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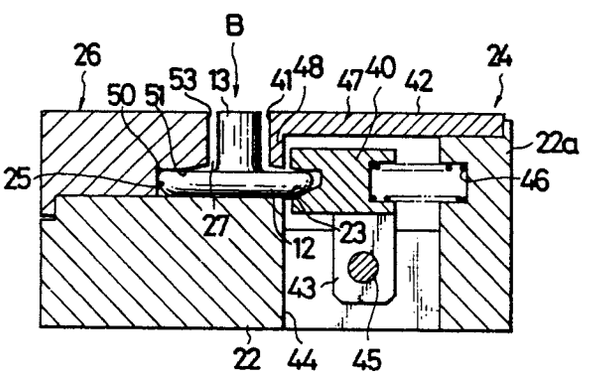
(54) Button feeder for button applicator.

(57) A button feeder for a button applicator has a feed guide (20) for orienting a button (B) in a predetermined direction. The feed guide (20) includes a stationary first side guide part (26) having first and second vertical guide walls (25), (53), and a second side guide part (24) composed of a movable first member (40) having a wedge-shaped groove (23) facing the first vertical guide wall (25), and a stationary second member (42) having a third vertical guide wall (4l) facing the second vertical guide wall (53). The first member (40) is normally urged by a spring (46) to pivot toward the first side guide part (26). As the button (B) is fed through the feed guide (20), a circular head (l2) of the button (B) tends to be caught in the wedge-shaped groove (23). The first member (40) is then pivotally moved away from the first side guide part (26) against the bias of the spring (46) to allow the button (B) smoothly moved without undue frictional resistance.

FIG. 2



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BUTTON FEEDER FOR BUTTON APPLICATOR

The present invention relates to a button feeder for feeding buttons such as snap buttons, hook buttons, ornamental buttons, or the like to a button applicator for attaching such buttons to garment fabric pieces.

Japanese Laid-Open Patent Publication No. 56-85407 published July II, I98I discloses an automatic button applicator having a lower die unit with a die and an upper die unit with a punch. The button applicator is equipped with a button feeder for feeding buttons one by one from a first hopper to the lower die unit. Button attachments are also fed one by one by another feeder from a second hopper to the upper die unit. With a garment fabric piece disposed between the upper and lower die units, the punch is moved toward the die to forcibly join the button and the button attachment together by staking on the garment fabric piece.

If an ornamental button with characters and/or figures on its face is to be attached to a fabric piece, the button must be oriented in a specified direction at all times when it is fed to a button applicator. A known button feeder is designed to supply such a button to a lower die unit while the button is being directed as desired.

For example, as shown by U. S. Patent No. 3,987,950 issued October 26, I976 to Schmidt et al, a guide member having a wedge-shaped groove and another guide member having a vertical wall are disposed in confronting relation on a base block, thus defining a button feed path receptive of the circular head of a button. When the button is fed along the button feed path by means of a pusher, the button is rotated about its own axis in one direction because the circular button head undergoes greater frictional resistance imposed by the wedge-shaped groove than by the vertical wall. The button has forks on its back which engage confronting edges of the guide members to orient the button while it is being fed along the button feed path.

When the button travels along the button feed path, the button tends to be subjected to more and more frictional resistance to its movement since the circular head thereof is progressively forced into the wedge-shaped groove due to rotation of the button about its own axis.

The present invention seeks to provide a button feeder capable of feeding buttons smoothly to a button applicator without increasing frictional resistance to movement of the buttons.

According to the present invention, there is provided a button feeder for feeding a button to a button applicator, the button having a circular head and a joint stud projecting centrally from the circular head, said button feeder comprising: a feed guide including a base, a first side guide part fixedly mounted on an upper surface of said base along one side thereof and having first and second vertical walls, and a second side guide part disposed on the upper surface of said base along the other side thereof, said second side guide part including a first member pivotally mounted on said base and having a groove of a generally wedge-shaped cross section confronting said first vertical wall of said first side guide part, and a second member fixedly mounted on said base and having a third vertical guide wall confronting said second vertical guide wall of said first side guide part, said first, second and third vertical walls, said wedge-shaped groove and the upper surface of said base jointly defining a button guide channel of a generally inverted T-shaped cross section, said first member being pivotable toward and away from said first vertical guide wall of said first side guide part; means for normally urging said first member to pivot toward said first vertical guide wall of said first side guide part; and a pusher unit connected to said feed guide for pushing the button into and through said button guide channel.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

Figure I is a perspective view of a button feeder embodying the present invention;

Figure 2 is a transverse cross-sectional view of a feed guide of the button feeder of Figure I;

Figure 3 is a schematic side elevational view of a button applicator with which the button feeder is used; and

Figure 4 is an exploded perspective view showing a button and a button attachment to be joined together with a fabric piece sandwiched therebetween.

