July 3, 1962 R. H. HENDRICKSON 3,042,254

BUTTON LOADING MECHANISM FOR SEWING MACHINES

Filed June 17, 1959

3 Sheets-Sheet 1

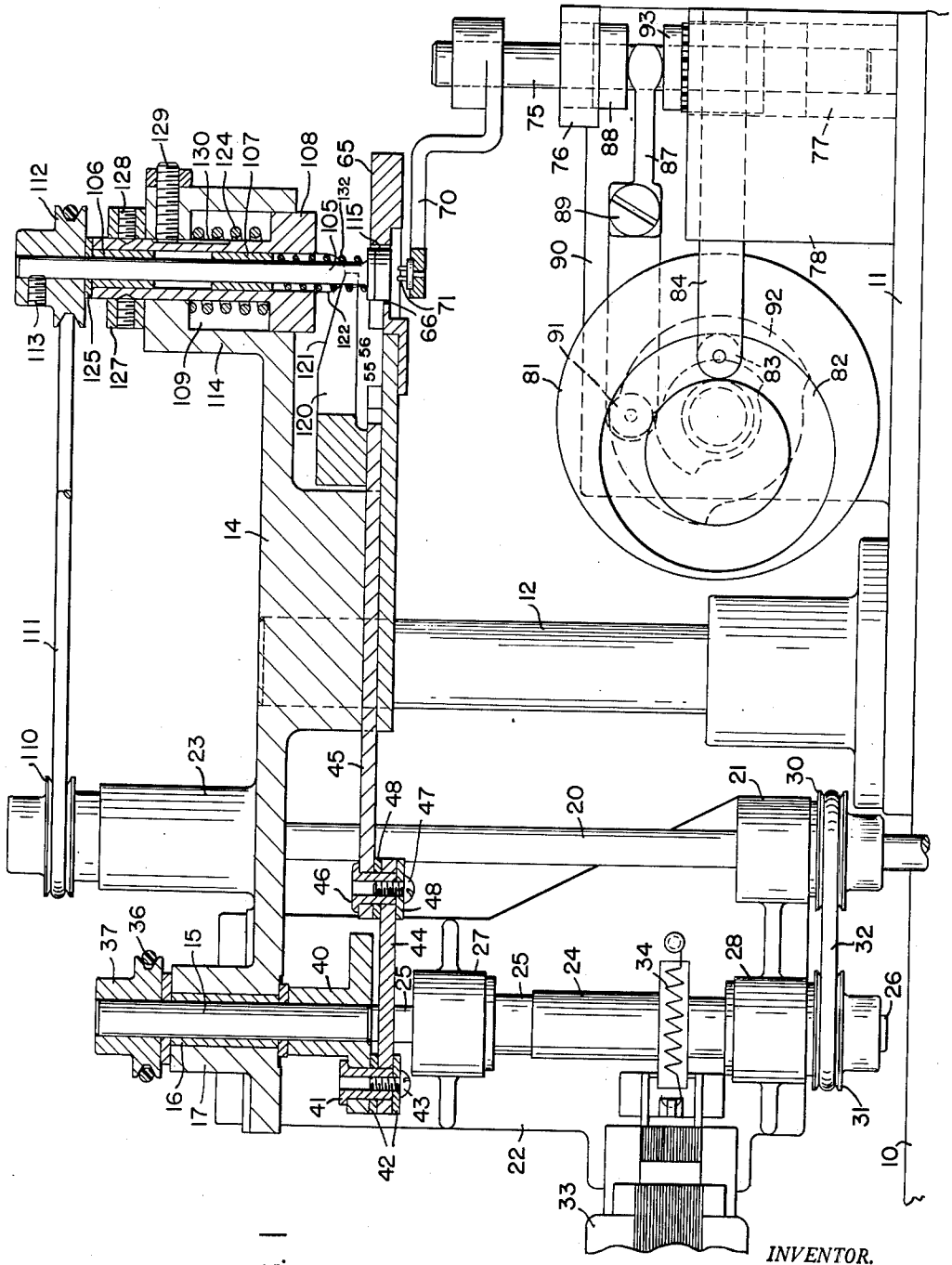


FIG. 1

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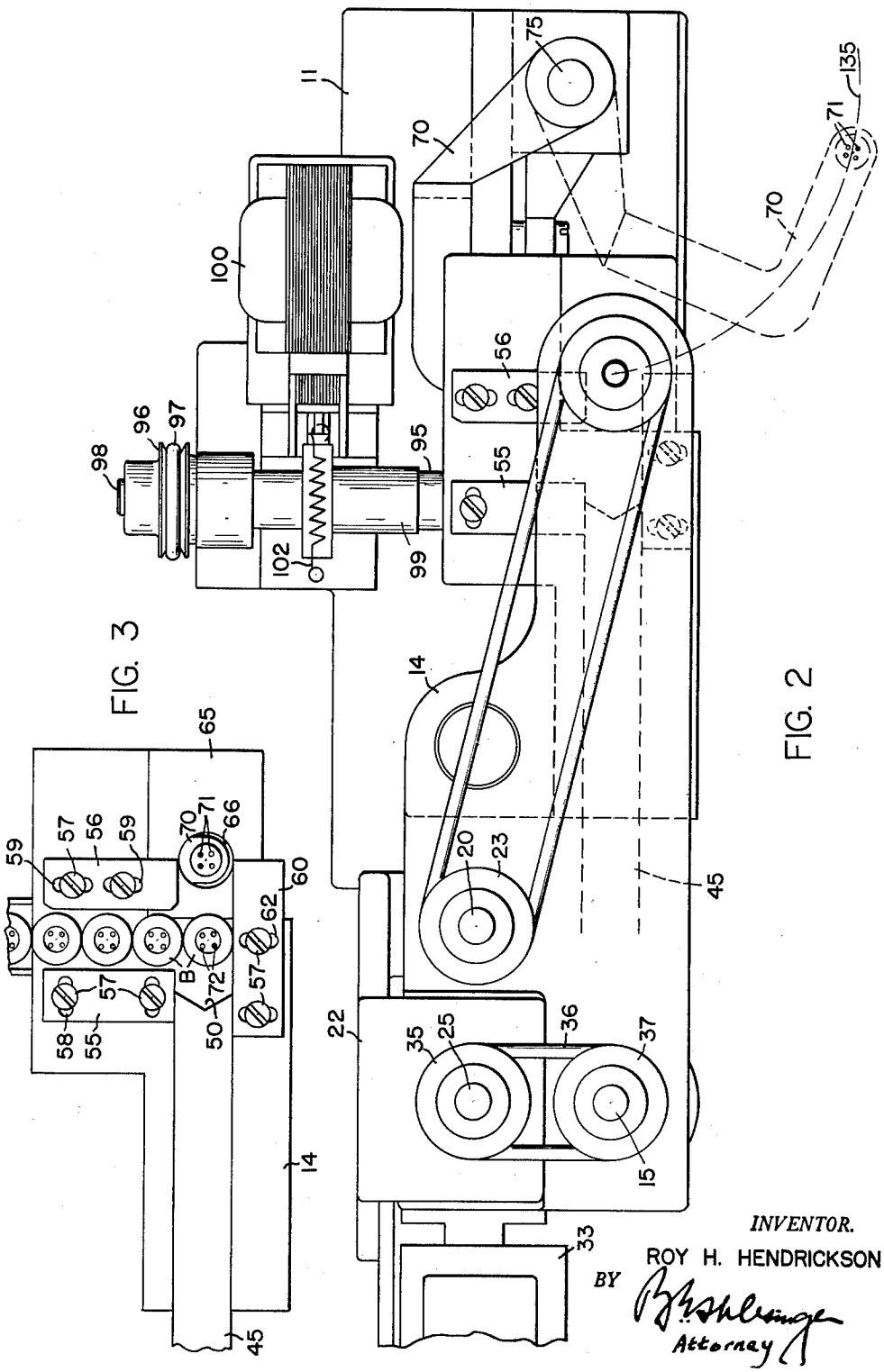


