(Model.) 3 Sheets—Sheet 1.

W. H. GILBERT.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 306,604. Patented Oct. 14, 1884.

Fig. 1

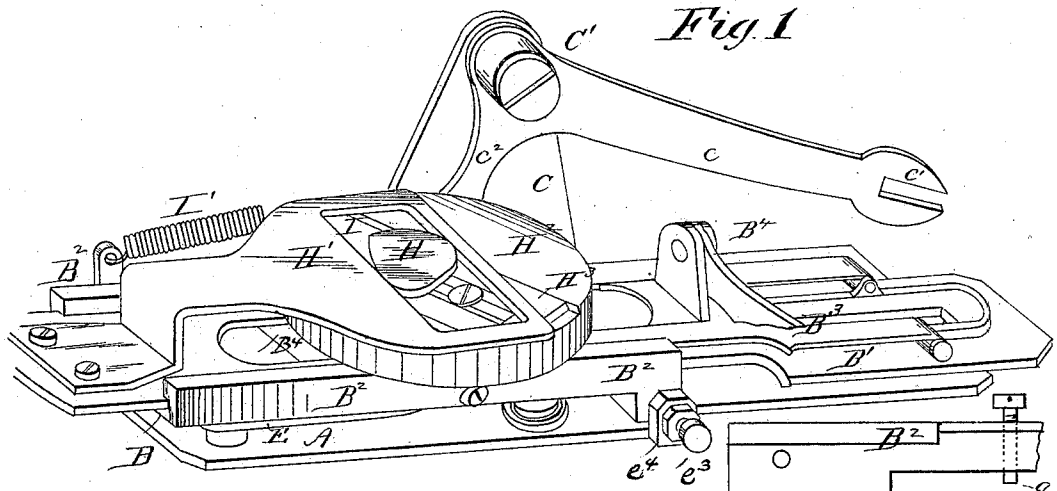


Fig 10

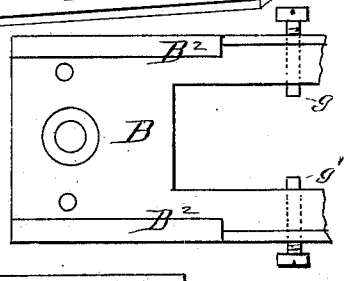


Fig 5

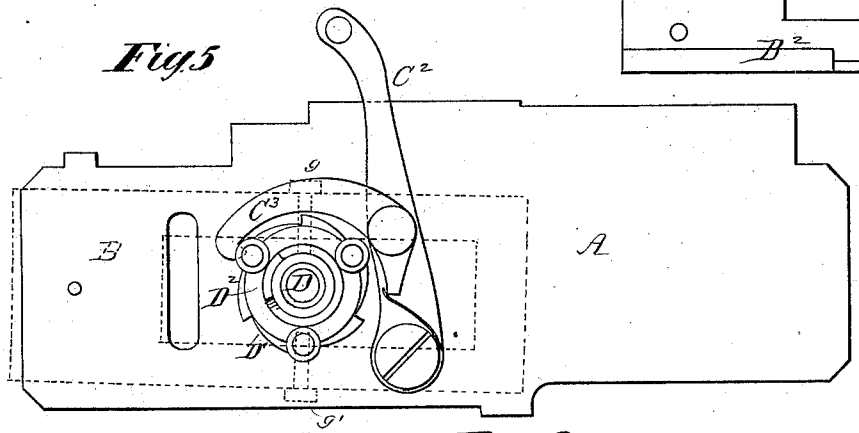
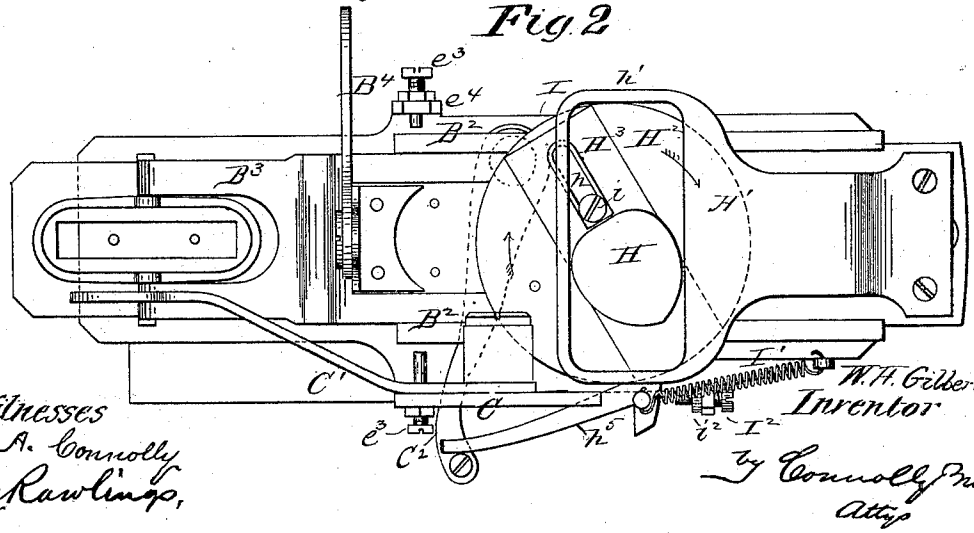


