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WATERTIGHT SLIDE FASTENER STRINGER

The present invention relates to slide fasteners, and more particularly to a watertight slide fastener stringer.

Watertight slide fastener stringers are known
5 which generally comprise a single support tape made of a water-tight soft material, and a row of discrete coupling elements mounted on the tape along an inner longitudinal edge portion thereof; such tape margin is folded so as to provide therealong a contact portion
10 engageable with a corresponding contact portions of a like companion stringer to effect a watertightness between the two stringers. When the apposed coupling element rows of the two stringers are interengaged by a slider to close the watertight slide fastener, the
15 opposed contact portions are brought into contact with one another. The common problem with this type of watertight stringer is that the interengaged individual coupling elements are subjected to rolling or tilting due to undue stress induced by lateral pulling forces
20 exerted on the tapes and by thrusting forces exerted on the coupling element rows. This rolling of the

coupling elements impairs the contact between the opposed contact portions, thus causing insufficient watertightness between the opposed stringers. Japanese Utility Model Publication (Jikkosho) 53-42161, issued October 12, 1978, is believed to exemplify the prior art.

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

(a) a support tape made of a watertight soft material and having a first folded-over edge portion and a first contact portion contiguous thereto and engageable with a corresponding first contact portion of a support tape of a like companion stringer to effect a watertightness between such two support tapes, said first folded-over portion being substantially parallel to, but spaced from, the plane of the tape apart from said first folded-over portion and said first contact portion;

(b) an auxillary tape made of a watertight soft material and having a second folded-over edge portion parallel to, but spaced apart from, said first folded-over edge portion, and a second contact portion substantially coplanar with, but spaced apart from, said first contact portion and engageable with a corresponding second contact portion of an auxillary tape of the companion stringer to effect a watertightness between such two auxillary tapes; and

(c) a row of discrete coupling elements mounted on and along said first and second folded-over edge portions, each of said coupling elements having

(1) a base disposed remotely from said first and second contact portions and substantially perpendicular to said plane of the tape apart from said portions thereof,

(2) a neck extending from said base in a direction which is parallel to said plane and perpendicular to the longitudinal axis of the stringer, the neck being disposed between said first and second folded edge portions,

(3) a coupling head extending from said neck beyond said first and second contact portions, and

(4) first and second legs extending from opposite ends of said base in the same direction as said neck and terminating in first and second flanges, respectively, lying parallel to said base and disposed

on respective inner surfaces of said first and second contact portions so as to hold said first and second folded-over edge portions between said first leg and said neck and between the latter and said second leg, respectively.

5 A believed possibility of the present invention is to provide a watertight slide fastener stringer which enables efficient and reliable watertightness between the opposed companion stringers.

10 Another believed possibility of the present invention is to a watertight slide fastener stringer which enables smooth movement of a slider.

The invention will be described by way of example with reference to the accompanying drawings in which a preferred embodiment

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of the present invention is shown by way of illustrative example. In the drawings:-

Figure 1 is a perspective view of a coupling element for a watertight slide fastener stringer
5 embodying the present invention;

Figure 2 is a fragmentary plan view, partly in longitudinal cross section, of the watertight slide fastener stringer;

Figure 3 is a fragmentary transverse cross
10 sectional view of the stringer;

Figure 4 is a fragmentary plan view, partly in longitudinal cross section, of the stringer of Figures 2 and 3, showing the same having been interengaged with a like companion stringer; and

15 Figure 5 is a fragmentary transverse cross-sectional view of the opposed companion stringers of Figure 4.

The present invention is particularly useful when embodied in a watertight slide
20 fastener stringer (hereinafter referred to as "stringer") such as shown in Figures 2 and 3, generally indicated by the numeral 20.

The stringer 20 includes a support tape 7 made of a watertight soft material such as natural or
25 synthetic rubber, or made of natural or synthetic fibers coated with such a watertight material. The tape 7 has an inner longitudinal margin folded through

its whole length so as to provide a first folded-over edge portion 7a and a first contact portion 7b contiguous thereto. The folded-over edge portion 7a is parallel to but spaced from the plane 13 of the slide fastener stringer 20, that is to say, the plane of the tape 7 apart from portions 7a and 7b. The portion 7b joins portion 7a to the rest of the tape 7. An auxillary tape 8, which is made of the same watertight material as the support tape 7 and coextends lengthwise therewith, has a second folded-over edge portion 8a and a second contact portion 8b. The first and second folded-over edge portion 7a, 8a are parallel to, but spaced apart from, one another, whilst the first and second contact portions 7b, 8b are substantially coplanar with, but spaced apart from, one another. Alternatively, the auxillary tape 8 may be an integral part of the support tape 7. The first and second contact portions 7a, 8a are adapted to engage corresponding first and second contact portions 7'a, 8'a, respectively, of a like companion stringer 20' (Figures 4 and 5), to effect a watertightness between the two stringers 20, 20'.

A first core thread 9 coextends lengthwise with the support tape 7 and is attached to the first folded-over edge portion 7a. Likewise, a second core thread 10 coextends lengthwise with the auxillary tape 8 and is attached to the second folded-over edge portion 8a.

