(No Model.) 2 Sheets—Sheet 1.

F. W. ROBERTS.

THREAD HOLDER AND CUTTER FOR BUTTON HOLE SEWING MACHINES.

No. 434,118. Patented Aug. 12, 1890.

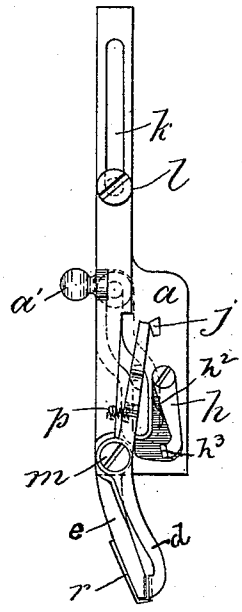


Fig. 1

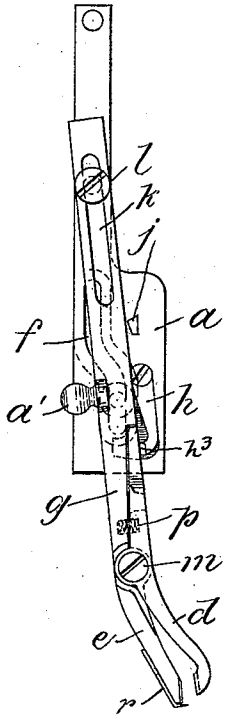
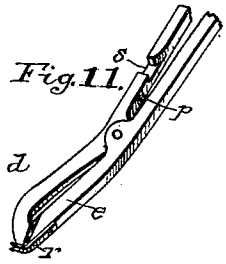


Fig. 2



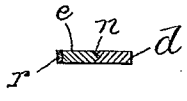


Fig. 9.

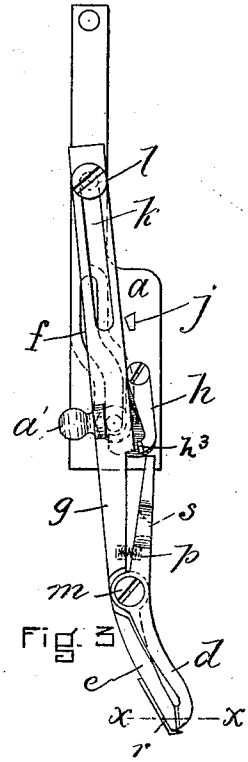


Fig. 3

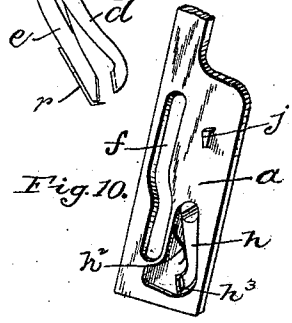


Fig. 10.



Fig. 8.

WITNESSES.

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(No Model.) 2 Sheets—Sheet 2.

F. W. ROBERTS.

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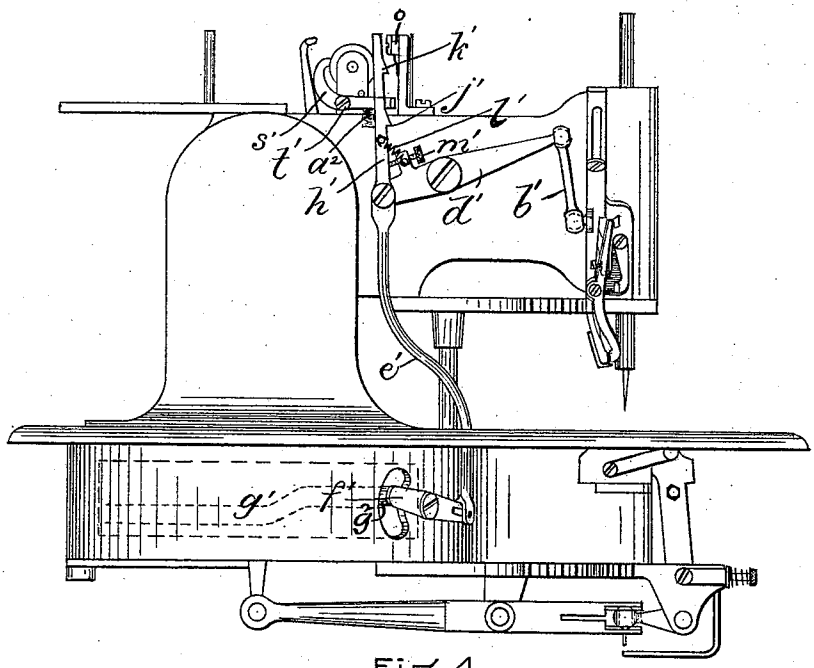


Fig. 4.

