

SPECIFICATION

Slide fastener stringer

The present invention relates to a slide fastener stringer; and more particularly to a woven slide fastener stringer having a row of coupling elements woven into a longitudinal edge of a stringer tape.

- 10 There have been proposed many slide fastener stringers including a woven stringer tape having a woven tube extending along one longitudinal edge of the tape, and a row of coupling elements each in the form of a
15 filamentary coil or convolution with a core therein, woven into the tube. One inherent problem with such slide fastener stringers is that the weft thread in the woven tube tends to be worn away by repeated frictional contact
20 with the slider under conditions in which the fastener stringers are transversely stretched with a lateral pull.

- An attempt to solve such a problem would be to use sliders so shaped as to reduce
25 friction in its sliding engagement with the weft thread in the woven tube. For example, a slider having a widened spacing between upper and lower guide flanges, or having rounded or tapered inside corners on the
30 guide flanges would be effective to prevent the weft thread from being rapidly abraded by repeated contact with such slider guide flanges. The proposed sliders, however, could endanger their ability to be smoothly or steadily
35 guided along a slide fastener chain.

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

- (a) a stringer tape woven of warp threads and a weft thread, and including a web and a
40 tube extending along one longitudinal edge of said web and having a tubular pocket;
(b) a row of coupling elements in the form of a continuous filamentary coil extending along and woven into said tube, said coupling
45 elements including a plurality of coupling heads and a plurality of connecting portions each interconnecting two adjacent coupling heads and disposed in said tubular pocket;
(c) a core extending longitudinally through
50 said coupling elements and held against said connecting portions in the interior of said coupling elements; and
(d) a pair of stuffer cords extending longitudinally through said tubular pocket and held
55 against said connecting portions at the exterior of said coupling elements, two of the warp threads in said tube being disposed respectively on said stuffer cords remotely from said connecting portions and serving as
60 a pair of respective corners for guiding a slide fastener slider, and at least two of the warp threads in said tube being of smaller diameter than the corner warp threads and disposed between the corner warp threads on portions
65 of said stuffer cords which are remote from

said connecting portions, thereby providing a recess disposed between said corner warp threads and opening away from said connecting portions, said weft thread having portions
70 interwoven with said smaller-diameter warp threads and held against said stuffer cords in said recess.

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

Figure 1 is a fragmentary plan view, partly cut away, of a slide fastener stringer embodying the present invention.

- Figure 2* is a cross-sectional view taken
80 along line II - II of Fig. 1;

Figure 3 is a cross-sectional view taken along line III - III of Fig. 1;

Figure 4 is a cross-sectional view taken along line IV - IV of Fig. 1.

- 85 *Figure 5* corresponds to Fig. 2, showing the slide fastener stringer which is transversely pulled;

Figure 6 is a cross-sectional view of a slide fastener stringer according to another embodiment of the present invention; and

Figure 7 is a cross-sectional view taken along line VII - VII of Fig. 6.

- Fig. 1 shows a woven slide fastener stringer
10 constructed in accordance with the present
95 invention, the slide fastener stringer 10 comprising a stringer tape 11 including a web 12 woven of a plurality of warp threads 13 and a weft thread 14 interwoven therewith in double picks. The stringer tape 11 also includes
100 an elongate tube 15 at one of its longitudinal edges, woven basically of a pair of spaced upper and lower groups of warp threads 16, 17 (Fig. 2) interwoven with double picks of the weft thread 14.

- As shown in Fig. 1, a row of coupling elements or convolutions 18 in the form of a continuous filamentary coil extends along and is woven into the woven tube 15 by the weft thread 14. The density of the weft thread 14
110 is two double picks per coupling element to coupling element pitch. Each of the coupling elements 18 includes a coupling head 19 and a connecting portion 20 interconnecting two adjacent coupling heads 19, the connecting portion 20 having an arcuate, rounded surface disposed in a tubular pocket 21 in the woven tube 15.

