R. L. LYONS.

BUTTON SEWING MACHINE.

APPLICATION FILED AUG. 27, 1906.

961,507.

Patented June 14, 1910.

5 SHEETS—SHEET 1.

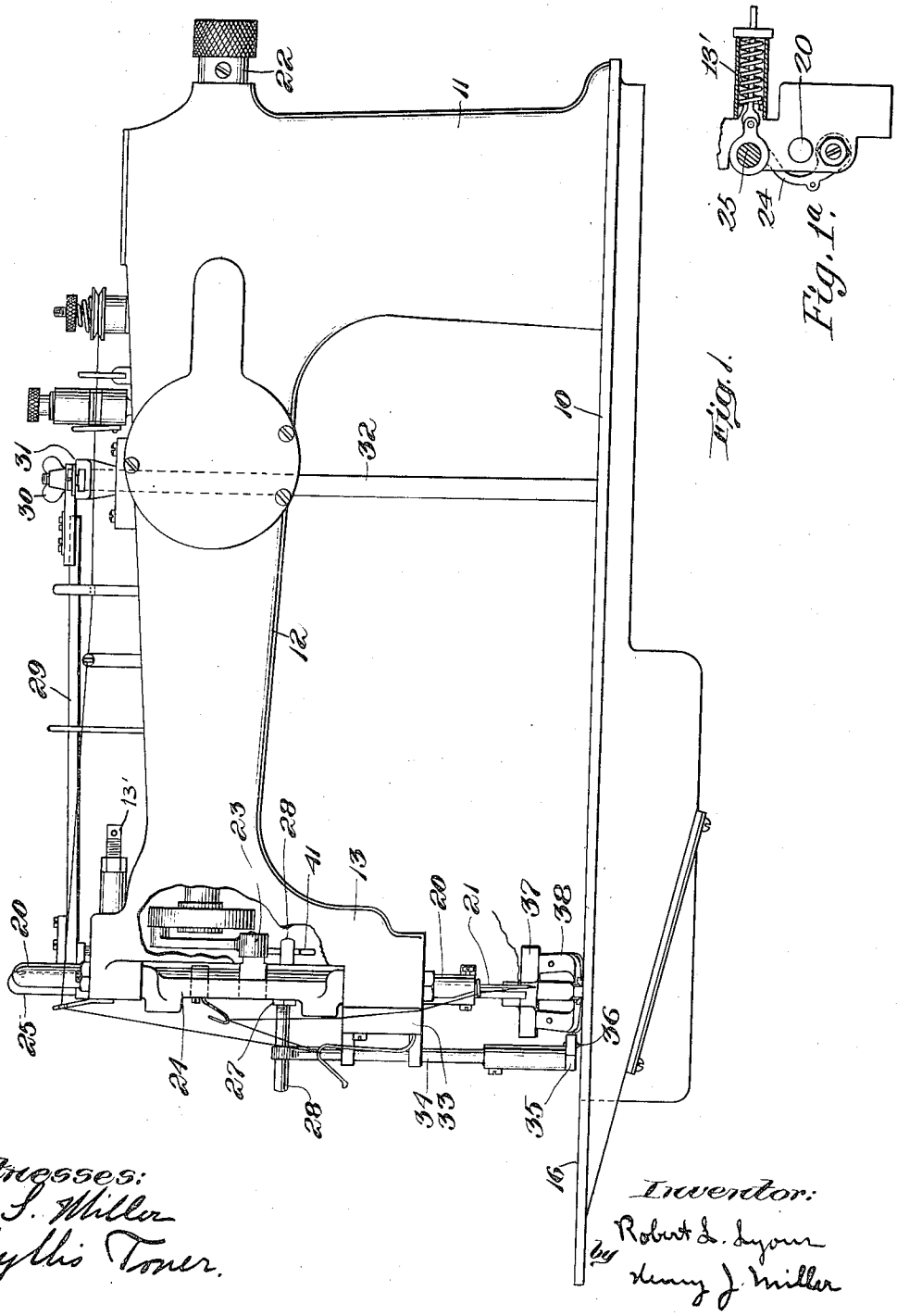


Fig. 1.




Fig. 1a.

