Feb. 15, 1966 F. H. ROJAHN 3,234,638

METHOD AND APPARATUS FOR THE ASSEMBLY OF SLIDE FASTENERS

Filed Oct. 8, 1964 3 Sheets-Sheet 1

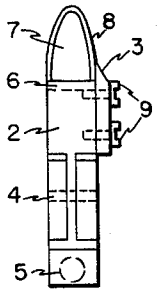


FIG. 1

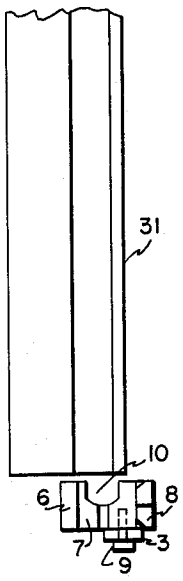


FIG. 3

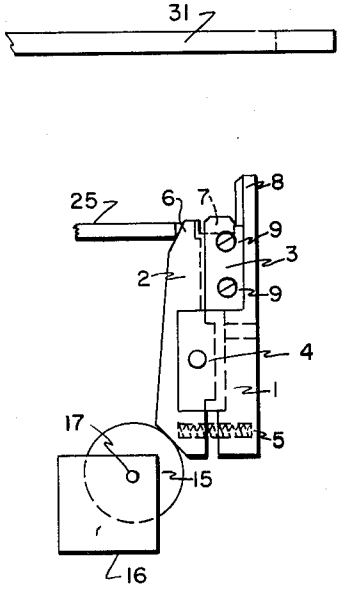


FIG. 2

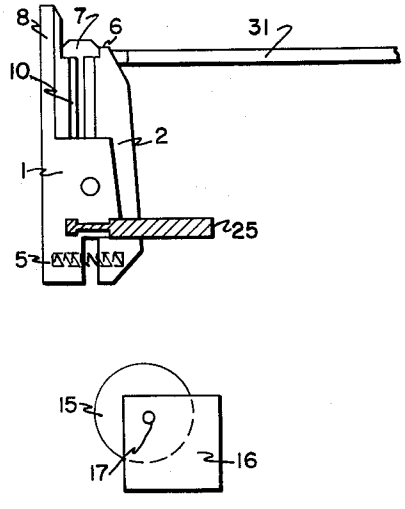


FIG. 4

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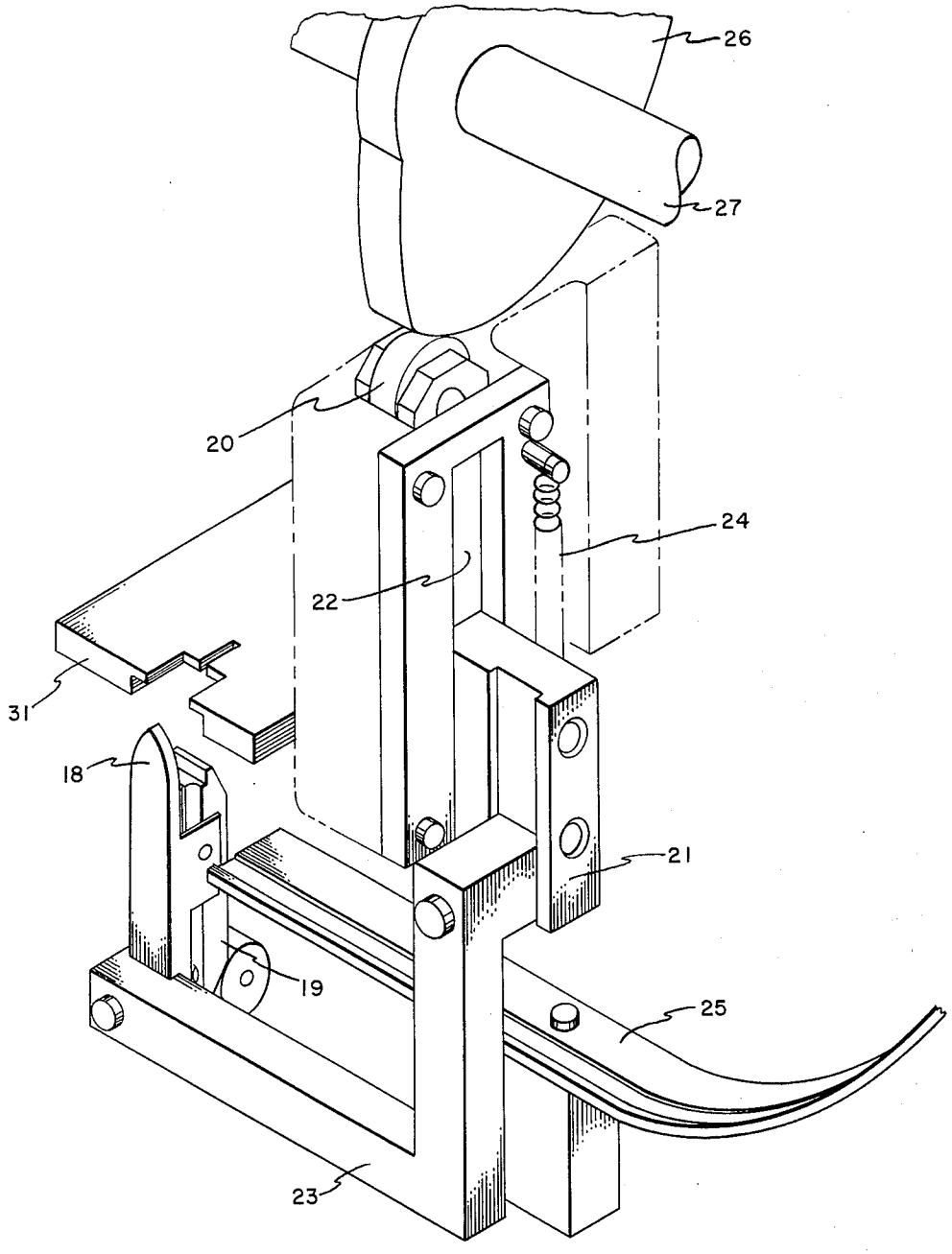


FIG. 5

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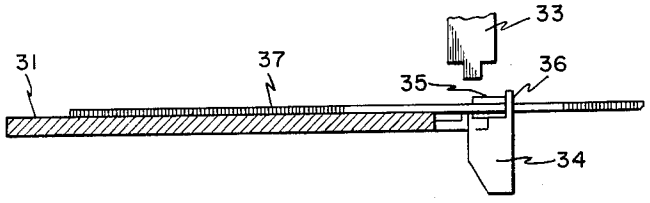


FIG. 6

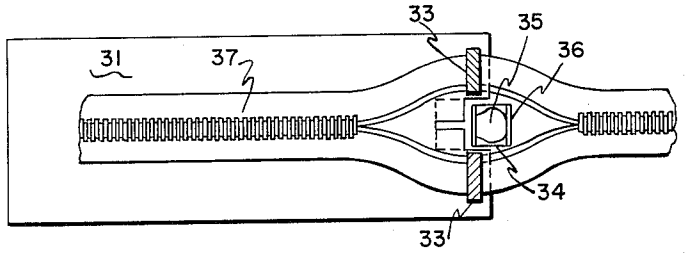


FIG. 7

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METHOD AND APPARATUS FOR THE ASSEMBLY OF SLIDE FASTENERS

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6 Claims. (Cl. 29—408)

This invention relates to a method and apparatus for assembling slide fasteners. More specifically, this invention relates to an apparatus for successively transporting sliders into alignment with stringers or tapes containing elements with intermittent gaps.

Recently, the assembly of slide fasteners has become subject to automation. Manual assembly lines have been replaced by semi-automatic and automatic machines which greatly reduce the amount of labor required. Though the manual operation for the assembly of sliders on these slide fastener tapes is compartively simple, the machines thus far developed have been strikingly complicated.