Figure 3 shows a button applicator including a button attaching assembly 5. The button attaching assembly 5 comprises an upper die unit 2 having a punch I vertically movable by a vertical actuator mechanism (not shown), and a lower die unit 4 having a die 3 disposed below the upper die unit 2 in vertical alignment therewith. A first hopper 6 containing a number of button attachments A has an outlet joined by a first chute 7 to a button-attachment feeder 8 connected to the upper die unit 2. A number of buttons B are contained in a

second hopper 9 having an outlet joined by a second chute I0 to a button feeder II connected to the lower die unit 4. The first and second hoppers 6, 9 are arranged to successively deliver the button attachments A and the buttons B, each one by one, to the first and second chutes 7, I0, respectively.

As shown in Figure 4, each of the buttons B has a circular head 2I bearing characters, figures, or the like on its face and a joint stud I3 projecting from the back thereof. The circular head I2 has a recess I4 formed in a peripheral edge of the back thereof. The joint stud I3 has a central hole I5 therein. Each of the button attachments A has a pin I6 projecting from a circular base I6a. The button B can be attached to a garment fabric piece C by inserting the pin I6 of the button attachment A into the central hole I5 of the joint stud I3 of the button B, and by pressing the button attachment A against the button B. This can be effected by supplying one button attachment A into the upper die unit 2 beneath the punch I, one button B into the lower die unit 4, then placing the garment fabric piece C between the upper and lower die units 2, 4, and finally moving the upper die unit 2 toward the lower die unit 4 until the inserted pin I6 is deformed in the hole I5.

As shown in Figure I, the button feeder II generally comprises a feed guide 20 disposed adjacent to the lower die unit 4, and a pusher unit 2I connected to the feed guide 20. The feed guide 20 includes a first side guide part 26 having a first vertical guide wall 25 and disposed on an upper surface of a base 22 along one side thereof. The feed guide 20 also includes a second side guide part 24 having a groove 23 of a generally wedge-shaped cross section and disposed on the upper surface of the base 22 along the opposite side thereof. The first and second side guide parts 26, 24 are disposed in confronting relation to each other over the upper surface of the base 22 so as to define therebetween a button guide channel 27 of a generally inverted T-shaped cross section for the passage of the button B.

The pusher unit 2I includes a pusher body 29 having an upwardly opening guide channel 28, and an elongate pusher 30 longitudinally slidably disposed in the guide channel 28. The pusher 30 has a slot 30a formed in its rear portion and terminating at a sloping edge 30b, from which a thin lower plate 30c extends toward the feed guide 20. A finger 3I is pivotally mounted by a pin 32 on the pusher 30 for vertical pivotal movement about the pin 32. The finger has a rear portion disposed in the slot 30a, and a front portion lying on the thin lower plate 30c. The finger 3I has on its front end a downwardly directed projection 34 disposed forwardly of a front edge 30e of the thin lower plate 30c. The finger 3I is normally urged to turn counterclockwise in Figure I about the pin 32 under the resilience of a compression spring 33 disposed in the slot 30a and acting on the rear end of the finger 3I, so that the projection 34 is biased downwardly. The pusher 30 is operatively connected at its rear end to an actuator (not shown) such as a cylinder or a reciprocating link mechanism. The pusher body 29 has in one side wall thereof a side recess 29a at which the second chute I0 is connected to the pusher body 29 to allow the button B to be fed from the second chute I0 through the side recess 29a into the guide channel 28.

The base 22 of the feed guide 30 is generally in the form of a rectangular parallelepiped, having an upright attachment flange 22a on one side thereof. The base 22 also has a vertical opening 44 (Figure 2) formed adjacent to the upright attachment flange 22a.

