

[54] SLIDE-FASTENER STRINGER WITH
STITCHED-ON COUPLING ELEMENT

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[58] Field of Search ...24/205.16, 205.16 C, 205.1 C,
24/205.13 C, 205.1; 112/265, 205, 262, 25;
2/265, 275, 274

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[57] ABSTRACT

A slide-fastener stringer has a pair of warp-knit sup-
port tapes with longitudinally running wales separated
by valleys. A coupling element is stitched to each tape
adjacent the edge thereof with rows of stitching
passing through the tape only in the valley adjacent
one of the edge wales thereof. In the case of a very
fine knit, the stitching lies in the second valley in from
the tape edge. The edge wale is reinforced for best
holding action by knitting it with a relatively dense or
bulky yarn.

4 Claims, 3 Drawing Figures

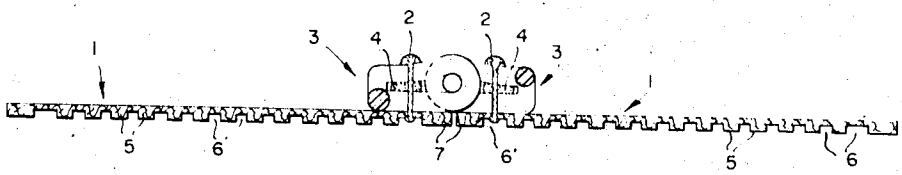


FIG. 1

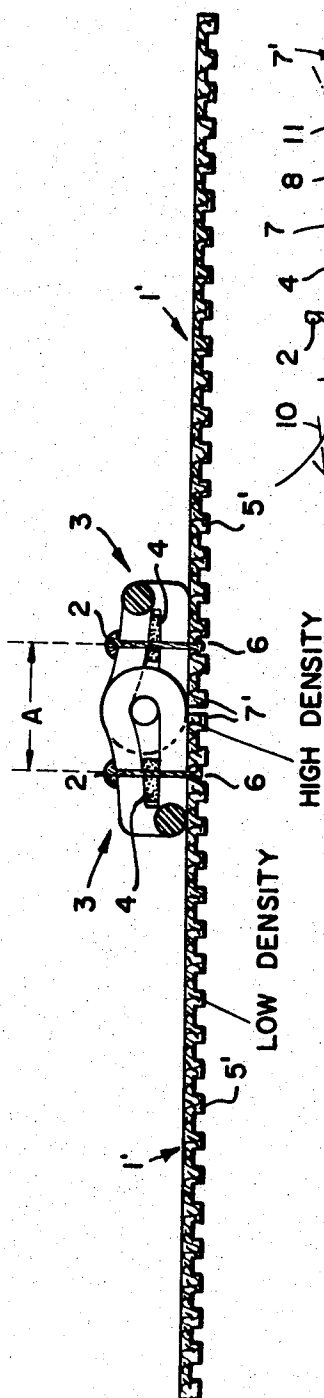
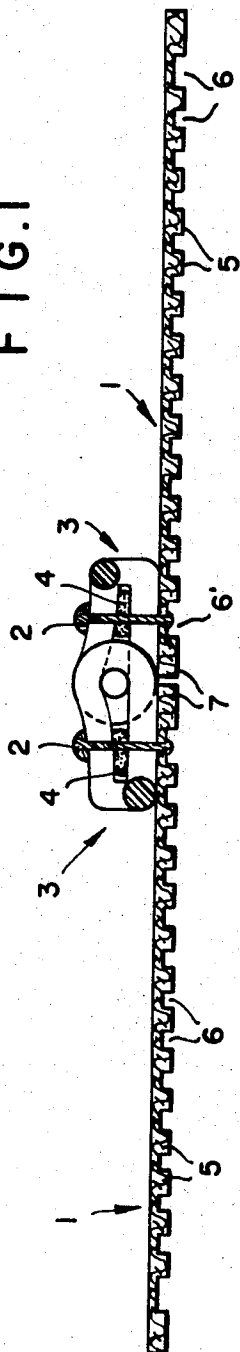


FIG. 2

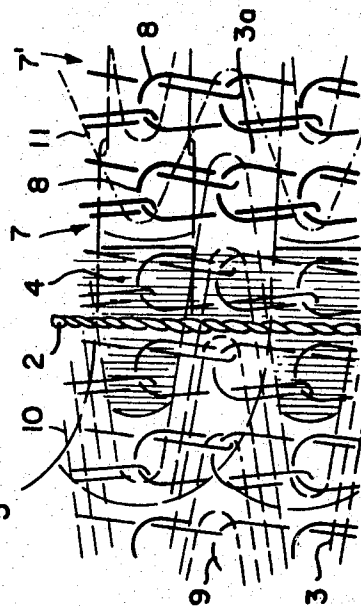


FIG. 3

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SLIDE-FASTENER STRINGER WITH STITCHED- ON COUPLING ELEMENT

FIELD OF THE INVENTION

The present invention relates to a slide-fastener stringer comprising a pair of parallel support tapes carrying on their confronting edges a pair of interengageable coupling elements.