Fig. 2



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A. E. Rawlings.

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(Model.) 3 Sheets—Sheet 2.

W. H. GILBERT.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 306,604. Patented Oct. 14, 1884.

Fig. 3

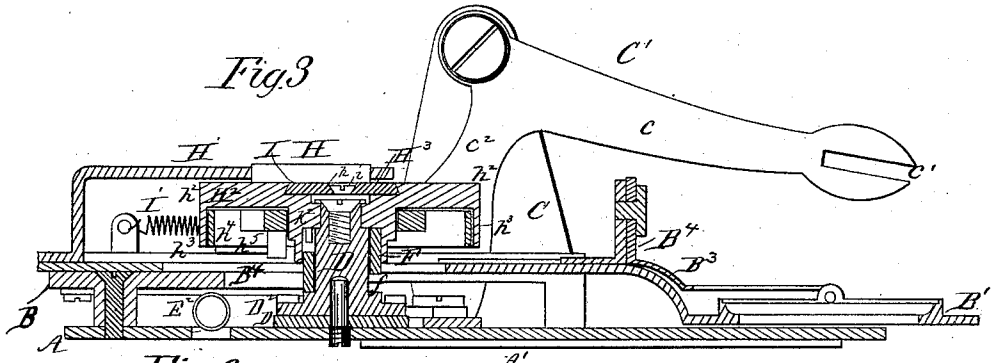


Fig. 6

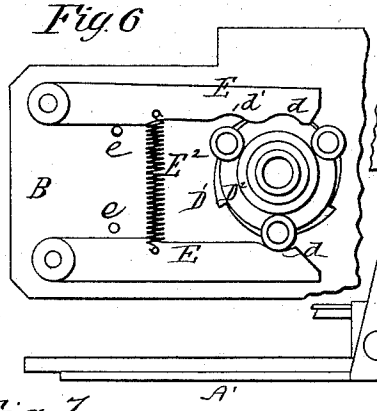


Fig. 4

Fig. 7

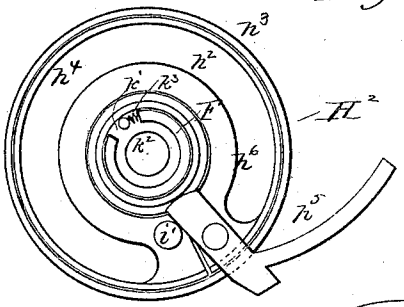


Fig. 8

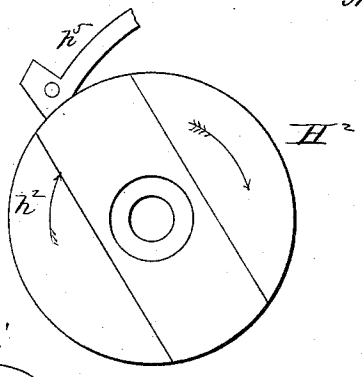
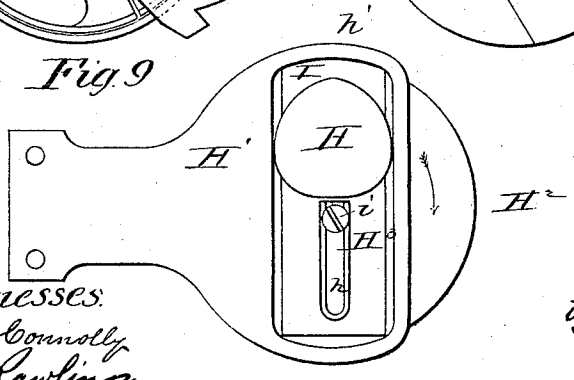


Fig. 9



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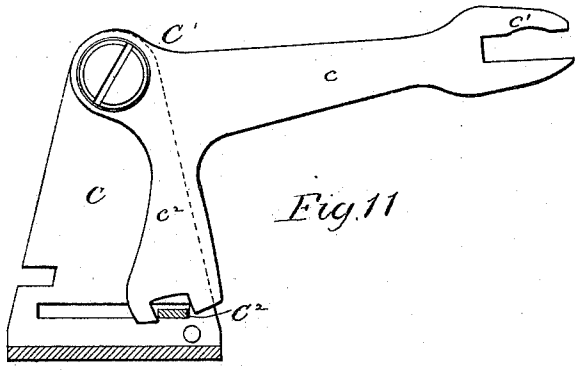


Fig. 11

Fig. 12

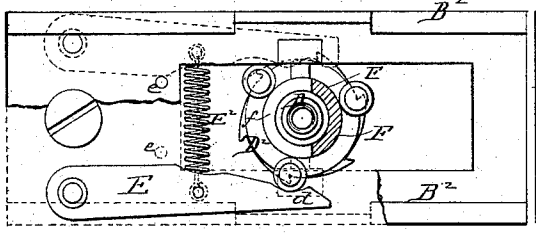


Fig. 13

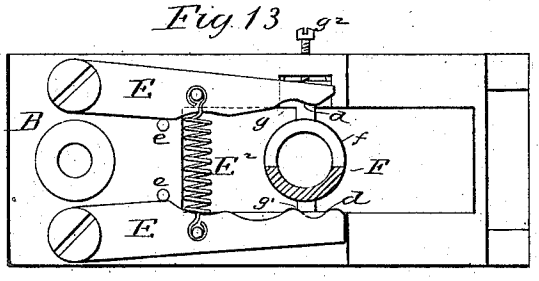
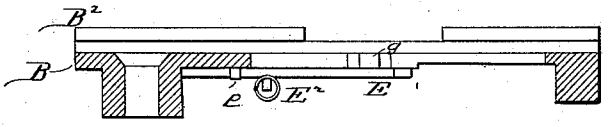


Fig. 14



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UNITED STATES PATENT OFFICE.

WILLIAM H. GILBERT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE UNITED STATES AUTOMATIC BUTTON-HOLE SEWING MACHINE COMPANY, OF CAMDEN, NEW JERSEY.

BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 306,604, dated October 14, 1884.

Application filed January 23, 1884. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM H. GILBERT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a perspective view of a button-hole attachment embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical longitudinal section. Fig. 4 is an elevation of part of one side of the attachment. Fig. 5 is a plan view of the base-plate of the attachment with tappet, ratchet-wheel, and dog or operating-lever. Figs. 6, 7, 8, 9, 10 are detail views. Figs. 11, 12, 13, 14 are detail views.