FIG. 3

FIG. 2

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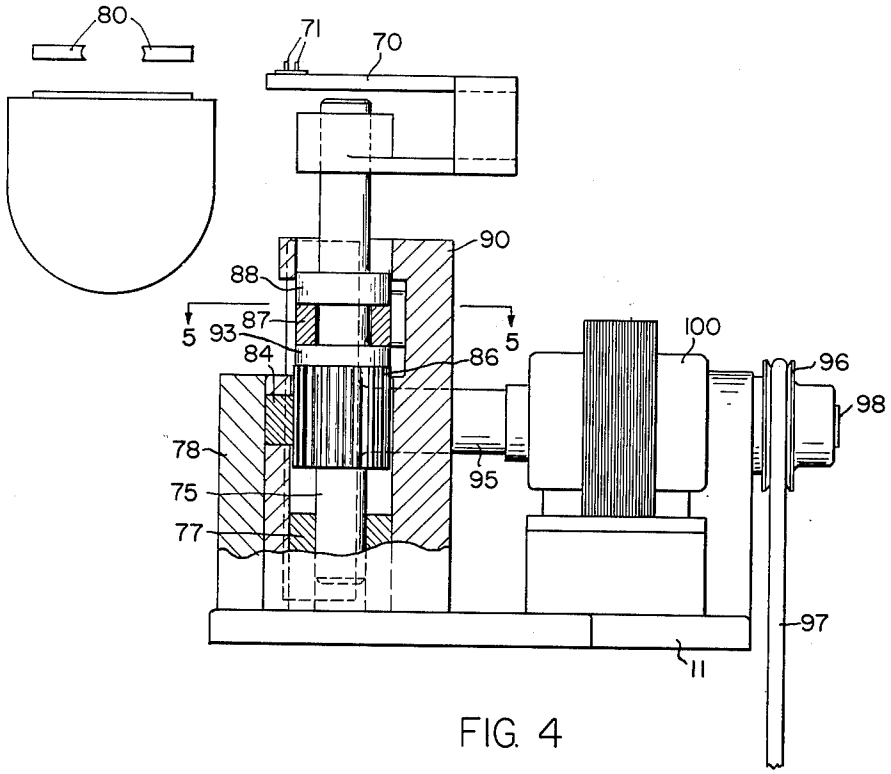


FIG. 4

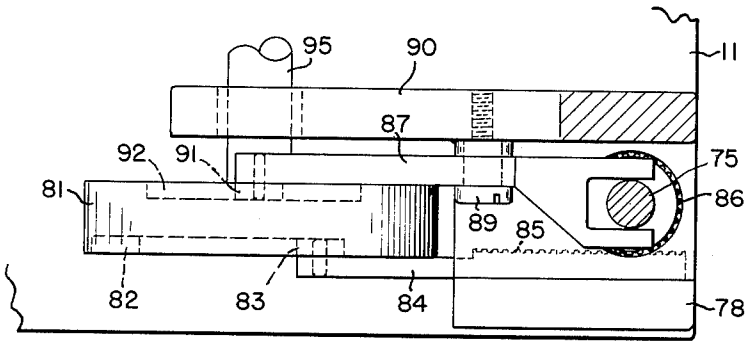


FIG. 5

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3,042,254

Patented July 3, 1962

3,042,254

BUTTON LOADING MECHANISM FOR SEWING MACHINES

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Filed June 17, 1959, Ser. No. 820,975
9 Claims. (Cl. 221—173)

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

Heretofore for sewing buttons on a shirt panel, a girl has sat in front of the sewing machine, and inserted one button at a time between the jaws of the button chuck of the sewing machine. She has had to orient the button so that when it is in the jaws of the chuck, the needle of the sewing machine will pass through a hole in the button on its stroke, and not strike the body of the button, which would split the button, and damage the needle. When the button is sewed on the shirt, she has had to release the chuck, and shift the shirt under the needle. Then she has had to put another button in place to be sewed 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 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 these buttons correctly, and deliver each button 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 which will be simple in construction, easily maintainable in order, and which can be operated 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 fragmentary vertical section through a button feeding apparatus built according to one embodiment of this invention;

FIG. 2 is a plan view of this feeding mechanism and showing also the button carrying arm in dotted lines in the course of its swing from loading position to delivery position;

FIG. 3 is a fragmentary view in a plane parallel to the plane of FIG. 2, parts being broken away to show the plunger or slide for moving the buttons from the chute to the button carrying arm;

FIG. 4 is a front elevation of the feeding mechanism with parts broken away and shown in section; and

FIG. 5 is a fragmentary horizontal sectional view showing details of the mechanism for operating the swinging arm of the feeder.