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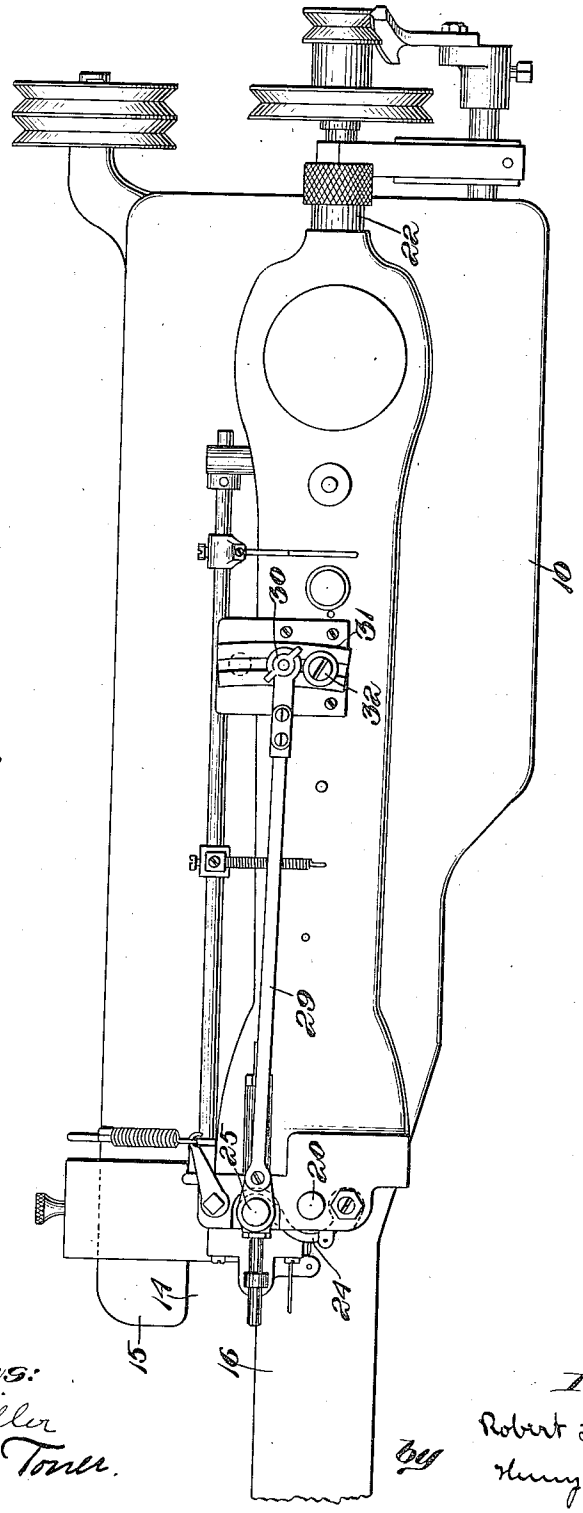


Fig. 2.

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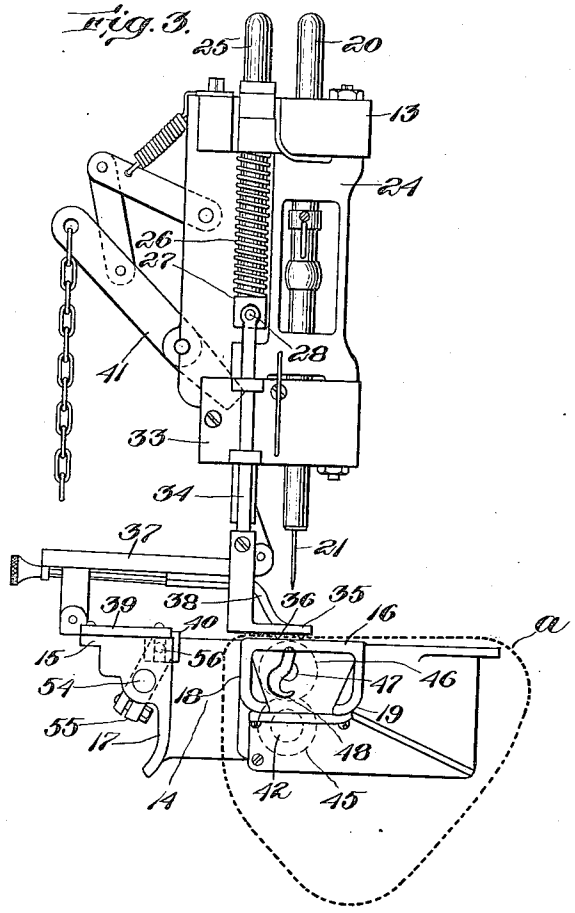
5 SHEETS—SHEET 3.

