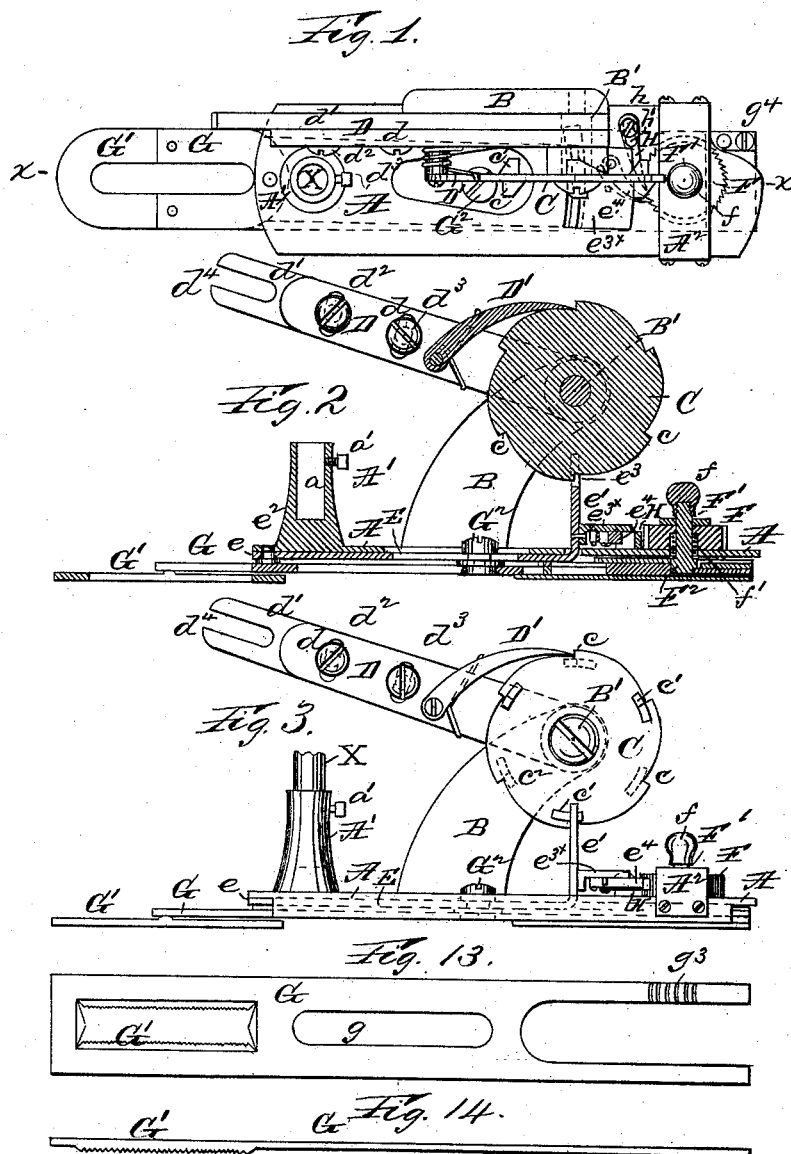


H. J. WILLIAMS.

## BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 383,423.

Patented May 22, 1888.



Witnesses,

Jos. O. Warner.  
F. C. Frost.

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Fig 15.

