

SPECIFICATION

A separable slide fastener

- 5 This invention relates to slide fasteners of a separable construction, and more particularly to such a slide fastener which is equipped with two separate sliders to permit the fastener to be opened and closed in opposite
10 directions.

There have been proposed numerous slide fasteners having a separator constituted by a pin member and a socket member releasably interengageable therewith. Pin members according to one known method were formed either by injecting a thermoplastic material into the region of a fastener tape edge where the coupling elements had been previously removed, or by attaching a preformed pin member to such element-free tape edge. This method was complicated and time-consuming, involving the removal of coupling elements, or attaching separate pin members to the tape edge. Another known method of forming a pin member was to fuse a thermoplastics film integrally with a short length of a pair of stringers which had been coupled together. Neither of these methods was satisfactory in respect of the cost involved in using extra material, particularly expensive plastics material. A further drawback was encountered with the prior art separable fasteners in that terminal coupling elements were often loosened up or shifted out of position with the results that the coupling elements were prone to undergo "mis-meshing" or consequent "rupture" or separation of meshed element chains during use of the fastener.

There was another drawback of the conventional form of separable slide fastener in that the slider was required to be mounted on one of the two stringers from the upper end thereof remote from the lower end to which the pin member having a slider-locking part is affixed. This slider mounting operation, usually manual, was tedious and laborious particularly where the fastener is relatively long as in the case of reversibly separable slide fasteners having two oppositely oriented sliders or "loop" fasteners having a single stringer. With sliders mounted on the stringers prior to attachment of pin members, then the sliders would often present themselves to be an obstacle to the mounting of pin members or to the sewing of stringers onto a garment fabric.

According to the present invention, there is provided a separable slide fastener comprising a pair of oppositely disposed stringers each having a support tape and a fastener element formed from a plastics monofilament into a continuous row of coupling elements secured by sewn seams to a longitudinal inner edge of the respective tape; the row of coupling elements consisting of a succession of elongated

loops each having a coupling head portion at one end thereof, an upper leg, a lower leg and a connecting heel portion at the opposite end remote from the coupling head connected to a next adjacent one of the successive loops; a reinforcing core extending through said succession of loops; and a slider having a pair of branched guide channels defined between its flanges and its diamond; a group of said successive loops being fused together over a predetermined length of the two coupled stringers at one end of the fastener and cut closely along the sewn seams to provide a pair of integrated pin members on the respective stringers, the group of fused loops on one stringer having a plurality of coupling head portions transferred from the other stringer.

The invention will be described by way of example with reference to the accompanying drawings, wherein:-

Figure 1 is a fragmentary plan view, on enlarged scale, of a pair of slide fastener stringers according to the invention with two oppositely directed sliders mounted thereon, Figure 2 is a cross-sectional view taken on part of the line II-II of Fig. 1;

Figure 3 is a cross-sectional view taken on part of the line III-III of Fig. 1; and

Figure 4a-4e, inclusive, are views utilized to explain the manner of mounting a slider on one of the fastener stringers.

Referring now to the drawings and Fig. 1 in particular, there is shown for purposes of illustration a portion of a separable slide fastener 10 provided in accordance with the invention. The fastener 10 comprises a pair of oppositely disposed stringers 11, 12 each having a support tape 13, (14) and a fastener element 15 (16) formed from a plastics monofilament into a row of interlocking coupling element 17 (18) mounted on and along a longitudinal inner edge of the respective tape. The fastener element 15, (16) is formed from a plastics monofilament into a continuous coil or alternatively a meandering or zig-zag structure, the element 15, (16) being shown in the illustrated embodiment to be a helically coiled structure consisting of a row of coupling elements in the form of a succession of elongated convolutions or loops 17, (18) each having a coupling head portion 17a (18a) at one end thereof, an upper leg 17b, (18b), a lower leg portion 17c, (18c) extending from the head 17a, (18a) in a common direction and a connecting heel or turn portion 17d, (18d) at the opposite end remote from the head 17a, (18a) connected to a next adjacent one of the successive loops 17, (18).

The coupling head 17a of the loop 17 on one stringer 11 is dimensioned to releasably coupled with the corresponding head 18a of the loop 18 on the mating stringer 12 to open and close the fastener 10 in the well-known manner. The upper and lower legs 17b and 18b are spaced apart in substantially

superimposed relation to each other as shown in Fig. 1 and define therebetween a longitudinally extending "tunnel" or hollow conduit through which a reinforcing string, cord or core 28 is inserted. Designated at 19 is a sewn seam or stitching securing the row of loops 17, (18) to the respective tape 13, (14).