Fig. 3.

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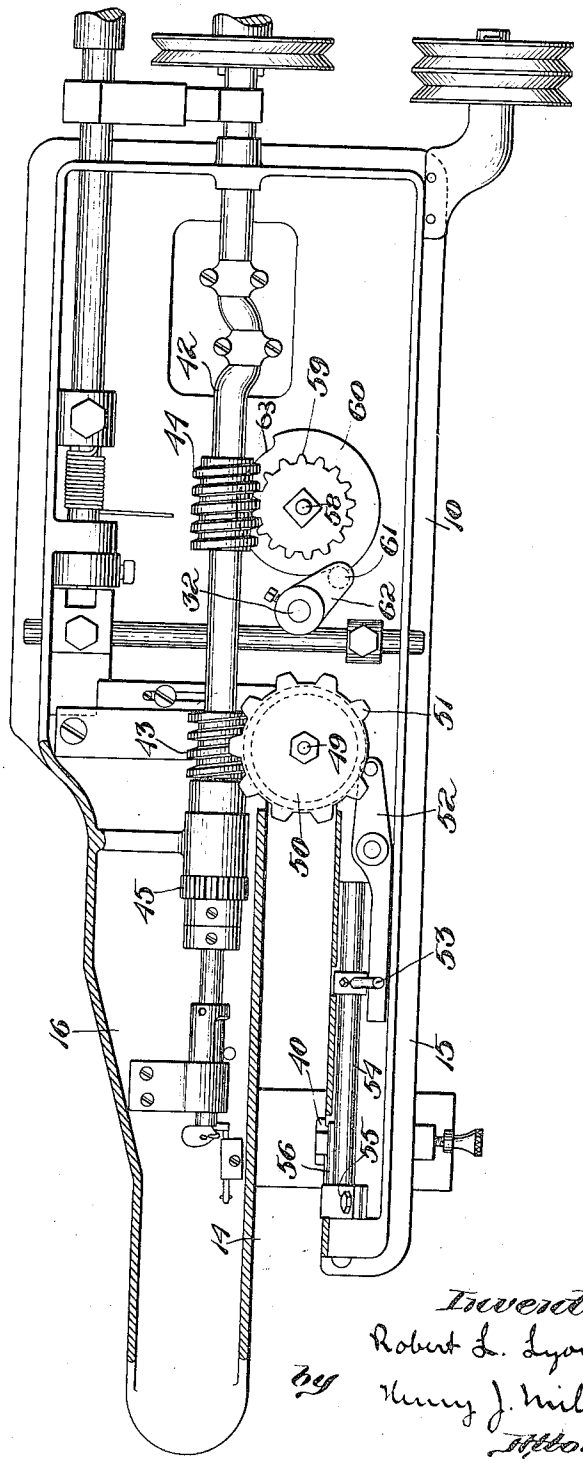


Fig. 4.

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5 SHEETS—SHEET 5.

Fig. 5.

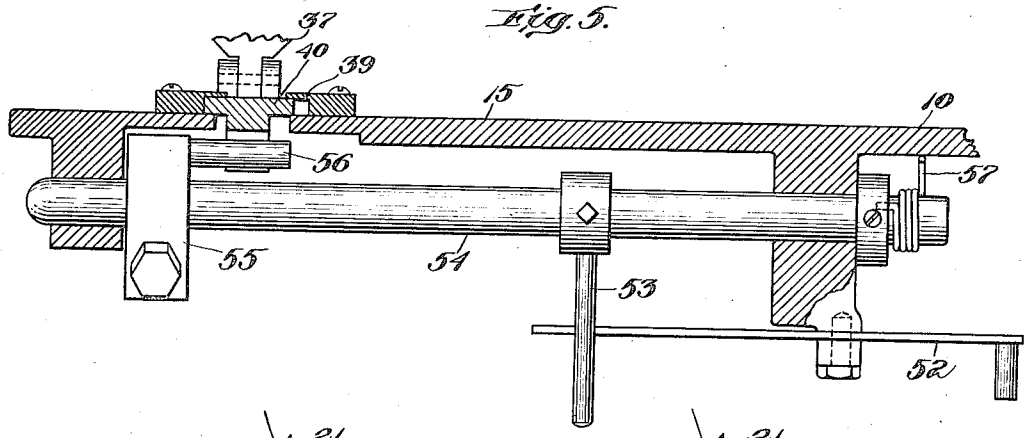



Fig. 6.

