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BUTTON FEEDING MECHANISM FOR SEWING MACHINES

Filed Aug. 31, 1959

2 Sheets-Sheet 1

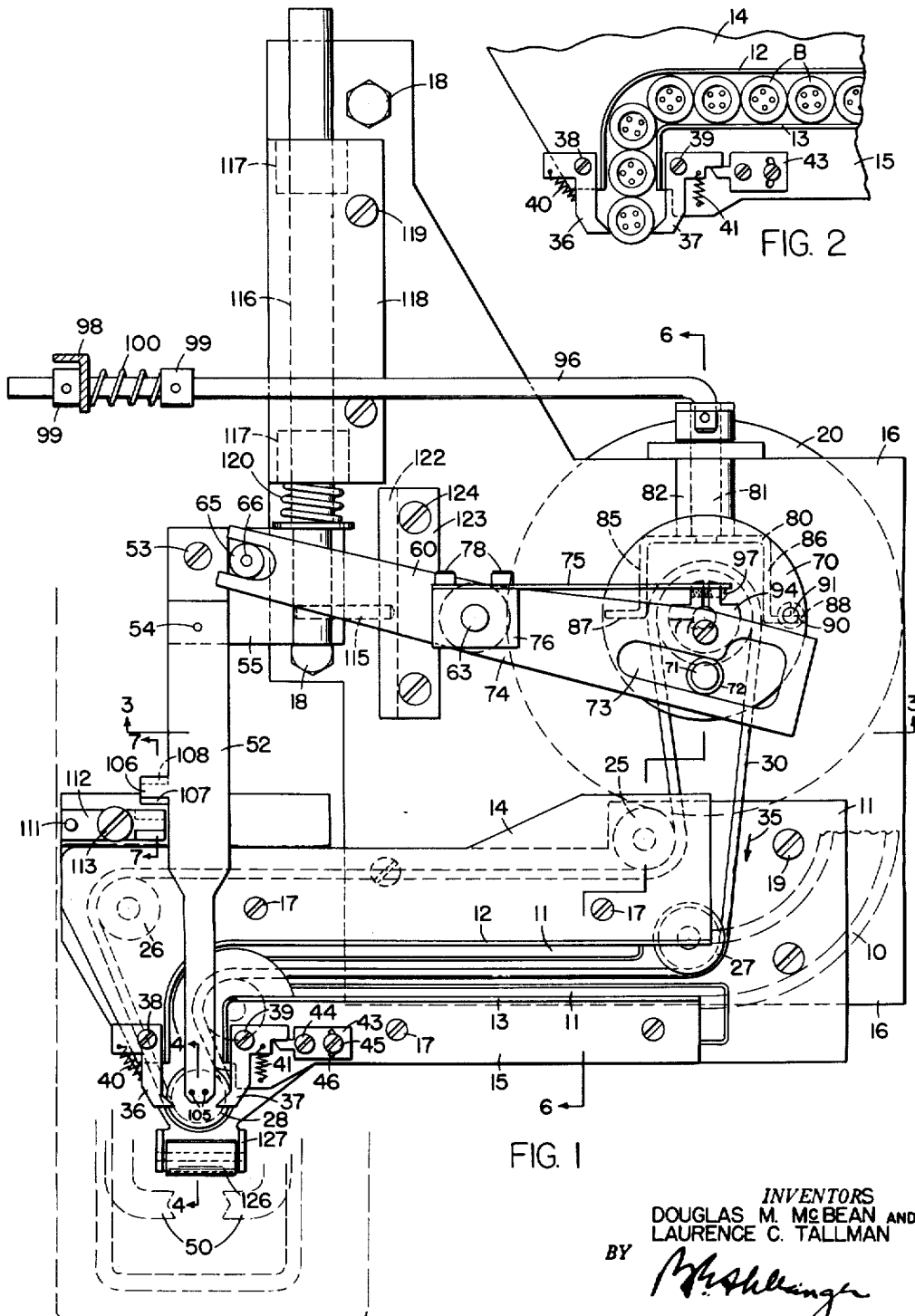


FIG. 1

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2 Sheets-Sheet 2

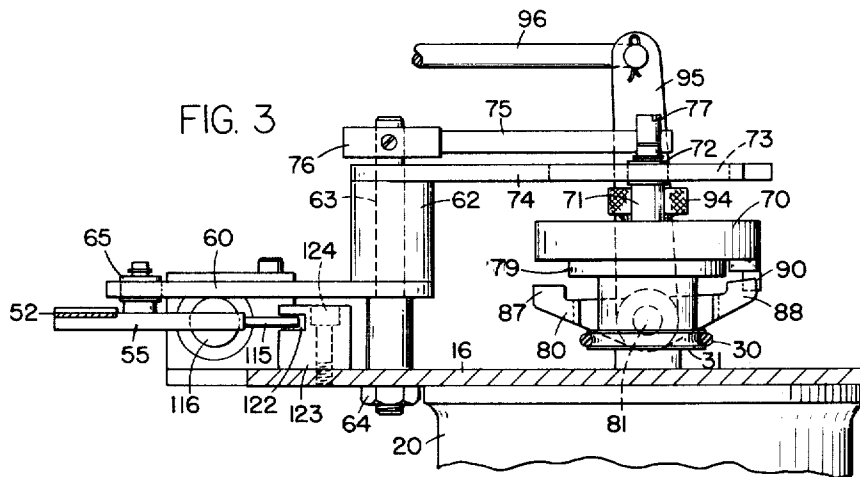
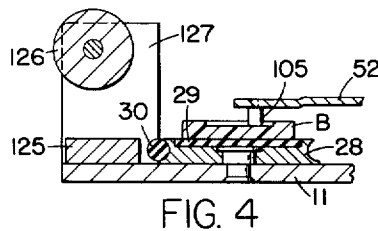
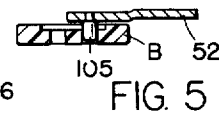
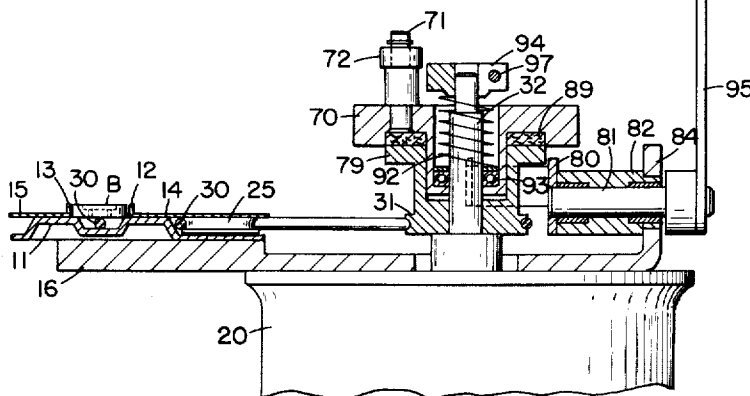
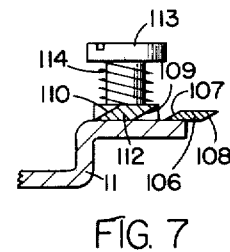


FIG. 6

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3,024,747

BUTTON FEEDING MECHANISM FOR SEWING MACHINES

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7 Claims. (Cl. 112—113)

The present invention relates to button feeding apparatus for sewing machines, and more particularly to apparatus for delivering buttons to the button gripping jaws of a commercial type sewing machine such as may be employed, for instance, in the sewing of buttons of men's shirts.

Heretofore, in sewing buttons on a shirt panel, a girl has had to feed the buttons to the sewing machine by hand. She has had to orient each button and has then had to insert it manually into the button chuck of the sewing machine. The button has had to be oriented precisely so that when the button is held by the jaws of the chuck in sewing position, the needle of the sewing machine will pass through a hole in the button on its strokes, and not strike the body of the button, for this would split the button and damage the needle. When the button is sewed on the shirt, the girl has had to release the chuck, and shift the shirt under the needle. Then she has had to orient and put another button into the chuck before sewing it in another position on the shirt. As will be obvious, it requires considerable skill to orient the buttons correctly, and to supply them quickly and accurately to the machine. It is only after years of experience that a girl can be a successful machine operator.

