

PATENT SPECIFICATION

(11)

1 425 534

1 425 534

- (21) Application No. 58970/73 (22) Filed 19 Dec. 1973 (19)
 (31) Convention Application No. 1526/72 (32) Filed 27 Dec. 1972 in
 (33) Japan (JA)
 (44) Complete Specification published 18 Feb. 1976
 (51) INT. CL.³ A44B 19/26
 (52) Index at acceptance
 E2S 1A2B1 1A2C 1A3C



(54) METHOD OF AND APPARATUS FOR APPLYING SLIDERS TO A SLIDE FASTENER CHAIN

(71) We, YOSHIDA KOGYO KABUSHIKI KAISHA, a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of applying sliders to a slide fastener chain of substantially endless length and an apparatus for carrying this method into practice.

Attempts have been made to automate the assembly of sliders upon a slide fastener chain, which had been mostly by hand, a process which is time-consuming and expensive. One prior-art method is known for accomplishing such automatic assembly wherein sliders are held stationary and pressed forcibly against a slide fastener chain to deflect the latter locally out of its plane so that the slider can be aligned and inserted through with element-free sections on the fastener chain. Such a method, however, has suffered from the difficulties that due to the fastener chain being deflected locally by the slider, its movement during the assembling operation is not smooth, adversely affecting the rate of production.

The present invention aims to provide a method of assembling sliders upon a slide fastener chain in an automatic cycle of operation with increased rate of speed.

A further aim of the invention is to provide an apparatus for carrying the above method into practice, which apparatus is simple in construction and highly reliable in operation.

According to one aspect of the invention, there is provided a method of applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges, which method comprises the steps of providing transverse slits across the inner longitudinal edges of the stringer tapes at spaced locations along the fastener chain; moving the fastener chain intermit-

tently along a first substantially horizontal path of travel and a second path extending at an angle downwardly inclined relative to said first path, said first and second paths merging at a cornering point in a slider assembling station; separating the opposed stringer tapes along their inner longitudinal edges prior to the mounting of sliders thereon; deflecting the fastener chain downwardly around said cornering point, whereupon said transverse slit is split open with its upper edge aligned with an entrance end of the slider; mounting the slider on the fastener chain through said slit positioned at said cornering point; and advancing the fastener chain a distance corresponding to a length of individual product fastener to which the chain is to be cut.

Another aspect of the present invention provides an apparatus for applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges and provided with transverse slits formed across said longitudinal edges at spaced locations along the fastener chain, which apparatus comprises a guide block having a first substantially horizontal guide surface and a second guide surface extending at an angle downwardly inclined relative to said first guide surface, along which surfaces the fastener chain is transported intermittently, and a guide groove extending longitudinally along said first and second guide surfaces for receiving sliders slidably therein; means for splitting open the transverse slits in the fastener chain so that the upper edge of each of said slits is aligned with an entrance end of a slider, said means being located at a point inter-connecting the lines of extension of said first and second guide surfaces; separating means movable into and away from the path of the fastener chain along said first guide surface adjacent said splitting means for separating the two opposed stringer tapes prior to arrival of the fastener chain at said splitting means; and a slider holder movable towards and away from said splitting means and adapted to re-

lease sliders one at a time onto the fastener chain at a point slightly beyond said splitting means by threading the slider through said transverse slit.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a plan view of a slide fastener chain prior to the assembly of sliders thereon;

Fig. 2 is a perspective view of the slide fastener chain showing the same in a disposition for receiving a slider;

Fig. 3 is a plan view of the fastener chain corresponding to Fig. 2 and showing the slider mounted in succession thereon;

Fig. 4 is a longitudinal cross-sectional view taken along the line IV—IV of Fig. 3;

Fig. 5 is a view similar to Fig. 2 but showing a concealed type of fastener to which the principles of the invention can be equally applied;

Fig. 6 is a plan view schematically illustrating an apparatus for implementing the invention and showing the disposition of the fastener chain relative to the same;

Fig. 7 is a plan view of a slider holder which constitutes part of the apparatus according to the invention; and

Fig. 8 is a longitudinal cross-sectional view taken along the line VIII—VIII of Fig. 6.

