

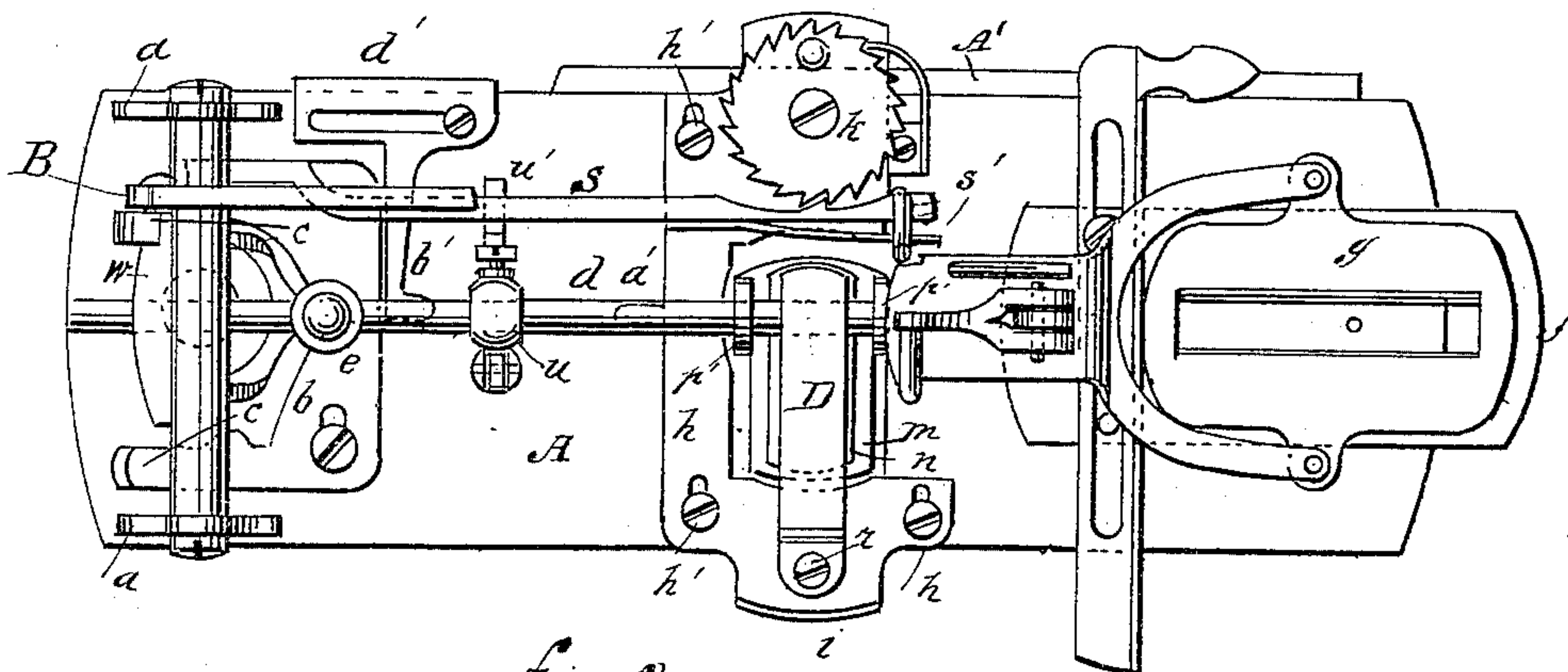
J. K. HARRIS.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

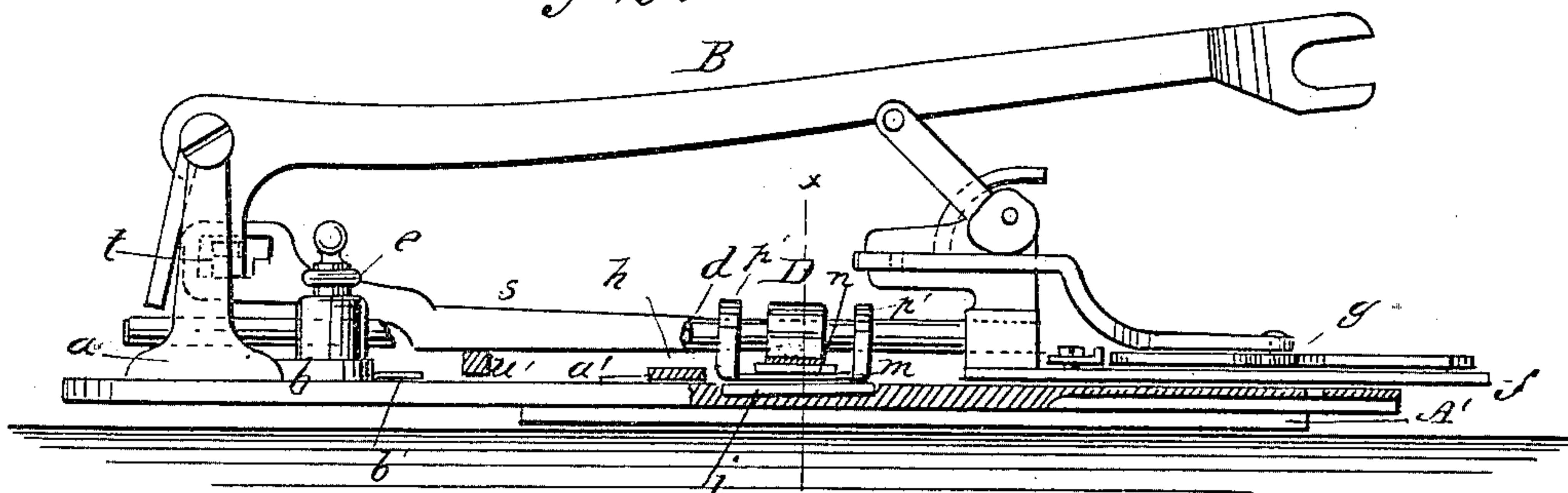
No. 318,470.

