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(54) A SLIDING CLASP FASTENER HAVING THERMOPLASTIC RESIN COMPONENT PARTS

(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:—

This invention relates to sliding clasp fasteners and more particularly to a slider-operated sliding clasp fastener having a pair of stringer tapes constructed with a warp-knitted structure. The invention is directed to the provision of a firm bond between the stringer tapes and various component parts.

The term "component part" or the plural form thereof as employed herein in relation to a sliding clasp fastener is intended to refer to opposed rows of interlockable fastener elements or teeth, and/or a top end stop and/or a bottom end stop, each of said fastener elements or teeth and each of said end stops being made of a thermoplastic resin material such for example as polyethylene, polypropylene, polyvinyl chloride and the like.

Sliding clasp fasteners are known which comprise woven stringer tapes carrying the aforesaid component parts. In such sliding clasp fasteners, however, the component parts were bonded in place to two woven stringer tapes in such a manner that they were either deposited on exposed surfaces of the tapes or permeated only through part of the surface layers of the tapes. These sliding clasp fasteners have therefore suffered from the drawback that the component parts are liable to move out of place or become detached from the stringer tapes after repeated use of the fastener.

The present invention seeks to provide a sliding clasp fastener having stringer tapes

of a knitted structure and being characterized by the provision of a firm stable bond of the component part (as defined above) to the supporting stringer tapes.

Accordingly, the present invention consists in a sliding clasp fastener having a component part (as defined above) which is disposed at corresponding one faces of a pair of oppositely disposed stringer tapes of a warp-knitted structure including wales, the thermoplastic resin material of which said part is made extending into and through the interstices between adjacent threads of said structure and reaching the wales of said structure at the corresponding other faces of said tapes, thereby filling said interstices and creating a firm and stable bond between said tapes and said component part. The bottom end stop may be of the separable type.

In addition to said component part, there may be disposed at said corresponding one faces a pair of stabilizing strips of thermoplastic resin material which is fused to that of said component part, the material of said strips also extending into and through the interstices between the adjacent threads of said structure and reaching the wales of said structure at the corresponding other faces of said tapes, thereby filling said interstices and creating a firm and stable bond between said strips and said tapes.

The present invention will now be more particularly described with reference to the accompanying drawings which illustrate by way of example certain preferred embodiments and in which:—

Figure 1 is a plan view of a stringer tape carrying along one longitudinal edge thereof a row of fastener elements or teeth;

Figure 2 is a transverse cross-sectional view taken on the line II-II of Figure 1;

Figure 3 is a plan view of a stringer tape having provided thereon a top end stop;

Figure 4 is a transverse cross-sectional view taken on the line IV-IV of Figure 3;

Figure 5 is a plan view of a pair of coupled stringer tapes having provided thereon a bottom end stop;

Figure 6 is a transverse cross-sectional view taken on the line VI-VI of Figure 5;

Figure 7 is a plan view of a pair of coupled stringer tapes having provided thereon a separable type of bottom end stop; and

Figure 8 is a transverse cross-sectional view taken on the line VIII-VIII of Figure 7.

Like reference characters or numerals are used to designate like parts throughout the several views.

Referring now to Figures 1 and 2, there is diagrammatically shown a fastener stringer tape 10 of a warp-knitted structure consisting for example of wale-forming threads or chain stitches, tricot stitches and transverse laid-in stitches formed on a three-bar knitting machine. This embodiment is concerned with a component part (as defined above) which is a row of fastener elements or teeth E made of thermoplastic resin material 11 of the class above mentioned and arranged in discrete formation and intended, in use of the fastener, to be interlocked with an opposed row of said fastener elements or teeth (not illustrated). The fastener elements E are attached to a flat face 12 of the tape 10, as better shown in Figure 2, by means of extrusion or injection moulding whereby the thermoplastic material 11 in molten condition penetrates into and through interstices 13 between adjacent knitted threads 14 of the tape 10 and fills in the interstices 13. Importantly, according to the invention, the molten thermoplastic resin material 11 forms a firm, stable bond with the tape 10 by filling said interstices and by reaching wales 15 at the opposite face 16 of said tape.

