

PATENT SPECIFICATION

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(54) SLIDING CLASP FASTENER STRINGERS

(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:

The present invention relates to sliding clasp fastener stringers of a type comprising fastener elements combined with a warp-knitted stringer tape knitted of synthetic fibre yarns.

There have been devised various warp-knitted stringer tapes for sliding clasp fasteners which are formed with synthetic fibre yarns. Since the stretch of such stringer tapes must be minimized, it is necessary to select those yarns which are highly resistant to stretch. Accordingly, the stitches in such knitted tapes are taut and tight, and the faces and backs of the tapes are relatively hard and slippery.

The prior stringer tapes therefore tend to slip relatively to garments while they are fed and sewn together by a sewing machine, with the results that the tapes can be skewed or displaced when attached, and the sewn tapes are prone to become wrinkled or puckered, a condition that spoils the appearance of the garment and the functioning of the sliding clasp fastener. Further, the stringer tape when shifted while being sewn causes the sewing machine needle to fail to penetrate at a selected groove between wales of the knit structure and to hit an adjacent wale, resulting in a curved line of stitching and breakage of the sewing needle.

It has been proposed to lay textured yarn as inlaid lapping threads in the warp-knitted tape in an attempt to prevent the puckering of the tape. However, since the inlaid textured yarn does not project from the waled face of the tape, such tape has a limitation in choosing its surface to be applied against the garment and thus has only met with a partial success.

According to the invention, there is provided a sliding clasp fastener stringer comprising fastener elements combined with a warp-knitted stringer tape knitted of synthetic fibre yarns in a plurality of different superimposed patterns, as least one said pattern being formed

of textured synthetic fibre yarn alone in at least a middle region of the tape, said one pattern being such that at least some courses have textured synthetic fibre yarn knitted in said one pattern at every needle position in at least said middle region of the tape, at least one other said pattern being knitted of non-textured synthetic fibre yarn alone in at least one edge region of the tape, the tape being knitted so that the middle region is more stretchable than said at least one edge region and so that the textured yarn forms bulges on both tape faces in the middle region of the tape.

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

Figure 1 is an enlarged graphic representation of a warp-knitted stringer tape supporting coil fastener elements;

Figure 2 is an enlarged cross-sectional view taken along the line and in the direction of the arrows II-II of Figure 1;

Figure 3 is a diagrammatic view of a stringer tape;

Figure 4 is a diagrammatic view of a first modification of stringer tape;

Figure 5 is a diagrammatic view showing a second modification of stringer tape;

Figure 6 is a diagrammatic view of a third modification of stringer tape;

Figure 7 is a diagrammatic view showing a fourth modification of stringer tape; and

Figure 8 is a diagrammatic view of a fifth modification of stringer tape.

In Figures 1 and 2, a stringer tape 10 for a sliding clasp fastener has a warp-knitted structure made of synthetic fibre yarns including textured yarn 11 that is mechanically bulky, crimped, soft, and stretchy. The stitches 12 which are formed with the textured yarn 11 project from or bulge out of both the face 13 and the back 14 of the warp-knitted structure. The synthetic fibre yarns also include non-textured, normal yarn 15 that cooperates with the textured yarn 11 in making up the stringer tape 10.

A stringer tape 16 as shown in Figure 3 includes a pair of spaced edge regions 17, 18 and a middle 'web' region 19 extending

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between the edge regions 17, 18. The stringer tape 16 is formed with chain stitches 20 having a stitch pattern of 1-0/0-1, tricot stitches 21 having a stitch pattern of 1-2/1-0 (under 1 over 1), and single cord stitches 22 having a stitch pattern of 0-1/4-3 (under 3 over 1). Additionally, reinforcing warp threads 23 and 24 are laid in two interwale grooves defined along the edge region 17, which is the element-supporting region of the stringer tape, the inlaid warp threads 23, 24 having a stitch pattern of 0-0/0-0. The tricot stitches 21 disposed in the edge regions 17, 18 and the web region 19, and the chain and single cord stitches 20, 22 in the edge regions 17, 18 are formed with non-textured yarn 25, and the chain and single cord stitches 20, 22 in the web region 19 are formed with textured yarns 26.

Since the textured yarn 26 has a greater stretchability and bulkiness, the stitches 27 of the textured yarn 26 are loose relatively to those of the non-textured yarn 25 just after the warp-knitting has been completed. Further, since the degree of shrinkage due to finishing processes such as heat-setting and dyeing is greater for the non-textured yarn 25 than for the textured yarn 26, the stitches 28 of the non-textured yarn 25 become additionally tight and the stitches 27 of the textured yarn 26 remain relatively loose after such finishing processes. The finished stringer tape 16 has the textured yarn stitches 27 bulging on its face and back due partly to such loosely-looped stitches 27 and due partly to the bulkiness of the textured yarn 26. Accordingly, the surfaces of the stringer tape 16 are rugged and have a relatively large coefficient of friction, and the tape 16 can be prevented from slipping on the garment during sewing operation, no matter which surface of the tape 16 is held against the garment.