One object of the present invention is to provide an apparatus which will take buttons, that are delivered from a chute or hopper, orient each button correctly, and deliver it into the jaws of the button chuck of the sewing machine, all automatically and without the button having to be handled by the sewing machine operator.

Another object of the invention is to provide apparatus of the character described in which the feed of the button into the chuck is interlocked with the movement of the button chuck, so that the button feeder is locked in back position where it cannot insert a button into the chuck, until the operator removes the previously sewed button from the chuck.

Another object of this invention is to provide apparatus of the character described which will obviate the necessity of the operator handling the button, and make it necessary only for the operator to place the cloth and raise and lower the button chuck.

Still another object of the invention is to provide apparatus of the character described which will be simple in construction, easily maintainable in order, and which can operate at high speed.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims when considered in conjunction with the attached drawings.

In the drawings:

FIG. 1 is a plan view showing fragmentarily in dotted lines portions of a conventional sewing machine having thereon a button feeding mechanism constructed according to one embodiment of this invention, the button chuck of the sewing machine being removed to show the button inserting device of this invention more clearly, the jaws of the button chuck being shown, however, in dotted lines to indicate their relation to the button inserting device;

FIG. 2 is a fragmentary plan view of the guideway

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through which the buttons travel to the orienting pulley of the apparatus, and showing a column of buttons traveling therethrough;

FIG. 3 is a section on the line 3—3 of FIG. 1 looking in the direction of the arrows;

FIG. 4 is a fragmentary sectional view showing a button on the orienting pulley, the feed finger still not engaged therewith, and the roller and spacer block between which each button is fed by the feed finger to the jaws of the button chuck of the sewing machine;

FIG. 5 is a fragmentary view showing the feed finger engaged with the button;

FIG. 6 is a section on the line 6—6 of FIG. 1, looking in the direction of the arrows; and

FIG. 7 is a fragmentary sectional view taken on the line 7—7 of FIG. 1 looking in the direction of the arrows and showing the cooperating cam surfaces of the cam block and feed finger.

In the illustrated embodiment of the invention, the buttons are delivered from a chute or hopper 10 (shown in dotted lines in FIG. 1) onto spaced, raised horizontal top surface portions of a support plate 11 (FIGS. 1 and 6), and between the opposed, confronting, vertically disposed guide walls 12 and 13 of the plates 14 and 15, respectively. The plates 14 and 15 are mounted on top of the raised portions of plate 11, and are secured to plate 11 by screws 17. Plate 11 is secured to a base plate 16 by screws 19; and base plate 16, in turn, is rigidly fastened by screws 18 to the top surface of the base portion of the sewing machine. The gear motor 20, which drives the feeding mechanism of the present invention, is secured to the plate 16 beneath the same.

Rotatably mounted on the plate 11 to rotate about parallel axes are three idler pulleys 25, 26 and 27, and an orienting pulley 28. These pulleys are driven from motor 20 by an endless spring belt 30, which connects these pulleys with a drive pulley 31 (FIG. 6) that is secured to the armature shaft 32 of the gear motor. The spring belt 30 travels in the direction denoted by the arrow 35 (FIG. 1), and one reach of the belt travels in the trough (FIG. 6) between the raised portions of plate 11 and in contact with the bottom faces of the buttons B so as to move the buttons along between the guides 12 and 13 to deliver them on top of the orienting pulley 28.