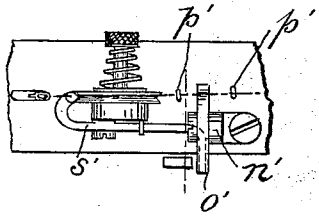


Fig. 6.

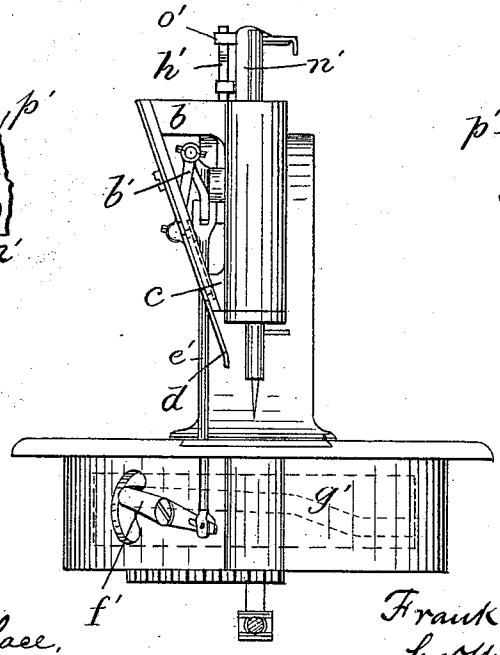


Fig. 5.

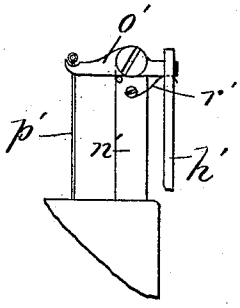


Fig. 7.

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UNITED STATES PATENT OFFICE.

FRANK W. ROBERTS, OF HAVERHILL, MASSACHUSETTS.

THREAD HOLDER AND CUTTER FOR BUTTON-HOLE SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 434,118, dated August 12, 1890.

Application filed February 11, 1890. Serial No. 339,983. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. ROBERTS, of Haverhill, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Devices for Holding and Cutting the Thread for Sewing-Machines, of which the following is a specification.

As is well known to those skilled in the art, after a button-hole is sewed on a button-hole machine it is necessary for the operator to seize the thread between the eye of the needle and the work, pull a portion of it through the eye of the needle and the work close to the work, (or the cutting may be done first and the pulling through afterward,) and then hold the end of the thread up against or substantially parallel with the needle preparatory to sewing the next button-hole. This operation renders it exceedingly difficult or wholly impossible for one operator to tend more than one machine.

The object of my invention is to produce a device or attachment for button-hole sewing-machines which shall perform the work above stated of cutting the thread close to the work after a button-hole has been sewed, holding the end of the thread which is through the eye of the needle up in a position nearly parallel with the needle, and pulling it through the needle-eye sufficiently so that the thread may be in position when the machine commences to sew the next button-hole. By accomplishing these operations automatically by means of my attachment a single operator is enabled to tend at least two machines. I have shown my device in the accompanying drawings in the best form now known to me applied to a button-hole sewing-machine of well-known construction, and I will describe the same, having reference to said drawings.

In the drawings, Figures 1, 2, and 3 are side elevations of my attachment, showing the same in three different positions, each at different periods in its operation. Fig. 4 is a side elevation of a well-known form of button-hole sewing-machine with my device attached, so much of the machine being shown as is necessary to render clear the operation of my device. Fig. 5 is a front view of the same. Fig. 6 is a detail top view, and Fig. 7 is a detail elevation. Fig. 8 is a perspective of the cutter detached. Fig. 9 is a section on line $x\,x$, Fig. 3. Figs. 10 and 11 are detail perspective view, of parts of my attachment.