This invention has relation to button-hole attachments for sewing-machines of that class in which the cloth, while being fed in the direction of the outline of the button-hole, is at the same time given a reciprocating or zigzag motion in order to produce the usual button-hole stitching. In button-hole attachments of this class as heretofore constructed one method of obtaining the requisite feed movement of the cloth-plate and presser-bar corresponding to the outline of the button-hole has been through the employment of a heart-shaped cam mounted on a spindle and connected by operative link-connections with the cloth-feeding clamp. In such attachments, the character of which is well understood, the expedients for varying the length of the button-hole have either required the use of different-sized heart-cams for every length of button-hole, or the employment of a system of connections between the cam and the feed-clamp, which I regard as more or less objectionable, and which my improvements are designed to dispense with.

The special object of my invention is to obviate the disadvantages following the necessity of changing the cams to meet the requirements of work, or of employing complex and unreliable connections, and with this object in view to provide an adjustable cam, whereby, without displacement of parts, and by a simple variation in the position of the heart-cam the feed may be regulated and made to conform to button-holes of any length within the possible minimum and maximum capacities of the feed.

My invention accordingly consists in the combination, with the feed-slide, and a wheel or disk through which the same receives motion from the working parts of the machine, of a yoke secured to said feed-slide, said yoke having a transversely-slotted head, and a heart-cam secured upon the face of said disk and diametrically adjustable thereon.

In the drawings, A designates the base-plate of a button-hole feeding attachment, having connected therewith a plate, A′, constructed and adapted to take the place of the usual slide in the cloth-plate of an ordinary sewing-machine when the latter is to be used for button-hole-stitching purposes. The base-plate A carries all the parts pertaining to my improvements.

B′ designates the button-hole feed-plate arranged to slide in grooved guides B^2 B^2, formed on the plate B, (which is swiveled at its rear end to the base-plate A, so that a vibratory motion may be imparted to it,) and carrying the presser-foot B^3 and presser-lever B^4, the parts B′ B^3 constituting a clamp by which the cloth is held and fed.

C is a standard rising from one side of the base-plate A and carrying the lever C′, having its arm *c* extended forward and forked, as shown at *c*′, for connection by set screw with the vertically-reciprocating needle-bar. Motion to all the moving parts of the feed devices is conveyed from the needle-bar through the lever C′, as is usual in button-hole feeds.

D designates a post rising from and rigidly secured to the plate A. Upon this post are journaled the six-toothed ratchet-wheel D′ and the three-toothed tappet-wheel or triangular cam D^2, the latter above the former and

fastened thereto so that both turn together. A pair of pivoted arms, bars, or levers, E E, embrace the tappet and are notched near their forward ends, as shown at *d d*, for the engagement therewith of the tappet projections or teeth. The pivoted arms E E are carried by the guide-plate B, which is swiveled upon the base-plate A at its rear end. As the tappet-wheel turns it engages with or presses upon and against the arms E E alternately, and through them imparts to the guide-plate B a vibratory motion, which is taken up by the feed-plate. Thus the movement of the cloth is in a zigzag line, to which the stitching corresponds. The levers E E are connected together between their pivotal points and free ends by means of what may be termed a "relieving-spring," E^2, since, under certain conditions, it relieves undue strain and friction. The proper and usual function of this spring is this: when one of the tappet-teeth impinges against one of the levers and moves the same laterally and outward the spring conveys motion to the other lever and draws it against one of the pins or studs *e*, which, being fixed upon the guide-plate B, produces a lateral movement of the latter in one direction, such movement being limited by one of the adjustable screw-stops e^3, fitted in standards e^4, rising from the base-plate A. Any tendency of the tappet to produce a further movement being arrested, the spring E^2 expands with and through the extra movement of the arm E, against which the tappet is working, and in this way relieves the strain which would otherwise ensue, and allows the tappet to continue in motion. As soon as the tappet is free from the arm E, the spring reacts to return the arm E to its normal position. The tappet then acts similarly upon the other arm E, and to this action or impingement the guide-plate responds by moving in the reverse direction from that previously produced. As will be inferred and understood, the stops e^3, while limiting the throw of the guide-plate B, and thus regulating the length of the stitch, may be adjusted so as to give any required length of stitch, the latter depending upon the lateral play of the guide-plate, and in correspondence therewith the lateral play of the cloth-clamp.

