

SPECIFICATION

Method of Forming a Bottom Stop on a Sliding Clasp Fastener**Description:—**

5 This invention relates to a method of forming a bottom stop on a sliding clasp fastener having coupling elements fabricated from continuous filaments, such as those of the helicoidal-coil or zigzag type. More specifically, the invention
10 concerns a method of forming a bottom stop by ultrasonically welding together several interengaged lowermost scoops of the continuous coupling elements.

Bottom stops have been suggested which are
15 formed by fusing or welding together several interengaged lowermost scoops of continuous coupling elements on stringer or carrier tapes, as by vibrating the interengaged scoops at ultrasonic frequencies, as disclosed for example in U.S.
20 Patent 3,263,291. Such bottom stops, as heretofore made, are unsatisfactory for the following reason.

Coupling elements in general are capable of withstanding crosswise tensile stresses by virtue
25 of their interengaged heads. The interengaged coupling elements of the helicoidal-coil and zigzag configurations, however, are susceptible to ready displacement when subjected to crosswise compressive stresses. This is because
30 gaps exist between the coupling heads of each continuous coupling element and a filler (i.e., a cord or like core in the case of coil type coupling elements and a longitudinal stringer tape edge in the case of zigzag type coupling elements)
35 received in the other continuous coupling element.

From the standpoint of this invention, the scoops of the continuous coupling elements can be considered to be somewhat loosely
40 interengaged by reason of the existence of the above noted gaps. Thus, when vibrated ultrasonically, the several interengaged lowermost scoops of the coupling elements do not develop sufficient frictional heat to coalesce
45 into a firmly united bottom stop. The efficiency of the ultrasonic welding operation is also poor.

According to the invention, there is provided a method of forming a bottom stop on a sliding clasp fastener of the type having a pair of stringer
50 tapes each carrying a continuous coupling element forming a row of scoops for mating engagement with the complementary row of scoops formed by the continuous coupling element on the other stringer tape, each coupling
55 element having a filler received therein, which method comprises the steps of: interengaging at least a preselected number of lowermost scoops of each coupling element with the corresponding number of lowermost scoops of the other
60 coupling element; compressing the interengaged lowermost scoops from opposite lateral sides thereof, in a direction parallel to the plane of the stringer tapes, thereby causing the coupling heads of the interengaged lowermost scoops of

65 each coupling element to be pressed against the filler received in the other coupling element; and fusing the interengaged lowermost scoops of the coupling elements for welding them together into a bottom stop.

70 The invention will not be described by way of example, with reference to the accompanying drawings, wherein:—

Figure 1 is a partial front view of a sliding clasp fastener having continuous coupling elements of
75 the helicoidal-coil type, the sliding clasp fastener including a bottom stop formed by the method of this invention;

Figure 2 is an enlarged sectional view taken along the line II—II in Figure 1;

80 Figure 3 is a sectional view schematically illustrating means for forming the bottom stop on the sliding clasp fastener of Figures 1 and 2 by the inventive method, the means being shown in a state before formation of the bottom stop; and

85 Figure 4 is a view similar to Figure 3 except that the means are shown in a state during formation of the bottom stop.

The method of this invention will now be described in detail as adapted specifically for the
90 formation of a bottom stop on a sliding clasp fastener having continuous coupling elements of the helicoidal-coil type illustrated in Figures 1 and 2 of the accompanying drawings. The illustrated sliding clasp fastener comprises a pair of stringer
95 or carrier tapes 10 and 10', and a pair of continuous coupling elements 11 and 11' extending along the confronting longitudinal edges of the stringer tapes.

Each in the form of a helicoidal coil, the
100 continuous coupling elements 11 and 11' are formed to provide rows of constantly spaced-apart scoops 12 and 12' for mating interengagement with each other. Cores or fillers 13 and 13', as in the form of cords, extend
105 through the turns or undulations of the respective coupling elements 11 and 11'. These coupling elements 11 and 11' together with the core cords 13 and 13' are fastened to the confronting longitudinal edges of the stringer tapes 10 and
110 10' by rows of stitches 14 and 14' traversing the rows of scoops 12 and 12'.

The rows of scoops 12 and 12' are formed to include coupling heads 15 and 15' projecting beyond the confronting edges of the stringer
115 tapes 10 and 10'. When a slider (not shown) is move along the continuous coupling elements 11 and 11' in the fastener closing direction, the rows of scoops 12 and 12' are interengaged as shown in Figure 1, with the coupling heads 15 or 15' of
120 each coupling element caught behind the coupling heads of the other element. It will be observed from Figure 1 that when the sliding clasp fastener is thus closed, gaps exist between the coupling heads 15 or 15' of each of the
125 continuous coupling element 11 and 11' and the core cord 13 or 13' received in the other coupling element.

