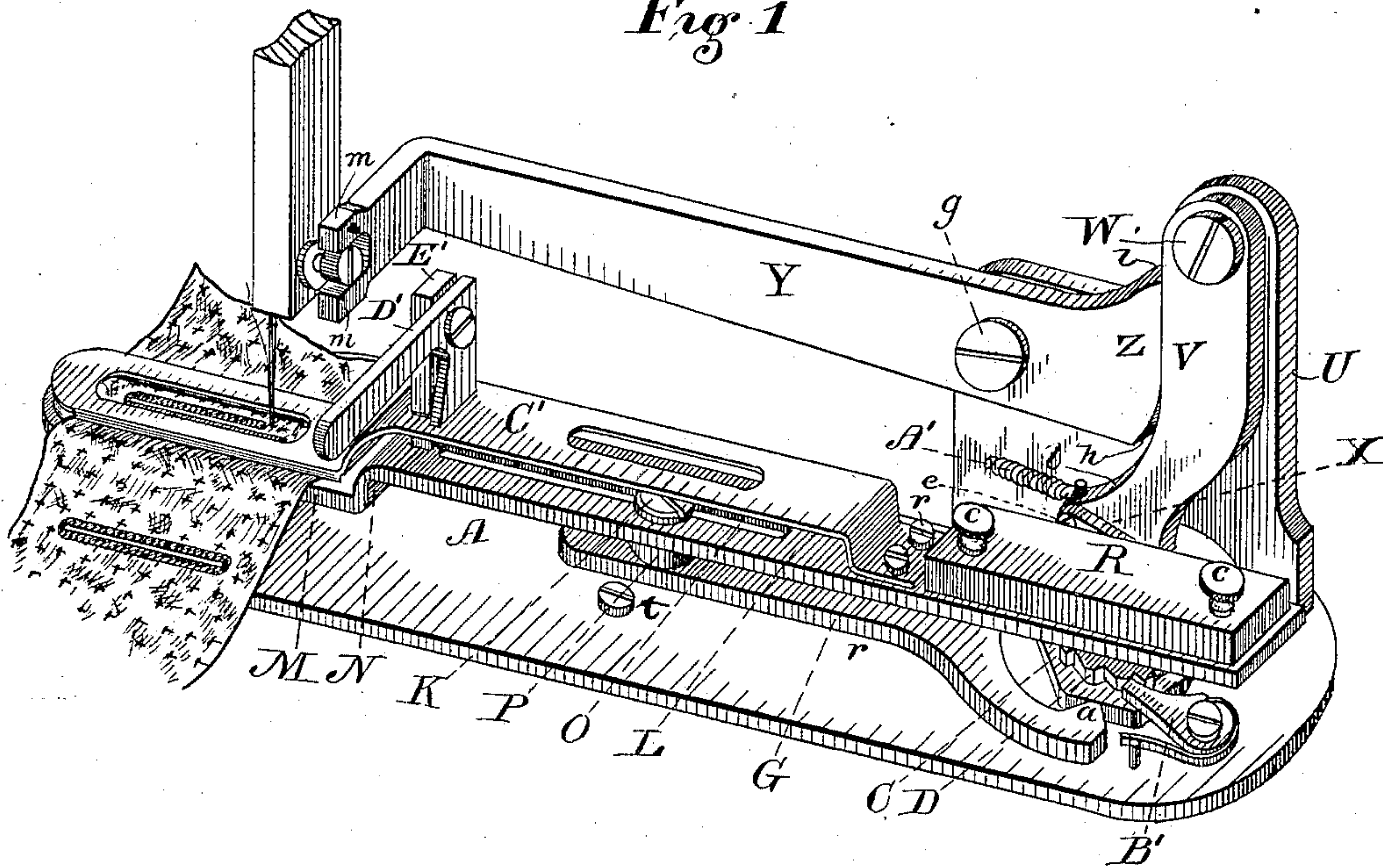


2 Sheets—Sheet 1.

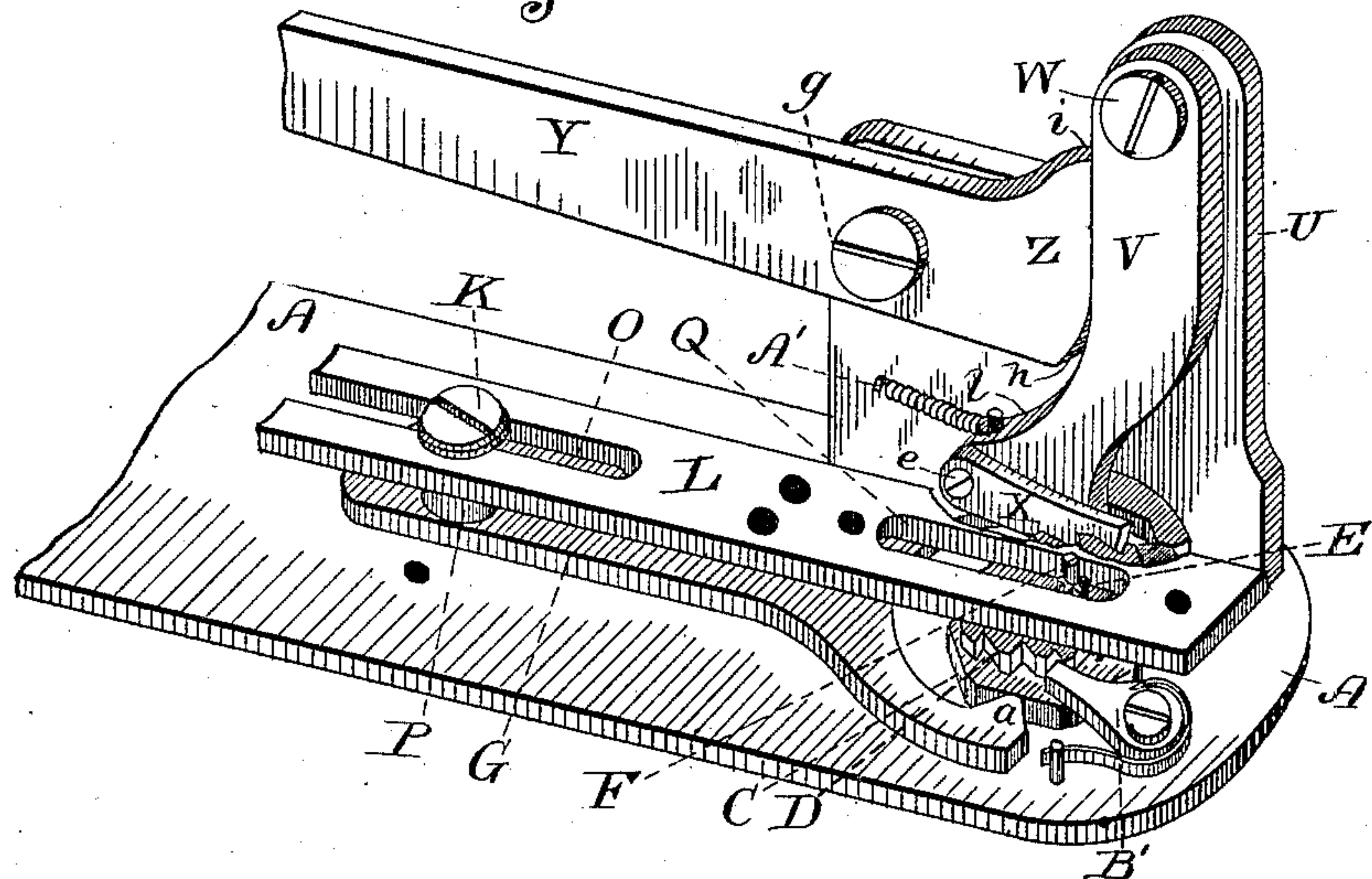
# BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

Patented Apr. 21, 1885.

*Fig. 1*



*Fig 2*



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 316,410, dated April 21, 1885.

Application filed February 7, 1885. (No model.) Patented in Canada February 25, 1885, No. 21,158.

*To all whom it may concern:*

Be it known that we, FRIEND W. SMITH, Jr., and S. STUART WILLIAMSON, citizens of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to certain novel and useful improvements in button-hole attachments for sewing-machines, and has for its object to provide such a machine which shall have but one ratchet movement, whose feed mechanism is constantly in gear, and be entirely automatic; and with these ends in view our invention consists in the details of construction and combination of elements hereinafter fully explained, and then specifically designated by the claims.

In order that those skilled in the art to which our invention appertains may more fully understand its construction and operation, we will proceed to describe the same in detail, referring by letter to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective of our improvement connected with the needle-bar of a sewing-machine; Fig. 2, a perspective of the rear portion of the attachment, the rack and holder being removed and the feed-bar broken away to clearly show the engagement of the pawl and ratchet; Fig. 3, a plan view, the feed-bar and parts carried thereby being removed; Fig. 4, a central vertical section with the clamp in an elevated position; Fig. 5, an enlarged inverted plan of the rack-holder, showing three positions of the feed-pin and guide-pin; and Fig. 6, an enlarged cross-section through the nest of wheels.

Similar letters denote like parts in the several figures of the drawings.

A is the bed-plate, through which from underneath, near its rear end, passes the shouldered screw B, countersunk so as to be flush with the bed-plate.

C is a wiper-wheel having an odd number of wipers or cams placed upon the bed-plate. Into the center of this wheel passes the threaded end of the screw B, the shoulder of the latter being set tightly against the bottom of the former, thus causing said screw to turn with and form the journal-bearing of said wiper-wheel.