Patented May 26, 1885.

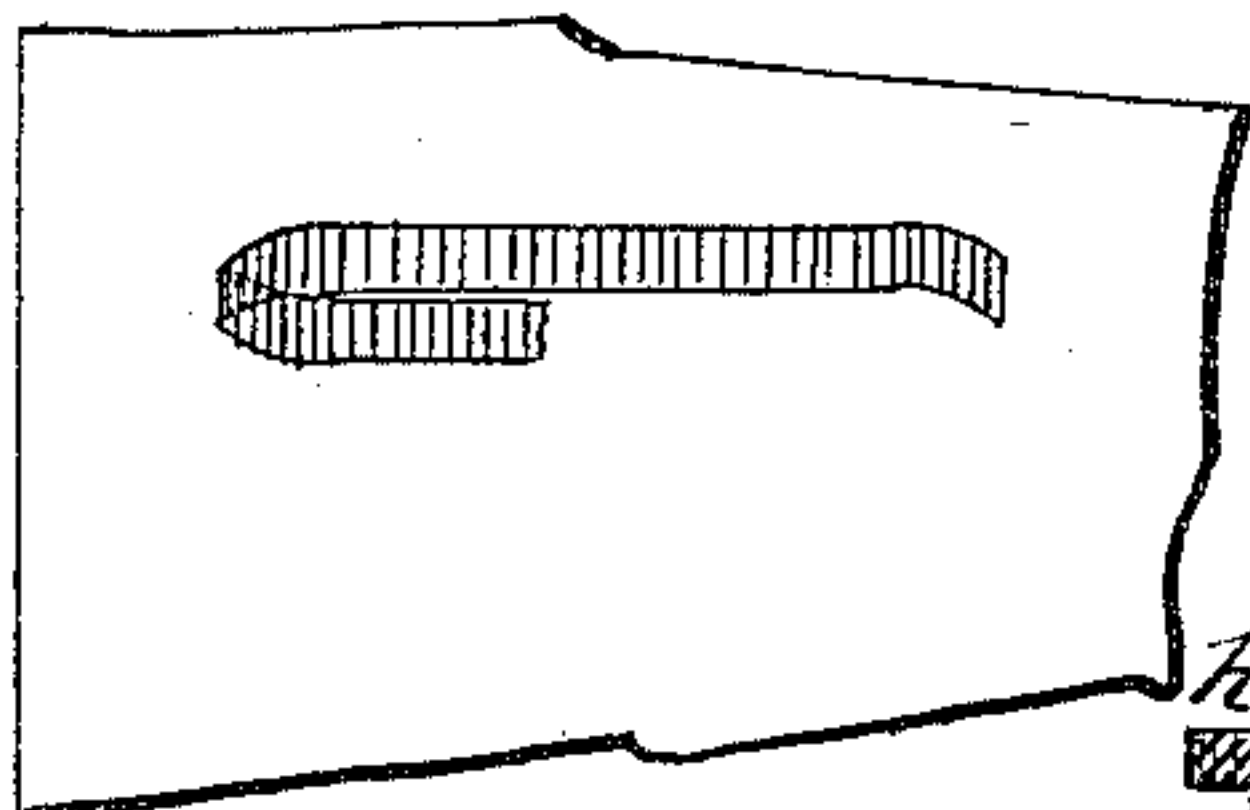
*Fig: 1.*



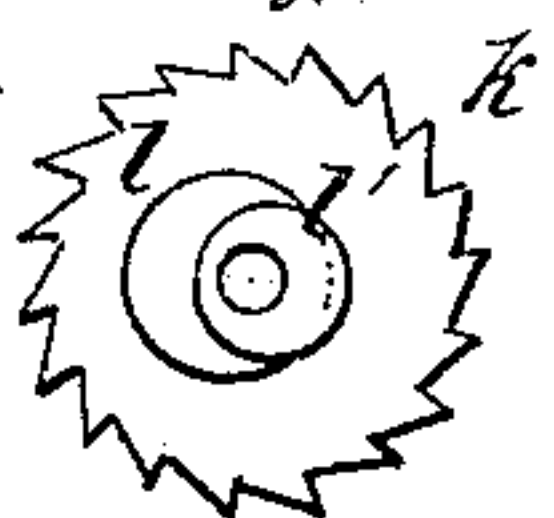
*Fig: 2.*



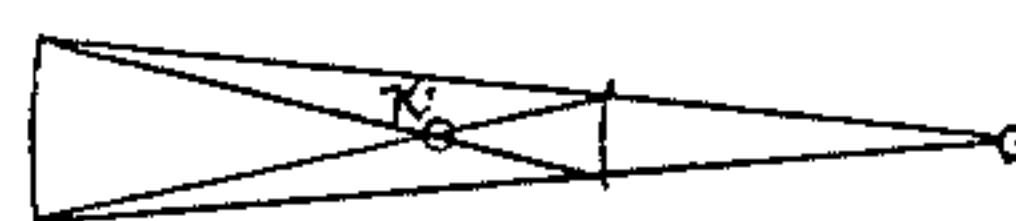
*Fig: 10.*



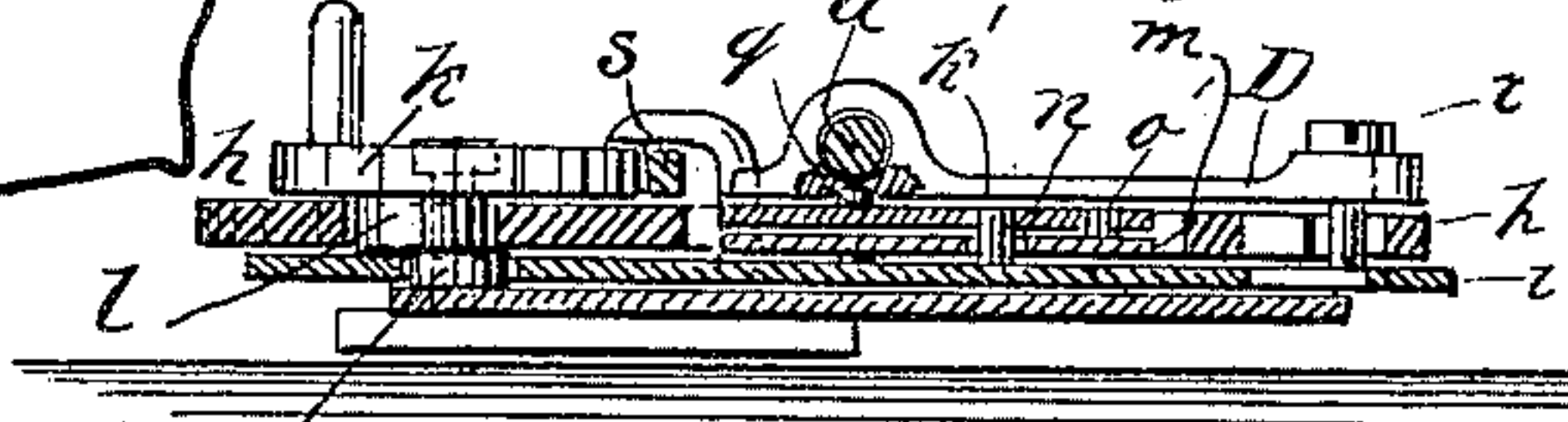
