the same.

The object of my invention is, primarily, to cut the button-hole in the cloth after it has been sewed around once without removing the cloth from the sewing-machine or altering in the least degree its position on the cloth-plate, and, secondarily, to sew around the slit made by the cutting apparatus to overseam the button-hole, covering in the loose fibers of the cloth to make a finished and perfect button-hole.

I have applied my cutting and overseaming apparatus to the button-hole attachment for sewing-machines patented to me December 13, 1887, Patent No. 374,918; but it may be readily applied to other button-hole sewing-machines.

To this end my invention consists in certain parts and combination of parts fully set forth in and claimed at the end of this specification.

In order that persons skilled in the art may understand, construct, and use my invention, I will proceed to describe it, referring to the drawings, in which the same figures and letters indicate the same parts in the several figures.

Figure 1 is a plan view of my invention, with the cloth-clamping plate *t'* broken away near its supporting-tongue to show the parts beneath it.

Fig. 2 is a central vertical section through lines *a a* of Fig. 1. In this figure the cloth-clamping plate *t'* is shown raised away or off the cloth holding and feeding plate C, and showing the cutting-knife attachments in their normal position out of reach of the needle-bar hammer.

Fig. 3 is a side view of the front part of my machine, with my cutting apparatus in the position in which it appears after the ham-

mer on the needle-bar has forced it down through the cloth. The cloth-clamping plate *t'* is shown in its position upon the cloth-plate C and the overseaming device 19 in operative position. No cloth is shown in the drawings; but its position would be between the clamping-plate *t'* and the upper surface of cloth-plate C, so that the end 21 of the overseaming spring-presser wire device 19 presses upon it in close proximity to the needle as the needle passes down and up through the cloth. The needle-bar 1 it will be seen is in its extreme downward throw with the needle through the cloth, and the main operating-lever F is also in its extreme downward position, having been carried down by the needle-bar, which gives it all its motion. Fig. 3 shows also a section on line *a a* of Fig. 1 of the clamping-plate *t'* and the cloth-plate C, the one upon the other.

Fig. 4 is a front view of my invention and a sectional view on line *y y* of Fig. 1, the clamping-plate *t'* being raised off the cloth feeding and holding plate C. Fig. 5 is a rear view of my invention with a portion broken away. Fig. 6 is a front view of the knife guide-plate and a section of the part of cloth-feeding plate C, where the guide-plate straddles it. Fig. 7 is a top or plan view of the cloth-holding plate C and the slotted vibrating plate on which it rests and by which it is controlled or adjusted sidewise. It also shows the transverse needle-slot and the longitudinal knife-slot in the slotted vibrating plate beneath plate C, the extension of plate C being broken away.

I mark the needle-bar 1, the knife-hammer located upon and clamped to the needle-bar 2. 3 is a plate upon the knife-arm 5.

4 is a screw, which secures the plate 3 to the knife-arm 5. This plate is slotted, so as to allow endwise adjustment of the plate. The knife is secured to the knife-arm by screw 35.

6 is the cutting-knife.

7 is an arm fastened by a screw to the side of bridge-piece E and extends crosswise of the machine behind bridge E near its top and supports one end of coiled spring 9.

8 is a hook on the end of arm 7 for holding the end of spring 9.

10 is a screw near the longitudinal center of

knife-arm 5, and on its upper surface to secure the other end of spring 9 to said arm 5.

11 is a bridge-guide, which straddles knife-arm 5 and guides and controls it in its motion. It is fixed to sliding piece 12 by screws 26 passing through slots, one in each leg of the guide 11, to allow of horizontal adjustment to bring the knife 6 directly over the knife-slot 27 in the slotted vibrating plate 30, beneath the cloth-plate C. This horizontal adjustment is also for the purpose of shifting the knife-arm to one side or the other for the purpose of bringing the knife in proper relation to the slot 27 in the plate 30, so that it will not bind therein or rub against the edges of the slot 27. As hereinafter described, it is sometimes necessary to adjust the plate 30 relatively to the feed-plate C, so that the position of the slot 27 is slightly shifted.

The sliding piece 12, which supports guide 11, is secured to the bottom flange of bridge E by screws 13, which pass through slots in the said sliding piece, and it has side pieces or legs which extend downward on each side of cloth-feeding plate C. Said plate C when in action carries said sliding piece with it transversely to its longitudinal movement.

14 is a double ear-piece. It is secured by an angular flange to the base of the bridge E. It turns or swings on a screw 15, projecting upward through a transverse slot in the base of bridge E. The head of screw 15 works in slot *h* in the cloth-plate and vibrates with it. Between the ears of piece 14 the rear end of knife-arm 5 vibrates on a cross-pin 23, which passes through said ears and through an elongated angular cam-slot 16 in the arm 5. This slot 16 is at an angle downward to the longitudinal center line of the knife-arm 5.

