W. J. ROBINSON.

BUTTONHOLE STITCHING ATTACHMENT FOR SEWING MACHINES.

APPLICATION FILED MAY 3, 1911.

**1,012,709.**

Patented Dec. 26, 1911.

3 SHEETS—SHEET 1.

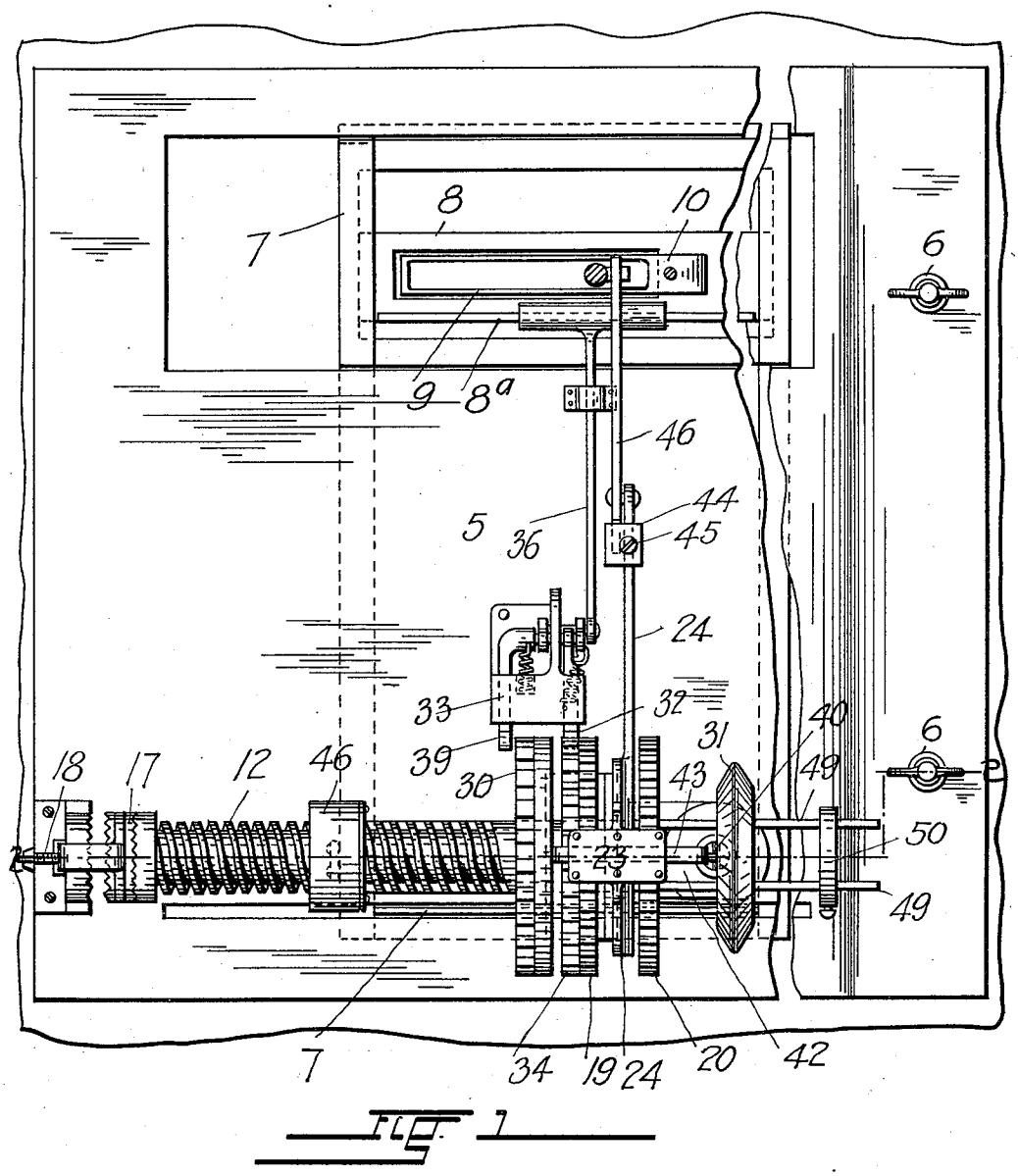


