

PATENT SPECIFICATION

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(54) CONTINUOUS COUPLING ELEMENT FOR SLIDING CLASP FASTENERS

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumi-cho, 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 coupling elements for sliding clasp fasteners, and in particular to the improved configuration of a continuous coupling element having a dual row of loops which can be fastened to a stringer tape as by stitching to provide a sliding clasp fastener half.

Continuous coupling elements for sliding clasp fasteners have been proposed and used in various configurations. Perhaps the most popular of such continuous coupling elements are those generally known as the coil and zigzag types. The continuous coupling elements of these well known types usually consist of elongated synthetic resin monofilaments which are shaped into a helical or zigzag configuration including a row of uniformly spaced apart coupling heads adapted for mating engagement with a similar row of heads of a complementary coupling element. A pair of legs or shanks extend rearwardly from each coupling head and are joined to arcuate or U-shaped bights bridging the adjacent shanks.

When the continuous coupling elements of these types are stitched onto stringer tapes as by a sewing machine, the elements must be retained in place on the tapes only by the threads extending longitudinally of the elements across their shanks. With the coupling elements fastened to the stringer tapes in this manner, there is no means for restraining them from lateral displacement. As a consequence, the prior art continuous coupling elements of the character described are prone to shift laterally out of their proper position when stitched to the stringer tapes.

In order to overcome this defect, there

has been advanced another type of continuous coupling element having a multiplicity of undulations each consisting essentially of first and second loops. A row of coupling heads are formed along one longitudinal side of the first loops, and the second loops are arranged along the opposite longitudinal side of the first loops. These second loops constitute the support portion of this continuous coupling element, such that the same is stitched onto a stringer tape with the needle guided centrally through the successive second loops.

With this latter type of continuous coupling element, however, the row of stitches is located substantially the farthest transverse distance away from the coupling heads, so that the element cannot necessarily be stably anchored in position on the stringer tape. It is therefore highly likely that parts of the coupling elements should displace out of their correct relative positions in the act of coupling or uncoupling of the sliding clasp fastener stringers. In order to realize a high degree of coupling efficiency in sliding clasp fasteners, it is of absolute necessity that the individual undulations of the continuous coupling elements be faithfully maintained in their correct relative positions on the stringer tapes.

According to the invention, there is provided a continuous coupling element formed of an elongated filament for attachment to a stringer tape to provide a sliding clasp fastener half, comprising a plurality of first loops having a series of uniformly spaced apart coupling heads along one longitudinal side thereof for mating engagement with identical coupling heads of a complementary continuous coupling element, each of said first loops further including a respective pair of shanks which are interconnected by a respective one of said coupling heads and which are compressed into contact with each other at a first point of contact at their ends remote from the coupling head, said pair of shanks being arranged in substantially parallel

spaced relationship in a plane perpendicular to the plane of the stringer tape to which the coupling element is to be attached, and a plurality of second loops formed along the other longitudinal side of said first loops, each of said second loops being formed substantially annularly by extensions from, either, two shanks of a respective adjoining pair of said first loops, or, the pair of shanks of a respective single first loop, which extensions include crossed-over portions contacting each other at a second point, said second loops being arranged in overlapping relationship so that each adjoining pair of second loops is in contact with each other at a third point, whereby there are three different series of points of contact.

The invention will be described by way of examples with reference to the accompanying drawings wherein like reference characters denote like parts throughout the several views, and wherein;

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

Figure 2 is a right hand end view of the element shown in Figure 1;

Figure 3 is a plan view of another preferred embodiment of the invention;

Figure 4 is a right hand end view of the embodiment shown in Figure 3;

Figure 5 is a plan view of a further preferred embodiment of the invention;

Figure 6 is a right hand end view of the embodiment shown in Figure 5;

Figure 7 is a plan view of a yet further preferred embodiment of the invention;

Figure 8 is a right hand end view of the embodiment shown in Figure 7;

Figure 9 is a plan view showing a continuous coupling element embodying the invention, in which parts of the filament are integrally welded together;

Figure 10 is a cross sectional view of the element shown in Figure 9;

Figure 11 is a view similar to Figure 2 except that the element is made cross-sectionally asymmetric;

Figure 12 is a view similar to Figure 6 or 8 except that the element is also made cross-sectionally asymmetric;

Figure 13 is a top plan view showing a mode of attachment of a continuous coupling element embodying the invention to a stringer tape;

Figure 14 is a cross sectional view taken along the plane of line XIV—XIV in Figure 13;

Figure 15 is a view similar to Figure 13 but showing an alternative mode of attachment of the continuous coupling element to a stringer tape; and

Figure 16 is a cross sectional view taken along the plane of line XVI—XVI in Figure 15.

