

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Production of Folded Thermoplastic Strips for Sliding Clasp Fasteners.

We, W. E. CUCKSON & SON PROPRIETARY LIMITED, a Company incorporated in the State of New South Wales, of Windsor Road, St. Marys, New South Wales, Commonwealth of Australia, 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 the production of synthetic thermoplastic strips ultimately to provide the interlocking elements on a sliding clasp fastener. More particularly, the invention concerns strips of this kind which are capable of moulding or extrusion and are intended to be attached to a tape in a folded condition to form the stringer for the fastener.

Several attempts have already been made to produce a row of interlocking elements for a sliding clasp fastener as integral parts of a thermoplastic strip which is firstly formed as a flat strip from which a series of cut-outs along the length of the strip are removed. The resultant strip is of ladder-like structure entirely of synthetic thermoplastic material having continuous longitudinal strands either extending in parallel lines, or in zig-zag fashion, laterally along the length of the strip. Prior to attachment of the strip to a tape it is folded across its width, i.e., along its longitudinal centre line, to become U-shaped in end elevation.

Due particularly to the double thickness of the continuous longitudinal strands of thermoplastic material, a degree of stiffness is imparted to the length of the stringer and therefore to the resulting fastener. Furthermore, these strips are relatively brittle and susceptible to breakage if pinched.

[Price 4s. 6d.]

Price 25p

It is the object of this invention to provide thermoplastic strips for the interlocking elements of sliding clasp fasteners, which are substantially free from the above defects.

The invention in one general form, therefore, provides a method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, comprising locating two yarn threads in spaced relationship, and forming on and between the yarn threads at spaced intervals a row of transversely extending elements of thermoplastic material having an enlarged central portion. Subsequently, it will be necessary longitudinally to fold the strip along its length to bring the yarn threads confronting each other at one longitudinal edge of the strip and the enlarged portions of the elements in an extending row at the other longitudinal edge of the strip, so that it may be applied to a mounting tape.

The invention also provides a thermoplastic strip formed by this method which has a row of separate bridging elements spanning a pair of parallel yarn threads. The strip will subsequently be folded to a U-shaped cross-section with the bridging elements which extend in a longitudinal row in the bight of the U forming interlocking elements for a fastener.

Two preferred embodiments of the invention are illustrated in the accompanying drawings, in which:—

Figure 1 is a sectional side view of a thermoplastic extrusion machine, showing the thermoplastic strip of this invention being formed;

Figure 2 is a greatly enlarged fragmentary perspective view of a strip according to a first form of the invention;

Figure 3 is a fragmentary perspective view of the first form of strip bent along its length into "U" shape and sewn to a tape;

Figure 4 is a fragmentary perspective view of a second form of strip; and

Figure 5 is a fragmentary perspective view of the second form of strip bent along its length into "U" shape and sewn to a tape.

According to one preferred form of production shown in Figure 1 thermoplastic strips 6 which will achieve the above object are produced by the following method. For each strip 6 a pair of cotton yarn threads 7 are fed in parallel alignment past the extrusion nozzle 8 of a thermoplastic extrusion machine 9. The machine 9 is designed and adjusted to discharge in semi molten state from the nozzle 8 a predetermined amount of thermoplastic material which is delivered to a casting roller 20 around which many pairs of the yarn threads 7 are passed. The profile of the roller 20 coacts with a lip 8A of the nozzle 8 to form a band 6A of material into one face of which is cast many closely spaced strips 6 each having a succession of elongated elements 10 on a respective pair of the yarn threads 7 preferably provided with enlarged ends 11 and an enlarged central portion 12 as shown in Figures 2 to 5. The enlarged ends 11 of each element 10 are formed around the cotton yarns 7. Preferably, before complete hardening of the thermoplastic material and before the band 6A has departed from the roller 20, a layer of the band 6A which forms a continuous backing 20B for the strips 6 is shaved from the band 6A by a knife 20A. After this stage the strips 6 are separate with their elements 10 connected only by their yarn threads 7. With progression of the yarn threads 7 from the roller 20 a plurality of ladder-like strips 6 are obtained through the attachment of the elements 10 to the yarn threads 7 at uniformly spaced intervals along their lengths. In this way both the bonding of the elements 10 to the yarn threads 7 and the casting of the elements 10 to desired shape are obtained in a single process. Since at the point of departure of the strips 6 from the roller 20 the thermoplastic material is firmly adhered to the yarn threads 7, they perform the task of withdrawing the elements 10 from the individual moulds in the periphery of the roller 20.