By his Attorney

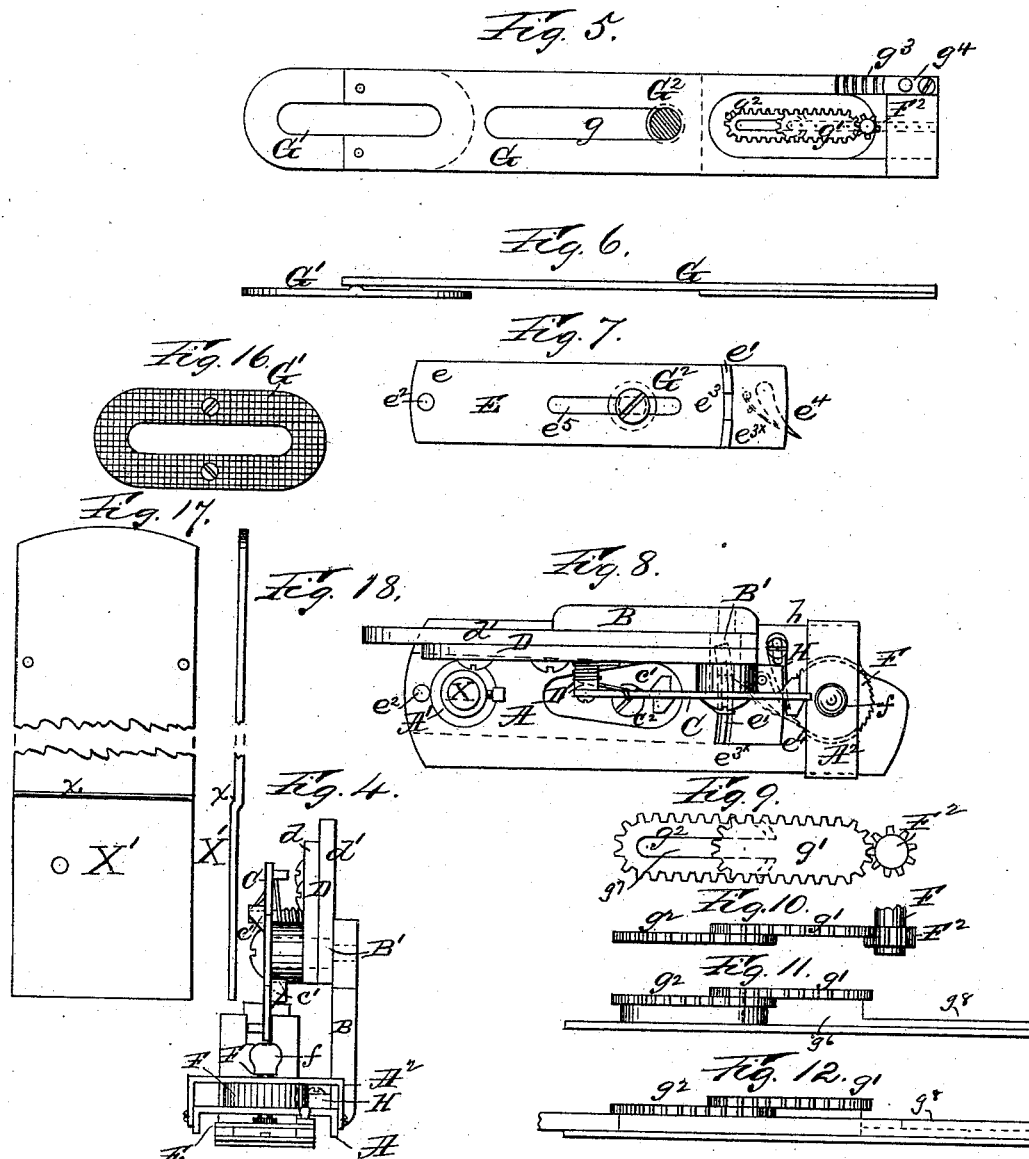
Inventor,  
H. J. Williams.

*H. L. Barron.*

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W. L. Bennett,

# UNITED STATES PATENT OFFICE.

HENRY J. WILLIAMS, OF NEW YORK, N. Y., ASSIGNOR TO THE HARRIS  
BUTTON HOLE ATTACHMENT COMPANY, OF SAME PLACE.

## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 383,423, dated May 22, 1888.

Application filed May 24, 1887. Serial No. 239,260. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY J. WILLIAMS, of the city, county, and State of New York, have invented a new and useful Improvement in Button-Hole Attachments for Sewing-Machines; and I hereby declare the following to be a full and clear description of the same.

This invention relates to a device for forming the requisite stitching necessary to the construction of any desired size or form of button-hole such as is in common use; and it consists of a mechanism adapted for attachment to the bed-plate of any ordinary sewing-machine, and the operative parts of which are attachable to and operated by the needle-bar of the sewing-machine through an intermediate rock-shaft and ratchet-wheel, from which is transmitted both the forward and lateral or zigzag feed movements required for the formation of the button-hole stitch.