*Fig: 8.*



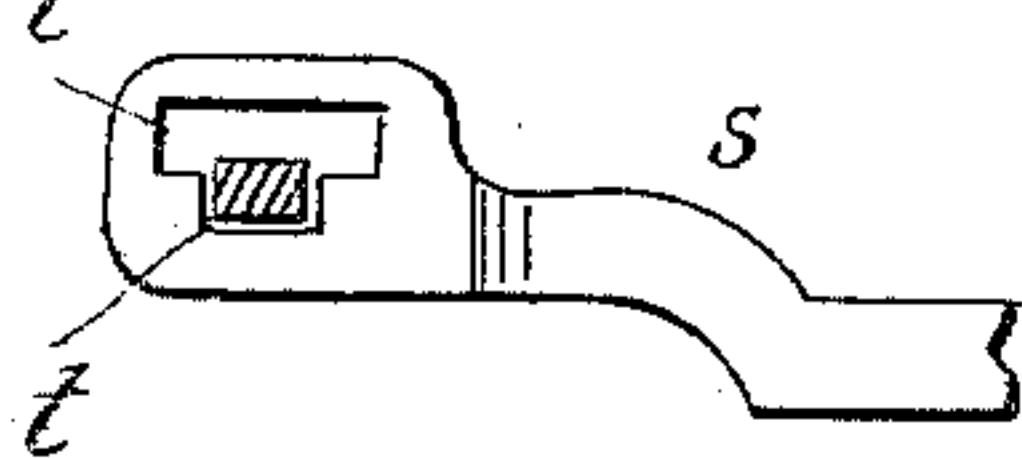
*Fig: 9.*



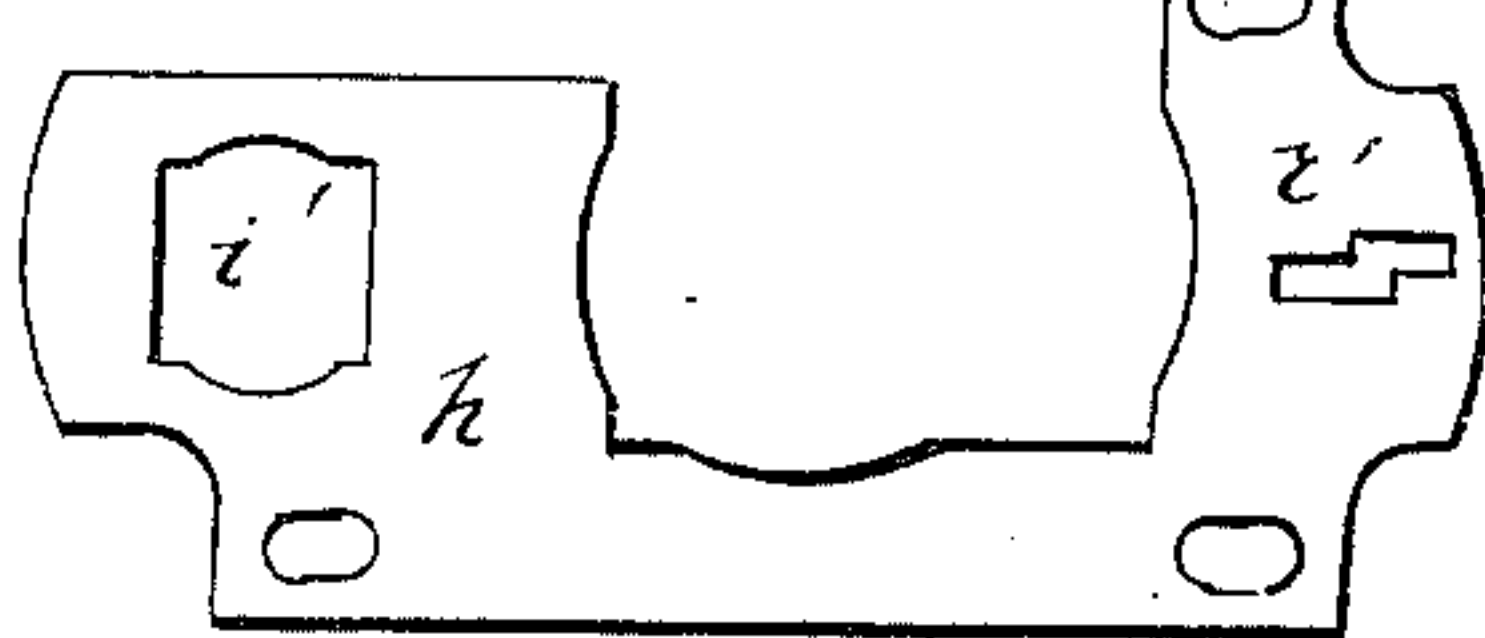
*Fig: 3.*



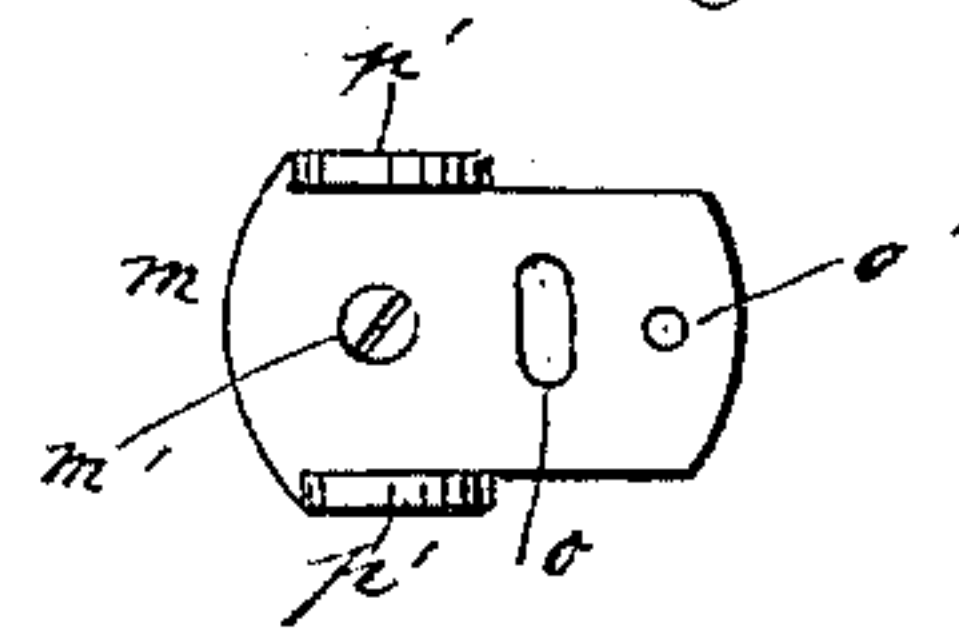
*Fig: 7.*



*Fig: 4.*



