

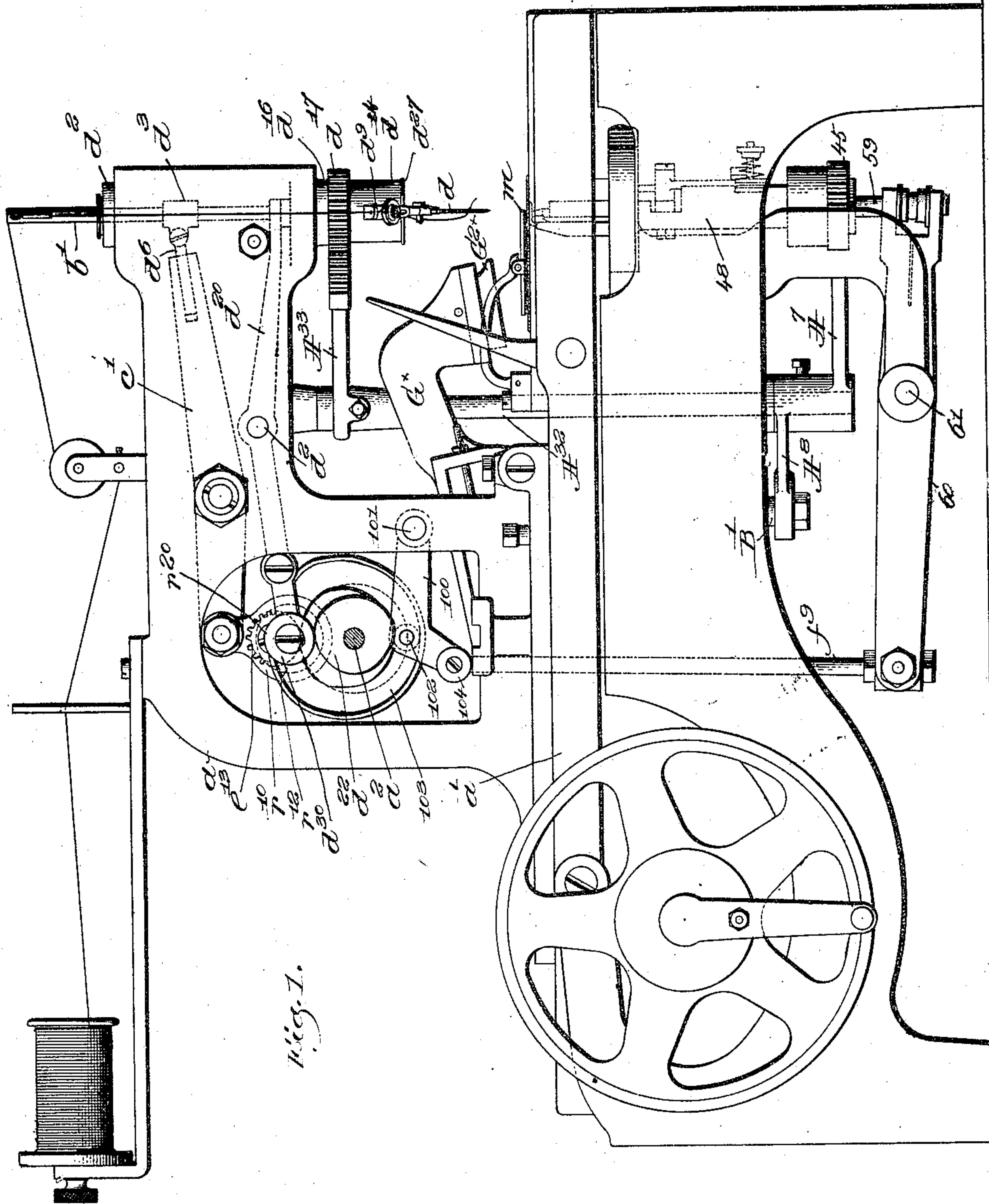
No. 862,238.

PATENTED AUG. 6, 1907.

C. A. DAHL.  
BUTTONHOLE STITCHING MACHINE.

APPLICATION FILED MAR. 14, 1907.

2 SHEETS—SHEET 1.



Witnesses:  
Fred. S. Grunke,  
Joseph M. Ward.

Inventor.  
Charles A. Dahl,  
by Lewisby Gregory,  
Attorney.

