

PATENT SPECIFICATION

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(54) A WARP-KNITTED TAPE FOR SLIDING CLASP FASTENERS

(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:—

10 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.

15 There are known various types of warp-knitted tapes for use in the field of sliding clasp fastener. Warp-knitted tapes of the known type 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 knitted tapes are known to be inferior to woven fabric tapes in respect of the qualities of mechanical strength and dimensional stability; that is, they have the inherent problem of "stretch" which occurs warpwise or weftwise when they are subjected to external stresses exerted in normal use of the sliding clasp fastener.

Many attempts have been made to eliminate the above problem and have proven successful to some extent in providing knitted fastener tapes which are rendered resistant to such stretch and which have a longitudinal marginal edge portion thickened or otherwise reinforced with use of a filling core so as to stabilize the position of fastener elements mounted thereon. However, the knit structure of the marginal edge portion of the prior-art tape is not sufficiently tight to retain the fastener elements in position over extended periods of use, the result being that the fastener elements be-

come displaced or detached from their support tape under the influence of severe stresses applied in normal use of the sliding clasp fastener. This tendency is pronounced with the type of fastener elements which is designed to be mounted astride of the marginal edge of the knitted tape because such edge is not configured to conform with the shape of the legs of each element. Due to the coarse structure of the marginal edge portion of the knitted tape, the filling core inserted therealong is also prone to shift out of place longitudinally of the tape.

According to the invention, there is provided a warp-knitted tape adapted to form a stringer tape of at least one sliding clasp fastener, the tape comprising a web portion and a marginal edge portion extending lengthwise of the web portion, the marginal edge portion being adapted to support a row of fastener elements, said web portion comprising a plurality of wales formed by chain stitches having closed laps alternating with open laps along each said wale, said web portion also comprising tricot stitches and transversely extending lapping threads, said tricot stitches being interknitted with said chain stitches, said transversely extending lapping threads each being laid over and across a plurality of wales of the web portion, each lapping thread having opposite U-turns, each said U-turn being at a location where a chain stitch is interknitted with a tricot stitch, said marginal edge portion comprising two layers of tricot stitches formed by a double-row needle arrangement and extending across a plurality of wales of said marginal edge portion, an outermost one of said transversely extending lapping threads of the web portion being stronger than at least the majority of the remainder of said lapping threads, said outermost lapping thread interconnecting said web portion and said marginal edge portion.

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The invention will be described by way of example with reference to the accompanying drawing, which illustrates by way of example a warp-knitted tape forming a preferred embodiment of the invention.

There is shown a warp-knitted tape 10 which comprises a web portion 11 which occupies most of the width of the tape and a longitudinal marginal edge portion 12 to which a row of fastener elements (not shown) is to be secured, edge portion 12 extending lengthwise of web portion 11. It will be seen that a plurality of these tapes are interconnected widthwise and knitted simultaneously in parallel relation to facilitate mass production. In the drawing, the dots indicating the needles of the two (i.e. front and back) bars of the warp-knitting machine are respectively referenced "F" and "B".

The web portion 11 is constructed basically with chain stitches 13 which form longitudinally extending wales *W* and tricot stitches 14 interknitted therewith. Into this basic warp-knitted structure are incorporated transversely extending lapping threads 15 which are laid over and across a plurality of wales *W* of web portion 11 uniformly throughout the entire length of the tape 10. Each lapping thread 15 has opposite U-turns 15', each said U-turn being at a location where a chain stitch 13 is interknitted with a tricot stitch 14. It is to be noted that the chain stitches 13 have closed laps 13a alternating with open laps 13b along each wale *W* of web portion 11. Advantageously, this should render the knitting operation much easier than if the chain stitches 13 were formed with closed laps alone. Another advantage is that the resulting tape web 11 is on one hand quite resistant to stretch and on the other retains a soft, flexible feel characteristic of a knitted fabric, this being due to the combined effects of the open laps 13b which are relatively stable with regard to warpwise stretch and the closed laps 13a which serve to tighten the loop-forming threads.