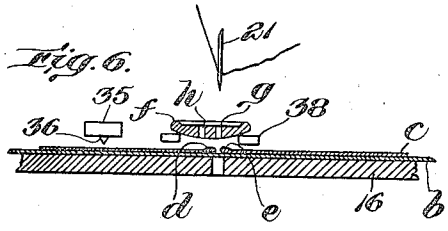



Fig. 7.

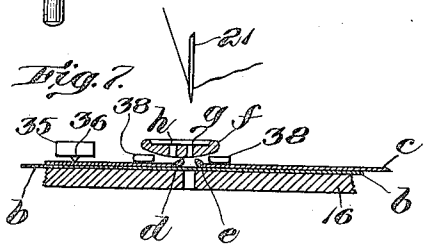



Fig. 8.

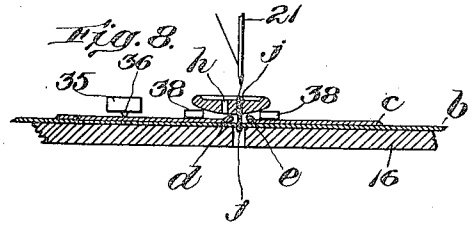



Fig. 9.

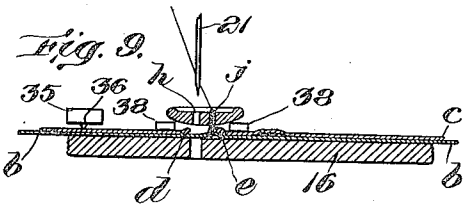
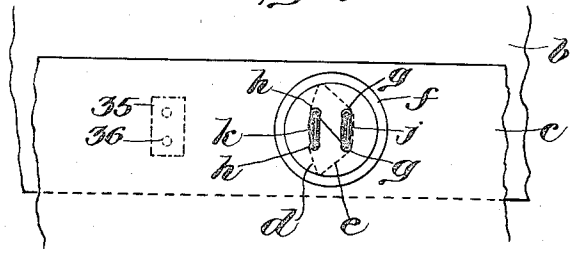



Fig. 10.

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# UNITED STATES PATENT OFFICE.

ROBERT L. LYONS, OF WALTHAM, MASSACHUSETTS.

## BUTTON-SEWING MACHINE.

961,507. Specification of Letters Patent. Patented June 14, 1910.

Application filed August 27, 1906. Serial No. 332,108.

*To all whom it may concern:*

Be it known that I, ROBERT L. LYONS, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Button-Sewing Machines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in button sewing machines and relates particularly to improvements whereby buttons may be sewed through button holes in an upper layer of fabric to an underlying fabric in order to deliver the goods buttoned up as a finished product of the machine.

One object of this invention is to so construct a button sewing machine that buttons may be sewed or attached to one edge portion of a garment through button holes previously formed in the other edge portion of the garment, the overlapping of these edge portions during the button sewing rendering the garment tubular in shape.

Another object of the invention is to so construct a button sewing machine that buttons may be sewed thereby through button holes in an upper layer of fabric to an underlying layer of fabric without the interpositioning of button hole expanding devices between the button and the fabric having the button hole.

Another object of the invention is to so construct a button sewing machine adapted to sew buttons to an under layer of fabric through button holes in a superposed layer of fabric that the button, partially attached to the under layer of fabric by a group of stitches extending through the unexpanded button hole, may be moved laterally to effect the expansion of the button hole to permit a second group of stitches to be formed therethrough.

Another object of the invention is to simplify the construction of button sewing machines of this nature.

Other objects of the invention will appear from the following description.

The invention consists in such peculiar features of construction and combination of parts as shall hereinafter be more fully described and pointed out in the claims.

