

(No Model.)

4 Sheets—Sheet 1.

F. W. CROSS.

BUTTON HOLE SEWING MACHINE.

No. 279,349.

Patented June 12, 1883.

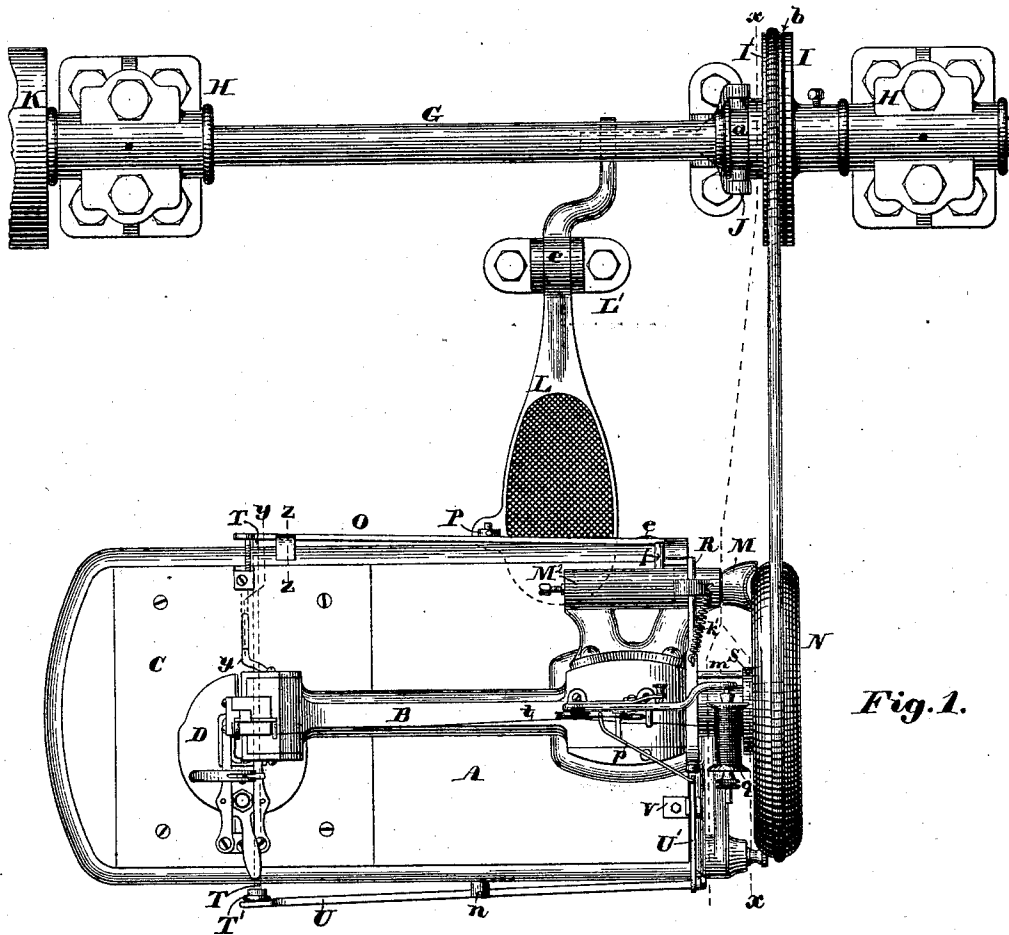


Fig. 1.

Witnesses:

Walter E. Lombard.
E. A. Hemmenway.

Inventor:
Frank W. Cross,
by N. C. Lombard
Attorney.

(No Model.)

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F. W. CROSS.

