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(54) Improved elastic material and curved garment elements and method and apparatus for their manufacture

(57) A narrow fabric elastic material comprises elastomeric elements (30) which are covered with a stretch yarn (40) of polybutylene terephthalate. The stretch yarn (40) may be applied in a knitting or weaving process and allows a significant increased grip of the elastomeric during the covering of the elastomeric elements. The elastic material (150) can have a variable modulus across its width and is included in a waistband (124) having a perdefined curvature or shape. The waistband (124) is formed by a folder (110) on a sewing machine having at least one needle. A blind stitch is formed on the front face (122) of the waistband (124) and a chain or lock stitch (125) is formed on the rear face (122). The curved waistband (124) can also be formed on a sewing machine having at least two needles by rows of stitching (127 and 128).

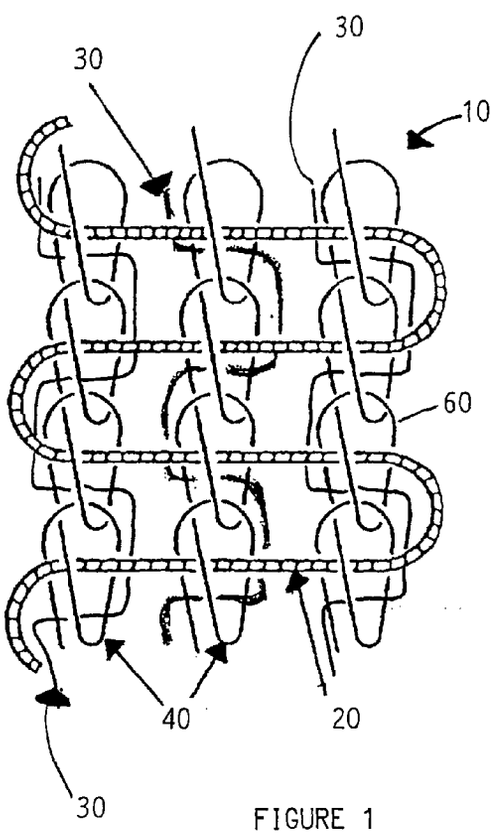

FIGURE 1

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Description

[0001] The present invention relates to elastic material, in particular to an improved elastic material with reduced run back characteristics, that is in which there is little or no run back or slippage of the elastic elements of a narrow fabric elastic material. The present invention also relates to curved or shaped garment elements and to a method of and apparatus for making garment elements, such as for example waist bands for garments, stolling bands for dressing gowns, collars for shirts and the like. The method and apparatus may be used particularly to apply predefined curves or shapes to such elements so as to provide curved or shaped waistbands for example.

[0002] Run back is a phenomenon which occurs in narrow fabric elastic material in which the elastomeric or Lycra (Trade Mark) elastic elements disengage from other warp and weft elements, and thereby contract in length reducing the overall elasticity of the narrow fabric elastic material. Run back, whilst still evident, is generally less of a problem with rubber based narrow fabric elastomeric materials. It manifests itself mainly with Lycra and with other synthetic elastomers.

[0003] The present invention provides a narrow fabric elastic material comprising elastomeric elastic elements, in which the elastomeric elements are covered with a stretch warp yarn.

[0004] Advantageously, the stretch yarn is or includes polybutylene terephthalate (PBT).

[0005] Preferably, the stretch warp yarn allows under full tension and feed control a significant increased grip of the elastomeric during the covering of the elastomeric elements of the elastic material, whilst retaining the stretch characteristics of the elastic material. The stretch yarn may be applied in a knitting or weaving process for the manufacture of narrow fabric elastic material.

[0006] A run back test method can measure resistance of the elastomeric element in a narrow fabric elastic material by exposing one elastic element and clamping it in an extension testing device. The other end of the narrow fabric elastic material is clamped in a separate lower jaw having cut the same elastic element which is exposed and clamped in the upper jaws above the lower jaw. A load is applied until the single elastic element is totally extracted from the piece of elastic material. Tests on embodiments of elastic material in accordance with the invention on an extension testing device have demonstrated a very significant improvement in run back.

[0007] Preferably, the stretch warp yarn also allows a significant increase in modulus due to the strength of the stretch yarn characteristics when wrapped around the existing elastomeric element. This can be advantageous if extra strength is required or a similar strength can be obtained with a coarser needle gauge machine thus reducing manufacturing costs. Further benefits of this additional strength is that it can be used to create a variable modulus across the width of the fabric in conjunction with multiple needle spacing which provides extra comfort in elasticated shaped garment waistbands.

[0008] The present invention also provides a garment element having a predefined curvature or shape, the garment element having a folded over single piece or two piece outer fabric and at least one row of stitching retaining the garment element in the predefined curvature or shape.

[0009] Advantageously, the stitching is a single or double row of stitching.

[0010] Preferably, in a single row stitching application, the line of stitching is a row of blind stitching whereby the stitching is not visible from one side of the garment element but is visible from the other side.

[0011] Conveniently, in a double row stitching application, the stitching on both rows is visible from both sides of the garment element. Such a type of stitching is used in jeans for example.

[0012] Advantageously, an interlining element or elements is retained within the garment element between the folded side or sides of the outer fabric of the garment element.

[0013] The interlining element may be elastic material with a single or dual multimodulus or variable modulus across its width, an elastic material with a single modulus across its width, two or more separate lengths of single variable modulus elastic, a rigid tape or interlining or the like.

[0014] The garment element may also be produced from a rigid fabric formed into an elasticated band using the method as outlined in my European Patent Application 0 774 215 A2 published on 21st May 1997, the contents of which are incorporated into this specification by reference.

[0015] The principal features of the apparatus and method will be appreciated from Claims 13 to 21 which are incorporated herein by reference.

[0016] The invention will hereinafter be more particularly described with reference to the accompanying drawings, which show, by way of example only, one embodiment of elastic material according to the invention and an apparatus for manufacturing the elastic material and two embodiments of apparatus according to the invention and an embodiment of a waistband according to the invention.

