

Jan. 12, 1954

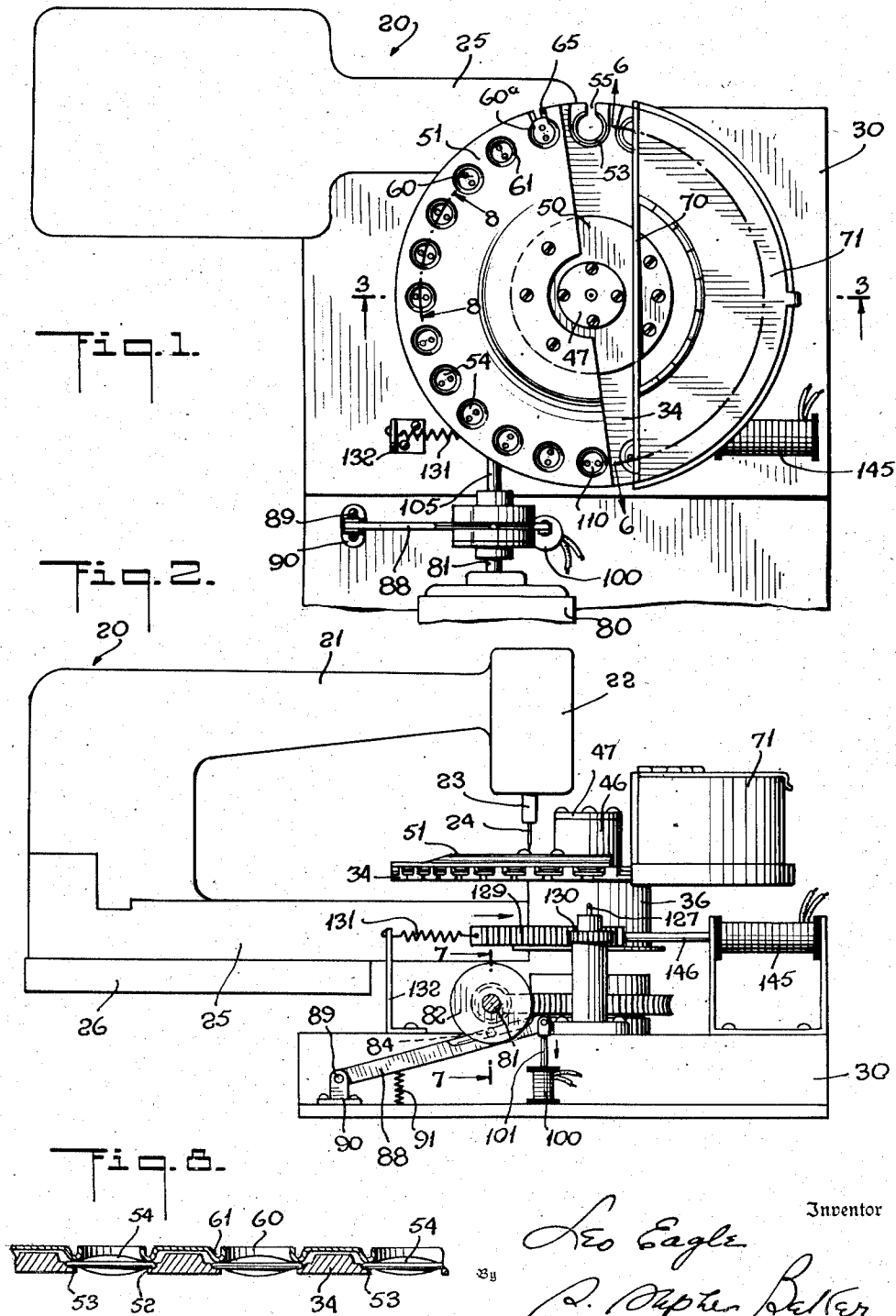
L. EAGLE

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BUTTON FEEDING MECHANISM FOR BUTTON SEWING MACHINES

Filed Oct. 6, 1952

