

SPECIFICATION

Sliding Clasp Fastener Stringer

Description:—

The present invention relates to a sliding clasp fastener stringer with a warp-knit stringer tape.

There have been proposed a variety of sliding clasp fastener stringers having warp-knit stringer tapes of synthetic fibers supporting coupling elements thereon. These warp-knit stringer tapes, however, give a greater amount of resistance to the penetration of a sewing needle when sewn to garments than woven stringer tapes. Also, these warp-knit stringer tapes while they are being attached tend to shrink due to displacement and distortion of stitches where the sewing threads pass through, causing the tape edge on which the coupling elements are mounted to get wavy or puckered. Such problems can be avoided by making a central portion of the warp-knit tape where the sewing needle penetrates structurally coarser than the remainder of the tape, to thereby ease the passing of the needle through the tape.

Another problem with these warp-knit stringer tape is that since the tape is knit of multifilaments of synthetic fiber with a view to minimizing the stretch in both warpwise and coursewise directions, the surfaces of the tape are relatively hard and slippery, allowing the tape to slip or shift on the garment on a sewing machine. The tape thus can be mounted out of place and wrinkly. One solution to such slippage has been to include in the tape two different kinds of inlaid wefts, one made of textured yarns and the other of synthetic fibers of high shrinkability, the textured yarns being bulged on a flat surface of the tape by the shrinkage of the synthetic fiber wefts so as to increase a coefficient of friction of the tape as it is held against the garment during sewing operation. The addition of such different inlaid wefts, however, necessarily results in a thickened central tape portion, which will give rise to an increased degree of resistance to the penetration therethrough of a sewing needle.

According to the invention, there is provided, a sliding clasp fastener stringer comprising: a warp-knit stringer tape having a pair of spaced edge portions and a central portion extending between said edge portions, said stringer tape comprising: a first set of yarns forming a knit ground structure containing stitch loops in every course and wale of said tape; a second set of yarns knit in said first knit ground structure, said yarns of the second set comprising textured yarns and forming a second knit ground structure containing stitch loops in every course and every wale of the tape, each lap of each yarn of the second set passing from a stitch loop in one wale to a stitch loop in a non-adjacent wale by crossing at least one intervening wale without forming a stitch loop in said at least one intervening wale, said central portion comprising said first set of yarns and said second set of yarns; a third set of yarns forming a plurality of chains of loops knit in said first and

second ground structures other than in said central portion and extending along wales in at least one of said edge portions; and a fourth set of yarns laid in said first and second ground structures other than in said central portion and extending in and along said last-named wales; and a row of coupling elements mounted on and along said one of the edge portions of the tape.

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

Figure 1 is a point diagram of the patterns by which a plurality of sets of yarns are knit in a stringer tape for a sliding clasp fastener stringer according to a first embodiment of the present invention;

Figures 2A to 2D are point diagrams showing the guide bar movement for the yarns shown in Figure 1;

Figure 3 is a cross-sectional view of the sliding clasp fastener stringer of the present invention;

Figure 4 is a point diagram showing the patterns of sets of yarns in a stringer tape for a sliding clasp fastener stringer according to a second embodiment;

Figure 5 is a point diagram showing the patterns of sets of yarns in a stringer tape for a sliding clasp fastener stringer according to a third embodiment; and

Figure 6 is a point diagram showing the patterns of sets of yarns in a stringer tape for a sliding clasp fastener stringer according to a fourth embodiment.

Figure 1 shows a warp-knit stringer tape 10 having a pair of spaced edge portions 11, 12 on one of which a row of coupling elements is to be mounted, and a central portion 13 extending between the edge portions 11, 12, the tape 10 being adapted to be attached to a garment (not shown) by sewing threads passing through the central portion 13. The tape 10 comprises a knit ground structure formed by a first set of yarns 14 of synthetic fibers knit in the pattern: 1-2/1/0 (Figure 2B), the ground structure thus containing stitch loops 15 in every course and wale of the tape 10. A second set of yarns 16 is knit in the tape ground structure in the pattern: 0-1/4-3 (Figure 2C), each yarn 16 extending coursewise across four wales or three interneedle spaces. The yarns 16 of the second set comprise textured yarns. The first and second sets of yarns 14, 16 extend coursewise for the full width of the tape 10, that is, in both of the edge portion 11, 12 and the central portion 13.