In the illustrated embodiment of the invention, the buttons are delivered from a chute or hopper onto the flat surface of a plate. The buttons are confined so that they move in a column of single buttons onto this surface. A button slide reciprocates back and forth over this surface. On each forward stroke the button slide engages the lead button of the column and acts as a cut-off for the rest of the column. It pushes the lead button over a hole in the plate, and the button drops through the hole. Positioned beneath the hole are four locating pins of a transfer arm that is adapted to be swung back and forth to carry individual buttons from the hole into the spring-tensioned jaws of the conventional button holding clamp of the commercial sewing machine.

The locating pins are adapted to enter into the holes of the button which is to be transferred. If the button, as it drops into the hole in the plate, is not properly oriented with reference to the pins it will rest on top of the pins instead of being engaged with them.

To orient the button and to nest the button properly on the pins, the rubber-tipped head of a rotating spindle is moved into the hole in the plate immediately after a button has been dropped therethrough. If the button is resting on top of the pins, the head of the rotating spindle will frictionally engage and rotate the button until its holes align with the pins and the button drops down onto the pins, thereby clearing itself from the head of the spindle.

The head of the spindle is lifted out of the way before another button is fed into the hole by the button slide so as not to interfere with the feed of this other button. A forked lifter member is provided on the button slide. This lifter member protrudes far enough forward from the button slide to engage and lift the spindle head out of the way before the slide will have delivered a button to the hole. The rotating spindle head may be returned to operative position by gravity or by spring pressure.

After a button has been nested on the pins of the transfer arm, the arm is swung through an arc to carry the button to and snap it into the spring-tensioned jaws of the button holding clamp of the sewing machine. The arm is then lowered to move the pins out of engagement with the button; and the arm returns to starting position with the pins located beneath the hole in the nesting plate, ready for another operation of the mechanism.

Referring now to the drawings by numerals of reference, 10 denotes the sewing machine table. Secured on this table at one side of the sewing machine proper there is a base plate 11. Bolted or otherwise secured to this base plate is a vertically extending support post 12. This post carries a plate or casting 14, in which a shaft 15 (FIG. 1) is journaled by means of a bushing 16.

The shaft 15 is adapted to be driven from a motor (not shown) through a shaft 20 which may be driven from the motor by a flexible cable (not shown). Shaft 20 is journaled at its lower end in a bearing 21 that is integral with or secured to a bracket 22. The bracket 22 is mounted to depend from the plate or casting 14. The shaft 20 is journaled at its upper end in another bearing 23 which is formed integral with the plate or casting 14. Journaled at its upper end in the bracket 22 is a shaft 25. This shaft is journaled adjacent its lower end in a bearing 27 integral with the bracket 22. The shaft 25 is connected by a conventional one revolution clutch 24 with an axially aligned shaft 26 that is journaled in a bearing 28 also integral with bracket 22. The shaft 26 is driven from the shaft 20 by a pulley 30, which is secured to the shaft 20, a pulley 31, which is secured to the shaft 26, and the belt 32, which connects the two pulleys. One revolution clutch 24 is adapted to be operated when solenoid 33 is energized, and is locked up when the solenoid is deenergized and the spring 34 operates to return the locking member (not shown) of the clutch to operative position. Secured to the upper end of the shaft 25 is a pulley 35 (FIG. 2) which drives the shaft 15 through a belt 36 and pulley 37. Pulley 37 is fastened to the upper end of the shaft 15. Thus, when the solenoid 33 is energized shaft 26 will be coupled to shaft 25, and shaft 15 will be driven.

Secured to the lower end of the shaft 15, beneath the plate or casting 14, is a crank plate 40 (FIG. 1), which

carries a crank pin 41. Mounted upon the crank pin 41, and secured thereto between washers 42 by means of a screw 43 is a connecting rod 44. This connecting rod is secured to the button slide 45 by means of a grommet 46, a screw 47 and washers 48.

The button slide 45 is adapted to reciprocate through a guide opening in the plate or casting 14. At its free, or forward, end, as shown in FIG. 3, it is formed with a V notch, denoted at 50 adapted to receive a button.

The buttons B are adapted to be delivered to the feeder mechanism from a chute, or hopper, or other suitable source of supply, as shown in FIG. 3, onto the top of the plate or casing 14 and between guides 55 and 56 which are secured by screws 57 to the plate or casting 14. The guide 55 is mounted on the plate or casting 14 to be adjustable in the direction of movement of the button slide 45, elongate slots 58 being provided in the guide for this purpose. The screws 57 pass through these elongate slots. The guide 56 is mounted on the plate or casting 14 for adjustment in a direction at right angles to the direction of movement of the button slide 45, elongate slots 59 being provided in the guide for this purpose. The screws 57, which secure the guide 56 to the plate 14, pass through these slots.