Referring now to the drawings and Fig. 1 in particular, there is shown a slide fastener chain 10 which comprises a pair of oppositely disposed stringer tapes 11, 11 each carrying along their respective inner longitudinal edge 12 a row of fastener elements E, the stringer tapes 11, 11 being engaged and disengaged by the reciprocal movement of a slider S along the rows of elements E in the usual manner. The fastener elements E may be of a discrete or a continuous type of structure to which sliders may be applied in accordance with the principles of the invention. The inventive principles may be applied not only to an ordinary type of fastener having its elements exposed to external view but also to a so-called concealed type wherein the fastener elements are disposed so as not to be seen when attached to a garment or the like.

Although it is not always necessary, it is preferred for best results to provide element-free gaps G in the fastener chain at predetermined intervals along which the chain is cut into individual fastener lengths.

A slit or cut 13 is formed in the midpart of each of the element-free gaps G and extending transversely across the opposed element-carrying edges 12 at an angle perpendicular or slightly inclined to the longitudinal axis of the fastener chain.

According to the method of the invention, and as shown in Fig. 4, the fastener chain

10 is moved face up in the direction of the one-headed arrow along a first or horizontal path of travel 14 and then along a second path 15 extending at an angle downwardly inclined relative to the first path. The first and second paths merge at a cornering point 16 which defines a slider assembling station. The movement of the fastener chain 10 is intermittent and is calculated to advance the same a distance corresponding to the length of an individual fastener which extends between two adjacent gaps G or more specifically two adjacent slits 13, until the chain 10 is brought to a stop temporarily at a position in which the slit 13 is registered with the slider assembling station. In this position, the fastener chain 10 is deflected downwardly around the cornering point 16 functioning as an axis of deflection, whereupon the transverse slit 13 is split open with its upper edge 13a extending parallel with the plane of the first path 14 of fastener chain and aligned with an entrance end S₁ of the slider S through which the fastener chain is threaded, as better shown in Figs. 2 and 4. While the fastener chain 10 is held stationary in this disposition, the slider S is moved beyond the cornering point 16 in the direction of the arrow b opposite to the direction of travel of the fastener chain 10 with its entrance end S₁ directed toward the slit 13 which has been split open and inserted therethrough to be mounted on the element-carrying edges 12 of the stringer tapes 11, 11. Upon completion of the mounting of the slider S, the fastener chain 10 is moved to continue its intermittent travel until the section of the fastener chain at which the slider S has been mounted moves past the cornering point 16 and down along the second path 15. The fastener chain 10 is then stopped upon arrival at the assembling station of the slit 13 in the next section of the chain, thus to repeat the cycle of operation described. In order to facilitate the threading of slider S through the fastener chain 10, it is necessary to separate beforehand the two opposed stringer tapes 11, 11, by disengaging the rows of fastener elements E that have previously been coupled together, at a location immediately adjacent the slit 13 in a manner better illustrated in Figs. 3 and 4.

Referring to Figs. 6 and 8, there is diagrammatically shown a preferred form of apparatus which is adapted to carrying the above described method into practice according to the invention. The slider assembling apparatus generally designated 17 comprises a guide block 18 having a first guide surface 19 and a second guide surface 20 providing the aforementioned first and second paths 14 and 15, respectively for travel of the fastener chain 10 therealong. The guide surfaces 19 and 20 are each pro-

vided therein with a centrally extending, longitudinal guide groove 21 which is dimensioned to fit the portion of the slider S that underlies the lower surface of the fastener chain 10 when the slider is mounted and which is thus adapted to permit the assembled sliders to run in sliding relation to the groove 21.

10 The guide block 18 is provided with a recess 22 extending transversely across the passage of the fastener chain 10 and adapted to accommodate a guide roller 23. This roller is rotatably mounted on a pin 24 secured to the block 18 and is provided centrally with a peripheral recess 23a which is dimensioned to fit the slider S for the same purpose achieved by the guide groove 21. On opposite sides of the peripheral recess 23a are subdivided roll portions 23b of the guide roller 23, which portions are disposed in guiding relation to the respective tapes 11, 11 of the fastener chain 10.