In order to further stabilize the position of the fastener elements E on the tape 10, there may be provided an elongated strip 17 of thermoplastic resin material 11 extending along a longitudinal edge of the tape 10 and secured thereto together with the fastener elements E by extrusion or injection process in the manner described. With the fastener elements E and the stabilizing strip 17 thus firmly anchored in place on the stringer tape 10, the elements E can be engaged with and disengaged from those on a companion stringer tape (not shown) and can be retained in position against displacement for extended periods of service time, with increased stability; thus overcoming the problem of weakness of the knitted fabric.

The embodiment shown in Figures 3 and

4 is directed to the provision of a top end stop 18 made of a similar thermoplastic resin material 11 which is attached to the stringer tape 10 by means for example of high-frequency heating or supersonic process. The top end stop 18 is conventional in form and shown fused to the fastener elements E which are secured by stitching S to the tape 10. The material 11 of the top end stop 18 extends, as can be seen in Figure 4, into and through the interstices 13 in order to fill said interstices and also reaches the wales 15 in the manner explained with reference to Figures 1 and 2.

Figures 5 and 6 illustrate the invention as applied to a bottom end stop 19 of conventional form which bridges and is fused to the interengaged fastener elements E and is bonded to the tape 10 by the material 11 of said stop 19 filling the interstices 13 and reaching the wales 15 of the knitted tape 10.

The embodiment shown in Figures 7 and 8 is concerned with a separable bottom end stop 20 to which the principles of the invention are applied. This end stop is also made of thermoplastic material and is of conventional construction including a pin member 20a and a box member 20b. A stabilizing strip 21 made of thermoplastic resin material is attached together with these members to each of the oppositely disposed stringer tapes 10. The strips 21 and the stop 20 can be attached to the tape 10 by means of high-frequency heating, supersonic process or with heat and pressure in the well-known manner. In this embodiment also, it is important that the material 11 of the strips 21 flows with that of the end stop 20 into and through the interstices 13 of the tape 10 and to reach the wales 15 for the reasons already stated above with reference to Figures 1 to 6. The attachment of this separable end stop 20 and the reinforcing film 21 to the tapes 10 may be made by injection moulding as will be readily apparent to those skilled in the art.

WHAT WE CLAIM IS:—

1. A sliding clasp fastener having a component part (as defined above) which is disposed at corresponding one faces of a pair of oppositely disposed stringer tapes of a warp-knitted structure including wales, the thermoplastic resin material of which said part is made extending into and through the interstices between adjacent threads of said structure and reaching the wales of said structure at the corresponding other faces of said tapes, thereby filling said interstices and creating a firm and stable bond between said tapes and said component part.



Figure 4 is a transverse cross-sectional view taken on the line IV-IV of Figure 3;

Figure 5 is a plan view of a pair of coupled stringer tapes having provided thereon a bottom end stop;

Figure 6 is a transverse cross-sectional view taken on the line VI-VI of Figure 5;

Figure 7 is a plan view of a pair of coupled stringer tapes having provided thereon a separable type of bottom end stop; and

Figure 8 is a transverse cross-sectional view taken on the line VIII-VIII of Figure 7.

Like reference characters or numerals are used to designate like parts throughout the several views.

Referring now to Figures 1 and 2, there is diagrammatically shown a fastener stringer tape 10 of a warp-knitted structure consisting for example of wale-forming threads or chain stitches, tricot stitches and transverse laid-in stitches formed on a three-bar knitting machine. This embodiment is concerned with a component part (as defined above) which is a row of fastener elements or teeth E made of thermoplastic resin material 11 of the class above mentioned and arranged in discrete formation and intended, in use of the fastener, to be interlocked with an opposed row of said fastener elements or teeth (not illustrated). The fastener elements E are attached to a flat face 12 of the tape 10, as better shown in Figure 2, by means of extrusion or injection moulding whereby the thermoplastic material 11 in molten condition penetrates into and through interstices 13 between adjacent knitted threads 14 of the tape 10 and fills in the interstices 13. Importantly, according to the invention, the molten thermoplastic resin material 11 forms a firm, stable bond with the tape 10 by filling said interstices and by reaching wales 15 at the opposite face 16 of said tape.