Most commonly, the automatic and semi-automatic machines operate as follows: A continuous length of the slide fastener chain is fed across a support table. When a gap space in the tape overlies a predetermined position on the support, the movement of the tape is stopped. The gap in the tape is then spread apart and a slider is placed therein. The beads which line the inner edge of the tapes are then forced into the channels of the slider. Thereafter, the tape is manipulated to engage the elements or teeth with the slider channels. The operation is then repeated to affix still another slider. The overall operation of automatic slide fastener machines is illustrated in U.S. Patents 3,127,670, 3,078,558, and 2,949,666. The instant invention may be readily adapted to these machines. Not only are these complicated mechanisms extremely expensive, requiring high initial capital outlays, but their many parts frequently break-down, resulting in the loss of operating time and cost of maintenance.

One of the primary reasons for the complexity of the mechanism is the difficulty in transporting the slider into alignment with the slide fastener tape. Conventionally, a vibrating hopper feeds a continuous feed of sliders to the machine via a track. In the prior art, particularly complex mechanisms are employed to transfer the sliders to a nest which, in turn, brings the sliders into appropriate alignment. The usual procedure is to use a finger to eject the sliders, one at a time, from the end of the track into the nest. In another modification, the nest itself moved horizontally to pick up one slider at a time, then moves back again to a position beneath the slide fastener tape, and, finally, upwardly to align the slider.

As can be readily seen, in both of these techniques it is necessary to provide a separate unit of the machine capable of two-dimensional motion. In accordance with this invention, a slider feed mechanism has been developed which eliminates the necessity for the aforesaid complex mechanisms. Basically, the sliders are fed into the nest substantially by the force of gravity. The nest is equipped with a movable jaw or clamping member which, when opened, readily receives the sliders. With the slider in the nest, the jaw closes, rigidly supports the slider body and brings it into alignment with the slide fastener tape. To illustrate the invention more fully, the following figures are annexed:

FIGURE 1 is a front view of the nest assembly in accordance with a preferred embodiment of the invention.

FIGURE 2 is a right side view of the nest assembly and the striker assembly.

FIGURE 3 is a top view of the nest assembly and the slider feed track.

FIGURE 4 is a left side view of the nest assembly in the upper position illustrating its relationship to the support table and the slide fastener chain.

FIGURE 5 is a perspective view of the nest assembly and the associated mechanism.

FIGURE 6 is a schematic side view of the slide fastener machine.

FIGURE 7 is a schematic top view of the slide fastener machine.

Turning first to FIGURES 1, 2 and 3, the nest assembly is shown in detail. This assembly is composed basically of a body portion **1**, a clamping member **2**, and a slider stop **3**. By means of the hinge pin **4**, the clamping member is maintained in pivotable relationship to the body portion. Spring **5** urges the lower portion of the clamping member **2** away from the base of the body portion **1** and the lip **6** towards the upper part of the body portion **1**. At the upper end of the nest assembly is a recess **7** adapted to receive a slider. The front and the rear of the slider are positioned between the lip **6** and the plunger **8**, the latter serving to define the front and back of the recess **7**. The slider stop **3** is held in fixed relationship to the body portion **1** by means of screws **9**. These screws **9** provide a means of precise adjustment, permitting the slider stop **3** to be located in respect to the body portion **1**. As can be best observed from FIGURE 3, the slider stop **3** serves to define the side of the recess **7** and limit the sidewise motion of a slider entering the nest. Of course, the slider enters the nest from the track located in the side opposite to the slider stop **3**. A groove **10**, preferably flared out at the track-side of the nest assembly, is defined by the clamping member **2** and the body portion **1** to freely receive the tab depending from the slider.