3 Sheets-Sheet 1



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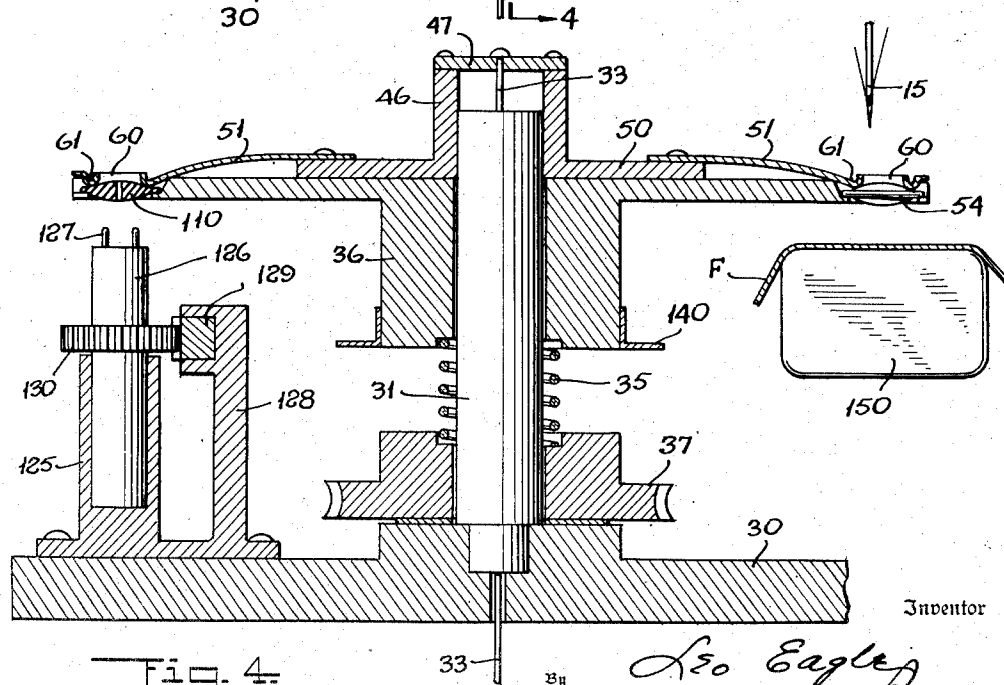
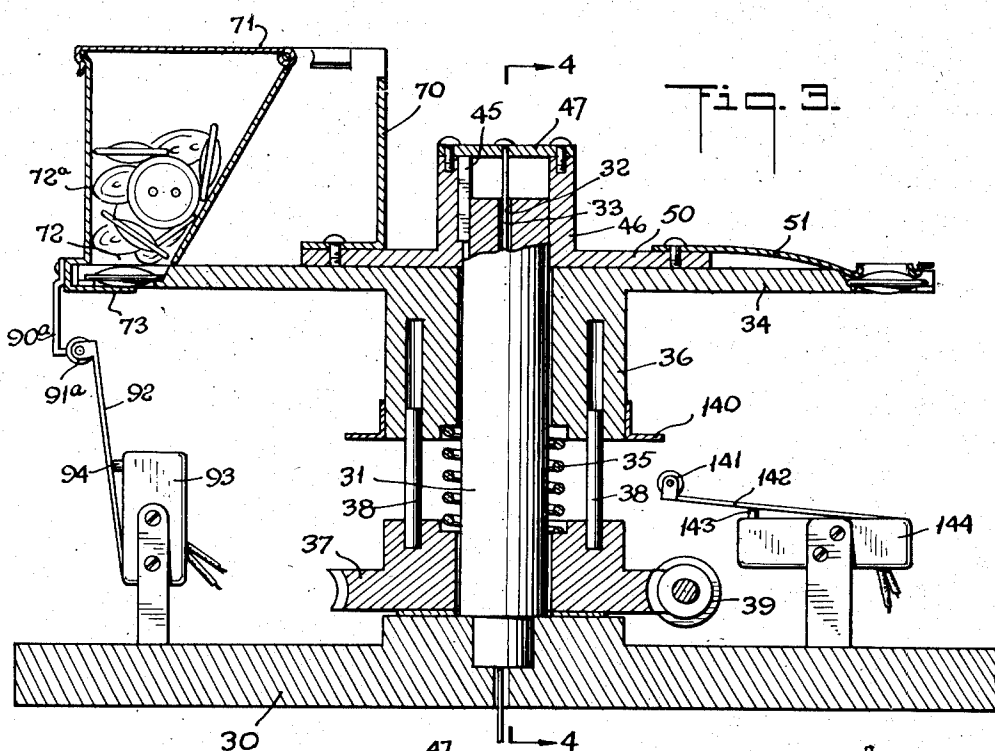
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