One form of construction of the strip 6 is shown in Figures 2 and 3 where the thickness of the element 10 is reduced at 13 adjacent either side of its enlarged central portion 12. The ladder-like strip 6 is subsequently folded at either side of its longitudinal centre line as in Figure 3, that is along its length, so that each of the bridging elements 10 are bent at their two reduced portions forming stems 13. The result is to produce in the strip 6 a fold which renders it U-shaped in end elevation with the

two yarn threads 7 located confronting and adjacent each other on one longitudinal edge 15 of the strip 6 and a projecting row of teeth 14 extending along the opposite longitudinal edge 16 of the strip 6.

The thermoplastic strip 6 may then be applied to a tape 17 to form a stringer for a sliding clasp fastener by locating a longitudinal edge portion 18 of the tape 17 within the bight of the U-shaped strip 6 and sewing the strip and tape together as at 19. The best location for the stitches 19 will invariably be about the stem 13 of the elements 10, i.e. between the enlarged end 11 and central portions 12. Therefore, the line of stitching 19 will extend down the length of the folded strip 6. Alternatively, the folded strip 6 may be located entirely upon one face of the tape 17 at its longitudinal edge portion (not shown). Furthermore, instead of stitching 19 the strip 6 may be attached to its tape 17 by cementing or by a combination of both, or any other suitable means.

It will be seen that with the above construction the teeth 14 forming the interlocking elements of the fastener are linked together solely through interconnecting strands of cotton yarn threads 7, this deriving considerable flexibility and suppleness. Preferably the yarn threads 7 are so located within the enlarged ends 11 of the elements 10 that in the folded condition of the strip 6 they lie close to the confronting faces at the root ends of the U-folded strip 6. In this way greater flexibility is obtained since the yarn threads 7 are located close to the mid-point of the folded strip 6 and therefore to the tape 17. Also, it will be preferred in the casting of the elements 10 to provide the enlarged central portions 12 thereof with domed outer faces as shown or opposite chamfers (not shown) located on the outer edges confronting the central portions 12 of adjacent elements 10. The ends 11 may be similarly shaped. Due to this provision, the teeth 14 subsequently formed which serve as interlocking elements 10 in the fastener, provide for more efficient engagement and separation of the stringers of a fastener.

When attachment to a tape 17 is effected by stitches 19 formed around the stems 13 of the fastener element 10, as shown in Figure 3, it may be desirable to provide additional means to anchor the said elements in position. To this end a second form of strip 6A may be provided. This strip is shown in Figures 4 and 5. The elements 10A forming this strip 6A are provided with enlarged ends 11 and central portions 12 as before. Each stem 13A is provided with an additional enlargement 22 intermediate of said enlarged end 11 and central portion 12.

When the strip 6A is bent into "U" shaped configuration as shown in Figure 5, it will be stitched to a tape 17A with the loops

of stitching 19A surrounding the stems 13A between the enlarged ends 11 and the adjacent enlargement 22. In this way each element 10A is locked to the tape 17A against longitudinal displacement with respect to the stems 13A.

The shape of the enlarged ends 11 in both embodiments is preferably as shown in which they are approximately rectangular with their length, i.e., greater dimension, extending longitudinally with the yarn threads 7. The length of the ends 11 should be such as to provide a narrow gap between adjacent ends which is spanned by the yarn 7. These provisions will give the slide of the slide fastener greater bearing surface and better anchorage of the elements 10 to the yarn threads 7. They also to some extent prevent breaking open of the fastener by resisting angling of its interlocking elements when the stringers are pinched by folding back upon themselves.

Several forms of thermoplastic strips have been described in the foregoing passages but it is to be understood that other forms are also feasible within the scope of this invention, as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, comprising locating two yarn threads in spaced relationships, and forming on and between the yarn threads at spaced intervals a row of transversely extending elements of thermoplastic material having one or more enlarged central portions.

2. The method claimed in claim 1, wherein the material for the elements is extruded from a thermoplastic extrusion machine onto the lengths of yarn, shaping of the elements being effected simultaneously with bonding of the elements to the yarn.

3. The method of claim 2, wherein shaping of the elements is effected by moulds cut into a rotatable roller and a backing piece is removed from the strip while on the roller.

4. The method of claim 3, wherein a plurality of strips are formed simultaneously upon the roller.

5. The method of claim 3 or 4, wherein said elements are withdrawn from the roller by the yarn threads.

6. The method claimed in any one of the preceding claims, including the step of subsequently folding the strip along its length to bring the yarn threads together at one longitudinal edge of the folded strip.

7. The method claimed in claim 6, wherein the transverse elements have a narrow stem between the central enlargement and each

yarn, and wherein the folded strip is U-shaped in cross-section and produced by bending the stems of each of the transverse elements.