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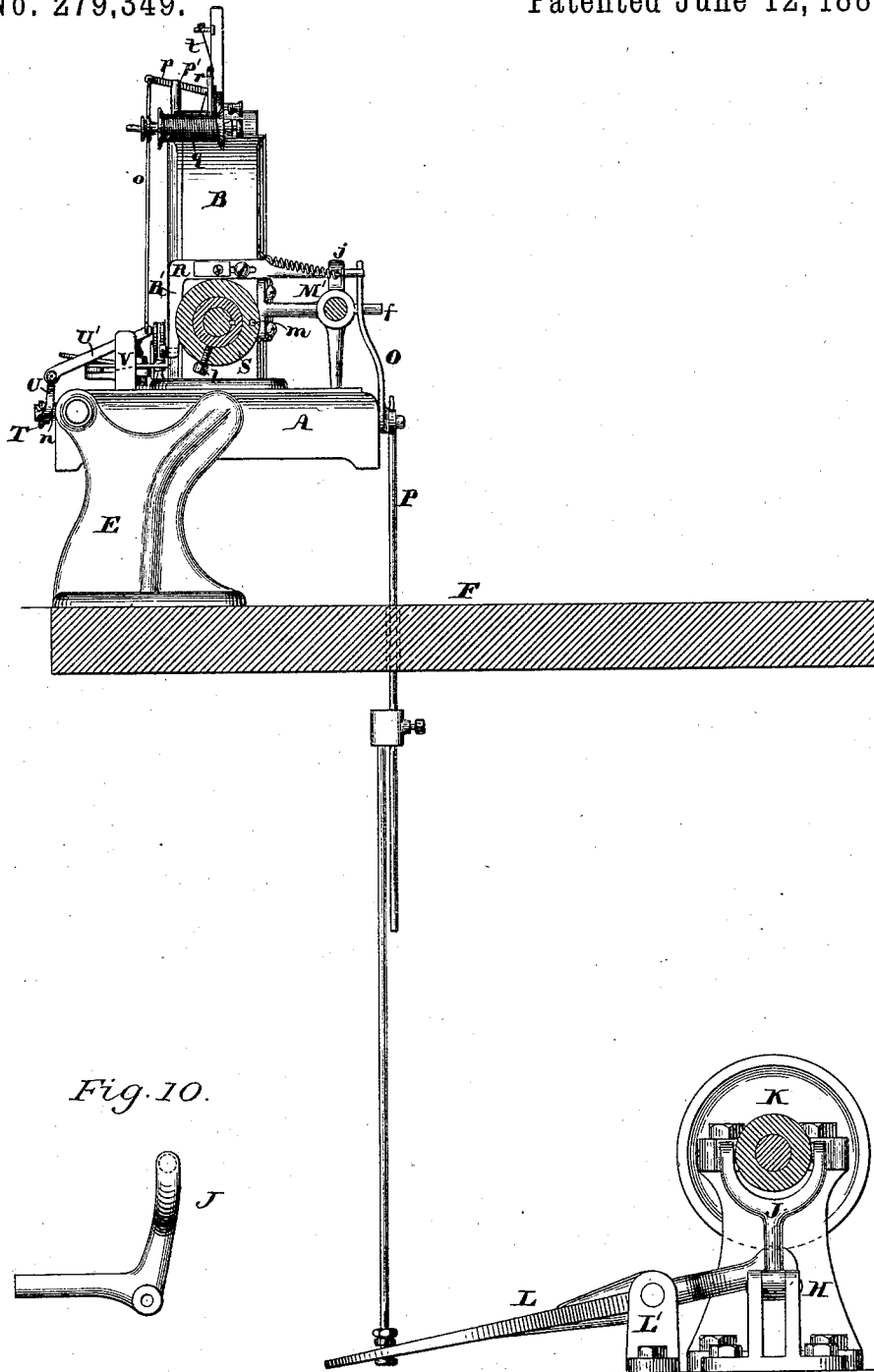


Fig. 10.

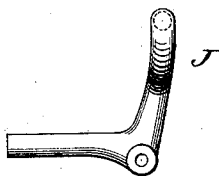


Fig. 2.