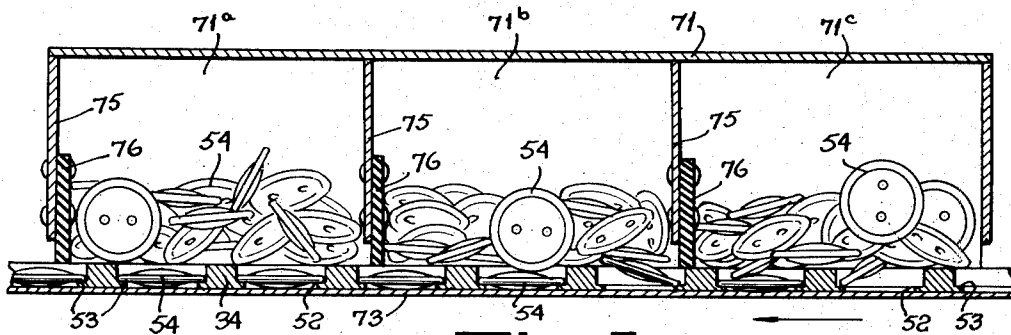


Fig. 6.

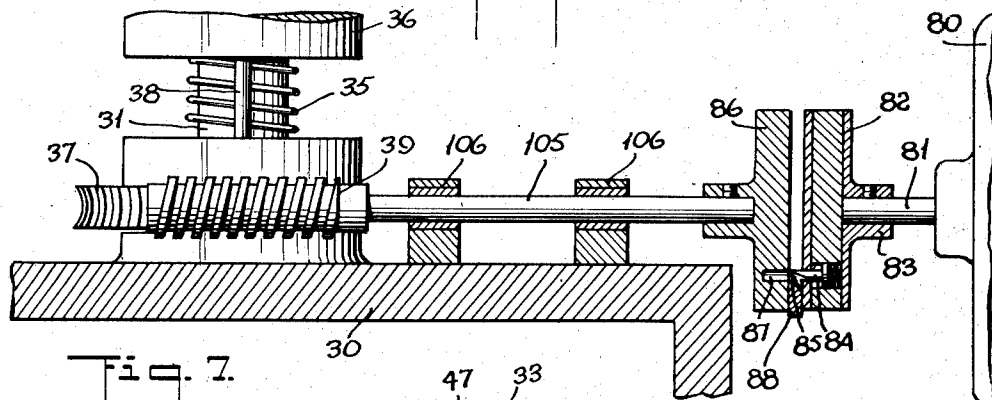


Fig. 7.

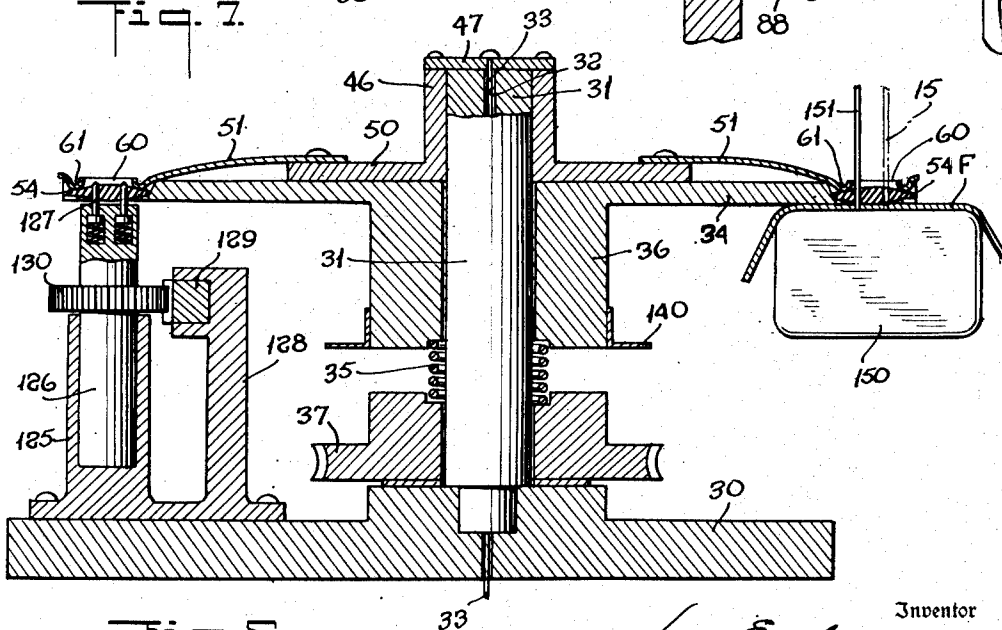


Fig. 8.