8. The method claimed in any one of the preceding claims, wherein each transverse element is also formed with enlarged end portions which are bonded to the yarn threads.

9. The method of Claim 8, wherein the formation of the end portions includes an outer face thereon which is curved.

10. The method claimed in any one of the preceding claims, wherein the formation of the central enlargements includes an outer face thereon which is curved.

11. A method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, substantially as herein described with reference to Figures 1 to 3 of the accompanying drawings.

12. A strip of interconnected thermoplastic interlocking elements produced according to the method claimed in any one of the preceding claims.

13. The method claimed in any one of Claims 1 to 10 wherein each transverse element on the strip is formed with a further enlargement between each yarn thread and the enlarged central portion.

14. A method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, substantially as herein described with reference to Figures 4 and 5 of the accompanying drawings.

15. The method claimed in any of the claims 1 to 11, 13 and 14, wherein one or more strips is or are formed upon a continuous backing which is removed to separate the strips if there is more than one and to remove all connections excepting the yarn threads between the interlocking elements of a strip.

16. A strip of interconnected thermoplastic interlocking elements produced according to the method claimed in claim 13, 14 or 15.

17. A stringer for a sliding clasp fastener, comprising a strip of interconnected thermoplastic interlocking elements produced according to the method claimed in any of claims 1 to 11, and a mounting tape to which the strip is stitched, the stitching being in a longitudinal line along an edge portion of the tape with individual stitches enclosing the stems of respective transverse elements between the further enlargement and its adjacent yarn thread.

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of stitching 19A surrounding the stems 13A between the enlarged ends 11 and the adjacent enlargement 22. In this way each element 10A is locked to the tape 17A against longitudinal displacement with respect to the stems 13A.

The shape of the enlarged ends 11 in both embodiments is preferably as shown in which they are approximately rectangular with their length, i.e., greater dimension, extending longitudinally with the yarn threads 7. The length of the ends 11 should be such as to provide a narrow gap between adjacent ends which is spanned by the yarn 7. These provisions will give the slide of the slide fastener greater bearing surface and better anchorage of the elements 10 to the yarn threads 7. They also to some extent prevent breaking open of the fastener by resisting angling of its interlocking elements when the stringers are pinched by folding back upon themselves.

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2. The method claimed in claim 1, wherein the material for the elements is extruded from a thermoplastic extrusion machine onto the lengths of yarn, shaping of the elements being effected simultaneously with bonding of the elements to the yarn.

3. The method of claim 2, wherein shaping of the elements is effected by moulds cut into a rotatable roller and a backing piece is removed from the strip while on the roller.

4. The method of claim 3, wherein a plurality of strips are formed simultaneously upon the roller.

5. The method of claim 3 or 4, wherein said elements are withdrawn from the roller by the yarn threads.

6. The method claimed in any one of the preceding claims, including the step of subsequently folding the strip along its length to bring the yarn threads together at one longitudinal edge of the folded strip.

7. The method claimed in claim 6, wherein the transverse elements have a narrow stem between the central enlargement and each

yarn, and wherein the folded strip is U-shaped in cross-section and produced by bending the stems of each of the transverse elements.

8. The method claimed in any one of the preceding claims, wherein each transverse element is also formed with enlarged end portions which are bonded to the yarn threads.

9. The method of Claim 8, wherein the formation of the end portions includes an outer face thereon which is curved.

10. The method claimed in any one of the preceding claims, wherein the formation of the central enlargements includes an outer face thereon which is curved.

11. A method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, substantially as herein described with reference to Figures 1 to 3 of the accompanying drawings.

12. A strip of interconnected thermoplastic interlocking elements produced according to the method claimed in any one of the preceding claims.

13. The method claimed in any one of Claims 1 to 10 wherein each transverse element on the strip is formed with a further enlargement between each yarn thread and the enlarged central portion.

14. A method of producing a strip of interconnected thermoplastic interlocking elements for a sliding clasp fastener, substantially as herein described with reference to Figures 4 and 5 of the accompanying drawings.

15. The method claimed in any of the claims 1 to 11, 13 and 14, wherein one or more strips is or are formed upon a continuous backing which is removed to separate the strips if there is more than one and to remove all connections excepting the yarn threads between the interlocking elements of a strip.

16. A strip of interconnected thermoplastic interlocking elements produced according to the method claimed in claim 13, 14 or 15.

17. A stringer for a sliding clasp fastener, comprising a strip of interconnected thermoplastic interlocking elements produced according to the method claimed in any of claims 1 to 11, and a mounting tape to which the strip is stitched, the stitching being in a longitudinal line along an edge portion of the tape with individual stitches enclosing the stems of respective transverse elements between the further enlargement and its adjacent yarn thread.

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