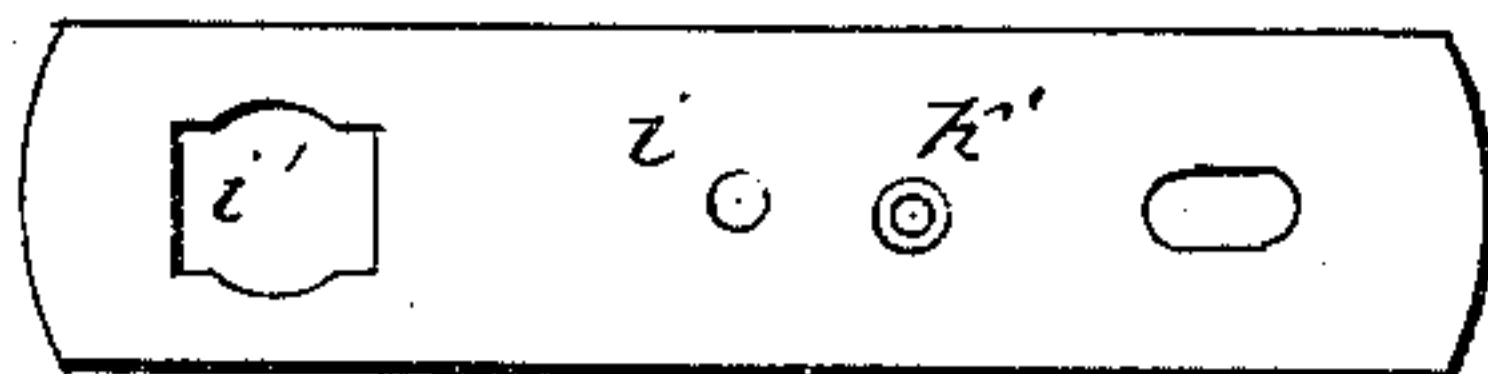
*Fig: 6.*



WITNESSES:

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*Chas. L. Loomis*

*Fig: 5.*



INVENTOR:

*John K. Harris*  
BY *Munn & Co.*  
ATTORNEYS.

