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Yoshikawa

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[54] **CONTINUOUS COUPLING ELEMENT FOR SLIDE FASTENERS**

[75] Inventor: **Kiichi Yoshikawa,** Toyonaka, Japan

[73] Assignee: **Yoshida Kogyo K.K.,** Tokyo, Japan

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **24/205.16 C;** 24/205.13 C

[51] **Int. Cl.²** **A44B 19/12**

[58] **Field of Search** ..... 24/205.13 C, 205.1 C, 24/205.16 C

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Primary Examiner—Bernard A. Gelak

Attorney, Agent, or Firm—Bucknam and Archer

[57] **ABSTRACT**

A continuous coupling element consists of an elongated filament of a synthetic resin or the like which is wound substantially helically to provide a multiplicity of turns with a row of spaced apart coupling heads formed along one longitudinal side thereof. Each of the turns further includes first and second shanks which when seen in a plan view, are curved arcuately in opposite directions, in such a manner that the first shanks of the respective turns partly overlap the second shanks of the preceding (or succeeding) turns and are connected to the second shanks of the succeeding (or preceding) turns via arcuate bights remote from the coupling heads. The continuous coupling element is to be fastened to one surface of a stringer tape as by a row of stitches extending along the overlapping portions of the first and second shanks.

2 Claims, 6 Drawing Figures

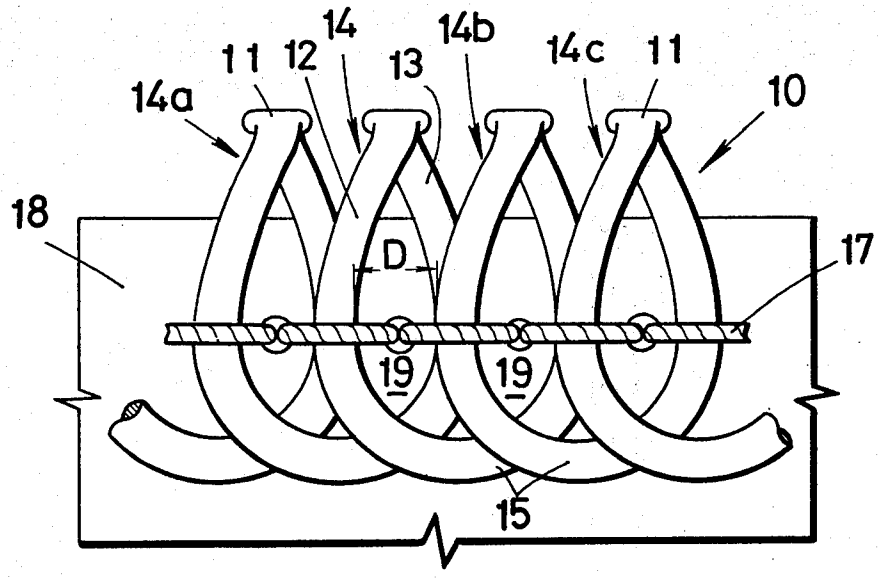


FIG. 1

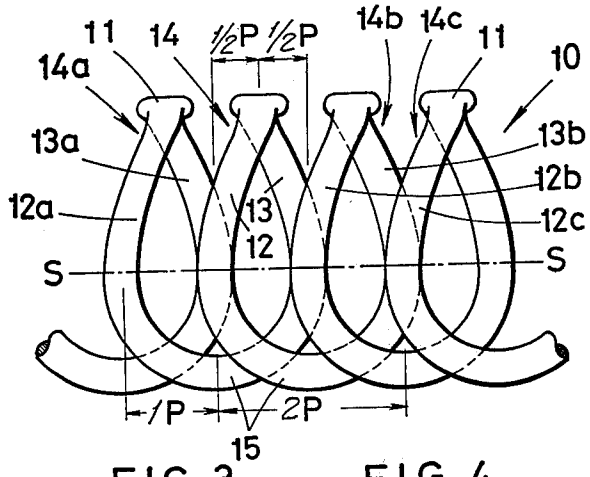


FIG. 2

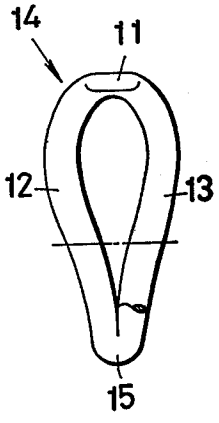


FIG. 3

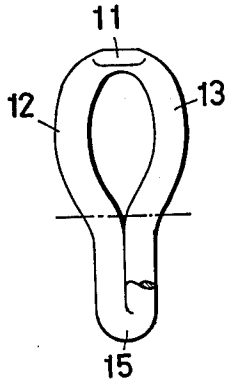


FIG. 4

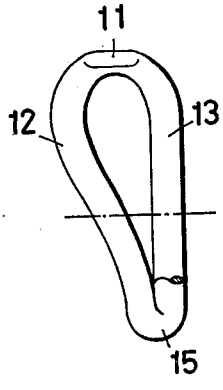


FIG. 5

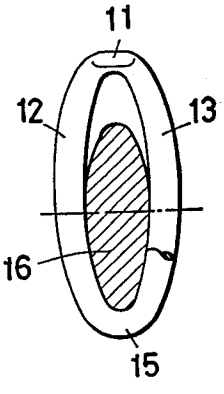