Mounted to cooperate with the guides 55 and 56 is a third guide 60. This guide is positioned opposite the ends of the guides 55 and 56 and so as to constitute an extension of one side of the slot in which the button slide 45 reciprocates. The opposed ends of the guides 55 and 56 form prolongations of the other side of this guide slot. The guide 60 is also secured to the plate 14 by screws 57. The guide 60 is adjustable toward and away from the guides 55 and 56; and for this purpose is provided with parallel elongate slots 62 through which the screws 57, which secure the guide 60 to the plate 14, pass.

By adjustment of the several guides 55, 56 and 60, the space between the guides can be determined to correspond with the size of the buttons that are to be fed to the sewing machine.

Secured to the plate or casting 14 at its forward end, considered in the direction of travel of the button slide 45, is an interchangeable nest plate 65. This plate has a hole 66 in it through which a button, that is pushed forward by the button slide 45, can drop onto pins 71 that project upwardly from a swing arm 70.

In the embodiment shown there are four upwardly projecting pins 71 on the swing arm. These are spaced in correspondence with the spacing of the holes 72 in the buttons B, which are to be fed to the sewing machine.

The arm 70 is secured to a shaft 75 that is oscillatably and reciprocably mounted in a pedestal 78 that is secured to or is integral with the base of the apparatus. It is mounted at its lower end in a bushing 77 that is carried in pedestal 78; and it is formed with a collar 88 intermediate its ends which is adapted to slide and oscillate in the circular opening in the pedestal 78 that constitutes the bearing 76. Shaft 75 is parallel to shafts 25, 26 and 15.

Swinging motion of the shaft 75 to swing the button carrying pins 71 from a position of registry with the hole 66 to a position between the conventional clamping jaws 80 of the sewing machine is effected by operation of a cam 81. This cam has a cam path 82 formed in one side face thereof in which there engages a roller or follower 83. This roller or follower is mounted upon a slide 84 (FIGS. 1, 4 and 5) which has rack teeth 85 formed integral therewith at its forward end. These mesh with a pinion 86 that is integral with or secured to the shaft 75.

The shaft 75 is adapted to be lifted and lowered by a lever 87. This lever is forked at one end to straddle the shaft 75 and to engage between the shoulder 88 and a second, axially-spaced lower shoulder 93 also turned on the shaft. At its opposite end lever 87 carries

a roller 91 which engages in the track 92 of the cam 81. Lever 87 is pivoted intermediate its ends upon the stud 89 that is threaded into a plate 90 that is integral with the base 11 and projects upwardly therefrom.

The cam 81 is secured to a shaft 95 which is journaled in the plate 90. This shaft is adapted to be driven from the motor mentioned above (not shown) through a pulley 96 (FIGS. 2 and 4) and belt 97. Pulley 96 is secured to a shaft 98 that is connected by a conventional one revolution clutch 99 with the shaft 95. The one revolution clutch 99 is adapted to operate when solenoid 100 is energized. The locking dog of this one revolution clutch is adapted to be returned to locking position by a coil spring 102.

To orient the buttons, which are fed to the nesting hole 66 by the button slide, there is provided a revolving spindle 105 (FIG. 1). This spindle is aligned axially with the hole 66 in the nesting plate 65. It is journaled by means of bushings 106 and 107 in a sleeve 108 which is slidably mounted in the casting 14 and which has an enlarged head at its lower end. The enlarged head is mounted to reciprocate in a chamber 109 formed in an upwardly projecting bearing portion 114 that is integral with plate or casting 14. The spindle 105 is adapted to be driven from the shaft 20 through the pulley 110, belt 111, and pulley 112. Pulley 110 is secured to the shaft 20; and pulley 112 is secured by set-screw 113 to the spindle 105. The lower end of the spindle 105 is rubber-tipped, as denoted at 115, to provide frictional means for rotating a button that has been dropped through hole 66 onto pins 71, should the button not have its holes in registry with the pins 71 of the arm 70.

