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(54) SLIDING CLASP FASTENERS

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumicho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement —

10 This invention relates to sliding clasp fasteners.

Continuous coupling elements for sliding clasp fasteners are well known in the art. Such coupling elements may 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 interengageable with a similar row of heads of a complementary coupling element. Each turn of the continuous coupling element can be visualized as a pair of 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.

30 In the continuous coupling elements of the type under consideration, difficulties have been 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 sliding clasp fasteners, it is of absolute necessity that the individual turns of the continuous coupling elements to be faithfully maintained in their predetermined relative positions on stringer tapes.

45 According to the invention there is provided a sliding clasp fastener comprising two stringer tapes, two continuous coupling elements and a slider, the two continuous coupling elements being attached each to a respective one of the two tapes, each coupling

element being formed by a substantially helically wound filament of which each turn (away from the very ends of the coupling element) forms a coupling head along one longitudinal side of the coupling element, each said turn having two shanks extending from opposite ends of the associated coupling head, said two shanks being bowed outwardly away from each other as seen in a direction which is perpendicular to the associated tape, so that a middle part of an upper one of the two shanks of each said turn substantially completely overlies a middle part of the lower shank of the adjoining turn which is on one side thereof and said upper shank is joined via an arcuate bight to the lower shank of the adjoining turn which is on the other side thereof.

Preferably stitches extending along each tape stitch said middle parts of the shanks to the tape to attach the associated coupling element to the tape.

The invention will be described by way of examples with reference to the accompanying drawings which illustrate, by way of examples only, some preferred embodiments of the invention and in which like reference characters denote like parts throughout the several views, and wherein;

Figure 1 is a plan view of a continuous coupling element of a sliding clasp fastener embodying this invention;

Figure 2 is a cross-sectional view of the element shown in Figure 1;

Figures 3 and 4 are views similar to Figure 2 but each showing a possible modification in the cross sectional shape of the element;

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

Figure 6 is a plan view explanatory of the mode of attachment of the element of Figures 1 and 2 to a stringer tape.

Figures 1 and 2 illustrate a preferred form of the continuous coupling element 10 for a sliding clasp fastener embodying this invention. The continuous coupling element 10 is composed of an elongated monofilament

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of a synthetic resin or the like which is wound into substantially helical configuration. Formed along one longitudinal side of the continuous 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 upper and lower shanks 12 and 13 extending generally rearwardly therefrom.

The upper and lower shanks 12 and 13 respectively of an exemplary turn 14 of the continuous coupling element 10 are bowed arcuately away from each other, as seen in Figure 1 (which is as seen in a direction which is perpendicular to an associated tape 18, Figure 6) so as to protrude from the central axis of the exemplary turn 14 toward the adjacent turns by a distance equal substantially to 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, an axis through the coupling head perpendicular to the longitudinal axis of the continuous coupling element 10.

Also as shown in Figure 1, a middle part of the upper shank 12 of the exemplary turn 14 completely overlaps a middle part of the lower shank 13a of a turn 14a adjoining the exemplary turn 14 on one side thereof. The upper shank 12 of the exemplary turn 14 is connected via an arcuate bight 15 to the lower shank 13b of a turn 14b immediately adjoining the exemplary turn 14 on the other side thereof, a middle part of the said lower shank 13b completely underlying a middle part of the upper shank 12c of a turn 14c two pitches away from the exemplary turn 14. A middle part of the lower shank 13 of the exemplary turn 14, of course, completely underlies a middle part of the upper shank 12b of the turn 14b and is connected via an arcuate bight 15 to the upper shank 12a of the turn 14a.

It should be noted from Figure 1 that there is a stitching line S—S where the middle parts of the upper shanks 12a, 12, 12b, 12c . . . of the respective turns 14a, 14, 14b, 14c . . . overlie the middle parts of the lower shanks 13a, 13, 13b . . . of the respective turns.

When viewed cross-sectionally, each turn of the continuous coupling element 10 may typically be teardrop-shaped as shown in Figure 2. However, if desired, the upper and lower shanks 12 and 13 respectively 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 Figure 3. Alternatively, if the cross-section is as shown in Figure 4, the lower shank 13 of each turn may lie flat on the tape 18 (Figure 6) whereas the other shank is bent as shown in Figure 2. It is also possible to provide an elliptic turn as shown in Figure 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 Figure 6, the continuous coupling element 10 of Figures 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 upper shank middle parts of the respective turns of this coupling element overlie the lower shank middle parts of the adjoining turns along the stitching line S—S in the manner previously set forth with reference to Figure 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 upper shank 12 of each turn 14 not only has a middle part completely overlapping a middle part of the lower shank 13a of one adjoining turn 14a but is connected via the bight 15 to the lower shank 13b of the other adjoining turn 14b, a middle part of shank 13b completely underlying a middle part of the upper shank 12c of the turn 14c 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 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 sliding clasp fastener incorporating such continuous coupling element.