J. K. HARRIS.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

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Fig. 11.

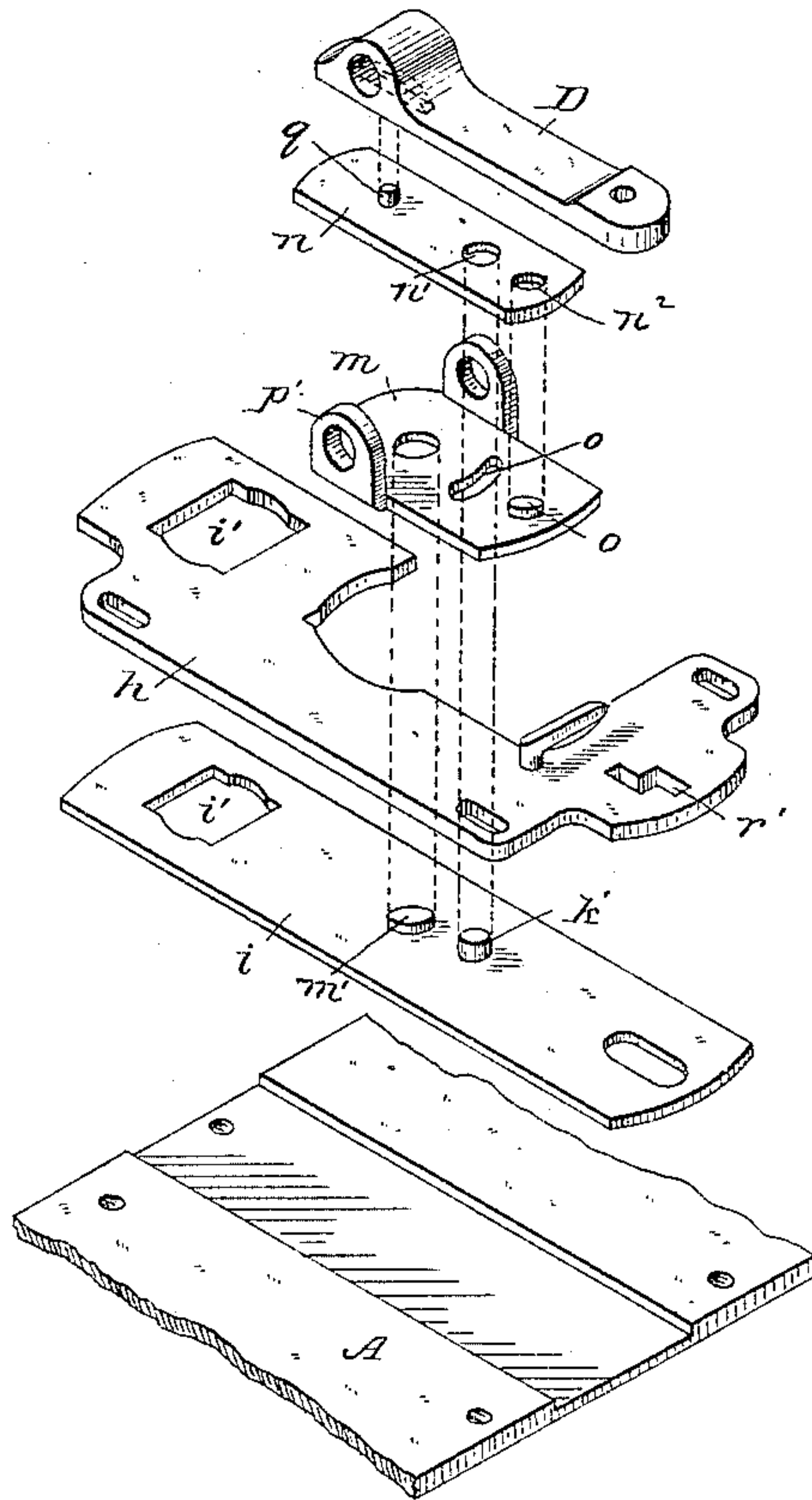
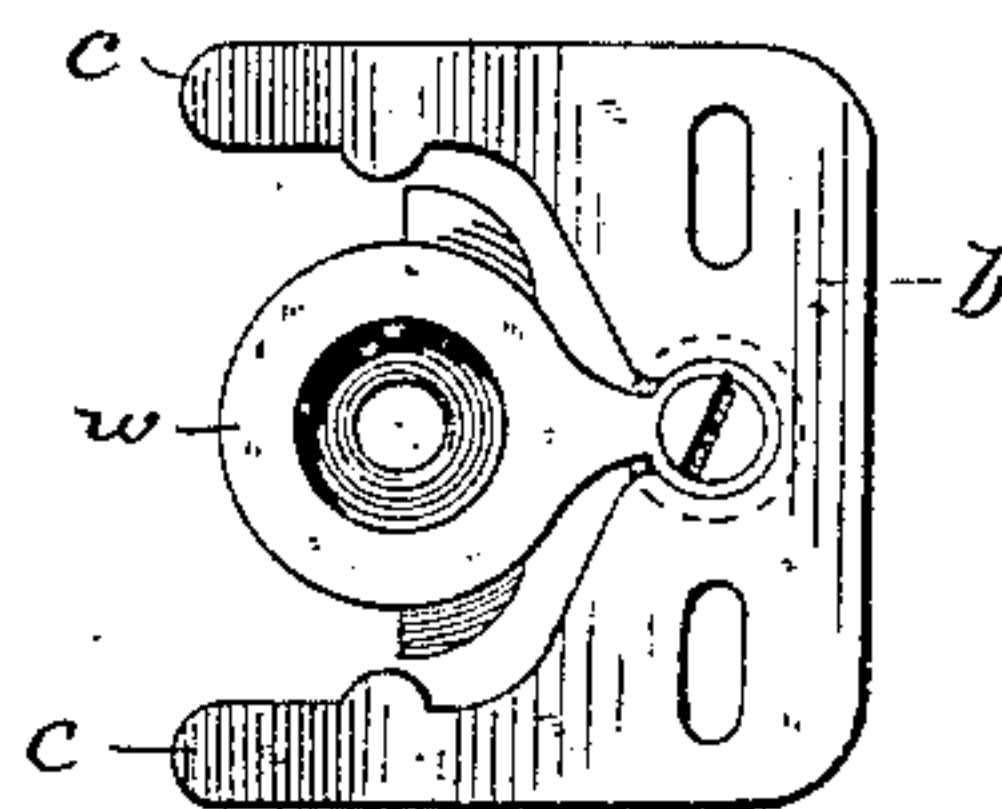