BACKGROUND OF THE INVENTION

The tapes of such stringers are usually woven and the elements are synthetic-resin coils stitched to these tapes. It has been considered virtually impossible to use knit tapes since they are usually so elastic that the elements fastened thereto are not held stiffly enough to ensure good closure. It has further been found difficult to fasten the elements securely adjacent the edges of the tapes to prevent mutual slipping which would cause the spaces between the coupling heads to spread and therefore allow the fastener to open.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide an improved slide-fastener stringer.

Another object of this invention is to provide an improved method of fastening a coupling element to a support tape.

SUMMARY OF THE INVENTION

The above objects are attained, according to the present invention, by a slide-fastener stringer comprising a pair of warp-knit support tapes having longitudinally extending wales separated by valleys on which are sewn a pair of interengageable coupling elements with the rows of stitching engaging over the coupling elements and passing through the tapes only in the valley adjacent an edge band thereof, which band is formed by one or two edge wales. Owing to the ladder-like way in which the weft filaments cross the valleys in a warp knit, the stitching cannot slip to any noticeable extent. At the same time the stitching tends to rigidify the edges of the tapes so that the normally inelastic warp knit is made even stiffer, while the reinforced edge bands impart a regular thickness to the tapes and make displacement of the slider very easy. In the case of fine knits, the stitching is passed through the valley which is located two wales inwardly from the tape edge, so that in this case the edge band is formed by a pair of wales.

In all cases the edges of the tapes abut with the fastener closed in the finished product so that a very stable closure is obtained. The stitching described above holds the coupling element on the tape in a very secure manner.

In our concurrently filed and commonly assigned application Ser. No. 82,327 there is disclosed a slide-fastener stringer comprising a pair of elongated warp-knit support tapes having confronting longitudinal edges, each tape constituted of a plurality of transversely offset longitudinally extending warp chains and laid-in weft filaments transversely connecting the chains to form a warp-knit foundation, and respective elongated continuous coupling elements interconnectable upon movement of a slider therealong and lying along the confronting edges and secured thereto.

In such a stringer the weft filament is laid in a 4—4/0—0 pattern and the warp filament is chained in a 0—1/1—0 pattern, or a 2—0/0—2 pattern, or a pair of such warp filaments are provided, one chained in a 0—1/1—0 pattern and the other in a 2—0/0—2 pattern.

The tapes of this stringer are formed with stitching holes for attachment of the coupling elements and its weft filaments are voluminous textured (bulk) yarn.

That application also discloses a method of making a slide-fastener stringer comprising the steps of forming a plurality of transversely offset longitudinally extending warp chains, laying into these chains a plurality of weft filaments to form a pair of warp-knit foundation tapes, securing an elongated coupling element to the confronting edges of the tapes, and thermally fixing the tapes.

Our commonly filed and assigned application Ser. No. 82,326 discloses a slide-fastener stringer comprising a pair of interengageable coupling elements each having a multiplicity of turns, a pair of warp-knit support tapes having wale-forming warp filaments and course-forming weft filaments, and a succession of stitches passing between the turns and through the tapes and securing the elements to the confronting edges of the tapes, the stitches having a stitch length greater than the course width. These stitches pass through the tapes between the wales, and the stitch length is an integral multiple of the course width, e.g., equal to twice the course width. The weft filaments are laid in a 4—4/0—0 pattern and at least some warp filaments are chained in a 0—1/1—0 pattern while other warp filaments are chained in a 2—0/0—2 pattern. The warp and weft filaments are of greater bulk adjacent the edges than remote therefrom. The wales are on one face of the tapes, the other face being smooth and engaging the coupling elements.