Each button is arrested, when it arrives on top of the pulley 28, by the stop fingers 36 and 37. The stop finger 36 is pivoted at 38 to the guide plate 14. The stop finger 37 is pivoted at 39 to the guide plate 15. The two stop fingers are constantly urged toward button arresting position by coil springs 40 and 41, respectively. One end of each of these springs is secured to a pin that is fastened in the respective stop finger; and the other end of each spring is fastened to a pin that is secured in one or other of the guide plates 14 and 15, respectively. A stop 43, which is mounted on a pin 44 for angular adjustment, is positioned on the guide plate 15 to engage the tail of the stop finger 37 to limit the movement of this finger inwardly (clockwise as viewed in FIG. 1). This stop member 43 may be secured in any adjusted position by means of a screw 45 which passes through an arcuate slot 46 in the stop and threads into the guide 15.

The chuck jaws of the machine are shown in dotted lines at 50 (FIG. 1). The buttons are adapted to be fed successively to these jaws by an inserting or feed finger 52, which is slidable on the plate 16, and which is secured by a screw 53 and a dowel pin 54 to a laterally projecting plate 55. The inserting finger 52 is adapted to be reciprocated by a lever 60. This lever is welded or otherwise fastened at one end to a block 62 (FIG. 3) which is journaled on a stud 63 that is secured by a nut 64 to the base plate 16. The lever 60 is

forked at its other end to engage a roller 65 (FIG. 1) which is mounted on a pin 66 that is secured in the plate 55. The lever 60 is oscillated by a faceplate or crank 70 on which there is secured a crank pin 71. The crank pin carries a roller 72 which engages in a slot 73 formed in a lever 74 adjacent one end thereof. This lever 74 is welded or otherwise secured at its other end to the block 62. Slot 73 is of enlarged width at its right hand and as shown in FIG. 1 for a purpose which will appear hereinafter. A flat leaf spring 75 is secured by screws 78 to a block 76 that is fastened to the stud 63. This spring is positioned to bear against a pin 77, that is secured in the lever 74, when the crank plate 70 has rotated lever 74 far enough for roller 72 to be in the enlarged portion of slot 73.

The faceplate 70 is driven from the armature shaft 32 of the motor 20 through the pulley 31 which is keyed to the armature shaft. This pulley has a clutch shoe 79 (FIG. 6) integral with it. The clutch shoe 79 is adapted to engage an annular friction pad 89 that is secured in a recess in the crank plate 70 and that is made of conventional brake lining material. The pad 89 is held in engagement with the shoe 79 by a coil spring 92 which surrounds the armature shaft 32 and which is interposed between a ball thrust bearing 93 and a split-clamp nut 94 (FIGS. 1 and 6). Ball thrust bearing 93 seats in the bottom of a counterbore in the crank plate 70; and nut 94 is clamped by screw 97 on the shaft 32. Adjustment of the nut 94 axially on the shaft adjusts the tension of the spring 92.

The crank or faceplate 70 is adapted to be driven only intermittently. The intermittent operation of the faceplate is controlled by a clutch, which comprises a rocker member 80 (FIGS. 1, 3 and 6) that is riveted to a shaft 81. This shaft is journaled on spaced bushings in a block 82 that is fastened in a lug 84 which is integral with or welded to the base plate 16 at one side thereof. The clutch member 80 has parallel arms projecting forwardly therefrom, which are designated at 85 and 86 in FIG. 1. These have catch portions 87 and 88, respectively, integral therewith at the free ends thereof, which extend at right angles to the main portions of the arms and that are positioned to engage alternately with the quadrant shaped portion 90 (FIG. 3) of a pin 91 (FIG. 1) which is fastened in the faceplate 70.

In the position shown in FIGS. 1 and 3, the catch 88 is engaged with the pin portion 90. When the clutch member 80 is rocked about the axis of the stud 81, downwardly, as viewed in FIG. 3, the catch 88 will be disengaged from the pin 91, and the catch 87 will be moved to operative position. Disengagement of catch 88 will permit the friction clutch 79—89 to drive the faceplate 70 until the faceplate has rotated through 180° and the pin portion 90 engages the catch 87. Then the crank plate is again stopped; the clutch shoe 79, which is driven continuously by motor 20, will slip on the pad 89.