17 is a forked piece fixed to the upper rear surface of knife-arm 5 by screws passing through an extension-flange at right-angles to said fork. Into this forked piece arm 18 enters.

The arm or lever 18 is secured by a bracket to the rear face of the upright of bridge E. Screw-stud 25 secures it to said bracket. The lever 18 has a handle 24 projecting beyond the screw-stud 25, and by this handle the lever-arm 18 is moved back and forth on stud 25 as a center. As arm 18 takes into the fork 17, it vibrates the knife-arm 5 backward and forward on pin 23, which works in slot 16 in arm 5. This action throws the forward end of the knife-arm 5 and the knife 6 under the hammer 2 on the needle-bar 1. In doing this spring 9 is strained, and when lever 18 is released the spring 9 returns the knife-arm to its position. (Shown in Fig. 2.)

19 is a spring presser-wire, secured at its two ends, respectively, to the two sides or legs of knife-arm guide 11 by screws 22, Fig. 6. It extends to a point forward of and around the needle transverse slot in the cloth-plate C, and also on each side of knife-slot 27. Its extreme forward end 21, where it presses upon

the cloth on cloth-plate C and slotted vibrating plate 30, close to the needle 20, is bent downward at about right angles to the legs of the presser-wire. The legs of this wire are somewhat curved from its forward end upward toward the point where it is held to the knife-arm guide-plate 11, so as to give it a spring action. It serves to hold the cloth and loose fibers down close to the slotted vibrating plate while the button-hole is being resewed after the knife 6 has cut the button-hole slit in the cloth. This presser-wire foot 19, being attached to the knife-guide 11, partakes of its sidewise reciprocating motion, but it has no backward and forward motion; otherwise its relation to the needle and needle-slot is maintained at all times.

There is an opening 32 in the forward end of cloth-plate C surrounding the needle and the slots 27 and 29. (Shown in Fig. 7.) Its edges are beveled inward and downward. Into this open space 32 the serrated or roughened bottom surface of the clamping-foot 33, located on the plate *t'*, enters and presses upon the cloth. The outer edges of this clamping-plate 33 are beveled to conform to the edges of the opening 32 in the cloth-plate C. The clamping-plate *t'* and clamping-foot 33 are lowered by the cam-lever *t'* and raised by the spring *t'*, located beneath the plate *t'* and the cam-lever *t'*. The spring presser-foot overseaming-wire 19 is also raised by the lifting of clamping-plate 33, but it returns to its operative position on the cloth-plate by its own elasticity. The forward surface of the bed-plate B of the sewing-machine is channeled out transversely at 34, and a circular plate 30 sets in it flush with the surface of the bed-plate B. The slotted vibrating plate 30 receives and holds the forward end of cloth-plate C between lugs 31, which lugs are held to the plate 30 by screws passing through slots in the lugs 31. The transverse needle-slot 29 and the longitudinal knife-slot 27 are located in this plate 30, and are adjusted transversely in relation to the cloth-plate C and its openings 32 by these lugs 31. The lugs 31 are made adjustable, so that the slotted plate 30 may be shifted transversely relatively to the feed-plate C for the purpose of bringing the knife down in the center of the button-hole, so that the knife can cut in the center of the button-hole in all kinds of material. In soft goods in sewing down one side of the button-hole, the bite of the button-hole is always a little wider on the first side sewed than on the opposite side when returning, for the reason that the needle always comes down in the same hole (in the center of the button-hole) that it made while sewing the opposite side, which gives the last side made a chance to draw up the goods more than it would if there were no hole for the needle in the goods. Therefore, in goods that draw tighter on one side than on the other, I can, by means of these adjustable lugs, so adjust the slotted plate relatively to

the feed-plate as to bring the knife down in the center of the button-hole.

The plate 3 is made of proper thickness to cause the knife 6 to be forced completely through the cloth when struck by the hammer 2, located on the needle-bar 1, and the location of the hammer 2 on the needle-bar may be adjusted vertically on said needle-bar by the clamping-screw, which secures it in position.

