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"SLIDE FASTENER STRINGER"

The present invention relates to a slide fastener stringer, and more particularly to a water-resistant slide fastener stringer having seal means for protection against water leakage between intermeshing rows of coupling
5 elements.

One type of known water-resistant, or water-proof, slide fastener stringer comprises a water-resistant tape and coupling elements mounted thereon by extrusion molding. The stringer tape is composed of a woven or knit web having
10 face and back layers of elastomer such as natural or synthetic rubber, and a sealing fin projecting from the element-supporting edge of the stringer tape toward the coupling heads of companion coupling elements. When two such stringers are coupled together and immersed in water, the
15 sealing fins are brought into tight contact with the coupling heads, thereby hermetically sealing the intermeshing coupling elements against water leakage. Since the sealing fins are pressed against the coupling elements during use, it is necessary that the coupling elements be
20 firmly attached to the stringer tapes for protection against unwanted displacement or tilting under usage, which would lower the water-resistant capability and make the slide fastener malfunction. Attempts to attach the coupling elements too securely to the stringer tape, however, would
25 render the slide fastener less flexible than required, resulting in the danger for the interdigitating coupling

elements to get separated or broken apart.

According to the present invention, there is provided a slide fastener stringer comprising:

- (a) an elongate stringer tape having a respective first
5 resilient and water-resistant layer on each surface thereof;
- (b) a row of coupling elements mounted on a longitudinal marginal edge of said stringer tape;
- (c) a second respective resilient and water-resistant layer
mounted on each surface of said stringer tape along said row of
10 coupling elements and integral with the respective first resilient and water-resistant layer, said second resilient and water-resistant layer having portions each interconnecting adjacent ones of said coupling elements and each including a slot, respectively, extending transversely of said stringer tape; and
- 15 (d) a resilient and water-resistant marginal fin projecting laterally from said longitudinal marginal edge of said stringer tape and lying on the plane of said tape.

One believed possibility of the present invention is to provide a water-resistant slide fastener stringer having coupling elements
20 securely attached to a stringer tape along a longitudinal edge thereof.

Another believed possibility of the present invention is to provide a water-resistant slide fastener stringer which is relatively flexible but ensures secure coupling engagement between mating rows
25 of coupling elements against the latter's

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being accidentally separated or broken apart when forcibly bent over or subjected to a transverse thrusting force.

Still another believed possibility of the invention is to provide a water-resistant slide fastener stringer in which 5 leg portions of each coupling element is covered by water-resistant elastomer with the uppermost and lowermost faces of the leg portions left not covered so that the inner walls of the slider can contact only such exposed or non-covered portions of the coupling elements, thus causing 10 smooth movement of the slider.

The invention will be described by way of example with reference to the accompanying drawings in which a preferred embodiment of the present invention is shown by way of illustrative example. In the drawings:-

15 Figure 1 is a fragmentary perspective view of a water-resistant slide fastener stringer;

Figure 2 is a perspective view of a coupling element on the slide fastener stringer shown in Figure 1;

20 Figure 3 is a fragmentary plan view of a pair of intermeshing water-resistant slide fastener stringers;

Figure 4 is a cross-sectional view taken along line IV - IV of Figure 3;

Figure 5 is a cross-sectional view taken along line V - V of Figure 4; and

25 Figure 6 is a front elevational view of the water-resistant slide fastener stringer illustrated in Figure 1.

The present invention is particularly useful when

embodied in a slide fastener stringer generally designated by the reference numeral 10 in Figure 1.

The slide fastener stringer 10 includes an elongate stringer tape 11 composed of a woven or knit web core 12 having a longitudinal beaded edge 13. The web core 12 is covered with face and back layers 14, 15 respectively of resilient and water-resistant elastomer such as natural or synthetic rubber, the layers 14, 15 being coated or extrusion-molded on the web core 12. The stringer tape 11 also has a sealing fin 16 projecting from the beaded edge 13 and lying in the plane of the stringer tape 11, the sealing fin 16 being made of the same material as that of the layers 14, 15 and thin so as not to impair the flexibility of the stringer 10. In the particular embodiment the sealing fin 16 is thinner than the web core 12.