The shaft 81 is adapted to be rocked alternately clockwise and counterclockwise with the up and down motion of the button chuck of the sewing machine, the shaft 81 being secured to a lever 95 that is pivotally connected to a lever 96. Lever 96 has a bend at its right hand end (FIG. 1) that engages in a hole in lever 95. Lever 96 is fastened to the bell crank 98 of the sewing machine which actuates the thread clamp of the machine.

There are collars 99 secured to the rod 96 to limit the amount of movement of the rod with reference to the bell crank 98; and a coil spring 100 is interposed between one of these collars and the lever 98 to cushion the movement.

The feed or inserting finger 52 is made of flexible strap metal, and can bend up or down readily at the point of its connection to the plate 55. It has two pins

105 in it adjacent its front end which are adapted to engage in two holes of a button to feed the button into the chuck jaws of the machine. The feed or inserting finger also has a lug 106 (FIG. 1) projecting from it at one side which has a forwardly inclined surface 107 (FIG. 7) at its front end and an approximately parallel inclined surface 108 at its rear end. These inclined surfaces are adapted to engage, on movement of the inserting finger in opposite directions, inclined surfaces 109 and 110, respectively, of a cam plate 112 which is slidably mounted on a stud 113 that threads into the base plate 16. A spring 114 is interposed between the cam plate 112 and the head of the stud 113 to constantly urge the cam plate to its lowermost position, shown in FIG. 7. A dowel pin 111 serves to hold cam plate 112 against rotation.

The feed finger is held against rotation, during its reciprocating movement, by a pin 115 (FIG. 1), that is secured in a shaft 116. The plate 55 is rigidly fastened in a slot in this shaft 116 at the horizontal center line of this shaft. The shaft reciprocates forward and back through bearings 117 in a block 118 that is fastened by screws 119 to the base plate 16. A coil spring 120, which is interposed between one end of this block 118 and a washer that is fixed to the shaft 116, serves to urge the shaft constantly forward. The pin 115 engages in a guide groove 122 formed in a block 123 that is fastened to the plate 16 by screws 124. The guide groove 122 extends parallel to the shaft 116 in the direction of movement of the inserting finger 52. The pin 115 prevents rotation of the shaft 116.

In the withdrawn position of the finger 52 the pins 105 are located over the orienting pulley 28, so that when a button is delivered onto the top surface of this pulley, the pins will drop into two holes of the button, if the button is properly oriented when it arrives at the pulley, or will ride on top of the button (FIG. 4) until the pulley has rotated the button until two holes of the button register with the pins; then the pins will drop into these holes (FIG. 5). Then the inserting finger 52 through the now-engaged pins 105 holds the button against rotation, and will move the button forward with the feed finger into the chucking jaws of the machine. The pins 105 are located so that when the button is engaged the button will be properly oriented, so that when it is subsequently positioned by the chuck jaws under the needle of the sewing machine it will be in position so that the needle will pass through a hole in the button.

When the inserting finger 52 moves a button forward, the button passes over a spacer block 125 (FIG. 4) and the button and finger pass between the block 125 and a roller 126. The spacer block is mounted between lugs 127 (FIG. 1) that are turned up from support plate 11; and roller 126 is journaled in these lugs 127. The roller 126 holds the pins 105 in the button being fed and therefore holds fingers 52 in engagement with the button, until the button, which has just previously been sewed on the fabric, has been removed from the button chuck of the machine to permit the new button to be inserted therein.

When the new button has been inserted in the chuck jaws, the sewing machine operator trips the button chuck operating mechanism to swing the button chuck down to bring the new button into position on the shirt panel beneath the needle of the machine so that it can be sewed on the shirt panel. The movement of the button chuck causes the linkage 96—95—81 to rock the clutch member 80 upwardly again to the position of FIG. 3, disengaging catch 87 and positioning catch 88 to stop the rotation of crank plate 70 when it has again rotated through 180°.