The invention will be readily understood by reference to the accompanying drawings, of which—

Figure 1 is a general plan of the button-hole mechanism. Fig. 2 is a longitudinal sectional elevation of the same taken on the line *xx* of Fig. 1. Fig. 3 is a side elevation of it. Fig. 4 is a rear end elevation of it. Fig. 5 is a top view of the feed-plate, showing the feed and adjusting racks and actuating-pinion. Fig. 6 is a side elevation of the feed-plate. Fig. 7 is a detail plan view of the laterally-vibrating lever, which gives a zigzag or button hole-stitch movement to the feeding device. Fig. 8 is a detailed plan of the frame-plate of the button-hole mechanism and of the parts which are located above it. The feed-plate, being located below the bed-plate, does not show in this figure. Fig. 9 is a detailed plan view of the adjustable toothed rack and pinion of the feed-plate, by means of which the feed movement is made to conform to the size and shape of the required button-hole. Figs. 10, 11, and 12 are respectively detailed side elevations of the parts shown in plan in Fig. 9, and illustrate the longitudinal adjustment of this mechanism, so as to adapt it to button-holes of different lengths. Figs. 13, 14, and 15 are respectively a plan, a side elevation, and an end view of a modified form of the feed-plate. Fig. 16 is a bottom plan of the presser-foot of

the feed-plate as it is usually made. Figs. 17 and 18 are respectively a plan and a side elevation of a modified form of the throat-plate of the sewing-machine to provide for the operation of this attachment.

The mechanism of this machine or attachment is constructed on or assembled with a common frame-plate, A, which is attached to the presser-foot bar of the sewing-machine in any suitable manner. To this frame-plate is attached an upwardly-projecting arm or standard, B, which forms an abutment or lug for the attachment and support of the axle *B'*, on which is mounted the ratchet or driving wheel C, which constitutes the principal feed-operator of the machine, and also the actuating vertically-vibrating lever D, by means of which the said ratchet-wheel is operated. The said lever D is preferably made of two pieces, *d* and *d'*, placed side by side and in contact with each other, and held together by two or more assembling-screws, *d''* and *d'''*, so that the said pieces *d* and *d'* may be adjusted so as to make the said lever D longer or shorter for the purpose of adapting it to a longer or a shorter stroke and also to adapt the button-hole mechanism to any required sewing-machine. The forward or free end of the said actuating-lever D is bifurcated or slotted at *d'* for attachment to the needle-bar of the sewing-machine to which it is to be attached, any suitable lug formed on or attached to the said needle-bar of the sewing-machine being readily adapted to enter into the said notch *d'*, and thereby move the said actuating-lever of the button-hole attachment up and down with the corresponding movements of the said needle-bar. The ratchet-wheel C has teeth or serrations *c* formed on its periphery, and also cam-like lugs or wipers *c'* and *c''* formed on its sides near its periphery.

A pawl, D', pivoted at its lower end to the actuating-lever D, and provided at or near its said pivot with a suitable engagement-spring, is at its other end made to engage with the teeth or serrations *c* of the ratchet-wheel C, and so move the said ratchet-wheel about its axis in a series of intermittent movements as the actuating-arm D is moved up and down by the successive strokes of the needle-bar, as above described.

