

PATENT SPECIFICATION

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(54) IMPROVED SLIDING CLASP FASTENER TAPE

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at 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 for mounting thereon rows of interlocking fastener elements.

There are known various types of warp-knitted tapes for use in the field of sliding clasp fasteners or zippers. Warp-knitted tapes of the known types 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. However, due primarily to their structural characteristics, the known types of knitted tapes are known to be inferior to woven fabric tapes in respect of mechanical strength and dimensional stability and hence are not suitable per se for use in holding rows of fastener elements stably in position. Certain advanced knitted tapes for use in the art of sliding clasp fasteners have incorporated additional threads with a view to reinforcing the tape structure to prevent the affixed rows of fastener elements from shifting out of their properly aligned position. However, such prior-art knitted tapes have not completely solved the inherent problem of "stretch" in the knitted fabric which occurs warpwise or weftwise when it is subjected to external stresses exerted in normal use of the sliding clasp fastener. Furthermore, during the course of manufacture of sliding clasp fasteners, dimensional errors have often arisen in a given length of fastener tape of a knitted structure such that the fastener elements would fail to be affixed thereto in the proper alignment.

According to the invention, there is provided a warp-knitted tape for sliding clasp fasteners which comprises longitudinally extending chain stitches having needle loops and

forming wales, tricot stitches interknitted therewith and having needle loops and sinker loops, transversely extending lapping threads laid over and across a plurality of wales and having U-turns located at points adjacent the needle loops of said chain stitches in each course, said transverse lapping threads extending over the needle loops of said chain stitches and the needle loops of said tricot stitches and passed under the sinker loops of said tricot stitches, and warp threads extending along and within the needle loops of said chain stitches and passed over the needle loops of said tricot stitches in a direction to close the open ends of the needle loops of said chain stitches in each course for holding said lapping threads to said chain and tricot stitches.

By "sinker loop" there is meant a loop between successive needle loops in each wale, in the case of chain stitches, and the part of the thread crossing over from wale to wale, in the case of tricot stitches.

By "needle loop" is meant a loop (of a chain stitch) interknitted as one loop with a loop of a tricot stitch.

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

Figure 1 is a diagram showing a warp-knitted tape constructed in accordance with a first embodiment of the invention;

Figure 2 is an exploded view utilized to explain the lay of each of the component threads employed in the tape of Figure 1;

Figure 3 is an enlarged view diagrammatically illustrating the construction of the reverse side of the tape of Figure 1 with a continuous coupling element sewn onto a marginal edge of the tape;

Figure 4 is a diagram showing another embodiment of the invention;

Figure 5 is an exploded view utilized to explain the lay of each of the component threads forming the tape of Figure 4;

Figure 6 is a diagram showing a further embodiment of the invention; and

Figure 7 is an enlarged view diagrammatically illustrating the reverse side of the tape of Figure 6 with a continuous coupling ele-

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ment mounted thereon. Like reference characters denote like parts throughout the several views.

Referring now to the drawings and Figure 1 in particular, there is shown a warp-knitted tape 10 for use as a support for mounting fastener elements. In this first embodiment of the invention, the tape 10 is basically constructed with longitudinally extending chain stitches $C_1, C_2, C_3 \dots C_n$ and tricot stitches $T_1, T_2, T_3 \dots T_n$ interknitted therewith. Designated at $W_1, W_2, W_3, W_4, W_5 \dots W_n$ are the wales which are formed by the chain stitches C and at $G_1, G_2, G_3 \dots G_n$ are the interwale grooves which are formed between adjacent wales W . As shown in Figure 2, the chain stitch C is knitted in the lay of 1-0/0-1 and the tricot stitch T in the lay of 1-2/1-0.

The longitudinally extending chain stitches $C, C_1, C_2, C_3, \dots, C_n$ have respective needle loops $Y, Y_1, Y_2, Y_3, \dots, Y_n$, and the tricot stitches $T, T_1, T_2, T_3, \dots, T_n$ have respective needle loops $N, N_1, N_2, N_3, \dots, N_n$ and sinker loops $S, S_1, S_2, S_3, \dots, S_n$.

Into this basic warp-knitted structure are incorporated transversely extending lapping threads $L_1, L_2, L_3 \dots L_n$ which are laid over and across a plurality of wales W uniformly throughout the entire length of the tape 10. In the first embodiment shown in Figures 1 to 3, lapping threads L are arranged to extend transversely across every four wales, i.e. the first lapping thread L_1 assigned to wales W_1, W_2, W_3 and W_4 , the second lapping thread L_2 to wales W_2 to W_5 and so on. Each lapping thread L has opposite U-turns U_1 and U_2 located in direct adjacency to needle loops Y where the chain stitches C are interknitted with the tricot stitches T .

The transverse lapping threads $L, L_1, L_2, L_3, \dots, L_n$ extend over the needle loops Y of the chain stitches $C, C_1, C_2, C_3, \dots, C_n$ and the needle loops $N, N_1, N_2, N_3, \dots, N_n$ of the tricot stitches $T, T_1, T_2, T_3, \dots, T_n$ and pass under the sinker loops $S, S_1, S_2, S_3, \dots, S_n$ of said tricot stitches.