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UNITED STATES PATENT OFFICE

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BUTTON FEEDING MECHANISM FOR
BUTTON SEWING MACHINES

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Application October 6, 1952, Serial No. 313,343

9 Claims. (Cl. 112—113)

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This invention relates to automatic button feeding mechanisms for sewing machines.

To my knowledge, the problem of devising a satisfactory and commercially acceptable automatic button feeding attachment for sewing machines has faced the industry for many years. Notwithstanding considerable research in this field, the feeding of buttons to a button sewing machine is still done manually and labor costs are correspondingly high. Many attempts have been made to solve this problem but none has had any significant success.

With the above in mind, I have devised an automatic button feeding attachment for sewing machines wherein one button of a series is automatically fed to the sewing site of a sewing machine upon actuation of a treadle or the like by the operator. The button is always in proper position to be acted upon by the needles, a positioning device operating to orient the button so that the holes thereof are in proper position to be penetrated by the sewing needle.

The invention includes the use of a supply of buttons, such as in a hopper, buttons therefrom being gravity-fed to a rotating feed disk upon which is formed a plurality of button supporting recesses or openings. After each button is deposited from the hopper to a recess on the disk, a positioning device physically actuates and orients the button so that the holes thereof are in a predetermined and proper position. The properly oriented button then travels together with the disk on its way to the sewing site. The disk rotates in discrete steps after each sewing operation so as to successively present buttons to the sewing site. Thus, after each button is sewn, actuation of the treadle by the operator rotates the disk one step while the operator moves the fabric as required so that the next button may be sewn in the proper place.

The use of the invention herein described only requires treadle actuation and suitable movement of the fabric by the operator in contrast to conventional practice where the operator must select each button and insert it in place with correct orientation. In practicing the instant invention, the operator is not required to handle the buttons at all.

The invention will be further understood from the following description and drawings in which:

Figure 1 is a top plan view of the button feeding attachment in connection with a conventional sewing machine;

Figure 2 is a side view thereof;

Figure 3 is a cross-sectional view, slightly en-

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larged, as taken along the lines 3—3 of Figure 1;

Figure 4 is a cross-sectional view as taken along the lines 4—4 of Figure 3;

Figure 5 is a view similar to Figure 4 but illustrating the depression of the attachment feed disk;

Figure 6 is a cross-sectional view taken along the lines 6—6 of Figure 1;

Figure 7 is a cross-sectional view, enlarged, taken along the lines 7—7 of Figure 2; and

Figure 8 is a cross-sectional view taken along the arcuate lines 8—8 of Figure 1.

Before describing the structure of the attachment, it is believed desirable to outline the sequence of operations so that the recitation of structure can be related thereto. Initially, the buttons are disposed in a hopper located above the feed disk. The disk rotates in discrete steps below the hopper and buttons are deposited therefrom during such rotation into peripheral recesses or openings formed around the edge of the disk. The mouth of the hopper is diametrically opposite the sewing site and the buttons are thus deposited on the disk in a semi-circular arrangement or series. The recesses of the disk which have buttons therein are advanced to the sewing site during the operation of the device.

Prior to the sewing of a button, the disk, in the particular form shown, is elevated relative to the bed or support upon which the fabric lies preparatory to sewing the button thereon. When the operator depresses a treadle or the like (not shown) the disk is pulled downwardly so that the button disposed at one end of the series rests against the fabric. The sewing machine needle then sews the button to the fabric in a conventional manner. At the same time, the depression of the disk by the treadle action closes a switch which effects actuation of an indexing device. This indexing device is near the other end of the semi-circularly arranged series of buttons and it rotates the button disposed at said end into proper orientation so that its holes are properly positioned. This position is maintained until the button arrives at the sewing site.

When the treadle is released, the disk is again elevated by a spring action and in travelling upward it closes another switch which causes the disk to be rotated one step or position so as to present another button to the sewing site. This button is in proper position, having been so positioned some time back by the operation of the indexing device. While the buttons are travelling toward the sewing site, they are maintained in position by a spring plate so that once having

been properly oriented, they will not become displaced therefrom.

