Feb. 25, 1941. H. GUNTHER 2,232,782

BUTTON-SEWING MACHINE

Filed Jan. 26, 1939 2 Sheets-Sheet 1

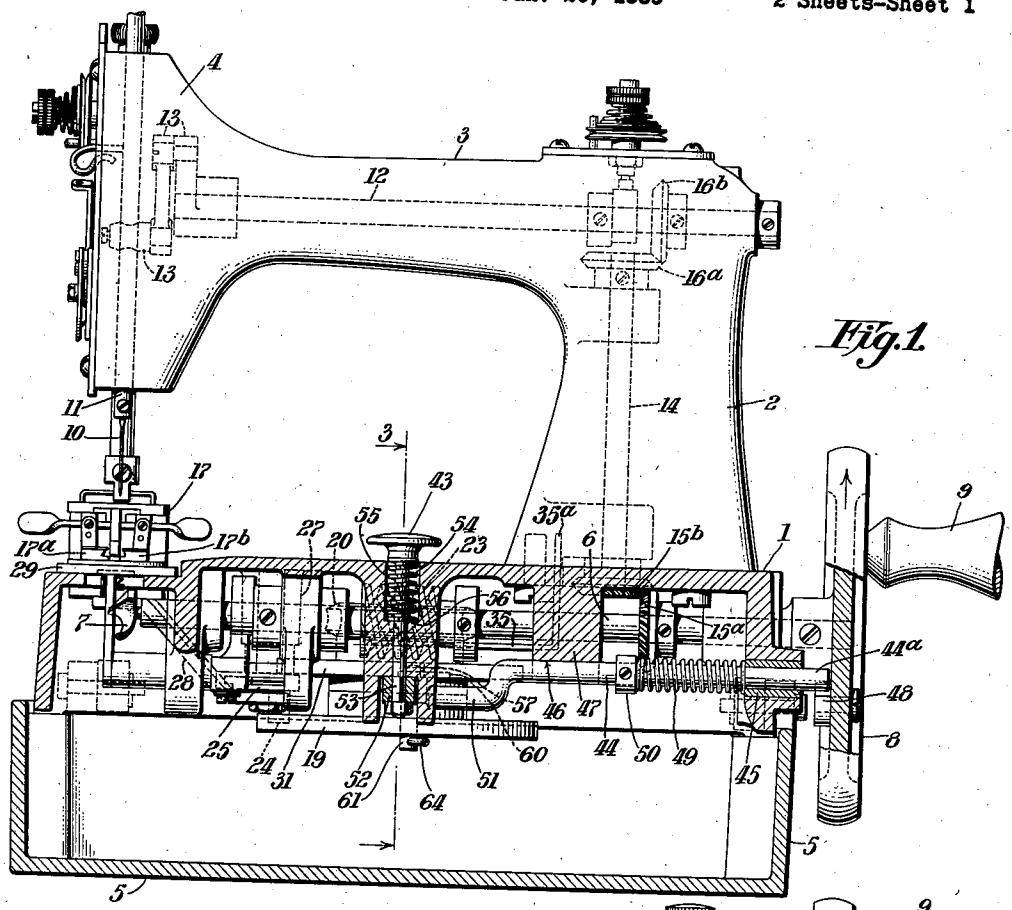


Fig. 1.