Fundamentally, the operation of the nest assembly involves a simple vertical reciprocal motion between a lower position wherein the slider enters the nest and an upper position where the slider is transferred to the slide fastener tape. While in the lower position the clamping member is opened, thereby permitting a slider to be fed from the track into the nest. When the nest assembly begins to ascend the clamping member closes, thereby securing the slider in the nest. This operation is best illustrated in FIGURES 2 and 4. In FIGURE 2 the nest assembly is shown in the lower position with the clamping member **2** in the open position. Clearance for the front and rear of the slider in the recess is provided, and is sufficient to avoid any contact with the slider which would impede its entry into the nest. Should any binding occur the feeding operation would be slowed to a great extent, thereby reducing the speed at which the machine can operate. Of course, insufficient clearance can render the machine completely inoperative. Note also that the tab depending from the slider moves freely within the groove **10**.

In this lower position the lower portion of the clamping member **2** strikes the striker wheel **15** which is supported on the bracket **16** and may rotate about pin **17**. As will be apparent to those skilled in the art, many other means may be used to open the clamping member **2** at the appropriate time. This contact with the striker wheel **15** causes the spring **5** to be compressed and the clamping means to be rotated about the hinge pin **4**.

In the upper position shown in FIGURE 4 the clamping member **2** is in the closed position and holds the slider securely in the recess. Force is applied to the clamping

member **2** by the spring **5**. This force is translated to the lip **6** about the hinge pin **4**. Even when the clamping member is in the closed position the tab depends freely in the groove **10**. In no way is the tab employed to position the slider. This is advantageous, because it permits more accurate positioning.

When the slider is transported to the upper position the associated mechanism, as is known to those skilled in the art, the channels thereof engages the beads, and finally the elements of the slide fastener chain. During this operation the slider is held securely by the nest and particularly by the action of the clamping member **2**. Once the elements engage the channels of the slider, the nest descends. Since the nest offers little resistance to the vertical displacement of the slider, the slider leaves the nest and remains with the slide fastener chain.

During the entire operation of the machine a substantially constant downward force is exerted on the sliders on the track. This force can be readily varied by changing the angle of descent of the track, the length of the track, or even by conventional lubrication of the track and sliders. Slight vibration in the track induced from the vibrating hopper assure that the sliders move uniformly. Though not illustrated, it is obvious to those skilled in the art that the force of gravity may be supplement by other means, such as, a pulsating finger, a friction wheel abutting against the slider, etc. These additional mechanisms may be advantageous where very high feeding rates are used.

As can be readily noted, the sliders are transported only when the nest is in the lower position. During the rest of the cycle, the sliders are restrained by the side face of the nest assembly. This embodiment of the invention permits the nest assembly to serve an additional function with the utmost simplicity. It will be apparent that to function effectively the nest assembly must be at least as long as the vertical movement thereof. While other means may be employed to restrain the slides, none are as effective. The distance between the end of the track and the nest assembly should be at an absolute minimum. Contact should preferably be avoided. The slider receiving recess **7** is carefully adjusted by means of slider stop **3** so that its width is substantially exactly that of the slider. If the width of the recess is greater, there will be a tendency for the next successive slider to enter the nest assembly. On the other hand, if the width is less than that of the slider, there will be a tendency for the slider to be impeded by the end of the track. In either event, it is clear that the slider feed will be disrupted.

As shown in FIGURE 5, the vertical reciprocal motion of the nest is provided indirectly by a cam **26**, which revolves about shaft **27**, in contact with cam follower **20**. Of course the actuation of the nest may be provided by equivalent means located elsewhere; however, it is most desirable that the cam be overhead, along with the other cam assemblies, to actuate the entire mechanism. The motion of the cam follower **20** is transmitted to the extension **21**, which is guided by guide slot **22**, and finally to slider bar **23**, which is rigidly connected to the nest assembly. Tension spring **24** serves to maintain the cam follower **20** securely against the cam.

