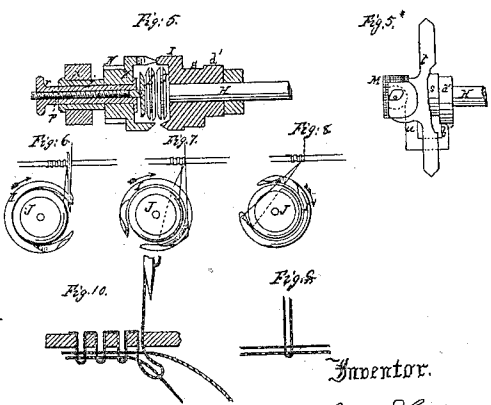
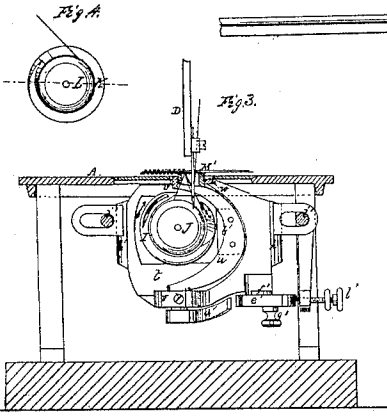
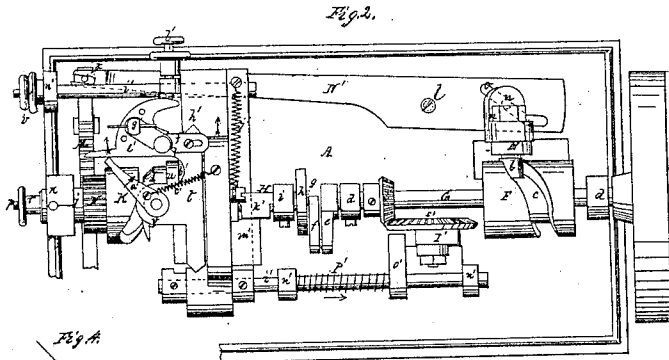
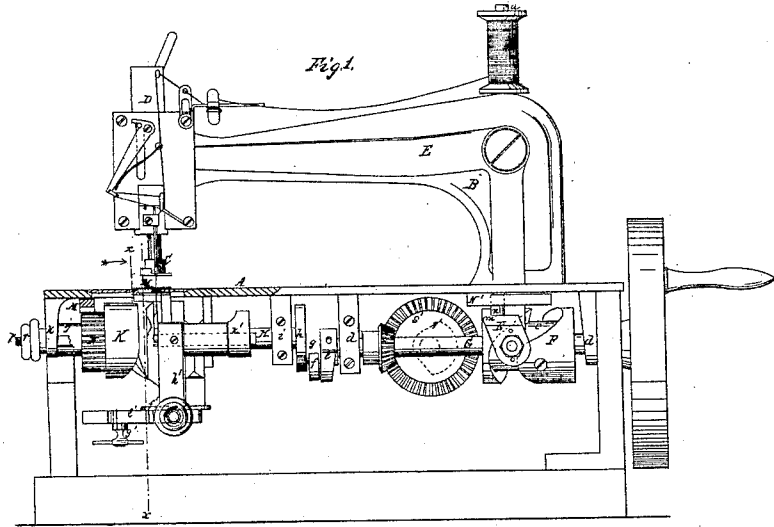


E. CAJAR.  
 BUTTON HOLE SEWING MACHINE.

No. 50,299.

Patented Oct. 3, 1865.



Witnesses.  
 M. M. Lynde  
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# UNITED STATES PATENT OFFICE.

EMIL CAJAR, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND JOHN H. THIELING, OF SAME PLACE.

## IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. 50,299, dated October 3, 1865.

*To all whom it may concern:*

Be it known that I, EMIL CAJAR, of the city, county, and State of New York, have invented a new and useful Improvement in Button-Hole Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a sectional side elevation of this invention. Fig. 2 is an inverted plan of the same. Fig. 3 is a transverse vertical section of the same, taken in the plane indicated by the line *x x*, Fig. 1, and looking in the direction of the arrow opposite to that line. Fig. 4 is a detached face view of the secondary hook. Fig. 5 is a longitudinal central section of the two hooks. Fig. 5\* is a detached plan of the feed machinery. Figs. 6, 7, and 8 are diagrams illustrating the manner in which the stitch is made. Figs. 9 and 10 show diagrams of the stitch in its progress of formation in an enlarged scale.

Similar letters of reference indicate like parts.