Designated at $Z_1, Z_2, Z_3 \dots Z_n$ are warp-threads each extending along and within the respective wales W . More specifically, as viewed from the reverse side of the tape 10 shown in Figure 3, the warp threads $Z, Z_1, Z_2, Z_3, \dots, Z_n$ extend along and within the needle loops Y of the chain stitches $C, C_1, C_2, C_3, \dots, C_n$ and pass over the needle loops $N, N_1, N_2, N_3, \dots, N_n$ of the tricot stitches $T, T_1, T_2, T_3, \dots, T_n$ in a direction to close the open ends of the chain loops Y . At the same time, the warp-threads Z cooperate with the chain stitches C in holding therebetween the lapping threads L that run in parallel across the tape 10. As a result, there is provided a highly intimately interknitted tape structure suitable for supporting thereon a row of fastener elements E in the

manner shown in Figure 3 wherein the fastener elements E are secured by a line of stitching 11 to one longitudinal edge of the tape 10. In the first embodiment described, it will be seen that the endmost wale W_1 is formed by a thread substantially thicker and stronger than the rest of the wale-forming threads or chain stitches C , so that the necessity of arranging the warp thread Z thereat is obviated.

There is shown in Figures 4 and 5 another warp-knitted tape embodying the invention, which is substantially similar to the first embodiment in that there are chain stitches C interknitted with tricot stitches T to form a basic warp-knitted structure. To this structure are added transverse lapping threads L which are laid over and across every three wales W as better seen in the knitting pattern of Figure 5. The warp-threads Z are as also seen in Figure 5, passed longitudinally of the tape 10 around the needle loops Y at every two courses and knitted to the chain stitches C thereat, the arrangement being that the lapping threads L are kept properly taut by and stabilized in position between the warp-threads Z , chain stitches C and tricot stitches T .

A third embodiment shown in Figures 6 and 7 is substantially the same as the first embodiment with the exception that the warp-threads Z are interconnected simultaneously with the needle loops Y of chain stitches C and tricot stitches T at each course. This warp-knitted structure is characterized by the provision of chain stitches C and tricot stitches T that are both oriented substantially linearly in the longitudinal direction under the influence of tension applied by the warp-threads Z as illustrated in Figure 7, while the corresponding stitches in the first and second embodiment remain unaffected by the warp-threads Z .

In each of the foregoing embodiments of the invention, it will be seen that the height of wales W is increased by the use of warp-threads Z on one surface of the tape 10 so that the line of stitching 11 securing the fastener elements E to the tape 10 may be completely submerged in the interwale grooves G while the other surface of the tape 10 is rendered substantially flat as seen in Figures 3 and 7.

Each of the above-described warp-knitted tapes is constructed intimately and tightly as a whole by virtue of the warp-threads Z which, being laid in to connect both the needle loops of the chain stitches C and the sinker loops of the tricot stitches T , will pull and keep the latter taut warpwise and at the same time will hold the lapping threads L to the chain and tricot stitches. Consequently, the warp-knitted tape 10 provided in accordance with the invention is highly resistant to warp-wise and weft-wise stretch, comparable to woven fabric

tapes, as desired in the art of sliding clasp fasteners.

WHAT WE CLAIM IS:—

- 5 1. A warp-knitted tape for sliding clasp fasteners which comprises longitudinally extending chain stitches having needle loops and forming wales, tricot stitches interknitted therewith and having needle loops and sinker loops, transversely extending lapping threads
- 10 laid over and across a plurality of wales and having U-turns located at points adjacent the needle loops of said chain stitches in each course, said transverse lapping threads extending over the needle loops of said chain
- 15 stitches and the needle loops of said tricot stitches and passed under the sinker loops of said tricot stitches, and warp threads extending along and within the needle loops of said chain stitches and passed over the needle loops
- 20 of said tricot stitches in a direction to close the open ends of the needle loops of said chain stitches in each course for holding said lapping threads to said chain and tricot stitches.

2. A warp-knitted tape as claimed in claim 1 wherein said warp threads are passed longitudinally of the tape around the needle loops of said chain stitches and the needle loops of said tricot stitches at every two courses.

3. A warp-knitted tape as claimed in claim 1 wherein said warp threads are laid in to connect the needle loops of said chain stitches and the sinker loops of said tricot stitches.

4. A warp-knitted tape substantially as herein described with reference to and as illustrated in Figures 1 to 3 of the accompanying drawings.

5. A warp-knitted tape substantially as herein described with reference to and as illustrated in Figures 4 and 5 of the accompanying drawings.

6. A warp-knitted tape substantially as herein described with reference to and as illustrated in Figures 6 and 7 of the accompanying drawings.

MARKS & CLERK,
Chartered Patent Agent(s),
Agents for the Applicant(s).

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2. A warp-knitted tape as claimed in claim 1 wherein said warp threads are passed longitudinally of the tape around the needle loops of said chain stitches and the needle loops of said tricot stitches at every two courses.

3. A warp-knitted tape as claimed in claim 1 wherein said warp threads are laid in to connect the needle loops of said chain stitches and the sinker loops of said tricot stitches.

4. A warp-knitted tape substantially as herein described with reference to and as illustrated in Figures 1 to 3 of the accompanying drawings.

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