The longitudinal and transverse stretch of the edge regions 17, 18 is held at a minimum by the chain stitches 20, tricot stitches 21, and single cord stitches 22, all constructed with the non-textured yarn 25. With the inlaid warp threads 23, 24, the edge region 17 is particularly stable dimensionally to provide rigid support for fastener elements. The web region 19, however, is relatively stretchable warpwise and coursewise because of the inclusion therein of the textured yarn 26 as the chain stitches 20 and the single cord stitches 22. The stretchability of the web region 19 makes the stringer tape 16 elastic enough to allow the fastener elements to be smoothly introduced into the slider as it moves for closing the sliding clasp fastener. Further, with the textured yarn 26 thus knitted in the web region 19, the web region 19 is uniformly soft and flexible, so that there will be only a small degree of resistance to the passage therethrough of the sewing machine needle, and hence a line of stitching can be made as straight as possible.

Figure 4 shows a modified stringer tape 29

in which chain stitches 30, tricot stitches 31, and single cord stitches 32 in the web region 19 are all formed with textured yarn 33. With this structure, the web region 19 has both its surfaces roughened by the textured yarn stitches to give an increased coefficient of friction, and the web region 19 is more flexible and offers less resistance to the penetration therethrough of the sewing needle.

According to Figure 5, the web region 19 is devoid of any chain stitches, and is formed only with tricot stitches 34 and single cord stitches 35, both of textured yarn 36. Therefore, the web region 19 is much more flexible, and contraction or shrinkage caused by shifting by the sewing threads of the stitches is substantially done away with.

In Figure 6, the web region 19 comprises only single cord stitches 37 of textured yarn 38 and tricot stitches 39 of non-textured yarn 40. Further, each edge region 17, 18 is formed with chain stitches 41 and tricot stitches 42, both made of non-textured yarn 43, and the single cord stitches 37 of the textured yarn 38. According to this modification, the textured yarn stitches project from the stringer tape over its entire width, so that the stringer tape can be prevented from slipping on the garment more effectively. In addition, the web region 19 is coarse and permits smooth penetration of the sewing needle therethrough, and shrinkage thereof due to sewing operation is substantially eliminated.

Figure 7 illustrates a stringer tape 44 of a double-faced structure knitted on a two needle bar knitting machine, the tape comprising an element-supporting edge region 45 constructed of a first group of single cord stitches 46, 47 having a stitch pattern of 1-0, 2-3/1-0, 2-3, a second group of single cord stitches 48, 49 having a stitch pattern of 2-3, 1-0/2-3, 1-0, and a reinforcing cord 50 laid as a warp thread in the edge region 45 in a stitch pattern of 0-0, 0-0/0-0, 0-0. The single cord stitches 46, 47, 48 and 49 are formed with non-textured yarn 51. The stringer tape 44 also comprises a web region 52 and another edge region 53, both including chain stitches 54 made of non-textured yarn 51 and having a stitch pattern of 0-1, 1-0/1-0, 0-1, tricot stitches 55 made of non-textured yarn 51 and having a stitch pattern of 1-0, 1-2/1-0, 1-2, and single cord stitches 56 made of textured yarn 57 and having a stitch pattern of 4-3, 2-2/0-1, 2-2, the single cord stitches 56 being formed on either a front or a back needle bar of the knitting machine (the back needle bar in the illustrated embodiment). The single cord stitches 56 may be knitted on both the front and back needle bars. The single cord stitches 56 bulge on the face of the tape 44 which is produced on the back needle bar. Further, by selecting a suitable thickness or denier for the textured yarn 57, the sinker loops of the single cord stitch pattern bulge on the tape face which

is formed on the front needle bar. Accordingly, both surfaces of the tape 44 have a sufficient coefficient of friction. The textured yarn 57 is uniformly distributed over the web region 52 and thus presents no areas where resistance to the passage of the sewing needle is locally increased.

In Figure 8, the web region 52 is composed mainly of tricot stitches 58 of non-textured yarn 59 and single cord stitches 60 of textured yarn 61. With this arrangement, the web region 52 is relatively coarse so that it permits smooth penetration of the sewing needle, and will not shrink under the influence of the sewing threads.

WHAT WE CLAIM IS:

1. A sliding clasp fastener stringer comprising fastener elements combined with a warp-knitted stringer tape knitted of synthetic fibre yarns in a plurality of different superimposed patterns, at least one said pattern being formed of textured synthetic fibre yarn alone in at least a middle region of the tape, said one pattern being such that at least some courses have textured synthetic fibre yarn knitted in said one pattern at every needle position in at least said middle region of the tape, at least the other said pattern being knitted of non-textured synthetic fibre yarn alone in at least one edge region of the tape, the tape being knitted so that the middle region is more stretchable than said at least one edge region and so that the textured yarn forms bulges on both tape faces in the middle region of the tape.

2. A stringer tape according to claim 1, in which all the stitch patterns other than said one pattern are formed with said non-textured yarn.