In the drawings:

[0017]

Figure 1 is an enlarged view showing the construction of the embodiment of elastic material;

Figure 2 is a perspective view of a portion of a knitting apparatus used to manufacture the elastic material;

Figure 3 is a perspective view of the first embodiment of the apparatus mounted on a sewing machine;

Figure 4 is a similar view to Figure 3 showing a waistband being attached to a garment fabric;

Figure 5 is a view similar to Figure 4 but showing only the needle of the sewing machine, the waistband and garment fabric;

Figure 6 is a view of a partially dismantled waistband from underneath;

Figures 7(a) to (e) show a progression of how the waistband is formed about and attached to a garment fabric as it passes through a folder (not shown) and the apparatus;

Figure 8 is a plan view of a variable modulus elastic material used to manufacture the waistband and Figure 9 is an end view of the elastic material;

Figure 10 is a front view of a portion of the waistband, Figure 11 is a rear view of the waistband and Figure 12 is a cross-sectional end view of the completed waistband;

Figure 13 is an exploded perspective view of the feed mechanism of a second apparatus according to the invention; and

Figure 14 is a schematic illustration of how a garment having a curved or shaped waistband would look in use.

[0018] The following is an index of the reference numerals used in the Figures:

10	narrow fabric elastic materia
20	weft
30	elastomeric warp yarn
40	PBT yarn
45	warp placing rail
60	chain links
70	bearded needle
75	shank
110	folder
112	upper channel
114	lower channel
116	upper lip of folder
118	lower lip of folder
120	front face
122	rear face
124	waistband

(continued)

125	chain stitch or lock stitch
126	garment
127	upper row of stitching
128	lower row of stitching
130	needle
131	thread
132	upper edge
133	lower edge
150	elastic material
151	elastomeric elements
152	hinge portion
153	upper edge of elastic material
154	lower edge of elastic material
170	inner turn of front face 20
172	inner turn of rear face 22
210	left feed dog
220	right feed dog

[0019] Referring to Figure 1, the narrow fabric elastic material 10 comprises a weft 20, and an elastomeric warp yarn 30 covered by a PBT yarn 40. The PBT yarn 40 is formed in chain links 60 with the weft 20 being laid within the loops. For the purposes of illustration, the elastomeric yarn 30 is shown in a staggered fashion, whereas in reality, the elastomeric yarn 30 will be substantially straight, as it is the strongest yarn.

[0020] Referring to Figure 2, the chain links 60 of PBT warp yarn are formed by the warp placing rail 45 forming loops on the shank 75 of the bearded needles 70 with the weft yarn 20 being laid within the loops. The needles 70 have a deeper shank 75 than normal. The needle therefore forms a bigger loop, allowing a significant increased number of picks or courses to be inserted per cm resulting in more compact wefts, whilst retaining the stretch characteristics of the elastic material which in turn gives reduced shrinkage properties for the fabric.

[0021] Referring to Figures 3 to 12, the first embodiment of apparatus comprises a folder 110 having an upper channel 112 and a lower channel 114 for accommodating a front face 120 and rear face 122 of a waistband 124. Elastic material 150 is fused to the waistband 124. The folder 110 has an upper lip 116 and a lower lip 118 which is staggered back from the line of the edge of the upper lip 116 by a distance of approximately 4.75 mm (3/16"). In this way, needle 130 of the sewing machine with thread 131 penetrates inner turn 170 of the front face 120 of the waistband 124 and penetrates fully through the garment fabric 126 through the inner turn 172 of the rear face 122 of the waistband 124 and exits at the rear face 122. In this way a blind stitch is formed on the front face 120 of the waistband 124 and a chain stitch or lock stitch 125 is formed on the rear face 122 of the waistband 124.

[0022] The elastic material 150 as shown in Figures

6 and 7 has a variable modulus across its width. It has a plurality of elastomeric elements 151 across its width, and a hinge portion 152 at its centre. The spacing towards the edges 153 and 154 is increased compared to the spacing towards the hinge 152. In this way when the elastic material 150 is included in a waistband 124 the upper edge 132 of the waistband 124 has a greater strength than the lower edge 133 which is weaker. Consequently, when the formed waistband 124 emerges from the apparatus, the upper edge 132 relaxes more than the lower edge 133 thus forming a curve or shape in the waistband.

[0023] Referring now to Figure 11, the second embodiment of apparatus includes a twin needle sewing machine (not shown) for applying two rows of stitching in which the feed mechanism for feeding material to the needle points is split so as to provide a differential feed to each needle.

[0024] The feed eccentric of the left feed dog 210 is adjusted separately from the feed eccentric of the right feed dog 220. Each eccentric is driven by a separate mechanism. In this way, a concave or convex curve or shape can be formed by forming two rows of stitching at different differential feed speeds on a garment element.

[0025] As shown in Figure 12, the waistband 124 is attached to a garment 126 by two rows of stitching 127 and 128. The waistband 124 is shaped as a result of its curvature, thereby giving a more comfortable fit about a person's hips and waist.

[0026] Although, both embodiments have been described separately, they will preferably be both mounted on a sewing machine, so that a user can select which type of garment element is to be manufactured.

[0027] It will of course be understood that the invention is not limited to the specific details described herein, which are given by way of example only, and that various modifications and alterations are possible within the scope of the invention as defined in the appended claims.

Claims

1. A narrow fabric elastic material comprising elastomeric elastic elements, in which the elastomeric elements are covered with a stretch warp yarn.

2. A narrow fabric elastic material as claimed in Claim 1, in which the stretch yarn is or includes polybutylene terephthalate (PBT).

3. A narrow fabric elastic material as claimed in Claim 1 or Claim 2, in which the stretch warp yarn allows under full tension and feed control a significant increased grip of the elastomeric during the covering of the elastomeric elements of the elastic material, whilst retaining the stretch characteristics of the elastic material, with the stretch yarn being applied in a knitting or weaving process for the manufacture of narrow fabric elastic material.