In accordance with the invention, some of the successive loops 17, (18) that have been coupled or meshed with each other are fused together over a predetermined length of the row of loops at one end of the fastener 10 as by means of a supersonic process and are cut closely along a longitudinal inner edge of each of the sewn seams 19 to provide a pair of integrated pin members 20 and 21 on opposed stringers 11 and 12, respectively. Fusing the plastics monofilament element 15, (16) causes its stock to melt and penetrates into the interstices of the fabric forming the sewn seam 19, reinforcing core (28) and support tapes 13, 14, with the results that all of these parts of the fastener 10 are intimately united. The pin member 20 and 21 are produced by cutting or removing portions of the fused region of the stringers 11, 12, of which portions a first portion 22 extends longitudinally closely along and substantially parallel to the inner edges of the respective sewn seams 19, with the coupling head portions 17a, (18a) of the fastener element 15, (16) completely removed. A second portion 23 of the fused and cut region is tapered off with a plurality of coupling heads of the successive loops 17 on one stringer 11 transferred to and anchored between adjacent ones of the successive loops 18 on the opposite companion stringer 12, or vice versa, as shown in Fig. 1. The cutting takes place of the second portion 23 in such a manner that the first meshing or terminal loops 17', 18' remain undeformed. The coupling head 18a' in particular which has been transferred, in the cutting of the second portion 23 of the fused region from one stringer 12 to the other stringer 11 is fused integrally with the first meshing or terminal loop 17' on the stringer 11 so as to mechanically strengthen this loop 17', which would otherwise be unstable, and further hold the same in the proper meshing position with respect to the mating first meshing or terminal loop 18' on the stringer 12, so as to prevent "over-running" of one stringer 12 relative to the other stringer 11 when the second pin member 21 is inserted into a slider S as shown in Fig. 1. The correct intermeshing of the two opposed first loops 17' and 18' thus provided ensures smooth coupling of the respective stringers 11, 12 without rupture or separation of the element chains.

The pin member 20 is a slider-lock pin member and includes a locking plug 24 which is formed integrally therewith at the lowermost end of the stringer 11 for locking en-

gagement with the slider S. The locking lug 24 has a straight marginal edge 24a coextensive with the edge of the first cut-out portion 22 on the stringer 11, a curved peripheral portion 24b and a locking surface 24c extending transversely of the stringer 11 for abutting engagement with the end of one of the flanges 25, 25' of the slider S. To provide effective locking of the locking lug 24 with the slider S, the width or transverse length e_1 of the lug 24 is calculated to be substantially equal to or slightly greater than the distance or spacing e_2 between one of the flanges 25, 25' and a diamond 26 of the slider S; more specifically between a flared flange portion 25' and an inclined diamond surface 26', defining therebetween one of the branched guide channels S' of the slider S, the arrangement being that when threading the stringer 11 through the slider S progressively from the position of Fig. 4a, through the position of Fig. 4b to the position of Fig. 4c, the locking lug 24 undergoes slight elastic deformation in frictional contact with the flange 25 and diamond 26 of the slider S as the lug 24 is moved into the slider S through rotation only in the plane of the fastener 10. The stringer 11 may be further threaded through another slider S in the manner shown in Figs. 4d and 4e in the case where the fastener 10 is desired to be reversibly opened and closed with use of two sliders S as is well known in the art.

Each of the pin members 20, 21 is provided with a linear reinforcing guide portion 20', (21') formed by deformation of the heel or turn portions 17d (18d) simultaneously with the fusing of the element 15, (16), which guide portion 20', (21') facilitates the insertion of the stringer 11, (12) with least frictional resistance through the slider S.

The other pin member 21 is an inserting pin member and has a rounded inner peripheral surface 21a engageable with the diamond 26 of the slider when the stringer 12 is threaded through the latter, in which position the first meshing loop 18' on the stringer 12 is brought into engagement with the first meshing loop 17' on the mating stringer 11 in the space between the loops 17' and the next adjacent one of the successive loops 17.

Designated at 27 is a reinforcing plastic film enveloping the lower end portions of the respective stringers 11, 12, and serving to prevent fraying of the threads of sewn seam 19, support tapes 13, 14 and reinforcing core (28) and at the same time to facilitate finger-gripping of the stringers 11, 12 when threading the latter through the slider S.

Reference is directed to our co-pending Patent Application No. 7934593 (Serial No. 2033469).

CLAIMS

1. A separable slide fastener comprising a



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- pair of oppositely disposed stringers each having a support tape and a fastener element formed from a plastics monofilament into a continuous row of coupling elements secured
- 5 by sewn seams to a longitudinal inner edge of the respective tape; the row of coupling elements consisting of a succession of elongated loops each having a coupling head portion at one end thereof, an upper leg, a lower leg
- 10 and a connecting heel portion at the opposite end remote from the coupling head connected to a next adjacent one of the successive loops; a reinforcing core extending through said succession of loops; and a slider having a pair of
- 15 branched guide channels defined between flanges and a diamond; a group of said successive loops being fused together over a predetermined length of the two coupled stringers at one end of the fastener and cut
- 20 closely along the sewn seams to provide a pair of integrated pin members on the respective stringers, the group of fused loops on one stringer having a plurality of coupling head portions transferred from the other stringer.
- 25 2. A separable slide fastener as claimed in claim 1 wherein one of said pin members includes a locking lug having a transverse length substantially equal to or slightly greater than the width of one of said branched guide
- 30 channels of the slider.
3. A separable slide fastener as claimed in claim 1 wherein said fused loops are united integrally with said sewn seams, said tape and said reinforcing core.
- 35 4. A separable slide fastener as claimed in claim 2 wherein said locking lug is dimensioned to be rotatable in the plane of the fastener when threading its associated stringer through the slider.
- 40 5. A separable slide fastener as claimed in claim 1 including a first meshing or terminal loop on one of the stringers extending integrally from the group of fused loops and undeformed to permit intermeshing with
- 45 another terminal loop on the other stringer.

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