

PATENT SPECIFICATION

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- (21) Application No. 41137/73 (22) Filed 31 Aug. 1973
 (31) Convention Application No. 88 072/72 (32) Filed 1 Sept. 1972 in
 (33) Japan (JA)
 (44) Complete Specification published 22 Sept. 1976
 (51) INT. CL.³ A44B 19/04//19/12 19/26
 (52) Index at acceptance
 E2S 1A2A 1A2B1 1A3C 1A4 1A5



(54) SLIDING CLASP FASTENERS AND METHOD OF MAKING THE SAME

(71) We, YOSHIDA KOGYO KABUSHIKI KAISHA, of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan; a corporation duly organized under the laws of 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:—

10 This invention relates to sliding clasp fasteners and to a method of making the same.

Sliding clasp fasteners usually comprise a pair of oppositely disposed stringer tapes which are closed together by moving a sliding member along the rows of inter-engageable fastener elements secured to the inner longitudinal edges of the respective stringer tapes.

20 Most stringer tapes of the class described are woven or knitted with textile yarns, and therefore are prone to become frayed or worn at their marginal ends which are severed to produce individual lengths of product fasteners.

Prior art attempts to prevent fraying of the tape ends of the sliding clasp fastener were to envelop each tape end portion with a film or strip of a plastics material, or to coat or impregnate that portion with a molten plastics material. Such attempts were disadvantageous in that the added material presents a thickened, bulky appearance and produces a locally stiffened tape surface which irritates the skin of the wearer or mars his garment. Coated or impregnated materials were also difficult to distribute uniformly through fine interstices of the tape fabric and hence were apt to separate therefrom.

40 With the above noted drawback in view, one aim of the invention is to provide a sliding clasp fastener having tape ends which may be neatly finished and held immune to fraying or wear.

A further aim of the invention is to provide a sliding clasp fastener having tape ends which may be flexible and thinner than the tape web and show little or no tendency to fray.

According to one aspect of the invention, there is provided a sliding clasp fastener comprising a pair of oppositely disposed string tapes each carrying along their respective inner longitudinal edges a row of inter-engageable fastener elements and a slider arranged to move along the inner longitudinal edges to open and close the fastener, each of said stringer tapes consisting of a first group of threads which are made of a textile or non-soluble material and a second group of threads which are made of a thermoplastic material, said second group of threads being present at least at a portion of the tape corresponding to a tape end to be cut and being melted, whereby the threads of said first group are held against fraying at the cut end of the tape entirely by thermoplastics material from said second group of threads fused to and forming a unitary bond with said first group of threads across the full tape width.

The invention will now be further described, by way of example, with reference to the accompanying drawings in which like reference characters or numerals refer to like and corresponding parts throughout the several views and in which:—

FIG. 1 is a plan view of a fragmentary piece of a sliding clasp fastener embodying the invention;

FIG. 2 is a transverse sectional view taken along the line II-II of FIG. 1;

FIG. 3 is a view similar to FIG. 2 but showing a modified embodiment of the invention;

FIG. 4 is a view similar to FIG. 2 but showing another modified embodiment;

FIG. 5 is a fragmentary plan view of a stringer tape of a knitted structure to which

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the principles of the invention are applied;

FIG. 6 is a fragmentary plan view of a section of a sliding clasp fastener which constitutes another embodiment according to the invention;

FIG. 7 is a fragmentary plan view of a sliding clasp fastener chain prior to fraying-free treatment and cutting;

FIG. 8 is a view similar to FIG. 7 but showing the fastener chain as treated and cut; and

FIGS. 9 and 10 are side elevational views of an apparatus employed to carry the method of the invention into practice and are utilised to explain the fraying-free treatment and cutting operation.

Referring now to the drawings and FIG. 1 in particular, there is shown a sliding clasp fastener 10 having a pair of opposed stringer tapes T_1 , T_2 each consisting of a woven structure. A row of coiled fastener elements E is secured by stitches 11 to the inner longitudinal edge of each of the stringer tapes T_1 , T_2 and is interengageable with that on the mating stringer tape through the agency of a slider S . Designated at P is an end stop adapted to prevent the slider S from running off the elements E .

Each stringer tape of woven structure consists of warp threads 12 extending longitudinally of the tape and transversely extending weft threads 13 that are interlaced with the warp threads 12. While the warp threads 12 are made of naturally-occurring textile materials such as cotton throughout the entire area of the tape T_1 , (T_2), it is to be noted that at least some of the weft threads 13 are made of a thermoplastic resin such as for example polyester to achieve the results hereinafter explained.