4. A narrow fabric elastic material as claimed in any one of the preceding claims, in which the stretch warp yarn also allows a significant increased number of picks or courses to be inserted per cm, whilst retaining the stretch characteristics of the elastic material resulting in more compact wefts which in turn gives reduced shrinkage properties for the fabric.

5. A narrow fabric elastic material as claimed in any one of the preceding claims, in which the stretch warp yarn allows for a significant increase in modulus due to the strength of the stretch yarn characteristics when wrapped around the existing elastomeric element.

6. A garment element having a predefined curvature or shape, the garment element having a folded over single piece or two piece outer fabric and at least one row of stitching retaining the garment element in the predefined curvature or shape.

7. A garment element as claimed in Claim 6, in which the stitching is a single or double row of stitching.

8. A garment element as claimed in Claim 6, in which the stitching is in a single row of blind stitching, whereby the stitching is not visible from one side of the garment element but is visible from the other side.

9. A garment element as claimed in Claim 7, in which the stitching is in a double row, the stitching on both rows being visible from both sides of the garment element.

10. A garment element as claimed in Claim 6, in which an interlining element or elements is retained within the garment element between the folded side or sides of the outer fabric of the garment element.

11. A garment element as claimed in Claim 10, in which the interlining element is an elastic material with a single multimodulus, or an elastic material with a dual multimodulus; or an elastic material with a variable modulus across its width; or an elastic material with a single modulus across its width; or it comprises a plurality of separate lengths of single variable modulus elastic; or it comprises a rigid tape or interlining.

12. A garment element as claimed in Claim 6, in which the garment element is produced from a rigid fabric formed into an elasticated band.

13. A method of manufacturing a narrow fabric elastic material comprising covering elastomeric elements with a stretch warp yarn.

14. A method of manufacturing a narrow fabric elastic material as claimed in Claim 13, in which the stretch yarn is or includes polybutylene terephthalate (PBT).

15. A method of manufacturing a narrow fabric elastic material as claimed in Claim 14, comprising forming a weft yarn and an elastomeric warp yarn covered by a PBT yarn by forming the PBT yarn in chain links and laying the weft within the loops of the chain links.

16. A method of manufacturing a narrow fabric elastic material as claimed in Claim 15, including forming the chain links of PBT yarn by a warp placing rail forming loops of the PBT yarn on the shanks of bearded needles.

17. A method of manufacturing a narrow fabric elastic material as claimed in Claim 16, including using needles with relatively deep shanks.

18. Apparatus for forming a curved waistband on a garment fabric comprising a sewing machine having at least one needle and a folder for forming a length of material into the shape of the waistband, the folder having an upper channel and a lower channel for accommodating a front face and a rear face of the waistband, the folder also having a front lip and a second lip staggered back from plane of the edge of the first lip by a needle clearance distance, whereby the needle of the sewing machine penetrates an inner turn of the front face of the waistband and penetrates fully through the garment fabric, an inner turn of the rear face of the waistband, exits at the rear face to form a chain or lock stitch, with a blind stitch being formed on the front face of the waistband.

19. Apparatus for forming a curved waistband on a garment fabric comprising a sewing machine having at least two needles, a folder forming a length of material into the shape of a waistband and means for providing differential feed of material to each of the needle points.

20. Apparatus for forming a curved waistband as claimed in Claim 19, in which the feed mechanism of the sewing machine is split so as to provide the differential feed to each needle point.

21. Apparatus for forming a curved waistband as claimed in Claim 20, in which each split feed mechanism comprises a separate drive means, a feed eccentric and a feed dog.

