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(54) IMPROVED SLIDING CLASP FASTENER TAPE

(71) We, YOSHIDA KOGYO K.K., a Japanese Company, of No. 1, Kanda Izumicho, 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:—

This invention relates to sliding clasp fasteners and particularly to stringer tapes of a warp-knitted structure on pairs of which are mounted rows of fastener elements.

There are known various types of warp-knitted tapes for use in the field of sliding clasp fasteners. Warp-knitted tapes of the known type onto which fastener elements are sewn are basically constructed with longitudinally extending chain stitches which form a multiplicity of wales and transversely extending lapping threads laid in to connect the wales coursewise so as to solve the inherent problem of "stretch" in the knitted fabric which occurs when subjected to external stresses exerted in normal use of the sliding clasp fastener. With this prior art warp-knitted tapes, the arrangement of the laid-in lapping threads at the element-supporting tape edge is that the lapping threads form U-turns in every two courses at the outermost wale adjacent to a line of sewing stitches which secures the fastener elements to the tape edge. In other words, the element-supporting tape edge includes a first group of courses where lapping threads are located and a second group of courses free of lapping threads, the second courses tending to yield themselves at the tape edge portion to a greater stretch widthwise than the first courses when lateral stresses are exerted on the tape fabric.

This has led to the drawback that the sewing stitches run longitudinally across and pass through these two different groups of courses at the element-supporting edge, thereby creating irregularities in the positional stability of a row of fastener elements secured to the tape edge during the use of the sliding clasp fastener. The prior art tape structures are therefore prone to reduce the mechanical strength of the resulting sliding clasp fastener against stresses tending to bend or split apart the coupled sliding clasp fastener.

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One solution to this drawback would be to see to it that the sewing needle passes exactly through only the courses at the tape edge where the inlaid lapping threads are devoid and that the sewing pitch registers with such courses. However, it would be difficult to reduce this proposal to practice when taking into account the inherent flexibility and stretch of the knitted tape and the shape of a given fastener element.

According to the invention, there is provided a stringer tape of a warp-knitted structure on which is mounted a row of fastener elements capable of interlocking with a row of the same elements on a second tape, comprising a web portion and a marginal edge portion to which the row of interlocking fastener elements is secured by a line of sewing stitches, said marginal edge portion including an outermost wale comprised of a chain of stitches formed in a warp thread extending outwardly of said line of stitches and tricot stitches connecting said outermost wale to said web portion in each course, and said line of stitches passing through sinker loops of said tricot stitches interconnecting said outermost wale and said web portion.

The invention will be described by way of examples with reference to the accompanying drawings which illustrate by way of example some preferred embodiments, and in which like reference characters or numerals refer to like parts throughout the several views, and wherein:

Figure 1 is an enlarged view diagrammatically illustrating the construction of the reverse side of a warp-knitted tape in accordance with an embodiment of the invention;

Figure 2 is a diagram showing the structure of the warp-knitted tape shown in Figure 1;

Figure 3 is a view similar to Figure 2, but showing the structure of another embodiment of the invention;

Figure 4 is a diagram utilized to explain the lay of a tricot stitch provided in accordance with another embodiment of the invention; and

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Figure 5 is a view similar to Figure 4, but showing still another embodiment.

Referring now to the drawings and Figures 1 and 2 in particular, there is shown a warp-knitted tape 10 for use as a support for mounting thereon fastener elements. The warp-knitted tape 10 of this invention is formed with longitudinally extending chains of stitches formed in warp threads forming respective chains of stitches $S_1, S_2, S_3 \dots S_n$ and two kinds of tricot stitches or formations $T_1, T_2 \dots T_n$ and $T'_1, T'_2 \dots T'_n$ connecting the chain stitches S coursewise. Designated at $W_1, W_2, W_3 \dots W_n$ are wales which are formed principally by the chains of stitches S and $C_1, C_2, C_3 \dots C_n$ are courses which indicate rows of loops L extending transversely of and across the tapes 10. The tape 10 includes a web portion 11 and a marginal edge portion 12 to which a row of fastener elements 13 is secured in an interwale groove G_1 along a line $X-X$.