Figure 1, represents a front elevation of the improved button sewing machine. Fig. 1ª represents a detail view, partly in section, of the spring device for actuating the swinging support for the work holder. Fig. 2, represents a plan view of the same. Fig. 3, represents an end view thereof. Fig. 4, represents a bottom plan view of the machine. Fig. 5, represents an end view of the machine looking in the direction in which the work is fed. Fig. 6, represents a diagrammatic view of portions of a garment as positioned for the button sewing operation one of the button hole margins being shown in section to illustrate the convexity of said margin in cross section. Fig. 7, represents a similar view of the same showing the button clamp arms pressing on the fabric at the sides of the button hole and indicating a slight expansion of the button hole by reason of the curling upward of the button hole margins as a result of such pressure, also showing the engagement of the holder with the upper layer of fabric. Fig. 8, represents a similar view showing the button sewed to the under piece of fabric by a single group of stitches passing through the button hole. Fig. 9, represents a similar view showing the button moved laterally from the position shown in Fig. 8 to receive the second group of stitches, the upper piece of fabric being held from movement by the teeth 36 of the plate 35, the button hole being expanded by the drawing of the first group of stitches against the edge thereof in the lateral movement of the button. Fig. 10, represents a plan view of one of the buttons secured to a part of one fabric showing the two groups of stitches and the expanded button hole.

Similar characters of reference designate corresponding parts throughout.

In carrying this invention into practice my main object is to so construct a button sewing machine that the goods may be delivered therefrom in a buttoned up condition, thus effecting a saving in time and labor from the method heretofore used in first marking the points at which the buttons are to be sewed, then sewing on the buttons and finally buttoning up the garment. To attain this object in a practical manner it is obvious that the button sewing operation must be practically as simple as the single step of sewing buttons on to articles as heretofore practiced where it was not desired to deliver the articles in a buttoned up condition. As the object of the invention

is to save time and labor the process must not be complicated by the introduction of additional mechanism of a nature that will retard the operation or from which it is necessary to disengage the article, or the button, at any one of the several button sewing operations for the loss of time necessary for effecting such disengagements will materially reduce the value of such a mechanism. While a button sewing machine of this particular nature may be used to sew buttons on articles which it is not desired to deliver in a buttoned up condition, or in which buttons may be sewed through the button holes of one fabric to another separate fabric, it is evident that the main value of such a button sewing machine is in the sewing of buttons through button holes formed in one edge portion of a fabric to the other edge portion of the same fabric whereby said edge portions of the article, or garment, are secured together by the buttons thus forming a tubular article. In order to thus sew buttons on to an article which, when delivered from the machine, is tubular in shape the article should preferably be presented for the button sewing machine with its edge portions overlapping, the button holes preferably being formed in the upper lap, and the article having in effect, a tubular structure of considerable length the feeding forward of practically the entire length of which to the button sewing position of the machine is important, as is also the proper positioning of the button holes which, in knitted goods, generally extend across the ribs of the knitting and hence transverse to the direction in which the garment is preferably fed.

As shown in the drawings 10 represents the bed plate of the machine having the standard 11 furnished with the arm 12 and the head 13. This bed plate 10 at the end opposite to that from which the standard 11 extends is furnished with the channel 14, of any desired length, which separates the button clamp supporting arm 15 of said bed plate from the work supporting member 16 of the bed plate having the usual needle passage. From the arm 15 depends the web 17 and from the work support 16 depend the webs 18 and 19 which form the sides of a chamber in which parts of the operating mechanism are contained, these webs 17 and 18—19 being primarily designed to protect the articles under operation from contact with mechanism located beneath the bed plate.

In bearings of the head 13 is mounted to slide vertically the needle bar 20 having means, of any usual construction, for carrying a needle 21 and operated by means of the usual shaft 22 journaled in bearings of the arm 12 and the arm 23 pivoted to a member of said shaft 22 and to a fitting on the needle bar 20. The shaft 22 is driven in any usual manner to effect the reciprocation of the needle bar 20.

The gate 24 is pivotally mounted on the head 13 and has bearings in which the presser and lifter rod 25 is free to rotate and slide, the spring 26 located between a portion of said gate 24 and the sleeve 27, of the laterally extending arm 28, on the rod 25, tending to move said rod toward the work support. At the free end of the gate 24 is pivoted one end of the rod 29 the other end of which rod is adjustably secured by the clamp 30 working in the curved slot of the plate 31 which is secured at one end to the upper portion of the vertical shaft 32 journaled in bearings and extending through the bed plate 10.

Secured to the head 13 is the bearing block 33 having bearings in which the rod 34 is free to slide vertically. At its upper end this rod has a transverse bearing, in which the arm 28 is free to move, and at the lower end of said rod 34 is secured the plate 35 having cloth engaging teeth 36.