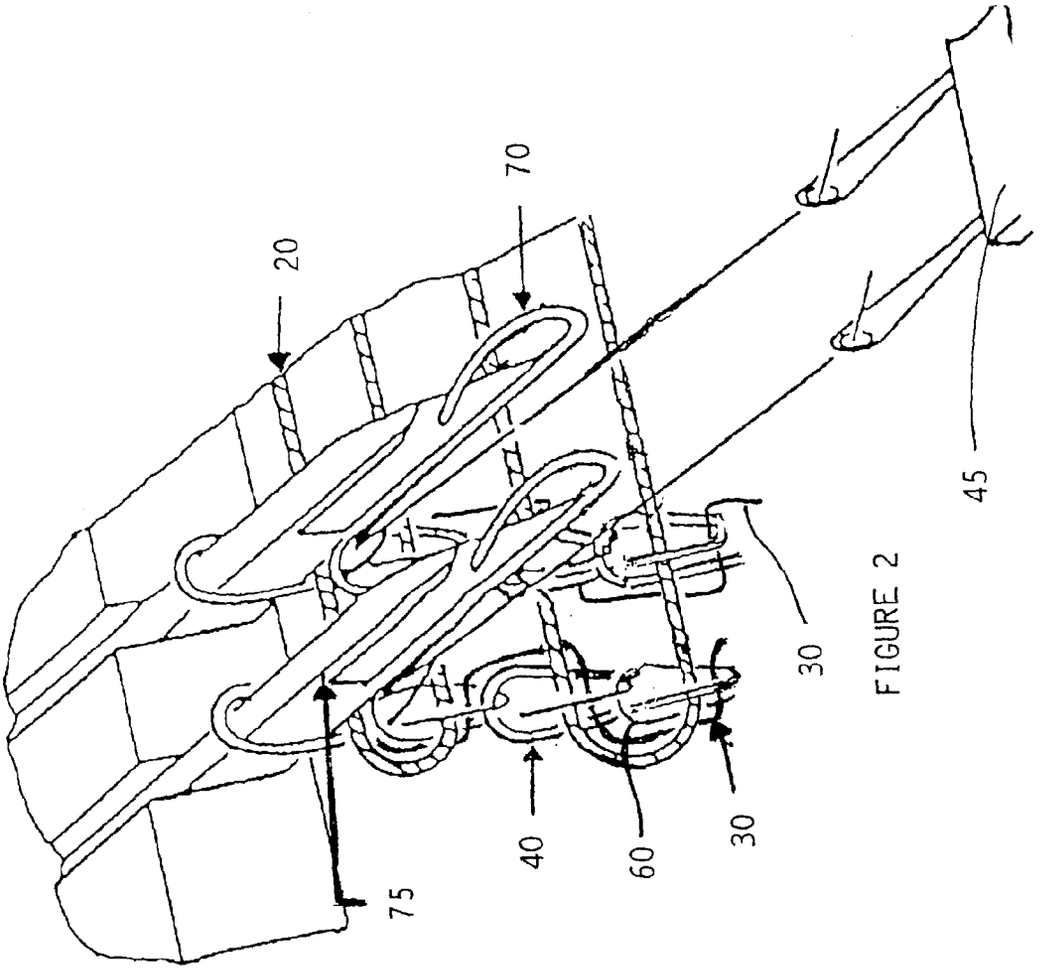

FIGURE 2

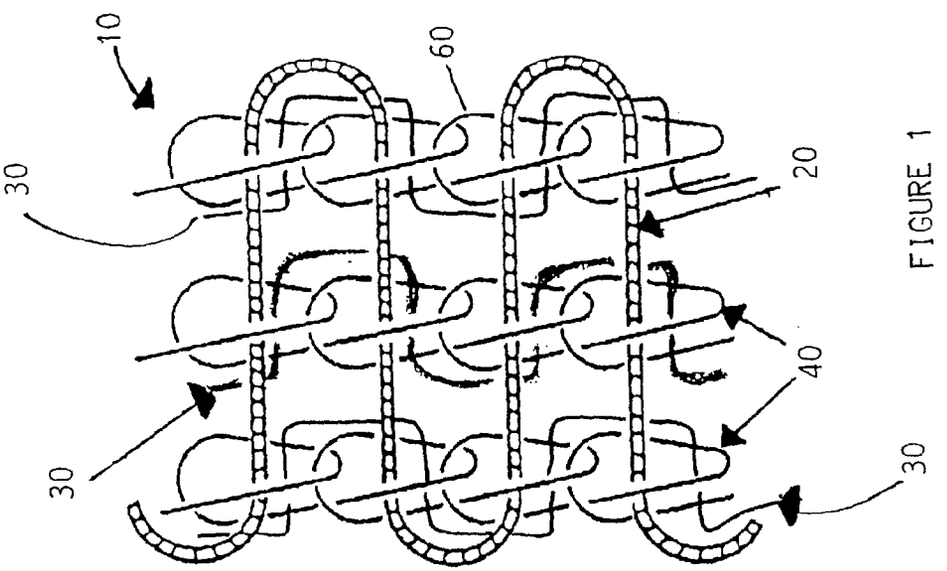

FIGURE 1

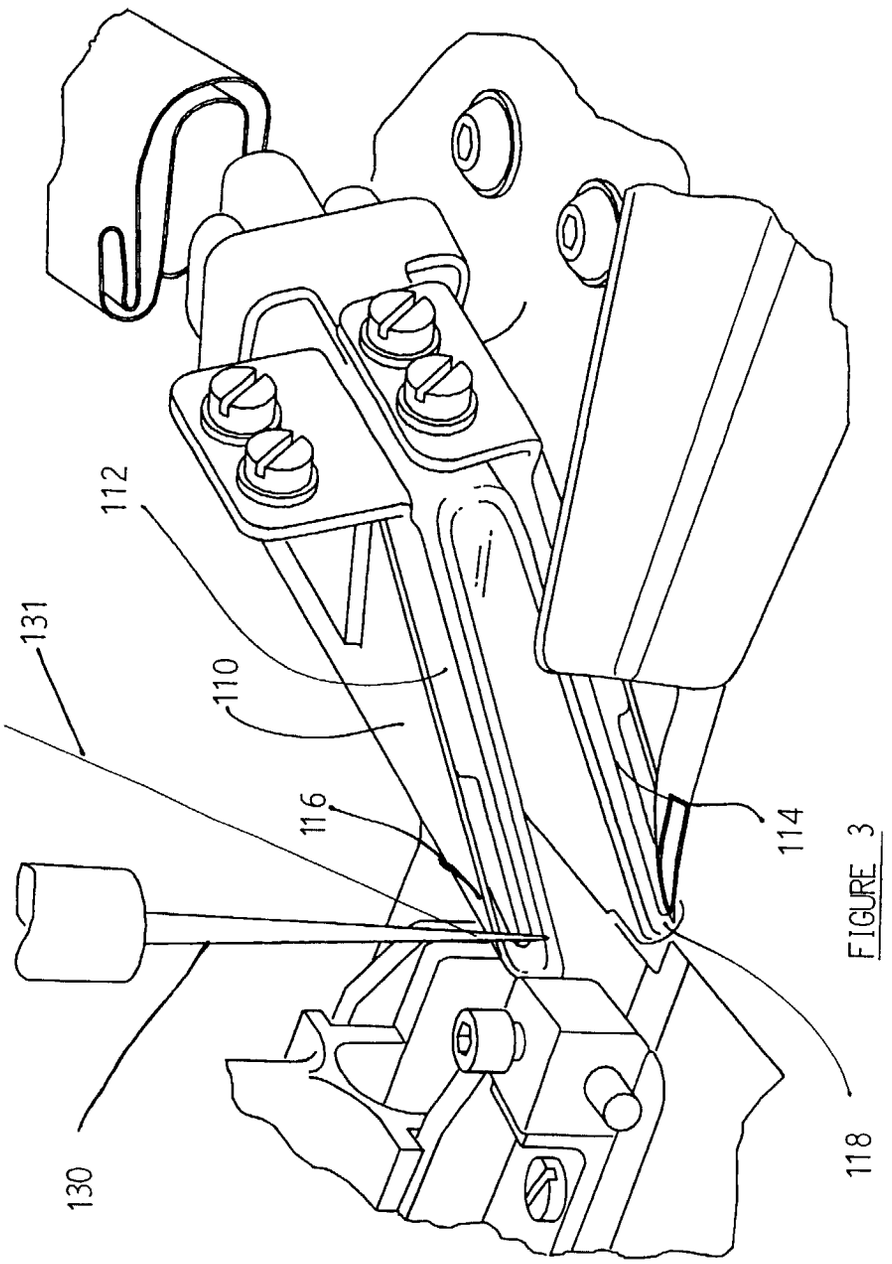