FIG. 1

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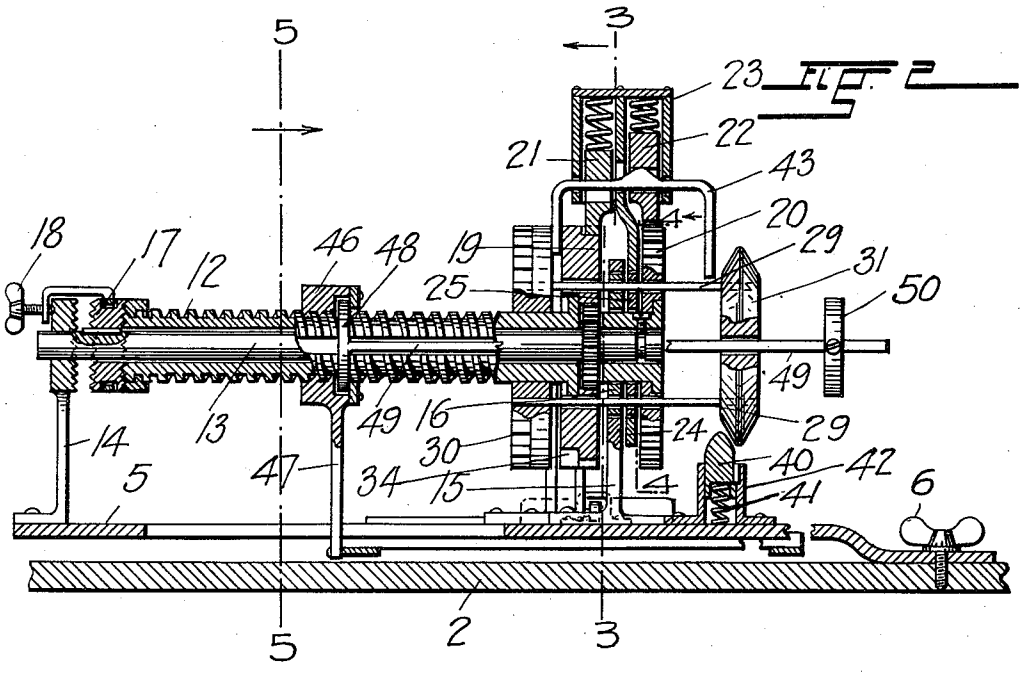


Fig. 2.

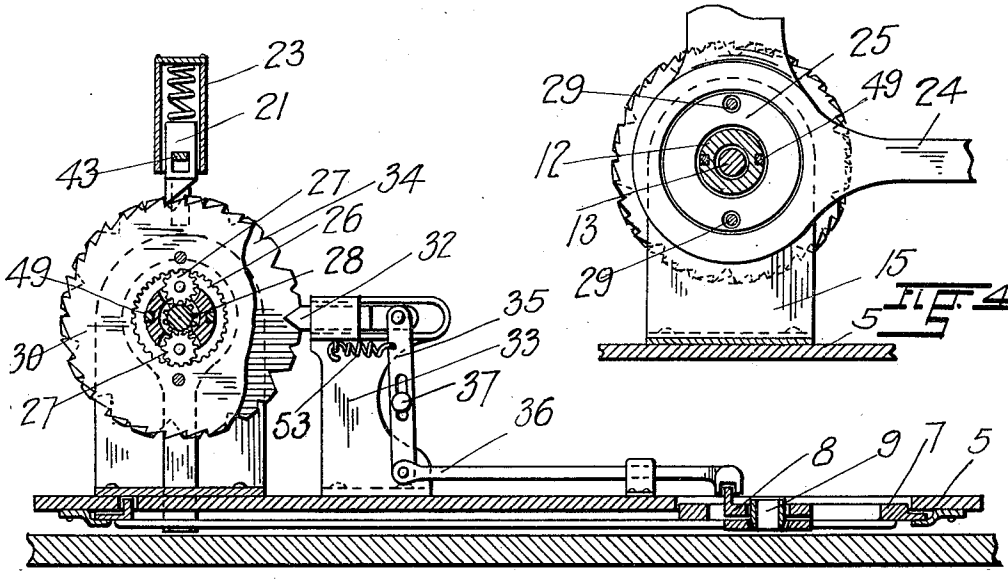


Fig. 3.




Fig. 4.