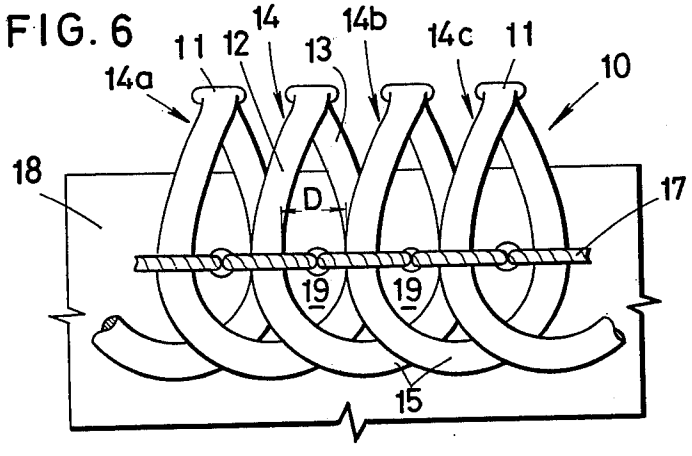


FIG. 6



CONTINUOUS COUPLING ELEMENT FOR SLIDE FASTENERS

BACKGROUND OF THE INVENTION

This invention relates generally to slide fasteners and more specifically to continuous coupling elements for slide fasteners of the so-called meandering or coil type which are anchored to respective stringer tapes as by rows of stitching.

Continuous coupling elements of the type mentioned are well known in the art. Usually, such coupling elements consist of elongated synthetic-resin monofilaments wound generally in the form of a helix which may be somewhat distorted so that each turn forms an ellipse, oval, teardrop, keyhole, or various other shapes. A row of spaced apart coupling heads are formed along one longitudinal side of the turns of such continuous coupling element so as to be interfittable with a similar row of heads of a complementary coupling element. Each turn of the continuous coupling element can be visuarized as a pair of legs or shanks interconnected on one side by the coupling head and, on the other side, joined by arcuate bights to a preceding and a succeeding turn respectively.

In the continuous coupling elements of the type under consideration, difficulties are encountered in relation to the maintenance of the desired pitch of the turns. These difficulties arise from the fact that according to the prior art, the desired interturn spacing is usually determined only by the bights interconnecting the shanks of the respective turns. However, in order to realize a high degree of coupling efficiency in slide fasteners, it is of absolute necessity that the individual turns of the continuous coupling elements be faithfully maintained in their predetermined relative positions on stringer tapes.