FIGURE 3

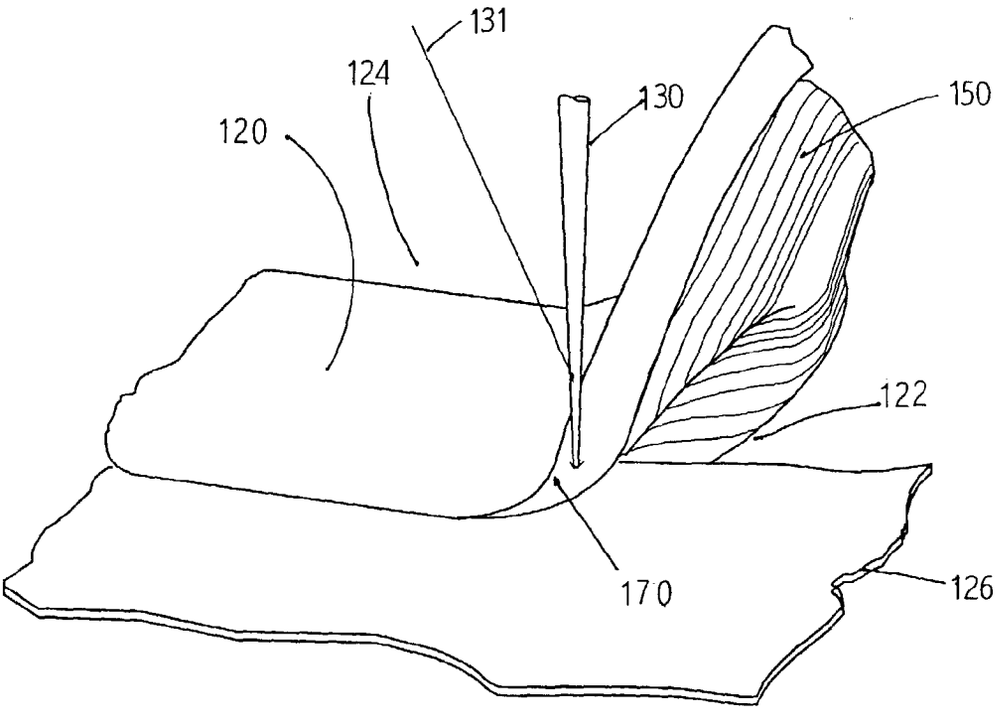

FIGURE 5

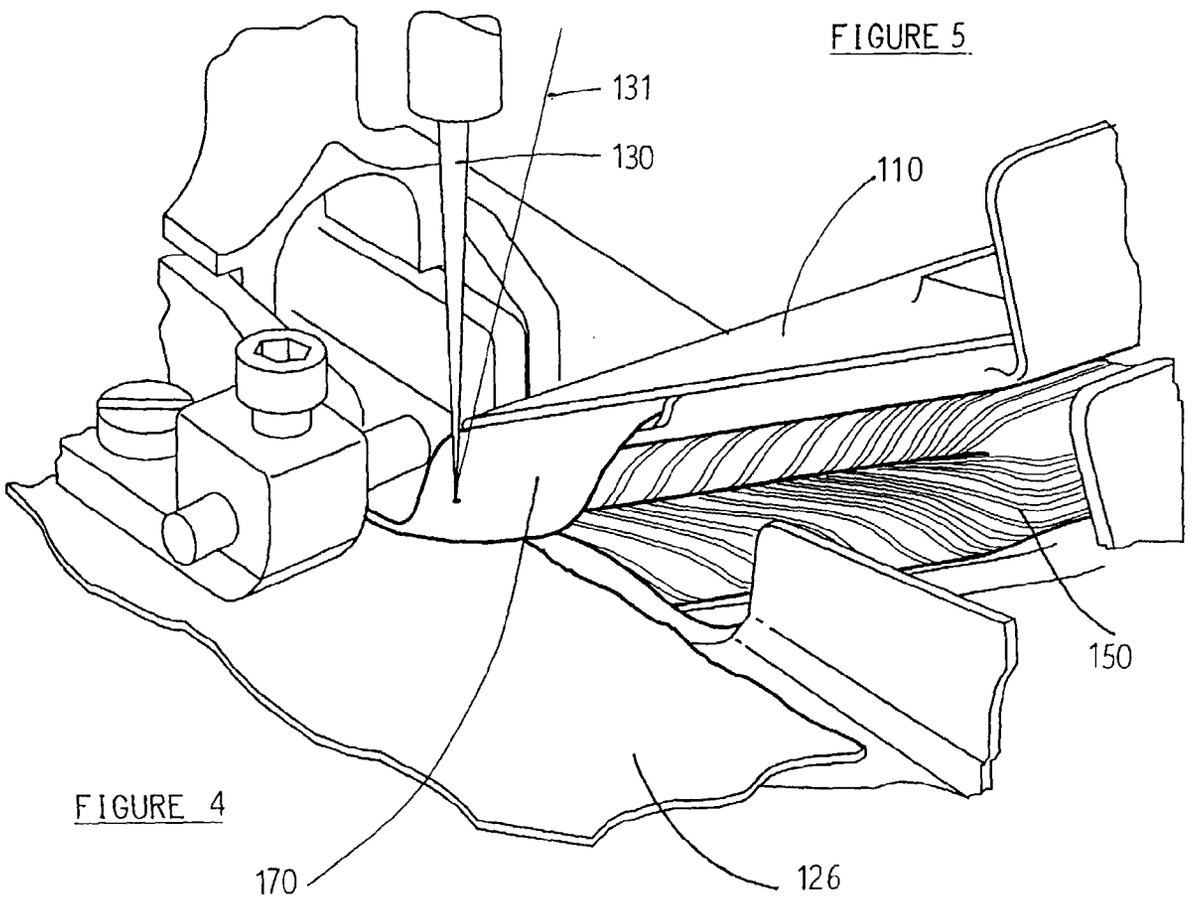

FIGURE 4

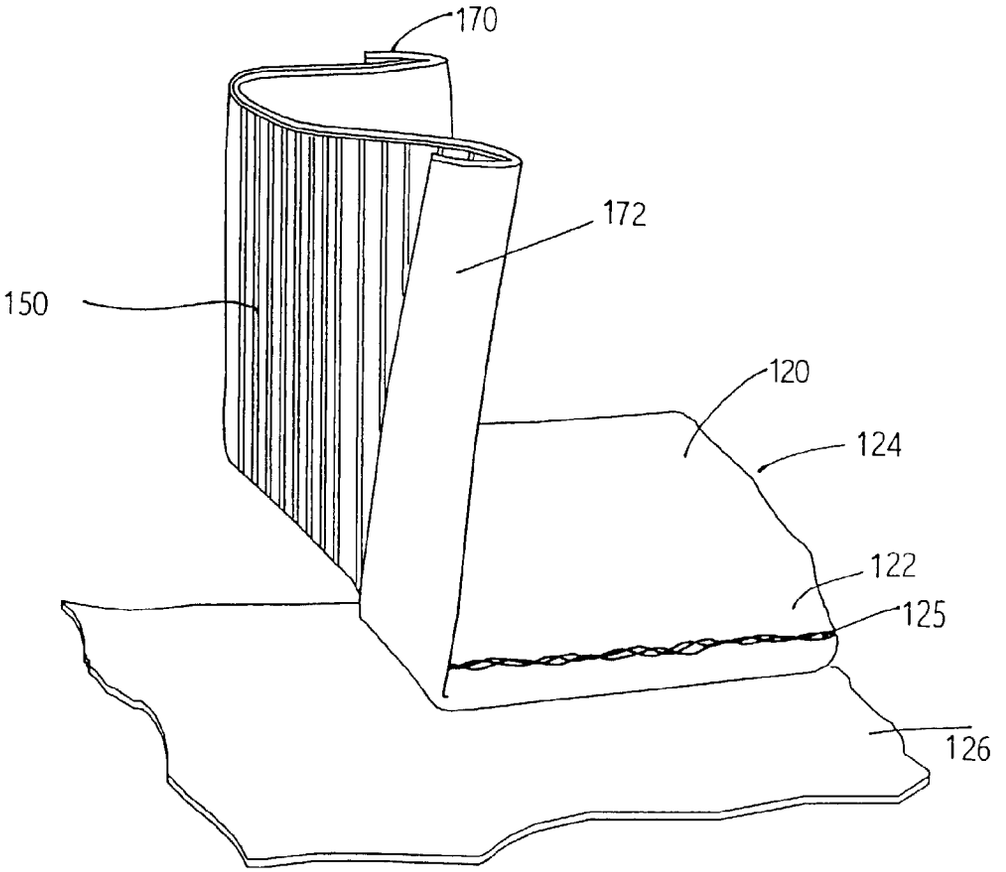