A row of coupling elements 17 are mounted on the web core 12 across the beaded edge 13, the coupling elements 17 being formed of either synthetic resin by extrusion molding or metal by die casting. As illustrated in Figure 2, each of the coupling elements 17 comprises a pair of upper and lower halves 18, 19 slightly displaced from each other in the longitudinal direction of the stringer tape 11 and clamped on the marginal edge of the stringer tape 11 including the beaded edge 13. Each of the upper and lower halves 18, 19 includes a wide (that is, wide in the longitudinal direction of stringer 10) leg portion 20 placed on the stringer tape 11; a narrower neck portion 21 projecting from the leg portion 20 beyond the beaded edge 13, and a

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round coupling head 22 joined to the neck portion 20. Each coupling element half 18, 19 also includes a rear tongue 23 disposed on the web core 12 and extending away from the coupling head 22. Each wide leg portion 20 has, 5 in an upper surface thereof remote from the stringer tape 11, a pair of lateral recesses 24, 25 and a groove 26 extending across between the lateral recesses 24, 25. Each rear tongue 23 also has a pair of lateral recesses 27, 28 (Figure 3) in an upper surface thereof which define 10 shoulders engaged by the layers 14, 15.

As illustrated in Figures 1 and 5, the wide leg portions 20 on each stringer tape surface are covered with a respective elongate layer 29 integral with one of the layers 14, 15 and having portions 30 disposed in the lat- 15 eral recesses 24, and the groove 26 and portions 31 interconnecting adjacent coupling elements 17. The layer 29 laterally extends beyond the beaded tape edge 13 and terminates at the narrower neck portion 21 of the coupling elements 17. The layer 29 is made of the same material as 20 that of the layers 14, 15 and has a thickness slightly smaller than that of exposed portions 17a of each coupling element 17. Each of the interconnecting portions 31 has a lateral slot 32 extending transversely of the stringer tape 11.

25 In use, the coupling elements 17 of two slide fastener stringers 10, 10 are coupled together as shown in Figure 3 by a slider 33, during which time the inner walls of the slide 33 contact only the exposed portions 17a

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of the coupling elements 17. After the slide fastener 10 has been closed by the slider 33, the sealing fins 16 of the stringers 10, 10 are pressed edgewise against peripheral surfaces of the coupling heads 22 of the opposite
5 coupling elements 17, thus providing a hermetic seal between the mating slide fastener stringers 10, 10 against water leakage therebetween.

With the layers 24, 25 and the layers 29 integrally coated or extrusion-molded on the web core 12 and the rows
10 of coupling elements 17, 17, the coupling elements 17 17 are securely fastened to the web core 12 against accidental displacement. Though the layers 29 are mounted on the coupling elements 17, the stringer 10 remains relatively flexible because of the slots 32 defined in the layers 29.
15 Figure 6 shows the manner in which the stringer 10 flexes when subjected to an external bending force. When the stringer 10 is bent, the slots 32 on the convex side of the stringer 10 spread open while those on the concave side become narrowed, thus assisting the stringer 10 in
20 flexing relatively easily with a small force applied. Further, since the uppermost and lowermost faces 17a of the element leg portions are left not covered with the layer 29, it follows that the inner walls of the slider 33 can contact only such exposed portions 17a of the coupling elements 17,
25 thus causing smooth movement of the slider 33.



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CLAIMS:-

1. A slide fastener stringer comprising:

(a) an elongate stringer tape having a respective first resilient and water-resilient layer on each surface thereof;

5 (b) a row of coupling elements mounted on a longitudinal marginal edge of said stringer tape;

(c) a second respective resilient and water-resistant layer mounted on each surface of said stringer tape along said row of coupling elements and integral with the respective first resilient and water-resistant layer, said second resilient and water-resistant
10 layer having portions each interconnecting adjacent ones of said coupling elements and each including a slot, respectively, extending transversely of said stringer tape; and

(d) a resilient and water-resistant marginal fin projecting laterally from said longitudinal marginal edge of said stringer tape
15 and lying in the plane of said tape.

2. A slide fastener stringer according to Claim 1, each of said coupling elements having uppermost and lowermost portions left not covered with said second resilient and water-resistant layer so that said uppermost and lowermost portions of said coupling elements can
20 contact inner walls of a slider.

3. A slide fastener stringer according to Claim 1, each

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of said coupling elements comprising a pair of members mounted respectively said surfaces of said stringer tape, each of said members having a leg portion placed on said longitudinal marginal edge, a neck portion extending from
5 said leg portion beyond said longitudinal marginal edge, and a coupling head contiguous to said neck portion, said leg portion having a pair of lateral recesses in a surface thereof remote from said stringer tape, said coupling element-covering portions of said second resilient and
10 water-resistant layer being disposed in said lateral recesses.

4. A slide fastener stringer according to Claim 3, said leg portion also having a groove extending across between said lateral recesses, said second resilient and
15 water-resistant layer having a portion disposed in each said groove.

5. A slide fastener stringer according to Claim 3, each of said members also having a tongue portion extending away from said coupling head and having shoulders
20 engaged by one of said first resilient and water-resistant layers.