SUMMARY OF THE INVENTION

It is, therefore, an object of this invention to provide an improved continuous coupling element in the form of a substantially helically wound filament of a synthetic resin or the like, such that the turns of the filament can be strictly retained in their predetermined spaced apart positions on a stringer tape to make possible the provision of slide fasteners with a high degree of coupling efficiency.

Another object of the invention is to provide a continuous coupling element of the character described which can be easily and positively fastened to a stringer tape as by a conventional stitching technique.

With these objects in view, this invention provides a continuous coupling element comprising an elongated filament wound substantially helically to provide a plurality of turns each consisting essentially of first and second shanks interconnected by a coupling head. When viewed in a plan view, the first and second shanks of each turn are curved arcuately so as to bulge toward a preceding and a succeeding turn respectively. Thus the first shanks of the respective turns are arranged in partly overlapping relationship to the second shanks of the preceding (or succeeding) turns and are joined to the second shanks of the succeeding (or preceding) turns via bights located remote from the coupling heads. By thus relating the shanks of each turn to those of the adjacent turns, the positional stability of the turns of the coupling element can be remarkably augmented when the same is fastened to one surface of a stringer tape as by a row of stitches extending along the overlapping portions of the first and second shanks.

The features which are believed to be novel and characteristic of this invention are set forth in particular in the appended claims. The invention itself, however, as well as the additional objects and advantages thereof, will become apparent from the following description taken in conjunction with the accompanying drawings which illustrate, by way of example only, some preferred embodiments of the invention and in which like reference characters denote like parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of the continuous coupling element according to the novel concepts of this invention;

FIG. **2** is a cross sectional view of the element shown in FIG. **1**;

FIGS. **3** and **4** are views similar to FIG. **2** but each showing a possible modification in the cross sectional shape of the element;

FIG. **5** is also a view similar to FIG. **2** but showing a further possible modification in the cross sectional shape of the element with a core member inserted longitudinally therethrough; and

FIG. **6** is a plan view explanatory of the mode of attachment of the element of FIGS. **1** and **2** to a stringer tape.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1** and **2** illustrate a preferred form of the continuous coupling element **10** for a slide fastener according to this invention. The continuous coupling element **10** is composed of an elongated monofilament of a synthetic resin or the like which is wound into substantially helical or meandering configuration. Formed along one longitudinal side of the continous coupling element **10** are a series of spaced apart coupling heads **11** adapted for mating engagement with identical coupling heads, not shown, of a complementary coupling element. Each coupling head **11** also functions to interconnect first and second shanks **12** and **13** extending generally rearwardly therefrom.

According to the novel concepts of this invention, the first and second shanks **12** and **13** of an exemplary turn **14** of the continuous coupling element **10** are curved arcuately away from each other, as seen in a plan view as shown in FIG. **1**, so as to protrude from the central axis of the exemplary turn **14** toward the adjacent turns over a maximum distance equal to substantially one-half of the pitch of the turns of this continuous coupling element. By the term "central axis of the turn" is meant, of course, that which is perpendicular to the longitudinal axis of the continuous coupling element **10**.

Also as shown in FIG. **1**, the first shank **12** of the exemplary turn **14** extends in partially overlapping relationship to the second shank **13***a* of a turn **14***a* adjoining the exemplary turn on one side thereof. The first shank **12** of the exemplary turn **14** is connected via an arcuate bight **15** to the second shank **13***b* of a turn **14***b* immediately adjoining the exemplary turn on the other side thereof, the said second shank **13***b* partially underlying the first shank **12***c* of a turn **14***c* two pitches away from the exemplary turn. The second shank **13** of the exemplary turn **14**, of course, partially underlies the first shank **12***b* of the turn **14***b* and is connected via an

arcuate bight **15** to the first shank **12***a* of the turn **14***a*.