Fig. 12.



Witnesses:

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Ed. Smith,

Inventor:

John K. Harris,  
by Munn & Co. Attys.



# UNITED STATES PATENT OFFICE.

JOHN K. HARRIS, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE HARRIS BUTTON HOLE ATTACHMENT COMPANY, OF NEW YORK, N. Y.

## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 318,470, dated May 26, 1885.

Application filed September 17, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN K. HARRIS, of Springfield, in the county of Clark and State of Ohio, have invented a new and Improved  
5 Button-Hole Attachment for Sewing-Machines, of which the following is a full, clear, and exact description.

My invention relates to certain improvements upon the button-hole attachment for  
10 sewing-machines patented by me September 6, 1881, No. 246,764, and also March 28, 1882, No. 255,622; also to a new device for throwing the clutch-lever back for a new bite on the  
15 feed-bar by a positive movement, instead of the use of springs, as heretofore used. In the devices shown and described in said Letters Patent an oscillating movement on a central pivot is given to the cloth-clamp by a lever  
20 operated by the needle-bar of the sewing-machine. This oscillation was utilized and made to perform a double purpose—viz., producing the necessary movement for the lateral stitch and also to produce a right-line longitudinal feed movement in either direction by the sim-  
25 ple means of a clutch-lever engaging the clamp or its feed-bar at or near the center of oscillation and the outer end impinging against a stationary stop or resistance. These devices have been very effective in their operation,  
30 working equally well in either direction; but as the central pivot or fulcrum on which the clamp oscillates had to be slightly moved from one side of a center longitudinal line to the  
35 other when working the ends of the button-hole, and the direction of the feed reversed when passing the longitudinal line, although this movement, as fully described in said Letters Patent, was effectively accomplished by simply turning a hand-lever from one stop to  
40 another, it is desirable to have this movement produced automatically, and to accomplish this result and to avoid the use of a clutch-spring by the substitution of a positive lever movement is the object of my present invention. As will be seen, I have accomplished  
45 this automatic result by a ratchet mechanism operated by the needle-bar lever and arranged to work only when rounding the ends of the button-hole. I have also produced the same  
50 result by utilizing for this purpose the oscil-

lating movement of the cloth-clamp feed-bar, as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate cor-  
55 responding parts in all the figures.

Figure 1 is a plan view of the entire button-hole attachment embodying my improvement. Fig. 2 is a longitudinal section of the same. Fig. 3 is a transverse section on the line *x x*,  
60 Fig. 2. Figs. 4 and 5 are plan views of the slide-plates. Fig. 6 is a plan view of the oscillating plate which carries the feed-bar. Fig. 7 is a detail view of part of the ratchet mechanism, and Fig. 8 is a plan view of the ratchet-  
65 wheel. Fig. 9 is a diagram hereinafter explained. Fig. 10 represents a button-hole in part. Fig. 11 is a detached perspective view of certain parts to indicate their operative relation to each other; and Fig. 12 is an under  
70 side view of the forked reciprocating plate and the oscillator by which it is operated, showing the connection of these two parts.

A is the base-plate, and A' is a plate to which the plate A is attached, the said plate A' being adapted to take the place of the shuttle-  
75 race slide in ordinary sewing-machines.

B is the main operating-lever, hung on posts or flanges *a* at one end of base-plate A, and extending longitudinally with said plate for  
80 connection with the needle-bar of the sewing-machine.