The longitudinal marginal edge portion 12 of the tape 10, which is adapted to carry a row of fastener elements, is comprised of a double layer of tricot stitches 16 extending across a plurality of wales *W*, preferably four wales *W*₁ to *W*₄ as shown, of marginal edge portion 12. This double tricot formation is effected as by means of a double-row needle arrangement known per se whereby a first group of tricot stitches 16a are knitted in the lay of 4-6/2-0/4-6/-2-0 and a second group of tricot stitches 16b in the lay of 2-0/4-6/2-0/4-6, with respective needle loops 17, 18, 19 and 20 intercrossed with corresponding sinker loops 17', 18', 19' and 20'. This knit structure is intended to render the marginal edge portion

(12) of the tape 10 thickened and strong. It will be also noted that the density of the loop formation is increased at the marginal edge portion 12, particularly at the region where the needle loops 18 and 19 are more frequently intercrossed with the sinker loops 17', 18', 19' and 20', so that advantageously a filling core 21 can be stably fixed in position between the needle loops 18 and 19. The use of such filling core 21 will cause the marginal edge portion 12 to become more thickened with its cross section substantially round as desired for the purpose of securing the legs of each fastener element to the thickened edge.

The web and edge portions 11 and 12 are interconnected by an outermost lapping thread 15a having a strength two or three times that of each of the remaining lapping threads along the borderline at which the intersection of an outermost chain stitch 13c and an outermost tricot stitch 14a is overlapped with the intersection of needle loop 17 in the double tricot region. This arrangement ensures that the fastener elements are clamped into position on the tape 10 with greater stability.

Designated at 22 is a chain stitch extending along an extreme edge or selvage opposite to the edge 12 of the tape 10, which chain stitch is thicker and stronger than the rest of the knit threads (i.e. the chain stitch and tricot stitch threads), so as to reduce the tendency of the selvage to become curled or otherwise flexed.

There may be used different qualities of knitting threads in the tape 10. The web portion 11 of the tape 10 may be formed for example of polyester, nylon or other synthetic fibre yarns, whilst the marginal edge portion 12 is knitted with spun yarns, so that the resulting tape can be adapted particularly for the attachment of metal fastener elements by clamping. If the marginal edge portion 12 is formed alternatively for example of nylon threads, the resulting tape will be suitable particularly for mounting the fastener elements by injection-moulding direct to the edge portion 12.

In order to increase the rate of production of the warp-knitted fastener tapes 10, a plurality of these tapes can be knitted simultaneously in parallel relationship and separated into individual unit tapes by either cutting the connecting threads 23 or dissolving the same if they are made of water-soluble material.

WHAT WE CLAIM IS:—

1. A warp-knitted tape adapted to form a stringer tape of at least one sliding clasp fastener, the tape comprising a web portion and a marginal edge portion extending lengthwise of the web portion, the marginal edge portion being adapted to support a row of fastener elements, said web portion com-



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prising a plurality of wales formed by chain
stitches having closed laps alternating with
open laps along each said wale, said web
portion also comprising tricot stitches and
transversely extending lapping threads, said
tricot stitches being interknitted with said
chain stitches, said transversely extending
lapping threads each being laid over and
across a plurality of wales of the web por-
tion, each lapping thread having opposite
U-turns, each said U-turn being at a location
where a chain stitch is interknitted with a
tricot stitch, said marginal edge portion
comprising two layers of tricot stitches
formed by a double-row needle arrangement
and extending across a plurality of wales of
said marginal edge portion, an outermost
one of said transversely extending lapping
threads of the web portion being stronger
than at least the majority of the remainder
of said lapping threads, said outermost
lapping thread interconnecting said web
portion and said marginal edge portion.

2. A warp-knitted tape as claimed in
claim 1 wherein said innermost lapping
thread is stronger than any of the remainder
of said lapping threads.

3. A warp-knitted tape as claimed in

claim 1 or 2 wherein said two layers of
tricot stitches extend across four wales of
said marginal edge portion.

4. A warp-knitted tape as claimed in
claim 1, 2 or 3 wherein a filling core is
inserted into said marginal edge portion
substantially centrally of said marginal edge
portion.

5. A warp-knitted tape as claimed in
any preceding claim wherein a series of
said chain stitches extending along the
edge of the tape opposite to said marginal
edge portion is formed with one or more
threads thicker and stronger than at least
the majority of the rest of the knit threads.

6. A warp-knitted tape substantially as
herein described with reference to and as
illustrated in the accompanying drawing.

7. A sliding clasp fastener comprising
two stringer tapes each of which is a warp-
knitted tape as claimed in any preceding
claim, and two rows of interlockable
fastening elements each supported by the
marginal edge portion of a respective one of
the tapes.

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