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[54] **METHOD OF MAKING SLIDE FASTENER FROM CONTINUOUS CHAIN**

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[51] **Int. Cl.** **B23p 11/00,** B23p 15/00

[58] **Field of Search** 29/408, 409, 410, 207.557

[56] **References Cited**

UNITED STATES PATENTS

3,353,256	11/1967	Frohlich et al.	29/408
3,588,991	6/1971	Maisenbacher	29/408

Primary Examiner—Thomas H. Eager

[57] **ABSTRACT**

Continuous slide fastener chain is cut to individual lengths, and two severed lengths are spaced apart to form a gap between the respective terminal parts of the two carrier tapes and interlocked rows of fastening elements. A connecting strip of pliable material is superimposed on the severed terminal parts of each carrier tape to bridge the gap and fastened to the terminal parts. When the connecting strips are cut transversely, the individual fastener lengths are provided with the free ends necessary for many applications without removing fastener elements from the continuous chain. Top or bottom stops may be mounted on the connecting strips prior to or after their fastening to the carriers, or such stops may be formed under heat and pressure from the material of the connecting strips during the fastening of the same to the carriers.

6 Claims, 4 Drawing Figures

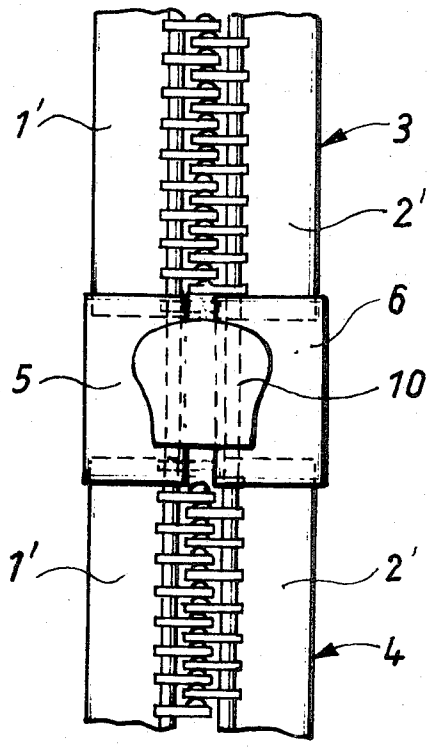


Fig. 1

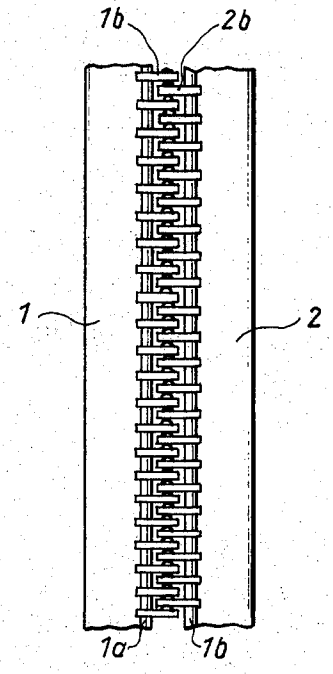


Fig. 2

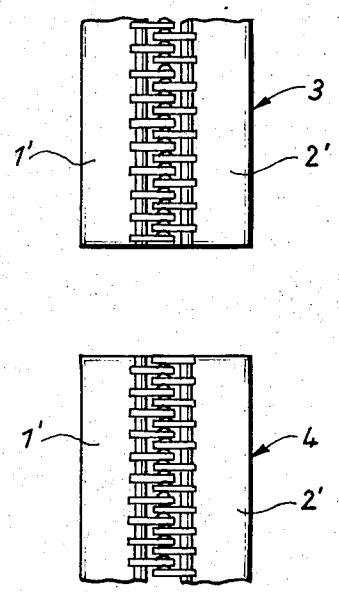


Fig. 3

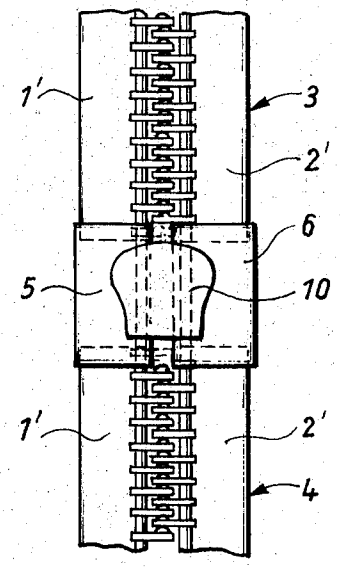
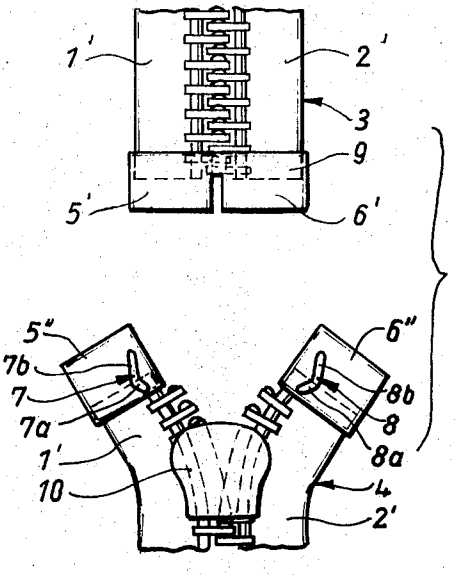


Fig. 4



METHOD OF MAKING SLIDE FASTENER FROM CONTINUOUS CHAIN

This invention relates to slide fasteners, and particularly to a method of converting continuous slide fastener chain to individual slide fasteners.

It is convenient to manufacture and store slide fastener chain in continuous lengths consisting of two continuous, elongated carriers, such as woven or other tapes, and a continuous row of fastening elements on each carrier, the two rows of fastening elements being interlocked. When it is desired to produce individual fasteners of relatively short length having ends free from fastening elements, it was necessary heretofore to cut away fastening elements to form a gap in the interlocked rows, and then to cut the two carriers transversely to their direction of elongation. The known method is not only laborious, it is also wasteful of fastening elements which cannot normally be removed from the continuous chain without being destroyed.