In order to stitch both sides of the button-hole the feed-plate is caused to be shifted laterally at either end of its path, and such shifting and consequent travel of the feed-plate is accomplished by the following-described means.

Upon the post or spindle D, which rises through an opening, B^4, in the guide-plate B, is fitted loosely a collar or stop-cam, F, recessed, as shown at *f*, by having a segment removed from its lower portion. Upon the inner sides of the guides B^2, and upon opposite sides of the spindle and collar, there are studs *g g'*, adjustable by means of set-screws g^2 g^2, and respectively so placed that when the recessed portion *f* of the collar is toward either stud the latter will be allowed to play into such recess. As the feed-plate moves, say forward, the recess *f* is toward the stud *g*, consequently the other stud, *g'*, is limited in its play by the wall of the collar or stop-cam F, and the line of stitching is on that side of a central line bisecting the collar F on which the stud *g* is located. Now, when the collar has moved around so as to oppose the recess to both studs, the latter are only limited by the post D, hence the line of their play or movement is doubled, and as the movement of the cloth-plate from side to side is in correspondence and keeping with this play of the studs the stitching is across both sides of the button-hole, thus forming the bars connecting the two lines of stitching at the end of the button-hole. The rotation of the stop-cams continuing, the wall of the collar or stop-cam now opposes the stud *g*, while the recess faces the stud *g'*. At this point the cloth-plate is on its return or backward movement, and, by the altered position of the wall of the collar or stop-cam has assumed the shifted condition before referred to. Lateral reciprocation of the feed-plate then takes place under the limitation effected by the opposition of the wall of the collar to the stud *g*, and is confined to the side of the button-hole corresponding to the position of the stud *g* with reference to the central line, and stitching continues on this side of the button-hole until the feed-plate has reached its backward limit, when the recess again allows both studs *g g'* free play and permits the feed-plate to reciprocate across both sides of the button-hole, so as to stitch or "bar" the end where the stitching was begun. The forward and return movement of the feed-plate is effected by the mechanism which embodies the essential features of my improvement—that is, the adjustable heart-cam and the yoke. The cam is represented at H, and the yoke at H'. The former is carried by a cylindrical head or wheel, H^2, which is mounted on the post D, so as to turn thereon and independently thereof. The heart-cam is attached to or made integral with a dovetailed slide, H^3, fitting a correspondingly-dovetailed channel, I, formed in the face of the head H^2, and traversing the same diametrically. This slide is slotted at *h* for the passage of a set-screw, *i*, by which the slide is secured at any position in the recess, and by loosening which the slide may be adjusted to regulate the distance of the heart-cam from the center of motion of the head. The greater the distance the cam is from the center the greater will be the radius of the circle described by it, and vice versa. The yoke H' consists of a plate or frame having a transversely-slotted portion, *h'*, with parallel sides, which embrace the cam. At its rear end the yoke is secured to the feed-plate, as shown. As the wheel H^2 rotates (in the direction indicated by the arrows) the motion is communicated through the cam to the yoke and resolved into a recti-