The button feeding attachment is illustrated as being employed in connection with a conventional form of sewing machine 20. For example, a machine with which the attachment may be used is Singer No. 175-60, after having removed the button holder or clamp from the space between the head and the base.

Machine 20 is formed with a neck 21 and a head 22. Head 22 is provided with a needle holder 23 supporting a needle 24. The machine is also provided with a base 25, the entire machine resting on a table 26. It will be understood by those skilled in the art that in a button sewing machine of this type, the needle 24 not only reciprocates vertically as in any sewing machine but it also reciprocates horizontally so as to successively penetrate the laterally disposed holes of a button for sewing it to a fabric.

The button feeding attachment is mounted on a base 30 which supports a post 31 which has a central bore 32 for receiving a vertically disposed cable 33. In the form shown, the lower end of cable 33 is drawn inwardly as by a treadle for depressing the feed disk 34 against the action of spring 35. Disk 34 is circular and is formed with a hub 36 which loosely embraces the post 31 and permits vertical sliding movement of the disk in relation to said post.

Similarly loosely or freely disposed around the post 31 is a worm gear 37 bearing a pair of spindles 38 which engage two bores in hub 36. It will be understood that when worm wheel 37 is rotated, the spindles 38 effect corresponding rotation of hub 36 and of the disk 34 while the post remains stationary. As will hereinafter be more fully described, worm wheel 37 is rotated by a lead worm 39 so as to produce stepped or intermittent rotation of the disk 34 and the series of buttons disposed thereon.

Slidably connected to the post 31 as by a key 45 is the circular flange or collar 46. It will be recognized that collar 46 will be held stationary together with post 31 notwithstanding any rotation of disk 34 but may rise or fall vertically because of the keyed connection. Collar 46 is formed with a top plate 47 which is secured thereto and serves as an upper terminal for the cable 33. Thus, when cable 33 is downwardly actuated, it will not only draw collar 46 downwardly but the horizontal flange 50 thereof will also force disk 34 downwardly against the action of spring 35.

It will be observed that disk 34 is formed with a series of arcuately arranged, peripherally disposed openings 52, each being provided with an interrupted, circular shoulder 53 for seating a button 54. Each opening 52 is provided with a discontinuity or passageway 55 by which means the thread connecting the buttons to the fabric may be withdrawn after a button has been sewed.

Connected to the horizontal flange 50 of collar 46 is a semi-circular spring plate 51. Spring plate 51 is also formed with a series of arcuately disposed openings 60 corresponding to each opening 52 of the feed disk and, being secured to collar 46, does not rotate but is capable of only vertical movement. Each opening 60 is defined by an annular, depressed bead 61 which serves to bear against the edge of a button 54 for firmly seating and maintaining it in an opening 52. The end opening of plate 51 designated as 60a and disposed at the sewing site, is provided with a pas-

sageway 65 for the purpose of cooperating with passageway 55 in permitting the thread to be withdrawn from the attachment after it has sewn the button to the fabric.

Horizontal flange 50 is also provided with an angle bracket 70 which supports a hopper 71 having a mouth 72 for feeding buttons therefrom to the openings 52 of the disk 34. Hopper 71 may be semi-circularly formed so as to complement the circular form of the disk 34, the mouth 72 of the hopper being at the same radius as the openings 52 in relation to the disk 34.

The hopper 71 is formed with a side wall 72a which is formed with a horizontal, semi-circular plate 73, disposed below the series of openings 52 so that the plate supports any button which has been fed from the hopper 71 to the holes 52 as illustrated in Figure 3. The purpose of this support is to assure the horizontal disposition of each button as it is fed to an opening so that each button is properly disposed for the sewing action which follows the positioning or indexing action.

As illustrated in Figure 6, the hopper is divided into a plurality of compartments 71a, 71b and 71c, each of which contains a supply of buttons. The purpose of such multiple compartments is to render more assured the disposition or seating of a button in all the openings of disk 34. Thus, for example, if a button from 71c does not succeed in being deposited from the first compartment into an opening, the second or third compartments will probably effect this result so that the possibility of an opening proceeding without a button to the sewing site is minimized. Each compartment is formed with a vertical end wall 75 which supports a wiper or brush 76 which holds back the supply of buttons in the compartments while the disk 34 moves in its rotating action so as to carry the buttons away from the hopper and toward the sewing point.