My device consists, essentially, of a plate a, (see Figs. 1, 2, and 3,) which is rigidly secured to the frame of the machine in the inclined position shown in Fig. 5, a projection b being attached to the top of the frame to enable the plate a to be firmly secured at the desired angle, and a correspondingly small projection c being set on the frame below the projection b for the same purpose. The angle or slant of the plate a is such as to throw the jaws $d\,e$, when they are at the lowermost point of their movement, into the line of the thread below the needle where the thread leaves the work, so that the jaws may seize the thread at this point. It will therefore be clear that the precise angle at which the plate a is set is not essential to my invention, and will require to be varied to suit different machines.

The plate a has a curved cam-slot f cut therein, as shown, Figs. 1, 2, and 3, which receives a projection from the rear face of the bar g, said projection having a nut which holds the bar in place. At the lower end of the cam-slot f a spring-impelled latch h is set in a recess in the plate a. This latch is flush with the plate a and is curved at its lower end. The tip h^3 of the curved portion or hook of the latch is turned out and projects in front of the face of the plate a. This latch is normally pressed by its spring h^2 away from the cam-slot f, and occupies the position shown, Figs. 1, 2, and 3. Above the latch h and opposite the cam-slot f is a projection j, having its side next the cam-slot f beveled or inclined, as shown, to receive the upper end of the pivoted jaw d of the pinchers. In front of the plate a and movable relatively thereto, is secured the pincher-bar g, having a slot k lengthwise of the upper part thereof to receive a screw l, by means of which the upper part of the bar g is secured to the plate a. This slotted connection of the plate a and the bar g permits the bar to be moved upward and downward relatively to the plate. The lower end of the bar g is cut away and shaped so as to form one jaw e of a pair of pinchers, as shown, Figs. 1, 2, and 3, and it has pivoted to it at m the other jaw d of the pincers. The beak or mouth of these pinchers is adapted to seize and hold the thread, and to render its

operation more certain one of the jaws has a V-shaped groove and the other is correspondingly convexed, as shown at *n*, Fig. 9. A spring *p*, inserted between the upper arms of the pivoted pinchers in recesses formed for the purpose, tends to keep the jaws of the pinchers closed.

As it is necessary that the pinchers should not only seize the thread, but that the thread should be cut close to the work, I have provided a knife or cutter *r*, which is secured to the jaw *e* of the pinchers, and the cutting-edge of which is turned up at the end of the jaw so as to project slightly beyond the gripping-face of the said jaw *e*. The cutting-edge of the knife is slightly concave, as shown, Fig. 8, so as to more surely hold the thread. If the thread be taut when the pinchers seize it, it will be cut as soon as it is seized, as will be clear. If, however, it be slack, it may not be cut when siezed, but it will be cut as soon as the jaws of the pinchers begin to move so as to strain the thread over the cutter.

The operation of the parts of the device which I have described and which are the essential parts, is as follows: When the machine has about completed a button-hole, the pinchers *d e* have descended, the bar *g* being moved by mechanism which will be hereinafter described. As the bar moves downwardly from the position shown Fig. 1 to that shown Fig. 2, the jaws *d e* are opened by contact of the upper end of the jaw *d* with the projection at the tip of the latch *h*, and the jaws are held in this open position by said projection until they have reached the lowest point of their movement and are in position to seize the thread, at which time the upper end of the jaw *d* has passed the projection at the tip of the latch *h* and the spring *p* forces the jaws together, seizing the thread, at which time the parts will be in the position shown Fig. 3. By properly timing the operation of the device with the operation of the machine, the jaws will seize the thread when the needle has risen after completing a button-hole. While the needle remains in its raised position the jaws *d e* will rise with the thread firmly grasped between them. As they move up, the jaws remain closed, the upper or tail end of the jaws *d* passing upward to the right of the projection on the tip of the latch *h* and operating to force the latch toward the left, Fig. 3, against the stress of its spring h^2. As soon as the projection on the end of the latch comes opposite the slot *s* (shown in dotted lines, Figs. 1, 2, and 3) cut on the rear or back of the upper end of jaw *d*, the latch *h* will fly back into its normal position and the projection on its lower end will pass through the slot *s* and present no obstruction to the further upward movement of the jaw. The jaws continue to move upwardly in their closed position, raising the end of the thread and holding it up in substantially the same manner as the operator would do, and toward the latter end of their upward movement they pull the thread a short distance through the eye of the needle. Before the jaws have reached the highest point of their upward movement the needle begins to descend to sew the next button-hole, thus pulling more of the thread through the eye. When the needle has got into the fabric again, the jaws have reached nearly the end of their upward movement, and the upper or tail end of the jaw *d* is in contact with the beveled face of the projection *j* on the plate *a*, as shown, Fig. 1. The bevel of the projection *j* serves to open the jaws slightly, thus freeing the thread from their grasp. I have called the slot *f* a "cam-slot." It is simply a guide-slot, and in the machine shown in the drawings acts as a cam to throw the jaws *d e* toward the front of the machine and in line with the thread and the needle at a given time in the downward movement of the parts, it being considered desirable that when the parts are up they should be rearward of the needle and back out of the way of certain other attachments which may be desirable to use on button-hole machines. If the jaws when in their raised position were not required to be rearward of the needle, it would be obvious that the slot *f* instead of being curved might be straight, so that it is not essential to the operation of the device that the slot *f* be of any specific shape.