When a button is being fed by the button slide to the nesting hole 66, it is necessary, of course, that the rubber tip of the spindle 105 be out of the way. To lift spindle 105, there is a spindle lifter 120 fastened on top of the button slide 45 adjacent the free end thereof and above the notch 50. This spindle lifter 120 is forked; and its furcations have upwardly inclined upper surfaces 121 which are positioned to engage under ears 122 that are formed integral with the sleeve 108 and that project from the bottom face thereof. A coil spring 124, which surrounds the sleeve 108 and which is interposed between the enlarged head of the sleeve and the opposed face of the chamber 109, serves to urge the sleeve 108 constantly downwardly. The sleeve transmits its upward motion to the pulley 112 which is secured to the spindle 105 through a washer 125. A collar 127, which surrounds the sleeve and which is secured to the sleeve by set-screws 128, serves to limit downward movement of the sleeve. Upward movement of the sleeve is limited by a set-screw 129 which engages in the slot 130 that extends axially of the sleeve. A coil spring 132, that surrounds the spindle 105 and that is interposed between the bushing 107 and the rubber-tipped lower end 115 of the spindle, serves to urge the spindle itself constantly downwardly, and to return it to its lower position. The ears 122 of the sleeve 108 are at opposite sides of spring 132.

The operation of the apparatus will be understood from the preceding description, but may be summed up briefly here. On each forward stroke of the button slide 45, the lifter fork 120 will lift spindle 105, lifting the head 115 of this spindle out of the way, and the button slide 45 itself will take the first button from the column that is being fed onto the top of plate 14, and push this button into registry with the hole 66 in the nesting plate 65. If the four holes in the button are in registry with the four pins 71 of the transfer arm the button will drop down through hole 66 and nest on pins 71. As the button slide 45 recedes on each return stroke, lifter 120 will allow the head 115 of the spindle 105 to return to its operative position. If the button has not nested on the pins, the rotating head 115 will frictionally engage the button and rotate it enough to cause the holes in the but-

ton to align with and to drop over the pins. If the holes in the button were aligned with the pins when the button dropped through hole **66**, the button will already be nested on the pins and the head **115**, when it returns to operative position, will simply rotate idly above the top of the button without engaging the button.

The drives to the various parts of the apparatus are so timed relative to one another that when sufficient time has elapsed for a button to have been nested on pins **71**, cam track **82**, rack **84** and pinion **86** will operate to swing arm **70** through an arc to transfer the button into the jaws of the button holding clamp of the sewing machine. The pins **71** are, of course, so positioned on the arm **70**, and the arc of swing of arm **70** is so selected that the button will be properly oriented with reference to the needle of the sewing machine when delivered into its button holding jaws. After delivery of the button to the button holding jaws, cam track **92** and lever **87** operate to lower shaft **75** and arm **70**; cam track **82** operates through rack **84** and pinion **86** to swing the arm **70** back again until pins **71** align with hole **66**; and cam track **92** operates through lever **87** to lift the arm and complete its return to starting position with the pins just below the nesting hole **66**.

The arc of swing of arm **70** is sufficient to effect the transfer and return operations. In one commercial embodiment of the invention this arc, part only of which is denoted in dash lines at **135** in FIG. 2, is approximately 122°. In the transfer operation the button is delivered into the button holding jaws of the machine from the back, by a counterclockwise swing as shown. This contrasts with the conventional manual operation which is to put the button into the jaws from the front.

The solenoid **33** which actuates the one-revolution clutch **24** may be energized by closing of a limit switch on the sewing machine that is tripped when the sewing operation on a button has been completed. The solenoid **100** for one-revolution clutch **99** may be simultaneously energized by closing of the same switch; or, if desired, might be tripped by a switch operated by shaft **25** or crank **40**.

It will be seen that with the mechanism of the present invention a button may be delivered to a sewing machine from a hopper without manual handling and properly oriented with reference to the needle of the machine.

While the transfer arm **70** has been described as having four pins **71**, the number of pins, of course, may vary in accordance with the number of holes in the buttons which are to be sewed on the fabric by the sewing machine with which the feeder of the invention is to be used.

While the invention has been described in connection with one embodiment thereof, then, 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, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention, what I claim is:

1. Apparatus for loading into a sewing machine buttons, each of which has at least one hole through it, said apparatus comprising a plate having an aperture through it, a transfer member having a pin thereon adapted to enter the hole and disposed initially with said pin beneath said aperture, reciprocatory means for delivering one button at a time into said aperture, said aperture being large enough for a button to pass therethrough, a rotary member movable into and out of said aperture, means for rotating said rotary member to engage and rotate any button whose hole does not align with said pin until it does so, so that the button may drop over the pin, and means for moving said transfer member to transfer the button, after it has engaged over the pin, to the sewing machine.