Our commonly filed and assigned application Ser. No. 82,325 now U.S. Pat. No. 3,685,474, discloses a method of making a slide-fastener stringer comprising the steps of simultaneously forming a pair of parallel fabric tapes and joining same together at their confronting edges by at least one connecting filament, thereafter simultaneously attaching one of a pair of interengageable coupling elements to each of the confronting edges, and breaking the connecting filament to separate the tapes. These tapes are warp knit by forming a plurality of longitudinally extending wale-forming warp chains from a plurality of warp filaments and laying into the chains a plurality of course-forming weft filaments. The weft filaments are spanned across at least three wales and the tapes are also knit with second warp filaments chained in opposition to the first warp filaments while at least one of the filaments which comes to the edge of the tapes is reinforced. That application also describes a method as above wherein there is the additional step of tensioning the connecting filaments more tightly than the warp and weft filaments to form a succession of openings in the tapes between the wales adjacent the confronting edges, whereby breaking the connecting filament separates the tapes and substantially closes the openings. The elements are attached by sewing with stitches passing through the openings or the elements are attached to the tapes by passing their coupling heads through the openings. The connecting filament may be spanned over only two

courses so that the openings are formed adjacent the edge wales of the tapes. Four such tapes can be knit interconnected by three such connecting filaments, so that the method further comprises the step of cutting the central filament prior to attachment of two pairs of interengageable coupling elements to the two joined pairs of tapes thus formed.

DESCRIPTION OF THE DRAWING

The above principles, objects, features and advantages will become apparent from the following description, reference being made to the accompanying drawing, in which:

FIG. 1 is a cross section through a stringer according to the present invention;

FIG. 2 is a cross section through another stringer according to the present invention; and

FIG. 3 is a top view in greatly enlarged scale of a detail of FIG. 2.

SPECIFIC DESCRIPTION

There is shown in FIG. 1 a pair of warp-knit tapes 1 on which are mounted coupling elements 3 fastened by stitching 2 passing through a filler cord 4. Each of the elements 3 is a nylon coil formed with coupling heads 3a (see FIG. 3). The tapes 1 have on their undersides wales 5 separated by valleys 6 and at their confronting edges thickened edge bands 7 which are formed during knitting of the tape by feeding a doubled or bulk yarn to the guide responsible for the edge wale. The stitching 2 lies in the valley 6' directly adjacent the band 7 with the elements 3 lying on the smooth side of the tapes 1.

The stringer shown in FIGS. 2 and 3 has structure which, when identical to that of FIG. 1, is given the same reference numerals as in that Figure. Tapes 1' here are of much finer knit than those of FIG. 1 and have smaller wales 5' and intervening valleys. The edge band 7' is formed by wales of high density—made with a stronger yarn—than the other wales 5'. In such a stringer, in order to secure the elements 3 far enough back from the tape edges, the stitching 2 must lie in the valley 6 which is two valleys in from the tape edge.

Thus, the two rows of stitching 2 are separated by a distance A equal to the width of four wales and two valleys.

FIG. 3 shows how the warp chains forming the wales are constituted by warp filaments 8 and 9, chained in a 1-0/0-1 pattern, while laid into them are weft filaments 10 in a 4-4/0-0 pattern. The code for these patterns is discussed in the book *Advanced Knitting Principles* edited by Charles Reichman (National Knitted Outerwear Association, 1964), chapters 26 and 30.

There is also shown in FIG. 3 a connecting filament 11 which is laid in with a 2-2/0-0 pattern between the two reinforced warp chains formed by the filaments 8. This filament 11 is tensioned during knitting of the two tapes 1 so that the edge wale or wales are pulled away from the rest of the tapes, thereby forming large valleys which make it easy to sew on the elements 3. After attachment of these elements 3 the filament 11 is broken and the large valleys contract around the stitching.

We claim:

1. A slide-fastener stringer comprising:

a pair of interengageable coupling elements;
a pair of parallel warp-knit support tapes having longitudinally extending parallel wales including at least one wale defining a band along the edge of said tape separated from the rest of said wales by a valley;

respective rows of stitching each engaging over one of said elements and passing through the respective one of said tapes only in its said valley for securing said elements to said tapes; and
connecting filament extending between the edge bands of said pair of tapes and tensioned to broaden said valleys, thereby facilitating stitching of said elements to said tapes.

2. The stringer defined in claim 1 wherein the edge band is formed by a single wale constituted largely from a reinforced warp filament.

3. The stringer defined in claim 1 wherein the edge band is formed by a pair of wales.

4. The stringer defined in claim 1, further comprising a smooth face on each of said of said tapes, each of said elements being attached to a respective smooth face.

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