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METHOD OF AND APPARATUS FOR ATTACHING
PARTS OF SEPARABLE BOTTOM END ASSEMBLY
TO A CONTINUOUS SLIDE FASTENER CHAIN

The present invention relates to the production of separable slide fasteners, and more particularly to a method of and apparatus for attaching parts of a separable bottom end assembly to a continuous slide fastener chain.

- 5 Japanese Patent Publication (Tokkosho) No. 49-44243 discloses an automatic finishing apparatus for separable slide fasteners, as reillustrated here in Figure 4, in which an insertion pin 8b and a box pin 8a (with a box 8c), both in the shape of a channel, of a
- 10 separable bottom end assembly are threaded onto the respective leading element-free end portions 4a, 4a of a pair of uncoupled continuous slide fastener stringers 2, 2 in an endwise direction, i.e. longitudinally from one of opposite end openings of the respective pin, as
- 15 shown in Figures 5A and 6A. Each pin 8a, 8b is then fixedly secured to the element-free end portion 4a as compressed into a final shape (Figures 5B and 6B) therearound by means of a respective holder or punch B, C (Figure 4). A common problem with this prior art

method is that because of smallness of the end openings of the pin, it is difficult or impossible to mount the pin correctly in a required position on the leading element-free end portion, especially if the latter is in objectionably bulged or otherwise deformed condition. Further, this inaccurate and insufficient
5 threading would be a cause for possible misoperations in various subsequent progressive finishing stages of the production, thus resulting in inadequate quality products.

According to a first aspect of the present invention
10 there is provided, in the production of separable slide fasteners each having a separable bottom end assembly, a method of attaching a box or insertion pin of a channel shape to one longitudinal edge of a continuous fastener stringer at one of longitudinally spaced successive element-free portions thereof, said method
15 comprising the steps of:

(a) moving the fastener stringer longitudinally along a substantially horizontal path;

(b) temporarily terminating the movement of the fastener stringer when one of the successive element-free portions arrives
20 at an attaching station;

(c) threading the channel-shaped pin onto said one element-free portion of the one longitudinal edge of the fastener stringer as the latter is at rest; and

(d) fixedly securing the threaded channel-shaped pin
25 to said one element-free portion by compressing said pin into a final shape around said one longitudinal edge of the fastener stringer while the latter is at rest.

According to a second aspect of the present invention

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there is provided apparatus for attaching a box or insertion pin of a channel shape to one longitudinal edge of a continuous fastener stringer at one of longitudinally spaced successive element-free portions thereof, in the production of separable slide fasteners each having a separable bottom end assembly, said apparatus comprising:

means for moving the fastener stringer longitudinally along a substantially horizontal path and

temporarily terminating the movement of the fastener stringer when one of the successive element-free portions arrives at an attaching station; and

means for threading the channel-shaped pin onto said one element-free portion of the one longitudinal edge of the fastener stringer as the latter is at rest and

fixedly securing the threaded channel-shaped pin to said one element-free portion by compressing said pin into a final shape around said one longitudinal edge of the fastener stringer while the latter is at rest.

— It is believed possible by means of the present invention to provide a method of attaching parts of a separable bottom end assembly to a continuous slide fastener chain easily with precision, thus making various subsequent progressive finishing stages of the production free from misoperations due to inaccurate mounting of the parts. Accordingly, the present invention is believed particularly suitable for automatic production of separable slide fasteners.

The invention will be described by way of example with reference to the accompanying drawings, wherein like references refer to like parts unless stated otherwise, and wherein:-

Figure 1A is a fragmentary perspective view showing the manner in which a box or insertion pin is attached to a continuous fastener stringer at one element-free portion contiguous to a leading or cut end of the stringer;

- 5 Figure 1B is a view similar to Figure 1A, showing the manner in which a box or insertion pin is attached to a continuous fastener stringer at one element-free portion remote from a leading or cut end of the stringer;

Figure 2A is a fragmentary cross-sectional view showing the manner in which the pin is threaded onto the inner longitudinal edge of the fastener stringer by a holder or clamp;

5 Figure 2B is a view similar to Figure 2A, showing the manner in which the threaded pin is fixedly secured to the inner longitudinal edge of the fastener stringer as compressed by the holder or clamp;

10 Figure 3A is a fragmentary plan view of a pair of uncoupled continuous slide fastener stringers to which a box pin and an insertion pin have been attached respectively;

15 Figure 3B is a side elevational view of a half of Figure 3A, showing a twisted portion of each fastener stringer;

Figure 4 is a fragmentary perspective view of a prior art apparatus for automatically finishing separable slide fasteners;

20 Figures 5A and 5B illustrate the manner in which an insertion pin is attached to the fastener stringer by the prior art apparatus of Figure 4; and

Figures 6A and 6B illustrate the manner in which a box pin with a box is attached to the fastener stringer by the prior art apparatus of Figure 4.

25 Figure 3A shows a pair of uncoupled slide fastener stringers 2, 2 being moved longitudinally along a substantially horizontal straight path through

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an attaching station A (of a separable-slide-fastener finishing apparatus) where an insertion pin 8b and a box pin 8a are attached to inner longitudinal edges of the fastener stringers 2, 2, respectively, in a manner described below as each stringer 2 is partially twisted through an angle of 90° so as to assume an upright posture with its inner longitudinal edge directed downwardly as shown in Figure 3B. Each fastener stringer 2 has longitudinally spaced element-free portions 4 devoid of coupling elements 5.