Figures 1 and 2 illustrate a preferred form of the continuous coupling element 20 for a sliding clasp fastener embodying this invention. The illustrated continuous coupling element 20 is made of an elongated filament of a synthetic resin or the like which is formed into a multiplicity of undulations consisting essentially of a series of first loops 21 and another series of second loops 22. Formed along one longitudinal side of the first loops 21 is a series of uniformly spaced apart coupling heads 23 adapted for mating engagement with identical coupling heads, not shown, of a complementary continuous coupling element. The second loops 22 are formed along the other longitudinal side of the first loops 21.

First and second legs or shanks 24 and 25 of one exemplary first loop 21, which are interconnected by the coupling head 23 on the said one side thereof, are arranged in substantially parallel spaced relationship to each other in a plane perpendicular to the plane of a stringer tape, not shown in Figures 1 and 2, to which the continuous coupling element 20 is to be fastened in the manner to be later described.

Those ends of the first and second shanks 24 and 25 which are remote from the coupling head 23 are compressed into contact with each other. Extensions of the first and second shanks 24 and 25 further extend crosswise away from each other, as shown in Figure 1. The extension from the first shank 24 of the exemplary first loop 21 is again arranged crosswise, in a plane perpendicular to the plane of the stringer tape, as shown in Figure 2, in contact with a similar extension from the second shank 25a of the adjoining first loop 21a on the right hand side, as seen in Figure 1, of the exemplary first loop 21. One annular second loop 22 is thus defined between the first loops 21 and 21a on the said other side thereof, the second loop being so disposed as to substantially parallel the plane of the stringer tape.

The extension from the second shank 25 of the exemplary first loop 21 is similarly arranged crosswise in contact with an extension from the first shank 24b of the left hand side first loop 21b, thereby also defining another annular second loop 22. Further, the thus formed second loops 22 are arranged in overlapping relationship in contact with each other, as will be seen from Figure 1.

It should be noted that there are three different series of points of contact, namely, between the ends of the first and second shanks 24 and 25 of each first loop 21, between crossing-over portions extending from the shanks 24 and 25 of each pair of adjoining first loops 21, and between the

overlapping portions of each pair of adjoining second loops 22, as indicated by the reference characters P1, P2 and P3 respectively in Figure 1.

5 Figures 3 and 4 illustrate a slight modification of the Figures 1 and 2 configuration, in which the extensions from the first and second shanks of the adjoining first loops do not cross-over as seen in Figure 4 in a plane perpendicular to the plane of the stringer tape as in the preceding embodiment. However, the said extensions do cross over as seen in Figure 3. Like element 20 of Figures 1 and 2, each annular second loop 22 of this modified continuous coupling element 20a is defined by forming a half-turn of each of the extensions from the first and second shanks 24 and 25 of the first loops 21 in a plane substantially parallel to the plane of the stringer tape and by joining the extension of the first shank 24a of the right hand side first loop 21a to the extension of the second shank 25 of adjacent loop 21. Other details of construction are substantially the same as those set forth above in connection with Figures 1 and 2.

Figures 5 and 6 illustrate another modified example, in which the extension from the first shank 24 of each first loop 21 of the continuous coupling element 20b is curved arcuately in a plane parallel to the plane of the stringer tape, thereby defining the left hand half, as seen in Figure 5, of each second loop 22. The second shank 25 of each first loop is likewise curved arcuately so as to define the right hand half of each second loop 22. These extensions from the first and second shanks 24 and 25 of the first loop 21 are further joined to the similar extensions from the second shank 25a of the right hand side first loop 21a and the first shank 24b of the left hand side first loop 21b.

45 In a further modified example illustrated in Figures 7 and 8, the extension from the second shank 25 of each first loop 21 of the continuous coupling element 20c is arranged along the plane of the first loop 21. The extension from the first shank 24 of the first loop 21, on the other hand, is curved in the shape of a U and is arranged in overlapping relationship to the extension from the second shank 25b of the left hand side first loop 21b. The U-shaped extension from the first shank 24 of the first loop 21 is further joined to the extension from the second shank 25a of the right hand side first loop 21a thereby defining the second loop 22 between the adjoining first loops 21 and 21b.