15 The guide roller 23 generally defines the assembling station at a point at which the lines of extension of the first and second guide surfaces 19 and 20 merge to form the cornering point 16 where the slider S is assembled on the fastener chain 10. More specifically, the first guide surface 19 extends horizontally in tangential relation to the periphery of each of the roll portions or subdivision 23b of the guide roller 23, while the second guide surface 20 extends at an angle downwardly inclined relative to the first guide surface 19 and also in tangential relation to the periphery of each subdivision 23b, so that the fastener chain 10 is deflected around the guide roller 23 as it moves past the same, when the slit 13 is split open.

20 Designated at 25 is a slider holder (Fig. 7) having a clamping jaw 25a adapted to releasably hold sliders S one at a time and connected to a suitable actuating means (not shown) for moving the holder 25 towards and away from the slider assembling station. The slider holder 25 is arranged to advance towards the assembling station along a horizontal path parallel with the first guide surface 19 and assume a position in which the entrance end S₁ of the slider S retained therein is directed toward and flush with the upper edge 13a of the slit 13 that has been split open. In this position, the holder 25 advances slightly beyond the cornering point 16, threading the slider S through the open slit 13 and thus assembling the same on the fastener chain 10. As this is done, the slider holder 25 is retracted away from the assembling station, whereupon the slider S is released from the clamping jaw 25a and carried away with the fastener chain 10 as the latter begins to move past the guide roller 23 down the second guide surface 20 in the direction of the one-headed arrow.

Designated at 26 is a fastener chain separator supported in the guide block 18 for vertical movement into and away from the passage of the fastener chain 10 through a vertical opening 27 extending through the guide groove 21 in the first guide surface 19 adjacent the assembling station or the guide roller 23. The separator 26 is adapted to separate the two opposed stringers 11, 11 as the fastener chain 10 moves past it, so as to present the latter as separated to the assembled station thereby facilitating the slider threading operation.

WHAT WE CLAIM IS:—

1. A method of applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges, which method comprises the steps of:

(a) providing transverse slits across the inner longitudinal edges of the stringer tapes at spaced locations along the fastener chain;

(b) moving the fastener chain intermittently along a first substantially horizontal path of travel and a second path extending at an angle downwardly inclined relative to said first path, said first and second paths merging at a cornering point in a slider assembling station;

(c) separating the opposed stringer tapes along their inner longitudinal edges prior to the mounting of sliders thereon;

(d) deflecting the fastener chain downwardly around said cornering point, whereupon said transverse slit is split open with its upper edge aligned with an entrance end of the slider;

(e) mounting the slider on the fastened chain through said slit positioned at said cornering point; and

(f) advancing the fastener chain a distance corresponding to a length of individual product fastener to which the chain is to be cut.

2. The method as claimed in claim 1 which further includes the step of forming element-free gaps at said spaced locations along the fastener chain.

3. An apparatus for applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges and provided with transverse slits formed across said longitudinal edges at spaced locations along the fastener chain, which apparatus comprises:

(a) a guide block having a first substantially horizontal guide surface and a second guide surface extending at an angle downwardly inclined relative to said



vided therein with a centrally extending, longitudinal guide groove 21 which is dimensioned to fit the portion of the slider S that underlies the lower surface of the fastener chain 10 when the slider is mounted and which is thus adapted to permit the assembled sliders to run in sliding relation to the groove 21.

- 10 The guide block 18 is provided with a recess 22 extending transversely across the passage of the fastener chain 10 and adapted to accommodate a guide roller 23. This roller is rotatably mounted on a pin 24 secured to the block 18 and is provided
- 15 centrally with a peripheral recess 23a which is dimensioned to fit the slider S for the same purpose achieved by the guide groove 21. On opposite sides of the peripheral recess 23a are subdivided roll portions 23b
- 20 of the guide roller 23, which portions are disposed in guiding relation to the respective tapes 11, 11 of the fastener chain 10.

The guide roller 23 generally defines the assembling station at a point at which the lines of extension of the first and second guide surfaces 19 and 20 merge to form the cornering point 16 where the slider S is assembled on the fastener chain 10. More specifically, the first guide surface 19 extends horizontally in tangential relation to the periphery of each of the roll portions or subdivision 23b of the guide roller 23, while the second guide surface 20 extends at an angle downwardly inclined relative to the first guide surface 19 and also in tangential relation to the periphery of each subdivision 23b, so that the fastener chain 10 is deflected around the guide roller 23 as it moves past the same, when the slit 13 is split open.