Witnesses:

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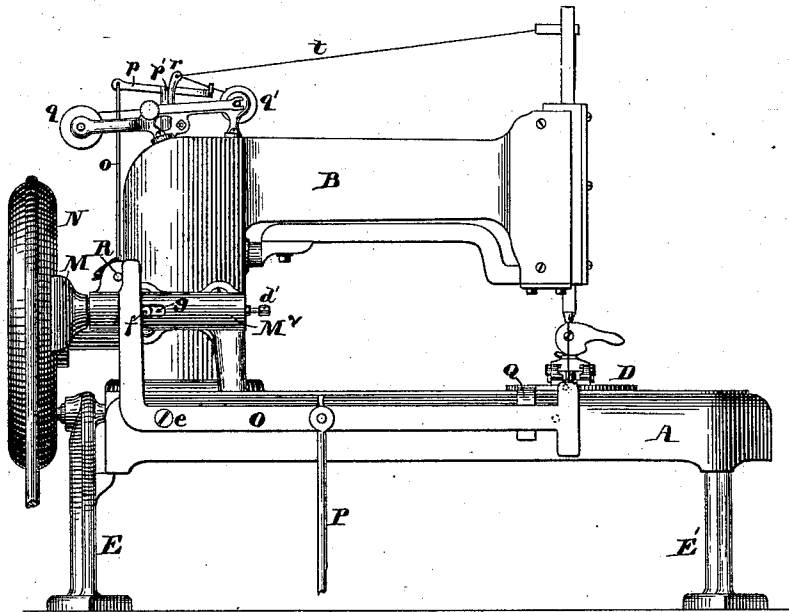


Fig. 3.

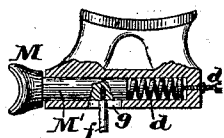


Fig. 7.

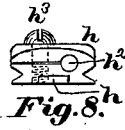


Fig. 8.

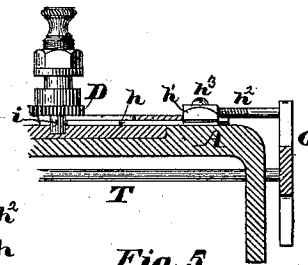


Fig. 5.

Fig. 11.

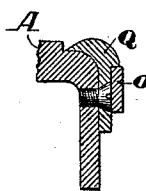
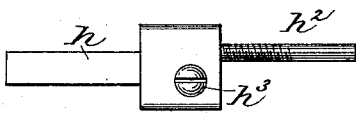


Fig. 6.

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(No Model.)

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F. W. CROSS.
BUTTON HOLE SEWING MACHINE.

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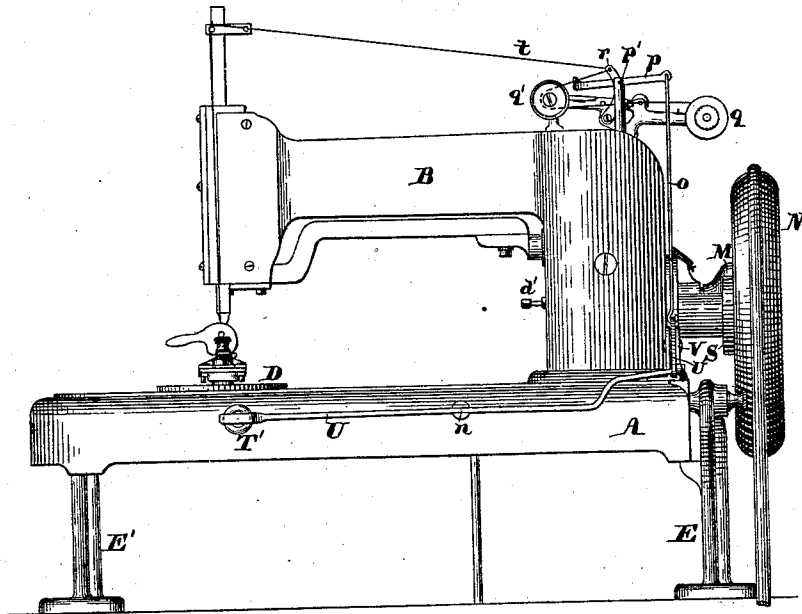


Fig. 4.