The slot 73 is widened adjacent its right hand end, as already stated. This is to provide a fast return movement of the inserting finger 52. This accelerated return motion is obtained by pressure from the spring 75 bearing against the stud 77. When the enlarged portion of

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the slot 73 comes into registry with the roller 72, which occurs during the return of the crank to the position of FIG. 3, the pressure from the spring 75 causes the lever arm 74 to travel rapidly forward, causing quick return of the inserting finger 52 as soon as the button chuck in its travel to its working station on the sewing machine has carried the button down far enough for the button to clear the locating pins 105 of the inserting finger. The tripping mechanism 96, 95 for the clutch synchronizes the action of the inserting finger 52 with that of the button chuck.

The cam plate 112 enables the pins 105 to clear the button, which has newly been moved into position on the orienting pulley 28, on the return stroke of the feed finger, for on this return stroke surface 108 (FIG. 7) of the feed finger rides up on surface 110 of the cam plate. While the pins 105 are passing over the leading edge of the new button, cam plate 112 lifts pins 105. Lug 106 drops off cam plate 112 again at the end of the return stroke of the feed finger; and the pins 105 are then in position to register with and engage in the holes of the new button, as shown in FIG. 1.

During operation, the gear motor runs continuously driving the spring belt 30 and the clutch shoe 79. The buttons are fed onto the belt 30 from a chute, hopper or other separate button feeding device which discharges the buttons onto the support plate 11 between guides 12 and 13, single file and rightside up. The continuously moving belt 30 carries the buttons to the orienting pulley 28 where they are stopped by the dogs 36 and 37. The pulley 28 is preferably covered on its top with a friction material 29 which causes the button, which is on top of it, to rotate. When two of the holes in the button register with the pins 105 of the feed finger 52, these pins drop into the holes, and hold the button against further rotation.

After a sewing operation has been completed on a button, the operator raises the button chuck. This causes the rod 96 to be moved to the right in FIGS. 1 and 3 to cause the lever 95 to rock the clutch member 80 clockwise to disengage the catch 88 from the pin 90. The clutch shoe 79 then drives the face plate 70 through the friction pad 89. This causes the crank lever 74 and lever 60 to move the feed finger 52 forward, pushing the button, which is engaged by the pins 105, over spacer 125 (FIG. 4) into the chuck jaws as soon as the previous button has been removed.

The operator then lowers the chuck down onto the fabric to locate the newly-chucked button thereon beneath the needle of the machine. The initial downward travel of the button chuck causes the rod 96 to rock the lever 95 and clutch member 80 counterclockwise, releasing the pin 90 from the catch 87. The face plate 70 will rotate then until the pin 90 again engages the catch 88.

At this moment the roller 72 (FIG. 1) will have rotated 180° from the position shown in FIG. 1. The disengagement of the catch 87 from the pin portion 90 will again permit the clutch shoe 79 to drive the face plate; and as the roller 72 starts its clockwise rotation from the twelve o'clock position back to the six o'clock position shown in FIG. 1, the crank arm 74 is forced rapidly forward by the spring 75 due to the sudden increase in width to the slot 73. This causes a quick return of the feed finger 52 as soon as the button disengages from the pins 105. When the pin 90 engages the catch 88, the face plate is again stopped at the position shown in FIG. 1 until the new button has been sewed on the shirt and the button chuck is again raised.

The spring tension produced by the spring 75 can be adjusted by rotation of the block 76 about the shaft 63.

When the feed finger 52 travels forward the lug 106 on the left side of the finger passes under the cam 112. As the feed finger travels back on its return stroke the lug 106 rides up over the inclined face 110 of the cam 112 causing the forward end of the feed finger, and the pins

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105 to be raised up to clear the leading edge of the new button which has just been fed onto the orienting pulley 28. When the lug 106 has passed over the cam 112, the feed finger drops back causing the fingers 105 to be in position to engage the new button. The feed finger, is, as stated above, made of spring steel, thereby eliminating any need for a hinge at the point of connection of this finger with the plate 55. The plate 55 merely serves to prevent twisting of the finger.