It is a primary object of this invention to provide a more economical method of converting a continuous slide fastener chain to individual fastener lengths.

It is another object of this invention to combine the assembly of a slider and of top and bottom stops, hereinafter jointly referred to as "end stops," with the conversion of the continuous chain in a single operation having but few and simple steps.

With these objects and others in view, as will hereinafter become apparent, the invention provides a method in which a longitudinal portion of a continuous fastener chain is severed from the remainder of the chain, whereby respective terminal parts of each carrier associated with the severed portions are separated from each other. The two severed chain portions are then moved longitudinally away from each other until a gap is formed between the two severed terminal parts of each tape or like carrier. Each gap is bridged by a pliable connecting strip in such a manner that respective terminal parts of the connecting strip are superimposed on the respective terminal parts of the associated carrier. Each terminal part of a carrier is fixedly fastened to the superimposed terminal part of the associated connecting strip, and the connecting strip is severed transversely to the direction of fastener chain elongation between its terminal parts in such a manner that a portion of the severed connecting strip projects beyond at least one of the terminal parts of the associated carrier.

Other features, additional objects, and many of the attendant advantages of this invention will readily become apparent from the following detailed description of a preferred embodiment when considered in connection with the appended drawing in which:

FIG. 1 shows a continuous fastener chain in fragmentary plan view;

FIG. 2 shows the chain of FIG. 1 after it has been cut transversely and the severed portions have been moved apart;

FIG. 3 shows connecting strips and a slider superimposed on the cut chain of FIG. 2; and

FIG. 4 illustrates the terminal stage of the method of the invention.