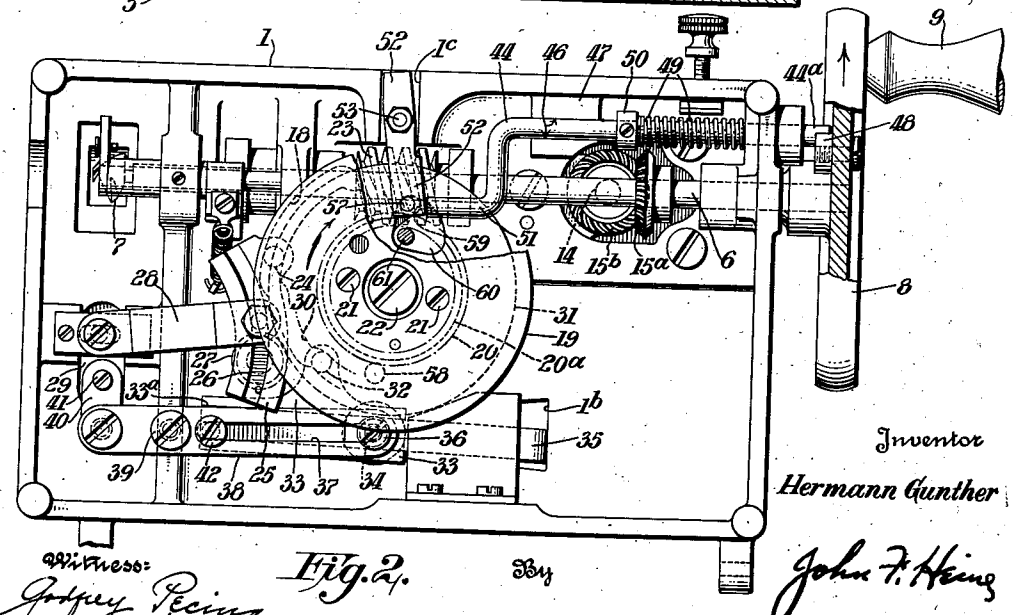


Fig. 2.

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BUTTON-SEWING MACHINE

Filed Jan. 26, 1939 2 Sheets-Sheet 2

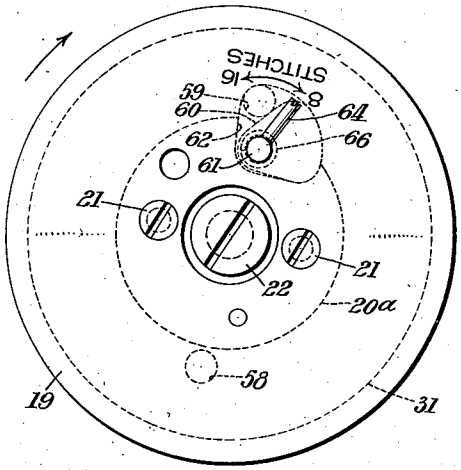


Fig. 4.

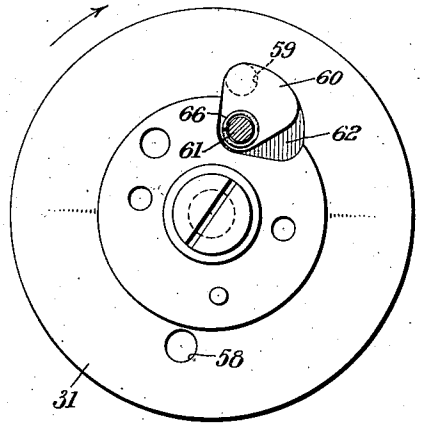


Fig. 5.

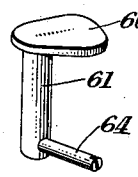


Fig. 8.

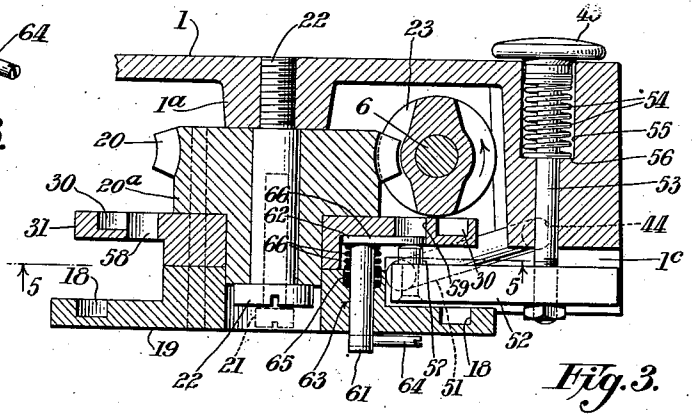


Fig. 3.

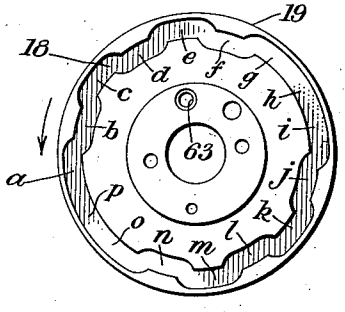


Fig. 6.