As shown in Figures I and 2, the first side guide part 26 is generally in the form of a rectangular plate having in and along its inner edge a recess 50 so as to define the first vertical guide wall 25 and a downwardly facing horizontal wall 5I. The first side guide part 26 is fixedly mounted on the base 22 by means of a pair of screws 52, 52. The first side guide part 26 also has a second vertical guide wall 53.

The second side guide part 24 includes a first member 40 having in and along its inner edge the groove 23, and a second member 42 having along its inner edge a third vertical guide wall 4I. The first member 40 has a downwardly directed arm 43 secured to a pivot pin 45 extending through the base 22 across the vertical opening 44. Thus the first member 40 is pivotably supported on the base 22, and is normally urged to pivot counterclockswise in Figure 2 toward the first vertical guide wall 25 under the resilience of a compression spring 46 acting between the upright attachment flange 22a and the first member 40.

The second member 42 is generally in the form of a rectangular plate fixedly secured at its outer edge portion to the top of the upright attachment flange 22a of the base 22 and having along its inner edge a downwardly directed flange 48 defining the third vertical guide wall 4I. This flange 48 serves to restrict the counterclockwise pivotal movement of the first member 40.

Thus the first vertical guide wall 25, the horizontal wall 5I and the second vertical guide wall 52 of the first guide part 26, the groove 23 of the first member 40 of the second guide part 24, the third vertical guide wall 4I of the second member 42 of the second guide part 24, and the upper surface of the base 22 jointly define the button guide channel 27 of a generally inverted T-shaped cross section.

In operation, the button B passes down the second chute 10 into the guide channel 28 via the side recess 29a, with the joint stud 22 directed upwardly, as shown in Figure 1. Then, the pusher 30 is moved forwardly to cause its front edge 30e to push the button B on the peripheral edge of the circular head 12 thereof into the guide channel 27 of the feed guide 20. At that time, the downwardly directed projection 34 of the finger 31 engages the back of the circular head 12 as the finger 31 is slightly turned clockwise about the pin 32 against the bias of the spring 33.

When the button B is pushed into the guide channel 27 of the feed guide 20, the circular head 12 is brought into contact with the inside walls of the wedge-shaped groove 23 of the first member 40 of the second guide part 24 and with the first vertical wall 25 of the first side guide part 26, at diametrically opposite peripheral portions of the circular head 12, as shown in Figure 2. Since the circular head 12 undergoes a greater amount of frictional resistance imposed by the inside walls of the wedge-shaped groove 23 than by the vertical wall 25 of the first side guide part 26, the button B is rotated about its own axis in one direction - (counterclockwise in Figure 1). Thus the button B rolls on and along the first member 40 until the downwardly directed projection 34 of the finger 31 is received in the recess 14 in the back of the circular head 12. When the projection 34 engages in the recess 14, the button B is prevented from rolling or rotation, and is thereby oriented in a predetermined direction. With continued pushing by the pusher 30, the button B is delivered out of the feed guide 20 into the lower die unit 4. As a result, the button B has been placed on the die 3 in a predetermined orientation.

While the button B is being fed along the guide channel 27 of the feed guide 20, the circular head 12, as it rolls or rotates, tends to be progressively forced into the wedge-shaped groove 23. At that time, partly because the first member 40 is pushed by the circular head 12 to turn clockwise in Figure 1 about the pivot pin 45 against the bias of the spring 46, and partly because the joint stud 13 engages the third vertical wall 41 of the flange 48 of the second member 42 which is non-movable, the circular head 12 is prevented from further entering the wedge-shaped groove 23 of the first member 40 and hence is kept from an increased degree of frictional resistance applied by the wedge-shaped groove 23. Therefore, the button B can be fed smoothly along the guide channel 27 of the feed guide 20 without being caught in the wedge-shaped groove 23.

Claims

1. A button feeder for feeding a button (B) to a button applicator, the button (B) having a circular head (12) and a joint stud (13) projecting centrally from the circular head (12), said button feeder comprising: a feed guide (20) including a base (22), a first side guide part (26) fixedly mounted on an upper surface of said base (22) along one side thereof and having first and second vertical walls - (25), (53), and a second side guide part (24) disposed on the upper surface of said base (22) along the other side thereof, said second side guide part (24) including a first member (40) pivotally mounted on said base (22) and having a groove (23) of a generally wedge-shaped cross section confronting said first vertical wall (25) of said first side guide part (26), and a second member (42) fixedly mounted on said base (22) and having a third vertical guide wall (41) confronting said second vertical guide wall (53) of said first side guide part (26), said first, second and third vertical walls (25), (53), (41), said wedge-shaped groove (23) and the upper surface of said base (22) jointly defining a button guide channel (27) of a generally inverted T-shaped cross section, said first member (40) being pivotable toward and away from said first vertical guide wall (25) of said first side guide part (26); means for normally urging said first member (40) to pivot toward said first vertical guide wall (25) of said first side guide part (26); and a pusher unit - (21) connected to said feed guide (20) for pushing the button (B) into and through said button guide channel (27).