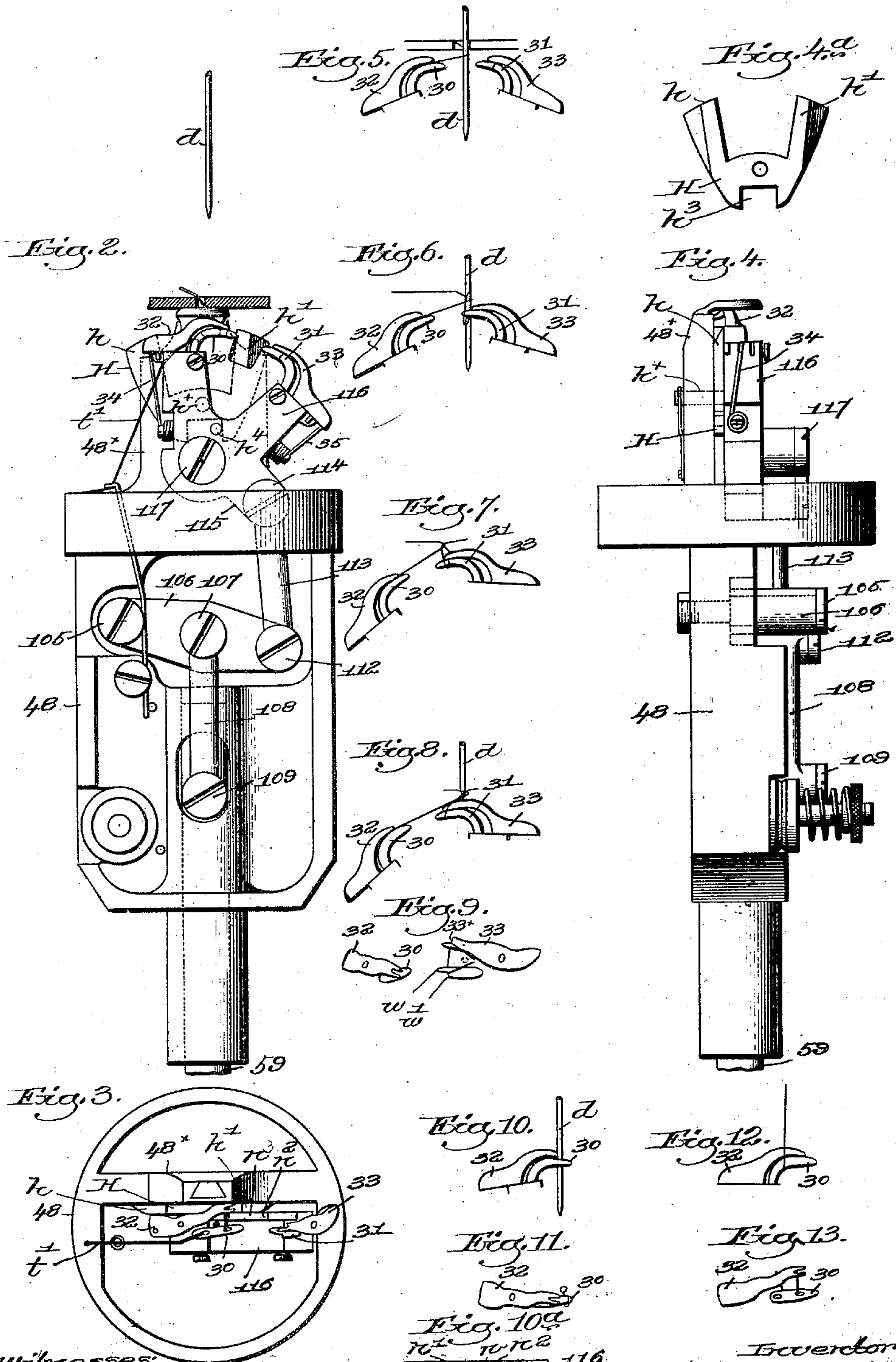
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Charles A. Dahl,  
by Leroy E. Gregory



# UNITED STATES PATENT OFFICE.

CHARLES A. DAHL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE REECE BUTTON HOLE MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

## BUTTONHOLE-STITCHING MACHINE.

No. 862,238.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed March 14, 1907. Serial No. 362,344.