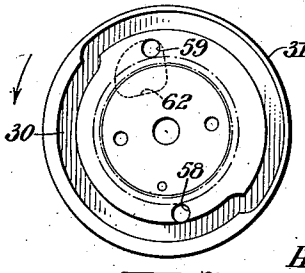


Fig. 7.

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Patented Feb. 25, 1941 2,232,782

UNITED STATES PATENT OFFICE

2,232,782

BUTTON-SEWING MACHINE

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Application January 26, 1939, Serial No. 252,858

13 Claims. (Cl. 112—112)

This invention relates to sewing machines and more particularly to sewing machines which are designed to operate through a predetermined cycle and then be brought to rest automatically. A button-sewing machine is a good example of a sewing machine having those characteristics and this invention will, therefore, be shown and described in connection with that type of sewing machine.

As commonly constructed, cyclically operated sewing machines produce, in each cycle of operation, a predetermined invariable number of stitches. It has been found desirable, in button-sewing machines, and especially in button-sewing machines which are adapted to sew, selectively, either large or small and two-hole or four-hole buttons, to be able to vary the number of stitches in the button-attaching cycle.

This invention therefore has as its primary object to provide, in a cyclically operated sewing machine, improved and simplified means for varying the number of stitches in the sewing cycle.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages obtained thereby will be readily understood by those skilled in the art.

In the accompanying drawings, Figure 1 is a side elevation, partly in section of a button-sewing machine embodying the present invention.

Fig. 2 is a bottom view of the machine illustrated in Fig. 1, with portions thereof broken away.

Fig. 3 is a vertical sectional view taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a bottom view of a button-clamp vibrating cam-disk later to be referred to, showing a portion of the cycle-regulating mechanism carried thereby.

Fig. 5 is a bottom view of a cycle-controlling and clamp-reciprocating cam-disk and a portion of the cycle-regulating mechanism which cooperates therewith.

Fig. 6 is a top view of the button-clamp vibrating cam shown in Fig. 4, but on a reduced scale.

Fig. 7 is a top view, on a reduced scale, of the cycle-controlling and clamp-reciprocating cam shown in Fig. 5.

Fig. 8 is a detail perspective view of a manually adjustable cycle-control element later to be described.

Referring more specifically to the drawings the invention is shown as embodied in a button-sewing machine comprising a bed 1, standard 2, overhanging arm 3 and head 4. The bed may be supported in any suitable manner, such, for example, as by being hingedly secured upon a rectangular base 5, which in turn may be seated on any suitable support. Journaled lengthwise beneath the bed 1 is a rotary main shaft 6 which carries, at its forward end, a conventional rotary chain-stitch loop-taker 7. The main shaft may be rotated by any suitable means, such, for example, as by a hand-wheel 8 secured thereto and having thereon a hand-crank 9. Cooperating with the looper, in the formation of stitches, is a needle 10, carried by the lower end of a needle-bar 11, mounted for reciprocation in the head 4. The needle-bar is actuated from a needle-bar driving shaft 12, journaled lengthwise of the arm 3, by a suitable crank-and-link mechanism designated generally as 13. The shaft 12 is driven from the main shaft 6, and synchronously therewith, by means of an upright shaft 14 journaled in the standard 2. At its lower end the shaft 14 is operatively connected with the main shaft 6 by bevel gears 15^a and 15^b, and at its upper end with the shaft 12 by bevel gears 16^a and 16^b.

Mounted upon the bed 1, in the manner similar to that illustrated in United States patent to Morris, No. 2,009,560, July 30, 1935, is a button-clamp 17 having button-holding jaws 17^a and 17^b. This clamp is adapted to receive lateral vibratory movements to cause the needle 10 successively to enter spaced holes in a button carried by the clamp and also, when sewing four-hole buttons, to be reciprocated lengthwise to place successive pairs of holes in the button in position to be entered by the needle. The mechanism for giving the button-clamp its various movements forms no part of the present invention and is similar to that shown in detail in the above mentioned Morris patent, being different therefrom primarily in that closed cams are provided instead of the open cams of the Morris construction. Stated briefly, the means for giving the button-clamp its vibratory movements comprises a cam-groove 18 formed in the upper face of a cam-disk 19, which, as shown most clearly in Figs. 2, 3 and 4, is secured to the hub 20^a of a worm-wheel 20 by screws 21. The worm-wheel 20 is rotatably journaled on a stud-screw 22, which is threaded into a boss 1^a projecting downwardly from the bed 1, as shown in Fig. 3, and is

driven from a worm 23 secured upon the main shaft 6. The ratio of the worm to the worm-wheel is such that one rotation is given to the worm-wheel, and the parts carried thereby, for each sixteen rotations of the main shaft 6.

