

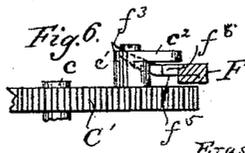
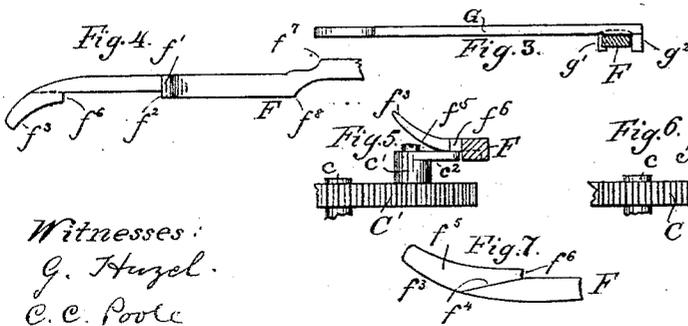
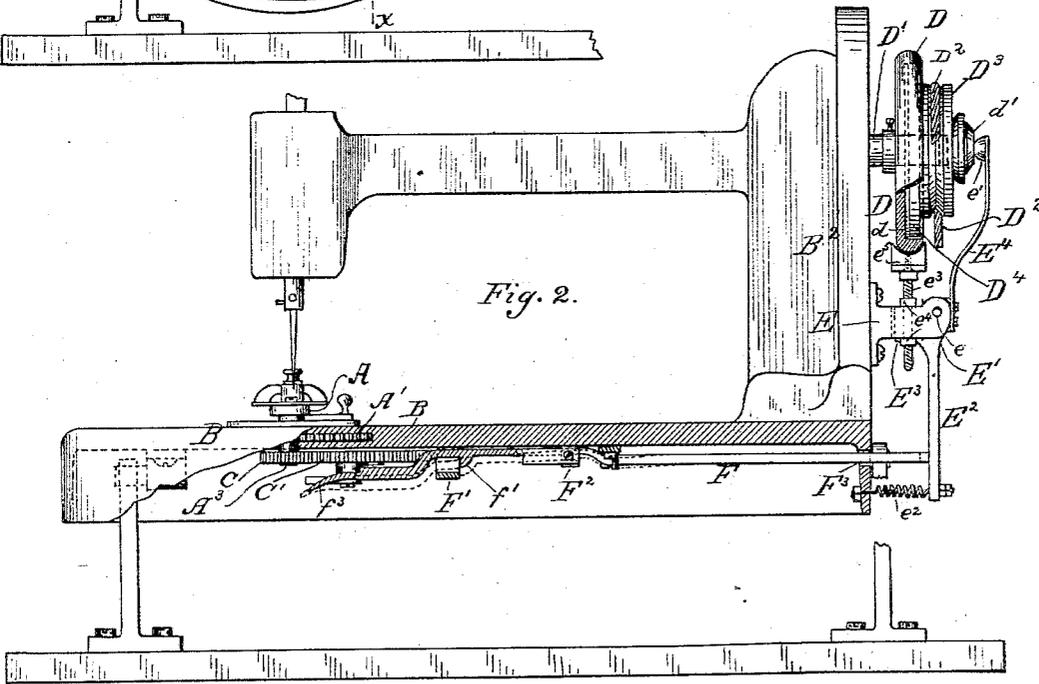
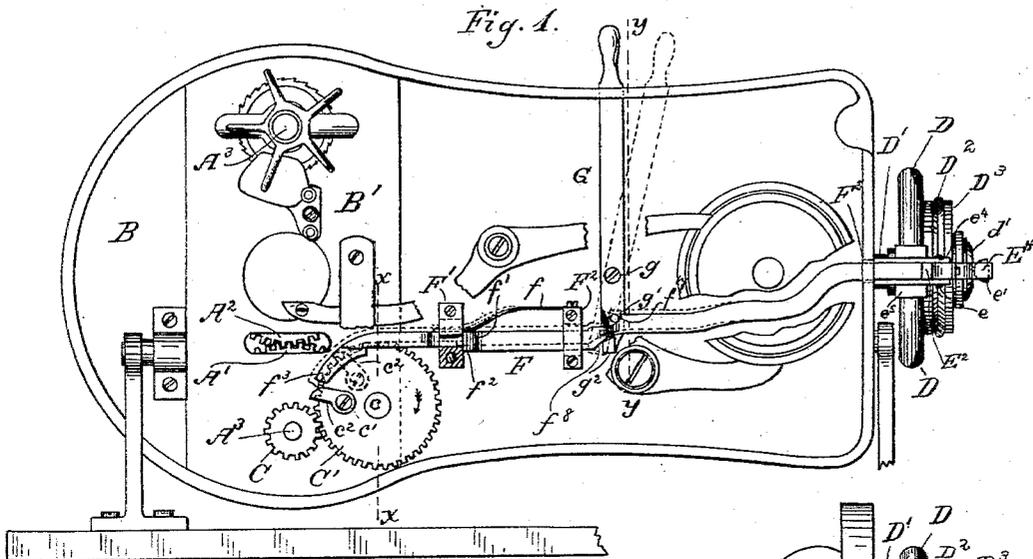
(No Model.)