- 40 Designated at 25 is a slider holder (Fig. 7) having a clamping jaw 25a adapted to releasably hold sliders S one at a time and connected to a suitable actuating means (not shown) for moving the holder 25 towards and away from the slider assembling station. The slider holder 25 is arranged to advance towards the assembling station along a horizontal path parallel with the first guide surface 19 and assume a position in which the entrance end S₁ of the slider S retained therein is directed toward and flush with the upper edge 13a of the slit 13 that has been split open. In this position, the holder 25 advances slightly beyond the cornering point 16, threading the slider S through the open slit 13 and thus assembling the same on the fastener chain 10. As this is done, the slider holder 25 is retracted away from the assembling station, whereupon the slider S is released from the clamping jaw 25a and carried away with the fastener chain 10 as the latter begins to move past the guide roller 23 down the second guide surface 20 in the direction of the one-headed arrow.

Designated at 26 is a fastener chain separator supported in the guide block 18 for vertical movement into and away from the passage of the fastener chain 10 through a vertical opening 27 extending through the guide groove 21 in the first guide surface 19 adjacent the assembling station or the guide roller 23. The separator 26 is adapted to separate the two opposed stringers 11, 11 as the fastener chain 10 moves past it, so as to present the latter as separated to the assembled station thereby facilitating the slider threading operation.

WHAT WE CLAIM IS:—

1. A method of applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges, which method comprises the steps of:
 - (a) providing transverse slits across the inner longitudinal edges of the stringer tapes at spaced locations along the fastener chain;
 - (b) moving the fastener chain intermittently along a first substantially horizontal path of travel and a second path extending at an angle downwardly inclined relative to said first path, said first and second paths merging at a cornering point in a slider assembling station;
 - (c) separating the opposed stringer tapes along their inner longitudinal edges prior to the mounting of sliders thereon;
 - (d) deflecting the fastener chain downwardly around said cornering point, whereupon said transverse slit is split open with its upper edge aligned with an entrance end of the slider;
 - (e) mounting the slider on the fastened chain through said slit positioned at said cornering point; and
 - (f) advancing the fastener chain a distance corresponding to a length of individual product fastener to which the chain is to be cut.

2. The method as claimed in claim 1 which further includes the step of forming element-free gaps at said spaced locations along the fastener chain.

3. An apparatus for applying sliders to a slide fastener chain having a pair of opposed stringer tapes carrying rows of fastener elements along their respective inner longitudinal edges and provided with transverse slits formed across said longitudinal edges at spaced locations along the fastener chain, which apparatus comprises:

- (a) a guide block having a first substantially horizontal guide surface and a second guide surface extending at an angle downwardly inclined relative to said

(3)



* C L M S *

1,425,534

4

4

first guide surface, along which surfaces the fastener chain is transported intermittently, and a guide groove extending longitudinally along said first and second guide surfaces for receiving sliders slidably therein;

(b) means for splitting open the transverse slits in the fastener chain so that the upper edge of each of said slits is aligned with an entrance end of a slider, said means being located at a point interconnecting the lines of extension of said first and second guide surfaces;

(c) separating means movable into and away from the path of the fastener chain along said first guide surface adjacent said splitting means for separating the two opposed stringer tapes prior to arrival of the fastener chain at said splitting means; and

(d) a slider holder movable towards and away from said splitting means and adapted to release sliders one at a time onto the fastener chain at a point slightly

beyond said splitting means by threading the slider through said transverse slit.

4. The apparatus as claimed in claim 3 wherein said splitting means comprises a guide roller pivotally supported in said block and provided at a location where said first and second guide surfaces merge, the periphery of said roller being disposed in tangential relation to the lines of extension of said first and second guide surfaces, and said roller having a peripheral recess formed centrally thereof for the passage of a slider.

5. The method substantially as herein described with reference to and as illustrated in the accompanying drawings.

6. The apparatus substantially as herein described with reference to and as illustrated in the accompanying drawings.

EDWIN C. AXE & CO.,
Chartered Patent Agents,
113, Kingsway,
London, WC2B 6QP,
For the Applicants.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1976.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.