The cam-groove 18 is tracked by a stud 24 which is carried by a segment 25 journaled at 26 in a boss 27 depending from the base 1. This segment is connected, by a link 28, with the base-plate 29 of the button-clamp, whereby oscillatory movements of the segment 25, under the influence of the cam-groove 18, effect lateral vibratory movements of the button-clamp. Longitudinal reciprocations of the button-clamp are derived from a cam-groove 30 formed in a disk 31 also secured upon the hub 20a of the worm-wheel 20. The cam-groove 30 is tracked by a roller 32 carried by a segment 33 fulcrumed at 34 on the bed 1. Slidingly mounted in the slotted arm 33a of the segment 33 is a slide-bar 35 having, at one end, an upstanding finger-piece 35a which projects through an aperture 1b in the bed 1 and is accessible from above the bed. The opposite end of the slide-bar 35 carries a shoulder-screw 36 slidingly mounted in a slot 37 formed in a lever 38 pivotally mounted on the under side of the bed 1 by a screw 39. With the slide-bar in the position shown in Fig. 2, the screw 36 carried thereby is in axial alignment with the pivotal point 34 of the segment 33 and therefore rocking movements of the segment under the influence of the cam-groove 30 will have no effect on the lever 38. When the slide-bar 35 is shifted to the left from the position shown in Fig. 2 to position the screw 36 remote from the fulcrum 34, rocking movements of the segment 33 will, through the screw 36 effect rocking movements of the lever 38. The lever 38 is connected by a link 40 with a stud 41 which extends downwardly from the base-plate 29 of the button-clamp and therefore oscillatory movements of the lever 38 will cause the button-clamp to be moved lengthwise. It will be understood that during the sewing of two-hole buttons the slide-bar 35 will be in the position shown in Fig. 2 and that no lengthwise movement will be transmitted to the button-clamp. When four-hole buttons are to be attached, the slide-bar 35 will be shifted to the left, from the position shown in Fig. 2, and the button-clamp will be caused to move lengthwise after stitches have been formed in the first pair of holes in the button, thereby to position the second pair of holes in the buttons in line with the reciprocatory needle. The position to which the screw 36 may be adjusted, and therefore the amount of endwise movement transmitted to the button-clamp, may be determined by a stop-screw 42 adjustably mounted on the lever 38. As above stated, this clamp-actuating mechanism is substantially the same as that disclosed in U. S. patent to Morris, No. 2,009,560, July 30, 1935, to which reference may be had for a more complete understanding thereof.

Operation of the machine is initiated by a manually operable stop-motion release button 43, located above the bed 1 and the machine is automatically brought to rest at the completion of its cycle by a stop-motion mechanism similar to that disclosed in United States patent to Gunther, No. 2,075,759, Mar. 30, 1937. This stop-motion mechanism comprises a stop-element or rod 44 slidably mounted, adjacent one end, in a bushing 45 supported by the bed 1, and intermediate its ends in a slot 46 formed in a lug 47 depending from the bed, and having its outer end 44a movable into and out of the path of movement of a rotary stop-lug 48 secured on the hand-wheel 8. A coil-spring 49 surrounding the rod 44 and interposed between the bushing 45 and a collar 50 on the rod, urges the latter into running position (not shown) in which the end 44a of the rod is out of the path of movement of the stop-lug 48 and the collar 50 is in engagement with the side of the guide-lug 47.