E. D. & G. M. LUDLOW.

STOP MECHANISM FOR BUTTON HOLE SEWING MACHINES.

No. 315,952.

Patented Apr. 14, 1885.



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# UNITED STATES PATENT OFFICE.

ERASTUS D. LUDLOW AND GEORGE M. LUDLOW, OF CHICAGO, ILLINOIS.

## STOP MECHANISM FOR BUTTON-HOLE SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 315,952, dated April 14, 1885.

Application filed August 4, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, ERASTUS D. LUDLOW and GEORGE M. LUDLOW, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stop Mechanisms for Button-Hole Sewing-Machines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to devices used in button-hole sewing-machines for automatically disconnecting the driving-power from said machines, and for applying a brake to one of the moving parts thereof for the purpose of stopping the machine immediately upon the completion of each button-hole; and the invention consists in the matters hereinafter described, and pointed out in the claims.

Devices embodying our invention are herein illustrated as applied to that form of button-hole sewing-machine in which the clamp for holding the material to be operated upon is actuated by means of two rotating grooved cam-plates operating in connection with a central ring-wheel—such, for instance, as is shown and described in Letters Patent of United States granted to Daniel W. G. Humphrey, June 13, 1871, and February 6, 1872; but said device may be equally well applied to a well-known form of button-hole sewing-machine in which the said clamp is actuated by a single rotating cam-plate, and also to other machines in which the necessary feed-motion is imparted to the said clamp by devices located beneath the top plate of the machine and which move continually in one direction while the button-hole is being worked.

In the accompanying drawings, Figure 1 is a view of the under side of the top or bed plate or table of the machine, showing those parts with which the present invention is directly related. Fig. 2 is a side elevation, partly in section, of the same. Figs. 3, 4, 5, 6, and 7 are views in detail of portions of the stop mechanism, which will be hereinafter described.

In the machine shown in the drawings, A, Fig. 2, indicates the clamping device, clamp-

plate, or cloth-clamp for holding the work to be operated upon, said clamp being located above and adapted to slide upon the top plate, B, of the machine. The clamp is in said machine actuated by means of two rotating cam-plates, a portion of one of which is shown at A', Fig. 2, and a ring-wheel, (indicated at A<sup>2</sup>;) the said cam-plates being provided with spiral grooves upon their upper faces adapted to engage a stud or projection upon the clamp and having spurs or teeth upon their peripheries engaged with corresponding teeth upon the ring-wheel. The said cam-plates and ring-wheel are constructed to rotate on vertical axes arranged in a straight line transversely of the machine, and all of the parts last above mentioned are constructed and operate substantially in the manner described in the patents above referred to.

A<sup>3</sup> A<sup>3</sup> are vertical shafts or arbors upon which the cam-plates A are secured, and which are provided with bearings in a plate, B', attached to the under side of the top or bed plate, B, of the machine. Upon the lower end of one of the said shafts is secured a pinion, C, which engages a spur-wheel, C', rotatably mounted in a stud, c, secured to the bottom of the plate B, the pitch-diameters of the wheel C' and the pinion C being relatively proportioned that the said wheel is caused to make one revolution while the machine is making one button-hole.

In the particular machine shown the cam-plates A' are arranged to make three-fourths of one rotation in moving the clamp laterally to stitch each side of the button-hole, and one-half of a rotation during the time that the clamp is being rotated by the ring-wheel A<sup>2</sup> in stitching the eye of the button-hole, so that the said spindle A<sup>3</sup> rotates twice in making each button-hole, and the wheel C' is made twice the circumference of the pinion C in order that the said wheel may be rotated once in making each button-hole.

Fastened rigidly upon the under side of the wheel C' is a dog, c', provided with an outwardly-projecting arm, c<sup>2</sup>, said wheel and arm being for a purpose hereinafter described.