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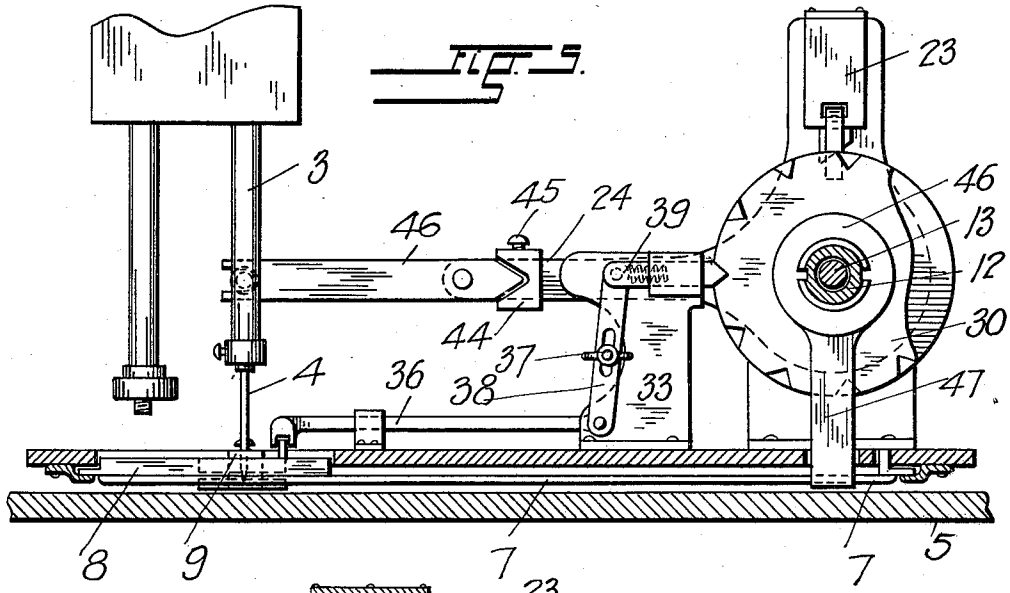


Fig. 5.

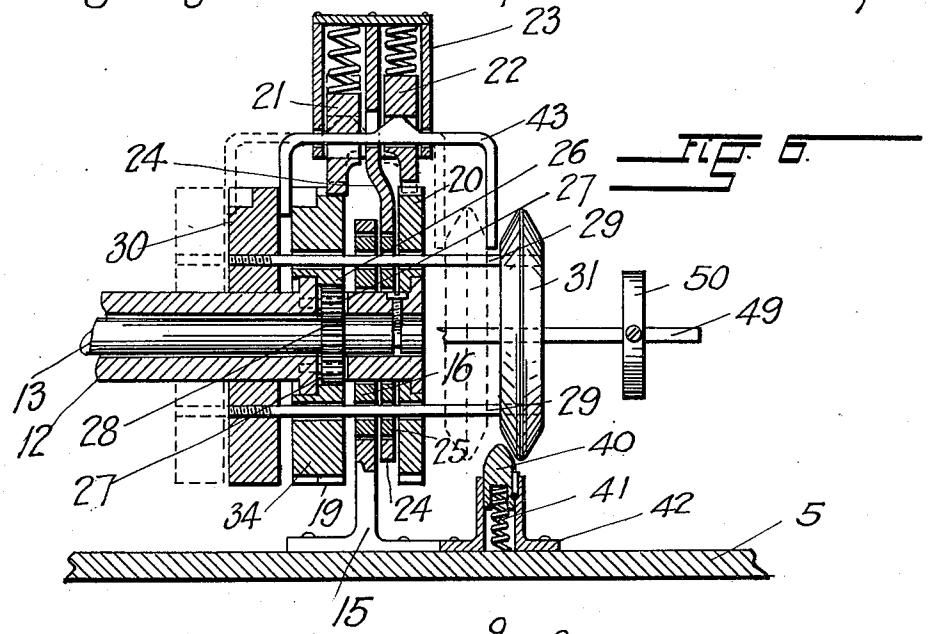


Fig. 6.

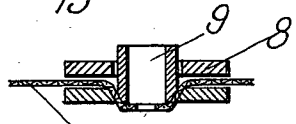


Fig. 7.

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# UNITED STATES PATENT OFFICE.

WILLIAM J. ROBINSON, OF DENVER, COLORADO.