D is a ratchet-wheel, having twice as many teeth as there are cams on the wiper-wheel. The ratchet and cam wheels are riveted or otherwise concentrically secured together, so that their movements will be simultaneous.

E is a pinion, which may be secured in any manner to the center of the ratchet. As shown, this pinion is made of sufficient length and driven or forced in an opening in the center of the ratchet. From the top of the pinion projects upward a pin, F, whose diameter is equal to the diameter of the stock from which the teeth of said pinion project. The use of this pin will hereinafter be explained.

G is a lever, pivoted by the screw H, which passes through said lever and into the bed-plate, as seen at Fig. 4. The inner end of this lever is forked, having pallets *a*, which bear on diametrically-opposite sides of the wiper-wheel, (see Figs. 1 and 3,) so that it will be understood that at every intermittent revolution of the wiper-wheel the lever G will be caused to oscillate to or fro about its pivotal point. The outer or free end of the oscillator G is slotted, as seen at I, and in this slot is fitted a headed nut, J, into which runs the threaded end of the screw K.

L is the feed-bar, whose forward or cloth-supporting end, M, rests upon the bed-plate, and is bent upward at N to a sufficient height to extend backward parallel with the bed-plate and rest upon the ratchet-wheel.

O is an elongated opening or slot cut in the feed-bar, through which passes the shank of the screw K, having a shoulder which bears against the washer P, interposed between the oscillator and feed-bar to give steadiness to the latter.

Q is a slot in the rear end of the feed-bar, twice the width of the diameter of the pinion, which projects within it. Placed upon the feed-bar, over the slot Q, and secured thereto



by the thumb-screws *c*, is a rack-holder, *R*. This holder has a slot, *S*, extending throughout nearly its entire length, the ends of the slot being curved, for the purpose presently explained, as may be readily seen by reference to Figs. 5 and 6.

*T* is the rack, which is secured to the holder so as to project downward from the central portion of the slot, the base or stock of the rack extending slightly above the bottom of the slot, so that a continuous groove is formed around said base. The pinion *E* is adapted to engage with the rack, and the pin *F* projects upward within the groove and acts as a guide to insure the continuous engagement of said rack and pinion throughout the entire length of the rack.

*U* is a standard secured to the bed-plate, and having pivoted to its upper portion a pawl-lever, *V*, by means of screw *W*.

To the bottom or heel end of the lever *V* is secured an operating lock-pawl, *X*, by means of a screw, *e*, which passes through said pawl and into the lever, leaving lost motion between said lever and screw.

*f* is a coil-spring interposed between pawl *X* and lever *V*, to keep the former in its normal position within the field of the ratchet-wheel.

*Y* is the operating-lever, fulcrumed by the screw *g* to the standard. The rear end of this lever forms a cam, *Z*, which impinges against and operates the lever *V* in such a manner that, regardless of the throw of the needle-bar, the lever *V* will be operated only a determined amount. For instance, if the outer end of the lever *Y* be carried below the horizontal, thus throwing the inner end upward, the part *h* of the cam, which is an arc described from the fulcrum of said lever, will come in contact with the lever *V*, and cease to operate the same, irrespective of the amount of movement of the lever *Y*, and likewise on the upper movement of the operating-lever the cam will move downward, operating the pawl-lever till the upper portion, *i*, of the cam comes in contact with the curve *l* of the lever *V*, which is concentric with the fulcrum of the operating-lever, when the cam will cease to operate the pawl-lever, as on the reverse stroke. The outer end of the lever *Y* is bent at right angles to its length, and forked at *m*, so as to embrace the needle-clamp screw and receive its motion therefrom.

*A'* is a coil-spring attached to the standard and pawl-lever for the purpose of keeping the latter in constant contact with the cam *Z*.

*B'* is a spring-click operating as a detent to the ratchet.

*C'* is an ordinary spring-clamp, whose rear end is bent downward and secured to the feed-bar by screws *r*.

*E'* is a post projecting upward from the forward end of the feed-bar through an opening in the clamp, and having pivoted thereto the L-shaped cam-lever *D'*, which operates to depress the clamp, as clearly shown at Fig. 1.

The cloth-support *M* is slotted or cut away in the usual manner.