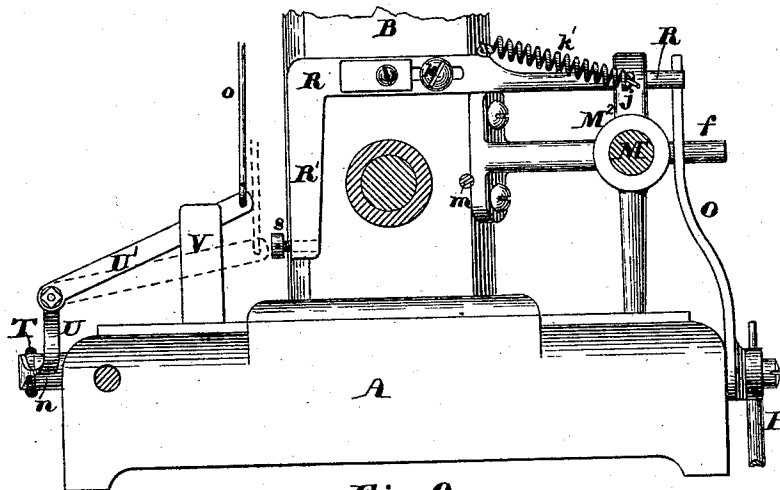


Fig. 9.

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UNITED STATES PATENT OFFICE.

FRANK W. CROSS, OF LYNN, MASSACHUSETTS.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 279,349, dated June 12, 1883.

Application filed March 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. CROSS, of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Stop-Motion Attachments for Sewing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to stop-motions for sewing-machines, and is primarily designed for use upon button-hole sewing-machines, though one portion thereof is equally adapted to use upon all power sewing-machines.

The button-hole sewing-machines to which my invention is more especially adapted are those provided with a clamping device for holding the work, that is arranged to be fed transversely of the machine-table and to be rotated about the needle; and my invention has for its objects a more accurate timing of the stopping of the machine at the end of the button-hole, an instantaneous stopping of the machine when the thread breaks, and simplifying the labor of the operator by enabling her to start the machine with the foot, thus leaving the hands free to manipulate the work; and it consists in certain novel devices and combinations and arrangements of parts, which will be best understood by reference to the description of the drawings, and to the claims, to be hereinafter given.

Figure 1 of the drawings is a plan of a machine embodying my invention, the bench upon which the sewing-machine is supposed to be mounted and beneath which the counter-shaft is placed being omitted for the purpose of the better showing the several parts of the invention. Fig. 2 is a vertical transverse section on line *xx* on Fig. 1. Fig. 3 is a rear side elevation of the sewing-machine without the counter-shaft. Fig. 4 is a front side elevation. Fig. 5 is a partial section on line *yy* on Fig. 1. Fig. 6 is a partial section on line *zz* on Fig. 1. Fig. 7 is a sectional plan of the brake-shoe and its stand. Fig. 8 is an elevation of the inner end of the push-pin for releasing the brake-retracting lever. Fig. 9 is an elevation of the devices for automatically stopping the machine when the thread breaks, drawn to an enlarged scale. Fig. 10 is an elevation of the shipper-lever, and

Fig. 11 is a plan of push-pin for releasing the brake-retracting lever.

A is the bed or main table, B the goose-neck, C the removable work-plate, and D the work-clamping plate, of a Singer button-hole sewing-machine. The table A is pivoted to the stands E and E', which are firmly secured in the appropriate positions upon the bench F.