A first tricot stitch T_1 at the marginal edge portion 12 is interknitted alternately with the wales W_1 and W_2 in successive courses to provide needle loops such as at 15, 16 and 17 at the outermost wale W_1 in the courses C_1, C_3 and C_5 , respectively. A second tricot stitch T'_1 at the marginal edge portion 12 is interknitted alternately with the wales W_1 and W_2 in successive courses to provide needle loops such as at 18 and 19 at the outermost wale W_1 in the courses C_2 and C_4 , respectively. In order to produce this tricot stitch pattern, the yarn guide bar (not shown) for the tricot stitch T'_1 is moved in a direction opposite to the yarn guide bar (not shown) for the tricot stitch T_1 . As seen in Figures 1 and 2, the outermost wale W_1 is thus connected to the wales W_2 and W_3 only by the tricot stitches T_1 and T'_1 in each course without using any transversely extending lapping threads as used in the conventional warp-knitted fastener tapes. It will be appreciated that the interwale groove G_1 through which the sewing stitch 14 passes is formed by the sinker loops 20 and 21 of the tricot stitches T_1 and T'_1 , respectively, which sinker loops are uniformly distributed in crossing relation with each other within the groove G_1 throughout the full length of the tape 10. Designated at reference numeral 22 are additional reinforcing warp threads laid-in along the wales W in a direction to close the open laps of the loops L to prevent the tape 10 from stretching in the warpwise direction. Alternatively, the reinforcing warp threads 22 may be inserted linearly in the interwale grooves G and held in position by the sinker loops as at 20 and 21 of the tricot stitches T_1 and T'_1 . However, for the ultimate purpose of the invention, these warp threads may be dispensed with.

Another embodiment shown in Figure 3 is

substantially the same as the first embodiment with the exception that the wales W_1 and W_2 at the marginal edge portion 23 are interconnected by tricot stitches T_1 and T'_1 . The tricot stitch T_1 has the same lay as that of the first embodiment depicted in Figures 1 and 2, whereas the tricot stitch T'_1 is interknitted with the wales W_1 and W_2 in a symmetrical relation to the pattern of the tricot stitch T_1 . Thus, the wale W_1 extending outwardly of a line $Y-Y$ along which sewing stitches 14 pass is connected to the wale W_2 by the tricot stitches T_1 and T'_1 in each course.

Figures 4 and 5 each show respectively the lay of another arrangement of tricot stitch which connects the outermost wale to an inner wale. In each of these embodiments, the tricot stitch extends transversely across four wales to connect the outermost wale to the fourth wale in.

It will be appreciated that the interwale groove G_1 adapted for the passage of the sewing needle is defined between the outermost wale W_1 in the tape edge and an adjoining wale W_2 , which wales are interconnected solely by tricot sinker loops in each course, the arrangement being that the sewing needle can be directed to and through any optional position of the interwale groove G_1 irrespective of the position of the courses with the result that the sewing stitches are secured relative to the tape edge with uniform stability and all individual fastener elements are affixed to the tape edge with uniform strength throughout the entire tape length.

This in turn ensures uniform positional stability of the secured fastener elements 13 throughout the full length of the sliding clasp fastener against possible partial displacement which might occur under severe external stresses tending to bend or split apart the coupled sliding clasp fastener. Another advantage is that the interwale grooves at the element-supporting edge are formed with tricot sinker loops which impart moderate flexibility to the wales W_1 and W_2 such that they may move transversely relative to each other to facilitate the passage of the sewing needle therebetween during the sewing operation. In accordance with the invention, therefore, the sewing needle can be directed to and through any optional position of the interwale groove of the tape without having regard to the courses and hence, the speed of sewing the fastener elements to the tape can be increased manifold. Since the wales W_2 and W_3 are also interconnected solely by the tricot stitches, the sewing stitches may be directed alternatively through a second interwale groove G_2 along a line $X'-X'$ (Figures 1 and 2) or a line $Y'-Y'$ (Figure 3). The web portion 11 or 24 may be formed with stitches different from those used in the marginal edge portions 12 and 23.

(12)

WHAT WE CLAIM IS:—

1. A stringer tape of a warp-knitted structure on which is mounted a row of fastener elements capable of interlocking with a row of the same elements on a second tape, comprising a web portion and a marginal edge portion to which the row of interlocking fastener elements is secured by a line of sewing stitches, said marginal edge portion including an outermost wale comprised of a chain of stitches formed in a warp thread extending outwardly of said line of stitches and tricot stitches connecting said outermost wale to said web portion in each course, and said line of stitches passing through sinker loops of said tricot stitches interconnecting said outermost wale and said web portion.
2. A stringer tape as defined in Claim 1, wherein said tricot stitches comprise a first tricot stitch formation and a second tricot stitch formation, said first tricot stitch formation being interknitted alternately with said outermost wale and the adjoining or second wale extending inwardly of said line of stitches in successive courses, and said second tricot

stitch formation being interknitted alternately with said outermost wale and a third wale extending inwardly of said second wale in successive courses, the two tricot stitch formations being such that the outermost wale is interknitted alternately with the two tricot stitch formations in successive courses.

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

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

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

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

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