This invention relates to a button-hole sewing-machine which imitates as near as possible the hand-stitch generally employed in making button-holes. One needle is employed, which passes down alternately through the cloth near the edge of the button-hole, and then through the hole itself, the cloth being shifted for that purpose. Two threads are employed, one of which is carried by the eye-pointed needle and the other by a circular shuttle or bobbin situated loosely in the interior of an oscillating hook. The cord or thread which is used as a bar-thread to strengthen the edge of the button-hole, is carried by a bobbin which lies in the cavity of a revolving hook. The lower thread, ordinarily used for locking the stitch, is contained on a bobbin situated in the cavity of an oscillating hook, which serves to take up the loops of the needle-thread as the same drop from the revolving hook and to pass the same over the bobbin carrying the lower thread, causing said lower thread to pass through the loops of the needle-thread in a direction opposite to the

bar-thread, so that said loops are interlaced between the cord and the lower thread, and when the threads are drawn tight a stitch is produced similar to that employed in making button-holes by hand. The position of the cloth on the cloth-plate is governed by a feeder which has a triple motion, viz: first, a horizontal rectilinear motion in the direction transversely to the cloth-plate—that is, in the direction in which the cloth is moved forward while sewing; second, a horizontal rectilinear motion in a direction at right angles to the forward motion just mentioned; and, third, a rotating motion. The first motion serves to feed the cloth in the ordinary manner, the second imparts to the cloth a lateral motion, causing the needle to pass down through the hole instead of through the cloth, and the third or revolving motion is employed to govern the motion of the cloth in sewing round the eye of the button-hole, this motion being substituted for the forward feed-motion at the proper intervals. While sewing the straight edges of the button-hole the circular motion of the feeder is thrown out of gear. The various motions of the feeder are adjustable, so that the same can be accommodated to button-holes of different size.

If desired, the sewing-machine can also be employed for ordinary or plain sewing.

A represents the cloth-plate, which may be made of iron or any other suitable material. From this plate rises the standard B, which is formed like similar standards of a great many sewing-machines now in use, and performs the same functions. From its rear end rises a pin, *a*, which is intended to support the spool that carries the needle-thread, and its front end is furnished with two lugs or ears, which form the guides for the pressure-foot C, and with suitable ways in which the needle-slide D moves in the ordinary manner. The usual devices for regulating the tension and taking up the slack of the needle-thread are also applied to the front end of the standard B and the needle-slide.

Motion is imparted to the needle-slide by an elbow-lever, E, which is pivoted to the side of the standard B, and one arm of which is connected to said needle-slide, whereas its other arm, which carries a friction-roller, *b*, engages

with a cam-groove, *c*, in a drum, *F*, which is mounted on the driving-shaft *G* of the sewing mechanism. All those parts, however, form no part of my invention, and are similar to those used in other sewing-machines, and I do not wish to confine myself to the precise arrangement of parts heretofore described and shown in the drawings; but I reserve the right to change the same as circumstances may make desirable.

The driving-shaft *G* has its bearings in pendants *d*, cast or otherwise rigidly attached to the under surface of the cloth-plate *A*, and it connects by a crank, *e*, and link *f* with an eccentric wrist-pin, *g*, which is secured in the face of a disk, *h*, mounted on the end of the hook-shaft *H*. By this method of connecting the two shafts a double object is gained—viz., the center of the shaft *H* which carries the hook can be brought as close as may be desired to the under surface of the cloth-plate without diminishing the size of the cam *F*, and the machine can be operated with a comparatively short needle; and, furthermore, by this connection the motion imparted to the hook-shaft is irregular, the object of which will be hereinafter explained. Said shaft has its bearings in suitable boxes, *i*, secured to the under side of the cloth-plate, and on its end is mounted the hook *I*, which is formed like the hook used in that class of sewing-machines known as "Wheeler & Wilson." The bobbin *J*, however, which is situated in the cavity of this hook, does not carry the lower thread, as it does in the Wheeler & Wilson sewing-machine; but it carries the cord which is used to strengthen the edges of the button-holes, and this cord is wound on the bobbin in a direction opposite to that in which the bobbin revolves to prevent it from being unwound by the friction between the bobbin and the hook.

Opposite the hook *I*, and in line therewith, is a second hook, *K*, which oscillates on a hollow shaft or stud, *j*, secured in a lug or bracket, *k*, which is cast with or otherwise rigidly attached to the cloth-plate *A*. Situated in the cavity of this hook is the bobbin *L*, which carries the lower thread, and this thread is wound on its bobbin in a direction opposite to that in which the cord is wound on its bobbin, as indicated in Fig. 3, where the cord is shown in brown and the lower thread in blue outlines. The hook *K* receives its motion by means of a toothed rack, *M*, which gears in a cog-wheel, *N*, mounted on the hub of the hook, and to which a reciprocating motion is imparted by a lever, *N'*. Said toothed rack is guided by ribs or projections cast or otherwise secured to the under side of the cloth-plate *A*, and the forked end of the lever *N'* straddles a pin, *k*, secured in the rack *M*, as shown in Fig. 2. Said lever has its fulcrum on a pin or screw, *l*, secured in the under side of the cloth-plate, and an oscillating motion is imparted to it from the elbow-lever *E*, which serves to operate the needle-slide, a bracket, *m*, being secured to the lower