In Figures 1 and 2 is also shown a bottom stop 16 formed by the method of this invention. For

the formation of this bottom stop 16, a preselected number of, four for example, lowermost scoops 12 or 12' of each continuous coupling element 11 or 11' are engaged with the

- 5 corresponding number of lowermost scoops of the other coupling elements, and the interengaged lowermost scoops are ultrasonically welded or fused to each other at 17, in the manner set forth in detail hereinbelow.
- 10 Figures 3 and 4 are illustrative of the means for use in the practice of the inventive method, and of the way the means are used to form the bottom stop 16 of Figures 1 and 2. Shown at 18 is part of a horn which is included in an ultrasonic
- 15 wave generator and which serves as a "sonotrode" of an ultrasonic welding assembly. The sliding clasp fastener of Figures 1 and 2 is placed upon the horn 18, with at least the preselected numbers of lowermost scoops 12 and
- 20 12' of the continuous coupling elements 11 and 11' interengaged as shown.

The other member of the ultrasonic welding assembly is an anvil 19 disposed over the sliding clasp fastener on the horn 18 for movement

25 toward and away from the latter. The horn 18 and anvil 19 coact to ultrasonically welding together the interengaged lowermost scoops 12 and 12' of the sliding clasp fastener, besides serving the additional purpose of substantially immovably

30 holding the interengaged lowermost scoops from both front and rear sides of the fastener.

According to a feature of this invention, a pair of pressers 20 and 20' are disposed on the opposite lateral sides of the sliding clasp fastener

35 on the horn 18 for movement toward and away from each other, in a direction parallel to the plane of the stringer tapes 10 and 10' and in sliding contact with the latter. Upon movement of the pressers 20 and 20' toward each other, the

40 interengaged lowermost scoops 12 and 12' are compressed, in such a way that the coupling heads 15 or 15' of each element 11 or 11' are pressed against the core 13 or 13' received in the other coupling elements, as clearly seen in Figure

45 4.

Ultrasonic vibrations are imparted to the preselected numbers of interengaged lowermost scoops 12 and 12' of the sliding clasp fastener through the horn or sonotrode 18, while these

50 scoops are supported from both front and rear sides of the fastener in a direction substantially perpendicularly to the plane of the stringer tapes 10, 10' by the members 18 and 19 of the ultrasonic welding assembly and are further

55 compressed from their opposite lateral sides by the pair of pressers 20 and 20'. Thus vibrated at an ultrasonic frequency, the interengaged lowermost scoops 12 and 12' of the sliding clasp fastener are welded or fused together, as at 17 in

60 Figures 1 and 2, owing to the heat generated frictionally by their contacting surface portions. At the same time, the coupling heads 15, 15' are fused integrally with the core 13, 13'. The desired bottom stop 16 is thus completed.

65 It will be appreciated that the frictional heat

generated as above by the interengaged lowermost scoops 12 and 12' is much higher, at a given ultrasonic frequency of vibration, than in the case where they are not compressed from the opposite lateral sides. The bottom stop 16 can therefore be formed efficiently and with a high degree of coherency. As an additional advantage, the interengaged lowermost scoops 12 and 12' are not appreciably deformed when ultrasonically

70 welded together by the method of this invention, so that the bottom stop 16 is favorable in appearance, too.

The specific example of the inventive method shown and described hereinbefore is meant

80 purely to illustrate or explain and not to impose limitations upon the invention, since numerous modifications will readily occur to persons skilled in the art. For example, the anvil 19 and the pair of pressers 20 and 20' may be integrated; that is,

85 the anvil may have formed in its bottom surface a groove having a width slightly less than the total width of the pair of continuous coupling elements 11 and 11' engaged with each other, for performing by itself the functions of both anvil 19

90 as illustrated and pair of pressers 20 and 20'.

Claims

1. A method of forming a bottom stop on a sliding clasp fastener of the type having a pair of stringer tapes each carrying a continuous

95 coupling element forming a row of scoops for mating engagement with the complementary row of scoops formed by the continuous coupling element on the other stringer tape, each coupling element having a filler received therein, which

100 method comprises the steps of: interengaging at least a preselected number of lowermost scoops of each coupling element with the corresponding number of lowermost scoops of the other coupling element; compressing the interengaged

105 lowermost scoops from opposite lateral sides thereof, in a direction parallel to the plane of the stringer tapes, thereby causing the coupling heads of the interengaged lowermost scoops of each coupling element to be pressed against the filler received in the other coupling element; and fusing the interengaged lowermost scoops of the coupling elements for welding them together into a bottom stop.

2. A method according to claim 1, said

115 interengaged lowermost scoops of the coupling elements being fused by imparting ultrasonic vibrations thereto.

3. A method according to claim 1, said coupling heads of the interengaged lowermost

120 scoops being fused integrally with the fillers in the coupling elements when said lowermost scoops are fused together.

4. A method according to claim 1, further, including the steps of substantially immovably

125 holding the interengaged lowermost scoops of the coupling elements from both front and rear sides of the sliding clasp fastener in a direction substantially perpendicular to said first-named direction.



the formation of this bottom stop 16, a preselected number of, four for example, lowermost scoops 12 or 12' of each continuous coupling element 11 or 11' are engaged with the corresponding number of lowermost scoops of the other coupling elements, and the interengaged lowermost scoops are ultrasonically welded or fused to each other at 17, in the manner set forth in detail hereinbelow.