To all whom it may concern:

Be it known that I, CHARLES A. DAHL, a citizen of the United States, residing in Boston, county of Suffolk, and State of Massachusetts, have invented an  
5 Improvement in Buttonhole-Stitching Machines, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention has for its object the improvement of that class of stitching machine employed for stitching buttonholes in clothing. The machine with which I have chosen to embody my stitch-forming mechanism  
10 cooperating with the needle supplying the needle thread, is of the type known as the Reece wherein a stitch-frame carrying stitch-forming mechanism, and a work-supporting or clamping-frame are movable one with relation to the other to enable the stitching to be carried on along the sides of a buttonhole and about its enlarged end or eye.

In my invention, I have combined with the eye-pointed needle of the stitch-forming mechanism, complementary thread-carrying means for controlling an under or extra thread that is concatenated with the needle thread in the formation of the stitch, said complementary  
15 means including two loopers and spreaders, and means for actuating the spreaders. I have also combined the complementary thread-carrying means with a carrier adapted to have a circular movement while stitching about the eye or outer end of the buttonhole. The  
20 loopers are actuated about their supporting stud by a slide rod and connected mechanism, the slide rod occupying a position in the longitudinal axis of the carrier during its circular movement.

The stitch herein to be described is made by the concatenation of two threads, one carried by an eye-pointed needle above the material, and the other by a looper provided with a second thread located below the material and moving under the usual throat plate mounted on the top of the carrier, the machine also  
25 having a non-thread-carrying looper, each looper having coacting with it a spreader that is moved independently by a movable actuator.

Figure 1 in side elevation represents a buttonhole stitching machine with which I have embodied my  
30 improvements; Fig. 2 is a detail showing a needle and the circularly movable carrier sustaining the means complementary to the needle making the stitch; Fig. 3 is a top or plan view of the carrier shown in Fig. 2; Fig. 4 is a left hand side elevation of the parts shown in Fig. 2; Fig. 4<sup>a</sup> shows the actuator detached; Figs. 5, 6, 7 and 8 are details showing the needle, the under thread-carrying loopers and spreaders in different positions occupied by them in making a stitch; Fig. 9 is a top view of the parts shown in Fig. 8; Fig. 10 is  
35 a detail of the looper and its spreader, the needle being shown in its depressed position. Fig. 10<sup>a</sup> is a top view of the spreader and looper-carrying block with the spreaders and loopers detached. Fig. 11 is a plan view of the parts shown in Fig. 10; Fig. 12 is a view of the parts as shown in Fig. 10 with the needle fully elevated, the looper and spreader being in the loop of needle thread. Fig. 13 is a plan view showing the position of the looper and spreader when the needle occupies the position Fig. 12.

Referring to the drawings, *a* represents a stitch frame, *a*<sup>2</sup> the main shaft for actuating the stitch-forming mechanism, *b*<sup>1</sup> a needle bar sustained at its upper end in a ball and socket bearing, *c*<sup>1</sup> a needle bar actuating lever, *d*<sup>1</sup> a hub embracing said bar loosely, *d*<sup>2</sup> a pin entering loosely the front end of said needle lever, *r*<sup>10</sup> an  
40 eccentric link connected with the rear end of said lever, *r*<sup>12</sup> is an eccentric embraced by said link, said eccentric being revoluble about a stud *r*<sup>20</sup> held in the framework, said eccentric having connected with it a pinion *e*<sup>13</sup> that derives its motion from a gear on the main shaft *a*<sup>2</sup> of the machine, all as provided for in United States Patent No. 544,827, dated August 20, 1895.