G is the counter-shaft, mounted in bearings in the stands H H, secured to the floor of the building, beneath the bench F, and to the rear of the back edge of the table A, as shown in Figs. 1 and 2. The shaft G has firmly secured thereon the disk I, and in near proximity thereto is mounted the grooved loose pulley I', provided with a circumferential groove, *a*, in its hub, with which the forked end of the elbow shipper-lever J engages, as shown.

Between the pulley I' and disk I is placed a disk of leather, *b*, to serve as a friction-pad, whereby the pulley I' may be made to revolve with the shaft G when pressed hard toward the disk I by the action of the shipper-lever J. Motion is imparted to the shaft G by means of the pulley K and a suitable belt (not shown) leading therefrom to a main shaft or other prime mover.

L is a treadle-lever pivoted at *c* to the stand L', and connected at its rear end to the horizontal arm of the shipper-lever J, and having its front end in a convenient position to be acted upon by the operator's foot while sitting at the machine and manipulating the work to be acted upon with his or her hands.

M is a brake-shoe shaped to fit the side of the rim of the fly-wheel N, and mounted by its horizontal shank M' in the stand M', secured to the back side of the goose-neck B, and pressed into contact with the wheel N by the spring *d*, the tension of which may be regulated by means of the set-screw, *d'*, as shown in Fig. 7.

O is an elbow-lever pivoted at *e* to the back edge of the table A, with its short arm projecting upward in a position to bear against the side of the pin *f*, set in the side of the shank of the brake-shoe M, and projecting through the slot *g*, formed in the stand M', all as shown in Fig. 3. The lever O is made preferably of sheet-steel, so that it may readily be

sprung horizontally, and has the end of its long or horizontal arm made T-shaped, and has pivoted thereto, near the middle of its length, the connecting-rod P, the lower end of which is connected to the treadle-lever L, as shown in Fig. 2.

Q is a catch, with which the upper edge of the long arm of the lever O engages when depressed to remove the brake-shoe from contact with the wheel N, said catch being secured to the rear edge of the table A, as shown in Figs. 1, 3, and 6.

A thin bar, *h*, is fitted to a groove formed in the under side of the rear portion of the work-plate in a position to be struck by the pin *i* of the work-holding clamp-plate D as it is moved toward the rear of the table after the eye of the button-hole has been worked. The bar *h* has secured to its rear end the block *h'*, in which is adjustably secured the screw-pin *h''*, in a position to come in contact with the lever O and push it from beneath the catch Q, when it is moved toward the rear by the action of said pin *i*. The block *h'* is split from the threaded hole which receives the screw-pin *h''* to one side and is provided with the clamping-screw *h'''*, as shown in Figs. 1, 5, and 8.

The operation of so much of my improvements as has been described is as follows: When the work has been properly placed in the work-clamp and the clamp properly adjusted relative to the needle the operator places the toe of the foot upon the treadle-lever L and depresses it, which causes the pulley I' to be forced into contact with the frictional surface of the leather disk *b*, which in turn is forced into contact with the disk I, thus causing the pulley I' to revolve with the shaft G. The downward motion of the treadle-lever L, acting through the rod P, causes the lever O to be moved about its pivot *e*, and its long arm to be depressed so as to engage with the catch Q, which movement of the lever O causes the brake-shoe M to be removed from contact with the rim of the wheel N and compress the spring *d* in an obvious manner. These movements take place simultaneously, and the sewing commences and continues till the pin *i* has moved the bar *h* and pin *h''* to the rear sufficiently far to disengage the lever O from the catch Q, when the reaction of the spring *d* causes the brake-shoe M to engage with the rim of the wheel N, and at the same time, by raising the long arm of the lever O, the rod P and treadle-lever L cause the pulley I' to be removed from contact with the disk I and the motion of the machine to be stopped. The advantage of this mechanism is that the operator does not have to use her hands to start the machine, as is the case with the machines now in common use. It has been found in practice, however, that while the stop-motions now in general use are a great improvement upon the old way of depending upon the skill of the operator to stop