The operation of my invention is as follows: The needle-bar is caused to reciprocate vertically by its connection with mechanism operated from the treadle motion of the machine. (Not shown.) The lever F is by its connection with the needle-bar 1 caused to vibrate and give forward and backward motion and also transverse vibrating motion to cloth-plate C by means of the feeding and oscillating mechanism, fully set forth and described in my patent of December 13, 1887, No. 374,918, and reproduced and shown in this present application, but not fully described. The longitudinal action of the feed is caused by actuating the ratchet-wheel J. This ratchet-wheel is provided with a pinion  $p^3$ , which comes in contact with one or more pins  $p^2$  and a guide arranged on the feed-plate, the said guide serving to keep the pinion in contact with the pins, thereby causing the feed-plate C to move forward or backward, as desired. The lateral movement is obtained by turning a V-shaped cam (not shown in the drawings, but shown and described in my patent above mentioned) around one tooth on the ratchet-wheel H, which will cause one action. To produce a narrow bite, a fulcrum-pin  $b$  is brought nearer to the cloth-clamp, while for a greater bite it is moved backward nearer to the ratchet. At the end of a zigzag lever D is a small link  $c$ , connected to the feed-plate C by means of screws and a sliding block  $g$ , which works in a groove  $h$  in the feed-plate. By this operation the button-hole is sewed once around and the button-hole slit is ready to be cut. This is done by moving the handle 24 backward and consequently the lever 18 forward, which by its connection with the arm 5 through the fork 17 throws the arm 5 forward, bringing the knife 6 beneath the hammer 2 on the reciprocating needle-bar 1. The hammer 2 in its downward motion strikes plate 3 and forces the knife 6 through the cloth on the slotted vibrating plate 30, thus cutting a slit. During the operation of first sewing around the button-hole before the slit has been cut, the spring-presser overseaming-wire has been in operation, pressing upon the cloth close to the needle; but the special function of this spring-presser overseaming-wire is called into play after the button-hole slit has been cut. After the cutting operation the lever-arm 24 is released and the spring 9, which in the forward motion of the knife-arm 5 has been strained, returns the knife-arm to its position shown in Figs. 1 and 2. The operator then sews around

the button-hole slit that has just been cut, overseaming it, and gathers all the loose fibers of the cloth under the second row of stitches. This is done easily by means of the spring-presser wire 19, which presses the loose fibers on the slotted vibrating plate (which rests on the bed-plate) in close proximity to the needle, so that the threads of the stitches lay them down and secure them as the cloth is fed along. This operation will be clear from the description of the details, as hereinbefore particularly described. The button-hole thus cut and sewed a second time by my invention is of the most perfect and finished character, more so than any ever before produced, and the button-hole thus cut and finished is much more cheaply produced from the fact that it is sewed, cut, and finished without removing the cloth from the machine until the whole operation has been completed.

Having now fully described my invention and the manner in which I have embodied it, what I claim as new, and desire to secure by Letters Patent, is—

1. In a button-hole attachment for sewing-machines, the combination, substantially as hereinbefore set forth, with the feed-plate and cloth-clamping devices, of the cutting-knife, the lever-arm to which it is secured pivotally secured to a stationary support at its rear end, and means, substantially such as described, for moving the knife-carrying arm longitudinally relatively to the feed-plate and relatively to its pivot and to the support to which the pivot is connected.

2. In a button-hole attachment for sewing-machines, the combination, substantially as hereinbefore set forth, with the feed-plate and cloth-clamping devices, of the cutting-knife, the lever-arm to which it is secured and which is slotted at its rear end, a pivot-pin extending through a slot in the rear end of the lever, a stationary support for the pivot-pin, and means for operating the cutter.

3. In a button-hole attachment for sewing-machines, the combination, substantially as hereinbefore set forth, with the feed-plate and cloth-clamping devices, of the knife-carrying lever-arm pivoted at its rear end to a support and having a reciprocating movement longitudinally relatively to the feed-plate independently of its pivotal movement and the movement of the feed-plate, means for operating the knife-carrying arm, a spring for returning the arm to its normal position, the reciprocating needle-bar, and a lug or hammer carried by the needle-bar and engaging with the knife-carrying arm, for the purpose specified.

4. In a button-hole attachment for sewing-machines, the combination, substantially as hereinbefore set forth, of the cutting-knife, the lever-arm to which it is secured, the reciprocating needle-bar, and the hammer adapted to engage with the knife-carrying arm and adjustable vertically on the needle-bar.

5. In a button-hole attachment for sewing machines, the combination, substantially as hereinbefore set forth, with the feed-plate and cloth-clamping devices, of the pivoted knife-carrying arm and a guide secured to the bridge-plate and through which the knife-carrying arm extends, whereby the knife-carrying arm is moved or vibrated transversely with the feed-plate.
- 10 6. In a button-hole attachment for sewing machines, the combination, substantially as hereinbefore set forth, with the feed-plate and cloth-clamping devices, of the pivoted knife-carrying arm and a laterally-adjustable guide
- 15 secured to the bridge-plate and through which the knife-carrying arm extends, whereby the knife-carrying arm is moved or vibrated transversely with the feed-plate.
7. In a button-hole attachment for sewing-

machines, the combination, substantially as 20 hereinbefore set forth, of the feed-plate, the slotted cloth-clamping presser-foot, the slotted plate below the feed-plate, and devices for connecting the slotted plate with the feed-plate and for adjusting it laterally relatively 25 thereto.

8. In a button-hole attachment for sewing machines, the combination, substantially as hereinbefore set forth, of the slotted feed-plate, the cloth-clamp having a slotted press- 30 er-foot, and the overseaming spring presser-wire extending into the slotted presser-foot to bear on the cloth.

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