Referring again to the drawings, *d*<sup>14</sup> represents a circularly movable casing having secured thereto a partial gear *d*<sup>17</sup>, said casing being closed at its lower end by a plate *d*<sup>27</sup>, the casing being revolubly sustained in an car *d*<sup>16</sup> forming part of the framework. The casing in practice receives a spring sustained zone-shaped projection that in turn receives an auxiliary slide bar *d*<sup>9</sup> suitably grooved to receive part of the lower end of the needle  
45 bar, and through which said needle bar is reciprocated during the stitching operation, *d*<sup>20</sup> represents a lever acting upon the upper end of said zone-shaped projection, said lever being pivoted at *d*<sup>2</sup> and provided at its rear end with a roller *d*<sup>30</sup> that is acted upon by a cam *d*<sup>22</sup> on the main shaft, said cam in its rotation moving the lever *d*<sup>20</sup> to depress the zone-shaped projection against its spring, said projection moving the slide block *d*<sup>9</sup> to provide for moving laterally the needle bar *b*<sup>1</sup> carrying the needle *d* to penetrate the stock in the line of the edge of the buttonhole and then back from said edge. The needle bar, the slide block *d*<sup>9</sup> and its actuating mechanism are and may be all as provided for in said Patent No. 544,827. The framework of the machine has an upright shaft *A*<sup>32</sup> on the upper end of which is mounted a toothed segment *A*<sup>33</sup> that engages the gear *d*<sup>17</sup> referred to, said shaft and segment being the same as the shaft and segment in United States Patent No. 488,028. The lower end of said shaft is provided with a segment *A*<sup>7</sup> having a projection *A*<sup>8</sup> with which is connected adjustably a link *B*<sup>7</sup> in turn connected with a lever having a roller or other stud that enters a cam groove in the under side of a cam hub shown in said  
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patents, said cam hub controlling the annular movement of the stitch-forming mechanism, and the relative traveling movement of the stitch frame and clamp frame, and also actuates the cutting mechanism, as in  
 5 United States Patent No. 655,637.

The segment  $A^7$  engages a pinion 45 secured to the lower end of a carrier 48 suitably sustained in the frame-work and capable of a circular movement, said carrier and gear being also common to Patent No. 655,637.

10 The carrier referred to has a longitudinal central shaft 59 connected by a lever 60 pivoted at 61, the rear end of said lever being connected to a link  $f^9$  that is extended upwardly through a central hole in the cam hub referred to. The latter parts are also common to  
 15 United States Patent No. 655,637. In the machine to be herein described, I have also illustrated a cutter-carrying lever  $G^x$  having a cutter  $G^{2x}$  to cut the work held in a cloth clamp  $m$ , said cutter coacting with an anvil in cutting the cloth held spread by the cloth  
 20 clamp, the cutter and clamp being also common to said Patent No. 655,637, and also to the other patent referred to:

Referring now to parts of my invention that I have incorporated with the well-known type of Reece machine heretofore briefly referred to, I have added a  
 25 lever 100 which is pivoted at 101 and provided with a roller stud 102 that enters a cam groove 103 in a side cam carried by the main shaft, said lever being connected at 104 with the upper end of the link  $f^9$ . Referring now to Fig. 2, the upper end of the rod 59 has a  
 30 stud screw 109 that enters a link 108 connected at its upper end by a stud screw 107 with a lever 106 mounted on a stud screw 105 of the carrier 48, the opposite end of said lever having a stud screw 112 with which is connected a link 113 in turn connected at its upper end  
 35 with a stud screw 114, carried by an arm 115 of a block 116 mounted on a stud screw 117. The block has two arms one of which is provided with a thread-carrying looper 30 and the other with a non-thread-carrying  
 40 looper 31, each arm of said block being provided with a hole to receive the shank, see dotted lines, of two loop spreaders 32 and 33, the loop spreader 32 coacting with the thread-carrying looper 30, while the spreader 33 coacts with the non-thread-carrying looper 31. Each  
 45 spreader has coacting with it a suitable spring as 34, 35 that serves normally to so hold the respective spreaders in such relation to the looper with which  $d$  coacts that the loopers and spreaders enter simultaneously the loops of needle thread. After the loopers and spreaders  
 50 are in the loops of needle thread, the spreaders are moved with relation to the loopers to spread the loops of needle thread, as is necessary in the formation of the stitch, as will be described, and to provide for moving these spreaders one after the other in the proper sequence, I have combined with said spreaders an independent spreader actuator H shown detached in Fig.  
 55 4<sup>a</sup>, said actuator having two arms  $h, h'$  each arm having a long tapered side. The actuator is mounted on a stud  $h^x$  erected in the upper portion 48<sup>x</sup> of the carrier, said spreader actuator having a notch  $h^3$  in its lower end that is entered by a pin  $h^4$  projected from one side of the block 116, said pin when said block is moved in one or the other direction meeting alternately the shoulders at the sides of the notch  $h^3$  and moving the upper end of  
 65 the spreader actuator in a direction opposite the move