A row of discrete coupling elements 1 is mounted on and along the first and second folded-over edge portions 7a, 8a of the tapes 7, 8; each coupling element 1 has a base 2, a neck 6, a coupling head 5, and first and second legs 3a, 3b. The base 2 is disposed remotely

from the first and second contact portion 7b, 8b and substantially perpendicular to the plane 13. The neck 6 extends centrally from the base 2 in a direction which is parallel to the plane 13 and perpendicular to the longitudinal axis 14 of the stringer 20, the neck 6 being disposed between the first and second folded edge portions 7a, 8a. The coupling head 5, in the form of an enlarged portion, extends from the neck 6 beyond the first and second contact portions 7b, 8b. The first and second legs 3a, 3b extend from opposite ends of the base 2 in the same direction as the neck 6 so as to hold tightly the first and second folded edge portions 7a, 8a between the first leg 3a and the neck 6 and between the latter and the second leg 3b, respectively.

The first and second legs 3a, 3b terminates in first and second flanges 4a, 4b respectively, disposed on the respective back surfaces of the first and second contact portions 7b, 8b. Each of the first and second flanges 4a, 4b has inner or outer sections projecting in opposite directions from a respective one of the first and second legs 3a, 3b. The first and second core threads 9, 10 are disposed between the inner section of the first flange 4a and the base 2 and between the inner section of the second flange 4b and the base 2 respectively. The inner flange sections serve to assist in holding the folded edge portions and the core threads in place between the neck 6 and the legs 3a, 3b. The outer flange sections serve as guide rails for a slider 11 (Figure 5).

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The slider 11 has in its inner wall 12 a longitudinal groove 13 for the passage therethrough of the outer sections of the second flanges 4b, 4'b and the outer halves of the second contact portions 8b, 8'b.

5 When the opposed rows of coupling elements 1, 1' of the two companion stringers 20, 20' (Figures 4 and 5) are interengaged by the slider 11 to close the watertight slide fastener, the opposed first contact portions 7b, 7'b are pressed against one another to
10 effect a watertight between the opposed support tapes 7, 7' and, likewise the opposed second contact portions 8b, 8'b are pressed against one another to effect a watertightness between the opposed auxiliary tapes 8, 8'. During this interengagement, the slider 11 slides
15 on outer surfaces 4c, 4'c of the first flanges 4a, 4'a and also on outer surfaces 4d, 4'd of the second flanges 4b, 4'b.

 With the watertight slide fastener thus in closed position, when lateral pulling forces are
20 exerted on the opposed support tapes 7, 7', or when a thrusting force is exerted on the interengaged coupling element rows 1, 1', the opposed individual coupling elements 1, 1' roll or tilt so as to allow reduced tightness between the opposed first contact portions
25 7b, 7'b. At the same time this rolling of the coupling elements 1, 1' causes the opposed second contact portions 8b, 8'b to be pressed against one other with

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increased tightness thus maintaining efficient and reliable watertightness between the opposed companion stringers 20, 20'.

5 With the watertight slide fastener stringer 20, since the support tape 7 and the auxiliary tape 8 are folded to virtually embrace the first and second flanges 4a, 4b, respectively, an improved watertightness can be achieved.

10 Another advantage of the watertight stringer 20 is that during interengagement of the opposed companion stringers 20, 20', the slider 11 is guided by the first flanges 4a, 4'a and also by the second flanges 4b, 4'b, thus guaranteeing smooth movement of the slider. Further, since the slider 11 does not touch either the support tape 7 or the auxiliary tape 8 during movement
15 along the opposed coupling element rows 1, 1', these tapes 7, 8 are free from being easily worn or otherwise damaged, thus guaranteeing reliable slide-fastener functions and efficient water-tightness for a long
20 period of time.

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CLAIMS:-

1. A watertight slide fastener stringer comprising:

(a) a support tape made of a watertight soft material and having a first folded-over edge portion and a first contact portion contiguous thereto and engageable with a corresponding first contact portion of a support tape of a like companion stringer to effect a watertightness between such two support tapes, said first folded-over portion being substantially parallel to, but spaced from, the plane of the tape apart from said first folded-over portion and said first contact portion;

(b) an auxillary tape made of a watertight soft material and having a second folded-over edge portion parallel to, but spaced apart from, said first folded-over edge portion, and a second contact portion substantially coplanar with, but spaced apart from, said first contact portion and engageable with a corresponding second contact portion of an auxillary tape of the companion stringer to effect a watertightness between such two auxillary tapes; and

(c) a row of discrete coupling elements mounted on and along said first and second folded-over edge portions, each of said coupling elements having

(1) a base disposed remotely from said first and second contact portions and substantially perpendicular to said plane of the tape apart from said portions thereof,

(2) a neck extending from said base in a direction which is parallel to said plane and perpendicular to the longitudinal axis of the stringer, the neck being disposed between said first and second folded edge portions,

(3) a coupling head extending from said neck beyond said first and second contact portions, and



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(4) first and second legs extending from opposite ends of said base in the same direction as said neck and terminating in first and second flanges, respectively, lying parallel to said base and disposed on respective inner surfaces of said first and second contact portions so as to hold said first and second folded-over edge portions between said first leg and said neck and between the latter and said second leg, respectively.

2. A watertight slide fastener stringer according to claim 1, each of said first and second flanges having inner and outer sections projecting in opposite directions from a respective one of said first and second legs.

3. A watertight slide fastener stringer according to claim 2, said support and auxillary tapes having first and second core threads attached to said first and second folded-over edge portions, respectively, said first and second core threads being disposed between said base and said inner flange section of said first leg and between said base and said inner flange section of said second leg, respectively.

4. A watertight slide fastener stringer substantially as described with reference to and as illustrated in the accompanying drawings.