FIGURE 6

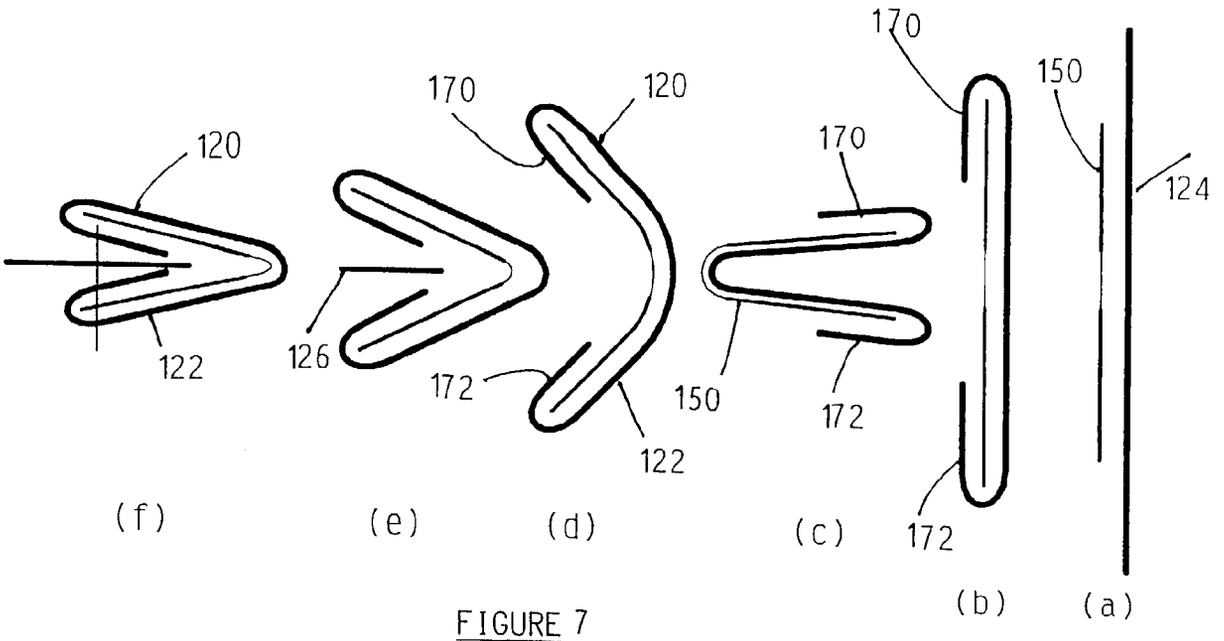

FIGURE 7

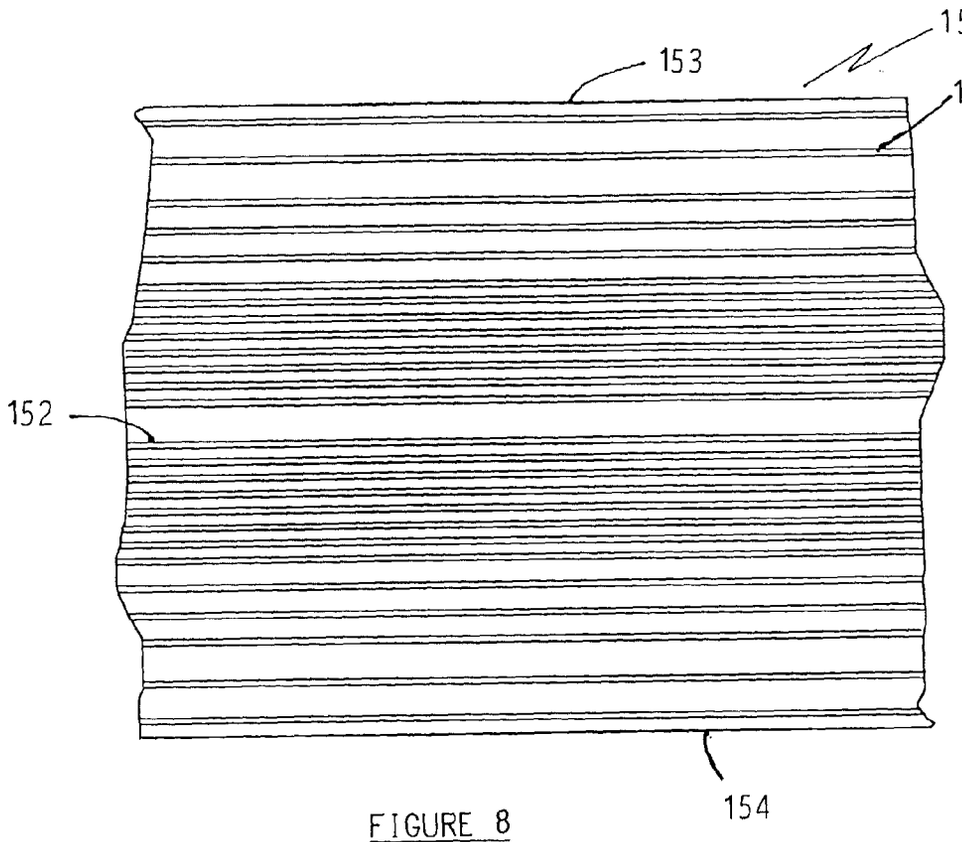

FIGURE 8

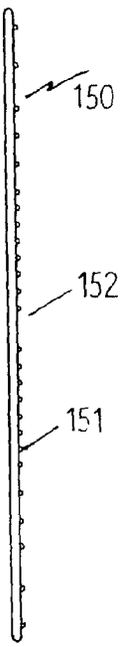