From the foregoing description the operation of our improvement will be as follows: The attachment is secured to the bed-plate of the sewing-machine by the pin *s*, entering a hole in the throat-plate, and the screw *t*, passing into said bed-plate, while at the same time the forked end of the operating-lever is placed around the needle-clamp screw. It will be seen that the movements of the needle-bar will be imparted to the operating-lever, and in turn, through the cam *Z*, to the pawl-lever, causing the pawl carried thereby to engage and operate the ratchet-wheel intermittently. This pawl, by its peculiar construction and relation to the ratchet-wheel, is disengaged from the ratchet by the tooth succeeding that which has been operated upon, and after having turned said ratchet the desired distance locks it as against any overthrow; and, as will be clearly understood, this being the only ratchet movement, and, in fact, the only primary movement, all others being derived therefrom, there can be no overthrow in the machine. As the ratchet is revolved, the pinion and cam-wheel secured thereto will also revolve, the latter operating the oscillator and the former feeding the feed-bar lengthwise in or out, as the case may be. Oscillation is imparted to the feed-bar from the oscillator through the screw *K*, so that at each up and down movement of the needle-bar the feed-bar and cloth-support are moved transversely first to one side and then to the other, and at the same time are fed one step forward or backward, as the case may be, by the action of the pinion on the rack. If the pinion be in engagement with the high side of the rack, as seen at Fig. 5, the feed-bar will be moved outward until the end of the rack reaches the pinion, when the latter, acting on the end tooth of the former, will cause it and the feed-bar to which it is attached to cease their forward movement and move transversely thereto, during which time the fabric upon the cloth-support is slowly moved step by step underneath the needle to a different vertical plane, the oscillation meantime causing the barring of the button-hole. Now, as the pinion continues to revolve, the opposite side of the rack will come into engagement therewith, thereby causing the feed-bar to travel backward, which movement will be continued throughout the length of the rack, when the latter will again be caused to move sidewise and the remaining end of the button-hole be barred, as above explained. During this operation of the pinion throughout the circuit of the rack the pin *F* will travel in the continuous channel around the rack, and thereby insure uniform engagement between the said rack and pinion, and at the same time prevent lost motion or any unsteadiness in the vibration of the feed-bar.

We do not wish to be confined to any particular style of cloth-clamp, as this is imma-



terial; also, we are enabled to use any ordinary pawl mechanism for rotating the ratchet-wheel step by step.

Different lengths of racks are used for different sizes of button-holes.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a button-hole-sewing attachment for sewing-machines, the combination, with a cap provided with a vertical rack secured to a feed-bar, an oscillator, and wiper-wheel therefor, of a pinion stationary except as to revolution around its axis, and adapted to mesh with said rack, and step by step operate laterally against every portion of the latter circumferentially, and means for driving the pinion, whereby the said bar is fed back and forth, substantially as described.

2. In a button-hole-sewing attachment for sewing-machines, a wiper-wheel, ratchet-wheel, and pinion rigidly secured on the same short shaft, (the number of teeth in the ratchet being double the number of cams on the wiper-wheel,) in combination with the pivoted oscillator embracing at its rear extremity the said wiper-wheel, means for turning the ratchet, and the feed-bar adjustably connected to the oscillator, and having attached thereto a vertical rack, with which the pinion is adapted to engage, substantially as shown and described.

3. The combination of the operating-lever, pawl-lever, spring-pawl attached to the lower extremity of said pawl-lever, ratchet-wheel, pinion, and wiper-wheel secured on the same short shaft, oscillator pivoted to the bed-plate and embracing said wiper-wheel, feed-bar adjustably connected to the oscillator, rack attached to the feed-bar and engaging with said pinion, and means for clamping the goods at the forward extremity of the feed-bar, substantially as specified.

4. In a button-hole attachment for sewing-machines, the combination, with a ratchet-

wheel and a wiper-wheel, both rigidly mounted on the same short shaft, of the oscillator pivoted to the bed-plate and having its rear extremity forked and embracing said wiper-wheel, and means for intermittently rotating said ratchet, whereby a positive vibration is imparted to the oscillator, substantially as set forth.

5. The combination, with the pivoted lever Y, adapted to be operated by the needle-bar of a sewing-machine, of the pawl-lever V, spring-actuated pawl X, pivoted to the lower extremity of the pawl-lever, ratchet-wheel D and wiper-wheel C, secured on the same short shaft, and the pivoted oscillator forked at the rear end and embracing said wiper-wheel, substantially as shown and described.

6. In a button-hole attachment for sewing-machines, the combination, with the oscillator and wiper-wheel therefor, and the feed-bar carrying a detachable cap containing a vertically-depending rack having a circumferential groove around its base, of a pinion meshing with said rack and adapted to be revolved intermittently, and a guide-pin projecting axially from said pinion within said groove, whereby continuous engagement of the rack and pinion is insured, substantially as and for the purpose described.

7. The combination, with the oscillator, forked as described, and the feed-bar carrying the vertically-depending rack, of the wiper-wheel, ratchet-wheel, and pinion, all rigidly secured on the same short shaft, cloth-clamp secured to the outer end of the feed-bar, and means for intermittently revolving said ratchet-wheel, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRIEND W. SMITH, JR.

S. STUART WILLIAMSON.

Witnesses:

W. T. HAVILAND,

WM. H. KELSEY.