the machine at the desired time, they could not be relied upon to stop the machine always at the right time in the movement of the needle-bar, and at the same stitch—as, for instance, if stitches were skipped, or the thread or needle broke, necessitating the setting of the needle anew, or the recommencing of the work at the point where the break was made, the feed-wheel was pretty sure to be thrown out of time with the needle, and in case of variations in speed, which were very liable to occur, variations in the stopping of the machine would be the result, the machine often coming to a standstill while the needle was in the work, while it was making its downward stroke, or while it was making its upward stroke, after having descended through the slit of the button-hole, either of which positions were objectionable, for the reason that the operator had to move the fly-wheel against the pressure of the brake to bring the needle into the proper position for commencing the work again at the desired point, the proper position for said needle being, when it had risen, some little distance above the work after having descended through the same, and not through the button-hole.

To insure the stopping of the machine uniformly at the same point in the movement of the needle, I apply to the brake-shoe, directly or indirectly, a locking-bolt so arranged as to lock said brake-shoe away from the fly-wheel N, and to be acted upon to release said brake-shoe, by a cam arranged to make a complete revolution about its axis of motion and come in contact with said bolt once to two complete strokes or double reciprocations of the needle.

In the machine illustrated in the drawings, R is the locking-bolt, having its bearings in the ear *j* of the stand M², and on the screw *k*, set in the goose-neck B, said bolt being provided with the downwardly-projecting arm R' in front of the shaft of the fly-wheel N, as shown in Fig. 9. The rear end of the bolt R is so arranged relative to the vertical arm of the lever O that when the long arm of said lever is depressed by the treadle, so as to engage with the catch Q, and the brake-shoe has been removed from contact with the fly-wheel, said bolt will be moved backward by the spring *k'* till its rear end is interposed in the vibratory path of the short arm of said lever O, so as to prevent the brake-shoe from being moved into contact with the fly-wheel, when the lever O is released from the catch Q, until the bolt R is withdrawn from the path of the lever O.

S is a ring or collar adjustably secured to the hub of the fly-wheel or its shaft by the set-screw *l*, and carrying the arm or pin *m*, projecting therefrom parallel to the axis of revolution of the fly-wheel, and adapted to strike the arm R' of the bolt R at each revolution of the wheel N, and move said bolt toward the front of the machine a sufficient distance to remove its rear end from the path of the vertical arm of the lever O, said collar and pin

being, in effect, a cam for moving the bolt R R'. The ring or collar S and its arm or pin *m* may be so adjusted as to accurately time the movement of the bolt R, so as to stop the machine when the needle has just left the work on its upward stroke, as before described.

In some machines the fly or driving wheel N is mounted directly upon the needle-bar-operating shaft, in which case, in order to apply my improvement, the collar S and its pin *m* would of necessity have to be applied to a different shaft from that on which the fly-wheel is mounted, as said collar and pin should make one revolution to two revolutions of the needle-bar-operating shaft.

In working button-holes in leather-work it is very desirable that the necessity for sewing twice over the same track should be avoided as much as possible, on account of the danger of spoiling the work by cutting the stock by too many perforations of the needle. This is likely to occur every time that the thread breaks, and hence the necessity of a stop-motion that may be operated by the breaking of the thread. To accomplish this I mount the rod T in bearings in the front and rear ribs of the table A, with its rear end in contact with the inner surface of the lever O, when it is engaged with the catch Q, and provided at its front end with the knob T', upon the front face of which bears one end of the lever U, pivoted at *n* to the front edge of the table A, and having pivoted to its other end the link U', at right angles thereto, and so arranged that its inner end may be moved vertically in a plane corresponding to the plane of movement of the arm R' of the bolt R. The inner end of the link U' is connected by the link *o* to one end of the lever *p*, pivoted at *p'*, and provided at its opposite end with an eye through which the thread from spool *g* passes on its way from the tension-wheel *q'* to the eye in the end of the pivoted arm *r*, as shown in Fig. 4.