end of said lever, from which a stud, *n*, projects into an oblique slot, *o*, in the lever *N'*, as shown in Fig. 2. It must be remarked, however, that the required motion of the toothed rack *M* and of the hook *K* can be produced in a great many different ways, and I do not wish to confine myself to the precise arrangement shown in the drawings, but reserve the right to make such alterations as may be desirable.

Through the hollow shaft *j* of the oscillating hook *K* passes a screw, *p*, which terminates on its inner end with a pad, *q*. The edge of this pad is rounded off, as shown in Fig. 5, and by turning the screw *p* in the proper direction the pad can be made to bear on the bobbin *L* in the oscillating hook *K* and move said bobbin up against the bobbin *J* in the revolving hook *I*, and the position of the two bobbins in relation to each other can be adjusted to suit circumstances. A jam-nut, *r*, serves to retain the screw *p* in the desired position after the same has been once adjusted in the proper position.

The manner in which the stitch is formed is as follows: After the needle has descended through the cloth and ascended again, as usual, so as to form the requisite loop, the hook *I* comes round and catches into this loop, carrying the same over the bobbin *J* and over the cord contained in said bobbin in the same manner that the needle-thread and bobbin-thread are interlocked in the Wheeler & Wilson machines. On leaving the hook *I* the loop of needle-thread is taken up by the oscillating hook *K*, which carries the same back in the opposite direction and drops it over the bobbin *L* and the thread contained therein, which is wound on said bobbin in a direction opposite to that in which the cord is wound on its bobbin. The motion of the two hooks *I* and *K* is so timed that they are not liable to interfere with each other during the time the loop of the needle-thread passes successively over the two bobbins, the hook *K* being stationary during the largest portion of the revolution of the hook *I*, and the motion of the hook *I* being irregular, as will be presently explained. The stitch thus formed is shown in Figs. 9 and 10, where the needle-thread is shown in red, the cord is brown, and the lower thread is blue. By referring to these figures it will be seen the loop of the needle-thread is interlaced between the cord and the lower thread; and if the stitch is drawn tight it presents exactly the appearance of a hand-made button-hole stitch. The formation of this stitch is considerably facilitated by the irregular motion of the hook-shaft *H*, imparted to it by the link and double crank connecting it with the driving-shaft *G*, whereby the hook is caused to rotate rapidly from the position which the same occupies before its point catches in the loop of the needle-thread until it arrives in the position shown in Fig. 8. At that point the hook remains stationary for an instant, and then it moves slowly until it has completed its

revolution, and during this latter period the time requisite for the purpose of dropping the loop from the hook I and transferring to the hook K is obtained, and the operation of the mechanism is rendered sure and faultless.

*M'* is the feeder, which governs the position of the cloth on the cloth-plate in relation to the needle. This feeder is made in the form of an *L*, one arm of which is parallel to the direction in which the cloth is to be fed and the other at right angles thereto. It rises and falls in the ordinary manner of feeders of sewing-machines, and it has three distinct feed-motions—viz., a motion in the direction in which the cloth is to be fed, then a motion at right angles thereto, and finally an oscillating motion.

The rising-and-falling motion of the feeder is effected by an eccentric, *s*, (see Figs. 5 and 5\*) which is situated close behind the revolving hook I, and which works in a frame, *t*, to which the feeder *M'* is connected. Said frame hugs the eccentric closely with the upper and lower edges of its opening, and consequently the eccentric imparts to the frame and feeder a positive rising-and-falling motion, but the opening in the frame is of such a length that the eccentric does not act on the ends thereof, and consequently no lateral motion is imparted to the frame by the action of the eccentric.