The spring 120 (FIG. 1) causes all the mechanical and wear clearances to be in one direction, thereby removing slop, so that the absolute back position of the pins 105 of the feed finger can be controlled, and the pins will be in proper relation to the holes in the button while the latter is being retained by the dogs 36 and 37. Thus, the pins 105 can readily be located over the button in back position of the feed finger to seek two holes in the button into which they can drop.

While the invention has been described in connection with one embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth.

Having thus described our invention, what we claim is:

1. Mechanism for feeding to a sewing machine buttons, each of which has a plurality of holes in it, comprising a guideway having spaced, parallel sides, means for feeding buttons through said guideway comprising an endless belt, and a plurality of pulleys around which said belt travels, one reach of said endless belt being disposed between the sides of said guideway to engage the buttons to carry the buttons along said guideway between said sides as said endless belt moves in operation, one of said pulleys being disposed at the forward end of said guideway to receive on top of it buttons successively from said guideway, and a reciprocable feed member disposed to be above the button which is on said one pulley when said feed member is at one limit of its movement, said feed member having a plurality of pins thereon adapted to enter holes in the button on said one pulley when the button is in a predetermined rotational position, and means for reciprocating said feed member.

2. Mechanism for feeding buttons to the button chuck of a sewing machine, which is equipped with a button chuck for holding a button beneath the needle of the machine during the sewing operation and which is also equipped with means for moving the button chuck to and from operative position, and wherein each of the buttons, which is to be fed, has a plurality of holes in it, said mechanism comprising a rotary member disposed to be aligned with the button chuck when the button chuck is in operative position, means for delivering a button onto said member, means for rotating said rotary member comprising a motor, and an actuating member driven continuously thereby and operatively connected to said rotary member, a reciprocatory feed member for moving a button off said rotary member into the button chuck when the button chuck is in operative position, said feed member being disposed to be above a button on said rotary member when said feed member is at one limit of its reciprocatory movement, said feed member having a plurality of pins disposed to engage holes in the button when the button has a predetermined rotational position about the axis of said rotary member, means for intermittently reciprocating said feed member from said one limit position forward to move a button from said rotary member into the button chuck and to then return said reciprocatory member to said one limit position including a second rotary member and a

friction clutch for driving said second rotary member from said actuating member, and latch means connected to said chuck and operative upon the movement of said chuck to operative position to engage said second rotary member and prevent the driving thereof by said clutch, whereby said reciprocating means cannot be actuated to feed a button to the chuck when the button chuck is in operative position.

3. Mechanism for feeding buttons to the button chuck of a sewing machine, which is equipped with a button chuck for holding a button in registry with the needle of the machine during the sewing operation and which is also equipped with means for moving the button chuck to and from operative position, and wherein each of the buttons, which is to be fed to the machine, has a plurality of holes in it, said mechanism comprising a rotary member disposed to be aligned with the button chuck when the button chuck is in operative position, means for delivering a button onto said member, means for rotating said rotary member comprising a motor, and a rotary actuating member driven continuously thereby, a rectilinearly reciprocable feed member for moving a button off said rotary member into the button chuck when the button chuck is in operative position, said feed member being disposed to be above a button on said rotary member when said feed member is at one limit of its reciprocatory movement, said feed member having a plurality of pins disposed to engage holes in the button when the button has a predetermined rotational position, means for reciprocating said feed member to effect feed and return strokes thereof from said one limit position comprising a rotary crank having a crank pin thereon, an arm operatively connecting said pin with said feed member, and a friction clutch for driving said crank from said actuating member, and means for holding said crank periodically against rotation comprising a pivoted clutch latch having two catch portions, a pin carried by said crank and positioned to be engaged alternately by said two catch portions after each 180° of rotation of said crank, and means connecting said clutch latch to the button chuck and operative when the button chuck is moved to operative position to cause the clutch latch to be rocked in one direction about its pivot to permit said crank to be driven 180° to effect a return stroke of said feed member, and operative when the button chuck is moved to inoperative position, to cause said clutch latch to be rocked in the opposite direction to permit said crank to be driven through another 180° to effect the feed stroke of the feed member.