D is the driving or balance wheel of the machine, which is secured to the horizontal shaft D' thereof, and is actuated from a driving-belt,

D<sup>2</sup>, through the medium of a pulley, D<sup>3</sup>, which is suitably grooved to receive the said belt. The said pulley is rotatably mounted on the end of the shaft D' in such manner as to be movable longitudinally of said shaft, and is provided with a disk, D<sup>4</sup>, having its inner surface adapted to frictionally engage the flat face of a recess, d, in the outer face of the wheel D, so that the said wheel and pulley together form a clutch mechanism, adapted to give motion to the machine when the disk upon the pulley is thrown in contact with the said wheel, and to become disengaged so as to cause the stoppage of the machine when the said pulley is released from pressure.

E is a bracket, which is attached to the vertical part or standard B<sup>2</sup> of the machine, and E' is a bent lever, which is journaled upon said bracket by means of a pivot-pin, e. The said lever is provided with a depending vertical arm, E<sup>2</sup>, and a short horizontal arm, E<sup>3</sup>, rigidly connected with the arm E<sup>2</sup> at the pivotal point of the lever. To the said lever E' is also attached a third upwardly-projecting spring-arm, E<sup>4</sup>, adapted to bear at its upper end upon a hub, d', upon the pulley D<sup>3</sup>, so as to thrust said pulley toward the wheel D when the lower arm, E<sup>2</sup>, of the lever E is thrown outwardly.

F is a slide-bar, which is supported in bearings F<sup>1</sup>, F<sup>2</sup>, and F<sup>3</sup> upon the machine-frame, and which is adapted to slide freely in a longitudinal direction in said bearings. The said slide-bar is connected with and actuated from the wheel C', before mentioned, by devices that will be hereinafter described, and its end which is adjacent to the driving-connections above described is constructed to rest against the inner surface of the depending arm E<sup>2</sup> of the lever E'. The said arm E<sup>2</sup> is held in contact with the end of the said slide by means of a spiral spring, e<sup>2</sup>, secured at its ends to the said arm and to the machine-frame, the said spring tending to retain the upper end of spring-arm E<sup>4</sup> at the outer limit of its movement, and the pulley D<sup>3</sup> free from pressure. The hub d' of the pulley D<sup>3</sup> is, as herein shown, extended to cover the central aperture in the said pulley, and the end of the spring is provided with a knob or button, e', adapted to rest centrally upon the said hub, and thereby give a relatively small area of surfaces in frictional contact. The horizontal arm E<sup>3</sup> of the lever E' extends inwardly from the pivot e to a point beneath the wheel D, and is provided with a vertical upwardly-projecting rod, e<sup>3</sup>, which is inserted through an aperture therein, and is adjustably secured thereto by means of nuts e<sup>4</sup> above and below the arm. To the upper end of the said rod e<sup>3</sup> is secured a brake-shoe, e<sup>5</sup>, which is adapted to rest against the periphery of the wheel D when the arm E<sup>3</sup> is thrown upward, and which is suitably lined with wood, india-rubber, or leather, or other suitable material.

By the construction above described of the lever E' and the parts connected therewith,

it will be observed that, when the lower arm, E<sup>2</sup>, of said lever is thrown outward against the action of the spring e<sup>2</sup>, the pulley D<sup>3</sup> will be engaged with the wheel D, and the brake-shoe e<sup>5</sup> will be released from contact with the said wheel, so as to start the machine, and that, when the said lower arm is drawn inward by the spring upon releasing the said arm, the brake will be thrown into contact with the wheel, and the pulley at the same time released therefrom, so as to stop the machine. The bearing F<sup>2</sup> of the slide-bar F is so constructed as to permit a slight lateral motion in the inner end of said bar, and a portion of the latter between its inner end and the said bearing F<sup>2</sup> is made relatively thin and elastic, so that the said inner end may also be moved in a vertical direction. The free or inner end of the slide-bar is constructed to stand normally at the upward or inner limit of its movement, so that it may be moved downwardly to the position indicated in dotted lines in Fig. 2, but will return by its resiliency to its normal position. A vertical and lateral motion is imparted to the free end of the bar F by an arm, C<sup>2</sup>, upon the wheel C', acting upon inclined surfaces of the said bar in a manner that will hereinafter appear. The said slide-bar is held at one limit of its movement by means of a spring, f, secured to the bearing F<sup>2</sup>, and resting at its free end against the edge of the said bar. Upon the edge of the said slide-bar opposite to that against which the spring f bears is formed a shoulder or lip, f<sup>2</sup>, and upon the outer or lower face of the bar is another lip or shoulder, f', said shoulders being adapted to engage a stationary projection, stop, or bearing, F', upon the machine-frame, said stop or bearing being herein shown as constructed to extend around the bar, so as to form an aperture for the latter, which aperture is adapted to permit both a lateral and a vertical movement of the bar and is made of a sufficient size to allow the passage through it of the shoulders f' and f<sup>2</sup>. The shoulders f' and f<sup>2</sup> and the stop or bearing F' are arranged to limit the inward longitudinal movement of the slide-bar under the action of the spring e<sup>2</sup>, attached to the arm E<sup>2</sup>, and are located in such position as to retain the said arm at the outward limit of its movement, and the arm E<sup>4</sup> pressed against the pulley D<sup>3</sup>, so as to keep the said pulley in engagement with the wheel D and the machine in operation. The end of the slide-bar F adjacent to the wheel C' is located at one side of said wheel, and is bent in a curved shape to conform approximately to the path of the end of the arm e<sup>2</sup> upon said wheel. The said curved portion of the slide-bar is bent down in its portion adjacent to the end of the bar, as indicated at f<sup>3</sup>, to form an inclined surface, f<sup>3</sup>, adapted to engage the edge of the arm e<sup>2</sup>, so that when said inclined surface is encountered by the said arm in the rotary motion of the wheel the end of the bar will be forced downward. The position of the parts after the engagement of the arm with the bar

