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PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO SLIDING CLASP FASTENERS

(71) We, OPTI-HOLDING AG, of Burgstrasse 24, Glarus, Switzerland, a Company organised under the laws of Switzerland, 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, and in particular to sliding clasp fasteners having a pair of parallel stringer tapes carrying on their adjacent longitudinal edges continuous rows of interlocking elements, and also to a method of assembling such fasteners.

15 It is important in sliding clasp fasteners that the interlocking elements be firmly attached to the edge of the respective stringer tape. In newer types of sliding fasteners having continuous rows of interlocking elements formed by a generally helical or helicoidal coil or of a meander with the coupling heads interconnected by rearwardly extending arms joined together by rearward connecting sections, the head, arms and rearward connecting sections forming a "turn", difficulties may be encountered. Such coils are formed of a smooth, synthetic-resin monofilament that deforms readily and therefore cannot be readily secured to the tapes.

35 Although it is known to weave the coupling element into the edge of the stringer tape, by far the most common method of attachment is to stitch each element to the edge of its stringer tape. Certain constructions of sliding clasp fastener using chainstitching to hold the elements to stringer tape and in which the looper thread overlies turns of the rows of elements may be found to be unsatisfactory since the slider tends to fray the thread and the chainstitches may be cut through.

45 It is therefore an object of the present

invention to provide an improved sliding clasp fastener and a method of making such fastener.

According to the present invention, a sliding clasp fastener stringer comprises a pair of like stringer tapes each comprising an elongated textile support tape having a front face and a back face and a longitudinal edge, there being a row of interlocking elements lying on said front face and extending along said longitudinal edge and having a plurality of spaced-apart turns, and stitching securing said elements to said tapes formed of at least one needle thread and a looper thread, said needle thread having a plurality of U-shaped bights straddling said turns and said looper thread lying substantially against said back face of said tape.

65 Preferably, each row of interlocking elements is a coil with each coil turn having a pair of parallel arms one of which lies on said front face, each such U-shaped bight straddling both arms of each turn, it being further preferred that the coil is generally helical and provided with a filler cord extending through its turns, each turn further having a rearward connecting portion turned away from said edge and connecting one arm of each turn to an arm of the neighbouring turn, aid cord being received between said arms and against said connecting portion. The rows of interlocking elements may be composed of a thermoplastic synthetic plastics material.

80 In order to secure the needle threads to the interlocking elements, at least one of the element arms may be formed with a notch to receive the U-bight of the needle thread, and the stringer tapes may be formed on their back faces adjacent the longitudinal edges with longitudinal grooves to receive the looper threads.

85 In order that the sliding clasp fastener stringer may serve in a so-called concealed sliding clasp fastener, the stringer tapes may

be folded back adjacent the longitudinal edge at which the rows of interlocking elements are positioned.

According to a further aspect of the invention a method of making the sliding clasp fastener stringer as previously defined according to the invention comprises the steps of feeding a pair of parallel stringer tapes to a sewing station, positioning a pair of interlocked rows of interlocking elements on front faces and extending along longitudinal edges of said tapes, and stitching said rows to said tapes from the front faces of the tapes with needle threads overlying said elements and looper threads lying against the opposite or back faces of said tapes.

Preferably the needle threads are formed by a stretched synthetic plastics monofilament, the method further comprising the step of heating said needle threads after said stitching operation to shrink and thermally fix said needle threads.

It is also preferred to tension the looper threads tighter than the needle threads so that the needle threads form U-shaped bights straddling the turns of the coils.

The invention also embraces a sliding clasp fastener incorporating a stringer as hereinbefore defined.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a top view of a portion of a sliding clasp fastener stringer according to the present invention;

Figures 2 and 3 are sections taken along the lines II—II and III—III, respectively, of Figure 1;

Figure 4 is a bottom view of the stringer portion shown in Figure 1;

Figure 5 is a view similar to Figure 3 showing an alternative embodiment of the present invention;

Figure 6 is a schematic diagram of apparatus for producing the sliding clasp fastener stringer of Figure 1; and

Figure 7 is a cross-section through an element of Figure 6, to an enlarged scale.

Figures 1 to 4 show a pair of warp-knit stringer tapes 1. Secured to these tapes 1 are rows 2 of interlocking elements of synthetic plastics monofilament. Each coil 2 has a plurality of turns 6 each connected to the neighbouring turn by a rearward connecting section 7 and each formed with a coupling head 5. Each turn comprises parallel and spaced upper and lower arms 6a and 6b lying in a common plane as shown at P which is orthogonal to the plane E of the tapes 1. The head 5 interconnects the upper and lower arms 6a, 6b of each turn 6 and the upper arm 6a is connected in one direction via the rearward connecting section 7 to the next lower arm 6b and the lower arm 6b of

the same turn is connected in the opposite direction to the neighbouring upper arm 6a. Thus the connecting section 7 lies at an angle to the plane P.

Extending longitudinally through the centre of each coil 2 is a natural fibre multifilament filler cord 8 that lies against the connecting section 7. Stitching 3, 4 passes through this cord 8 and over the upper arms 6a to hold the elements against the tapes.

As best seen in Figures 2 to 4 the stitching 3, 4 is a two thread chainstitch according to B.S. 3870: 1965, type 401. It comprises a needle thread 3 that is here advantageously a synthetic plastics monofilament, and a looper thread 4. The needle thread 3 is sinuous, running in a plurality of U-shaped bights 3a which snugly straddle the upper arms 6a and which have legs extending substantially parallel to the planes P of the arms 6a and 6b. The looper thread 4 lies on the back of the tape 1 in a longitudinally extending valley 10 formed between the wales of the warp-knit tape 1. In addition each upper arm 6a is formed with an indentation or notch 9 in which the extreme upper portion of each bight 3a lies. Thus the threads 3 and 4 hardly project from the faces of the stringer so that the slider is not likely to wear them out.