## BUTTONHOLE-STITCHING ATTACHMENT FOR SEWING-MACHINES.

1,012,709. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed May 3, 1911. Serial No. 624,685.

*To all whom it may concern:*

Be it known that I, WILLIAM J. ROBINSON, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Buttonhole-Stitching Attachments for Sewing-Machines, of which the following is a specification.

My invention relates to improvements in button hole stitching attachments for sewing-machines and its object resides in the provision of a mechanism of simple construction which by connection with the reciprocating needle bar of a sewing machine will impart to the fabric in which the buttonhole is cut an intermittent rectilinear movement to bring successive points along an edge of the buttonhole beneath the sewing needle, and a transverse reciprocating movement to produce the stitches around said edge.

When an end of the buttonhole has reached the point below the needle bar, the cloth is automatically adjusted first to produce stitches across the end of the buttonhole and then to bring the opposite edge of the latter in position beneath the needle bar to produce the stitches along the same while the cloth is moved intermittently in the opposite direction.

Another object of my invention resides in the provision of simple adjusting means whereby the attachment may be readily adapted for stitching buttonholes of varying lengths, for the employment of thin and coarse thread, and to produce stitches of different lengths.

My invention comprises, essentially, an endless screw which receives an intermittent rotary movement by connection with the reciprocating needle-bar of a sewing-machine, a carriage which is fed in a rectilinear direction by the movement of the screw, a slide on said carriage which is adapted to clampingly secure the cloth in which the buttonhole is cut, and which receives a reciprocating motion by the same movement that actuates the carriage, and a reversing element by which the direction of rotation of the screw and in consequence the direction of movement of the carriage, is automatically reversed when an end of the button-hole has reached the position directly beneath the sewing needle.

In the accompanying drawings in the various views of which like parts are similarly designated, Figure 1, represents a plan view of the attachment in its operative position with relation to the needle bar of a sewing machine, Fig. 2, a section taken along the line 2—2 Fig. 1, Fig. 3, a section along the line 3—3 Fig. 2, Fig. 4, a fragmentary section taken along the line 4—4 Fig. 2, Fig. 5, a section along the line 5—5 Fig. 2, Fig. 6, a fragmentary sectional view similar to Fig. 2 but drawn to an enlarged scale, and Fig. 7, a sectional view of the clamping slide with the cloth in which the buttonhole is cut, in position.

Referring to the drawings by numerals, 2 designates the table of a sewing machine to which the attachment is applied and 3 the reciprocating bar which at its lower extremity carries the threaded needle 4.

The buttonhole stitching attachment comprises a base plate 5 which is securely fastened upon the table 2 by means of thumbscrews 6. A carriage 7 has a rectilinear movement in guide-grooves formed at the under surface of the plate and a clamp 8 is slidingly mounted upon the carriage to have a transverse reciprocating movement. The carriage 7 is composed of a rectangular frame in which the member 8 is slidably supported and the latter comprises two slotted plates between which the cloth 52 to be operated upon, is inserted, and a clamping frame 9 which is secured at one of its ends upon the upper plate by means of a spring 10 and which is fitted in corresponding openings in the two plates to firmly secure the fabric placed between them with the portion in which the button-hole is cut beneath the opening of the frame, as shown in Fig. 7 of the drawings, the plate 5 being positioned with relation to the sewing machine so that the needle bar 3 extends above the opening of the clamping frame to engage the cloth stretched beneath the same.

The endless screw 12 through the instrumentality of which the reciprocating movement of the needle bar is converted into rectilinear intermittent and reciprocating movements of the carriage 7 and the sliding member 8, is revolubly supported upon a shaft 13 which is rotatably mounted in two standards 14 and 15 which are erected upon the base plate 5. One of the standards, 14 and 15, is directly engaged by the end of the shaft 13 but the other one has a ring 16 which is revolubly fitted in an opening in

the standard and which supports the smooth end portion of the endless screw around which it is disposed.

An end face of the screw 12 and the thereto adjacent face of the standard 14 are serrated to be engaged by correspondingly formed serrations on a clutch 17 which is slidably keyed on the shaft 13 and which may be moved into engagement with one or the other of the said faces by manipulation of an adjusting screw 18 to either lock the shaft against rotation or to compel the screw 12 to move in unison therewith.