Having described the essential part of my device, I will now describe the device shown by which it is operated:

To the side of the bar *g*, I secure a projection *a'*, which has a rounded head or end, which serves as one member of a ball-and-socket joint and receives the socket at the lower end of a connecting rod or link *b'*, the upper end of which is attached by a similar ball-and-socket joint to the lever *d'*, which is pivoted to the frame of the machine, as will be clear from Fig. 4. To the other end of the lever *d'* is pivoted a connecting-rod *e'*, which is bent, as shown, so that it may be carried down through the plate of the machine at a convenient point and pivoted at its lower end to a lever *f'*, which is pivoted to the frame below the plate. The lever *f'* has at its free end a projection which travels in the cam-groove g^2, cut in the periphery of the large cam-wheel of the machine, said large cam being shown at *g'* in dotted lines and being a well-known feature of certain button-hole sewing-machines. I have shown the device as operated from the large cam *g'*, because this cam is in continuous rotation and furnishes a convenient means of operating my device. On the pivot which secures the connecting-rod *e'* with the lever *d'*, I attach an upwardly-projecting arm *h'*, which has two teeth *j' k'*. A spring *l'* is secured between the arm *h'* and a projection on the lever *d'*, and tends to pull the arm *h'* toward the lever. A set-screw *m'* through the projection on the lever *d'* bears against the arm *h'*, and regulates the position of the arm with reference

to the lever. On the top of the frame of the machine I secure an upright n', (see Fig. 7,) at the top of which is pivoted a lever o', one end of said lever being slightly hooked and projecting under the thread as it passes from the tension device on its way to the needle, said lever o' being at that part of the thread between the eyes p', (see Fig. 6,) which serve as guides for the thread. The other end of the lever o' is opposite the upper end of the arm h', and is supplied with a spring r', which tends to throw the hooked end of the lever down away from the thread. As the lever d' oscillates, it raises the arm h', and the upper hook k' of the arm snaps over the end of the lever o'. When the lever d' carries the arm h' downwardly, that end of the lever o' in contact with the hook k' is pulled downwardly, raising the other end of said lever o' and pulling up the thread, so as to make a slack therein. When the arm h' has moved downwardly through a portion of its downward movement, its upper end is thrown off the lever o' by the screw m', and the lever is released and its spring r' moves it back to its normal position.

To permit of slacking the thread by means of the lever o' the tension device must be released so as to permit the thread to pass through it from the spool, and this is accomplished by the following mechanism: The tension device consists of two disks which are held together by spring-pressure, as shown, Fig. 6, and which are of well-known construction, and the tension may be taken off the thread by forcing these disks apart. For this purpose I have provided a bent lever s', which is pivoted, as shown at t', to the upright which supports the tension-disks. One end of this lever is bent at right angles, or substantially so, and projects in front of the arm h' near the hook j', as shown, Fig. 4, and the other end of said lever is bent upwardly and sidewise, and is provided with a wedge-shaped end adapted to be inserted between the tension-disks to force them apart and thus release the tension. When the upper hook k' of the arm h' is acting on the lever o', the lower hook j' is acting on the lever s', and as that lever is pulled downwardly by the hook j' its wedge-shaped end is forced between the tension-disks and the tension is taken off, thus allowing a slack to be formed in the thread by the lever o', as heretofore described. A spring a^2, set under the lever s', serves when the hook j' has been freed from the lever to throw the lever back again into its normal position and allow the tension to act again on the thread. The object of this device, as will be clear, is simply to produce a slack in the thread and thus avoid any danger of the thread's breaking when the jaws d e are pulling it through the eye of the needle, and the amount of the slack produced must be regulated in accordance with the amount of thread which the jaws pull through the needle-eye. If, owing to the strength of the thread or the slightness of the tension, the thread could be pulled through the needle-eye by the jaws without danger of breaking, this device would, as will be clear, be unnecessary.