*b* is a forked reciprocating plate having upward inclines *c c*, and attached to the bed-plate by means of screws passing through slots,  
85 so that it is free to be reciprocated laterally on the bed-plate by the oscillator *w*, with which it is connected. (See Fig. 12.)

*d* is a round bar, to one end of which is attached the cloth-clamp consisting of the lower  
90 plate, *f*, which is rigid with the bar *d* and the upper adjustable plate, *g*, which is clamped on plate *f* by means of an eccentric. The other end of the bar *d* passes freely through the ears  
95 *p' p'* of the oscillating plate *m*, Fig. 6, through clutch-lever D, and through a post, *e*, on the reciprocating plate *b*. The post *e* is allowed to turn slightly in its connection to the plate  
100 *b*, so as to conform to the lateral movement of rod *d*, and has a screw in its upper end for



forcing a plug of leather or rawhide upon the rod to cause a slight friction.

*h* is a slide-plate attached to the bed-plate by means of screws *h'* passing through slots in the plate, so that the latter is capable of a slight movement transversely of the bed-plate.

*i* is a second slide-plate fitted in a transverse groove of the plate *A*, beneath plate *h*.

*k* is a ratchet-wheel, formed upon its under side with two eccentrics, *l l'*, reversely placed and attached upon the bed-plate by a pivot-screw, so that the eccentrics lie within slots *i'*, formed in plates *h i*. The plate *h* is recessed at one side, (see Fig. 4,) and receives within said recess the center oscillating plate, *m*, Fig. 6, which is thus allowed to lie upon the lower plate *i*, to which it is attached by a pivot-pin or screw, *m'*.

A fulcrum-pin, *k'*, extending upward from the plate *i*, extends through a slot, *o*, formed transversely of plate *m*, into a hole, *n'*, in plate *n*. Upon plate *m*, and turning on fulcrum-pin *k'*, is the clutch-adjusting plate *n*, which engages by a hole, *n''*, at one end with a pin, *o'*, projecting upward from plate *m*. *D* is the clutch-lever, formed tubular at one end for the passage of feed-bar *d*, and having its outer end provided with a pin or screw, *r*, which serves as a fulcrum for said lever, engaging the irregular slot *r'* in the end of slide-plate *h*.

A pin or projection, *q*, upon the clutch-adjusting plate *n* engages the clutch-lever *D* by means of a slot formed in the under side of the recessed or tubular end of said lever. The object of this plate *n* is to utilize the reverse oscillation, from the one that feeds the bar *d*, to set the clutch-lever *D* back to the center of oscillation for a new bite on bar *d* by a positive lever movement, instead of by the springs heretofore used. When the bar *d* is oscillated, it causes the plate *m* to swing upon its fulcrum *m'*, and by the connection of plate *m* to plate *n* by pin *o'* the plate *n* is oscillated upon its fulcrum *k'*, and the pin *q*, engaging clutch-lever *D*, throws it back on rod *d* the instant the bite is released by the reverse direction of oscillation. This adjusting-plate *n*, as a substitute for springs, performs its functions equally well in either direction of the feed movement, but in order to prevent binding care should be taken in locating its fulcrum *k'*. Fig. 9 illustrates the position of the fulcrum with reference to the two movements, the shorter crossed lines in said figure indicating the movements of the plate *n*, and the longer outer lines the movements of the clutch-lever *D*.

The ratchet-wheel *k* is engaged by a pawl, *s*, that is hung upon a lug, *t*, projecting into a T-slot, *t'*, in the pawl from the pendent portion of the operating-lever *B*, and its inner end is maintained in continuous engagement with the ratchet-wheel by a spring, *s'*, acting against a fixed guide on the bed-plate.

Upon feed-bar *d* is attached a block, *u*, on which is pivoted an arm, *u'*, that is bent to extend beneath the pawl *s*.

Upon the bed-plate *A* is a fixed projection, *a'*, and also a projection, *b'*, which is part of an adjustable piece, *d'*. These two projections represent the extremes of feed movement, the piece *d'* being adjustable according to the length of the button-holes, and in the movement of the feed-bar forward or back, when the projection *a'* or *b'* is reached the arm *u'* is raised, and with it the outer end of the pawl *s*, so that the lug *t* comes within the shorter portion of the slot *t'* in the pawl, and the pawl is thus given a reciprocating movement by the lever *B*. This movement occurring when the end of the button-hole is reached, the ratchet-wheel *k* is moved the required number of teeth in order to effect the shipping over of plate *i* and parts it carries, and the pawl continues to act until the arm *u'*, clearing the projection *a'* or *b'*, the pawl drops and the movement ceases.

At the time when the ratchet-wheel moves plate *i* by one eccentric *l* the other eccentric moves plate *h* in the reverse direction.

The oscillating plate *m*, through the ears *p p'* of which the feed-bar *d* passes, is attached to the sliding ship-over plate *i* by the pin or screw *m'*, and the said plate *m* is thus caused to move transversely of the bed-plate *A* with the said plate *i* when the latter is shifted by the eccentric *l'*. The plate *i* in its ship-over or lateral movements, carries with it the plate *m* and the feed-bar and cloth-clamp.