ment of the block 116 carrying the loopers, so that one of the beveled parts of one of the arms of said spreader actuator, when the actuator is moved in one direction, meets one of the spreaders and moves it, the opposite beveled arm of the spreader actuator, when moved in  
 70 the opposite direction, meeting the other spreader and moving it. The spreader actuator herein shown, owing to its construction and combination with the carrier, and the block on which is mounted the loopers and spreaders, enables the speed of the stitch-forming  
 75 mechanism to be greatly increased and enables the spreaders to be actuated at their maximum speed with the minimum of friction or shock. The stitch produced by the mechanism herein described comprises two threads, a needle thread  $t$  carried by the needle  $d$   
 80 and a looper thread  $t'$  carried by the thread-carrying looper 30.

When the stitching of a buttonhole is to be commenced, the needle  $d$  will stand with its point above the fabric, and at a distance from what is to be the  
 85 edge of a buttonhole equal to the distance of the depth stitch, back from the edge of the buttonhole slit, as in Fig. 2, and the needle will be made to descend from the position Fig. 2 for its first stitch, the needle penetrating the material say at the inner end of the slit, but  
 90 before the needle enters the material, the block 116 will be moved into the positions Figs. 2 and 3 where it will be seen that the spreader actuator 115 has been moved toward the left to act on the spreader 32 to move  
 95 the same into the position shown best in Fig. 3 where the thread  $t'$  carried by the looper 30 is shown stretched in a straight line from the eye of the looper 30 to the notch in the end of said spreader 32. In the position of the parts, Figs. 2 and 3, the needle after penetrating  
 100 the material passes between the looper 30 and spreader 32 and behind of to the left of the looper thread  $t'$ , and the block 116 will then be moved to the left causing the looper 30 to draw the looper thread about the needle then in the material, as shown in Fig. 5. Now the  
 105 needle starts to rise and the looper continues its movement toward the left, a loop of the thread  $t$  is thrown out from the side of the needle, which loop is entered by the non-thread-carrying looper 31, it having a point  $w$  and a shoulder  $w'$ , see Fig. 9, and the spreader 33  
 110 having a point and a shoulder 33<sup>x</sup>, and the needle continues to rise after said looper and spreader enter the loop of needle thread. As the needle completes its ascent, the slide block  $d^9$  is moved to shift the needle laterally so that it is placed in the vertical plane of the  
 115 edge of the slit cut in the material held in the cloth clamp in usual manner, and at the same time the spreader actuator is moved to the right to act on the spreader 33 back of its pivot and move the spreader to spread the loop of needle thread held by the looper 31 and spreader 33, the movement of the looper 31 to the  
 120 left acting through the shoulders  $w'$  and 33<sup>x</sup> to carry the loop of needle thread from the point where the needle emerged from the material, to and across the edge of the slit, said looper and spreader holding the loop of needle thread spread until the needle in its  
 125 descent, over the edge of the slit, enters a loop in its own thread then held spread by the looper 31 and spreader 33. After this the block 116 and its loopers are moved into their farthest position to the left, Figs. 8 and 9. Then the block and its loopers are started  
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toward the right at which time the looper 31 backs out of the loop of needle thread, and the needle in the final part of its descent tightens the loop of needle thread so cast from the looper 31 and spreader 33, drawing said loop to the edge of the slit. After this the needle starts to rise, a loop of needle thread is thrown out, and the approaching looper 30 enters the loop of needle thread, as shown in Fig. 10, and in the further movement of the looper 30 to the right, the spreader 32 enters the loop of needle thread and the spreader actuator is moved to the left to contact with the spreader 32 and move it into the positions, Figs. 3 and 13, to spread the loop of needle thread under the edge of the fabric and back of said edge where the needle, in its next descent, is to enter the fabric, it being understood that the needle is shifted or moved laterally each time that it rises into substantially its highest position, all as provided for in said Patent No. 544,827. As the needle continues in its descent through the material, it will pass to the left of the looper thread and between said thread and a loop of needle thread at that time held on the looper 30 and spreader 32. As the needle continues its descent, the block 116 and looper are started toward the left, and the looper 30 and spreader 32 then closed retire from both loops leaving a loop of looper thread about a loop of needle thread, and as the needle completes its descent, it acting on its own thread, draws the same taut to complete the stitch. After this, the needle rises, and at the completion of its ascent is moved laterally, and the block, loopers, and actuator are again brought into the positions, Figs. 2 and 3. This completes the round of two thrusts of the needle, one through the fabric and the other over the edge thereof, and this action is repeated throughout the stitching of the buttonhole.

