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SLIDE FASTENER SUITABLE FOR USE
ON ARTICLES MADE OF PLASTICS MATERIAL

This invention relates to slide fasteners, more particularly such a slide fastener which is suitable for use on rain coats, windbreakers, cushion covers and other articles that are made of a plastics material.

5 There are known slide fasteners which comprise a pair of support tapes each carrying along one of their longitudinal edges a row of coupling elements, the support tape being made of a sheet of plastics material which can be attached by means of ultrasonic or
10 high-frequency welding to a given article made of similar plastics material. Difficulties were encountered however with the way of securing the coupling elements to such thread-free plastic tape. When this was done by sewing stitches, the needle holes
15 would often become widened and ruptured, causing the tape to tear apart under the influence of transverse pull. To overcome this difficulty, it has been proposed to reinforce the plastic tape with a strip of woven fabric such as taffeta extending over one or the

other side along the longitudinal edge of the tape to which the coupling elements are secured. This prior art proposal however has a drawback in that the reciprocal movement of the slider to open or close the fastener becomes sluggish or otherwise difficult on account of dimensional changes in the plastic tape with changing ambient temperature. Performance tests further indicate that when stress, particularly as by transverse pull, is applied, the tape tends to get torn along its edge portion that confronts the side flanges of the slider, thus rendering the fastener inoperational under severe conditions. It was also found difficult during the assembling of fasteners with component parts, sliders in particular, to thread these sliders through the stringers because the tapes would often get warped and so deformed due to change in the environmental temperature.

15 According to the present invention, there is provided a slide fastener as claimed in each of the claims, to which reference is directed.

It is believed possible by means of the present invention to provide a slide fastener including a pair of opposed stringer tapes having structural features which enable easy attachment of the slide fastener to an article made of a plastics material and provide prolonged service life of the slide fastener without being effected by changing ambient temperature.

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

Figure 1 is a plan view of a general construction of a slide fastener provided in accordance with the present invention;

Figure 2 is an enlarged fragmentary transverse cross-sectional view, partly in end elevation, of a slide fastener according to an embodiment of invention;

Figures 3 to 5 are views similar to Figure

2, respectively showing different embodiments;

Figure 6 is an enlarged fragmentary transverse cross-sectional view, partly in end elevation, of one of identical halves of a slide fastener according to still another embodiment of the invention;

Figure 7 is a view similar to Figure 6 but showing a still further embodiment;

Figure 8 is an enlarged fragmentary transverse cross-sectional view, partly in end elevation, of a tape portion of a fastener according to another embodiment with coupling elements and a slider being omitted for clarity;

Figure 9 is a view similar to Figure 8 but showing a further embodiment of the invention; and

Figure 10 is a fragmentary plan view of a part of a stringer tape having perforations along one of its longitudinal edges.

Like numerals refer to like or corresponding parts throughout the several views.

As shown in Figure 1, a slide fastener comprises a pair of stringer tapes 11, 11 each including an element-supporting inner portion 12 formed solely of a fibrous thread system and an outer web portion 13 formed solely of a sheet of plastics material, the portions 12, 13 being joined side-by-side along outer and inner longitudinal edges respectively thereof. A pair of opposed rows of coupling elements 14, 14 of a meander or zig-zag formation is secured by a pair of sewn seams

(not designated) to and along confronting inner longitudinal edges of the respective element-supporting inner portions 12, 12 of the stringer tapes. A slider 15 is slidably mounted on the rows of coupling elements 14, 14 and reciprocable between two remotely disposed end stops 16, 17 to take the rows of coupling elements into and out of interdigitating engagement with each other as is well known in the art.

Figure 2 shows a specific embodiment of the invention in which each stringer tape 11a comprises an element-supporting inner portion 12a carrying on and along its inner longitudinal edge a row of zig-zag coupling elements 14a and disposed in confronting relation to a respective guide flange 18 of a lower pair of guide flanges 18, 18 and a respective guide flange 18' of an upper pair of guide flanges 18', 18', and an outer web portion 13 formed solely of a sheet of plastics material such as vinyl chloride. Each pair of guide flanges 18, 18 and 18', 18' are respectively disposed along opposite side edges of the slider 15. (In a modification there may be only one such pair of guide flanges.) The element-supporting inner portion 12a, which may have substantially uniform thickness across its width, is formed of a warp-knit fabric with a waled-face on one side of the element-supporting inner portion 12a, the waled-face having a plurality (seven in the illustrated embodiment) of wales W. The element-supporting inner portion 12a has a connecting section 19a formed by, and extending along, its outer longitudinal edge and including at least one, preferably more than two wales W. The connecting section 19a is anchored in place centrally within the outer web portion 13. This anchoring may be done for example by extruding the plastics material constituting the outer web portion 13 over the connecting

section 19a of the element-supporting inner portion 12a.

Figure 3 shows another specific embodiment which is identical with that of Figure 2 with the exception that an element supporting inner portion 12b of each stringer tape 11b is formed of a warp-knit fabric having a waled-face including a plurality of wales W, on each side of the element-supporting inner portion 12b.

5 Figure 4 shows a further embodiment which is similar to that of Figure 2, except that a row of
10 coupling elements 14C is in the form of a helical coil mounted on and secured through a core cord (not designated) to each element-supporting inner portion 12a and that the connecting section 19a is embodied within the
15 thickness of the outer web portion 13.

Figure 5 shows still another embodiment of the invention in which a stringer tape 11d has an element-supporting inner portion 12d formed of a woven fabric. The woven element-supporting portion 12d is
20 embodied in an outer web portion 13 along its connecting portion 19d.