FIGURE 9

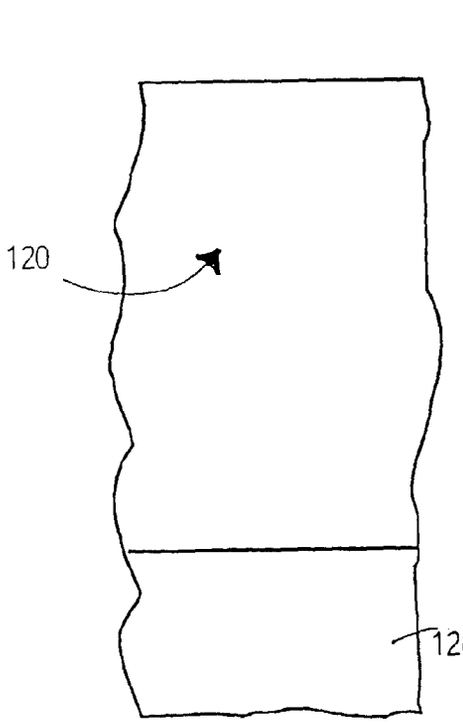

FIGURE 10

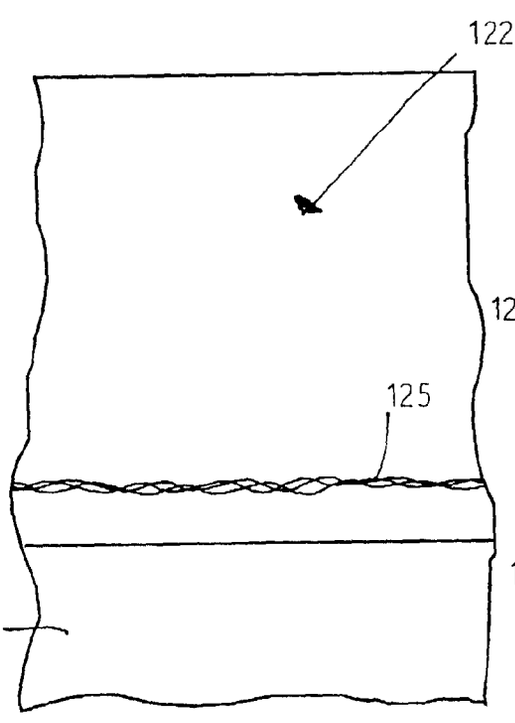

FIGURE 11