4. Mechanism for feeding buttons as claimed in claim 3, wherein said arm has a slot therein in which said crank pin engages, and said slot is enlarged at one end, and a spring is provided to urge said arm in one direction when said crank pin is in the enlarged portion of said slot to effect quick return of said feed member.

5. Mechanism for feeding buttons to the button chuck of a sewing machine, which is equipped with a button chuck for holding a button in registry with the needle of the machine during the sewing operation and which is also equipped with means for moving the button chuck to and from operative position, and wherein each of the buttons, which is to be fed to the machine, has a plurality of holes in it, said mechanism comprising a guideway having spaced, parallel sides, means for feeding buttons through said guideway comprising an endless belt, and a plurality of pulleys around which said belt travels, one reach of said endless belt being disposed between the sides of said guideway to engage the buttons frictionally to carry the buttons along said guideway between said sides as said endless belt moves, one of said pulleys being disposed at the forward end of said guideway to receive successively on top of it buttons from said guideway, means including a motor for rotating a second of said pulleys to drive said belt, a rectilinearly reciprocable feed member for moving a button

off said one pulley into the button chuck when the button chuck is in operative position, said feed member being disposed in its rearward limit position to be above a button on said one pulley, said feed member having a plurality of pins thereon disposed, when said feed member is in its rearward limit position, to engage holes in the button when the button has a predetermined rotational position about the axis of said one pulley, means for reciprocating said feed member to effect feed and return strokes thereof comprising a rotary crank having a crank pin thereon, an arm operatively connecting said pin with said feed member, a friction clutch connecting said second pulley to said crank for driving said crank, and means for holding said crank periodically against rotation comprising a latch member, and means for connecting said latch member to the button chuck and operative when the button chuck is moved to inoperative position to cause the latch member to be disengaged to permit said friction clutch to drive said crank 180° to effect a feed stroke of said feed member, and operative when the button chuck is moved to operative position to cause the latch member to be again disengaged to permit said friction clutch to drive said crank another 180° to effect a return stroke of said feed member.

6. Mechanism for feeding to a sewing machine buttons, each of which has a plurality of holes in it, comprising a pulley, a source of power, an endless belt connecting said pulley to said source of power to rotate said pulley, means for delivering buttons into frictional engagement with said belt, so that said belt as it moves carries the buttons with it to feed individual buttons onto said pulley successively, a reciprocable feed member disposed to be above said pulley when said feed member is at one limit of its movement, said feed member having a plurality of pins thereon positioned to enter and engage in holes in the button on said pulley when said feed member is at said one limit position and the button is in a rotational position where holes in the button register with said pins, resilient means constantly urging said pins into hole-engaging position in said one limit position of said feed member, and means for moving said feed member after said pins have engaged a button to move the engaged button off the pulley for delivery to the sewing machine.

7. Mechanism for feeding buttons to the button chuck of a sewing machine, which is equipped with a button chuck for holding a button beneath the needle of the machine during the sewing operation and which is also equipped with means for moving the button chuck to and from operative position, and wherein each of the buttons which is to be fed has a plurality of holes in it, said mechanism comprising a guideway having spaced, parallel sides, means for feeding buttons through said guideway comprising an endless belt, and a plurality of pulleys around which said belt travels, one reach of said endless belt being disposed between the sides of said guideway to engage the buttons to carry the buttons along said guideway between said sides as said endless belt moves in operation, one of said pulleys being disposed at the forward end of said guideway to receive on top of it buttons successively from said guideway, a reciprocable feed member disposed to be above the button which is on said one pulley when said feed member is at one limit of its movement, said feed member having a plurality of pins thereon to enter holes in the button on said pulley when said feed member is at said one limit position and the button is in a rotational position where holes in the button are in registry with said pins, means for intermittently moving said feed member in opposite directions to effect feed and return movements thereof, and means connecting the last-named means and the button chuck and operative upon movement of the button chuck to operative position to prevent said last-named means

from being actuated to feed a button to the machine when		2,505,468
the button chuck is in operative position.		2,832,506
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