The movement of each fastener stringer 2 is temporarily terminated when one of the successive element-free portions 4 arrives at the attaching station A where a pair of holder or clamps 6, 6 are disposed below the stringer path and are movable vertically toward and away from the respective inner longitudinal edges of the two fastener stringers 2, 2. Meanwhile, each clamp 6 pre-clamps a box or insertion pin 8a, 8b of a channel shape delivered from a chute 10 onto an auxiliary support 7, as shown in Figures 1B and 2A, at which time the pin 8a, 8b is upwardly open wide with its opposite side walls diverging upwardly.

Upon termination of the movement of the fastener stringers 2, 2, each clamp 6 holding the respective pin 8a, 8b is raised from the solid-line position to the phantom-line position in Figures 1B and 2A until the pin 8a, 8b is threaded onto the inner longitudinal edge

4a of the one element-free portion 4 in an edgewise direction from a longitudinal upward opening of the channel (of the pin 8a, 8b), i.e. in the direction perpendicular to the longitudinal edge of upright
5 fastener stringer 2. At that time, since the longitudinal upward opening of its channel is open widely, each pin 8a, 8b can be threaded over the element-free inner longitudinal edge 4a in a proper posture to a required extent without difficulty even if
10 the latter is in an objectionably bulged or otherwise damaged condition.

Then the thus threaded pin 8a, 8b is compressed into a final shape about the element-free longitudinal edge 4a as a pair of parts of each clamp 6 are
15 angularly moved relative to one another about a pivot 9 from the position of dash-and-two-dot lines to the position of solid lines in Figure 2B. As a result, each pin 8a, 8b has been fixedly secured to the longitudinal edge 4a of the one element-free portion of
20 the respective fastener stringer 2 precisely at a required position in a proper posture.

During the threading and compressing, each fastener stringer 2 is kept in a state of tension as gripped by upstream and downstream grippers 11 (only
25 upstream gripper is illustrated).

Finally, each clamp 6 opens to release the respective attached pin 8a, 8b and returns to the

2A

initial or lower position (dash-and-two-dot lines) in Figure 2B. The resulting fastener stringers 2, 2 is further moved to the following station where a subsequent finishing process, such as cutting or pairing, may take place.

In the embodiment of Figures 1B 3A and 3B, each pin 8a, 8b is attached to the respective fastener stringer 2 at one element-free portion 4 that is remote from the leading or cut end of the fastener stringer 2. Alternatively, the pin 8a, 8b may be attached to the fastener stringer 4 at one element-free portion 4 that is contiguous to the leading or cut end of the fastener stringer 2, as shown in Figure 1A; that is, the attaching takes place after a preceding piece of the fastener stringer of the individual slide fastener length (not shown) has been cut from the continuous fastener stringer 2 across that one element-free portion 4.

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CLAIMS:-

1. In the production of separable slide fasteners each having a separable bottom end assembly, a method of attaching a box or insertion pin of a channel shape to one longitudinal edge of a continuous fastener stringer at one of longitudinally spaced successive element-free portions thereof, said method comprising the steps of:

(a) moving the fastener stringer longitudinally along a substantially horizontal path;

(b) temporarily terminating the movement of the fastener stringer when one of the successive element-free portions arrives at an attaching station;

(c) threading the channel-shaped pin onto said one element-free portion of the one longitudinal edge of the fastener stringer as the latter is at rest; and

(d) fixedly securing the threaded channel-shaped pin to said one element-free portion by compressing said pin into a final shape around said one longitudinal edge of the fastener stringer while the latter is at rest.

2. A method according to claim 1, wherein said one element-free portion is disposed contiguously to a leading end of the fastener stringer.

3. A method according to claim 1, wherein said one element-free portion is disposed remotely from a leading end of the fastener stringer.



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4. A method according to claim 1, 2 or 3 wherein the fastener stringer is kept in a state of tension during said threading and said securing steps.

5. Apparatus for attaching a box or insertion pin of a channel shape to one longitudinal edge of a continuous fastener stringer at one of longitudinally spaced successive element-free portions thereof, in the production of separable slide fasteners each having a separable bottom end assembly, said apparatus comprising:

10 means for moving the fastener stringer longitudinally along a substantially horizontal path and

temporarily terminating the movement of the fastener stringer when one of the successive element-free portions arrives at an attaching station; and

15 means for threading the channel-shaped pin onto said one element-free portion of the one longitudinal edge of the fastener stringer as the latter is at rest and

20 fixedly securing the threaded channel-shaped pin to said one element-free portion by compressing said pin into a final shape around said one longitudinal edge of the fastener stringer while the latter is at rest.

6. A method of attaching a pin to a continuous fastener stringer substantially as described with reference to and as illustrated in Figures 1 to 3 of the accompanying drawings.

25 7. Apparatus substantially as described with reference to and as illustrated in Figures 1 to 3 of the accompanying drawings.