A laterally-vibrating lever, E, is made in an L shape by means of its horizontal arm *e* and a vertical arm, *e'*, projecting upwardly therefrom at its inner end. The outer end of this lever is pivoted by a pivot-pin, *e<sup>2</sup>*, to the bottom side of the plate A, as shown best in Fig. 2, so as to allow the rear or inner end of the said lever a lateral vibration thereon. The upper end of the upwardly-projecting arm *e'* is slotted at *e<sup>3</sup>* and arranged to embrace the lower part of the ratchet-wheel C, as is also shown in Fig. 2. At each movement of the said wheel C one of the lugs *e'* or *e<sup>2</sup>* (they being placed alternately on opposite sides of the said wheel for this purpose) engages with the said lever E *e'* and moves it toward one side, and then a lug on the opposite side of the wheel moves the lever toward the other side, thus causing the lever to vibrate laterally coincidentally with the vertical strokes of the needle-bar of the sewing-machine attached to the actuating-lever D, as above described. This vibrating lateral movement of the vibrating lever E is transmitted through its projecting arm *e<sup>3</sup>* on its inner end, as in Fig. 2, and through a spring-pawl, *e<sup>4</sup>*, pivoted thereon, to a horizontally-rotating feed ratchet-wheel, F, mounted on a vertical axle or post, F', seated in the inner end of the plate A. These movements are utilized to produce the forward and backward and laterally or zigzag movements of the feeding-plate G and its presser-foot G', for forming the button-hole work, in the manner next hereinbelow described. The said feeding-plate G is an elongated metal plate, somewhat longer and narrower than the frame-plate A, below which it is located. The vibrating lever E is interposed between the frame-plate A and the feed-plate G, and the assembling pivot-pin G<sup>2</sup> couples them together, the said pin G<sup>2</sup> for this purpose passing through a slot, *e<sup>5</sup>*, in the said lever E. A slot, *g*, in the feed-plate G accommodates the assembling-pin G<sup>2</sup>, and the two slots *e<sup>5</sup>* and *g* permit a longitudinal adjustment of the said assembling-pin, so as to make the lateral throw of the feed-plate more or less in order to accommodate coarser or finer work. The frame-plate A has a slot, *a*, of sufficient width to allow the upper end or head of the pin G<sup>2</sup> to vibrate laterally with the plates E and G. At the rear or inner end of the feed-plate G it is provided with a longitudinally-adjustable toothed rack made in two sections, *g'* and *g<sup>2</sup>*, which are placed one above the other, and made adjustable as to length by sliding one of them over the other, so as to lengthen or shorten the entire rack, (which really constitutes the button-hole former,) so as to conform it to the length of the button-hole to be worked. One of these cogged sections *g'* or *g<sup>2</sup>* is fixed to the feed-plate G, and the other one is made to slide longitudinally thereon in certain fixed movements which are measured by teeth or serrations *g<sup>3</sup>*, (shown in Fig. 5,) which are formed on the plate G, and coincide with the distances

between the teeth of the racks *g'* and *g<sup>2</sup>*. In this manner when a longitudinal adjustment of the racks *g'* *g<sup>2</sup>* is made the overlapping teeth of the one will come vertically over the underlying teeth of the other, so as to make a perfectly-continuous rack, as shown by the detail drawings in Figs. 10, 11 and 12.

The preferred way of arranging the adjustable racks is as follows: The rack-section *g'* is provided on its under side with a flange or ridge, *g<sup>6</sup>*, that fits in a corresponding slot, *g<sup>7</sup>*, in the rack section *g<sup>2</sup>*. The ridge *g<sup>6</sup>* is secured to a frame, *g<sup>8</sup>*, that may be adjusted back and forth in suitable guideways in the feed-plate G. A clamping-tooth, *g<sup>4</sup>*, is secured to the adjustable frame *g<sup>8</sup>* and engages with teeth or serrations *g<sup>3</sup>* on the feed-plate. The teeth *g<sup>3</sup>* are spaced to correspond with the teeth or cogs in the rack-sections, so that the sections may be adjusted accurately to bring their teeth in line with each other.

A cogged pinion, F<sup>2</sup>, attached to the bottom end of the post or axle F', is arranged to gear into this cogged rack, and as it is rotated by the ratchet F in the manner above described the said pinion F<sup>2</sup> moves the rack *g'* *g<sup>2</sup>*, and with it the feed-plate G, in a succession of intermittent movements coinciding with the movements of the needle of the machine around the whole contour of the button-hole to be worked, and at the same time a laterally-vibrating movement is given to the feed-plate by the lateral movements of the lever E and its pin G<sup>2</sup> acting upon the feed-plate G in the manner above described. These two movements of the feed-plate impart to the presser-foot G<sup>2</sup> the zigzag movement of the button-hole stitch.

The bottom face of the presser-foot G' may be made in the usual serrated form, as shown in Fig. 16, or the foot and the feed-plate may be made in one piece, as in Figs. 13, 14, and 15, and the serrations thrown up thereon by means of forming-dies.

At the front end of the frame-plate A there is an upwardly-projecting hub or lug, A', which is socketed at *a* to receive the rod X of the presser-foot of the sewing-machine, which is coupled to this hub-piece by a set-screw, *a'*.