- A core 22 in the form of a textile cord extends longitudinally through the coiled coupling elements 18 and is held by the weft thread 14 against the connecting portions 20 in the interior of the coiled coupling elements
120 18.

- As best illustrated in Figs. 2 and 3, a pair
125 of upper and lower stuffer cords 23, 24 extend longitudinally through the tubular pocket 21 and are held against the connecting portions 20 at the exterior of the coupling elements 18. The tubular pocket 21 is substantially filled up with the connecting por-
130

tions 20, the core 22, and the pair of stuffer cords 23, 24, with the stuffer cords 23, 24 having surfaces which are jointly deformed in conformity with the arcuate, round surfaces of the connection portions 20. The coupling elements 18 are stably supported by the stuffer cords 23, 24 and the core 22 which jointly sandwich the connecting portions 20 in the woven tube 15.

- 10 A pair of upper and lower corner warp threads 25, 26 which are interwoven with the weft thread 14 and constitute part of the woven tube 15 are disposed respectively on the upper and lower stuffer cords 23, 24 at upper and lower portions of the woven tube 15 which are adjacent to the respective upper and lower groups of warp threads 16, 17 and remote from the connecting portions 20. The warp threads 25, 26 are of larger diameter than the warp threads 16, 17 in the woven tube 15. The upper and lower corner warp threads 25, 26 serve as a pair of respective guide corners for guiding a slide fastener slider 29 therealong.
- 25 A pair of upper and lower warp threads 27, 28 which also are interwoven with the weft thread 14 and constitute part of the woven tube 15 are of smaller diameter than the warp threads 25, 26 and are interposed between the warp threads 25, 26 on portions of the stuffer cords 23, 24 which are remote from the connecting portions 20.

The weft thread 14 has portions 30 interwoven with the warp threads 27, 28 and normally held against the stuffer cords 23, 24 by the corner warp threads 25, 26.

- The corner warp threads 25, 26 that have a larger diameter than the warp threads 27, 28 jointly provide a recess 31 therebetween opening away from the connecting portions 20 toward the tape web 12, in which recess 31 the portions 30 of the weft thread 14 are normally disposed out of contact with a pair of guide flanges 32, 33 of the slider 29.

- 45 The woven tube 15, being filled up with the stuffer cords 23, 24, the connecting portions 20 of the coupling elements 18, and the core 22, is tight and compact, and is prevented from collapsing under a force tending to stretch the fastener stringer 10 transversely, resulting in a tendency of the weft thread portions 30 to cling on to the stuffer cords 23, 24. The portions 30 of the weft thread 14 are normally held against the stuffer cords 23, 24, and even when subjected to a lateral pull, are held free from contact with the guide flanges 32, 33 of the slider 29 (Fig. 5).

- It has now been found that where the warp threads 16, 17 comprise yarns of 300-denier, the corner warp threads 25, 26 yarns of 600-denier, and the warp threads 27, 28 yarns of 150-denier, the weft thread portions 30 (Fig. 4) are effectively anchored on the stuffer cords 23, 24 by bulge portions 34 of the

corner warp threads 25, 26, and are held back in the recess 31 out of contact with the slider guide flanges 32, 33.

- The slider 29 is positively guided for smooth sliding movement by the corner warp threads 25, 26 without the guide flanges 32, 33 interfering with the weft thread portions 30 and the warp threads 27, 28, which are disposed in the recess 31 between the corner warp threads 25, 26.

- Even when the fastener stringers 10, 10 are transversely stretched apart with a lateral pull, the weft thread portions 30 are prevented from striking the slider guide flanges 32, 33 for the reason mentioned above and because the corner warp threads 25, 26 and warp threads 27, 28 distribute such lateral pull longitudinally of the woven tube 15 and tend to hold the weft thread portions 30 back into the recess 31. Therefore, the weft thread portions 30 engage the slider guide flanges 32, 33 only with a minimum of friction when the weft thread portions 30 have been forced out of the recess 31 under a severe lateral pull, with the result that the weft thread portions 30 are prevented from being rapidly worn away by frictional contact with the slider 29.