In the lower end of the arm R' of the bolt R is fitted the screw *s*, in such a manner that it may be adjusted so that the outer end of its head may be at a greater or less distance from the axis of motion of the pin *m* to insure its moving the link U' the desired distance to unlock the lever O from the catch Q through the medium of the lever U and rod T.

The inner end of the link U' is guided in its upward and downward movements by the slotted standard V, and when the machine is properly threaded its inner end is maintained in the elevated position shown in Figs. 2 and 9, out of the path of the screw-head *s*; but if at any time in the progress of the work the thread breaks or becomes slack by reason of the breakage of the needle, the inner end of the link U' will drop of its own weight into the position indicated in dotted lines in Fig. 9, with its inner end directly in the path of the screw-head *s*, and at the next movement of the bolt R, caused by the contact therewith of the pin

m, said screw-head will strike the link U', and, moving it endwise, will thus cause the lever U to be vibrated about its fulcrum and push the rod T toward the rear of the machine, thereby releasing the lever O from engagement with the catch Q and permitting the brake-shoe M to be thrown into contact with the rim of the fly-wheel N at the same instant that the pulley I' is moved away from the disk I, and thus rendered inoperative, and the needle-bar is instantly brought to a standstill. This part of my invention—viz., the mechanism for stopping the machine when the thread breaks—is just as applicable to other sewing-machines as to button-hole sewing-machines, as it is not dependent upon the movement of the work-clamp, and hence I do not wish to be limited to its use on button-hole sewing-machines.

I am aware that stop-motions have been applied to button-hole sewing-machines and operated by the work-clamp, and therefore I do not claim, broadly, a stop-motion operated by the work-clamping device; but

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a button-hole sewing-machine provided with a work-clamping device, the spring-pressed brake-shoe M, the elbow-lever O, the catch Q, the push-pin *i*, the counter-shaft G, provided with tight and loose pulleys, the shipper J, and the treadle-lever L, connected by the rod P to the lever O, and arranged and adapted to be depressed by the foot, and thereby retract the brake-shoe and lock it, substantially as described.

2. In combination with a button-hole sewing-machine provided with a work-clamping device, the brake-shoe M, the elbow-lever O, the catch Q, the push-pin *h h'*, the pin *i*, the locking-bolt R R', and an adjustable cam arranged and adapted to be revolved about its axis and to retract the locking-bolt R R' once to every two revolutions of the needle-operating shaft of the machine, substantially as described, for the purposes specified.

3. In a button-hole sewing-machine provided with an automatic stop mechanism, the combination of the vertically-vibrating elbow-lever O, the latch Q, the extensible push-pin *h h'*, fitted to slide in a groove in the under side of the work-plate C, and the pin *i* of the work-clamping device D, as a means of operating the stop mechanism, substantially as described.

4. The combination, in a sewing-machine, of a spring-pressed brake-shoe, a lever for retracting said shoe, a catch for locking said lever, a bolt for locking the brake-shoe in a retracted position, a cam or other device for retracting said bolt at regular intervals, a push-rod adapted to disengage the brake-shoe-retracting lever from its catch, a system of levers connecting said push-rod with the thread that supplies the needle, and arranged and adapted to be inoperative while the thread

remains taut, and to be acted upon to move said push-rod endwise by the retractive movement of the locking-bolt whenever the thread breaks, substantially as described.

5 5. The combination of the brake-shoe M, the lever O, the catch Q, the locking-bolt R R', the adjustable screw *s*, the cam S *m*, the rod T, the levers U and *p*, link U', and the
10 rod *o*, all arranged and adapted to operate substantially as and for the purposes described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 26th day of February, A. D. 1883.

FRANK W. CROSS.

Witnesses:

E. A. HEMMENWAY,
WALTER E. LOMBARD.