In order to further stabilize the position of the fastener elements E on the tape 10, there may be provided an elongated strip 17 of thermoplastic resin material 11 extending along a longitudinal edge of the tape 10 and secured thereto together with the fastener elements E by extrusion or injection process in the manner described. With the fastener elements E and the stabilizing strip 17 thus firmly anchored in place on the stringer tape 10, the elements E can be engaged with and disengaged from those on a companion stringer tape (not shown) and can be retained in position against displacement for extended periods of service time, with increased stability; thus overcoming the problem of weakness of the knitted fabric.

The embodiment shown in Figures 3 and

4 is directed to the provision of a top end stop 18 made of a similar thermoplastic resin material 11 which is attached to the stringer tape 10 by means for example of high-frequency heating or supersonic process. The top end stop 18 is conventional in form and shown fused to the fastener elements E which are secured by stitching S to the tape 10. The material 11 of the top end stop 18 extends, as can be seen in Figure 4, into and through the interstices 13 in order to fill said interstices and also reaches the wales 15 in the manner explained with reference to Figures 1 and 2.

Figures 5 and 6 illustrate the invention as applied to a bottom end stop 19 of conventional form which bridges and is fused to the interengaged fastener elements E and is bonded to the tape 10 by the material 11 of said stop 19 filling the interstices 13 and reaching the wales 15 of the knitted tape 10.

The embodiment shown in Figures 7 and 8 is concerned with a separable bottom end stop 20 to which the principles of the invention are applied. This end stop is also made of thermoplastic material and is of conventional construction including a pin member 20a and a box member 20b. A stabilizing strip 21 made of thermoplastic resin material is attached together with these members to each of the oppositely disposed stringer tapes 10. The strips 21 and the stop 20 can be attached to the tape 10 by means of high-frequency heating, supersonic process or with heat and pressure in the well-known manner. In this embodiment also, it is important that the material 11 of the strips 21 flows with that of the end stop 20 into and through the interstices 13 of the tape 10 and to reach the wales 15 for the reasons already stated above with reference to Figures 1 to 6. The attachment of this separable end stop 20 and the reinforcing film 21 to the tapes 10 may be made by injection moulding as will be readily apparent to those skilled in the art.

WHAT WE CLAIM IS:—

1. A sliding clasp fastener having a component part (as defined above) which is disposed at corresponding one faces of a pair of oppositely disposed stringer tapes of a warp-knitted structure including wales, the thermoplastic resin material of which said part is made extending into and through the interstices between adjacent threads of said structure and reaching the wales of said structure at the corresponding other faces of said tapes, thereby filling said interstices and creating a firm and stable bond between said tapes and said component part.

2. A sliding clasp fastener as claimed in Claim 1, wherein the bottom end stop is of the separable type.

3. A sliding clasp fastener as claimed in Claim 1 or Claim 2, wherein, in addition to said component part, there is disposed at said corresponding one faces a pair of stabilizing strips of thermoplastic resin material which is fused to that of said component part, the material of said strips also extending into and through the interstices between the adjacent threads of said structure and reaching the wales of said structure at the corresponding other faces of said tapes, thereby filling said interstices and creating a firm and stable bond between said strips and said tapes.

4. A sliding clasp fastener constructed, arranged and operable substantially as hereinbefore described with reference to 20 and as illustrated in Figures 1 and 2 or Figures 3 and 4 or Figures 5 and 6 or Figures 7 and 8 of the accompanying drawings.

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