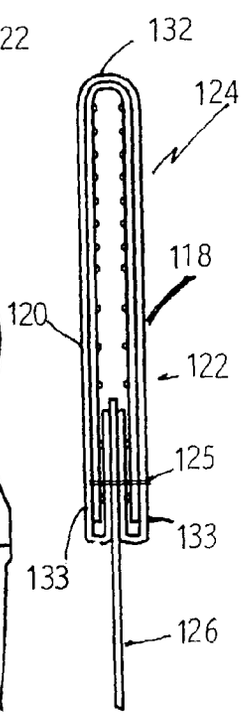

FIGURE 12

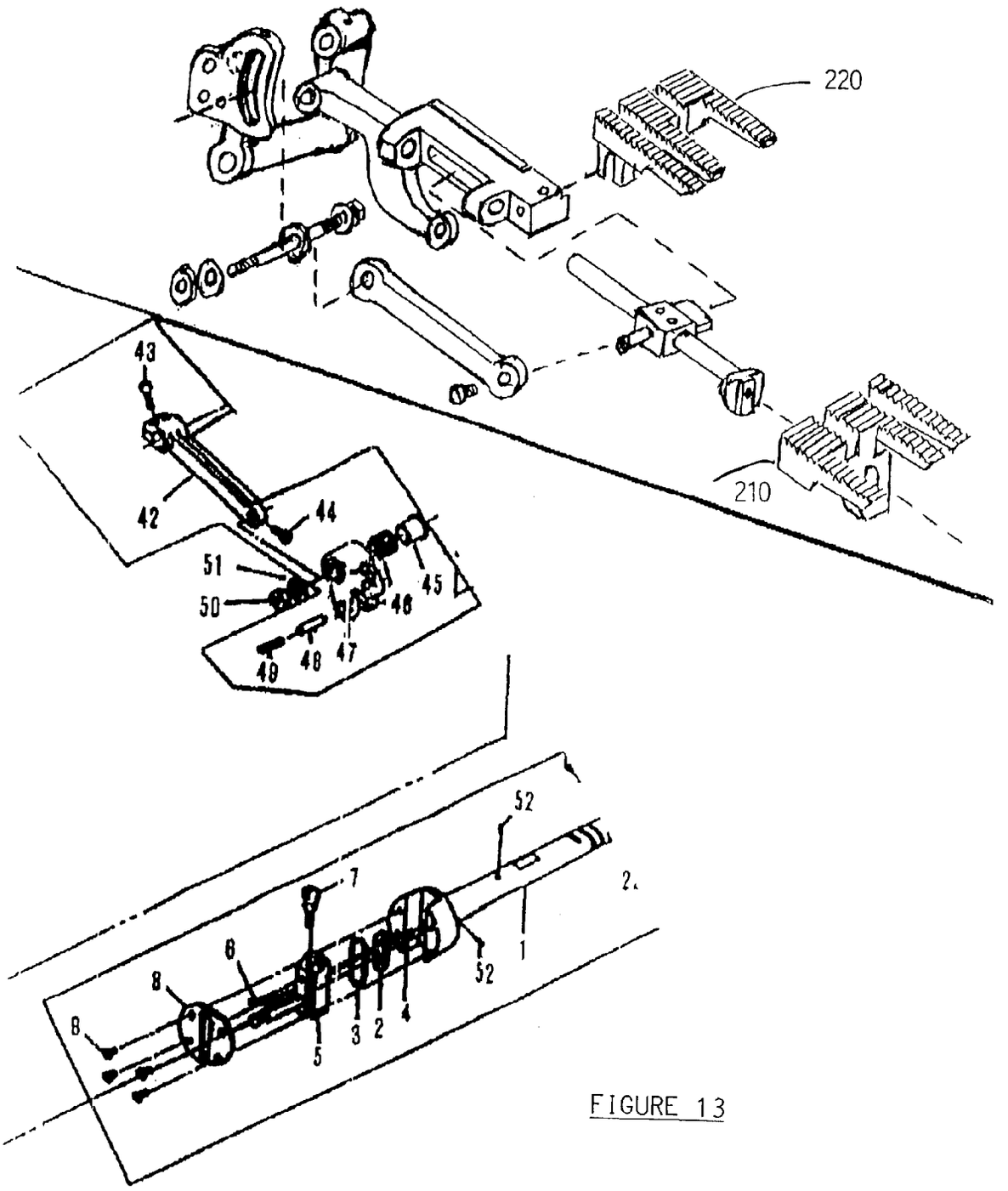

FIGURE 13

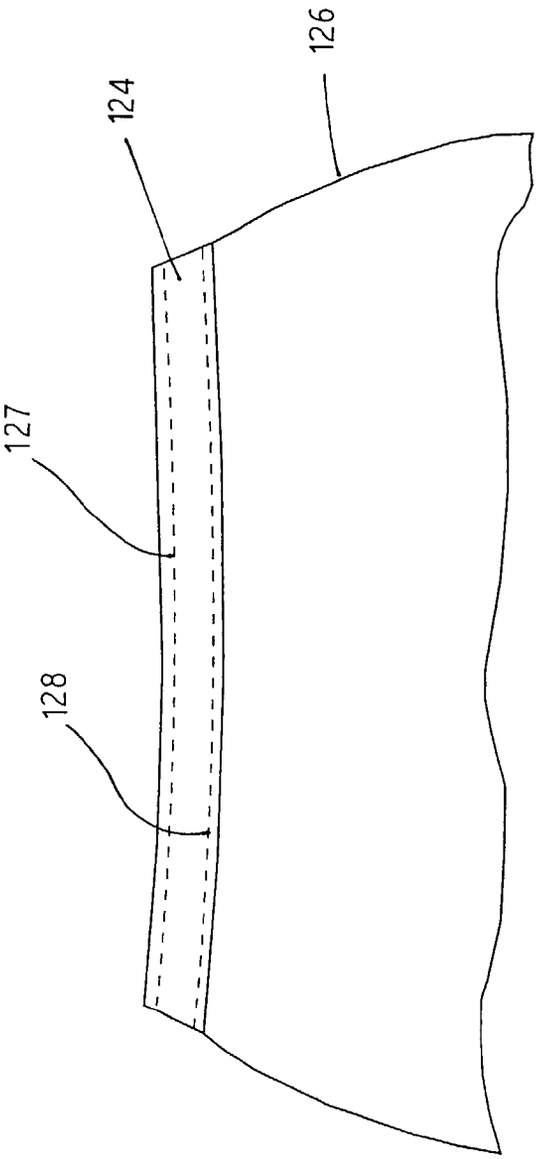

FIGURE 14