The rod 44 is formed, adjacent its inner end, with an offset portion 51 the end of which is engaged by one side face of an arm 52 fixed to the lower end of a vertical rod 53 mounted in the bed 1 for free sliding as well as rocking movement. The rod 53 carries the stop-motion release button 43 above mentioned and is surrounded by a coil-spring 54 located in a cavity 55 in the bed 1 and interposed between the starter-button and the bottom wall 56 of said cavity. The arm 52 carries a pin 57 the upper end of which normally slides on the under side of the disk 31 and which at a predetermined point, or points, in the cycle of operation of the machine, under the action of the spring 54, snaps into or enters either one or the other of two holes 58 or 59 formed in the cam-disk 31. After the pin 57 has entered one of the stop-holes, a slight further rotation of the cam-disk causes the arm 52 to be rocked counter-clockwise as seen in Fig. 2 which movement projects the outer end of the rod 44 into the path of the stop-lug 48 and thereby stops the machine. Depression of the stop-motion release button 43 moves the pin 57 out of the stop-hole, whereupon the spring 49 may shift the stop-rod 44 out of the path of the stop-lug 48 to permit starting of the machine. The holes 58 and 59 are arranged in diametrically opposite sides of the cam-disk 31 at equal distances from the center thereof. It will be observed that the arm 52 is received within a clearance slot 1c in the bed 1, which slot is somewhat wider than the arm 52 and allows the latter to partake of the limited lateral rocking movements which cause the stop-rod 44 to be projected, in opposition to the spring 49, into the path of the stop-lug 48 on the handwheel 8, and thereby bring the machines to rest as above described.

Under a certain setting of a cycle-control device later to be described, the pin 57 will enter each of the holes 58 and 59 successively, thereby bringing the machine to rest after each 180 degrees of rotation of the cam-disks 19 and 31. Under another setting of the cycle-control device the pin 57 is prevented from entering the hole 59 and therefore the cam-disks 19 and 31 will be given a complete rotation of 360 degrees before the machine is brought to rest.

As shown in Fig. 6, the cam-groove 18, formed in the cam-disk 19, comprises sixteen zones lettered from *a* to *p*, respectively. Movement of the stud 24 inwardly or outwardly from one zone to the other causes the button-clamp to be shifted laterally. One reciprocation of the needle is effected when the stud is in each of the zones *a* to *p*. It will be noted that the zones *a*, *p*, *o* and *g*, *h*, *i* are on the same radius and therefore as the stud 24 is passing through those portions of the cam-groove no lateral motion is transmitted to the button-clamp. As above stated the machine may be operated through either an eight stitch cycle of 180 degrees rotation of the cam-disks or through a cycle of 360 degrees when it is desired to attach a button by sixteen stitches. When operating through the first 180 degree cycle the stud 24 moves from the zone *a* to zone

h. During this cycle the vibration of the button-clamp is discontinued and the needle therefore is reciprocated twice through the same hole in the button while the stud is passing through zones *g* and *h*, thereby producing a tying stitch at the end of the first stitching cycle. In the next 180 degree cycle of operation the stud moves from zone *i* to zone *p*, the needle again making a tying stitch at the end of the stitching cycle. When attaching two-hole buttons the cam-groove **30** in the cam-disk **31** is rendered ineffective to shift the clamp lengthwise, by the setting of the slide-bar **35** and the screw **36**, as above described.

When attaching four-hole buttons the machine is operated either through two successive 180 degree cycles or through one continuous 360 degree cycle, dependent upon what form of attachment is desired. When attaching a four-hole button by two disconnected groups of stitches the machine is operated through two successive eight stitch cycles, each including a tying stitch, the machine being brought to rest and the thread severed below the work, preferably by lifting the button-clamp, after each cycle has been completed. After the thread has been severed following the first cycle, the free end of the thread extending from the needle-eye to the button is wiped to one side to withdraw the end thereof from the button so that there will be no cross-over thread connecting the two groups of stitches. The cam-groove **30** in the cam-disk **31** acts to shift the button-clamp lengthwise after the first eight stitches have been made through one pair of holes in the button thereby to position the other pair of holes in the button in position to be entered by the needle.

In the operation of attaching a four-hole button by a single continuous sixteen stitch cycle, the seventh and eighth stitches are made in the same hole in the button, the ninth stitch is a cross-over stitch connecting the two pairs of holes in the button, and the fifteenth and sixteenth stitches are made in the same hole to produce a tying stitch at the end of the button attaching operation.