The means for driving the disk 34 intermittently will now be described. The electric motor 80 (Figure 7) is driven through any suitable source of power. The shaft 81 of the motor supports a one revolution clutch plate 82 having a hub 83. Clutch plate 82 has a spring loaded pin 84 which is provided with a bevelled end face 85. The complementary clutch plate 86 is driven by clutch 82 by the entrance of pin 84 into opening 87 of clutch plate 86.

In order to effect intermittent clutch action, means are provided to effect periodic disengagement of these clutch faces. Such means comprises an elongated knife arm 88 having a bevelled end face which may be caused to ride up the bevelled end face 85 of pin 84 so as to force withdrawal of the pin 84 from opening 87 against the spring loading action so as to interrupt the clutch drive. Knife arm 88 is pivotally connected at 89 to a post 90 and is urged upwardly by a spring 91 (see Figure 2). Thus, the normal action of the knife arm 88 is to interrupt clutching action. However, the process of feeding the buttons disables knife arm 88 intermittently as will now be described.

When the operator depresses a treadle or the like so as to draw cable 33 downwardly, the feed disk 34 together with the hopper 71 are also drawn downwardly, and the sewing of a button may be commenced at that time. The depression of the treadle may automatically start the sewing operation or the operator may prefer to actuate the conventional treadle of the machine, either method being usable. After the button

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has been sewn, the disk 34 is allowed to return to normal position by releasing the treadle. During such return, the feed disk is caused to advance one step by means of the following mechanism.

Connected to outer wall 72 of hopper 71 is a downwardly depending cam arm 90a which, upon its upward, return movement, is caused to contact and press roller 91a inwardly. Roller 91a is connected to arm 92. Arm 92 is a spring arm of microswitch 93, said microswitch being provided with a switch button 94. Microswitch 93 is normally open and of the impulse type wherein depression of switch button 94 closes a circuit. The closing of microswitch 93 energizes solenoid 100, the armature 101 of which is pivotally connected to knife 88. Accordingly, actuation of the microswitch serves to pull knife 88 downwardly so as to permit pin 84 of clutch plate 82 to engage and drive the clutch plate 86. At the end of one revolution, the bevelled edge of knife 88 again enters into the slight space between the pin 84 and hole 87 and dis-engages the clutch plates because the microswitch 93 re-opens the circuit when it returns to a normal position as illustrated in Figure 3. On the succeeding downward movement, the roller 91a is not actuated inwardly because the cam arm 90a is normally at its center.

Clutch plate 86 is connected to a shaft 105 which is supported in bearings 106. Shaft 105 drives the lead worm 39 which, in turn, drives the worm wheel 37 for rotating the feed disk 34. Thus, the feed disk is driven intermittently upon each return of the disk to normal position after having sewn a button to the fabric.

As the buttons are fed to the openings of the disk 34, means are provided to position or orient them accurately so that the needle may enter the holes of the button properly. Thus, it will be observed in Figure 1 that the first button 110 of the series has its holes misaligned in relation to the remaining buttons. Such misalignment is thereafter corrected by the following mechanism.

Secured to disk 34 and disposed adjacent to the hopper or feeding end of the series of buttons, is a standard 125 having a central opening within which is rotatably supported a post 126 having a pair of indexing pins 127. Standard 125 includes a vertical arm 128 supporting a horizontally disposed rack 129 which meshes with a gear 130 secured to post 126. Rack 129 has one end thereof connected by a spring 131 to a bracket 132 so that the rack 129 is normally maintained in a leftward position as viewed in Figure 2. It will be further observed in Figures 3 and 4 that hub 36 is provided with a circular flange 140 which is actuated downwardly when the cable 33 is thus actuated. Such action results in depression of roller 141 and arm 142 by the flange 140. This effects actuation of microswitch button 143 of the microswitch 144. Microswitch 144 controls a solenoid 145 (Figure 2) which is provided with an armature 146. Armature 145 is connected to the rack 129 so that it effects horizontal reciprocation of the rack 129 against the action of spring 131. Microswitch 144 is a virtual duplicate of switch 93, being of the impulse type and normally open. However, switch 93 operates on the upward movement of the disk 34 while switch 144 works on the downward movement thereof.