3. A stringer tape according to claim 2, in which said warp-knitted stringer tape has two said edge regions spaced apart from each other, the middle region extends between said spaced edge regions, the non-textured yarn stitch patterns include chain stitches and tricot stitches disposed in said edge regions, and the middle region comprises two of the different patterns of stitches.

4. A stringer tape according to claim 3, in which said two stitch patterns in said middle region are formed with the textured yarn and are selected from the class of stitch patterns

consisting of chain stitches, tricot stitches, and single cord stitches.

5. A stringer tape according to claim 3, in which the middle region includes chain stitches, tricot stitches, and single cord stitches.

6. A stringer tape according to claim 3, in which the middle region consists of stitch patterns formed with said textured yarn.

7. A stringer tape according to claim 3, in which each of said edge regions further includes single cord stitches.

8. A stringer tape according to claim 1, in which said textured yarn stitch pattern comprises single cord stitches.

9. A stringer tape according to claim 1, in which said warp-knitted structure comprises a double-faced fabric made on two needle bars.

10. A stringer tape according to claim 9, in which said one of the different patterns of stitches are formed on one of said two needle bars.

11. A stringer tape substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings.

12. A stringer tape substantially as herein described with reference to and as illustrated in Figure 3 of the accompanying drawings.

13. A stringer tape substantially as herein described with reference to and as illustrated in Figure 4 of the accompanying drawings.

14. A stringer tape substantially as herein described with reference to and as illustrated in Figure 5 of the accompanying drawings.

15. A stringer tape substantially as herein described with reference to and as illustrated in Figure 6 of the accompanying drawings.

16. A stringer tape substantially as herein described with reference to and as illustrated in Figure 7 of the accompanying drawings.

17. A stringer tape substantially as herein described with reference to and as illustrated in Figure 8 of the accompanying drawings.

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is formed on the front needle bar. Accordingly, both surfaces of the tape 44 have a sufficient coefficient of friction. The textured yarn 57 is uniformly distributed over the web region 52 and thus presents no areas where resistance to the passage of the sewing needle is locally increased.

In Figure 8, the web region 52 is composed mainly of tricot stitches 58 of non-textured yarn 59 and single cord stitches 60 of textured yarn 61. With this arrangement, the web region 52 is relatively coarse so that it permits smooth penetration of the sewing needle, and will not shrink under the influence of the sewing threads.

WHAT WE CLAIM IS:

1. A sliding clasp fastener stringer comprising fastener elements combined with a warp-knitted stringer tape knitted of synthetic fibre yarns in a plurality of different superimposed patterns, at least one said pattern being formed of textured synthetic fibre yarn alone in at least a middle region of the tape, said one pattern being such that at least some courses have textured synthetic fibre yarn knitted in said one pattern at every needle position in at least said middle region of the tape, at least the other said pattern being knitted of non-textured synthetic fibre yarn alone in at least one edge region of the tape, the tape being knitted so that the middle region is more stretchable than said at least one edge region and so that the textured yarn forms bulges on both tape faces in the middle region of the tape.

2. A stringer tape according to claim 1, in which all the stitch patterns other than said one pattern are formed with said non-textured yarn.

3. A stringer tape according to claim 2, in which said warp-knitted stringer tape has two said edge regions spaced apart from each other, the middle region extends between said spaced edge regions, the non-textured yarn stitch patterns include chain stitches and tricot stitches disposed in said edge regions, and the middle region comprises two of the different patterns of stitches.

4. A stringer tape according to claim 3, in which said two stitch patterns in said middle region are formed with the textured yarn and are selected from the class of stitch patterns

consisting of chain stitches, tricot stitches, and single cord stitches.

5. A stringer tape according to claim 3, in which the middle region includes chain stitches, tricot stitches, and single cord stitches. 55

6. A stringer tape according to claim 3, in which the middle region consists of stitch patterns formed with said textured yarn.

7. A stringer tape according to claim 3, in which each of said edge regions further includes single cord stitches. 60

8. A stringer tape according to claim 1, in which said textured yarn stitch pattern comprises single cord stitches.

9. A stringer tape according to claim 1, in which said warp-knitted structure comprises a double-faced fabric made on two needle bars. 65

10. A stringer tape according to claim 9, in which said one of the different patterns of stitches are formed on one of said two needle bars. 70

11. A stringer tape substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings. 75

12. A stringer tape substantially as herein described with reference to and as illustrated in Figure 3 of the accompanying drawings.

13. A stringer tape substantially as herein described with reference to and as illustrated in Figure 4 of the accompanying drawings. 80

14. A stringer tape substantially as herein described with reference to and as illustrated in Figure 5 of the accompanying drawings. 85

15. A stringer tape substantially as herein described with reference to and as illustrated in Figure 6 of the accompanying drawings.

16. A stringer tape substantially as herein described with reference to and as illustrated in Figure 7 of the accompanying drawings. 90

17. A stringer tape substantially as herein described with reference to and as illustrated in Figure 8 of the accompanying drawings. 95

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