The button clamp 37 is of the usual construction except that the work supporting plate usually extending beneath the arms 38—38 is omitted. This button clamp is pivotally connected with the presser and lifter rod 25 to move upward and downward, and laterally therewith to follow the movement of the gate 24. This lateral movement is permitted by reason of the width of the guide 39 mounted on the arm 14 as said guide is considerably wider than the block 40, which block is slidable laterally in said guide, to which the rear portion of the button clamp is pivoted. Any ordinary means herein shown as the arm 41 pivotally mounted on the head 13 and engaging under one end of the arm 28 on the presser rod 25 is used to lift the forward end of the button clamp at times to permit of the positioning of the fabric thereunder.

At the under side of the bed plate 10 is journaled the main shaft 42 which is furnished with the worm gears 43 and 44; any ordinary mechanism for driving this shaft 42 is utilized. Motion is transmitted from the shaft 42 by means of the gears 45 and 46 to the looper shaft 47, journaled in bearings beneath the work support 16, and furnished with the looper hook 48.

Extending from the lower portion of the bed plate 10 is the stud 49 on which the gear 50 and the cam 51 are journaled to rotate together, the gear 50 meshes with the worm 43 of the shaft 42 and the cam 51 works against one end of the lever 52 pivotally mounted at the under side of the bed plate, the other end of this lever 52 engages the arm 53 extending from the shaft 54, journaled in bearings beneath the button clamp support arm 15, and having the crank arm

56 the pin 57 of which is engaged in a transverse bearing in the block 40 whereby back and forth movement of the block 40 and the button clamp 37, connected therewith is effected, such back and forth movement being controlled by the shape of the cam 51 which shape is determined by proposed number of stitches in each group of stitches. Pressure is exerted by the spring 57, secured to the shaft 54 and bearing against the bed plate 10 to resist the rotation of said shaft and to hold the end of the lever 52 against the cam 51.

From the under side of the bed plate 10, adjacent the worm 44 of the shaft 42 extends the stud 58 on which is journaled the gear 59 meshing with the worm 44 and having the cam 60 which works against the pin 61 of the crank arm 62 fixed at the lower end of the vertical shaft 32 to effect the partial rotation of said shaft and the swinging of the plate 31 on its pivot whereby the rod 29 is caused to draw the free end of the gate 24 toward the head 13 against the action of the spring piston 13′ on said head and bearing against a part of said gate. When the recess 63 of the cam 60 is brought opposite the pin 61 movement of said pin is permitted to allow the spring piston 13′ to force the free end of the gate 24 outward from the head 13.

When it is desired to sew on a two hole button the swinging of the gate 24 is not necessary as the button is secured with a single group of stitches but when a four hole button is to be sewed the stitching is divided in two approximately parallel groups of stitches, the back and forth movement of the button clamp under the action of the cam 51 and the intermediate mechanism alternately presenting the holes of each pair in the path of the needle until one group of stitches is completed and the lateral movement of the button clamp under the swinging of the gate 24 effecting the movement of the button from the position shown in Fig. 8 to that shown in Fig. 9 to bring the second pair of holes in the button in line with the needle passage in the work support 16 whereby the second pair of holes may be brought alternately in the path of the needle by the back and forth movement of the button clamp.

Button sewing machines of this nature are particularly designed for the sewing of buttons on knitted fabrics, such as union suits and under garments generally. While this machine is not limited in its use to this class of goods special conditions are met in the sewing of buttons thereto which may assist in illustrating the operation of this machine. As these knitted fabrics are generally formed by rows of stitches extending across the fabric, as distinguished to its length, the button holes are preferably cut in line with the rows of stitches that is approximately at right angles with the length of the garment. With the button holes cut in this direction and the edges of the garment overlapped to form, practically, a tubular garment with the edge to which the buttons are to be sewed underlying that edge in which the button holes are formed it is evident that to sew on four hole buttons with stitches passing through the button holes the button holes must be expanded at right angles to their extension, and that provision must be made for feeding forward the tubular garment to successively present all of the button holes to the button sewing position.