Mounted upon the smooth end-portion of the screw to move in unison therewith, are two ratchet wheels 19 and 20 the teeth of which are directed oppositely to be respectively engaged by spring-controlled pawls 21 and 22 which are slidably held in a housing 23 formed integral with the annular end of an arm 24 which is rotatably mounted upon the smooth portion of the screw in between the two ratchet-wheels and adjacent the standard 15, by means of an interposed ring 25.

The ratchet wheel 20 is loosely mounted upon the extreme end of the screw and the other wheel 19 is provided with a circumferentially toothed recess 26 into which mesh two planet-gears 27 which are rotatably mounted in openings in the screw 12 and which are disposed oppositely in operative engagement with a sun-gear 28 formed on the shaft 13. The planet gearing in cooperation with the clutch 17, serves to vary the velocity of the ratchet wheels relative to the uniform rate of speed of the endless screw when it is desired to employ a finer or coarser thread in producing the stitches around the buttonhole.

When the endless screw 12 is by means of the clutch 17 connected to move in unison with the shaft 13, the planet gears are locked against rotation about their axes and the ratchet wheel 19 will, in consequence, rotate at a rate of speed equal to that of the screw, but when by adjustment of the clutch, the shaft 13 is held against rotation, the movement of the screw 12 is transmitted to the ratchet wheel by the planetary movement of the pinions 27, at a reduced rate of speed. The two ratchet wheels 19 and 20 are connected to move in unison by means of two rods 29 which project slidingly through alined openings in the two wheels and the rings 25 and 16 and which at their opposite extremities are connected by means of heads 30 and 31. The rods 29 together with their heads constitute the element which in the operation of the invention serves to automatically reverse the direction of rotation of the screw and, in consequence, the direction of travel of the carriage 7 which carries the cloth in which the button-hole has been cut, when an end of the latter has reached the point directly beneath the needle 4. The slide 8 which secures the cloth receives in the operation, a reciprocating movement through the instrumentality of a dog 32 which has a sliding movement in a bearing on a standard 33 erected on the base plate and which engages with the peripheral edge of a disk 34 which is formed integral with the ratchet-wheel 19 and which has a series of equidistant notches of alternately varying depths into which said dog enters during the rotatory movement of the disk. The dog 32 is pivotally connected at the upper extremity of a lever 35 which at its lower end connects with a pitman 36, which at its opposite extremity slidably engages a ridge $8^a$ on the clamping member 8. The lever 35 is by means of a bolt 37 fulcrumed upon a rocker arm 38 which at its lower extremity is pivotally attached to the standard 33, the said bolt being inserted through longitudinal slots formed in both the lever 35 and the arm 38 to permit an adjustment of the fulcrum when it is desired to vary the length of the stitches produced by the action of the needle 4. The head 30 of the reversing element is peripherally divided into a notched section and a plain section, and a sliding spring-controlled dog 39 on the standard 33 is pivotally connected at the upper end of the rocker-arm 38 to engage the peripheral surface of the said head when the position of the element of which it forms part, is being reversed. The purpose of this part of the mechanism is to produce a number of stitches across the ends of the button-hole by moving the clamp-slide back and forth when the dog engages the notched section of the head, and by subsequently changing the position of the said slide by the engagement of the dog with the plain section of the head to bring the edge of the button-hole opposite to that already stitched in alinement with the needle 4.

A coiled spring 53 is applied between a fixed point of the standard 33 and the lever 35 to maintain the latter resiliently in its normal position. A plunger 40 having a vertical movement against the action of a spring 41 on a housing 42 on the plate 5 is disposed to be engaged by the beveled peripheral edge of the head 31 on the reversing element during the latter's movement in either direction. The upper extremity of the plunger is tapered and its object is to accelerate and complete the movement of the reversing element by the action of the spring when the head has been moved to a position in which its edge has passed the apex of the plunger. The pawls 21 and 22 which alternately engage the teeth of the respective ratchet wheels 19 and 20 are provided with openings for the reception of a cam-bar 43 which is slidably mounted in

alined apertures in the sides of the housing 23 and whose ends are bent to extend in the paths of the heads 30 and 31 of the reversing element. The cam portion of the bar which is provided by a protuberance upon its upper edge occupies one or the other of the openings in the pawls to hold the pawl in which it is disposed free from engagement with the teeth of the respective ratchet wheel and it is moved from the opening in one pawl to that in the other by the engagement of the extremity of the bar 43 by one of the heads of the reversing element when the latter moves through the alined openings in the ratchet-wheels and the disks 16 and 25 in which the rods 29 are supported.