The fulcrum-pin *k'* of the plate *n* is attached to the ship over slide *i*, and passes loosely through the slot *o* of the oscillating plate *m*, thus leaving the latter plate free to swing on its fulcrum-pin *m'* as it is operated by the oscillating feed-bar *d*. The feed-bar *d* passes freely through the recessed or tubular end of the clutch-lever *D* when the latter lever and feed-bar are at right angles to each other; but the centers of the offset portions of the irregular slot *r'* in the plate *h*, into which slot the fulcrum-pin *r* of the said clutch-lever extends, are so placed as to be slightly to one side or the other of the centers of the pins *m'* and *k'*, attached to the plate *i*. Thus the clutch-lever will be normally slightly displaced from a right-angular position relative to the oscillating feed-bar *d*, and as the latter bar swings in one direction the clutch-lever will bite or bind upon it as it swings with it. The fulcrum-pin *r* of the clutch lever will at this moment be braced against the outer or end wall of that portion of the irregular slot *r'* in which said pin happens to be, and will thus cause the clutch-lever to move the feed-bar and its cloth-clamp along for a short distance. As the feed-bar is reversed in its oscillating movement, carrying with it the oscillating plate *m*, the bite of the clutch-lever on the said feed-bar is released, and the pin *o'* on the free end of the said plate *m* engaging the clutch-reversing plate *n* will swing the latter plate on its fulcrum-pin *k'* in a direction opposite to the movement of the oscillating plate *m*, and the pin *q* in the plate *n* engaging the free



or clutching end of the clutch-lever will reverse the latter as its hold on the feed-bar is released, moving it back for a new grip. Thus the operation will continue, the feed-bar being moved in one direction to work one side of the button-hole, while the fulcrum-pin *r* of the clutch-lever is in one offset portion of the irregular slot *r'* of the slide-plate *h*; but when the ratchet-wheel *k* receives a half-revolution (by means of the automatic mechanism hereinbefore described) when the end of the button-hole is reached, to shift the ship-over plate *i*, and thus bring the other side of the button-hole beneath the needle of the sewing-machine, the plate *h* will be shifted in a direction opposite to that of the movement of the plate *i*. This sliding movement of the plate *h* will gradually bring the fulcrum-pin *r* of the clutch-lever into the other offset portion of the slot *r'*, thereby reversing the angular displacement and biting operation of said clutch-lever, causing it to reverse the movement of the feed-bar to work the other side of the button-hole.

As the ship-over movement and the transfer of the fulcrum-pin *r* of the clutch-lever to a new part of the irregular slot *r'* occur slowly, occupying the time consumed in sewing several stitches, the ends of the button-holes will be strongly barred by a series of overlapping stitches, as indicated in Fig. 10. Thus it will be apparent that all of the movements of the cloth-clamp required to form complete button-holes, both ends of which will be strongly barred, will be effected automatically.

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

1. In a button-hole attachment for sewing-machines, the combination, with a cloth-clamp and an oscillating and longitudinally-movable feed-bar, of a ship-over slide to which said bar is connected, a ratchet-wheel and eccentric for operating said ship-over slide, and mechanism for partially rotating said ratchet-wheel at intervals, substantially as set forth.

2. In a button-hole attachment for sewing-machines, the combination, with a cloth-clamp and a feed-bar therefor, of clutch-lever for moving said feed-bar longitudinally, a slide-plate having an irregular or offset slot for the fulcrum-pin of said lever, a ship-over slide to which said feed-bar is connected, a ratchet-wheel, two reversely-placed eccentrics, an operating-le-

ver, and a pawl loosely connected with the latter for partially rotating said ratchet-wheel and eccentrics at intervals, substantially as set forth.

3. The combination of the ratchet-wheel *k*, eccentrics *l l'*, slide-plates *h i*, clutch-lever *D*, ear-plate *m*, and feed-bar *d*, substantially as described.

4. The combination, with the cloth-clamp and the oscillating feed-bar, of the ship-over slide *i*, the oscillating ear-plate *m* attached thereto, the slide-plate *h*, having the slot *r'*, and the clutch-lever *D*, having fulcrum-pin *r*, engaging said slot, substantially as set forth.

5. In a button-hole attachment for sewing-machines, the combination, with a cloth-clamp and an oscillating and longitudinally-movable feed-bar, of a ship-over slide for moving said feed-bar laterally, and devices for automatically shifting said bar when an end of a button-hole is reached, substantially as set forth.

6. In a button-hole attachment for sewing-machines, the combination, with a cloth-clamp and a feed-bar, of a clutch-lever for moving said bar lengthwise, a pivoted adjusting or reversing plate having a connection with said clutch-lever, and positively-operating mechanism for retracting said plate in reversing said lever, substantially as set forth.

7. In a button-hole attachment for sewing-machines, the combination, with a cloth-clamp and a feed-bar therefor, of a clutch-lever for feeding said bar longitudinally, a pivoted reversing-plate having a pin engaging said clutch-lever, and a pivoted oscillating plate having a pin for vibrating said reversing-plate, substantially as set forth.

8. The combination, with the bed-plate having the fixed and movable stops or projections *a'* and *b'*, the operating-lever *B*, and the pawl *s*, having a T-slot at its rear end, of the ratchet-wheel *k*, and the feed-bar *d*, having the pivoted arm *u'*, for throwing the said pawl into operation at intervals, substantially as set forth.

9. The projections *a' b'*, the pawl *s*, having a T-slot, and the arm *u'* on the feed-bar, combined to bring the pawl into operation at the extremes of feed movement, substantially as described.

JOHN K. HARRIS.

Witnesses:

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