Figures 3 and 4 are illustrative of the means for use in the practice of the inventive method, and of the way the means are used to form the bottom stop 16 of Figures 1 and 2. Shown at 18 is part of a horn which is included in an ultrasonic wave generator and which serves as a "sonotrode" of an ultrasonic welding assembly. The sliding clasp fastener of Figures 1 and 2 is placed upon the horn 18, with at least the preselected numbers of lowermost scoops 12 and 12' of the continuous coupling elements 11 and 11' interengaged as shown.

The other member of the ultrasonic welding assembly is an anvil 19 disposed over the sliding clasp fastener on the horn 18 for movement toward and away from the latter. The horn 18 and anvil 19 coact to ultrasonically welding together the interengaged lowermost scoops 12 and 12' of the sliding clasp fastener, besides serving the additional purpose of substantially immovably holding the interengaged lowermost scoops from both front and rear sides of the fastener.

According to a feature of this invention, a pair of pressers 20 and 20' are disposed on the opposite lateral sides of the sliding clasp fastener on the horn 18 for movement toward and away from each other, in a direction parallel to the plane of the stringer tapes 10 and 10' and in sliding contact with the latter. Upon movement of the pressers 20 and 20' toward each other, the interengaged lowermost scoops 12 and 12' are compressed, in such a way that the coupling heads 15 or 15' of each element 11 or 11' are pressed against the core 13 or 13' received in the other coupling elements, as clearly seen in Figure 4.

Ultrasonic vibrations are imparted to the preselected numbers of interengaged lowermost scoops 12 and 12' of the sliding clasp fastener through the horn or sonotrode 18, while these scoops are supported from both front and rear sides of the fastener in a direction substantially perpendicularly to the plane of the stringer tapes 10, 10' by the members 18 and 19 of the ultrasonic welding assembly and are further compressed from their opposite lateral sides by the pair of pressers 20 and 20'. Thus vibrated at an ultrasonic frequency, the interengaged lowermost scoops 12 and 12' of the sliding clasp fastener are welded or fused together, as at 17 in Figures 1 and 2, owing to the heat generated frictionally by their contacting surface portions. At the same time, the coupling heads 15, 15' are fused integrally with the core 13, 13'. The desired bottom stop 16 is thus completed.

It will be appreciated that the frictional heat

generated as above by the interengaged lowermost scoops 12 and 12' is much higher, at a given ultrasonic frequency of vibration, than in the case where they are not compressed from the opposite lateral sides. The bottom stop 16 can therefore be formed efficiently and with a high degree of coherency. As an additional advantage, the interengaged lowermost scoops 12 and 12' are not appreciably deformed when ultrasonically welded together by the method of this invention, so that the bottom stop 16 is favorable in appearance, too.

The specific example of the inventive method shown and described hereinbefore is meant purely to illustrate or explain and not to impose limitations upon the invention, since numerous modifications will readily occur to persons skilled in the art. For example, the anvil 19 and the pair of pressers 20 and 20' may be integrated; that is, the anvil may have formed in its bottom surface a groove having a width slightly less than the total width of the pair of continuous coupling elements 11 and 11' engaged with each other, for performing by itself the functions of both anvil 19 as illustrated and pair of pressers 20 and 20'.

Claims

1. A method of forming a bottom stop on a sliding clasp fastener of the type having a pair of stringer tapes each carrying a continuous coupling element forming a row of scoops for mating engagement with the complementary row of scoops formed by the continuous coupling element on the other stringer tape, each coupling element having a filler received therein, which method comprises the steps of: interengaging at least a preselected number of lowermost scoops of each coupling element with the corresponding number of lowermost scoops of the other coupling element; compressing the interengaged lowermost scoops from opposite lateral sides thereof, in a direction parallel to the plane of the stringer tapes, thereby causing the coupling heads of the interengaged lowermost scoops of each coupling element to be pressed against the filler received in the other coupling element; and fusing the interengaged lowermost scoops of the coupling elements for welding them together into a bottom stop.

2. A method according to claim 1, said interengaged lowermost scoops of the coupling elements being fused by imparting ultrasonic vibrations thereto.

3. A method according to claim 1, said coupling heads of the interengaged lowermost scoops being fused integrally with the fillers in the coupling elements when said lowermost scoops are fused together.

4. A method according to claim 1, further, including the steps of substantially immovably holding the interengaged lowermost scoops of the coupling elements from both front and rear sides of the sliding clasp fastener in a direction substantially perpendicular to said first-named direction.



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5. A method according to claim 1, utilizing an ultrasonic welding assembly having a horn and an anvil opposite to the horn, said interengaged lowermost scoops of the coupling elements being
5 fused by imparting thereto ultrasonic vibrations from the horn, said interengaged lowermost scoops of the coupling elements being

substantially immovably held between the horn and the anvil from both front and rear sides of the
10 sliding clasp fastener in a direction substantially perpendicular to said first-named direction.

6. A method substantially as herein described with reference to and as illustrated in Figures 3 and 4 of the accompanying drawings.