- A slide fastener stringer according to another embodiment shown in Figs. 6 and 7 differs from the first embodiment in that a pair of upper and lower warp threads 25, 26 that serve as a pair of respective corners for guiding a slide fastener slider are of substantially the same diameter as a pair of upper and lower groups of warp threads 37, 38 which form a woven tube 39. A pair of upper and lower groups of warp threads 40, 41 (eight in total number) are of less diameter than the corner warp threads 35, 36 and are interwoven with weft thread portions 42.

- It has been found that where the warp threads 35, 36, 37, 38 comprise yarns of 300-denier, and the warp threads 40, 41 yarns of 100-denier, the weft thread portions 42 are covered more densely by the warp threads 40, 41 to provide a compact structure behind a pair of stuffer cords 43, 44 for protection against frictional contact with a slider.

- Although preferred embodiments of the present invention have been shown and described in detail, it should be understood that many minor changes and modifications may be made therein without departing from the scope of the appended claims.

CLAIMS

1. A slide fastener stringer comprising:
 - (a) a stringer tape woven of warp threads and a weft thread, and including a web and a tube extending along one longitudinal edge of said web and having a tubular pocket;
 - (b) a row of coupling elements in the form of a continuous filamentary coil extending



15) 2
tions 20, the core 22, and the pair of stuffer
cords 23, 24, with the stuffer cords 23, 24
having surfaces which are jointly deformed in
conformity with the arcuate, round surfaces of
the connection portions 20. The coupling ele-
ments 18 are stably supported by the stuffer
cords 23, 24 and the core 22 which jointly
sandwich the connecting portions 20 in the
woven tube 15.

10 A pair of upper and lower corner warp
threads 25, 26 which are interwoven with the
weft thread 14 and constitute part of the
woven tube 15 are disposed respectively on
the upper and lower stuffer cords 23, 24 at
upper and lower portions of the woven tube
15 which are adjacent to the respective upper
and lower groups of warp threads 16, 17 and
remote from the connecting portions 20. The
warp threads 25, 26 are of larger diameter
than the warp threads 16, 17 in the woven
tube 15. The upper and lower corner warp
threads 25, 26 serve as a pair of respective
guide corners for guiding a slide fastener
slider 29 therealong.

25 A pair of upper and lower warp threads 27,
28 which also are interwoven with the weft
thread 14 and constitute part of the woven
tube 15 are of smaller diameter than the warp
threads 25, 26 and are interposed between
the warp threads 25, 26 on portions of the
stuffer cords 23, 24 which are remote from
the connecting portions 20.

The weft thread 14 has portions 30 inter-
woven with the warp threads 27, 28 and
normally held against the stuffer cords 23, 24
by the corner warp threads 25, 26.

The corner warp threads 25, 26 that have a
larger diameter than the warp threads 27, 28
jointly provide a recess 31 therebetween
opening away from the connecting portions
20 toward the tape web 12, in which recess
31 the portions 30 of the weft thread 14 are
normally disposed out of contact with a pair
of guide flanges 32, 33 of the slider 29.

45 The woven tube 15, being filled up with
the stuffer cords 23, 24, the connecting por-
tions 20 of the coupling elements 18, and the
core 22, is tight and compact, and is pre-
vented from collapsing under a force tending
to stretch the fastener stringer 10 trans-
versely, resulting in a tendency of the weft
thread portions 30 to cling on to the stuffer
cords 23, 24. The portions 30 of the weft
thread 14 are normally held against the stuf-
fer cords 23, 24, and even when subjected to
a lateral pull, are held free from contact with
the guide flanges 32, 33 of the slider 29 (Fig.
5).

It has now been found that where the warp
threads 16, 17 comprise yarns of 300-denier,
the corner warp threads 25, 26 yarns of 600-
denier, and the warp threads 27, 28 yarns of
150-denier, the weft thread portions 30 (Fig.
4) are effectively anchored on the stuffer
cords 23, 24 by bulgin portions 34 of the

corner warp threads 25, 26, and are held
back in the recess 31 out of contact with the
slider guide flanges 32, 33.