2. Apparatus for loading into a sewing machine buttons, each of which has a plurality of holes in it, said apparatus comprising a plate having an aperture through it, said aperture being large enough for a button to pass therethrough, a transfer member having a plurality of pins thereon adapted to enter holes of a button to orient the button relative to said transfer member, said transfer member being disposed initially so that said pins are beneath said aperture, a reciprocable slide for moving buttons individually from a source of supply over said plate into registry with said aperture to have them drop through the aperture, a rotary member movable into and out of said aperture, means for reciprocating said slide, means for rotating said rotary member when in said aperture to frictionally engage and rotate any button whose holes do not align with said pins until they do so so that the button may drop over said pins, and means for moving said transfer member to transfer the button, after it has engaged over the pins, to the sewing machine.

3. Apparatus for loading buttons as claimed in claim 2 in which said slide is reciprocable rectilinearly in a direction generally radial of said aperture.

4. Apparatus for loading buttons as claimed in claim 2 having means on said slide for raising said rotary member out of said aperture as said slide moves toward said aperture so as to prevent said rotary member from interfering with movement of the button into said aperture.

5. Apparatus for loading buttons as claimed in claim 2 in which said transfer member is a swinging arm that is also movable axially, and in which control means is provided that in sequence swings said arm to transfer the button to the sewing machine, to lower the arm to disengage the pin from the button after the button has been loaded into the sewing machine, and then swing said arm back and raise it again to return it to starting position.

6. Apparatus for loading into a sewing machine buttons, each of which has a plurality of holes in it, said apparatus comprising a plate having an aperture through it, said aperture being large enough for a button to pass therethrough, a swingable transfer member having a plurality of pins thereon adapted to enter holes of a button to orient the button relative to said transfer member, said transfer member being disposed initially so that said pins are beneath said aperture, a slide for moving buttons individually from a source of supply over said plate into registry with said aperture to have them drop through the aperture, said slide being reciprocable rectilinearly in a direction generally radial of said aperture, a rotary member aligned axially with said aperture and normally disposed therein but being reciprocable axially to move it into and out of said aperture, said rotary member having a head for frictionally gripping and rotating a button, which has dropped into said aperture, if the holes of said button do not drop over said pins, so that the button will be rotated until its holes align with said pins and drop thereover, a sleeve in which said rotary member is journaled, a forked lifter member carried by said slide and having its furcations projecting ahead of said slide when said slide is moved toward said aperture, said furcations having top surfaces which are inclined upwardly rearwardly from their front ends and which are disposed to engage said sleeve to lift said rotary member when said slide is moved toward said aperture, means for reciprocating said slide, means for rotating said rotary member, and means for moving said transfer member from its initial position to a loading position and back again to load a button into said sewing machine, and then to return said transfer member to initial position.

7. Apparatus for loading buttons as claimed in claim 6 wherein said transfer member is swingable about a vertical axis and reciprocable axially of its axis, and wherein said moving means swings said transfer member about its axis to effect the transfer operation, then moves the mem-

ber downwardly axially to disengage the pins from the button after the button has been loaded in the sewing machine, and then swings the transfer member back and raises it again to return it to initial position.

8. Apparatus for loading buttons as claimed in claim 7 wherein said rotary member rotates about an axis parallel to the axis of swing of said transfer member, said slide is driven by a crank which rotates about an axis also parallel to said axis of swing, the means for driving said crank includes a one-revolution cltuch for intermittently driving said crank, and the means for swinging and reciprocating said transfer member includes a cam and a one-revolution clutch for intermittently driving said cam.

9. Apparatus for loading a perforated button into a sewing machine having generally horizontally disposed button-holding jaws from the rear of said jaws, comprising a transfer arm mounted for oscillation about a vertical axis and for reciprocation in the direction of said axis, a plurality of pins extending upwardly from said arm

parallel to said axis for holding a button on said arm, and means operatively connected to said arm to successively swing said arm about said axis from a button-receiving position below a source of button supply to button loading position to insert a button carried by said pins between said jaws from the rear of said jaws, then to lower said arm vertically to disengage said pins from the button, then to swing the arm back to initial angular position and to raise said arm vertically again to return it to starting, button-receiving position.

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