It will be noted from the showing of FIG. **1** that the first shanks **12***a*, **12**, **12***b*, **12***c* . . . of the respective turns **14***a*, **14**, **14***b*, **14***c* . . . overlie the second shanks **13***a*, **13**, **13***b* . . . of the adjoining turns at their portions arranged along a stitching line S — S, as later described in more detail.

When viewed cross-sectionally, each turn of the continuous coupling element **10** may typically be teardrop-shaped as shown in FIG. **2**. However, if desired, the first and second shanks **12** and **13** of each turn may be compressed toward each other at their end portions close to the bights **15**, thereby shaping the turn into generally racketlike configuration as shown in FIG. **3**. Alternatively, one of the shanks (second shank **13** in the example shown in FIG. **4**) of each turn may be formed in a straight line, whereas the other shank is bent as that shown in FIG. **2**. It is also possible to provide an elliptic turn as shown in FIG. **5**. In this latter case a suitable cord or like core member **16** may be inserted longitudinally through the respective elliptic turns of the continuous coupling element.

As illustrated in FIG. **6**, the continuous coupling element **10** of FIGS. **1** and **2** can be stitched by sewing stitches **17** along the aforesaid line S — S onto one surface of a stringer tape **18** so as to extend along one longitudinal edge thereof. Since the first shanks of the respective turns of this continuous coupling element overlie the second shanks of the adjoining turns along the stitching line S — S in the manner previously set forth with reference to FIG. **1**, the distance D between the shanks of the adjacent turns is maximized along this stitching line. Sufficient spacings **19** are thus formed for the passage of the needle in stitching the continuous coupling element **10** onto the stringer tape **18**.

It may have been noted from the foregoing description that the first shank **12** of each turn **14** is not only arranged in partially overlapping relationship to the second shank **13***a* of one adjoining turn **14***a* but is connected via the bight **15** to the second shank **13***b* of the other adjoining turn **14***b* partially underlying the first shank **12***c* of the turn **14***c* two pitches away from the exemplary turn **14**. This configuration is in marked contrast to the prior art where the respective turns of continuous coupling elements have been sought to be retained in their predetermined spaced apart positions only by the bights interconnecting the shanks. It will therefore be apparent that the continuous coupling element according to the invention is capable of withstanding stresses to which it is subjected to a materially greater extent than the prior art, with its individual turns positively maintained in their correct relative positions throughout the prolonged periods of use of the slide fastener incorporating such continuous coupling element.

Having thus described the several useful and novel features of the continuous coupling element according to the invention, it is believed that the many objects for which it was designed have been fully accomplished. However, while but a few of the various possible embodiments of the invention have been illustrated and described herein, certain additional modifications may well occur to those skilled in the art within the broad teaching hereof. The invention, therefore, should be interpreted to comprehend all such modifications remaining within the scope of the following claims.

What is claimed is:

1. In a slide fastener having a continuous coupling element attached to a stringer tape by stitches extending along a line of stitching the improvement which comprises a coupling element in the form of a substantially helically wound filament with the turns thereof forming a plurality of spaced apart coupling heads along one longitudinal side of said filament for mating engagement with identical coupling heads of a complementary coupling element, each of said turns of said filament having first and second shanks which are curved arcuately in opposite directions, so as to protrude from the central axis of the turn toward the adjacent turns over a maximum distance equal to substantially one-half of the pitch of said turns of said filament, said first shank of one exemplary turn being disposed in partially overlapping relationship to the second shank of the turn immediately adjoining said exemplary turn on one side thereof and being connected via a bight to the second shank of the turn immediately adjoining said exemplary turn on the other side thereof, the last mentioned second shank partially underlying the first shank of the turn two pitches away from said exemplary turn on said other side thereof, said continuous coupling element being stitched against one surface of the stringer tape, and said first shanks of said turns of said filament overlapping said second shanks of the adjoining turns along said line of stitching.

2. The improvement as defined in claim **1**, further comprising a core member extending longitudinally through said turns of said filament.

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