The above referred to arm 24 by means of which the movement of the needle bar 3 is transmitted to the slide 8, is composed of two pivotally connected members, the one connected with the bar having a bifurcated tapering extremity which projects into correspondingly formed recesses in a block 44 which is adjustably secured upon the other member by means of a set-screw 45. By proper adjustment of the block the member 46 which is pivotally connected with the needle is allowed more or less lost motion and the extent of the intermittent rotary movements of the endless screw may thus be varied without changing the rate of speed of the sewing machine with which the invention is associated. The intermittent rotary movement of the screw imparted thereto through the action of either one of the pawls 21 and 22 upon the respective ratchet wheels, is converted into an intermittent rectilinear movement of the carriage 7 through the instrumentality of a nut 46 which is mounted on the screw and which is connected with the carriage by means of an arm 47. A ring 48 which loosely surrounds the screw is rotatably held in a recess in the nut 46 and it is attached to two oppositely disposed bars 49 which slidingly occupy longitudinal grooves in the screw and which project through a central opening in the head 31 of the reversing element to be connected adjacent their extremities by an adjustable striking-disk 50 which serves to change the position of the reversing element by contact with the head 31.

Having thus described the mechanical construction of my invention its operation is as follows: After the attachment has been placed in position upon the table of the sewing machine with the clamping frame 8 beneath the needle 4 and the arm 46 in pivotal connection with the vertically reciprocating bar 3, the cloth in which the button-hole is cut is clamped upon the carriage 7 as is shown in Fig. 7 of the drawings. Presuming that the parts are in the position shown in Fig. 2, the nut 46 will by the intermittent rotary motion of the screw 12 which is imparted thereto by the reciprocating motion of the bar 3, through the instrumentality of the pawl 21 acting upon the ratchet wheel 19, be impelled toward the left end of the screw and the carriage 7 will in consequence move intermittently in the same direction. The rotary movement of the wheel 19 causes the dog 32 to slip into and out of the notches cut in the periphery of the disk 30 with the result that an intermittent reciprocating movement is imparted to the clamping member 8 to which the cloth 52 is secured. The combined movements of the carriage and the member 8 together with the reciprocatory movement of the threaded needle through the cloth, result in the formation of alternately long and short stitches around the edge of the button-hole until an end of the latter has reached the point directly beneath the needle when the striking disk engages the head 31 of the reversing element and impels it beyond the apex of the plunger 40 which by the action of the spring 41 completes the movement of the said element to the position shown in broken lines in Fig. 6. During the movement of the reversing element, the head 31 is brought in engagement with the adjacent end of the cam-bar 43 which in consequence is pushed through the openings in which it is supported to lift the pawl 21 out of engagement with the teeth of the ratchet wheel 19 while the pawl 22 falls into the interdental spaces of the other wheel 20. The movement of the reversing element furthermore brings the notched and smooth sections of the head 30 successively in engagement with the dog 39 which in consequence, first moves the fulcrum of the lever 35 back and forth to produce the stitches across the end of the button-hole and then moves the said fulcrum permanently to bring the opposite edge of the button-hole beneath the needle 4. Inasmuch as the teeth of the ratchet-wheel 20 are directed oppositely to those of the wheel 19, the screw will now be rotated in the opposite direction and the nut 46 will impart a return movement to the carriage to produce the stitches around the edge of the button-hole as before until the end of the button-hole at which the operation was commenced has been reached, when by the engagement of the nut 46 with the head 30 of the reversing element, the parts are returned to their normal positions, it being understood that during the return movement of the said element the notched portion of the head 30 was again brought in engagement with the dog 39 to produce stitches across the end of the button-hole. By adjustment of the fulcrum 37 in the slots of the lever 35 and the rocker arm 38, the length of the stitches produced by the action of the needle may be varied within determined limits, the at-

tachment may be adjusted for use with either coarse or fine thread by changing the position of the clutch 17, the function of which has been hereinbefore explained, the length of the intermittent rotary movements of the endless screw relative to the uniform reciprocating movement of the needle bar may be varied by adjustment of the block 44 and the attachment may be readily adapted for the stitching of button-holes of different lengths by moving the striking disk 50 upon the bars 49 to make the distance between the said disk and the head 31 of the reversing element, when the parts are in the position shown in Fig. 2, equal to the length of the button-hole cut in the cloth 52.