The slider 29 is positively guided for
smooth sliding movement by the corner warp
threads 25, 26 without the guide flanges 32,
33 interfering with the weft thread portions
30 and the warp threads 27, 28, which are
disposed in the recess 31 between the corner
warp threads 25, 26.

Even when the fastener stringers 10, 10 are
transversely stretched apart with a lateral pull,
the weft thread portions 30 are prevented
from striking the slider guide flanges 32, 33
for the reason mentioned above and because
the corner warp threads 25, 26 and warp
threads 27, 28 distribute such lateral pull
longitudinally of the woven tube 15 and tend
to hold the weft thread portions 30 back into
the recess 31. Therefore, the weft thread
portions 30 engage the slider guide flanges
32, 33 only with a minimum of friction when
the weft thread portions 30 have been forced
out of the recess 31 under a severe lateral
pull, with the result that the weft thread
portions 30 are prevented from being rapidly
worn away by frictional contact with the slider
29.

A slide fastener stringer according to
another embodiment shown in Figs. 6 and 7
differs from the first embodiment in that a
pair of upper and lower warp threads 25, 26
that serve as a pair of respective corners for
guiding a slide fastener slider are of substan-
tially the same diameter as a pair of upper
and lower groups of warp threads 37, 38
which form a woven tube 39. A pair of upper
and lower groups of warp threads 40, 41
(eight in total number) are of less diameter
than the corner warp threads 35, 36 and are
interwoven with weft thread portions 42.

It has been found that where the warp
threads 35, 36, 37, 38 comprise yarns of
300-denier, and the warp threads 40, 41
yarns of 100-denier, the weft thread portions
42 are covered more densely by the warp
threads 40, 41 to provide a compact structure
behind a pair of stuffer cords 43, 44 for
protection against frictional contact with a
slider.

Although preferred embodiments of the pre-
sent invention have been shown and de-
scribed in detail, it should be understood that
many minor changes and modifications may
be made therein without departing from the
scope of the appended claims.

CLAIMS

1. A slide fastener stringer comprising:
 - (a) a stringer tape woven of warp threads
and a weft thread, and including a web and a
tube extending along one longitudinal edge of
said web and having a tubular pocket;
 - (b) a row of coupling elements in the form
of a continuous filamentary coil extending



16

along and woven into said tube, said coupling elements including a plurality of coupling heads and a plurality of connecting portions each interconnecting two adjacent coupling heads and disposed in said tubular pocket;

(c) a core extending longitudinally through said coupling elements and held against said connecting portions in the interior of said coupling elements; and

- 10 (d) a pair of stuffer cords extending longitudinally through said tubular pocket and held against said connecting portions at the exterior of said coupling elements, two of the warp threads in said tube being disposed
- 15 respectively on said stuffer cords remotely from said connecting portions and serving as a pair of respective corners for guiding a slide fastener slider, and at least two of the warp threads in said tube being of smaller diameter
- 20 than the corner warp threads and disposed between the corner warp threads on portions of said stuffer cords which are remote from said connecting portions, thereby providing a recess disposed between said corner warp
- 25 threads and opening away from said connecting portions, said weft thread having portions interwoven with said smaller-diameter warp threads and held against said stuffer cords in said recess.

30 2. A slide fastener stringer according to Claim 1, said tubular pocket being substantially filled up jointly with said connecting portions, said core and said stuffer cords, whereby said tube is tight and compact.

35 3. A slide fastener stringer according to Claim 1, said corner warp threads comprising yarns of 600-denier, and said smaller-diameter warp threads being provided in a pair and comprising yarns of 150-denier.

40 4. A slide fastener stringer according to Claim 1, said corner warp threads comprising yarns of 300-denier, and said smaller-diameter warp threads being provided in eight in number and comprising yarns of 100- to 150-

45 denier.

5. A slide fastener stringer substantially as hereinbefore described with reference to the accompanying drawings.