The material having the slit, the edge of which is to be over stitched in the formation of a buttonhole, will, in practice, be held in the clamp *m*, such as herein partially shown, but fully described in said patent, the cutter being actuated by means fully described in said patent, said patent also describing fully means for starting the stitching preferably at the inner end of the slit and continuing said stitching along one side of said slit about its enlarged end or eye and back along the other side of the buttonhole, the needle bar being moved laterally when in its upper position between one and its next stitch, the stitch-forming mechanism traveling longitudinally with relation to the work held in said work clamp while the straight sides of the buttonhole are being stitched, and as the eye of the buttonhole is being stitched, the needle will have imparted to it an extra swing, as provided for in said Reece patents, to enable the eye of the buttonhole to be shaped or rounded as provided for in said patent, the carrier containing the block on which is mounted the loopers, spreaders and actuator, as well as the casing *d*<sup>14</sup>, being partially rotated while the stitching is being carried on about the eye of the buttonhole. The machine herein illustrated partially will in the particulars not herein fully described be the same in construction and operation as in the Reece patents referred to, and the cam hub referred to will be provided with a projection at its upper side for actuating the cutter-carrying lever to cut the buttonhole slit

preferably just before the beginning of the stitching of a buttonhole, I preferring to cut the slit before stitching rather than after, as may be done, as by cutting the fabric before stitching it is possible to over stitch and form a cleaner and smoother edge.

The central portion of the block 116 is provided with a loop turner *n* shown as presenting two shoulders *n'*, *n*<sup>2</sup>, said shoulders being left by the formation of a notch in the upper end of said turner. As the needle rises its loop is thrown out at both sides of the eye of the needle, this happening while the needle is opposite said notch, and as these loops are thrown out the shoulders *n'*, *n*<sup>2</sup> strike said loop at its fabric connected or inactive side and causes the outer or active side of the loop projecting from the needle to be moved or turned slightly toward the advancing looper, thus insuring the entrance of the looper into the loop of needle thread. These features insure the entrance of the loopers into the loop of needle thread and prevents any skipping of stitches, which is liable to happen when the stitch-forming mechanism is run at extra high speed.

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

1. In a buttonhole stitching machine, the combination of a needle-bar and its eye-pointed needle, of complementary under thread-carrying mechanism comprising a plurality of loopers, a plurality of loop spreaders, an independent spreader-actuating member, and means for moving said spreader-actuating member.

2. In a buttonhole stitching machine, the combination of a needle-bar and its eye-pointed needle, of complementary under thread-carrying mechanism comprising a plurality of loopers and a plurality of loop spreaders, an independent two-armed spreader-actuating member, and means for moving said spreader-actuating member to move first one and then the other of said spreaders.

3. In a buttonhole stitching machine, a needle-bar, an eye-pointed needle, means for moving the needle-bar and needle, a carrier, and means for imparting circular movement to said carrier, combined with a plurality of loopers, a plurality of loop spreaders, and an independent movable actuator for moving said spreaders with relation to said loopers.

4. In a buttonhole sewing machine, a carrier, a plurality of loopers mounted thereon, a plurality of pivoted loop spreaders coacting with said loopers, and an independent spreader actuator pivoted on said carrier, combined with means for moving said loopers and actuator, the latter moving the spreaders one after the other to operate substantially as described.

5. In a buttonhole stitching machine, a needle-bar, an eye-pointed needle, means for moving the needle-bar and needle, a carrier, and means for imparting circular movement to said carrier, combined with a plurality of loopers, a plurality of loop spreaders, an independent spreader actuator, and means to move the latter in a direction opposite the movement of the loopers to actuate the spreaders to spread the loops of needle thread.

6. In a buttonhole stitching machine, a looper-carrying block having a loop turner, two loopers and means for moving said block and loopers, combined with a needle, and means for actuating the same, said loop turner meeting the loops of needle thread at its inactive side as the needle is rising and turning the active side of said loop toward the approaching looper.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES A. DAIL.

Witnesses:

THOMAS J. CARTY,

FREDERICK W. DAVISON.