The improved means for predetermining whether the machine shall operate through an eight stitch cycle of 180 degrees rotation of the cams **19** and **31** or through a sixteen stitch cycle of 360 degrees, comprises a manually controlled element adapted, in one position, to permit entry of the stop-pin **57** into the stop-hole **59** under the influence of the spring **54** when the pin and the hole are aligned and thereby, through arm **52** and rod **44**, stop the machine, and in another position to close the stop-hole **59** and prevent entry of the pin **57** therein, whereupon the machine continues to operate until the hole **58** is brought into alignment with the stop-pin. This device consists of a plate **60** secured to the upper end of a pin **61** and seated within a cavity **62** formed on the under side of the cam-disk **31**, adjacent the stop-hole **59**. The pin **61** is rotatably journaled in a bore **63** in the cam-disk **19** and has secured to it, beneath the cam-disk, a transverse pin **64** which serves as a finger-piece for rotating the pin **61** and the plate **60** carried thereby. Interposed between the plate **60** and the disk **19**, and having one end seated in a cavity **65** in the disk, is a coil-spring **66** which acts to hold the plate upwardly in the cavity **62** and to apply friction to plate **60** to prevent inadvertent shifting thereof.

As shown most clearly in Figs. 4 and 5, the cavity **62** in the cam-disk **31** is of such size and shape that the plate **60** may be shifted therein either to a position in which the plate underlies the stop-hole **59**, as shown in full lines in Fig. 5, thereby preventing the pin **57** from entering the stop-hole so that the machine will continue to operate, or to the position shown in dotted lines in Fig. 4 in which the plate is located wholly at one side of the stop-hole **59** and therefore permits the stop-pin to enter the hole and effect stopping of the machine. The finger-piece **64** serves as convenient means to enable the operator to shift the platet **60** to its two positions thereby to predetermine whether the machine shall produce an eight stitch cycle or a sixteen stitch cycle. Indicia on the under side of the disk **19**, adjacent the finger-piece **64**, indicates the number of stitches produced in either setting of the finger-piece and its attached plate **60**.

From the foregoing it will be perceived that this invention has provided an improved sewing machine which may be used, selectively, to attach two-hole buttons with either eight or sixteen stitches, including a tying stitch, or four-hole buttons by either two disconnected groups of eight stitches each or by sixteen stitches including a cross-over stitch and a tying stitch. Furthermore, it will be apparent that the invention has provided simplified means, which is rendered readily accessible to the operator by a mere tipping of the machine, for predetermining which of the two available cycles the machine shall produce.

Having thus set forth the nature of the invention what I claim herein is:

1. A sewing machine combining stitch-forming mechanism; means including a rotary control element to cause said stitch-forming mechanism to operate through a predetermined cycle to produce a predetermined number of stitches including a tying stitch, said control element having therein a plurality of stop-apertures; a stop-motion mechanism having an element adapted to enter said apertures to effect stopping of the machine; and means to close one of said apertures thereby to prevent said element from entering therein whereupon the operation of the machine will be repeated.

2. A button-sewing machine comprising stitch-forming mechanism including a reciprocatory and non-vibratory thread-carrying needle and a co-operating loop-taker; a button-clamp; means to effect lateral movements of said button-clamp to cause the needle successively to enter spaced holes in a button carried by the button-clamp; means including a rotary cam adapted, in a 180 degree rotation, to cause said stitch-forming mechanism to operate through a predetermined cycle to produce a predetermined number of stitches including a tying stitch; means controlled by said cam to stop the machine at the completion of said cycle; and adjustable means carried by said cam and adapted to render said stop means ineffective to stop the machine, thereby to cause the stitching cycle to be repeated.

3. A button-sewing machine comprising stitch-forming mechanism; a button-clamp; means including a cam to give to said button-clamp lateral movements relative to said stitch-forming mechanism to cause the latter to form stitches in spaced holes in a button carried by the former; means including a rotating cycle-control element having a stop-aperture therein, and a cooperating member adapted to enter said aperture to effect stopping of the machine; and a manually adjustable control device adapted in one position to

permit said member to enter said aperture to effect stopping of the machine and in another position to prevent such entry, thereby to cause the continued operation of the machine.

4. A button-sewing machine as set forth in claim 3 in which the manually adustable control device is carried by the clamp-actuating cam and includes a plate adapted in one position of the device to close the stop-aperture to prevent entry of the cooperating member therein.