2. A button feeder according to claim 1, said base (22) having an upright attachment flange - (22a) on one side thereof, and a vertical opening - (44) adjacent to said upright attachment flange (22a), said second member (42) being fixedly secured at its outer edge portion to a top of said upright attachment flange (22a), said first member - (40) having a downwardly directed arm (43) secured to a pivot pin (45) extending through said base (22) across said vertical opening (44).

3. A button feeder according to claim 2, said second member (42) having along its inner edge a downwardly directed flange (48) engageable with said first member (40) for restricting the pivotal movement of said first member (40) under the resilience of said urging means, the last-named flange (48) defining said third vertical guide wall - (41) engageable with the joint stud (13) of the button (B).

4. A button feeder according to claim 2 or 3, said urging means being a spring (46) acting between said upright attachment flange (22a) and said first member (40).

FIG. 1

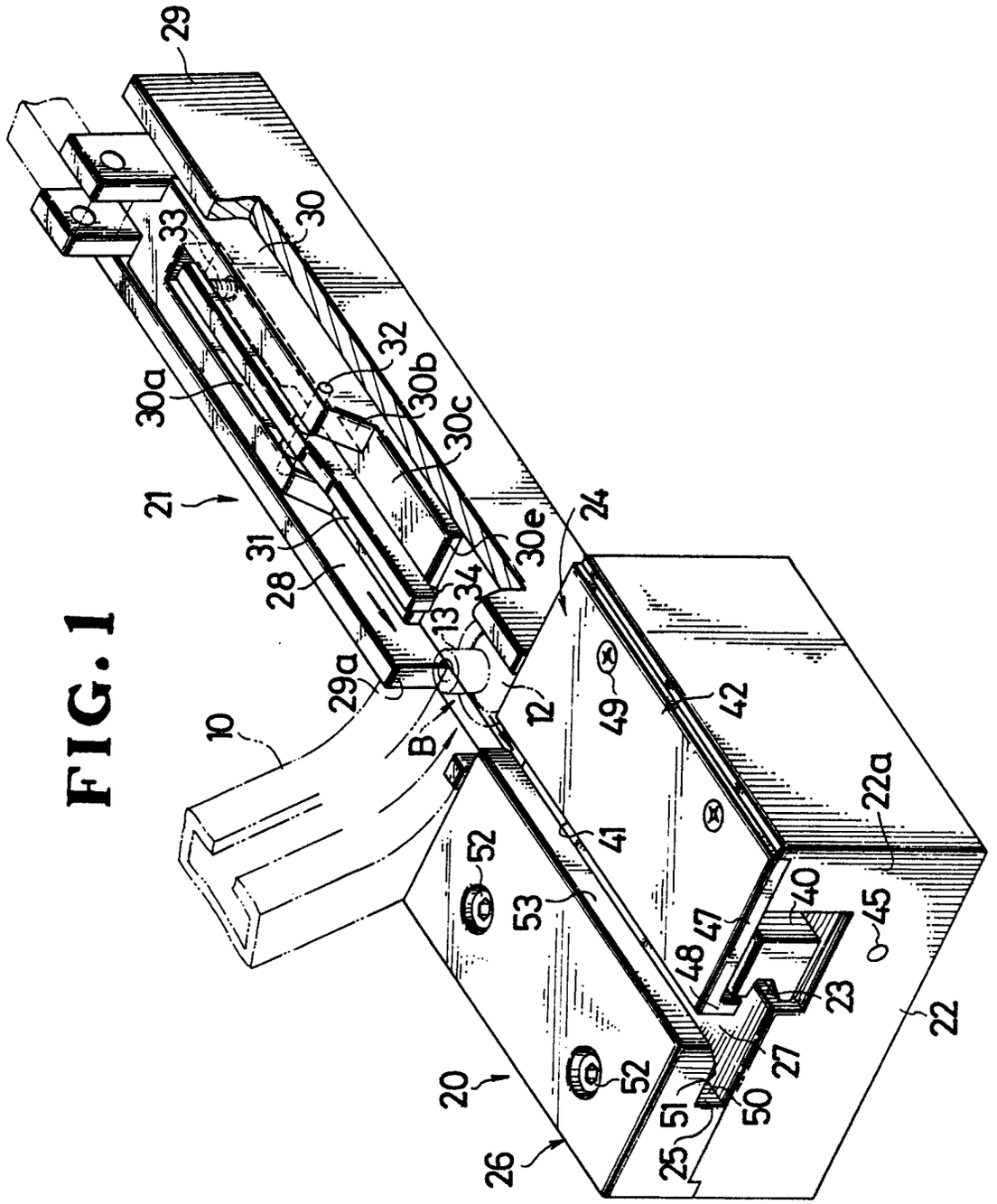
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FIG. 2