The connection between the feeder *M'* and the frame *t* is effected by a curved rocker, *u*, which has its bearings in suitable lugs or ears, *v*, projecting from the front side of the frame *t*. This rocker is curved so as to clear the hook I, and its upper end is bored out to allow the needle to pass down through it, as shown in Fig. 3. Firmly connected to said upper end is the feeder, so that by turning the rocker the desired oscillating motion can be imparted to the feeder, and at the same time the rocker is secured to the frame, so that the same, together with the feeder, is compelled to partake of the rising-and-falling motion of said frame. To the lower end of the rocker *u* an arm, *a'*, is connected, and a cam, *b'*, is riveted to its inner surface. A spring, *c'*, which is connected to the arm *a'*, (see Fig. 2,) has a tendency to turn said rocker in the direction of the arrow marked on the arm *a'* in Fig. 2, and by this action the cam *b'* is held in contact with the periphery of an eccentric, *d'*, (see Fig. 5\*,) which is secured to the hook-shaft H, or which may be cast solid with the hook I, as seen in Fig. 5. As the hook-shaft rotates the eccentric *d'* imparts an oscillating motion to the rocker *u* and to the feeder *M'*. The amount of this motion is governed by a swinging stop, *e'*, which is linged to a slotted bracket, *f'*, that is secured to the frame *t*, as shown in Fig. 2. By turning this stop to the position which it occupies in said figure the arm *a'* forced back against the action of the spring *c'*, and the cam *b'* on the inner surface of the rocker *u* is brought in such a position that

the eccentric does not act on it, and consequently no oscillating motion is imparted to the feeder. In this position the swinging stop is kept, being held in position by a thumb-screw, *g'*, until the needle reaches the eye of the button-hole. At that point said stop is turned in the direction of the arrow marked near it in Fig. 2, (more or less,) according to the fineness of the stitch to be produced, and by doing so the rocker is allowed to oscillate by the action of the eccentric *d'*, and a circular motion is imparted to the cloth in which the button-hole is to be made.

The frame *t* moves up and down in V-shaped grooves in a guide-piece, *h'*, which is hung by means of slotted ears upon rods *i'*, (see Figs. 2 and 3,) and which is subjected to the action of a spring, *j'*, and of a cam, *k'*. The spring has a tendency to draw the guide-piece in the direction of the arrow marked on it in Fig. 2, as far as the set-screw *l'* allows, the point of which bears on the edge of the swinging stop *e'*, and the cam *k'* on the hook-shaft H causes said frame to move against the action of the spring once for every revolution of the shaft. This motion produces the regular feed of the cloth on the cloth-plate in the direction transversely to said plate or parallel to the edges of the button-hole to be made. The extent of this motion is regulated by the set-screw *l'*, and when the machine is to be used for ordinary sewing this feed-motion is the only one brought into action.

The rods *i'*, which support the guide-piece *h'*, are connected by a cross-bar, *m'*, and they slide in a longitudinal direction in lugs *n'*, cast or otherwise rigidly attached to the cloth-plate A. One of these rods is provided with a tappet, *o'*, and a spring, *p'*, is placed round said rod and forces this tappet up against a cam, *r'*, on the hub of a bevel-wheel, *s'*, which gears in a pinion, *t'*, on the driving-shaft. By the action of the cam on the tappet a longitudinal sliding motion is imparted to the rods *i'*, and through them to the feeder *M'*, and by this motion the needle is caused to pass alternately through the cloth and then through the hole. This motion takes place once for every two revolutions of the driving-shaft, and in order to time it properly the bevel-wheel *s'* has twice as many teeth as the pinion *t'*. It must be remarked, however, that for this latter motion of the feeder an equivalent motion of the needle could be substituted, which would be produced by securing the needle-bar in an oscillating head, to which the requisite motion would be imparted by an arm exposed to the action of the cam *r'*, and by this oscillating motion the needle would be caused to pass alternately down through the cloth and then through the hole. The last-named motion of the feeder is regulated by a nut, *v'*, on the end of one of the rods *i'*. By means of this nut the motion allowed to said rods, and the consequent motion of the feeder, can be limited to any desired extent, and if the machine is to

be used for ordinary sewing the longitudinal motion of said rods is entirely stopped and no other motion is allowed to the feeder besides the ordinary feed-motion.

What I claim as new, and desire to secure by Letters Patent, is—

1. The method herein described of producing a stitch such as shown in Figs. 9 and 10, composed of two threads passing through the loop of the needle-thread in opposite directions and being interlaced with said loop by mechanism substantially such as herein set forth, or by any other equivalent means.

2. The use of an L-shaped feeder, in combination with a sewing mechanism composed principally of an eye-pointed needle, a revolving hook, and an oscillating hook, and otherwise constructed and operating substantially as and for the purpose described.

3. Imparting to the feeder M' of a sewing-

machine, in addition to its ordinary rising-and-falling motion and to its ordinary rectilinear reciprocating feed motion, an oscillating or circular motion, by means substantially such as herein described, or any other equivalent means, for the purpose specified.

4. Imparting to the feeder M' of a sewing-machine, in addition to its ordinary rising-and-falling motion and to its ordinary rectilinear reciprocating feed motion, a reciprocating motion acting conjointly with and in aid of the other motions to effect both a lateral as well as a forward feed of the cloth in the formation of each single stitch, by means substantially as herein described, or by any other equivalent means, for the purpose set forth.

EMIL CAJAR.

Witnesses:

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