The reciprocation of rack 129 causes gear 130 to rotate in the holder or standard 125 so as to cause corresponding rotation of the spring loaded

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index pins 137 (Figure 5). As the rack is pulled inwardly by the solenoid, post 126 makes a complete revolution so that the indexing pins 127 also make one revolution. Accordingly, notwithstanding the fact that button 110 may be held down by the spring plate 51, the indexing pins 127 will enter the two holes of the button and will rotate it into proper position and this may occur at either of two points, since the post 126 rotates 360 degrees whereas only a 180 degree rotation is ordinarily necessary as will be understood.

In the form shown, the properly aligned buttons have their holes in radial alignment with a radius line of the disk although it is obvious that this will depend upon the movement of the needle in the specific machine employed.

Each button having been initially oriented by the indexing pins, continued intermittent rotation of the feed disk 34 advances the buttons toward the sewing site. When the operator depresses the treadle so as to correspondingly depress the feed disk 34 as shown in Figure 5, the button to be sewn is brought directly against the fabric F which rests upon the conventional base 150 which receives the needle 151. The broken line representation of the needle 15 which is shown in Figure 5 illustrates the horizontal reciprocation of the needle in sewing the button to the fabric.

As each such sewing operation proceeds, the last button 110 to be deposited on the feed disk is being oriented into proper position. When the sewing of the button is completed, the operator withdraws the fabric from the base 150, the passageway 55 of the feed disk 34 and the passageway 65 of the spring plate 51 permitting the thread to be withdrawn together with the fabric. The release of the treadle has meanwhile shifted the feed disk angularly one more position so that when the operator moves the fabric for the next sewing operation, he again depresses the treadle and the feed disk and a new button, properly aligned, will be presented into position so as to be sewn by the needle. This action continues as long as buttons are fed to the feed disk from the hopper and they are advanced to the sewing site.

It will be understood that any type of button may be used and the indexing pins will be of a number and will be spaced according to the holes of the particular buttons being employed. Furthermore, it is quite evident that a second indexing post may be used to succeed the one shown so as to further insure the proper orienting of buttons before they are delivered to the sewing site.

The machine as described herein will be used with conventional buttons but it is understood that it may be employed in connection with a particular type of button, a patent application for which I am simultaneously filing herewith, and which will eliminate the necessity for a rotating form of indexing device, the serial number of my application being 313,342. Such a button, as reference to my above mentioned concurrent patent application will show, comprises cam surfaces on both sides thereof so that pressure alone against such cam surfaces by a pin-like object, will cause the button to rotate and such rotation will bring the button into proper position. Thus, as shown in my co-pending application, the post 126 need not rotate but need merely be brought and pressed against the button whereupon the cam surfaces of the button

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will cause it to automatically rotate into proper position.

It will be understood that whereas I have described the button feeding mechanism as being an attachment to a sewing machine, it is evident that it may be made part of said machine in the first instance so that the sewing machine and feed mechanism will be produced and sold as a single unit.

What is claimed is:

1. A button feeding mechanism for use with a button sewing machine comprising a feed disk having a uniformly spaced series of button receiving openings formed adjacent the edge of the disk, means to rotate said disk intermittently so as to advance each button receiving opening to the sewing site of said sewing machine, means to orient each button disposed in said openings before it arrives at said sewing site, said last-named means comprising a post having a plurality of pins formed at one end thereof, said pins being adapted to enter the buttonholes of each button for urging the button into a predetermined position in respect to the orientation of its buttonholes, means to rotate said post for first bringing the pins thereof into alignment with and enter the buttonholes and then to rotate the button into said predetermined position, and means to actuate said disk vertically for bringing the properly oriented button to a piece of fabric on which the button is to be sewn, said means to rotate said post being operative on a button preceding the one being sewn and during the time that it is sewn.

2. A button feeding mechanism according to claim 1 and including a microswitch having a spring arm disposed so as to be actuated by the vertical movement of said disk when bringing a button to the fabric, said microswitch when closed operating an electrical circuit for rotating said post.

3. A mechanism according to claim 2 and including a solenoid energized by the closing of said microswitch, a rack actuated by said solenoid when energized, and a gear connected to said post, said rack engaging said gear so as to rotate said post when the solenoid is energized.