Referring now to the drawing in detail and initially to FIG. 1, there is seen a small longitudinal portion of a continuous fastener chain essentially consisting of two juxtaposed tapes **1, 2**, two cords **1***a*, **2***a* respectively

woven to the proximate edges of the tapes **1, 2**, and interlocked respective rows of scoops or fastening elements **1***b*, **2***b*, for which the corded tapes **1, 1***a* and **2, 2***a* serve as carriers, as is conventional in itself. The scoops **1***b*, **2***b* illustrated consist of metal, but may be made of plastic as is known in itself and not directly relevant to this invention.

When it is intended to make individual fasteners from the chain of FIG. **1**, a longitudinal portion **3** of the chain is severed by a cross cut from the remainder **4** of the chain, and the two chain portions **3, 4** are pulled longitudinally apart into the position illustrated in FIG. **2** in which the two terminal parts **1'** of the tape **1** and the corresponding terminal parts **2'** of the tape **2** are separated by a gap.

As is illustrated in FIG. **3**, the gaps are bridged respectively by a connecting rectangular strip **5** whose terminal parts are superimposed on the two terminal parts **1'**, and by a connecting strip **6** which is similarly superimposed on the terminal tape parts **2'**. The flat connecting strips **5, 6** consist of thermo-plastic resin composition such as nylon, and the tapes **1, 2** are woven from mixed cotton and nylon yarns. Prior to being placed upon the tape ends **1', 2'**, the strips **5, 6** are loosely assembled with a slider **10** by inserting respective edge portions of the pliable strips into the lateral slots between the rails of the slider, not themselves visible in the drawing, and the strips **5, 6** are laid on the tape ends in such a manner that the slider **10** is located in the gap between the tape ends, as shown in FIG. **3.**

A heated platen is then pressed against the strips **5, 6** while the sub-assembly illustrated in FIG. **3** is supported on a flat, heated anvil. The shape of the platen is evident from consideration of FIG. **4.** It is formed with three recesses into which the heated, thermoplastic material of the strips **5, 6** is forced under the applied pressure to form projections **7, 8** and **9.** Simultaneously, the nylon fibers in the terminal tape parts **1', 2'** are welded to the nylon strips **5, 6.**

The projections **7, 8** are elongated ribs symmetrical relative to the longitudinal median line of the fastener. The ribs each have two straight longitudinal portions of different length. The shorter portions **7***a*, **8***a* of the ribs are closely adjacent the last fastening elements of the chain portion **4** and are inclined at angles of at least 45° to the direction of tape elongation. The longer rib portions **7***b*, **8***b* extend from the associated rib portions **7***a*, **8***a* longitudinally away from the fastening elements of the chain portion **4** at an angle of less than 20° to the direction of tape elongation, and the two portions of each rib are obtusely inclined relative to each other so that their bights face each other.

The projection **9** connects the two strips **5, 6** over the last fastening elements of the chain portion **3** and is formed jointly by fused material of both strips.

After heat-sealing of the strips **5, 6** to the tape ends **1', 2'** and cooling of the heat-sealed assembly, the slider **10** is moved over the chain portion **4** into the position illustrated in FIG. **4.** The slider readily overrides the ribs **7, 8** and thereafter forces the matching fastening elements on the two tape ends **1', 2'** apart in the usual manner to open the chain portion **4.** The closing movement of the slider **10** is limited by the more steeply inclined rib portions **7***a*, **8***a* which act as top stops. If so desired, only one of the ribs **7, 8** may be used to provide a single top stop. The plastic strips **5,**

6 are then cut transversely to leave free ends 5', 6' and 5'', 6'' as extensions of the tape ends 1', 2', the location of the cut being determined by the intended application of the fasteners.

The operation described above is repeated as often as needed, thereby producing fasteners each having a slider 10 and top stops 7, 8, and a bottom stop constituted by the plastic projection 9 which connects the carrier ends 5', 6' in FIG. 4, the end stops 7, 8, 9 being longitudinally aligned with the fastening elements.