At the rear end of the frame-plate A is attached an overlying strap-piece, A<sup>2</sup>, which forms the upper support for the vertical post or shaft F', as shown in Figs. 1, 3, and 4. The upper end of this post or shaft F' terminates in an operating-knob, *f*, by means of which the operator can raise up the said shaft and its attached pinion F<sup>2</sup>, so as to disconnect the said pinion from its cogged rack *g'* *g<sup>2</sup>*. A recess in the bottom side of the ratchet-wheel F is made to receive a coil of spiral spring, *f'*, which is set so as to habitually throw the said post or shaft F' down, but also permits it and its attachments to be raised up, as above described, the object of raising it up and disconnecting the said pinion F<sup>2</sup> being to allow the operator to move and adjust the feed-plate G to the work

in hand without moving the operative parts of the machine. The ratchet-wheel F is coupled with its axle F' by means of a tongue or spline and groove, (not shown,) so as to allow for this vertical movement of the said axle F' without interrupting the rotation of the said parts.

An adjustable stop or gage-pawl, H, is pivoted to the bed-plate A by means of an assembling screw or pin, h, as seen in Fig. 1, which said pin passes through a slot, h', in the said pawl H, the slot being formed in the pawl, so that it may be moved in or out, as required for the adjustment of the said pawl or stop-gage. The forward end of this gage-piece H is made to contact, or nearly contact, with the periphery of the ratchet-wheel F, just behind or under the operating-pawl e', and by moving it in or out by means of its adjustment h h', as above described, the pawl e' may be adjusted so as to take one or more of the teeth of the said ratchet F at each stroke of the lever E, and thus the movement of the feed-plate at each stroke and the spread of the zigzag making up the stitches may be regulated to great exactness.

In adapting this mechanism to a sewing-machine the ordinary flat throat-plate of the machine is not adapted to work with this mechanism, so I introduce into the sewing-machine, in combination with this button-hole mechanism, a throat-piece, X', of peculiar construction, as shown in Figs. 17 and 18. In this throat-piece there is a slight offset at x, so as to slightly raise one end of the said plate off of the ordinary feed-gear of the machine, so as to allow the feed-gear of this attachment to operate as above described.

Having described my invention, I claim—

1. The combination of the frame-plate, the feed-plate, the rack secured thereon, a pinion mounted in the frame-plate, the driving-wheel having ratchet-teeth in its periphery, and cams or wipers alternately set upon its opposite sides, a lever vibrated by the driving-wheel, connections between the lever and the feed-plate for giving the latter a vibrating movement, and connections between the lever and pinion that engage with the rack for giving the feed-plate a longitudinal movement, substantially as set forth.

2. The combination of the frame-plate, the driving-wheel having teeth in its periphery, and cams or wipers alternately set upon its

opposite sides, the vibrating lever in operative connection with the driving-wheel, a pinion mounted on the frame-plate operatively connected with the vibrating lever, the rack on the feed-plate with which the pinion meshes, and connections between the vibrating lever and the feed-plate for giving the latter a vibrating motion, substantially as set forth.

3. The combination of the frame-plate, the feed-plate, the driving-wheel, means for rotating it, the vibrating lever operated by the driving-wheel, the rack secured on the feed-plate, the pinion with which it meshes, the ratchet-wheel rigidly connected with the pinion and operatively connected with the vibrating lever, and a handle or knob for withdrawing the pinion from engaging with the rack, substantially as set forth.

4. The combination of the frame-plate, the feed-plate, the driving-wheel, means for rotating it, the vibrating lever operated by the driving-wheel, the pawl on the end of said lever, the ratchet-wheel with which it engages, the pinion rigidly secured thereto, the rack on the feed-plate with which the pinion engages, and an adjustable gage that regulates the movement of the pawl on the end of the vibrating lever, substantially as set forth.

5. The combination of the frame-plate, the feed-plate, the driving-wheel mounted on the frame-plate and having teeth in its periphery and cam-shaped lugs or wipers on its opposite sides, a lever pivoted to the frame-plate and having a slotted upright extension in which the driving-wheel works, and a backwardly-extending arm carrying a pawl, the ratchet-wheel with which said pawl engages, the pinion secured thereto, the rack secured to the feed-plate with which the pinion meshes, and the securing-pin G', extending through slots in the feed-plate and the vibrating lever and adjustable therein, substantially as set forth.

6. The combination of the button-hole attachment herein described, the bed-plate of a sewing-machine, and the removable throat-plate X', having a transverse offset at x to form a cover for the ordinary feeding mechanism of the sewing-machine, substantially as set forth.

Witness my hand this 17th day of May, 1887.

H. J. WILLIAMS.

Witnesses:

W. L. BENNEM,  
F. C. FROST.