Having thus described my invention what I claim and desire to secure by Letters-Patent is:—

1. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, and means for converting the movement of the said ratchet wheels into a reciprocating movement of the said sliding member.

2. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a notched disk connected to move in unison with the ratchet wheels, a dog mounted to slip into and out of the notches in said disk, and means for transmitting the movements of the said dog to the sliding member.

3. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a lever connected at one of its ends with the said sliding-member, and a spring-controlled dog pivotally attached at the opposite end of the lever in engagement with the periphery of said disk.

4. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a dog disposed to slip in and out of the notches in said disk, a lever pivotally connected with said dog, and a connection between the lever and the said sliding member, the fulcrum of the said lever being adjustable to vary the length of movement of the said member.

5. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a dog disposed to slip in and out of the notches in said disk, a lever pivotally con-

nected with said dog, a connection between the lever and the said sliding member, and means automatically actuated at a pre-determined point in the movement of the carriage to shift the said member relative to the needle bar for the purpose set forth.

6. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a dog disposed to slip in and out of the notches in said disk, a lever pivotally connected with said dog, a connection between the lever and the said sliding member, and means automatically actuated at a pre-determined point in the movement of the carriage to shift the said member relative to the needle bar by lateral displacement of the fulcrum of said lever.

7. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a dog disposed to slip in and out of the notches in said disk, a lever pivotally connected with said dog, a connection between the lever and the said sliding member, and means automatically actuated at a predetermined point in the movement of the carriage to shift the said member successively, reciprocatingly and permanently with relation to the needle bar for the purpose set forth.

8. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, means for converting the movement of said ratchet wheels into a reciprocating movement of the said sliding member and means for varying the length of the intermittent rotary movements of the screw relative to the uniform reciprocating motion of the needle bar.

9. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm composed of two pivotally connected members, one of which is pivotally connected with the needle bar and is tapered at its opposite extremity, a block adjustable on the other member of the arm, being recessed to receive said tapering extremity, pawls on the same member to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut and means for converting the movement of the said ratchet wheels into a reciprocating movement of the said sliding member.

10. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, a peripherally notched disk connected to move in unison with the ratchet-wheels, a dog disposed to slip in and out of the notches in said disk, a lever pivotally connected with

said dog, a connection between the lever and the said sliding member and means automatically actuated at a predetermined point in the movement of the carriage to shift the said member relative to the needle bar by successively effecting a lateral reciprocating movement and a permanent lateral displacement of the fulcrum of said lever.

11. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, an element for reversing the position of said device, a striking member adjustably connected with the nut to actuate said element at a selected point in the movement of the nut and means for converting the movement of said ratchet-wheels into a reciprocating movement of the sliding member.

12. The combination with the reciprocating needle bar, of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, a notched disk connected to move in unison with the ratchet wheels, a dog mounted to slip into and out of the notches in said disk, an element for reversing the position of said device, including a member for shifting the sliding-member with relation to the needle bar, a striking disk adjustably connected with the nut to actuate the reversing element at a selected point in the movement of the nut, a rocker arm adapted to be impelled by action of the said shifting-member, a lever fulcrumed upon said arm and connected with the said sliding member, and a dog on the said lever, disposed to slip in and out of the notches in the said notched disk.

13. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet-wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, a notched disk connected to move in unison with the ratchet wheels, a dog mounted to slip into and out of the notches in said disk, an element for reversing the position of said device, including a member for shifting the sliding-member with relation to the needle bar, the periphery of said member being divided into a plain section and a notched section, a striking disk adjustably connected with the nut to actuate the reversing element at a selected point in the movement of the nut, a rocker arm, a dog connected therewith to be successively engaged by the peripheral sections of the shifting member during movement of the said element, a lever fulcrumed upon said arm and connected with the said sliding member, and a dog on the said lever disposed to slip in and out of the notches in the said notched disk.

14. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, a notched disk connected to move in unison with the ratchet wheels, a dog mounted to slip into and out of the notches in said disk, an element for reversing the position of said device, including a member for shifting the sliding-member with relation to the needle bar, a striking disk adjustably connected with the nut to actuate the reversing element at a selected point in the movement of the nut, a rocker arm adapted to be impelled by action of the said shifting-member, a lever fulcrumed upon said arm and connected with the said sliding member, and a dog on the said lever, disposed to slip in and out of the notches in the said notched disk, the said arm and the said lever having parallel longitudinal slots for the adjustment of the fulcrum.

15. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels loosely mounted thereon, means for imparting the movement of one of said wheels to the said screw, an arm operatively connected with the

needle-bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, an element for reversing the position of said device, comprising connected rods slidably extending through alined apertures in the ratchet wheels, a carriage, a nut on the screw impellently connected with the carriage, a striking member connected with the nut to actuate the reversing element at a predetermined point in the movement of the nut, a sliding member on the carriage adapted to secure a cloth in operative relation to the needle bar, and means for converting the movement of said ratchet wheels into a reciprocating movement of the said sliding member.

16. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels connected to move in unison and loosely mounted on said screw, means for converting the movement of the said wheels into a movement of the screw at a selected rate of speed, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, and means for converting the movement of the said ratchet-wheels into a reciprocating movement of the said sliding member.

17. The combination with the reciprocating needle bar of a sewing machine, of a rotary shaft, an endless screw revolubly mounted thereon, ratchet wheels connected to move in unison and loosely mounted on said screw, one of the said wheels having an internal gear, planet gears between said gear and a gear formed on the shaft, a clutch adapted to either connect said screw to the shaft or to lock the latter against rotation, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet-wheels, a carriage, a nut on the screw impellently connected with the carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, means to automatically actuate the said device at a predetermined point in the movement of the nut, and means for converting the movement of the said ratchet wheels into a reciprocating movement of the said sliding member.

18. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, an element for reversing the position of the said device, a carriage, a nut on the screw impellently connected with the carriage, a rod non-rotatably connected with the nut, a disk adjustably mounted on said rod to impellently engage the said element, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, and means for converting the movement of the said ratchet wheels into a reciprocating movement of the said sliding member.

19. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, an element for reversing the position of the said device, a carriage, a nut on the screw impellently connected with the carriage, a striking disk connected with the nut to impellently engage the said element, means for accelerating the movement of the said element, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle-bar, and means for converting the movement of said ratchet wheels into a reciprocating movement of the said sliding member.

20. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, ratchet wheels mounted to move in unison and to impart their motion to the said screw, an arm operatively connected with the needle bar, pawls on said arm to engage the teeth of the respective ratchet wheels, a device for moving said pawls alternately out of engagement with the teeth of the respective ratchet wheels, an element for reversing the position of the said device and including a peripherally tapered disk, a carriage, a nut on the screw impellently connected with the carriage, a striking disk connected with the nut to impellently engage the said element, a spring actuated, tapering plunger disposed to be moved against the action of the spring when engaged by the said tapered disk, a sliding member on said carriage adapted to secure a cloth in operative relation to the needle bar, and means for converting the move-

ment of said ratchet-wheels into a reciprocating movement of said sliding member.

21. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, a ratchet wheel connected to move in unison therewith, an arm connected with the said needle bar, a pawl on said arm engaging said ratchet, a carriage, a nut on said screw impellently connected with said carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the said needle-bar, a peripherally notched disk moving in unison with said ratchet wheel, a dog disposed to slip in and out of the notches of said disk, a lever connected with said dog and a connection between said lever and said sliding member.

22. The combination with the reciprocating needle bar of a sewing machine, of an endless screw, a ratchet wheel connected to move in unison therewith, an arm connected with the said needle bar, a pawl on said arm engaging said ratchet, a carriage, a nut on said screw impellently connected with said carriage, a sliding member on said carriage adapted to secure a cloth in operative relation to the said needle bar, a peripherally notched disk moving in unison with said ratchet wheel, a dog disposed to slip in and out of the notches of said disk, a lever connected with said dog, a connection between said lever and said sliding member, and means for changing the position of the fulcrum of said lever longitudinally with relation thereto.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM J. ROBINSON.

Witnesses:
L. RHOADES,
G. J. ROLLANDET.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."