Thermoplastics filaments constituting the weft threads 13 should be used at least at portions of the tape corresponding to tape ends 14 which are to be cut at predetermined intervals on a fastener chain F (FIGS. 7 and 8) during the finishing operation thereof. Those weft threads designated at 13 which lie in the region of tape ends 14 are caused to melt by heat and pressure thereby firmly bonding with the textile warp threads 12, with molten plastics material filling up the interstices of the tape system, as shown in FIGS. 1 and 2. Thus, melting or fusing the thermoplastic weft threads 13 will form a strong unitary bond with the textile or non-soluble warp threads 12 at the tape end 14, with the results that the textile warp threads 12 are fortified against fraying at an extremity 14' of the tape end 14 to be cut and that the tape end 14 can be neatly finished with a clean cut contour.

A preferred method of producing the sliding clasp fastener of this or any of the embodiments still to be described comprises feeding a continuous fastener chain

intermittently for a distance corresponding to a desired fastener length to be cut, applying heat and pressure to a portion of the chain corresponding to a tape end to cause the thermoplastic threads to melt and set to form a unitary bond with the non-soluble threads, and simultaneously cutting the chain across the thus bonded portion.

There is shown in Figures 9, 10 a suitable apparatus for carrying the above method into practice, which apparatus is designed more particularly to form the reinforced tape end 14 illustrated in FIGS. 1 and 2, wherein weft threads 13 on both sides of the tape are melted and set. The tape end finishing apparatus 15 includes a forming die 16 and an ultrasonic horn 17 movable towards and away from the die 16. The horn 17 has a substantially flat contact surface 17a for abutting and pressing the fastener chain F against a similarly flat corresponding surface 16a of the die 16. At midpart of the contact surface 17a of the horn 17 is provided a "V" shaped cutting blade 17b projecting downwardly therefrom. With this construction, the ultrasonic horn 17 is lowered to press the fastener chain F against the die 16, whereupon the ultrasonic energy of the horn 17 is applied to cause the thermoplastic weft threads 13 of the tapes T_1 , T_2 to melt or fuse thereby adhesively bonding to the non-soluble or textile warp threads 12 and simultaneously cut the chain to a desired product length.

The embodiment shown in FIG. 3 is characterised in that the weft threads 13 are melted on only one side of the stringer tapes T_1 , T_2 .

The embodiment of FIG. 4 is characterised by the provision of a reinforced tape end 14 consisting of warp and weft threads 12' and 13' both formed of a thermoplastic material at a portion of the tape corresponding to the tape end 14 and fused together.

FIG. 5 illustrates a warp-knitted stringer tape T_1 (T_2) consisting of wale-forming threads 18, tricot stitches 19 and laid-in lapping threads 20. In the illustrated knitting structure, the lapping threads 20 alone are formed with thermoplastic threads so as to be melted for providing a reinforced tape end 14 but other threads in the knitted structure may of course be chosen to be thermoplastic to obtain the results contemplated by the invention.

FIG. 6 shows a woven stringer tape T_1 (T_2) which has been processed to provide an element-free gap 21 in a well known manner. While the reinforced tape end 14 in each of the preceding embodiments is in the form of a strip of certain width extending transversely of the stringer tape T_1 (T_2), the corresponding tape end in the embodiment of FIG. 6 further embraces the longi-

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tudinal edge 22 and short transverse marginal end 23 which have resulted from the gap formation.

5 WHAT WE CLAIM IS:—

1. A sliding clasp fastener comprising a pair of oppositely disposed stringer tapes each carrying along their respective inner longitudinal edges a row of inter-engage-
10 able fastener elements and a slider arranged to move along the inner longitudinal edges to open and close the fastener, each of said stringer tapes consisting of a first group of threads which are made of a textile or non-
15 soluble material and a second group of threads which are made of a thermoplastic material, said second group of threads being present at least at a portion of the tape corresponding to a tape end to be cut and
20 being melted, whereby the threads of said first group are held against fraying at the cut end of the tape entirely by thermoplastics material from said second group of threads fused to and forming a unitary
25 bond with said first group of threads across the full tape width.

2. A sliding clasp fastener as claimed in Claim 1, wherein said stringer tape is of a woven structure in which said second
30 group of threads constitute at least some of the weft threads.

3. A sliding clasp fastener as claimed

in Claim 1, wherein said stringer tape is of a knitted structure consisting of wale-forming threads, tricot stitches and laid-in lap-
35 ping threads in which at least some of the lapping threads are constituted by said second group.

4. A method of producing a sliding clasp fastener as claimed in Claim 1, 2 or
40 3, which comprises feeding a continuous fastener chain intermittently for a distance corresponding to a desired fastener length to be cut, applying heat and pressure to a portion of the chain corresponding to a
45 tape end to cause the thermoplastic threads to melt and set to form a unitary bond with said tape end, and simultaneously cutting the chain across the thus bonded portion.

5. A sliding clasp fastener substantially
50 as herein described with reference to and as illustrated in the accompanying drawings.

6. A method of producing a sliding clasp fastener, substantially as herein described with reference to and as illustrated
55 in the accompanying drawings.

7. A sliding clasp fastener made by a method as claimed in any one of Claims 4 or 6.

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