linear movement of the latter and the feed-plate, a forward movement taking place during half a revolution of the wheel, and a reverse movement during the other half revolution. The length of the button-hole depends upon the distance traveled by the feed-slide, and this distance is regulated by the adjustment of the heart-cam, which, according to its position with reference to the center of the wheel H^2, produces a greater or lesser travel of the yoke and feed-slide. The wheel H^2 is made in the form of a friction-clutch, and is of the class upon which is based the construction embodied in the application of Daniel Mills, filed June 11, 1883, Serial No. 97,716—that is, it comprises the recessed cap portion h^2, having the annular flange h^3, the split ring h^4, the lever h^5, to press said ring into frictional contact with the flange h^3, and the yoke h^6 carrying said ring. By moving the lever h^5 in one direction, so that its short arm will impinge against the stud i', the split ring is expanded against the flange h^3, and by continuing the movement the wheel H^2 is turned. A spiral-spring connection, I′, is employed for the automatic retraction of the lever independently of the wheel after each movement of the latter, and an adjusting-screw, I^2, carried by a standard, i^2, attached to the base-plate A, serves as means for limiting the backward stroke of the lever and the consequent extent of revolution given to the wheel through each forward stroke. Hence by adjusting the screw I^2 the length of the stitch is varied. The six-toothed ratchet-wheel D, through which motion is imparted to the tappet or three-toothed cam D^2, is actuated from the lever C′ through the lever C^2 and spring-pawl C^3, pivoted on said lever C^2. The lever C′ has a short depending branch, c^2, which is forked and embraces the lever C^2, so that upon each descent of the needle the pawl C^3 will be thrown back and into engagement with one of the teeth of the ratchet-wheel, while upon the ascent of the needle the ratchet-wheel will be turned the distance of a single tooth. This movement being communicated to the tappet, and thence to the reciprocating feed-slide, a lateral movement of the latter takes place upon every rise of the needle. The arms E E are notched at *d d*, to afford seats for the tappet-teeth and ensure a regular and uniform throw of the tappet, the notched ends acting as detents for the tappet and ratchet.

To impart motion to the clutch-wheel H^2, the lever C^2 is extended laterally through a slot, C^3, in the standard C, and is armed with an anti-friction roller, *k*, arranged as shown with reference to the curved arm of the clutch-lever h^5. As the lever C^2 is drawn forward in giving an impulse to the ratchet-wheel, the friction-roller *k* comes in contact with and presses against the clutch-lever h^5, producing a forward stroke of the latter and effecting a partial revolution of the clutch-wheel H^2. The upper end of the stop-cam enters a chamber in the hub of the clutch-wheel H^2, and has a recess at *k′*, into which enters a pin, k^2, secured to the wheel H^2, and serving to interlock the wheel and stop-cam, so that they will move together, the cam being designed to receive its motion from the clutch-wheel. A spring, k^3, maintains the stop-cam in position on its spindle; but should one of the studs or stops g^3 come in contact with one of the edges of the recess or segment formed in the lower end of the stop-cam the spring k^3 will yield sufficiently to allow the stop-cam a slight movement on its spindle, this movement being permitted by the recess *k′*.

The general construction and operation of the stop-cam is the same as of the stop-cam shown and described in the application of Daniel Mills, filed March 5, 1883, No. 87,153, and August 6, 1883, No. 102,914, and April 5, 1884, No. 126,756.

I have shown and described my improvements applied to an attachment in which the clutch-wheel H^2 is mounted on the same axis with the tappet and ratchet wheel. This arrangement, broadly, I do not claim to have devised, and accordingly I disclaim such in favor of Daniel Mills, in order that this application may not operate as a bar or obstacle to any broad claim which the said Daniel Mills may have made or shall hereafter make upon such an arrangement.

What I claim as my invention is as follows:

In a button-hole-stitching mechanism, the combination, with the feed-slide and a wheel or disk through which the same receives motion from the working parts of the machine, of a yoke secured to said feed-slide, said yoke having a transversely-slotted head and a heart-cam secured upon the face of said disk and diametrically adjustable thereon, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 12th day of January, 1884.

WILLIAM H. GILBERT.

Witnesses:

J. H. WHEELER,

CURTIS TILTON.