Figure 6 shows a still further embodiment in which each stringer tape 11e has a warp-knit element-supporting inner portion 12e similar to that shown in
25 Figure 3 and which features the provision of an enlarged bulb-like protuberance 20 at the innermost edge of the element-supporting inner portion 12e. A row of

coupling elements 14e of synthetic resin is injection-molded around the protuberance 20.

Figure 7 shows another embodiment of the invention in which each stringer tape 11f includes a woven element-supporting inner portion 12f having an enlarged bulb-like protuberance 21 at the innermost edge of the element-supporting inner portion 12f, the protuberance 21 supporting a row of metallic coupling elements 14f molded on or clinched to the protuberance 21.

10 Figure 8 shows a modification of a stringer tape 11g according to the invention. The stringer tape 11g includes an element-supporting inner portion 12g of a woven fabric, the thickness of which is substantially the same as that of the outer web portion 13, excepting that a connecting section 19g is reduced to be fully embodied
15 in the outer web portion 13. To make such thickened element-supporting inner portion 12g, thicker threads may be employed.

Another modification shown in Figure 9 is
20 substantially the same in principle as that of Figure 8 only except that the element-supporting inner portion 12h is formed of a warp-knit fabric.

Throughout all of the illustrated embodiments, the connecting section of the element-supporting inner
25 portion 12, which is either knitted or woven with fibrous material, is anchored within the outer web portion 13 by means of the plastics material of the outer web portion 13

which melts and penetrates into the interstices of the fibrous threads of the connecting section. To enhance this anchoring effect, the element-supporting inner portion 12 may be perforated at suitable intervals along the connecting section 19 by ultrasonic or high-frequency processing as shown in Figure 10, the resulting perforations 22 being filled with hot melt plastics material thereby securing the connecting section 19 to the outer web portion 13.

10 The slide fastener of the foregoing construction is suitable for use on a variety of articles made of a plastics material as the outer web portion 13 may be attached thereto conveniently by ultrasonic or high-frequency welding.

15 The combination of the element-supporting inner portion 12, 12a-12h made of a fibrous thread system and the outer web portion 13 made of a plastics material provides prolonged service life of the slide fastener without being effected by changing ambient temperature and thus
20 eliminates the various drawbacks of the prior art noted at the outset of this specification.



CLAIMS:-

1. A slide fastener comprising a pair of stringer tapes, a pair of rows of coupling elements and a slider;

each stringer tape comprising an inner portion made solely of a fibrous material and an outer portion side-by-side with said inner portion and made solely of a plastics material, an inner longitudinal edge of said outer portion being joined with an outer longitudinal edge of said inner portion;

said inner portion of said stringer tape forming an element-supporting portion of the tape, a respective one of said pair of rows of coupling elements being carried by an inner longitudinal edge of said element-supporting portion;

said outer portion of each stringer tape forming a web adapted for attachment to an article;

said slider being slidably mounted on and reciprocable along said pair of rows of coupling elements to take them into and out of interdigitating engagement with each other, said slider having at least one pair of guide flanges, the or each said pair of guide flanges being respectively disposed along mutually opposite side edges of the slider, the or each said pair of guide flanges each being in confronting relationship respectively to said inner portions of said pair of stringer tapes respectively.

2. A slide fastener according to claim 1, the outer longitudinal edge of said element-supporting portion forming a connecting section embedded in said web.

3. A slide fastener according to claim 2, said element-supporting portion having a number of perforations defined in and along said connecting



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section at suitable intervals and filled with said plastics material of said web portion, said.

connecting section being formed of a woven fabric.

5 4. A slide fastener according to claim 2, said connecting section being disposed centrally within said web portion.

5. A slide fastener according to claim 2, said connecting section being disposed off the center of the
10 thickness of said web portion.

6. A slide fastener according to claim 2, said element-supporting portion having a thickness substantially the same as the thickness of said web portion, except its connecting section.

15 7. A slide fastener according to claim 1, said element-supporting portion being formed of a warp-knit fabric.

8. A slide fastener according to claim 7, said warp-knit element-supporting portion having a
20 waled-face on one of its opposite sides.

9. A slide fastener according to claim 7, said warp-knit element-supporting portion having a waled-face on each of its opposite sides.

10. A slide fastener according to claim 1, said
25 element-supporting portion being formed of a woven fabric.

11. A slide fastener according to claim 1, said



element-supporting portion having an enlarged bulb-like protuberance at said one longitudinal edge thereof.

12. A slide fastener according to claim 1, said element-supporting portion having substantially uniform thickness across
5 its width.

13. A slide fastener substantially as described with reference to and as illustrated in Figure 2 of the accompanying drawings.

14. A slide fastener substantially as described with reference to and as illustrated in Figure 2 modified as in Figure 3 of the
10 accompanying drawings.

15. A slide fastener substantially as described with reference to and as illustrated in Figure 2 modified as in Figure 4 of the accompanying drawings.

16. A slide fastener substantially as described with
15 reference to and as illustrated in Figure 2 modified as in Figure 6 of the accompanying drawings.

17. A slide fastener substantially as described with reference to and as illustrated in Figure 2 modified as in Figure 7 of the accompanying drawings.

20 18. A slide fastener substantially as described with reference to and as illustrated in Figure 2 modified as in Figure 8 of the accompanying drawings.

19. A slide fastener substantially as described with reference to and as illustrated in Figures 2 and 8 modified as in Figure
25 9 of the accompanying drawings.

20. A slide fastener substantially as described with reference to and as illustrated in any of Figures 2 to 9 modified as in Figure 10 of the accompanying drawings.