5. A button-sewing machine as set forth in claim 3 in which the rotating cycle-control element is located adjacent said clamp-actuating cam and is rotated synchronously therewith and is formed with a cavity adjacent said stop-aperture; and in which the control device is carried by the cam and includes a plate located in said cavity and movable therein to two positions in one of which it permits said cooperating member to enter said stop-aperture and in the other of which it prevents such entry.

6. A button-sewing machine as set forth in claim 3, in which the rotating cycle-control element is formed with a cavity adjacent said stop-aperture; and in which the control device is carried by the cam and includes a pin journaled in and extending through the cam, a plate secured to one end of the pin and located in said cavity, and means at the opposite end of said pin to facilitate manual oscillation of said pin thereby selectively to shift said plate to effective and ineffective positions in said cavity.

7. A button-sewing machine as set forth in claim 3, in which the rotating cycle-control element is located adjacent said clamp-actuating cam and is formed with a cavity adjacent said stop-aperture; in which the control device is carried by the cam and includes a pin journaled in and extending through the cam, a plate secured to one end of the pin and located in said cavity, manually actuable means at the opposite end of said pin for oscillating the pin thereby to shift said plate to effective and ineffective positions in said cavity; and indicia carried by said cam adjacent said manually actuable means to indicate the position of said plate in said cavity.

8. A button-sewing machine as set forth in claim 3, in which the rotating cycle-control element is formed with a cavity adjacent said stop-aperture; in which the control device is carried by the cam and includes a member located in said cavity and shiftable to effective and ineffective positions therein, means for manually shifting said member in said cavity, and means preventing inadvertent shifting of said member.

9. A button-sewing machine as set forth in claim 3, in which the rotating cycle-control element comprises a disk located adjacent said clamp-actuating cam and rotated synchronously therewith and has a cavity formed therein adjacent the stop-aperture; in which the control device is carried by the cam and includes a pin journaled in said cam, parallel with the axis thereof, and having on one end a plate located in said cavity and on its other end a finger-piece to facilitate manual oscillation of said pin; and in which a coil spring surrounds said pin between said plate and said cam frictionally holds said plate in said cavity to prevent inadvertent shifting of the plate.

10. A button-sewing machine comprising stitch-forming mechanism including a reciprocating but non-vibrating needle and a complemental loop-taker; a button-clamp movable laterally in two directions relative to said stitch-forming mechanism; means, including a cam, to cause said stitch-forming mechanism to produce, in a 180 degree rotation of said cam, a predetermined stitching cycle through a button carried by said button-clamp, said cycle including a plurality of attaching stitches and a tying stitch; a stop-motion mechanism adapted to stop the machine at the completion of said stitching cycle; and manually adjustable means carried wholly by said cam to render said stop-motion mechanism temporarily ineffective at the completion of one cycle, whereupon the machine will automatically repeat said cycle and then be brought to rest by said stop-motion mechanism at the completion of the second cycle.

11. A button-sewing machine as set forth in claim 10, in which the relative movement between the button-clamp and the stitch-forming mechanism is effected by a plurality of rotary cams which move the button-clamp in transverse directions; and in which one of the cams carries means which cooperates with the stop-motion to stop the machine after the selected cycle has been completed.

12. A button-sewing machine as set forth in claim 10, in which the movement of the button-clamp is effected by a plurality of rotary cams which move the clamp in transverse directions; in which one of the cams is provided with a plurality of stop-apertures into which a portion of the stop-motion mechanism normally enters to effect stopping of the machine; and in which another of the cams carries means to close one of said apertures thereby to prevent such entry and effect continued operation of the machine.

13. A button-sewing machine as set forth in claim 10, in which the movement of the button-clamp is effected by two rotary cams one of which reciprocates the clamp lengthwise and the other of which vibrates it laterally; in which means is provided for effecting one complete rotation of said cams for a predetermined number of actuations of the stitch-forming mechanism; in which the clamp-vibrating cam is adapted to produce, in one complete rotation, two similar cycles of lateral movement of said button-clamp and the clamp-reciprocating cam positions the clamp in a different longitudinal position for each of said cycles; and in which manually controlled automatic means is provided for selectively stopping the machine after either one or two of said cycles.

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