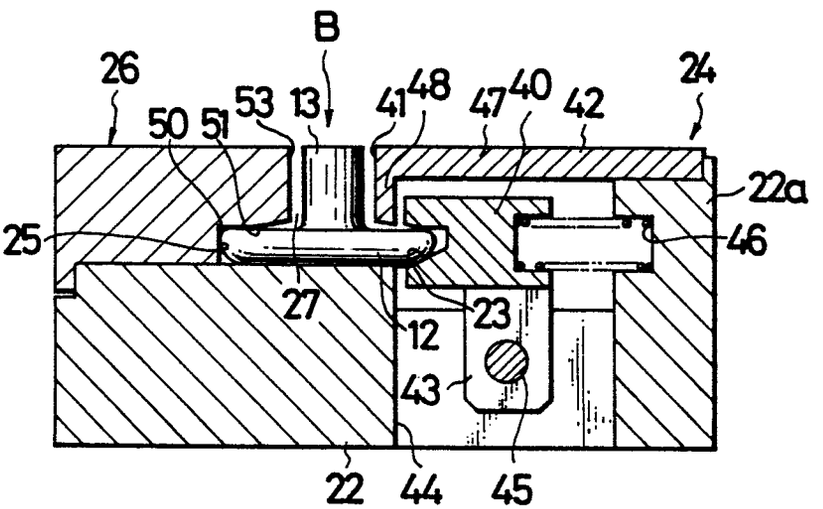

FIG. 3

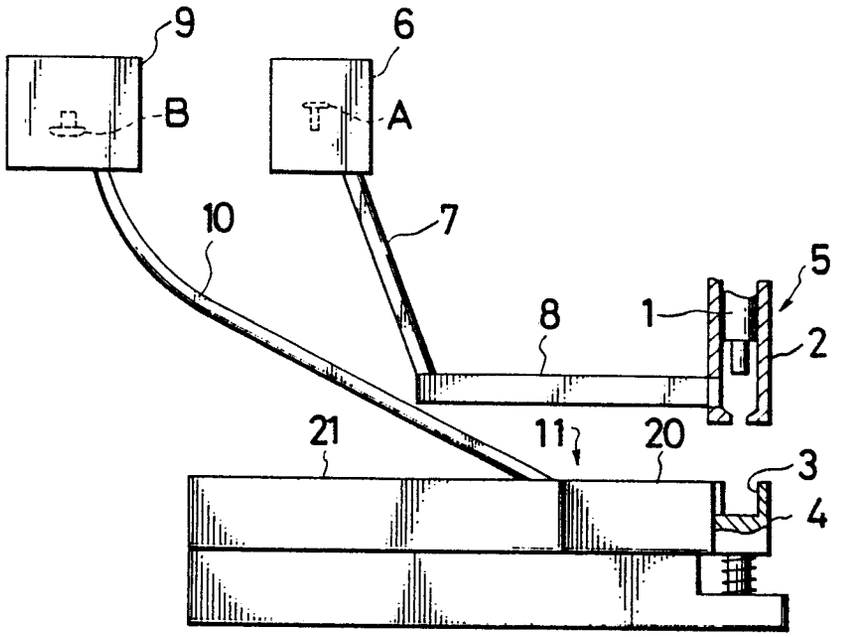

FIG. 4