The whole operation of the device is as follows: When the machine is nearing the completion of a button-hole, the cam on the periphery of the cam-wheel g' operates to move the bar g and the pinchers downward into proximity to the thread and the work. As the needle moves up after having completed the button-hole, the pinchers have come into position close to the work with the thread between them and the arm h' is in its raised position with its hooks on the levers o' s'. As the pinchers d e reach the lowest point of their movement, they close on the thread and then commence an upward movement, cutting the thread off, if it has not previously been cut, and carrying up the slack end of the thread which projects through the eye of the needle. At the same time the lever o' has made a slack in the thread in front of the tension and the last part of the upward movement of the pinchers pulls a small additional portion of thread through the needle-eye. The needle then moves downward to begin the next button-hole, pulling more of the thread through the needle-eye, and as it passes into the fabric or after it has taken a few stitches, the pinchers are slightly opened by the projection j' letting go of the thread, thus completing the operation which is repeated again at the next button-hole.

What I claim is—

1. The combination, with a sewing-machine, of a device for seizing and cutting the thread between the needle thereof and the work, the said device consisting of a vertically-reciprocating and automatically-operated pair of pinchers provided with a cutter and supported by the head or arm of the machine above the work-plate thereof, whereby the said pinchers will be moved into position to seize and cut the thread and then away from the needle to draw the thread through the eye thereof, substantially as set forth.

2. The combination, with the plate a, of the bar g guided thereon and provided at its lower end with the pincher-jaws d e, the spring p, for closing said jaws, and means for opening said jaws when the said bar is being lowered.

3. The combination, with the plate a, provided with the cam-slot f and the projection j, of the sliding bar g, provided at its lower end with the pincher-jaws d e, and having on its rear face a projection entering the said cam-slot, the upper arm of the said jaw d having in its rear side the recess s, the spring p, for closing said jaws, and the spring-pressed latch h, having the outwardly-turned tip or projection h^3 to open the said jaws.

4. The combination, with the plate a, the pinchers d e, and mechanism for operating them, of the cutter r, carried by one of the

jaws of the said pinchers and having its cutting-edge turned over the end of the said jaw, substantially as set forth.

5. In a sewing-machine, the combination, with a tension device, of a thread seizing and cutting apparatus consisting of a pair of reciprocating and automatically opened and closed pinchers provided with a cutter, and a thread-releasing apparatus comprising an automatically-operated lever, one end of which is forced between the tension disks or plates when the thread is to be drawn through the eye of the needle.

6. The combination, with a guide-plate *a*, provided with the projection *j* and the spring-pressed latch *h*, of the sliding bar *g*, carrying a pair of spring-pressed pinchers provided with a cutter, the rotating cam-disk *g'*, and connecting mechanism whereby the said sliding bar is operated from the said disk.

7. The combination, with the rotating cam-disk *g'*, the arm *h'*, provided with the shoulders *j' k'*, and connections between the said cam-disk and arm, of the tension device, the tension-releasing lever *s'*, and the thread-slackening or pull-off lever *o'*, the said levers being operated by the said shoulders on the said arm.

8. The combination, with the plate *a* and the sliding bar *g* movable thereon and provided at its lower end with a pair of spring-pressed pinchers having a cutter, of the tension device, the tension-releasing lever *s'*, the thread-slackening or pull-off lever *o'*, the rotating cam-disk *g'*, and connecting mechanism whereby the said sliding bar and the said levers are operated from said cam-disk.

FRANK W. ROBERTS.

Witnesses:
WM. A. MACLEOD,
ROBERT WALLACE.