65 It may be noted that in all the modified examples set forth in the foregoing with reference to Figures 3 to 8, as in the example of Figures 1 and 2, there are three

different series of points of contact P1, P2 and P3; more particularly: P1 between the ends of the shanks 24 and 25 of each first loop 21 remote from the coupling head 23; P2 between crossed-over portions of shank 24 of each first loop 21 and of shank 25 of an adjacent first loop 21; and P3 between overlapped portions of each pair of adjacent second loops 22.

70 If desired, the crossed-over portions of the extensions from the first and second shanks of the adjoining first loops of the continuous coupling elements 20 and 20a may be welded or otherwise integrally united together, as in the continuous coupling element 20d depicted in Figures 9 and 10.

When seen in an end view or cross-sectionally, the various continuous coupling elements disclosed hereinbefore are all symmetric, as will be seen from Figures 2, 4, 6 and 8. However, if desired, all these continuous coupling elements can be made cross-sectionally asymmetric as represented by the continuous coupling elements 20e and 20f shown in Figures 11 and 12 respectively, so that the lower sides of the elements, that is, those sides to be held in direct contact with the stringer tape, may offer a plane parallel to the plane of the stringer tape.

Figures 13 and 14 illustrate a mode of attachment of the continuous coupling element 20 to the stringer tape 26, it being understood that the other continuous coupling elements 20a to 20f disclosed herein can be attached in an identical manner. As will be seen from these drawings, the continuous coupling element 20 is fastened to one surface of the stringer tape 26 along one longitudinal edge thereof by two parallel spaced rows of stitching 27 and 28. The first row of stitching 27 is formed by passing the sewing machine needle centrally through the successive second loops 22, as has been known heretofore. Since the shanks 24 and 25 of the respective first loops 21 are arranged in overlapping relationship in a plane perpendicular to the plane of the stringer tape 26, and since relatively wide spacings S are consequently formed between the adjoining first loops 21, these spacings are utilized to form the second row of stitching 28 in parallel spaced relationship to the first row 27. It may be noted that each stitch of the first row 27 passes over the overlapping portions of the adjoining second loops 22, and each stitch of the second row 28 over the two shanks 24 and 25 of each first loop 21.

Positive anchorage of the continuous coupling element 20 onto the stringer tape 26 is thus established by the two rows of stitching 27 and 28. Furthermore, since the

first and second loops 21 and 22 of the continuous coupling element are arranged in close contact at the three dissimilar points P1 to P3 as above stated, the positional stability of the respective undulations of the continuous coupling element is all the more reinforced to assure a high degree of coupling efficiency.

Figures 15 and 16 illustrate an alternative mode of attachment of the continuous coupling element 20 to the stringer tape 26, in which the stitches of the second row 28a pass not straightly over the respective first loops 21 but around the rear ends of the first loops. The second row of stitches 28a is therefore arranged in a zigzag configuration when seen in a plan view as in Figure 15.

WHAT WE CLAIM IS:—

1. A continuous coupling element formed of an elongated filament for attachment to a stringer tape to provide a sliding clasp fastener half, comprising a plurality of first loops having a series of uniformly spaced apart coupling heads along one longitudinal side thereof for mating engagement with identical coupling heads of a complementary continuous coupling element, each of said first loops further including a respective pair of shanks which are interconnected by a respective one of said coupling heads and which are compressed into contact with each other at a first point of contact at their ends remote from the coupling head, said pair of shanks being arranged in substantially parallel spaced relationship in a plane perpendicular to the plane of the stringer tape to which the coupling element is to be attached, and a plurality of second loops formed along the other longitudinal side of said first loops, each of said second loops being formed substantially annularly by extensions from, either, two shanks of a respective adjoining pair of said first loops, or, the pair of shanks of a respective single first loop, which extensions include crossed-over portions contacting each other at a second point, said second loops being arranged in overlapping relationship so that each adjoining pair of second loops is in contact with each other at a third point, whereby there are three different series of points of contact.

2. A continuous coupling element as claimed in claim 1, wherein at least said crosswise contacting portions of said extensions are integrally united together.

3. A continuous coupling element as claimed in claim 1, wherein said first and second loops are cross-sectionally asymmetric so that the side of said continuous coupling element to be held in direct

contact with the stringer tape is arranged in a single plane.