is clearly shown in Fig. 5, which is a transverse section through the bar, showing the wheel C' and the arm c<sup>2</sup> in elevation. The end of the side-bar is also provided upon its upper or inner side with an inclined rib or projection, f<sup>4</sup>, (see Fig. 7,) adapted for engagement with the end of the arm c<sup>2</sup> after the latter has engaged the inclined surface f<sup>5</sup> of the bar, in such manner that the latter will be forced laterally away from the center of the wheel by the action of the said arm upon the inclined surface of the rib f<sup>4</sup>. The curved portion f<sup>3</sup> of the slide-bar is made of greater width than the adjacent part of the body of the bar, so as to form a shoulder, f<sup>6</sup>, adapted for the disengagement of the end of the arm c<sup>2</sup> from the surface f<sup>5</sup> after the said arm has passed from contact with the rib f<sup>4</sup>, for a purpose which will appear in the following.

When the slide-bar is in the position shown in Figs. 1 and 2 of the drawings, and at the extreme limit of its movement to the right and is held in such position by the engagement of the shoulder f<sup>2</sup> with the bearing F', the clutch will be closed and the machine running. The wheel C' at such time turns in the direction indicated by the arrow, the arm c<sup>2</sup> being shown in the drawings as moving towards and about to engage the slide F.

In the operation of the stop-mechanism the arm c<sup>2</sup> first engages the inclined surface f<sup>5</sup> on the curved portion f<sup>3</sup> of the slide-bar and moves the end of the said bar downward, causing the lip or projection f' to engage the bearing F', but not releasing the shoulder f<sup>2</sup> from engagement with the bearing. By the further advance of the arm c<sup>2</sup>, its end engages the shoulder or rib f<sup>4</sup>, as seen in Figs. 5 and 7, and causes the slide to move laterally, by which the shoulder f<sup>2</sup> is released from the bearing; but the slide is still held from longitudinal movement by the engagement of the projection f' with the said bearing. The arm c<sup>2</sup> in its further advance passes beyond the end f<sup>6</sup> of the surface f<sup>5</sup>, and permits the end of the bar to spring upward or toward the plate B, so as to disengage the said projection f' from the bearing and to permit the slide-bar to move longitudinally inward to the position indicated in dotted lines in Fig. 1. The arm c<sup>2</sup> when released from engagement preventing vertical movement of the slide-bar, momentarily preserves its engagement with the side of the said bar during the time that the bar is being thrown upward, so as to prevent the shoulder f<sup>2</sup> from engaging the bearing F' before the projection f' has passed over the edge of said bearing. The bar, when thrown inward by the spiral spring e<sup>2</sup> acting upon the arm E<sup>2</sup>, allows the lever E' to swing on its pivot, whereby the pressure of the spring-arm E<sup>1</sup> on the hub d' is removed, and the driving-power thus disconnected from the machine. When the arm E<sup>2</sup> swings inward to disengage the clutch, the arm E<sup>3</sup> is obviously caused to rise and thus bring the friction pad or shoe up

against the wheel D<sup>3</sup>. This shoe overcomes by its friction upon the wheel the momentum of the moving parts, whereby the machine is instantly brought to a state of rest.