WHAT WE CLAIM IS —

1. A sliding clasp fastener comprising two stringer tapes, two continuous coupling elements and a slider, the two continuous coupling elements being attached each to a respective one of the two tapes, each coupling element being formed by a substantially helically wound filament of which each turn (away from the very ends of the coupling element) forms a coupling head along one longitudinal side of the coupling element, each said turn having two shanks extending from opposite ends of the associated coupling head, said two shanks being bowed outwardly away from each other as seen in a direction which is perpendicular to the associated tape, so that a middle part of an upper one of the two



of a synthetic resin or the like which is wound into substantially helical configuration. Formed along one longitudinal side of the continuous 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 upper and lower shanks 12 and 13 extending generally rearwardly therefrom.

The upper and lower shanks 12 and 13 respectively of an exemplary turn 14 of the continuous coupling element 10 are bowed arcuately away from each other, as seen in Figure 1 (which is as seen in a direction which is perpendicular to an associated tape 18, Figure 6) so as to protrude from the central axis of the exemplary turn 14 toward the adjacent turns by a distance equal substantially to 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, an axis through the coupling head perpendicular to the longitudinal axis of the continuous coupling element 10.

Also as shown in Figure 1, a middle part of the upper shank 12 of the exemplary turn 14 completely overlaps a middle part of the lower shank 13a of a turn 14a adjoining the exemplary turn 14 on one side thereof. The upper shank 12 of the exemplary turn 14 is connected via an arcuate bight 15 to the lower shank 13b of a turn 14b immediately adjoining the exemplary turn 14 on the other side thereof, a middle part of the said lower shank 13b completely underlying a middle part of the upper shank 12c of a turn 14c two pitches away from the exemplary turn 14. A middle part of the lower shank 13 of the exemplary turn 14, of course, completely underlies a middle part of the upper shank 12b of the turn 14b and is connected via an arcuate bight 15 to the upper shank 12a of the turn 14a.

It should be noted from Figure 1 that there is a stitching line S—S where the middle parts of the upper shanks 12a, 12, 12b, 12c . . . of the respective turns 14a, 14, 14b, 14c . . . overlie the middle parts of the lower shanks 13a, 13, 13b . . . of the respective turns.

When viewed cross-sectionally, each turn of the continuous coupling element 10 may typically be teardrop-shaped as shown in Figure 2. However, if desired, the upper and lower shanks 12 and 13 respectively 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 Figure 3. Alternatively, if the cross-section is as shown in Figure 4, the lower shank 13 of each turn may lie flat on the tape 18 (Figure 6) whereas the other shank is bent as shown in Figure 2. It is also possible to provide an elliptic turn as shown in Figure 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 Figure 6, the continuous coupling element 10 of Figures 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 upper shank middle parts of the respective turns of this coupling element overlie the lower shank middle parts of the adjoining turns along the stitching line S—S in the manner previously set forth with reference to Figure 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 upper shank 12 of each turn 14 not only has a middle part completely overlapping a middle part of the lower shank 13a of one adjoining turn 14a but is connected via the bight 15 to the lower shank 13b of the other adjoining turn 14b, a middle part of shank 13b completely underlying a middle part of the upper shank 12c of the turn 14c 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 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 sliding clasp fastener incorporating such continuous coupling element.

WHAT WE CLAIM IS —

1. A sliding clasp fastener comprising two stringer tapes, two continuous coupling elements and a slider, the two continuous coupling elements being attached each to a respective one of the two tapes, each coupling element being formed by a substantially helically wound filament of which each turn (away from the very ends of the coupling element) forms a coupling head along one longitudinal side of the coupling element, each said turn having two shanks extending from opposite ends of the associated coupling head, said two shanks being bowed outwardly away from each other as seen in a direction which is perpendicular to the associated tape, so that a middle part of an upper one of the two



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shanks of each said turn substantially completely overlies a middle part of the lower shank of the adjoining turn which is on one side thereof and said upper shank is joined via an arcuate bight to the lower shank of the adjoining turn which is on the other side thereof.

2. A sliding clasp fastener as claimed in claim 1 wherein stitches extending along each tape stitch said middle parts of the shanks to the tape to attach the associated coupling element to the tape.

3. A sliding clasp fastener as claimed in claim 1 or 2 wherein a respective core extends through the turns of each coupling element.

4. A sliding clasp fastener substantially as described with reference to Figures 1, 2 and 6 of the accompanying drawings.

5. A sliding clasp fastener substantially as described with reference to Figures 1, 2 and 6 but modified as in Figure 3 of the accompanying drawings. 20

6. A sliding clasp fastener substantially as described with reference to Figures 1, 2 and 6 but modified as in Figure 4 of the accompanying drawings. 25

7. A sliding clasp fastener substantially as described with reference to Figures 1, 2 and 6 but modified as in Figure 5 of the accompanying drawings. 30

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