In the stitching of the edges of button holes the formation of the stitches and their drawing action on the fabric embraced by the stitches increases somewhat the thickness of the edges of the button holes as compared with the thickness of the main part of the fabric. When therefore the, practically, tubular garment *a*, indicated in Fig. 3 of the drawings, is placed on the work support 16 of the machine the underlying edge portion *b*, see Figs. 6 to 9 inclusive, will rest on the hard surface of said support and will form a cushion for the edge portion *c* of the garment, the thick edges *d* and *e* of the button hole approximately meeting above the needle passage. A button *f* is now placed in the button clamp which, in its normal position, is designed to locate the first pair of holes *g*—*g* in line with the button hole, and the button clamp is brought to position, by releasing the lever 41, as shown in Fig. 7 with its arms 38—38 pressing down on the edge portion *c* of the garment at the sides of the button hole, this pressure of the arms 38—38 effecting, in a slight degree, the curling upward of the edges *d* and *e* of the button hole and a resultant slight opening of said hole. At the downward movement of the button clamp the engaging plate 35 also moves downward until its teeth 36 engage the upper edge portion *c* of the garment. The sewing of the group of stitches *j*—*j* through the holes *g*—*g* of the button *f* now proceeding in the ordinary manner the result being that these stitches *j*—*j* pass through the button hole and secure the button *f* to the edge portion *b* of the garment, as is shown in Fig. 8 of the drawings. At the completion of the sewing of the group of stitches *j*—*j* the button clamp 37 is moved laterally by the swinging of the gate 24 under the action of the rod 29, shaft 32 and cam 60 and their related parts. As the button is moved laterally the edge portion *b* of the garment attached to the button by the stitches *j*—*j* is moved, or stretched, in the direction in which the button is moved and the stitches *j*—*j* draw the edge *e* of the button hole in the same direction, the movement of the edge *c* of the garment being prevented by the en-

gagement of the teeth 36 therewith; this lateral movement of the button *f* continues until the holes *h*—*h* thereof are brought beyond the edge *d* of the button hole and in line with the needle passage of the work support 16 as is shown in Figs. 9 and 10 of the drawings when the sewing of the second group of stitches *k*—*k* is effected whereby the button is attached to the underlying edge portion *b* by the stitches *j*—*j* and *k*—*k* extending through the expanded button hole. The button clamp 37 and the plate 36 are now raised by means of the lever 41, the button *f* is released from the arms of the button clamp and the garment is moved along the work support until another button hole is brought to position, the slot 14 permitting this movement without interference from the button clamp or its mounting.

It is obvious that the mechanical elements herein shown and described may be considerably modified without departing from the spirit of this invention. This being particularly true of the construction of the button clamp and the means for operating the same; as also of the means for engaging and holding the upper fabric from movement during the movement of the button laterally. While it is preferred to move the fabric engaging means toward and from the work support in unison with the movement of the button clamp this movement in unison is not necessary and any form of fabric engaging device operated in any suitable manner may be substituted for that shown without departing from this invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent.

1. A button sewing machine of the nature described comprising fabric supporting means, button supporting means movably mounted, stitch forming means including a needle, work gripping means, and mechanism for moving the button supporting means laterally after the button has been partially attached to the fabric.

2. A button sewing machine for sewing buttons to an underlying fabric by stitches extending through the button holes of a superposed fabric comprising means for engaging the superposed fabric to prevent its movement, stitch forming means comprising a needle adapted to attach the button to the underlying fabric by stitches extending through the button hole of the superposed fabric, and means for moving the semi attached button laterally to expand said button hole and to position a series of holes in the button above said expanding button hole.

3. A button sewing machine of the nature described comprising a work support for the fabric, fabric engaging means movable toward and from said support, and a button clamp mounted to move toward and from said support in unison with the fabric engaging means and movable laterally independently of said engaging means.

4. A button sewing machine of the nature described comprising a work support adapted to receive a garment having its edges overlapped to effect a tubular formation of the garment, and to permit the feeding of the garment approximately at right angles to the extension of the button holes in the upper of said overlapped edges, means for sewing two holes of a four hole button through an unexpanded button hole to the underlying edge and means for drawing said sewing stitches against one edge of the button hole to expand the button hole beyond the line of the other pair of holes in said button whereby stitches passed through said second pair of holes will pass through the expanded button hole.

5. A button sewing machine comprising a bed plate having two parallel fixed members disconnected at one end one of which is a work support having depending flanges forming a compartment for the looper mechanism and the other of which is a button clamp supporting arm back of said work support and having a depending flange.

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

ROBERT L. LYONS.

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