4. A continuous coupling element as claimed in claim 1, in combination with a stringer tape, the coupling element being attached to the stringer tape by a first row of stitches extending over the overlapping portions of said second loops and by a second row of stitches extending over said shanks of said first loops, said first and second rows of stitches being arranged in parallel spaced relationship to each other.

5. A continuous coupling element in combination with a stringer tape as claimed in claim 4, wherein the stitches of said second row pass around those ends of the respective first loops which are remote from said coupling heads, whereby said second row of stitches is arranged in a zigzag configuration.

6. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings.

7. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 3 and 4 of the accompanying drawings.

8. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 5 and 6 of the accompanying drawings.

9. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 7 and 8 of the accompanying drawings.

10. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 9 and 10 of the accompanying drawings.

11. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 1 and 2 modified as in Figure 11.

12. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 5 and 6 modified as in Figure 12.

13. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 7 and 8 modified as in Figure 12.

14. A continuous coupling element in combination with a stringer tape substantially as herein described with reference to and as illustrated in Figures 13 and 14 of the accompanying drawings.

15. A continuous coupling element in combination with a stringer tape substantially as herein described with reference to and as illustrated in Figures 15 and 16 of the accompanying drawings.

first and second loops 21 and 22 of the continuous coupling element are arranged in close contact at the three dissimilar points P1 to P3 as above stated, the positional stability of the respective undulations of the continuous coupling element is all the more reinforced to assure a high degree of coupling efficiency.

Figures 15 and 16 illustrate an alternative mode of attachment of the continuous coupling element 20 to the stringer tape 26, in which the stitches of the second row 28a pass not straightly over the respective first loops 21 but around the rear ends of the first loops. The second row of stitches 28a is therefore arranged in a zigzag configuration when seen in a plan view as in Figure 15.

WHAT WE CLAIM IS:—

1. A continuous coupling element formed of an elongated filament for attachment to a stringer tape to provide a sliding clasp fastener half, comprising a plurality of first loops having a series of uniformly spaced apart coupling heads along one longitudinal side thereof for mating engagement with identical coupling heads of a complementary continuous coupling element, each of said first loops further including a respective pair of shanks which are interconnected by a respective one of said coupling heads and which are compressed into contact with each other at a first point of contact at their ends remote from the coupling head, said pair of shanks being arranged in substantially parallel spaced relationship in a plane perpendicular to the plane of the stringer tape to which the coupling element is to be attached, and a plurality of second loops formed along the other longitudinal side of said first loops, each of said second loops being formed substantially annularly by extensions from, either, two shanks of a respective adjoining pair of said first loops, or, the pair of shanks of a respective single first loop, which extensions include crossed-over portions contacting each other at a second point, said second loops being arranged in overlapping relationship so that each adjoining pair of second loops is in contact with each other at a third point, whereby there are three different series of points of contact.

2. A continuous coupling element as claimed in claim 1, wherein at least said crosswise contacting portions of said extensions are integrally united together.

3. A continuous coupling element as claimed in claim 1, wherein said first and second loops are cross-sectionally asymmetric so that the side of said continuous coupling element to be held in direct

contact with the stringer tape is arranged in a single plane.

4. A continuous coupling element as claimed in claim 1, in combination with a stringer tape, the coupling element being attached to the stringer tape by a first row of stitches extending over the overlapping portions of said second loops and by a second row of stitches extending over said shanks of said first loops, said first and second rows of stitches being arranged in parallel spaced relationship to each other.

5. A continuous coupling element in combination with a stringer tape as claimed in claim 4, wherein the stitches of said second row pass around those ends of the respective first loops which are remote from said coupling heads, whereby said second row of stitches is arranged in a zigzag configuration.

6. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings.

7. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 3 and 4 of the accompanying drawings.

8. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 5 and 6 of the accompanying drawings.

9. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 7 and 8 of the accompanying drawings.

10. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 9 and 10 of the accompanying drawings.

11. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 1 and 2 modified as in Figure 11.

12. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 5 and 6 modified as in Figure 12.

13. A continuous coupling element substantially as herein described with reference to and as illustrated in Figures 7 and 8 modified as in Figure 12.

14. A continuous coupling element in combination with a stringer tape substantially as herein described with reference to and as illustrated in Figures 13 and 14 of the accompanying drawings.

15. A continuous coupling element in combination with a stringer tape substantially as herein described with reference to and as illustrated in Figures 15 and 16 of the accompanying drawings.





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