The method of the invention described above with reference to specific materials of construction and specific processing equipment, known in themselves, is capable of many modifications obvious in the light of the above teachings. If the fastening elements 1*b*, 2*b* consist of thermoplastic material, they may be flattened where compressed by the afore-mentioned heated platen so that the bottom stop 9 need not project beyond the remainder of the carrier ends 5', 6' connected by the stop. If the material of the fastening elements is miscible with that of the strips 5, 6 when heated near its fusion temperature, the compressed fastening elements may themselves provide a portion of the bottom stop material.

While thermoplastic strips 5, 6 are preferred and are preferably attached to the tape ends 1', 2' by heat-sealing, the method of the invention is applicable to tapes and strips which consist entirely of woven cotton yarn. The superimposed respective terminal parts of the tapes and strips may then be fastened to each other by sewing or by adhesively cementing in a conventional manner. Top stops of metal or plastic shaped as shown in FIG. 4 may be attached to the strips 5, 6 prior to assembly with the slider 10, and a bottom stop or the conventional bottom assembly of a separable fastener including two pins and a U-shaped clip may be attached to the projecting carrier ends 5', 6' after the strips 5, 6 were cut.

The cut across the strips 5, 6 may be placed to suit the intended application of the fastener so that free fastener ends projecting longitudinally beyond the rows of elements 1*b*, 2*b* are formed only at one end of each fastener.

The conversion of continuous chain to individual slide fasteners is readily made semi-automatic or fully automatic by adapting apparatus conventional in this art to the intended purpose in an obvious manner.

It should be understood, therefore, that the foregoing disclosure relates only to a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. A method of converting a continuous slide fastener chain to individual lengths of fastener, said chain having two elongated carriers and respective continuous rows of releasably interlocked fastening elements on said carriers, said rows extending in the direction of elongation of said carriers, which method comprises:

a. severing a longitudinal portion of said continuous chain from the remainder of said chain, whereby respective terminal parts of each carrier are separated from each other;

b. moving said longitudinal portion and said remainder away from each other until a gap is formed between said terminal parts of each carrier;

c. bridging each gap by a pliable connecting element, respective terminal parts of the connecting element being superimposed on the respective terminal parts of the associated carrier;

d. fixedly fastening each terminal part of each carrier to the superimposed terminal part of the associated connecting element; and

e. severing each connecting element transversely to said direction intermediate said terminal parts thereof in such a manner that a portion of the severed connecting element projects in said direction beyond at least one of the terminal parts of the associated carrier.

2. A method as set forth in claim 1, wherein at least one of said connecting elements essentially consists of material capable of being permanently shaped under applied pressure, and said one connecting element is being fastened to the terminal parts of the associated carrier under a pressure sufficient to shape an end stop on one terminal part of said one connecting element, said end stop being aligned with the row of fastening elements on the terminal part of the associated carrier fastened to said one terminal part of the connecting element.

3. A method as set forth in claim 2, wherein said stop includes two rib portions offset in said direction and respectively nearer and farther from the fastening elements on said terminal part of the associated carrier, said rib portions being obliquely inclined relative to said direction, said nearer rib portion being more steeply inclined than said farther rib portion.

4. A method as set forth in claim 3, wherein a slider matching said fastening elements is assembled with said connecting elements prior to said bridging of each gap, and said slider is moved in said direction for engagement with the fastening elements of said rows after said fastening of the carrier parts to the connecting elements, said slider overriding said end stop during said moving of the slider.

5. A method as set forth in claim 1, wherein a slider matching said fastening elements is assembled with said connecting elements prior to said bridging of each gap, and said slider is moved in said direction for engagement with the fastening elements of said rows on said longitudinal portion after said fastening of said connecting elements to the carrier of said longitudinal portion.

6. A method as set forth in claim 1, wherein at least one of said terminal parts of said connecting element carries an end stop prior to being fastened to an associated carrier, and is fastened to said carrier in a position in which said end stop is aligned with the fastening elements on said associated carrier.

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