Each of the tape edge portions 11, 12 further includes a third set of yarns 17 (three in the illustrated embodiment) of synthetic fibers knit in the ground structure in the pattern: 1-0/0-1 (Figure 2A). The yarns 17 of the third set form a plurality of chains of loops and extend along three outermost wales 18, 19, and 20 in the edge portion 11 and three outermost wales 21, 22 and 23 in the edge portion 12. Additionally included in each of tape edge portions 11, 12 is a fourth set of yarns 24 (three in the illustrated embodiment)

laid in the ground structure and extending in and along the wales 18, 19, and 20 (21, 22, and 23), the yarns 24 of the fourth set being laid in the pattern: 0-0/1-1 (Figure 2D). A pair of additional yarns 25 in the pattern: 0-0/1-1 are also laid in the ground structure and extend in and along a pair of wales 26, 27, respectively, in the central portion 13 which are next respectively to the wales 20, 21 in the edge portions 11, 12. Such inlaid yarns 24, 25 engage tightly with the stitch loops along the wales 18 to 23 and the wales 26, 27. With the stringer tape 10 thus constructed, the tape edge portions 11, 12 are structurally tight and are resistant to walewise stretch due to inclusion of the inlaid yarns 24. The central portion 13 of the tape 10 has a relatively coarse structure which will facilitate the penetration of a sewing needle therethrough.

Figure 3 illustrates the stringer tape 10 having a row of helically coiled coupling elements 30 with a reinforcing cord 31 extending therethrough, the coupling elements 30 being sewn to one of the edge portions 11 by sewing threads 32 positioned between the wales 18 and 19. The central portion 13 is relatively stretchable walewise and coarsewise, so that the tape 10 will allow itself to be stretched by a pull that a slider (not shown) will impose on the tape 10 during frictional movement along the row of coupling elements 30. The textured yarns 16 make one of the surfaces of the tape 10 relatively roughened, thereby enabling the tape 10 to have a desired degree of softness and bulging which is comparable to that of a garment to which the tape 10 is to be attached, and also thereby preventing the tape 10 from slipping during attachment onto a garment.

A stringer tape 33 of a second embodiment shown in Figure 4 has a pair of spaced edge portions 34, 35 and a central portion 36 extending between the edge portions 34, 35, and is different from the stringer tape 10 of Figure 1 in that there is an additional yarn 37 forming a chain of loops knit in the ground structure and extending along a wale 38 located centrally in the central portion 36. The additional yarn 37 lessens walewise stretch of the central portion 36.

According to a third embodiment illustrated in Figure 5, a stringer tape 40 is substantially similar to the stringer tape 10 of Figure 1 except that a set of yarns 41 is laid in wales in each tape edge portion in the pattern: 0-0/0-0/1-1/1-1.

In Figure 6, a stringer tape 42 of a fourth embodiment differs from the stringer tape 10 shown in Figure 1 in that a set of inlaid yarns 43 is included in wales in each tape edge portion in the pattern: 0-0/1-1/0-0/2-2/1-1/2-2.

Although some preferred embodiments have been shown and described in detail, it should be understood that changes and modifications may be made without departing from the scope of the

appended claims. For example, the inlaid yarns 25 in and along the wales 26, 27 of the tape 10 may be omitted, and the yarns 17 forming chains of loops at the outermost wales 18, 23 may comprise thickened or paralleled yarns. Further, the second set of yarns 16 may be knit in other patterns: 1-0/3-4, 0-1/3-2, or 1-0/2-3, for instance.

70 Claims

1. A sliding clasp fastener stringer comprising: a warp-knit stringer tape having a pair of spaced edge portions and a central portion extending between said edge portions, said stringer tape comprising: a first set of yarns forming a first knit ground structure containing stitch loops in every course and every wale of said tape; a second set of yarns knit in said first knit ground structure, said yarns of the second set comprising textured yarns and forming a second knit ground structure containing stitch loops in every course and every wale of the tape, each lap of each yarn of the second set passing from a stitch loop in one wale to a stitch loop in a non-adjacent wale by crossing at least one intervening wale without forming a stitch loop in said at least one intervening wale, said central portion comprising said first set of yarns and said second set of yarns; a third set of yarns forming a plurality of chains of loops knit in said first and second ground structures other than in said central portion and extending along wales in at least one of said edge portions; and a fourth set of yarns laid in said first and second ground structures other than in said central portion and extending in and along said last-named wales; and a row of coupling elements mounted on and along said one of the edge portions of the tape.

2. A sliding clasp fastener stringer according to claim 1, said first set of yarns being knit in the pattern: 1-2/1-0, and said second set of yarns being knit in the pattern: 0-1/4-3.

3. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being laid in the pattern of 0-0/1-1.

4. A sliding clasp fastener stringer according to claim 1, including another yarn forming a chain of loops knit in said ground structure and extending along a wale located centrally in said central portion.

5. A sliding clasp fastener stringer according to claim 1, including another yarn laid in said ground structure and extending in and along a wale in said central portion which is next to said one of the edge portions.

6. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being knit in the pattern: 0-0/0-0/1-1/1-1.

7. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being knit in the pattern: 0-0/1-1/0-0/2-2/1-1/2-2.



laid in the ground structure and extending in and along the wales 18, 19, and 20 (21, 22, and 23), the yarns 24 of the fourth set being laid in the pattern: 0-0/1-1 (Figure 2D). A pair of additional

- 5 yarns 25 in the pattern: 0-0/1-1 are also laid in the ground structure and extend in and along a pair of wales 26, 27, respectively, in the central portion 13 which are next respectively to the wales 20, 21 in the edge portions 11, 12. Such inlaid yarns
- 10 24, 25 engage tightly with the stitch loops along the wales 18 to 23 and the wales 26, 27. With the stringer tape 10 thus constructed, the tape edge portions 11, 12 are structurally tight and are resistant to walewise stretch due to inclusion of
- 15 the inlaid yarns 24. The central portion 13 of the tape 10 has a relatively coarse structure which will facilitate the penetration of a sewing needle therethrough.

- 20 Figure 3 illustrates the stringer tape 10 having a row of helically coiled coupling elements 30 with a reinforcing cord 31 extending therethrough, the coupling elements 30 being sewn to one of the edge portions 11 by sewing threads 32 positioned between the wales 18 and
- 25 19. The central portion 13 is relatively stretchable walewise and coarsewise, so that the tape 10 will allow itself to be stretched by a pull that a slider (not shown) will impose on the tape 10 during frictional movement along the row of coupling
- 30 elements 30. The textured yarns 16 make one of the surfaces of the tape 10 relatively roughened, thereby enabling the tape 10 to have a desired degree of softness and bulging which is comparable to that of a garment to which the
- 35 tape 10 is to be attached; and also thereby preventing the tape 10 from slipping during attachment onto a garment.

- A stringer tape 33 of a second embodiment shown in Figure 4 has a pair of spaced edge
- 40 portions 34, 35 and a central portion 36 extending between the edge portions 34, 35, and is different from the stringer tape 10 of Figure 1 in that there is an additional yarn 37 forming a chain of loops knit in the ground structure and
- 45 extending along a wale 38 located centrally in the central portion 36. The additional yarn 37 lessens walewise stretch of the central portion 36.

- According to a third embodiment illustrated in Figure 5, a stringer tape 40 is substantially similar
- 50 to the stringer tape 10 of Figure 1 except that a set of yarns 41 is laid in wales in each tape edge portion in the pattern: 0-0/0-0/1-1/1-1.

- In Figure 6, a stringer tape 42 of a fourth embodiment differs from the stringer tape 10
- 55 shown in Figure 1 in that a set of inlaid yarns 43 is included in wales in each tape edge portion in the pattern: 0-0/1-1/0-0/2-2/1-1/2-2.

- Although some preferred embodiments have been shown and described in detail, it should be
- 60 understood that changes and modifications may be made without departing from the scope of the

appended claims. For example, the inlaid yarns 25 in and along the wales 26, 27 of the tape 10 may be omitted, and the yarns 17 forming chains of

65 loops at the outermost wales 18, 23 may comprise thickened or paralleled yarns. Further, the second set of yarns 16 may be knit in other patterns: 1-0/3-4, 0-1/3-2, or 1-0/2-3, for instance.

70 Claims

1. A sliding clasp fastener stringer comprising: a warp-knit stringer tape having a pair of spaced edge portions and a central portion extending between said edge portions, said stringer tape
- 75 comprising: a first set of yarns forming a first knit ground structure containing stitch loops in every course and every wale of said tape; a second set of yarns knit in said first knit ground structure, said yarns of the second set comprising textured
- 80 yarns and forming a second knit ground structure containing stitch loops in every course and every wale of the tape, each lap of each yarn of the second set passing from a stitch loop in one wale to a stitch loop in a non-adjacent wale by crossing
- 85 at least one intervening wale without forming a stitch loop in said at least one intervening wale, said central portion comprising said first set of yarns and said second set of yarns; a third set of yarns forming a plurality of chains of loops knit in
- 90 said first and second ground structures other than in said central portion and extending along wales in at least one of said edge portions; and a fourth set of yarns laid in said first and second ground structures other than in said central portion and
- 95 extending in and along said last-named wales; and a row of coupling elements mounted on and along said one of the edge portions of the tape.

2. A sliding clasp fastener stringer according to claim 1, said first set of yarns being knit in the
- 100 pattern: 1-2/1-0, and said second set of yarns being knit in the pattern: 0-1/4-3.

3. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being laid in the
- 105 pattern of 0-0/1-1.

4. A sliding clasp fastener stringer according to claim 1, including another yarn forming a chain of loops knit in said ground structure and extending
- 110 along a wale located centrally in said central portion.

5. A sliding clasp fastener stringer according to claim 1, including another yarn laid in said ground structure and extending in and along a wale in
- 115 said central portion which is next to said one of the edge portions.

6. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being knit in the
- 120 pattern: 0-0/0-0/1-1/1-1.

7. A sliding clasp fastener stringer according to claim 1, said fourth set of yarns being knit in the
- 120 pattern: 0-0/1-1/0-0/2-2/1-1/2-2.