FIGURES 6 and 7 illustrates schematically the essential elements of a slide fastener assembly device which may readily incorporate the improved nest assembly of the instant invention. The operation proceeds as follows: Firstly, the tape **30** is moved across a support table **31** until a feeler (not shown) senses a gap in the tape, i.e., an area free of the interlocking elements. At this time a micro-switch connected to the feeler opens the circuit to a magnetic clutch and the tape stops. Simultaneously, a mechanical cycle commences. Secondly, a cam-actuated gripper **33** descends, grips the tape, and spreads the two beads apart. Thirdly, the nest **34** holding a properly aligned slider **35**, lifts the slider into the space between the spread beads just behind the gripper. A plunger **36**, integrally united to the front edge of the nest and extending upwardly therefrom, spreads the beads in front of the slider **35**, thereby insuring that the space between the beads is adequate for positioning the slider **35**. FIGURES 6 and 7 illustrate this point of the mechanical cycle. Fourthly, the gripper **33** forces the beads together so that the beads engage the slide **35**. Fifthly, the gripper **33** rises out of contact with the tape. Sixthly, the magnetic clutch advantages the tape forward a short distance. This causes the elements **37** on the tape to engage the slider which is restrained from movement by the plunger **36**. The plunger **36** also serves to keep widening the space between the beads until the elements **37** are engaged. Seventhly, the nest **34** and plunger **36** descend, ending the mechanical cycle. Eighthly, the magnetic clutch is again engaged and the cycle is completed.

In view of the foregoing disclosures, variations and modifications thereof will be apparent to one skilled in the art, and it is intended to include within the invention all such variations and modifications except as do not come within the scope of the appended claims.

What is claimed is:

1. In a machine for assembling sliders on a slide fastener tape wherein an element free portion of said slide fastener tape is brought to an assembly station which comprises: a nest assembly having a recess on the upper surface thereof, said recess having an open side, a closed side, and clamping means defining the front and rear of said recess; means for reciprocating said nest assembly between a slider receiving position and said assembly station; means for opening said clamping means when said nest assembly is in said slider receiving position; feeding means for continuously supplying sliders to the open side of said recess when said clamping means is open; means for closing said clamping means when said nest assembly leaves said slider receiving position, thereby securing said slider in said recess; and restraining means for preventing the movement of sliders on said feeding means when said nest assembly leaves said slider receiving position.

2. The machine of claim **1** wherein the side of said nest assembly acts as said restraining means.

3. The machine of claim **1** wherein said clamping means comprises: a stationary jaw and a longitudinally disposed movable jaw, said movable jaw having a slider engaging surface defining said recess at the upper end thereof and a striker surface at the lower end thereof, wherein said movable jaw is pivotably mounted at a point intermediate to said upper and lower ends on said jaw assembly; and wherein are further provided, striker actuating means to contact said striker surface when said nest assembly is in said slider receiving position, thereby opening said clamping means to permit the entrance of a slider into said recess; and spring actuating means for urging said clamping means into the closed position when said nest assembly leaves said slider receiving position; said clamping means being adapted to grip the front and rear of the body of said slider and offering a minimal resistance to the vertical displacement thereof.

4. The machine of claim **3** wherein said recess is substantially the width of a slider.

5. The machine of claim **1** wherein said closed side of said recess is movable to adjust the width of said recess.

6. A process for continuously positioning sliders at an assembly station for assembly on a slide fastener tape, wherein said sliders are transported side-by-side to a predetermined position, and wherein said sliders are conveyed from said predetermined position to said assembly station by a nest assembly, said nest assembly having a recess in the upper surface and a movable jaw defining the front and rear of said recess, which comprises: juxtaposing said recess to said predetermined position and opening said movable jaw, thereby permitting the entrance of the lead slider into said recess; upwardly moving said nest assembly containing said slider and simultaneously clos-

ing said movable jaw so as to secure said slider in said recess; positioning said slider at said assembly station; engaging the beads of said slide fastener tape in the channels of said slider; downwardly moving said nest assembly, thereby releasing said slider from said recess and leaving said slider engaged on said beads of said slide fastener tape; and again juxtaposing said recess to said predetermined position and opening said jaw for the entrance of the next leading slider.

References Cited by the Examiner

UNITED STATES PATENTS

2,949,666	8/1960	Rogers et al.	29—211
3,078,558	2/1963	Langwell	29—408
3,127,670	4/1964	Bruning	29—408 X

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