The position of the slide-bar with relation to the arm c<sup>2</sup> after the machine is stopped is that shown in Fig. 6, which is a detailed section similar to Fig. 5, said bar being free at such time, as clearly shown in said figure, to move outward without coming in contact with the arm c<sup>2</sup>, the end of which passes beneath the portion f<sup>3</sup> of the bar in the movement referred to. The outward movement for starting the machine is preferably imparted to the bar F in the machine herein shown by means of a hand-lever, G, which is pivoted at g to the under side of the plate B and projects outward beyond the side of the said plate, so as to be easily within reach of the operator. Upon the said lever, near its inner end, is secured a pin, g', adapted to engage the shoulder f<sup>7</sup> on the slide F, as seen in Fig. 4, when the outer end of the lever is moved to the left, so as to force the slide to the right and start the machine. A dog or pin, g<sup>2</sup>, on the lever G is adapted to engage the inclined edge f<sup>8</sup> of the slide when the outer end of the lever is moved to the right, and to thereby disengage the catch f<sup>2</sup> from the bearing F' and allow the spring e<sup>2</sup> to force the slide to the left when it is desired to stop the machine during the process of working a button-hole. This latter device for stopping the machine is more particularly designed for use in case the thread is broken or other accident occurs while the machine is in operation.

It is evident that the stop mechanism hereinabove described may be actuated from the ring-wheel A<sup>2</sup> by arranging a pinion to engage said ring-wheel, said pinion being mounted on a spindle or staff which extends down through the table and has a second pinion on its lower end adapted to drive the wheel C'; or it may be actuated by the second grooved cam A' in a similar way, or by or from any part of the feed mechanism located beneath the plate B, provided such part moves continuously in one direction while the button-hole is being stitched or worked.

We claim as our invention—

1. The combination, with a clutch mechanism, a cloth-clamp, and a cam-plate or other movable part for actuating said cloth-clamp, of a wheel, C', actuated from the cam-plate or other moving part and provided with an arm, c<sup>2</sup>, a longitudinally-movable slide-bar supported in suitable bearings upon the machine-frame, connected with the clutch device, and provided with a curved portion, f<sup>3</sup>, and with a rib or projection, f<sup>4</sup>, adapted for engagement with the arm c<sup>2</sup> of the wheel C', and with shoulders f' and f<sup>2</sup>, a stop or bearing, F', constructed for engagement with said shoulders, and a spring applied to hold the bar at one limit of its longitudinal movement, said bar being constructed to yield laterally and ver-

tically in its portion adjacent to the said wheel, substantially as and for the purpose set forth.

2. The combination, with a clutch mechanism, a cloth-clamp, and a cam-plate or other movable part for actuating said cloth-clamp, of a wheel,  $C'$ , actuated from the said cam-plate or other moving part and provided with an arm,  $c^2$ , a longitudinally-movable slide-bar supported in suitable bearings upon the machine-frame, connected with the clutch device, and provided with a curved portion,  $f^3$ , and a rib or projection,  $f^4$ , adapted for engagement with the arm  $c^2$  of the wheel  $C'$ , and with shoulders  $f' f^2$ , said bar being laterally movable at its end adjacent to the wheel  $C'$  and elastic in its middle part to permit a vertical movement of its said end, a stop or bearing,  $F'$ , constructed for engagement with said shoulders, a spring applied to hold the bar at one limit of its longitudinal movement, and a spring applied to throw the said end of the bar adjacent to the wheel  $C'$  laterally, substantially as and for the purpose set forth.

3. The combination, with a suitable clutch device, a cloth-clamp, and a cam-plate or other moving part of the mechanism for actuating said cloth-clamp, of a longitudinally and laterally movable bar,  $F$ , provided with a shoulder,  $f^2$ , a suitable stationary stop or bearing,  $F'$ , constructed to engage the said shoulder, means actuated from the cam-plate or other

moving part of the feed mechanism for moving said bar laterally, and a pivoted lever,  $G$ , provided with a projection,  $g^2$ , said bar  $F$  being provided with an inclined surface for engagement with the said projection  $g^2$ , whereby the said bar may be moved laterally, substantially as and for the purpose set forth.

4. The combination, with a suitable clutch device, a cloth-clamp, and a cam-plate or other moving part of the mechanism for actuating said cloth-clamp, of a longitudinally and laterally-movable bar,  $F$ , provided with a shoulder,  $f^2$ , a suitable stationary stop or bearing,  $F'$ , constructed to engage said shoulder, a spring applied to move the bar longitudinally, means actuated from the said cam-plate or other moving part for moving said bar laterally, and a pivoted lever,  $G$ , provided with projections  $g' g^2$ , said bar being provided with a shoulder,  $f'$ , and an inclined surface,  $f^3$ , whereby the said bar may be moved longitudinally and laterally by said lever, substantially as described.

In testimony that we claim the foregoing as our invention we affix our signatures in presence of two witnesses.

ERASTUS D. LUDLOW.  
GEORGE M. LUDLOW.

Witnesses:

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