Figure 5 shows an embodiment substantially identical to that of Figures 1 to 4 except that square-backed coil turns 6 of coils 21 are used. In addition tapes 1' are used which are folded over at 1b to have flaps 1a to which the elements 2' are secured via a single looper thread 4' and a pair of parallel needle threads 3'. This stitch is a three thread chainstitch according to B.S. 3870: 1965, type 402. Due to the wide transverse lay of the looper threads 4' the crease is maintained at 1b to allow use of the stringer of Figure 5 in a so-called concealed sliding clasp fastener. In this embodiment as two needle threads are used to hold the looper thread then the stitch is extremely stable. Thus, assuming that the stitching is cut at any point, raveling is virtually impossible. This is extremely important since the interlocking elements of a sliding clasp fastener must not come loose from its tape at any point; the slightest disattachment suffices to make the fastener inoperative.

Figures 6 and 7 illustrate how the stringer of Figures 1 to 4 is made. First a pair of tapes 1 are fed from supply rolls 15 in a transport direction D towards a sewing station 11. Also upstream of the station 11 a pair of interleaved rows of interlocking elements 2 provided with filler cords 8 are pulled off a spool 16 and laid on the juxtaposed longitudinal edges of the advancing parallel tapes 1.

In the sewing station 11, shown in Figure 7 in detail, the tapes 1 and elements 2 are

advanced between two guide plates 13a and 13b, the former of which is formed with a T-shaped notch 19 extending in the transport direction. The tapes 1 and coils 2 are aligned perfectly by the notch 19 and when they pass between in-line holes 14 needles 12 and loopers 18 serve to execute the necessary stitching operation. Since the needles 12 pierce the stringer from the coil side there is no chance that they be deflected by the textile tapes 1 to strike the coils 2.

The threads 3 and the threads 4 come from respective supplies 20 and 21 but pass through identical tensioners 22 formed by a threaded rod 23 screwed at one end into a disc 24 and carrying two more slidable annular discs 25 and 26. A nut 27 is threaded onto the end of the rod 23 and compresses a spring 28 against the ring 26. The threads to be tensioned pass to either side of the disc 25 and are wrapped around the rod 23 so that the extent of compression of the spring 28 determines the thread tension. The tension of the looper threads 4 is made substantially greater than that of the needle threads 3 in order that these threads 3 rather than the threads 4 be pulled through the tapes.

Downstream of the sewing station 11 in the transport direction the assembled stringer S is passed between two heated rollers 29 at a heat-treatment station 30. These rollers 29 serve to shrink the stretched monofilamentary needle threads 3 in order that the coils 2 be held very securely on the tapes 1. The pressure exerted by these rollers 29 also serves to flatten the stringer S somewhat and to thermally fix the shapes of the coils 2 and threads 3.

WHAT WE CLAIM IS:—

1. A sliding clasp fastener stringer comprising a pair of like stringer tapes each comprising an elongated textile support tape having a front face and a back face and a longitudinal edge, there being a row of interlocking elements lying on said front face and extending along said longitudinal edge and having a plurality of spaced-apart turns, and stitching securing said elements to said tapes formed of at least one needle thread and a looper thread, said needle thread having a plurality of U-shaped bights straddling said turns, and said looper thread lying substantially against said back face of said tape.

2. A sliding clasp fastener stringer as in Claim 1, wherein each row of interlocking elements is a coil with each coil turn having a pair of parallel arms one of which lies on said front face, each such U-shaped bight straddling both arms of each turn.

3. A sliding clasp fastener stringer as in Claim 2, wherein each coil is generally helical and is provided with a filler cord extending through its turns, each turn further having a rearward connecting portion turned away from said edge and connecting one arm of each turn to an arm of the neighbouring turn, said cord being received between said arms and against said connecting portion.

4. A sliding clasp fastener stringer as in any of Claims 1 to 3, wherein the rows of interlocking elements are composed of a thermoplastic synthetic plastics material.

5. A sliding clasp fastener stringer as in any of Claims 2 to 4, wherein at least one of said arms is formed with a notch receiving said U-bight of said needle thread.

6. A sliding clasp fastener stringer as in any of Claims 1 to 5, wherein said stringer tapes are formed on said back faces adjacent said longitudinal edges with longitudinal grooves receiving said looper threads.

7. A sliding clasp fastener stringer as in any of Claims 1 to 6, wherein each of said tapes is folded back adjacent said longitudinal edge with said back side within the fold.

8. A method of making the sliding clasp fastener stringer of Claim 1, comprising the steps of feeding a pair of parallel stringer tapes to a sewing station, positioning a pair of interlocked rows of interlocking elements on front faces and extending along longitudinal edges of said tapes and stitching said rows to said tapes from the front faces of the tapes with needle threads overlying said elements and looper threads lying against the opposite or back faces of said tapes.

9. A method as in Claim 8, wherein said needle threads are each a stretched synthetic plastics monofilament, said method further comprising the step of heating said needle threads after said stitching operation to shrink and thermally fix said needle threads.

10. The method as in Claim 8 or Claim 9, further comprising the step of tensioning said looper threads tighter than said needle threads so that said needle threads form U-shaped bights straddling the turns of said coils.

11. A sliding clasp fastener stringer substantially as hereinbefore described with reference to Figures 1 to 4 or Figure 5 of the accompanying drawings.

12. A method of making a sliding clasp fastener stringer substantially as hereinbefore described with reference to the accompanying drawings.

13. A sliding clasp fastener incorporating a stringer as defined in Claim 1.

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