4. A button feeding mechanism according to claim 3 and including a spring plate disposed over said feed disk for pressing upon buttons disposed in said button receiving openings so as to maintain them in said predetermined position.

5. A button feeding mechanism for use with a button sewing machine comprising a feed disk having a uniformly spaced series of button receiving openings formed adjacent the edge of the disk, means to rotate said disk intermittently so as to advance each button receiving opening to the sewing site of said sewing machine, means to orient each button disposed in said openings before it arrives at said sewing site, said last-named means comprising a post having a plurality of pins formed at one end thereof, said pins being adapted to enter the buttonholes of each button for urging the button into a predetermined position in respect to the orientation of its buttonholes, means to rotate said post for first bringing the pins thereof into alignment with and enter the button holes and then to rotate the button into said predetermined position, means to actuate said disk vertically for bringing the properly oriented button to a piece of fabric on which the button is to be sewn, said means to rotate said post being operative on a button preceding the one being sewn while it is

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being sewn to the fabric, and a hopper connected to said mechanism above said feed disk, said hopper being divided into a plurality of compartments each having a mouth for feeding buttons to the openings formed in said feed disk.

6. A button feeding mechanism for use with a button sewing machine comprising a feed disk having a uniformly spaced series of button receiving openings formed adjacent the edge of the disk, means to rotate said disk intermittently so as to advance each button receiving opening to the sewing site of said sewing machine, means to orient each button disposed in said openings before it arrives at said sewing site, said last-named means comprising a post having a plurality of pins formed at one end thereof, said pins being adapted to enter the buttonholes of said button for urging the button into a predetermined position in respect to the orientation of its buttonholes, means to rotate said post for first bringing the pins thereof into alignment with and enter the buttonholes and then to rotate the button into said predetermined position, means to actuate said disk vertically for bringing the properly oriented button to a piece of fabric on which the button is to be sewn, said means to rotate said post being operative on a button preceding the one being sewn while it is being sewn to the fabric, a hopper disposed above said feed disk for feeding buttons to said openings thereof, said means to rotate said disk intermittently and advance each button being operative after a button is being sewn to a piece of fabric and comprising a microswitch having a spring arm disposed in the path of vertical movement of said disk and being acted upon by the return of said disk to normal position after having sewn a button to the fabric.

7. A button feeding mechanism according to claim 6 and including a gear for rotating said disk, a clutch and gear mechanism for actuating said gear, said clutch and gear mechanism including a driving clutch plate, a motor for rotating the driving clutch plate, and a driven clutch plate, a pin on said driving clutch plate and normally transmitting power between the plates so that the clutch plates are normally engaged so as to normally rotate the disk, and means to intermittently disengage said pin from the driven clutch plate, said last-named means comprising an arm, and a solenoid for actuating said arm, said microswitch energizing said solenoid, said arm being operative when actuated to engage said pin and disengage it from said driven clutch plate when the disk is lifted away from the fabric.

8. A button feeding mechanism for use with a button sewing machine comprising a feed disk having a series of spaced button receiving openings formed adjacent the edge of the disk, means to rotate said disk intermittently so as to advance each button receiving opening to the sewing site of the sewing machine, means to orient each button disposed in said openings before it arrives at said sewing site, said last-named means comprising a post having a plurality of pins formed at one end thereof, said pins being operative to enter the buttonholes of each button and urge the button into a predetermined position in respect to the orientation of its buttonholes, and a spring plate disposed adjacent to said feed disk for pressing upon buttons disposed in said buttonholes so as to maintain them in said predetermined position, said spring plate being formed with a plurality of openings corre-

sponding, and in vertical alignment with, a plurality of consecutive button receiving openings formed in said feed disk.

9. A button feeding mechanism for use with a button sewing machine comprising a feed disk having a uniformly spaced series of horizontally disposed button receiving openings formed adjacent the edge thereof, means to rotate said disk intermittently so as to advance each button receiving opening to the sewing site of said button sewing machine, each of said openings being formed with a passageway extending through the periphery of the disk so that the thread of a sewn button may be removed therefrom, and a spring plate disposed over said feed disk and having edge portions disposed in each of said openings so as to bear against the buttons in

said openings and maintain them in a predetermined position, said spring plate being formed with a passageway in an edge portion thereof which is adjacent the sewing site of a button in the sewing machine so that said thread of the sewn button may be drawn through both passageways for releasing it from the mechanism.

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